

3DEXPERIENCE CONFERENCE

SEPTEMBER 14-15, 2022 | DARMSTADT, GERMANY

Complexity Management through Model Based Systems Engineering Collaboration

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INCOSE Vision 2035 – Global Megatrends



Source: INCOSE,
www.incose.org/about-systems-engineering/se-vision-2035



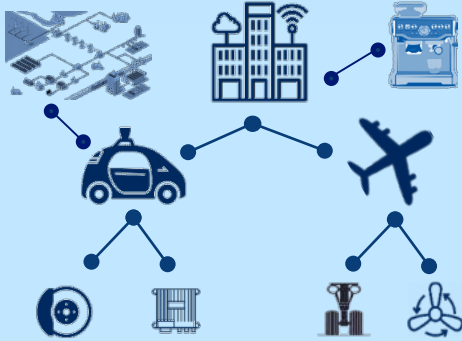
- Change is the norm, it is accelerating
- Need for a science-based approach
- From product to experience with new usage & business models
- Systems engineering adoption across all industries

Systems engineering is the only function looking after stakeholders needs to maximize the business value, while minimizing risks

Strategy for Model Based Systems Engineering

1

Smart & Connected Systems



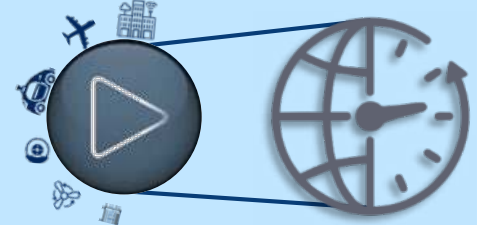
2

Discipline Federation



3

Experience Anytime In the Process



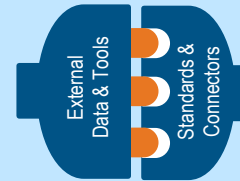
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Governance Services



