Digital Transition to 3Dimensions

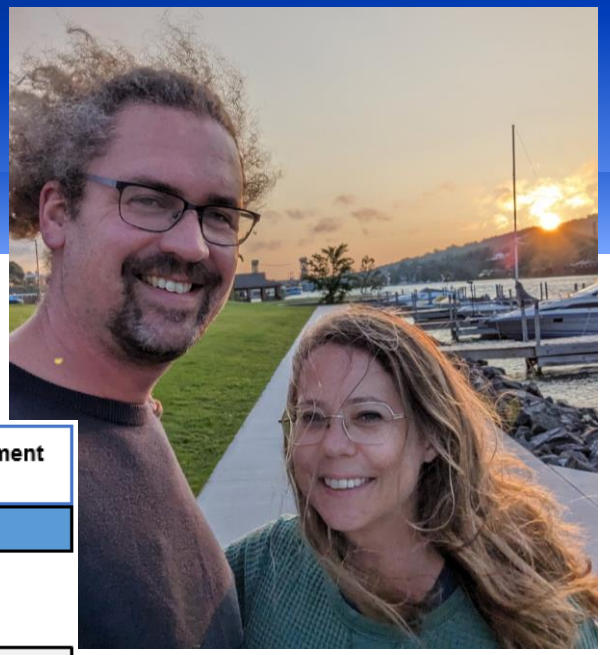
Question Everything

Explore All The Options

Jayson M. Latowski

Ref. # 23-178626-BCA

Presenters Bio



Design Engineer

B.S. Aeronautical Engineering
Western Michigan University

747/767/777 Cargo Furnishing Design

747-8F Cargo System Design & Integration

747-8I Interiors Integration

767-2C / KC-46A Physical Systems Integration and Validation

Physical Integration

Simulation & Analysis Integration

Digital Transformation of Development System

1

2

3

4

5

6

Process & Tool Engineer

Systems Engineering and Analysis Certification
California Institute of Technology & Boeing

CATIAV5/ENOVIA Lean+ for Mfg.&Eng.

Aircraft Composite Structural Analysis and Design
University of Washington

HTML, JavaScript, AJAX, Relational Database Design

Aircraft Conceptual Design – by Raymer

SAFe 4 Certified Agilest
Scaled Agile, Inc.

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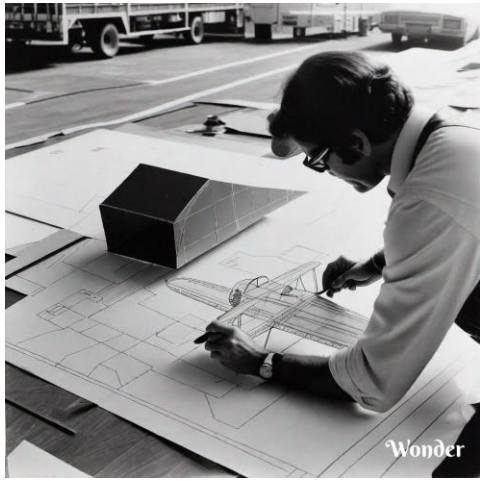
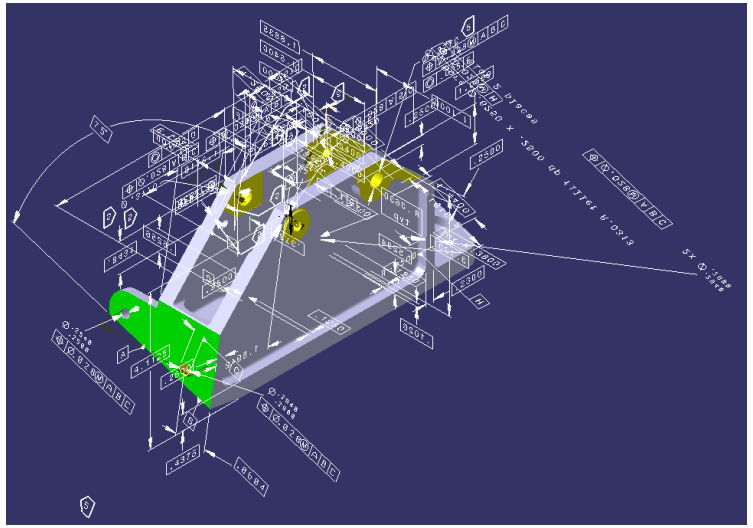
Mylar to Today

Mylar



CATIA V4 to V5

Model Based Definition & Virtual Reality



Digital Transformation Word Salad

Product Lifecycle Management
Captures the Virtual Twin

~~Manufacturing~~ Operations Management
Captures the internal Digital Twin

~~Enterprise~~ Resource Planning
Captures the external Digital Twin

ISO/IEC/IEEE 15288 Systems and software engineering – System lifecycle process
IEEE 15288.1 Standard for Application of Systems Engineering on Defense Programs

- It focuses on defining stakeholder needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem.
- This International Standard can be used in one or more of the following modes: By an organization / project / acquirer and supplier / process assessors
- **By process assessors — to serve as a process reference model for use in the performance of process assessments that may be used to support organizational process improvement.**

