

# Moving from Single-user to Multi-user Collaborative CAX Workflows

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# Problem Statement

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**Engineering Data –models, parameters, results, artifacts, etc. are today serialized by single-user, file based applications, and workflows.**

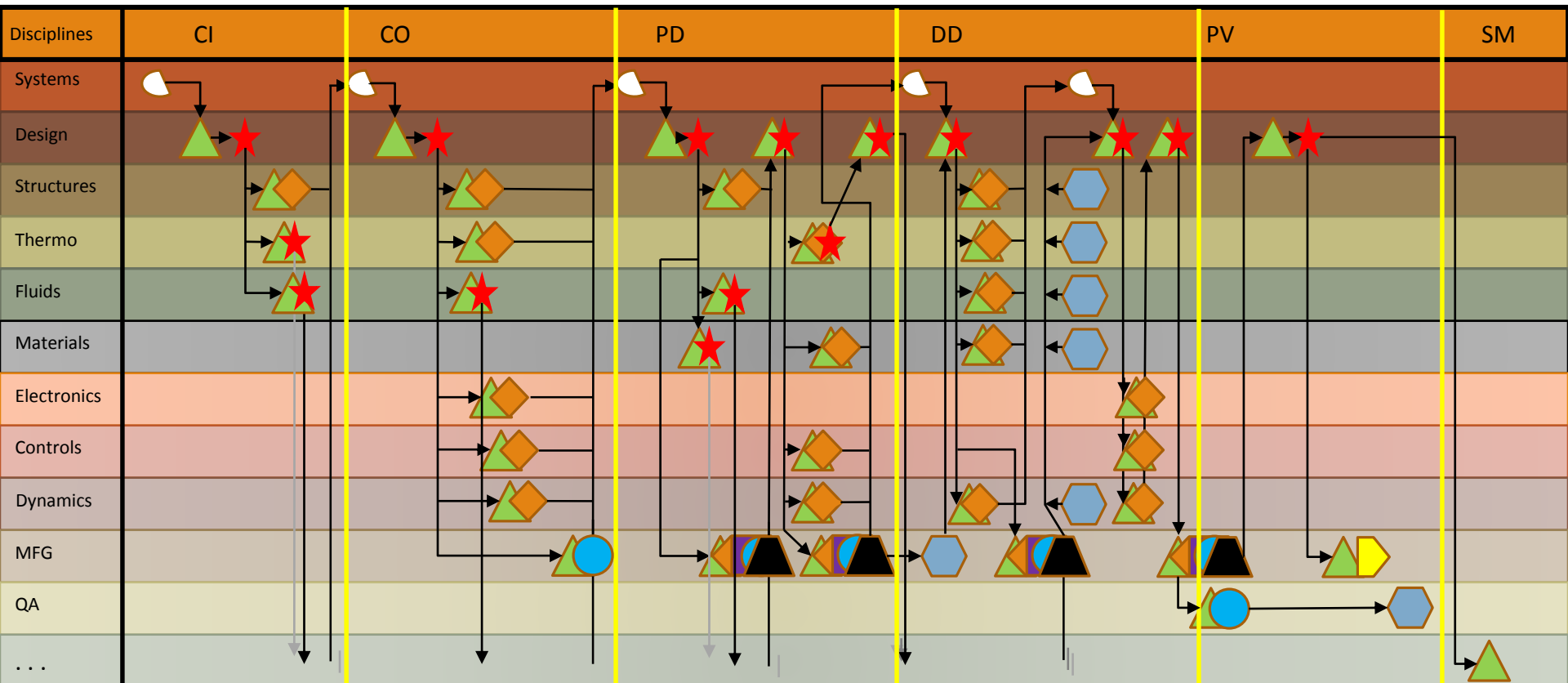
- ❑ Companies and their associated supply chain suffer from the following data issues
  1. Data is commonly maintained in files, and files only support **Single-user Access.**
  2. PLM systems are good at checking file-based Data in and out, which only promotes/allows **Serialized Contribution.**
  3. Workflows are commonly time-sliced, giving each discipline one or more moments of it's ownership and control over the file-based Data leading to **Siloed Discipline Obscurity.**
  4. When canonical/master file-based Data is converted or translated to another representation **Multiple Copies** are ever after out of sync.

# Flow of Engineering Data

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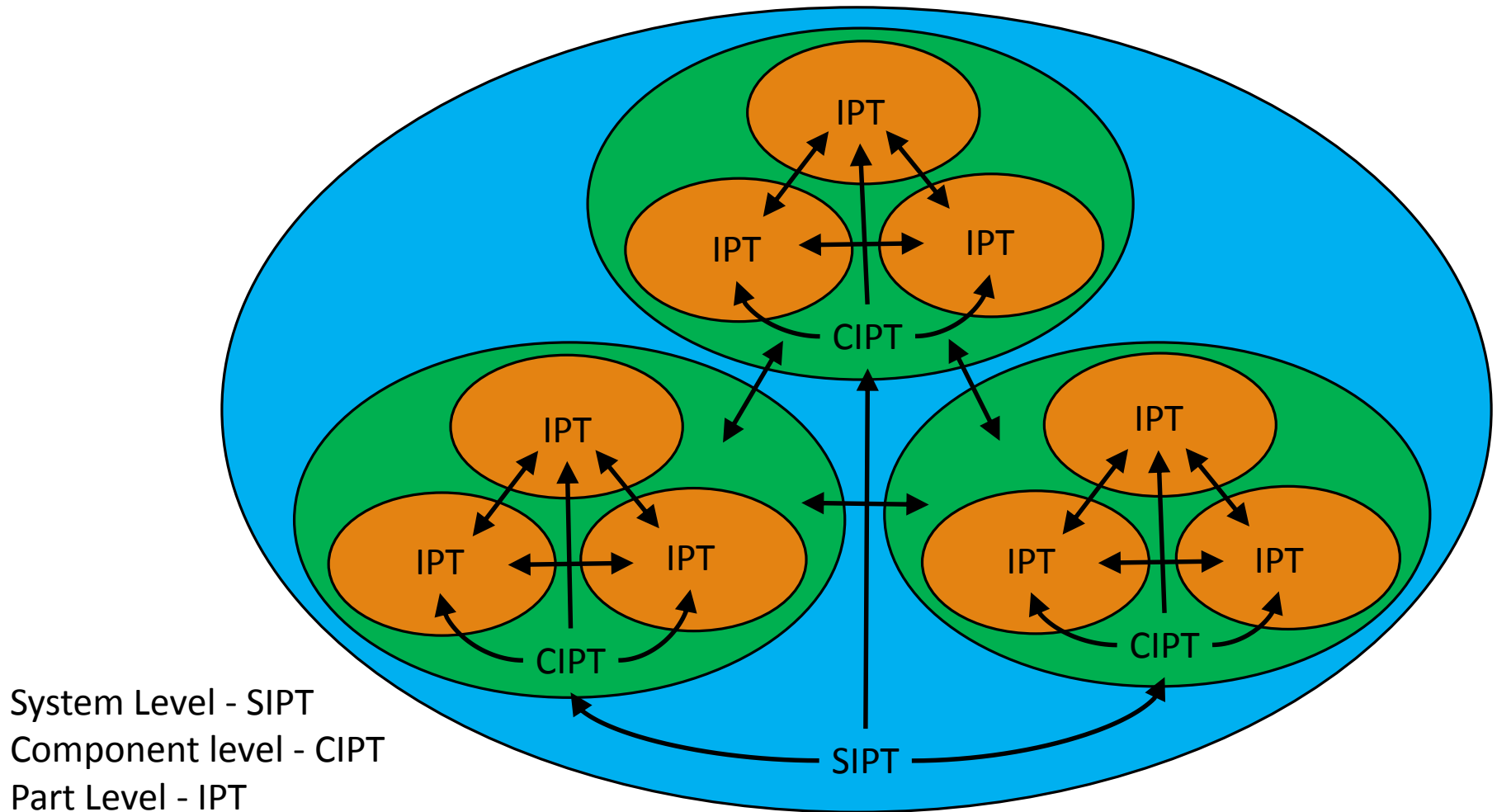
1. Inward Facing, Standard Work Part or Product Flow Map
2. Data Flow between IPTs, CIPTs and SIPTs
3. Outward Facing, Data Flow between OEM and Supply Chain