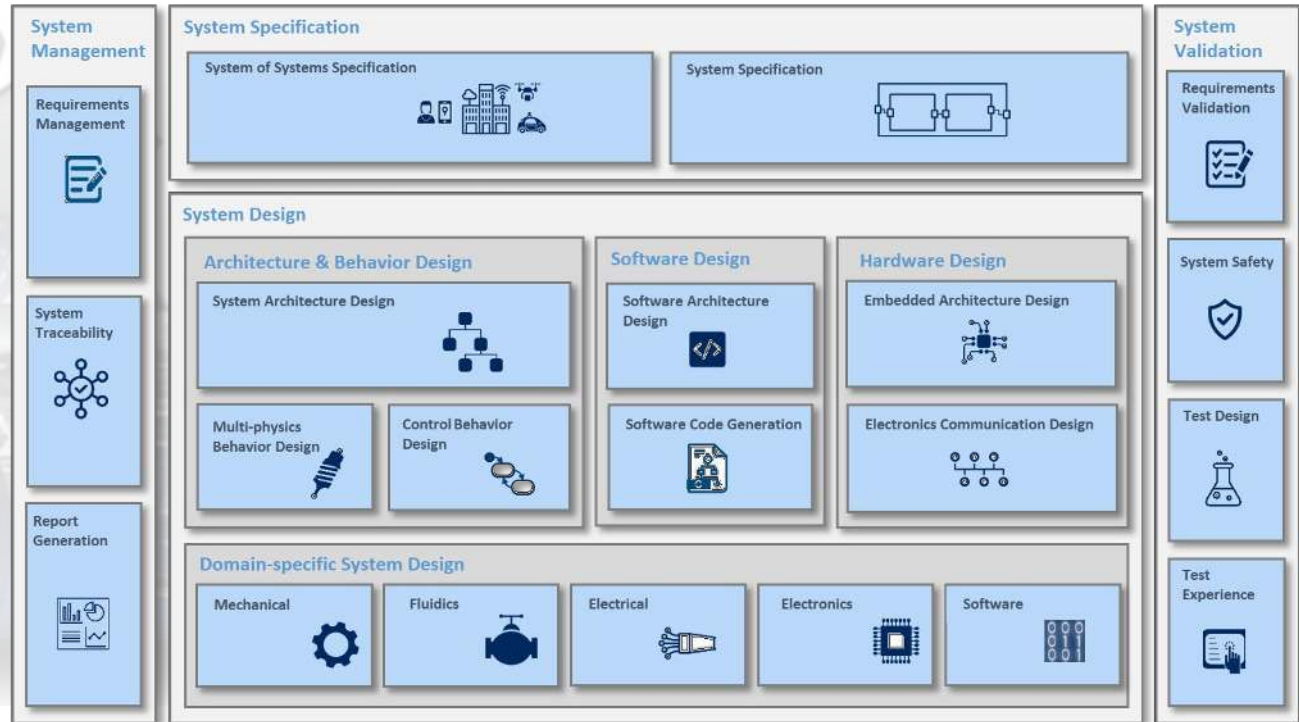
5

Openness



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Model Based Systems Engineering Solution



Requirements Complexity in Systems Engineering



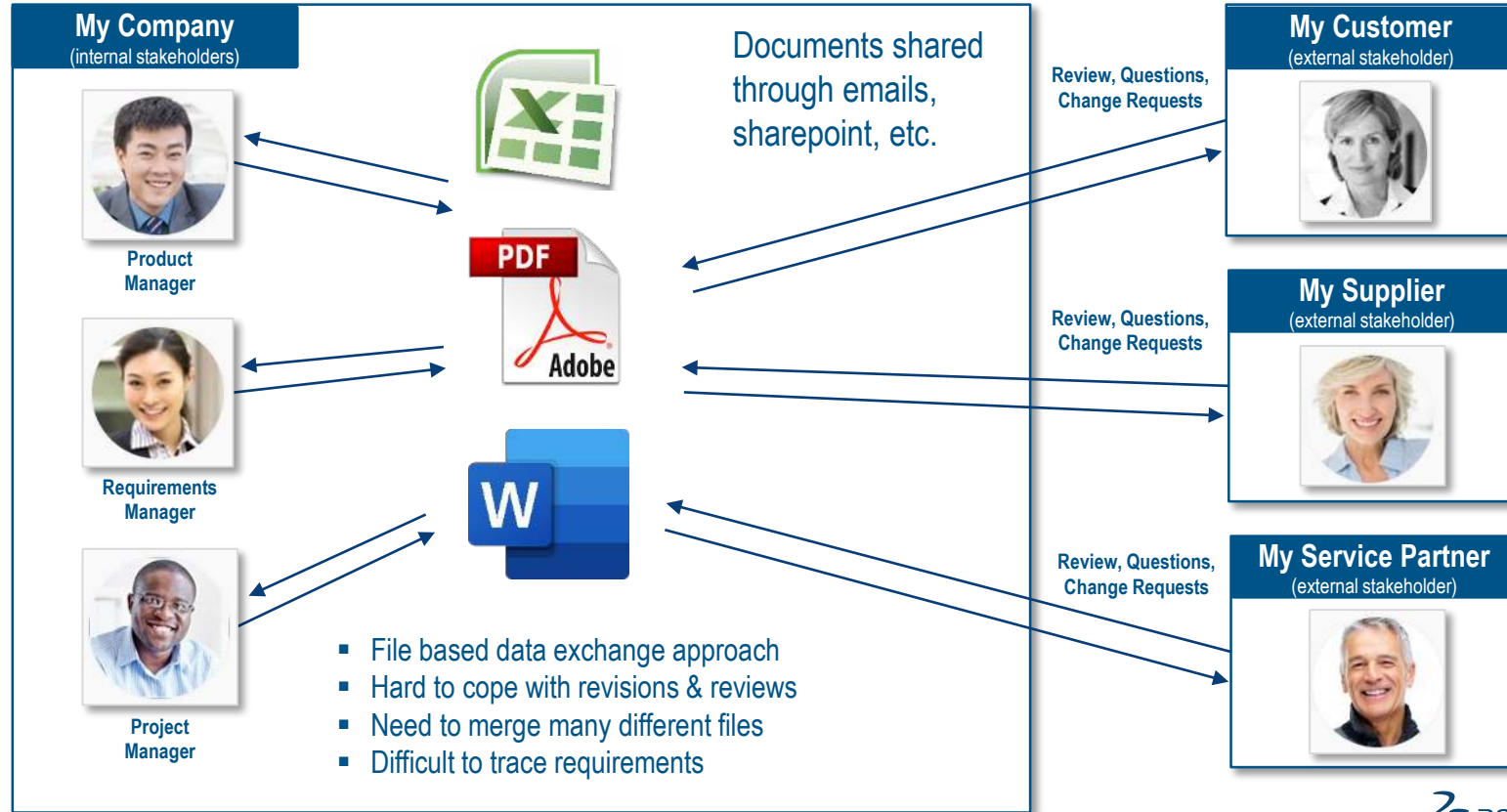
How to...