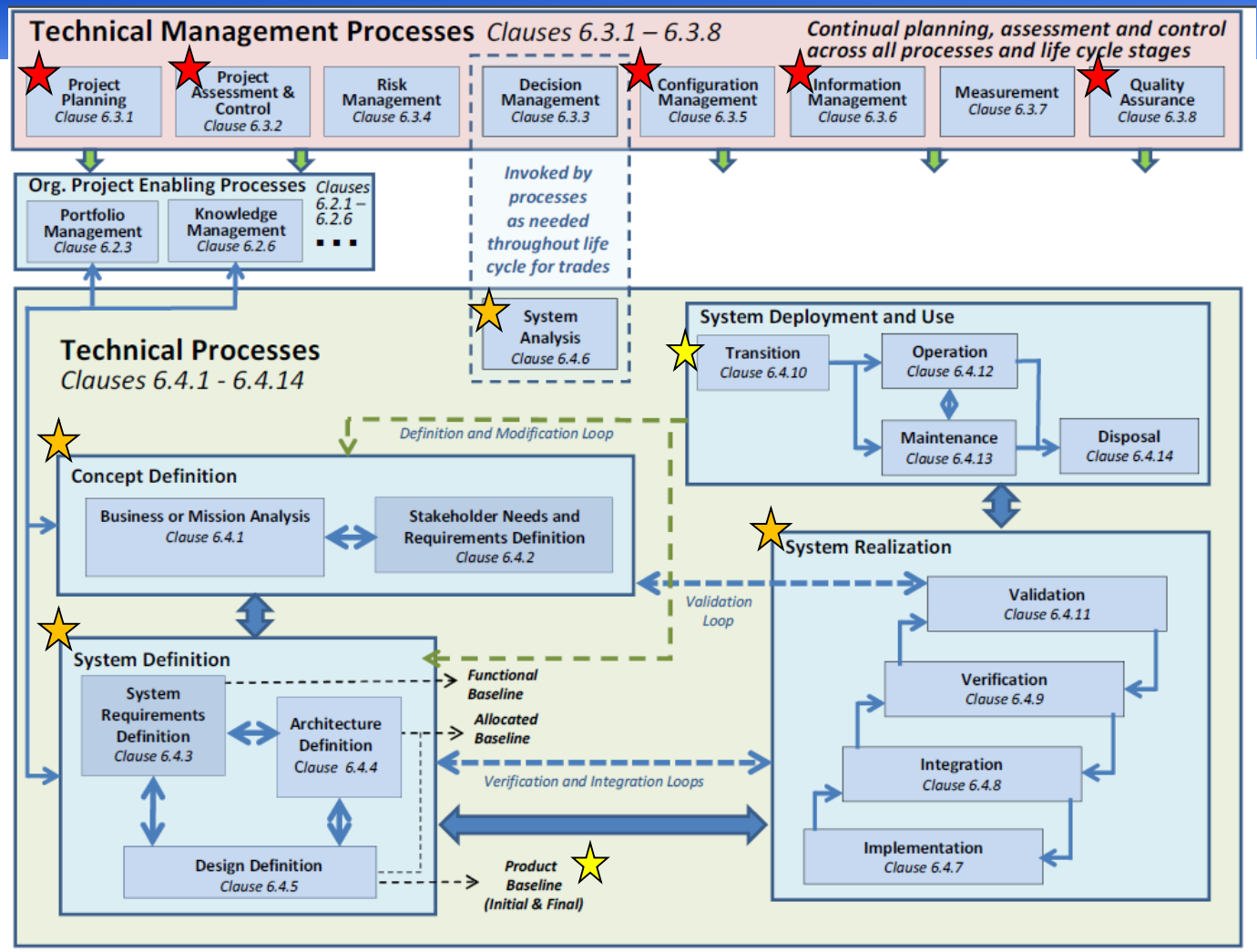
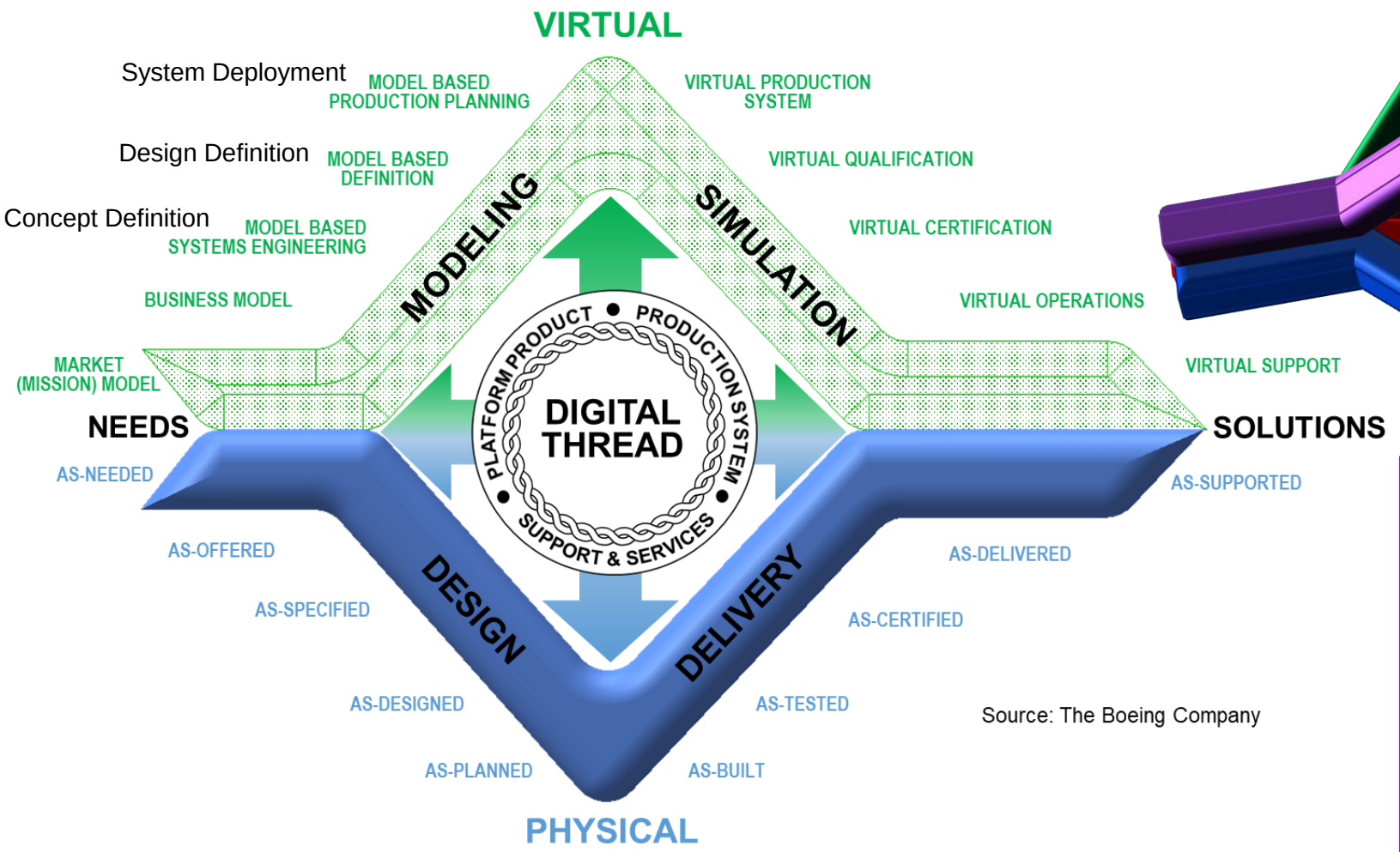
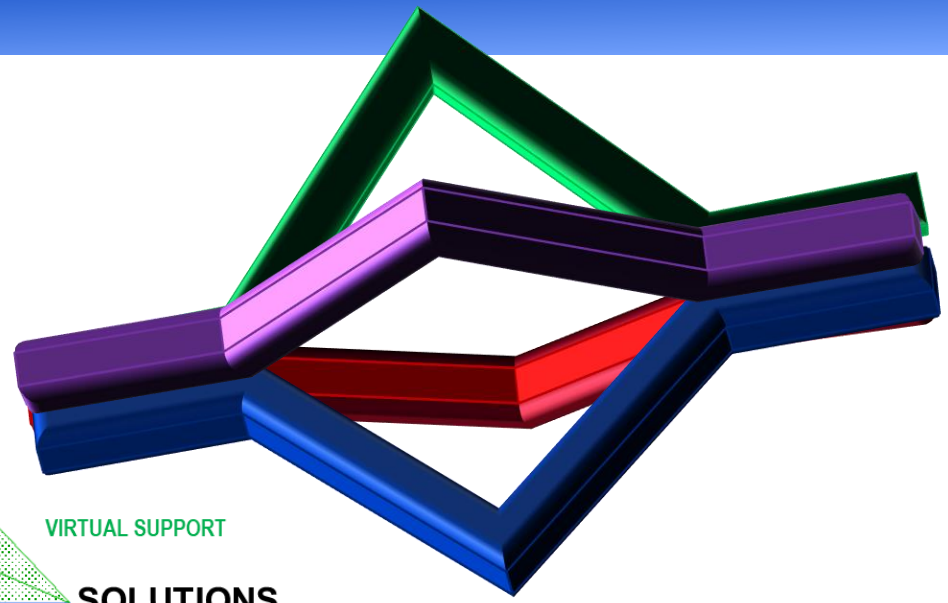