# Standard Work Part Flow Map

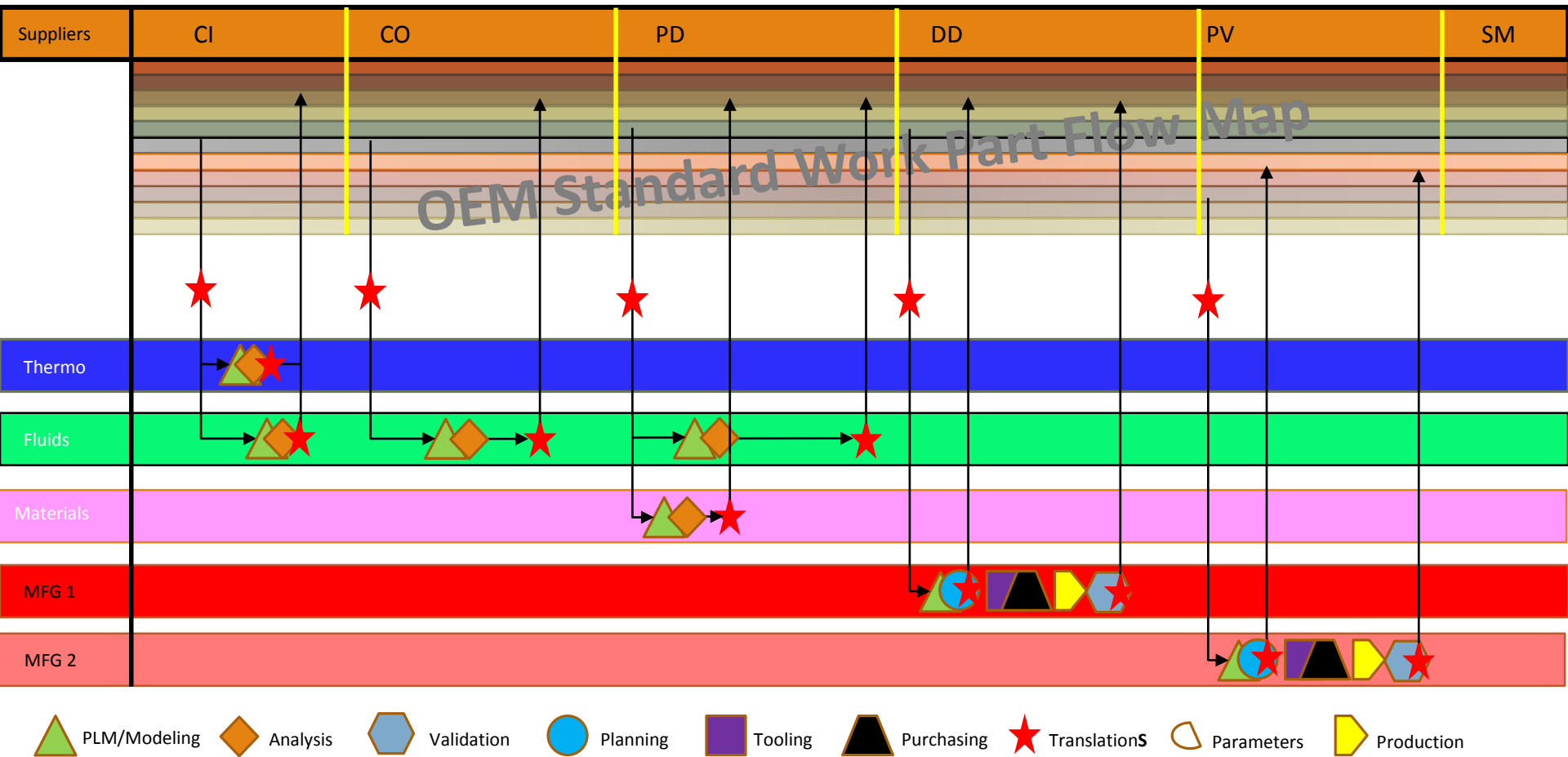


 PLM/Modeling
  Analysis
  Validation
  Planning
  Tooling
  Purchasing
  TranslationS
  Parameters
  Production

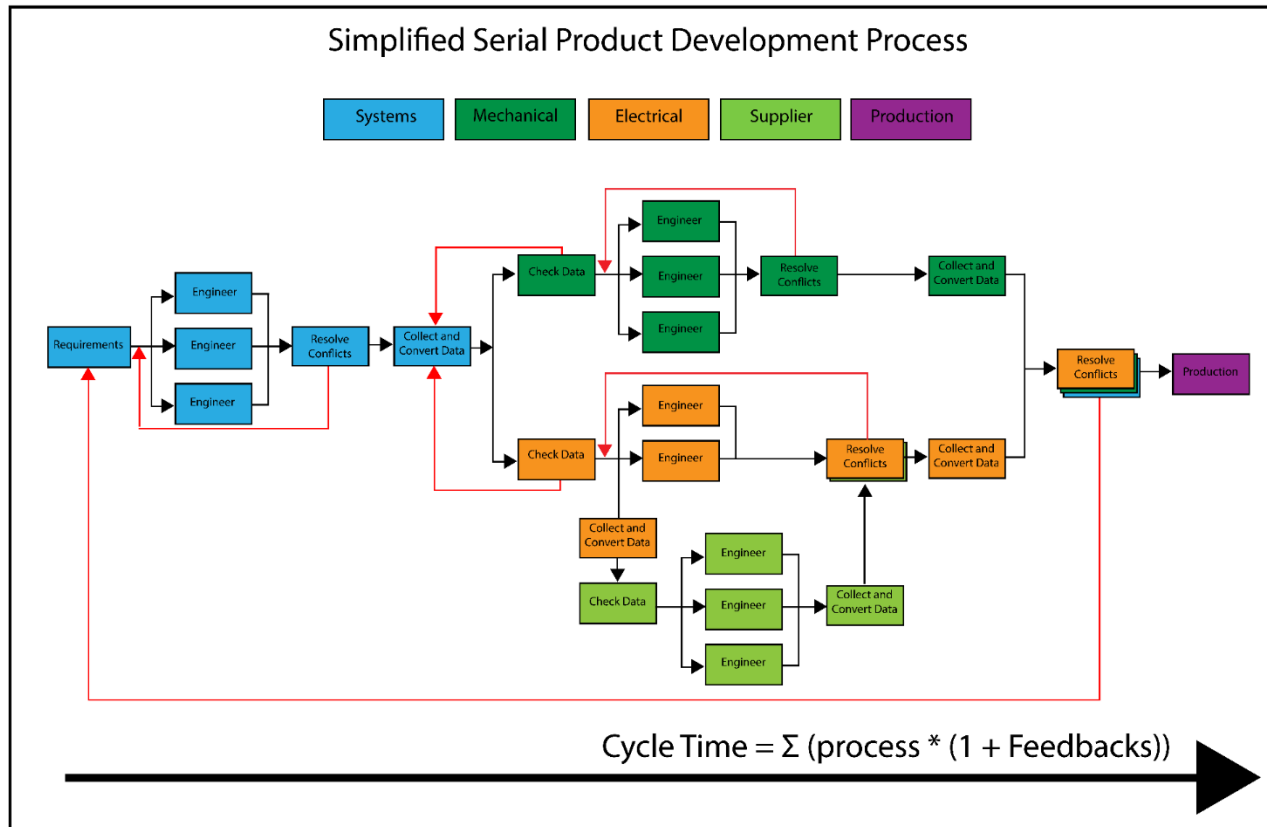
# Integrated Product Team (IPT) Data Flow Map