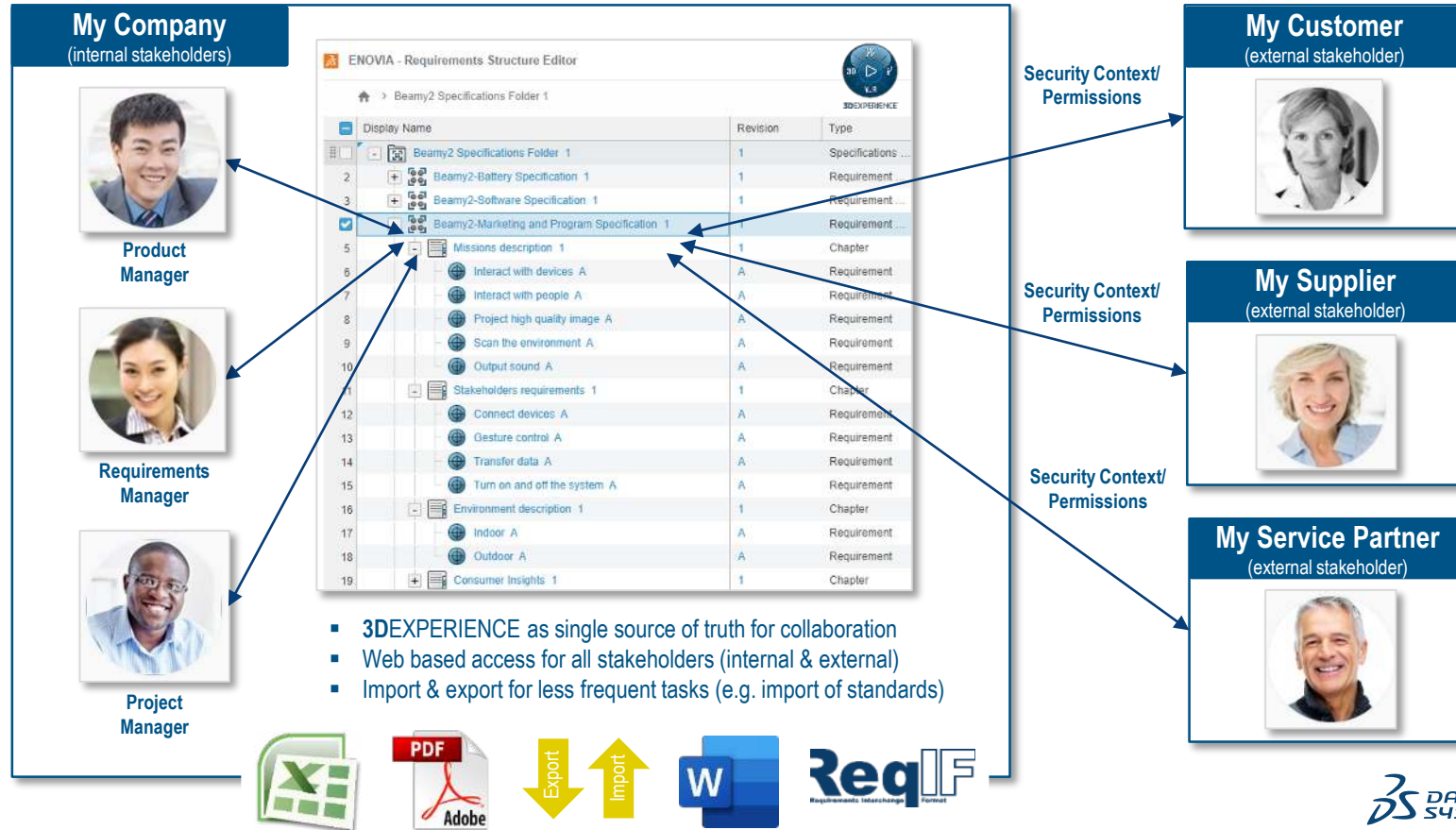
- ...manage all requirements?
- ...collaborate with stakeholders?
- ...trace all requirements?
- ...deal with changes & revisions?
- ...track verification status?