Figure 1—Systems engineering planning, assessment, and control interfaces with the systems engineering technical activities

Diamonds & Frameworks

Digital System Model
Virtual Twin Development
Provisioned Product + All Options
Enterprise Systems





Source: The Boeing Company

Digital & Physical Twin

Enterprise…. Virtual Twin of the World

Aircraft
Satellites
Defense

PLM Development System
- 3DExperience
- Cameo
- Simulink
- Mentor
- Cubicles
- Computing

Verification and Cert Systems
Flight and Ground Test
- Static and Dynamic Wing Bend

Component and Material Test
- Flammability
- Stress / Strain
- Coupon Testing

Transportation Systems
- Dreamlifter
- Railway
- Cargo Freighter
- UPS

Production System
- Everett
- North Charleston
- Renton

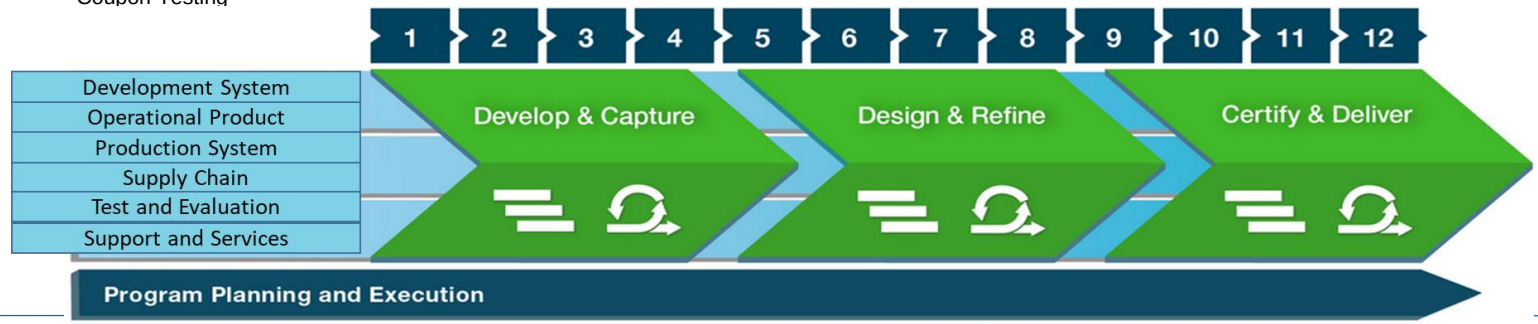
Delivery System
- Delivery Center

Operations
Flight Training Systems
Airport Systems
- Refueling and Cargo Handling
- Flight
- Passenger Services

Mods / Retrofit Systems
- Retrofit Kits

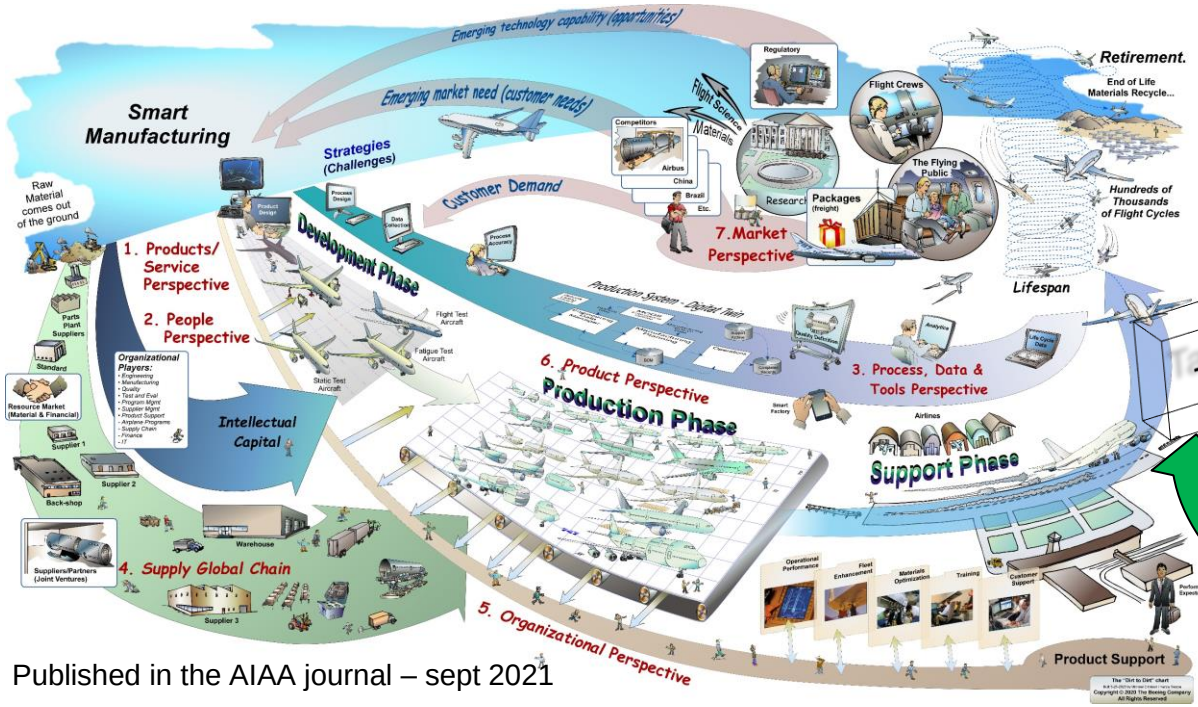
Maintenance Facilities
- Facilities
- Spare Parts