# Supplier Part Flow Map



# Problems Facing Industry



# Proposed Solution

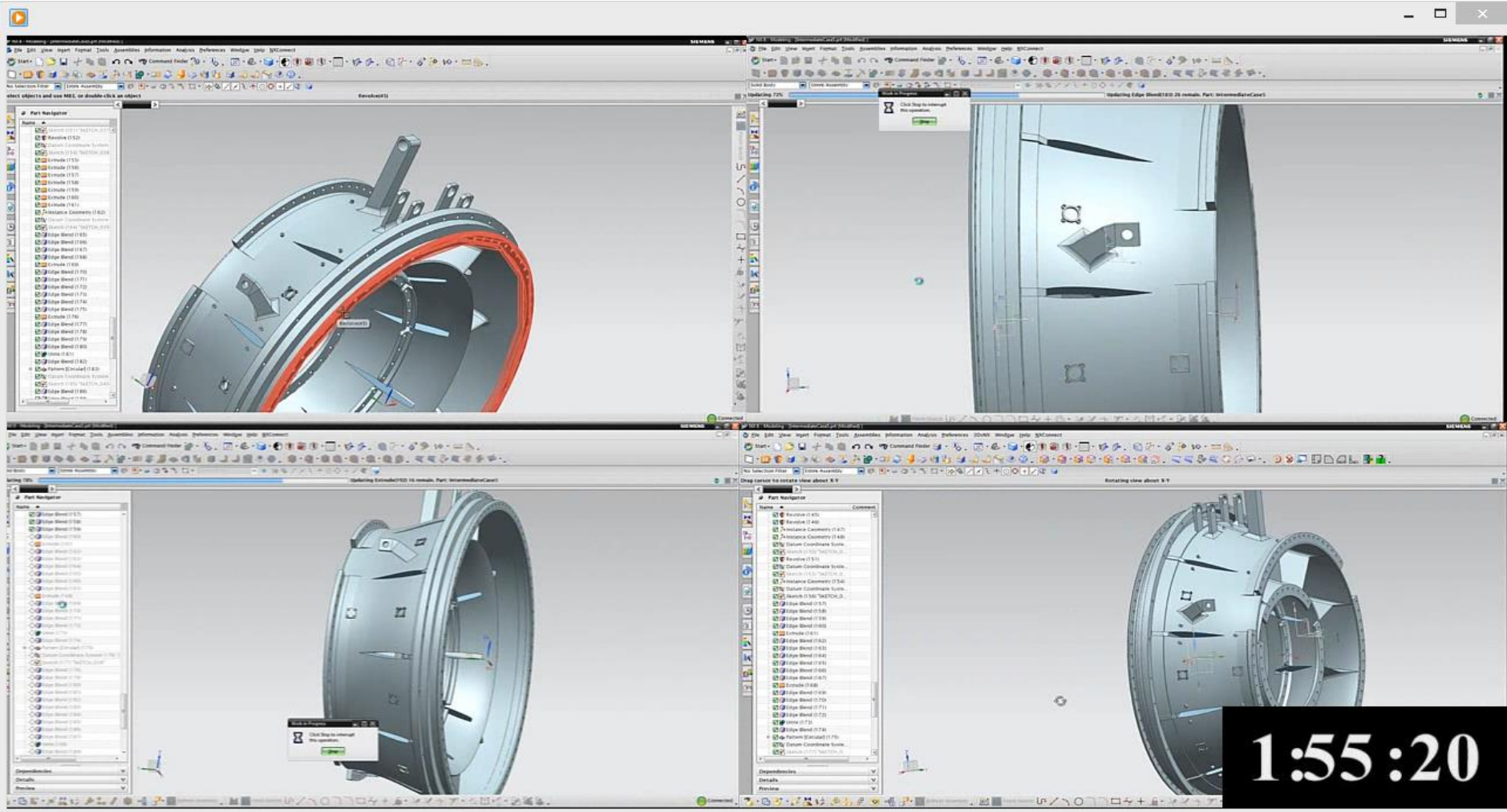
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## Hold Engineering Data –models, parameters, results, artifacts, etc. in a Shared, Secure Intranet Data-Base

- Early adopters and their associated supply chain will see the following benefits
  1. Data can be **Simultaneously Accessed** by multiple users and multiple disciplines both internally and across the supply chain.
  2. **Simultaneous Contribution** of data creation, edits, etc. across IPTs, CIPTs, SIPTs and supply chain.
  3. Data translations and the proliferation of non-associative files are reduced or eliminated through the adoption of a **Single Data Source**.
  4. Errors, ECO's, Design Escapes, Turn-backs, etc. are reduced or eliminated through collaborative, shared IPT, CIPT, SIPT **Awareness**.