Requirements Collaboration – The complex Way



Requirements Collaboration – On a single Source



Requirements Collaboration & Review Process

The screenshot displays the 3DEXPERIENCE Requirements Collaboration & Review Process interface. The left pane shows the 'ENOVIA - Requirements Structure Editor' with a tree view of requirements. The right pane shows the 'ENOVIA - Requirements Specification Editor - Beam2-Marketing and Program Specification' with a detailed view of a requirement.

Left Pane: ENOVIA - Requirements Structure Editor

Display Name	Revision	Type	Covers	Refined Info	Parameter Value
Beam2 Specifications Folder 1	1	Specifications ...			
Beam2-Battery Specification 1	1	Requirement ...			
Beam2-Software Specification 1	1	Requirement ...			
Beam2-Marketing and Program Specification 1	1	Requirement ...			
Missions description 1	1	Chapter			
Interact with devices A	A	Requirement	1		
Interact with people A	A	Requirement	1		
Project high quality image A	A	Requirement	1		
Scan the environment A	A	Requirement	1		
Output sound A	A	Requirement	1		
Stakeholders requirements 1	1	Chapter			
Connect devices A	A	Requirement	1		
Gesture control A	A	Requirement	1		
Transfer data A	A	Requirement	1		
Turn on and off the system A	A	Requirement	1		
Environment description 1	1	Chapter			
Indoor A	A	Requirement	1		
Outdoor A	A	Requirement	1		
Consumer insights 1	1	Chapter			
Home decoration smart object A	A	Requirement	1		
Sound quality A	A	Requirement	1		
Streaming A	A	Requirement	2		
Quiet cooling system A	A	Requirement	1		
Covers: tolerant to shocks A	A	Requirement	1		
Focus & optical stabilization A	A	Requirement	1		

Right Pane: ENOVIA - Requirements Specification Editor - Beam2-Marketing and Program Specification