Recycling Centers
- Boneyards



Concept Definition

- **Concept of Operations**
  - **What are the known elements and the high-level capabilities of the system?**
  - **What are the geographical and physical extents of the system?**
- **Mission and Service Analysis**
- **Stakeholder Needs and Requirements Definition**



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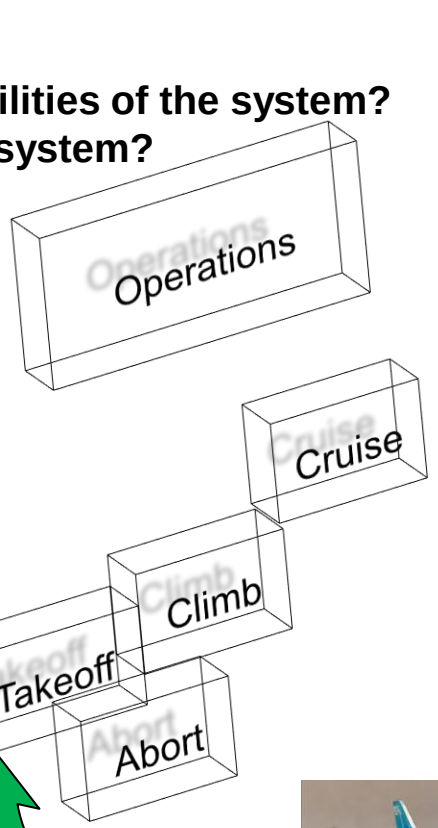
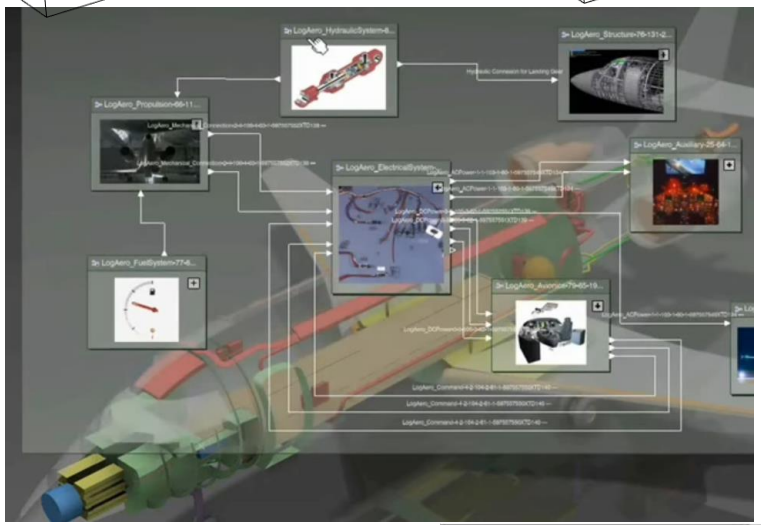
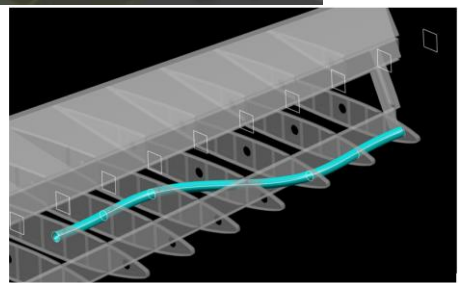
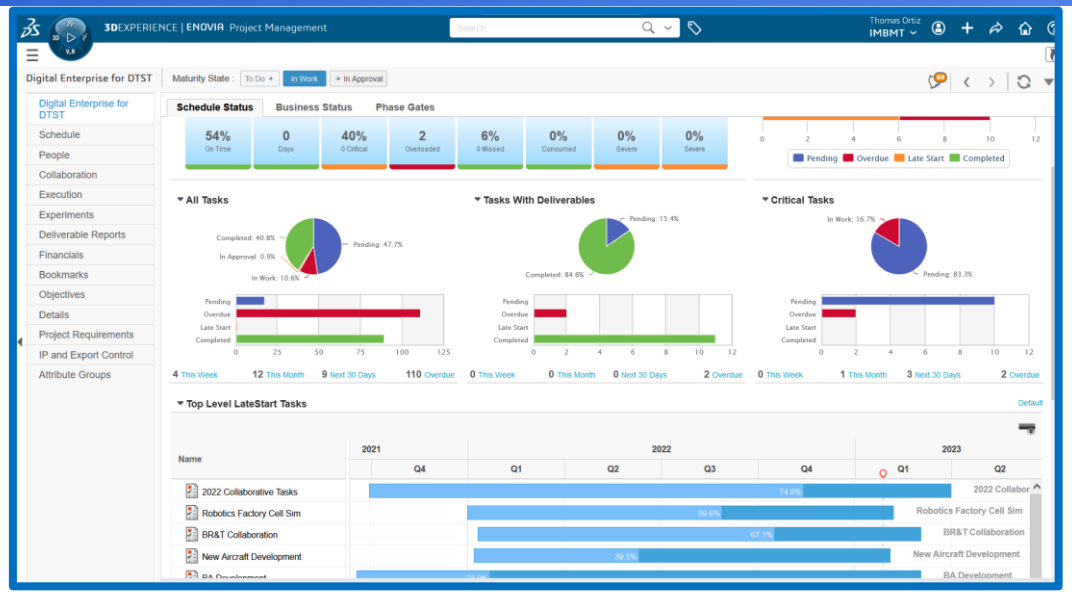
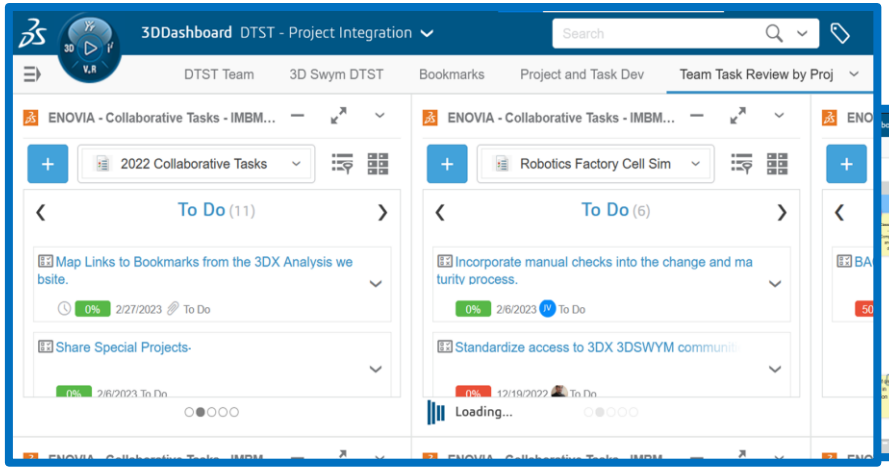