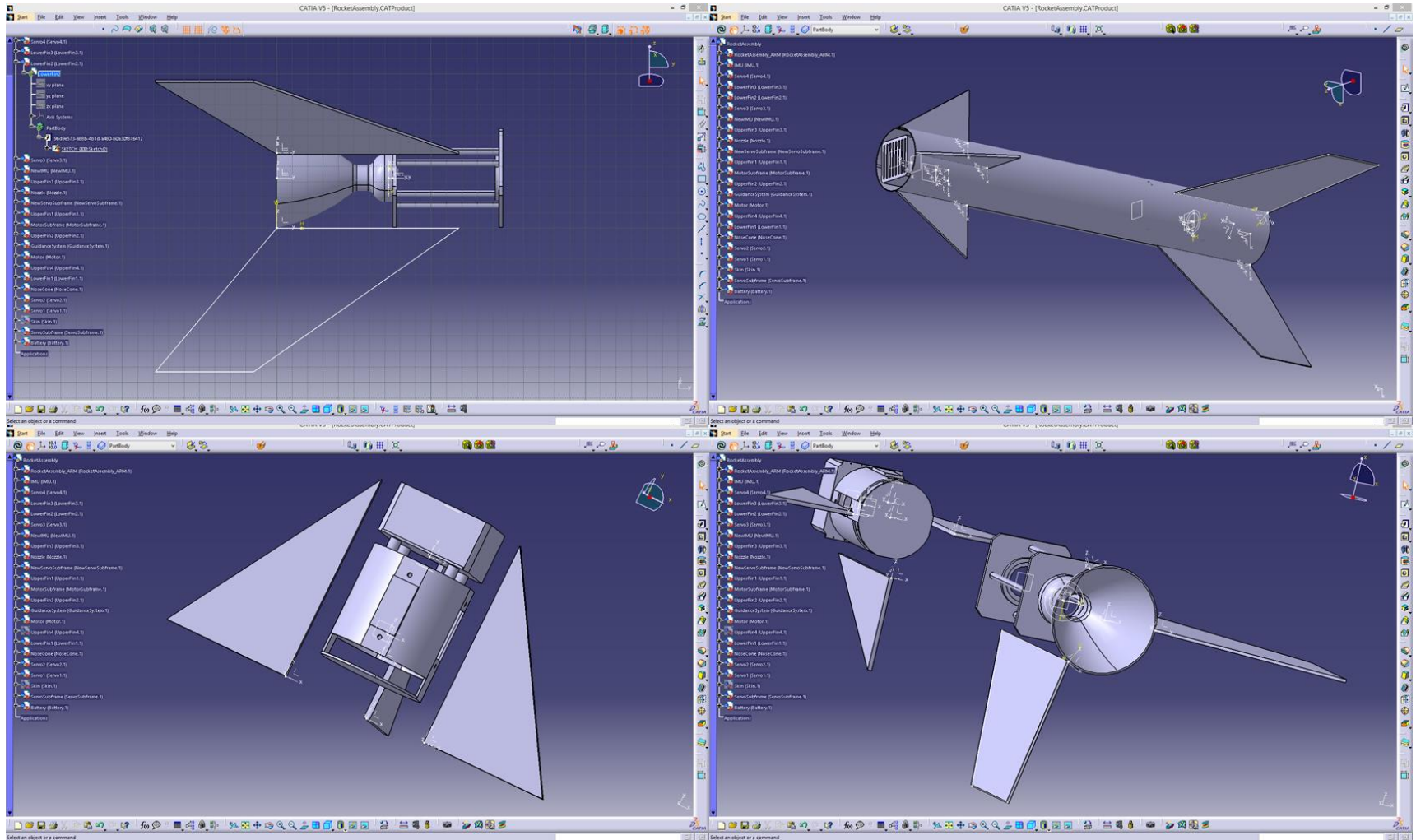
# Multi-user NXConnet



GLOBAL PRODUCT DATA  
INTEROPERABILITY  
SUMMIT

2015

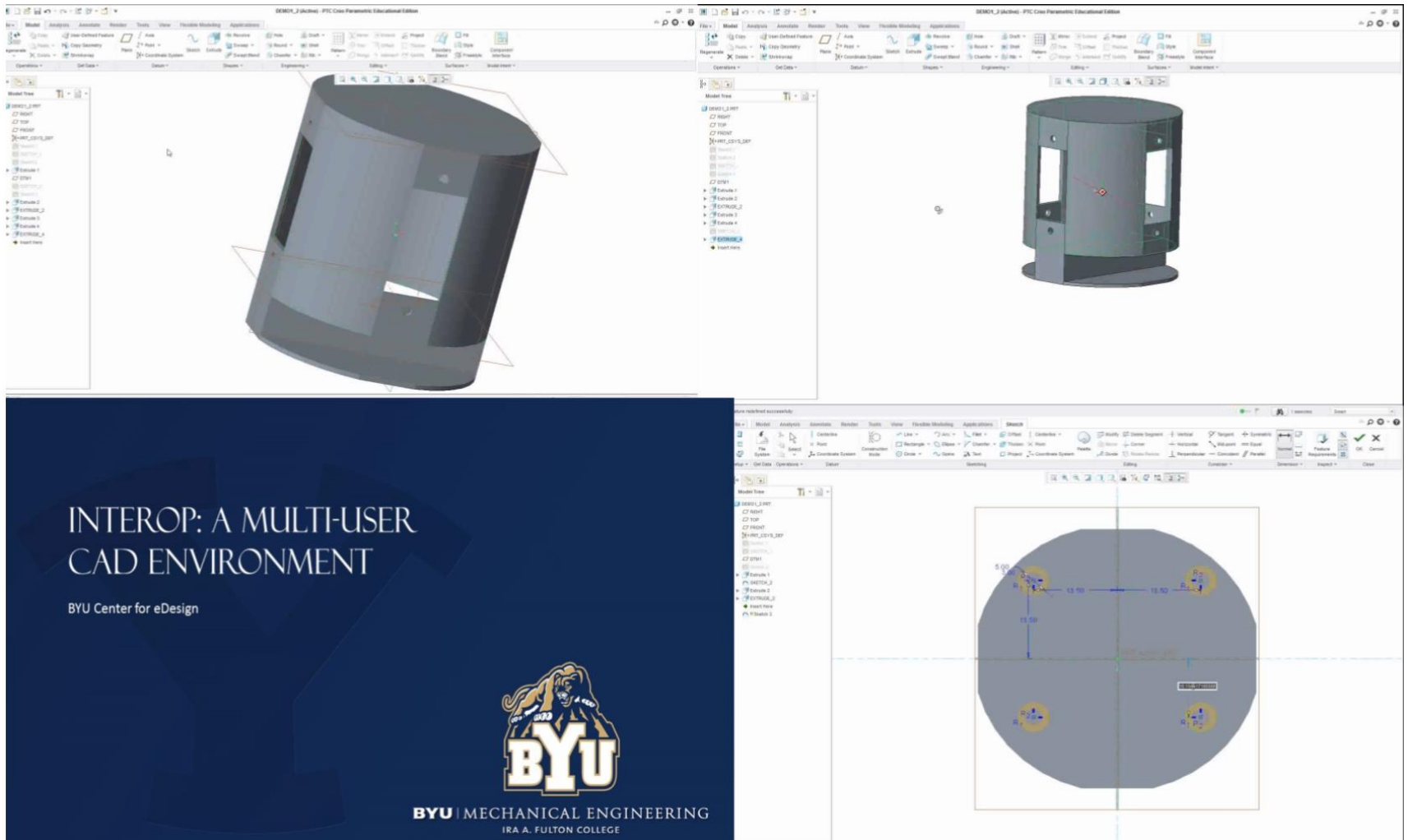
# Multi-user CATIAConnect



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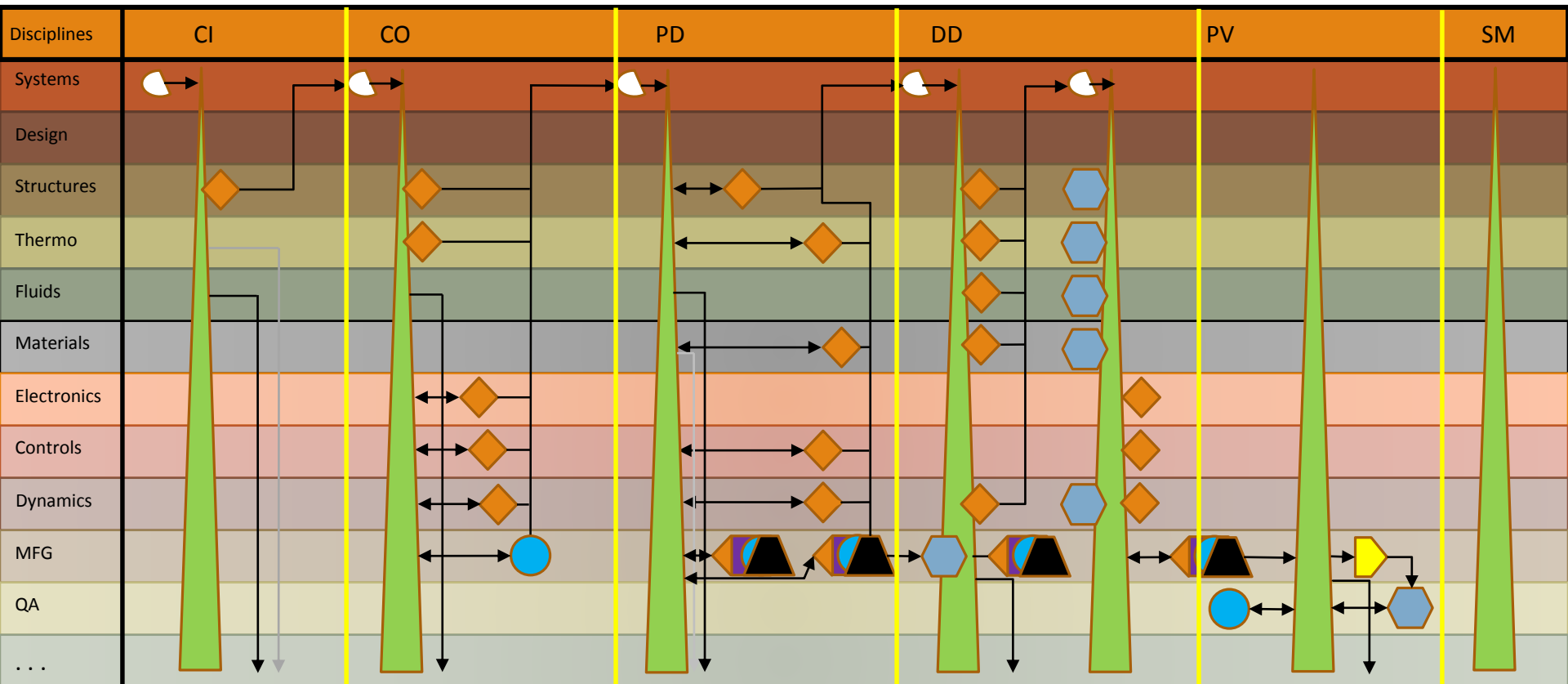
# Multi-user CreoConnect



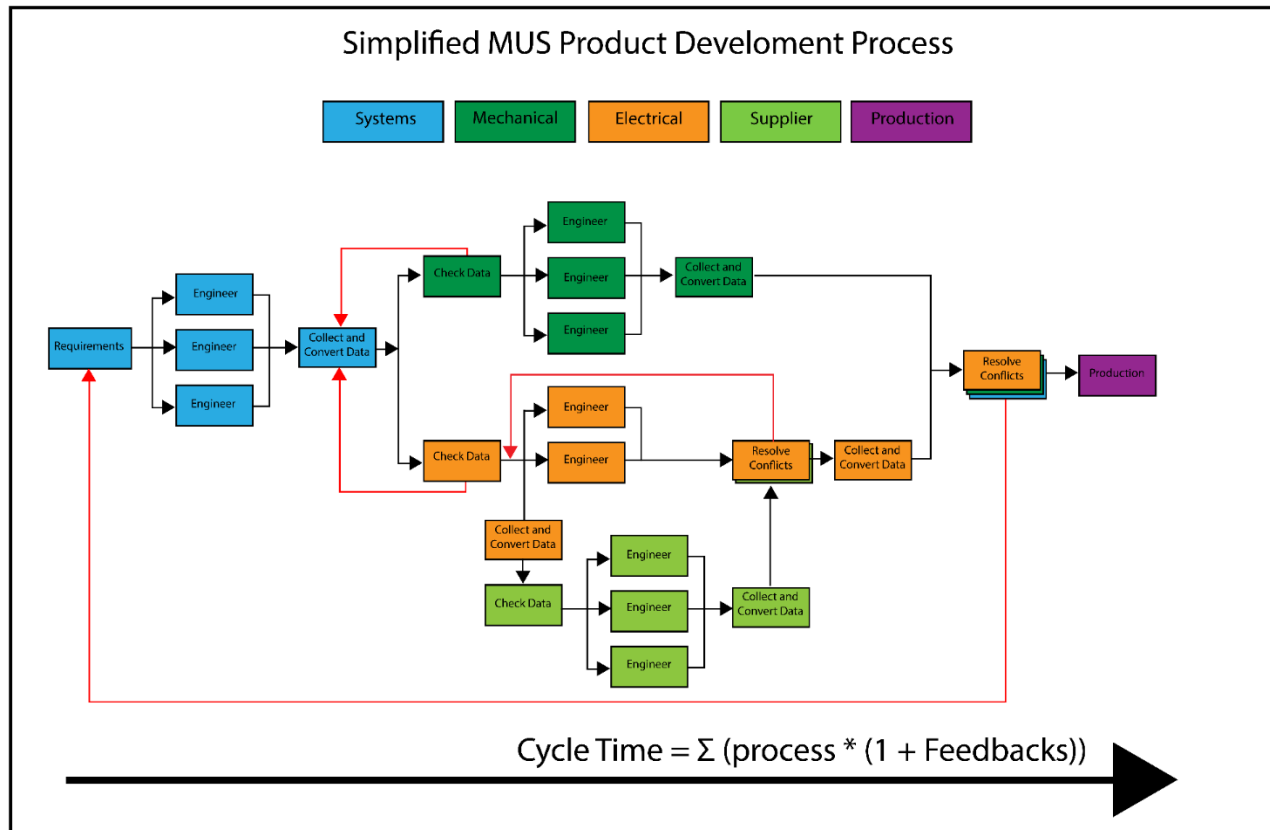
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# MU Standard Work Part Flow Map