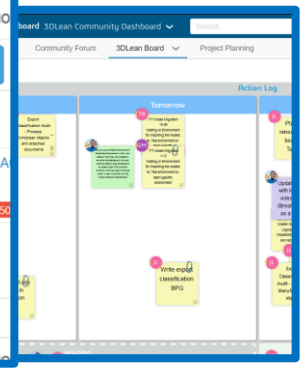




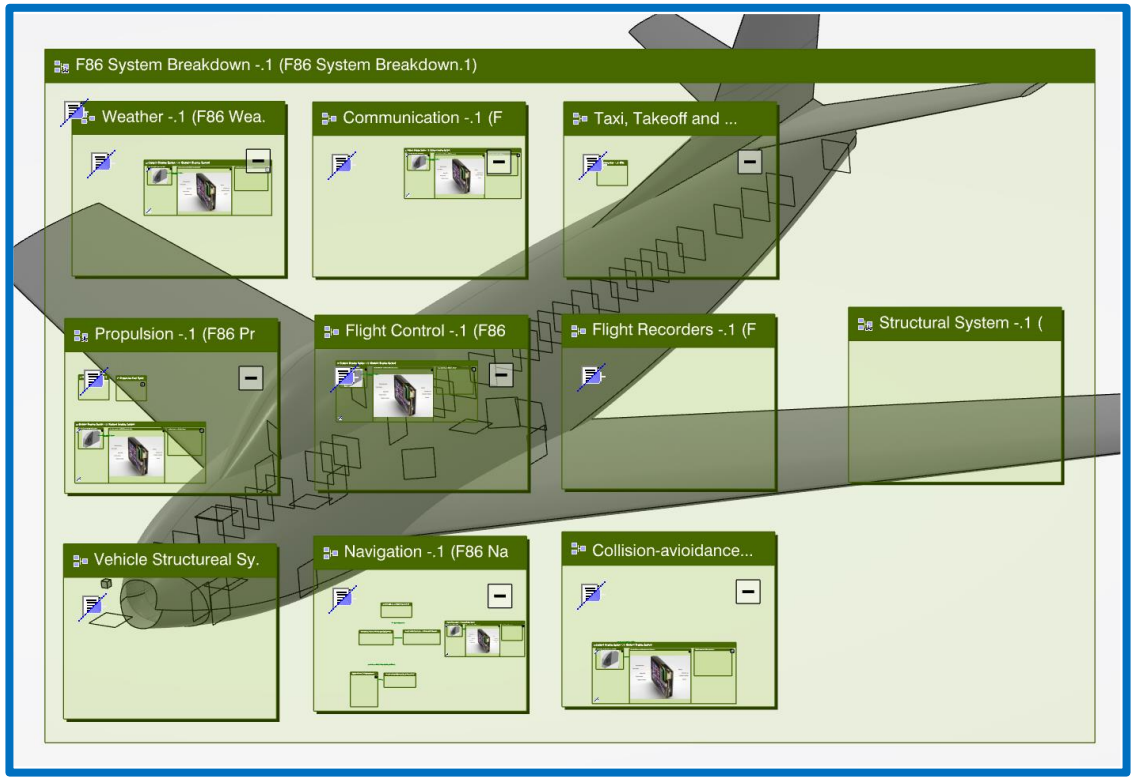
Program and Project Management Transformation for New Product Development







- **Engineering Precedence Networks**
- **Processes**
- **Tools**
- **User Guides**
- **Tip Sheets**

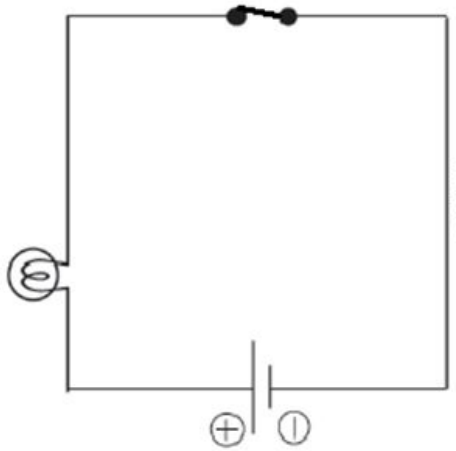


Configure and Manage

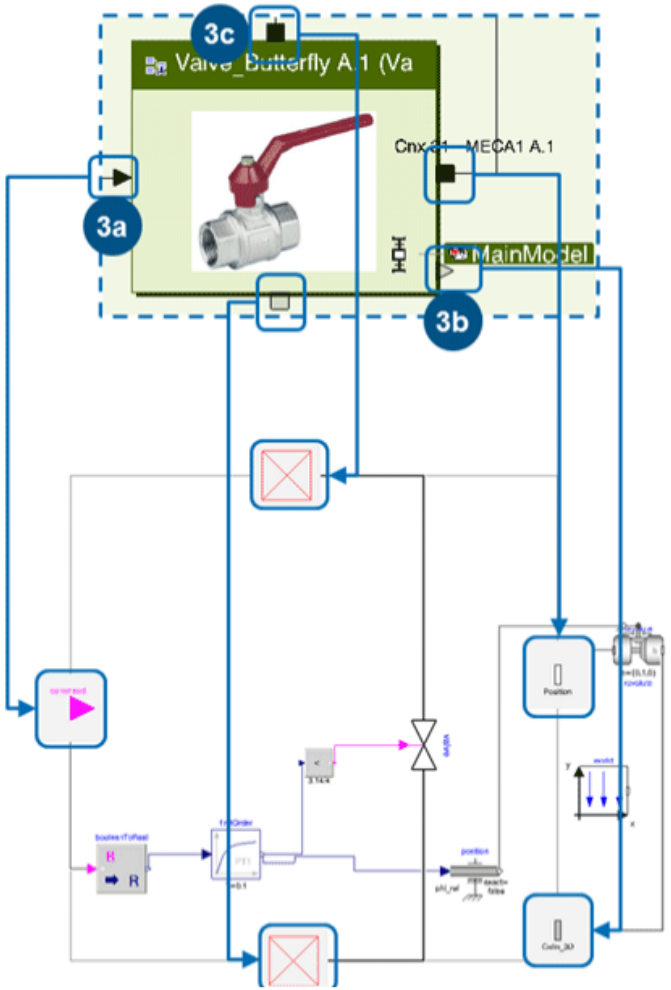
Reference / Instance / Trace / Effectivity