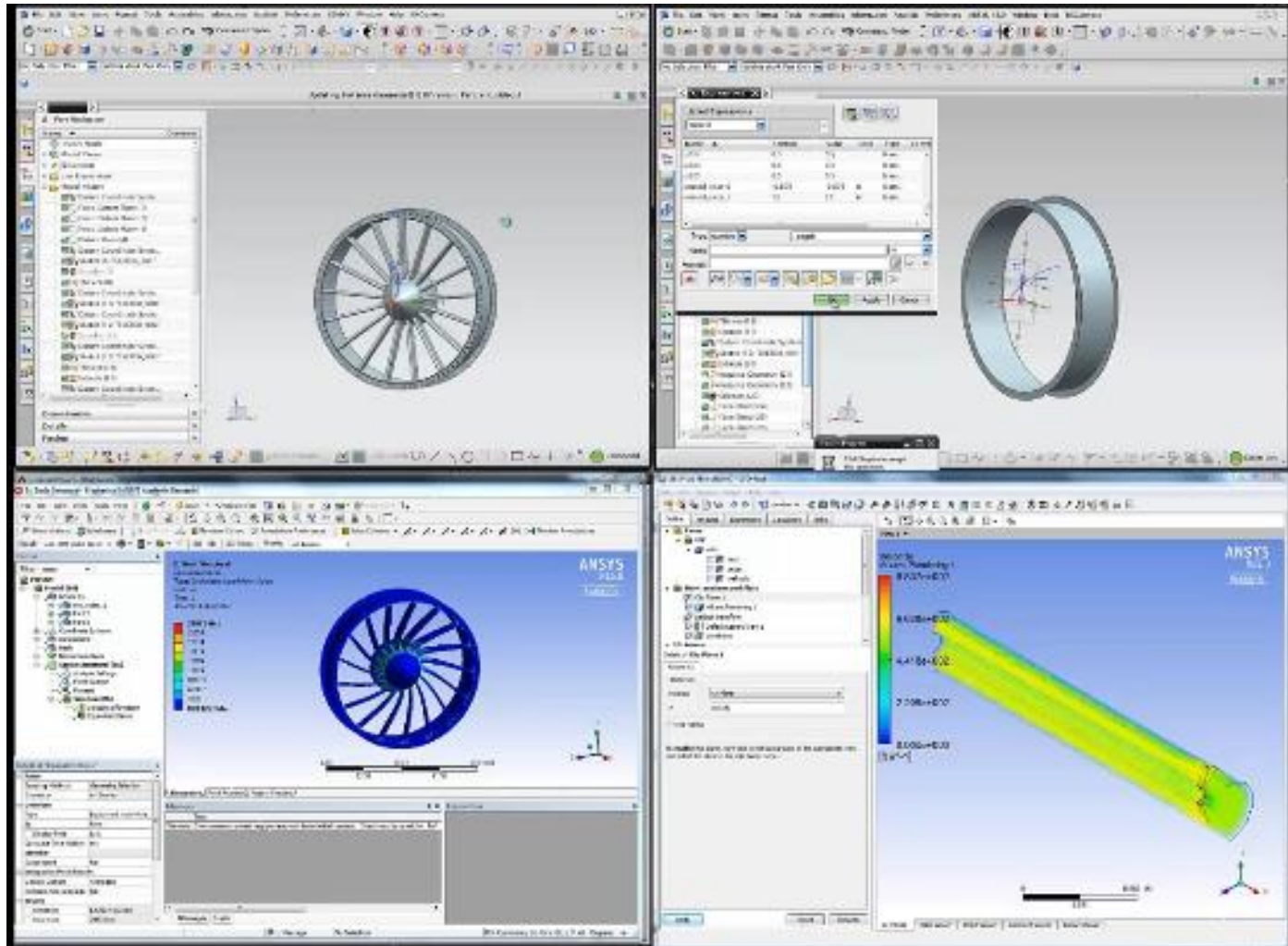


# Simultaneous Access & Contribution





# Multi-disciplinary NXConnect

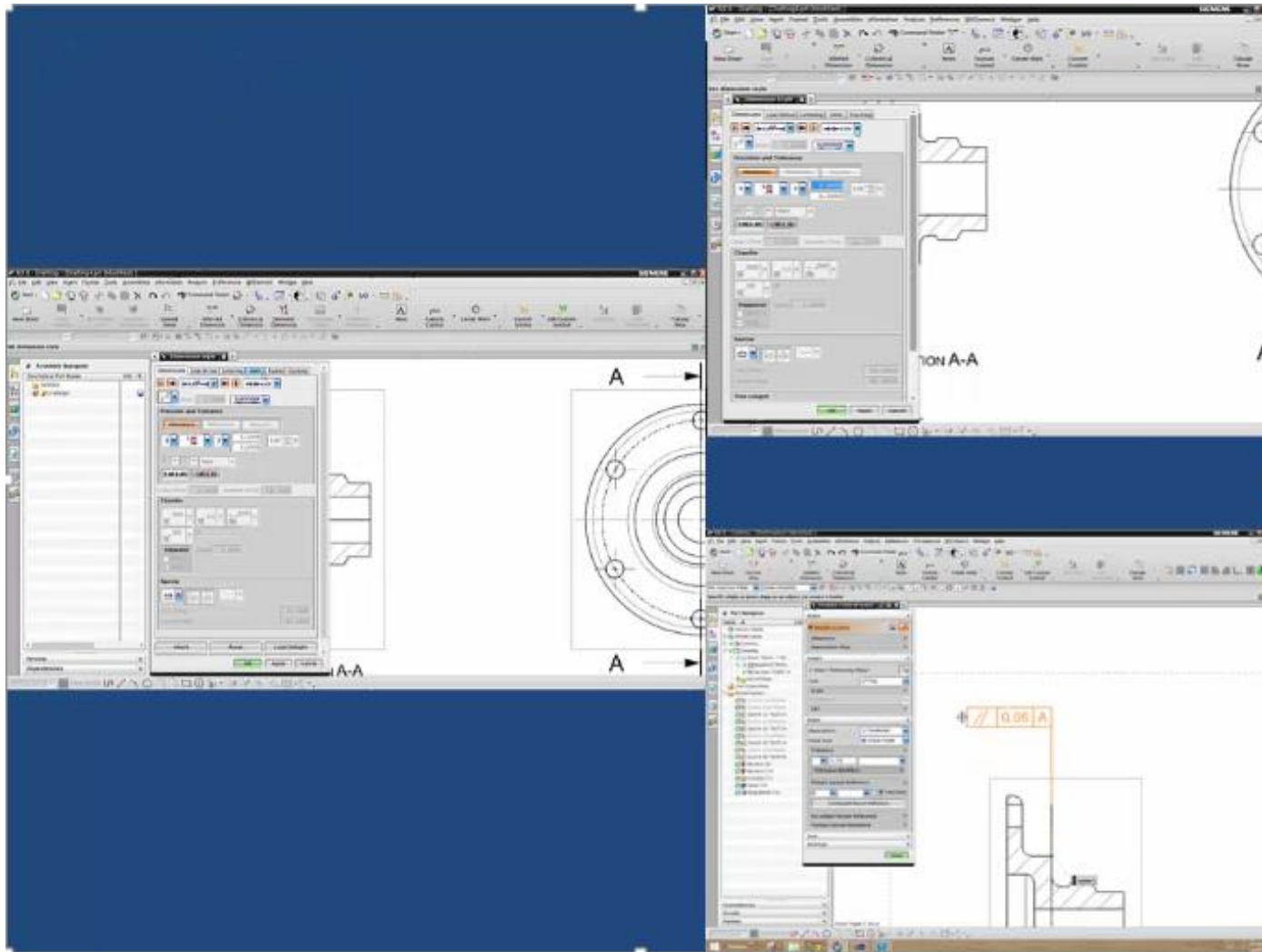


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INTEROPERABILITY

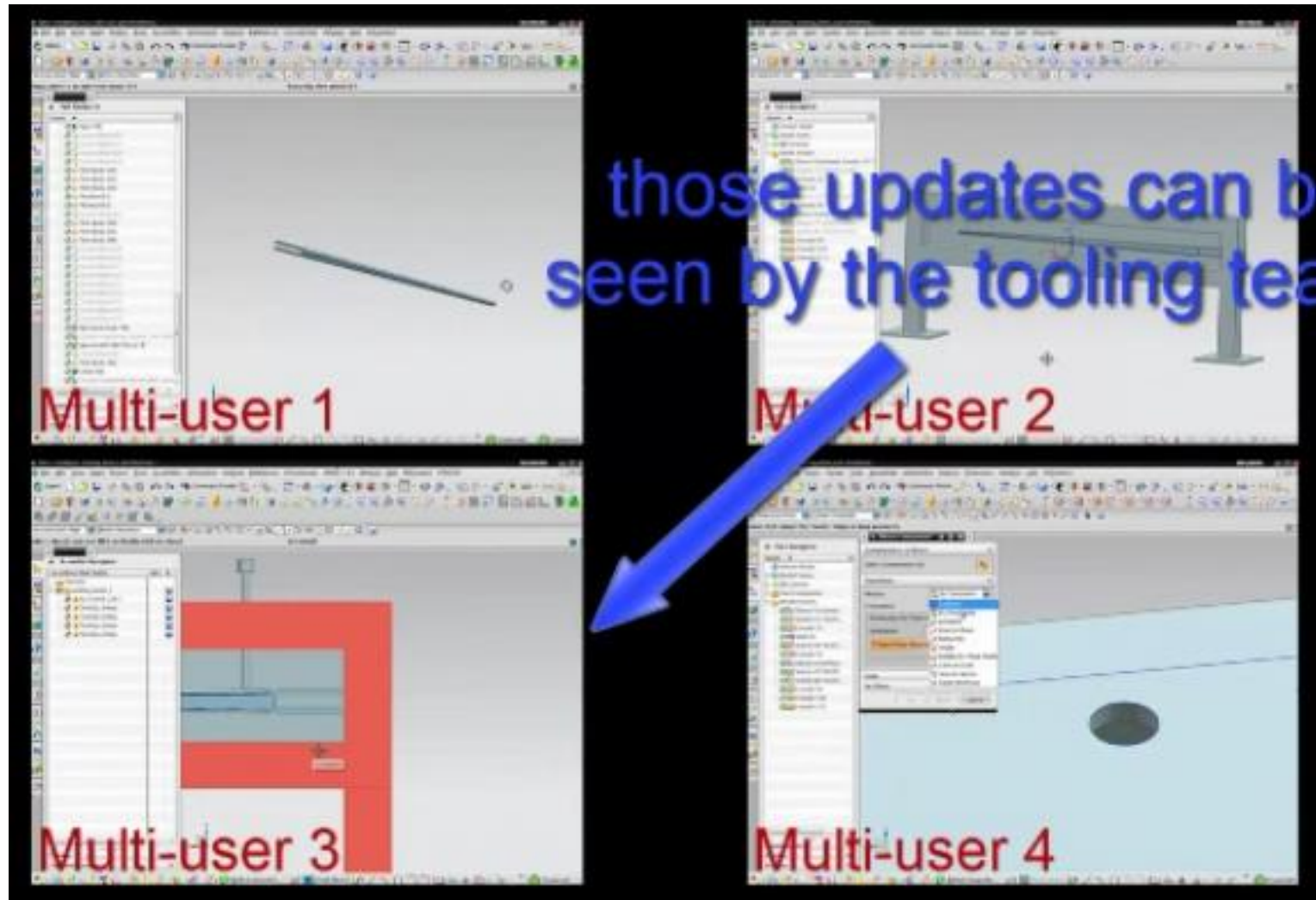
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# Multi-disciplinary NXConnect