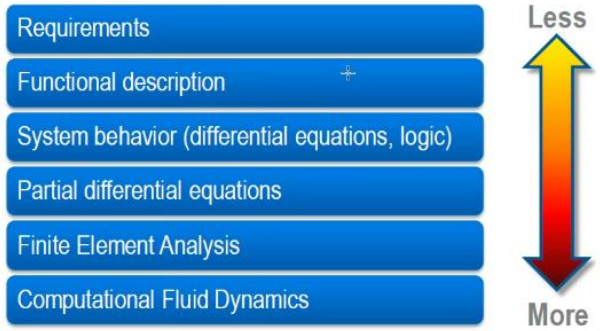
Architecture Definition

Diagram



Schematic





Industry Behavior Modeling

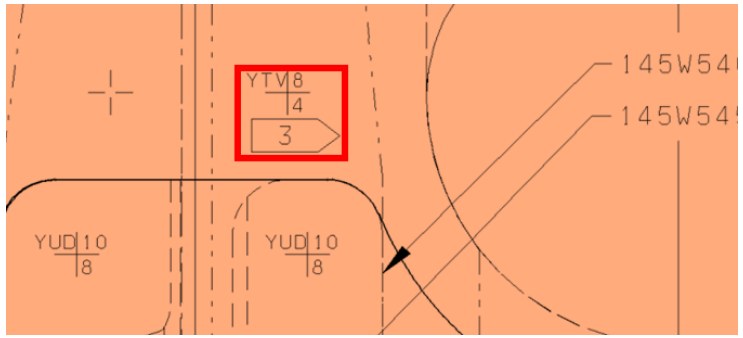
- Simulink
- Dymola / 3DX
- Easy5
- Simscape
- Ansys
- Open Modelica
- Wolfram Sys. Modeler
- 20-Sim
- Maple Sim
- Simio
- Cameo
- …Excel

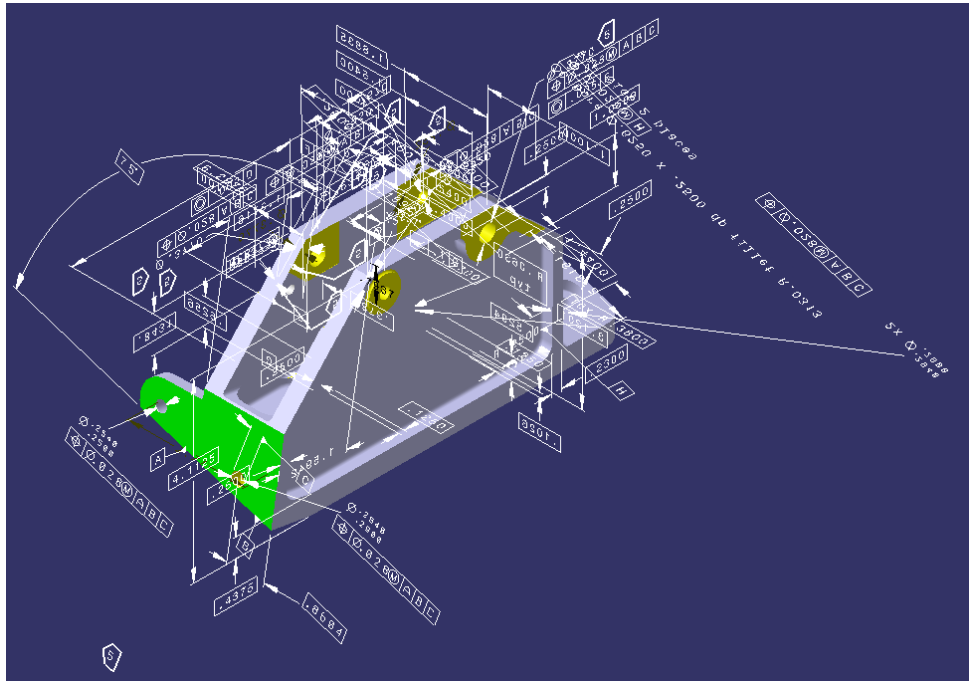
Manufacturing Process Specifications

- **PDF documents that contain:**
  - **Functions to be performed**
  - **Systems that can perform the functions**
  - **Performance / Timing Parameters - Requirements**
  - **Suppliers and their verified systems – not typical**

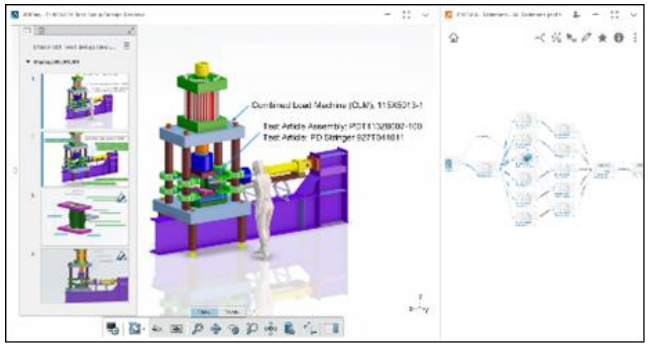
- **Specification allocated to the production system virtual twin**
- **Trace to product definition**
- **Work instructions verifies the Mfg Specification can be met**
- **Test Plan to develop a system to capture the Digital Twin**

- **3D flag note element in a Requirement object?**
- **Unique flag note number?**

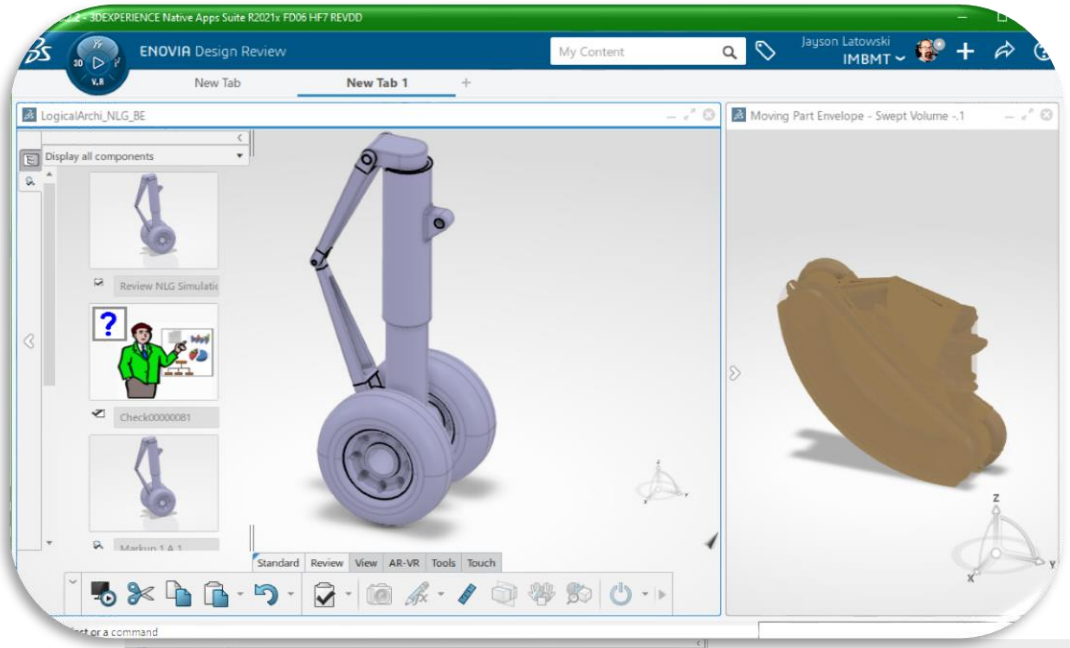


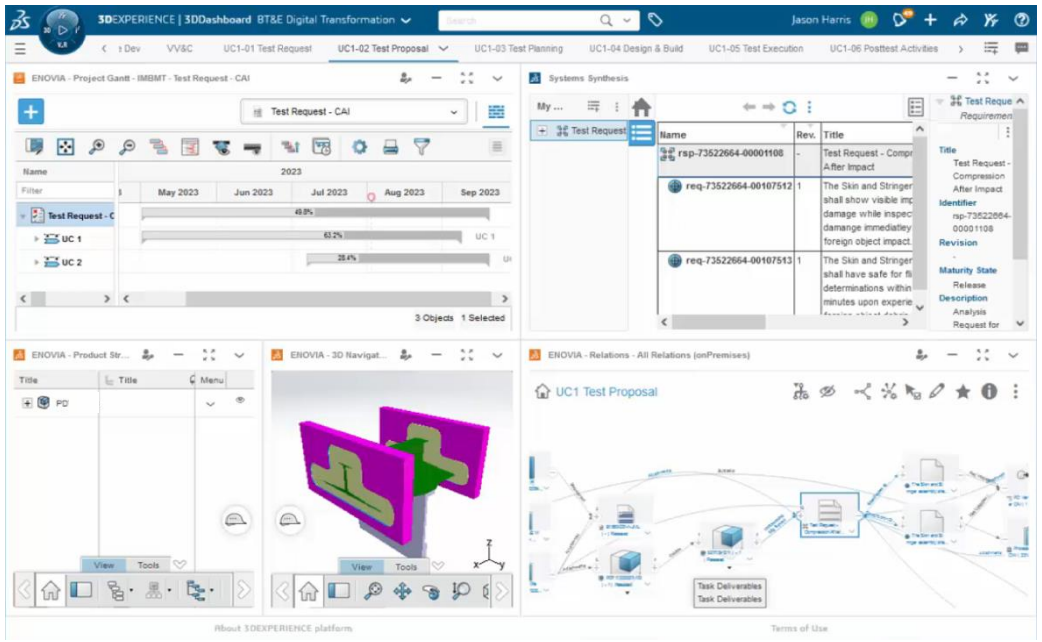


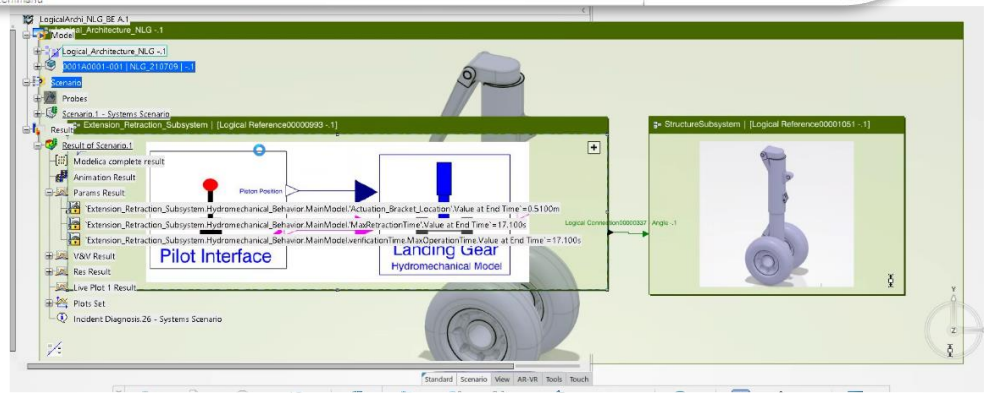
Review - Validation, Verification, Integration



- **Interactive 3D Power Point**
- **Generate Reports**
  - **Power Point**
  - **Excel**
  - **Word**







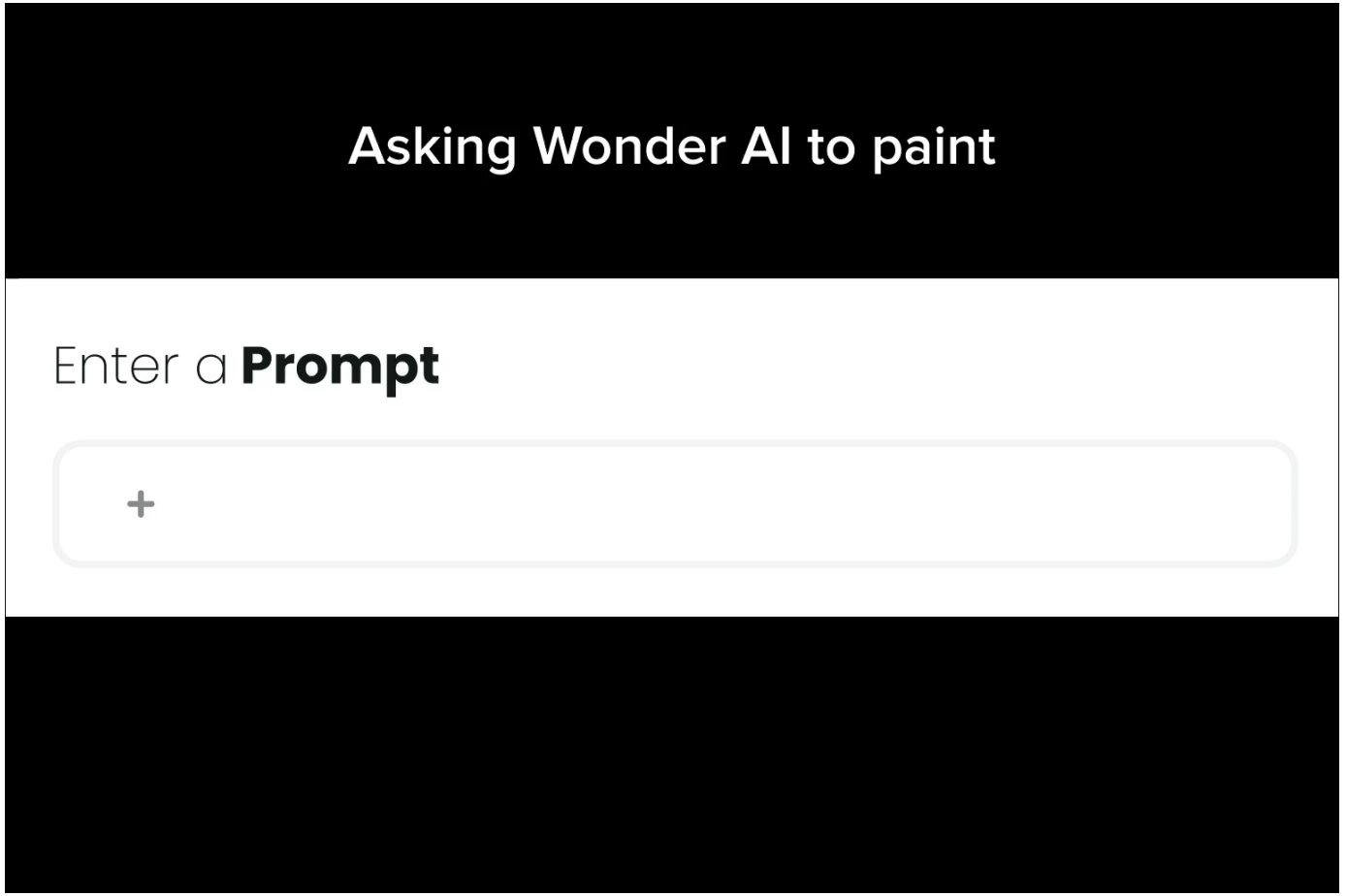
Model Based AI Prompt – Is the Future Now?