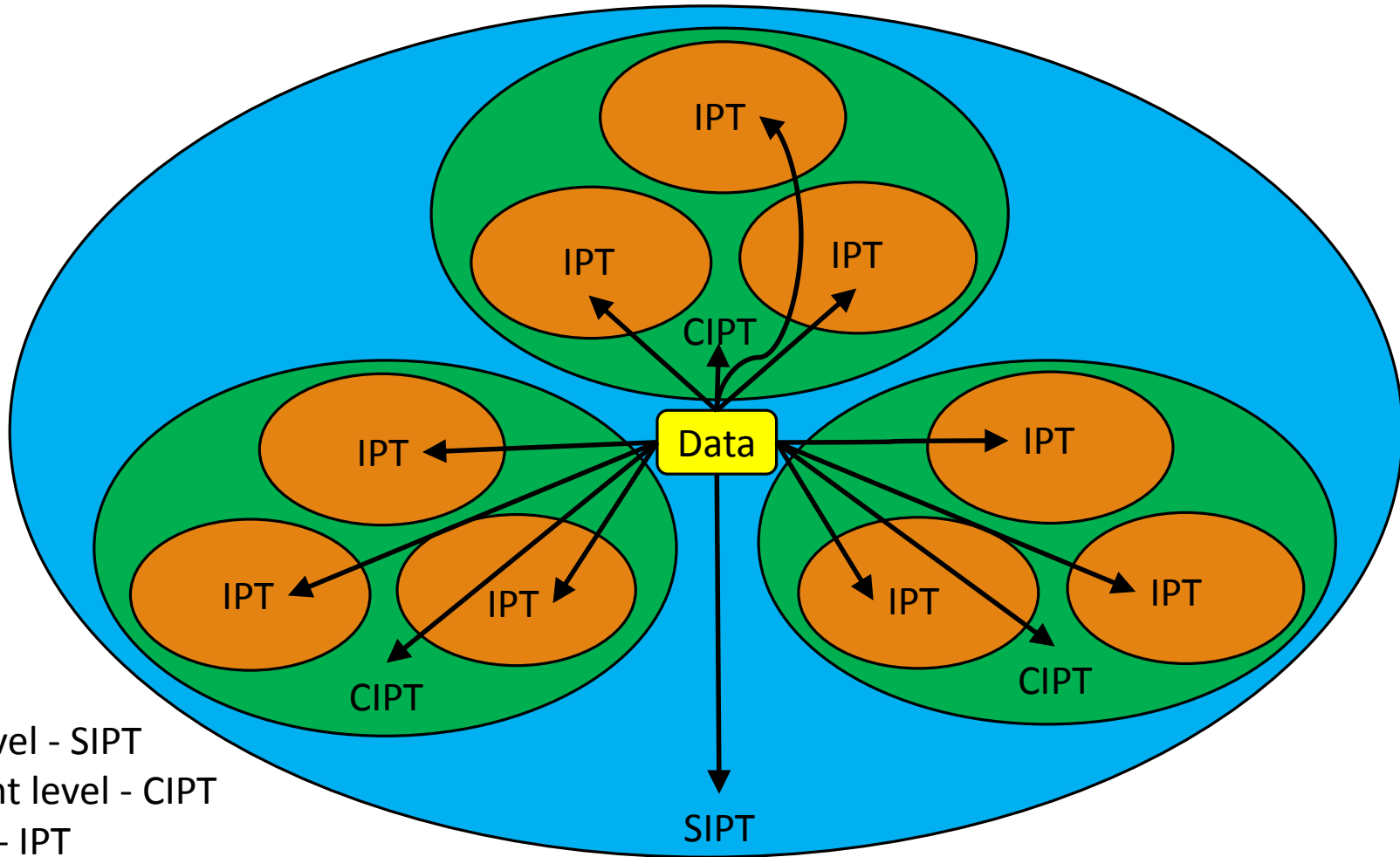


# Multi-disciplinary NXConnect



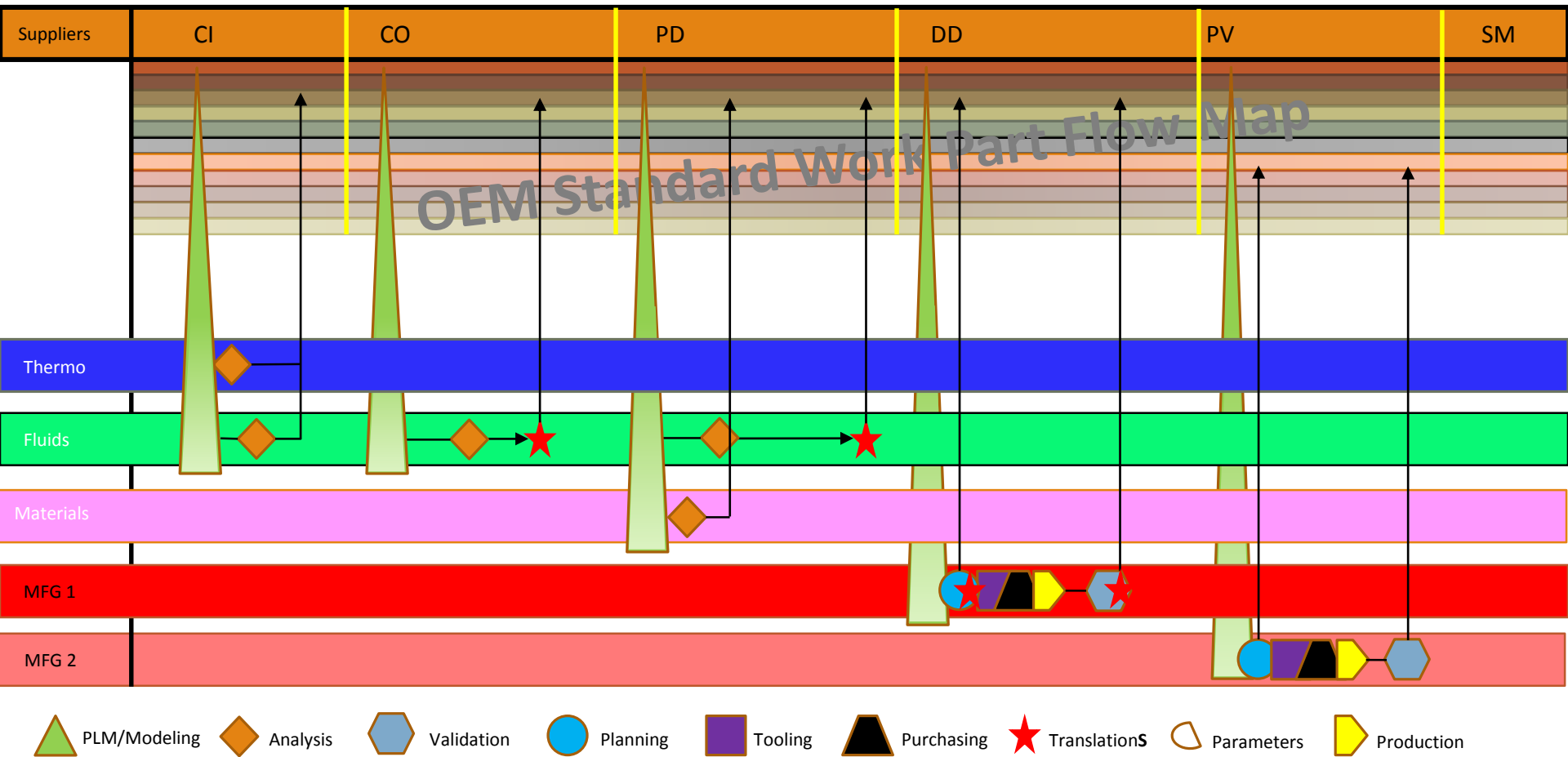


# Multi-user IPT Data Flow Map

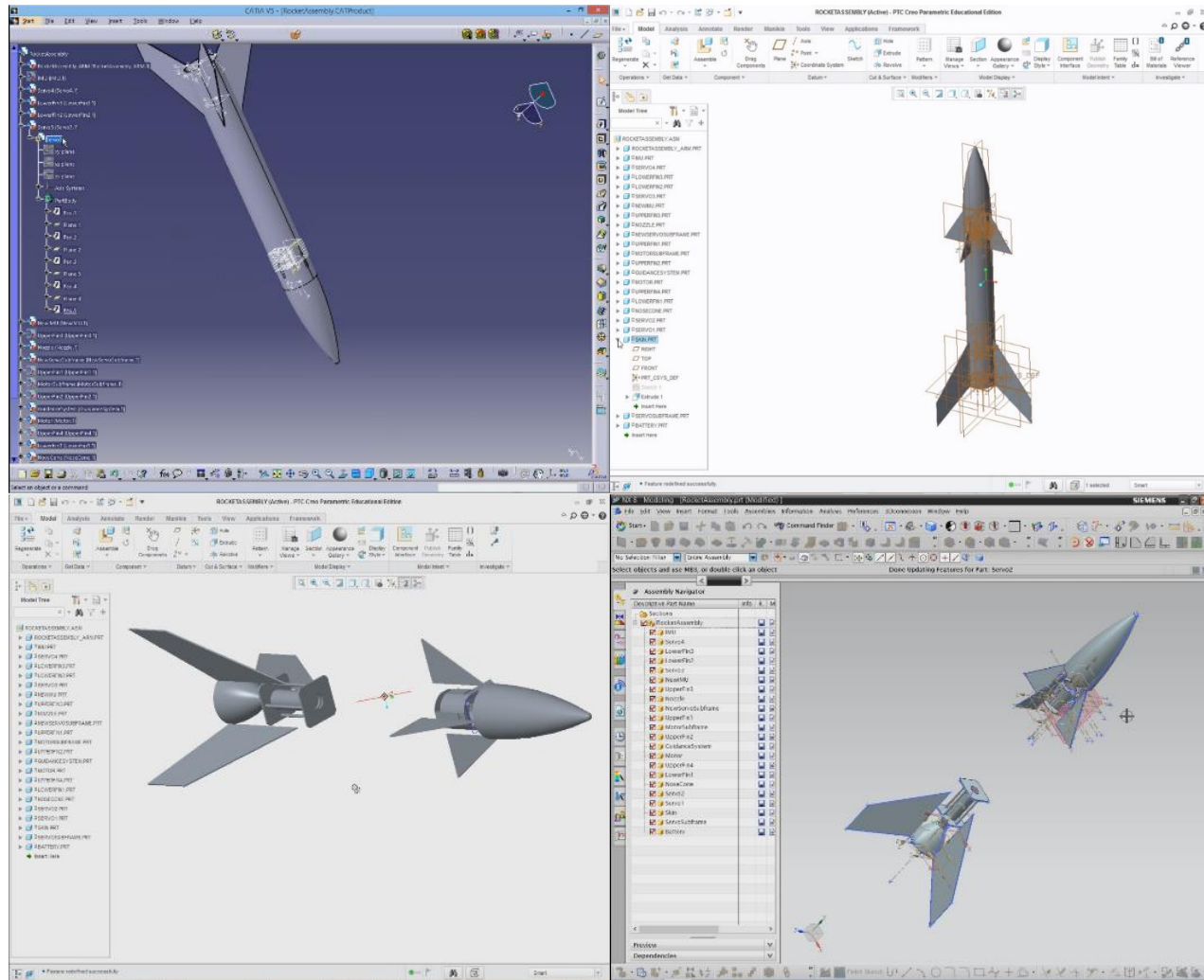


System Level - SIPT  
Component level - CIPT  
Part Level - IPT

# Supplier Part Flow Map



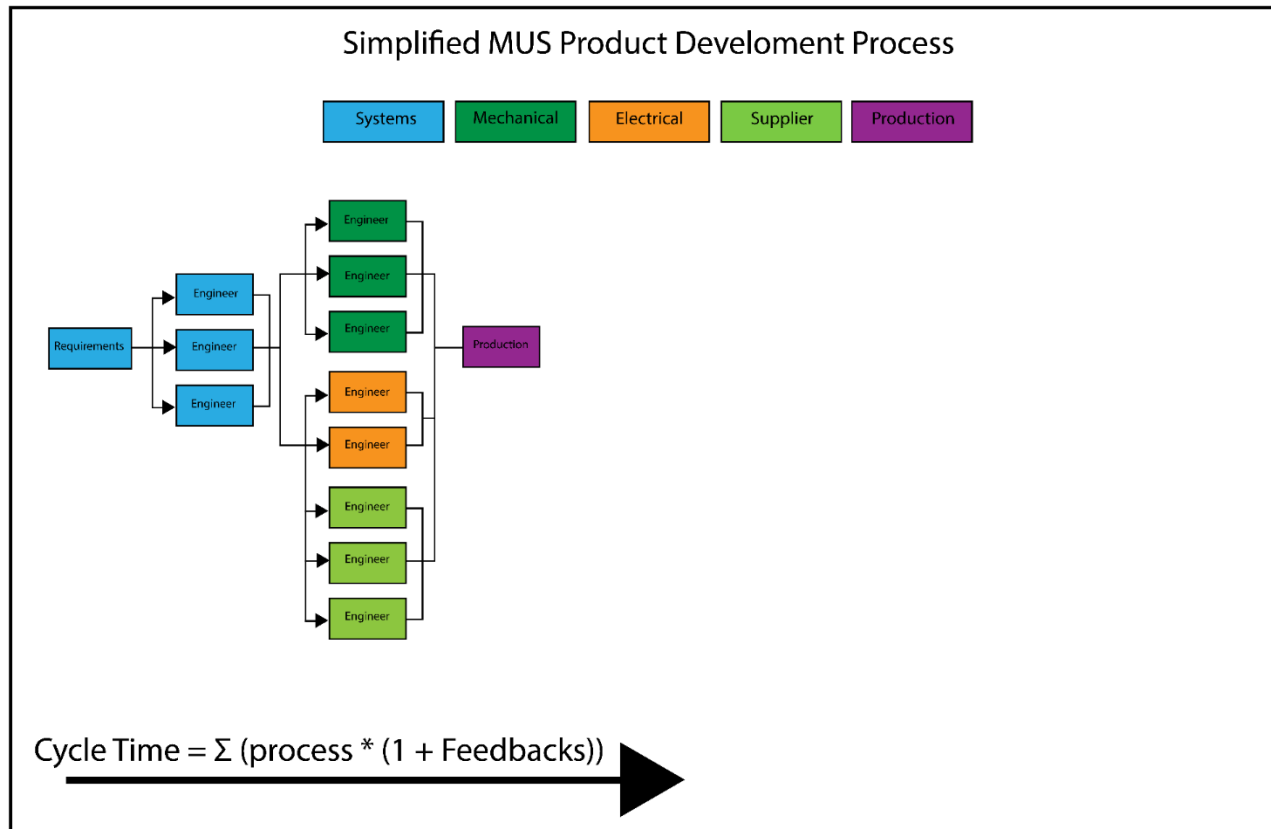
# Heterogeneous CAD Interop Demo's



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INTEROPERABILITY  
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# Interoperability Parallelizes Workflow



# State of Multi-user IP and App

Prototype	BYU Name	TRL	IP
Siemens NX MUS CAD	NX Connect	4	Y
<u>PTC Creo MUS CAD</u>	<u>Creo Connect</u>	<u>3</u>	<u>Y</u>
CATIA MUS CAD (Dassault Systemes)	CATIA Connect	2	Y
AutoDesk Inventor MUS CAD	Inventor Connect	1-2	Y
Siemens MUS CAM	Siemens MU CAM	2	Y
MUS concept drawing & design rationale	Telestrator	2	Y
Siemens CAE	MU CAE	2	Y
MUS Team Organizer	Team Former	2	Y

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# Summary and Conclusions

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## Multi-user CAD/CAE tools dramatically improve engineering workflows

- ❑ **Simultaneous Access and Contribution** by multiple users across various disciplines, groups and supply chains, eliminates serial processes in engineering workflows.
- ❑ A **Single Data Source** eliminates duplication and corruption of information and significantly simplifies the process of finding data for users from various disciplines, groups and supply chains.
- ❑ The ability of users to be **Aware** of what other users are doing, across various disciplines, groups and supply chains, reduces Errors, ECO's, Design Escapes, Turn-backs, etc.