- **Requirements generated from configured and traceable components in the Functional, Logical and Physical structure.**
- **Add parameters**
- **AI generates behavior and 3D models needed to define the system.**
- **Review, correct and enhance generated architecture and design definitions**
- **Add optimization for needs and wants.**

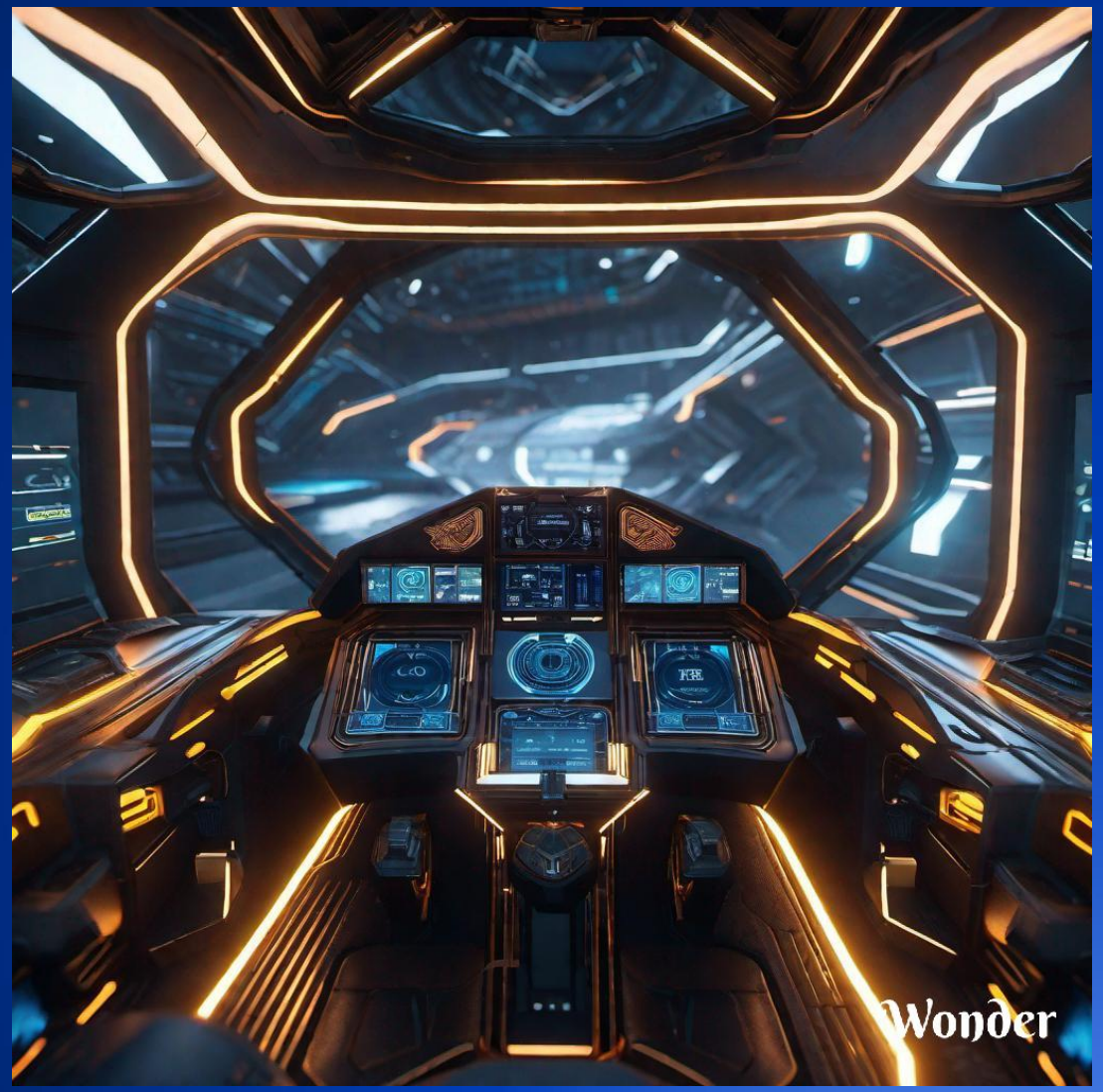
- **Functional / Performance**
  - **The AGENT shall FUNCTION (action verb) in accordance with OUTPUT INTERFACE with PERFORMANCE [and TIMING upon INPUT in accordance with INPUT INTERFACE] while in CONDITION.**
- **Environmental**
  - **The AGENT shall exhibit CHARACTERISTIC during and after exposure to ENVIRONMENT [for TIME DURATION]**
- **Suitability**
  - **The AGENT shall exhibit CHARACTERISTIC during and after exposure to ENVIRONMENT [for TIME DURATION]**
- **Design**
  - **The AGENT shall exhibit DESIGN CONSTRAINTS with PERFORMANCE while CONDITION.**

AI Prompt Engineering

AI Prompt Engineering



Questions?



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