Containers: 4
Objects: 18
Selected: none
Traceability Scope: none

1 - Missions description

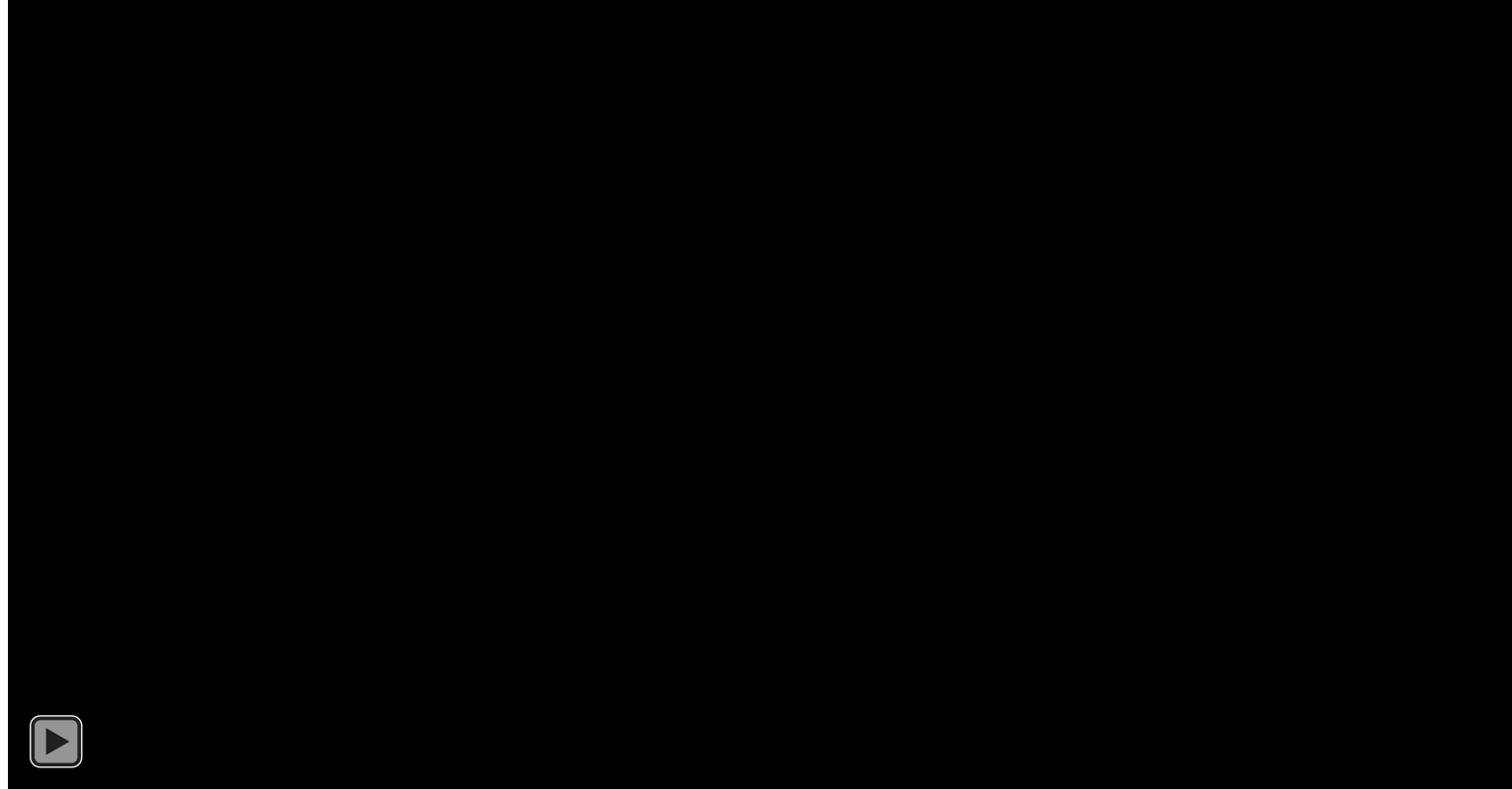
1 - 1 Interact with devices
The mission is to interact with multiple devices simultaneously.

1 - 2 Interact with people
The mission is to interact with users in multiple ways.

1 - 3 Project high quality image
The mission is to project high quality image in any environment.



Requirements Collaboration & Review Process



From Requirement to Innovation using



CATIA | Magic

Collaborative Ideation

New Airport Coffee Drinker Experience



- Requirement 1 (Ver 1)
- Requirement 2 (Ver 3)
- Requirement x (Ver 2)



- What are the use cases?
- What functions are needed?
- What interfaces are required?
- What logical components will it take?
- How will the system architecture look like?



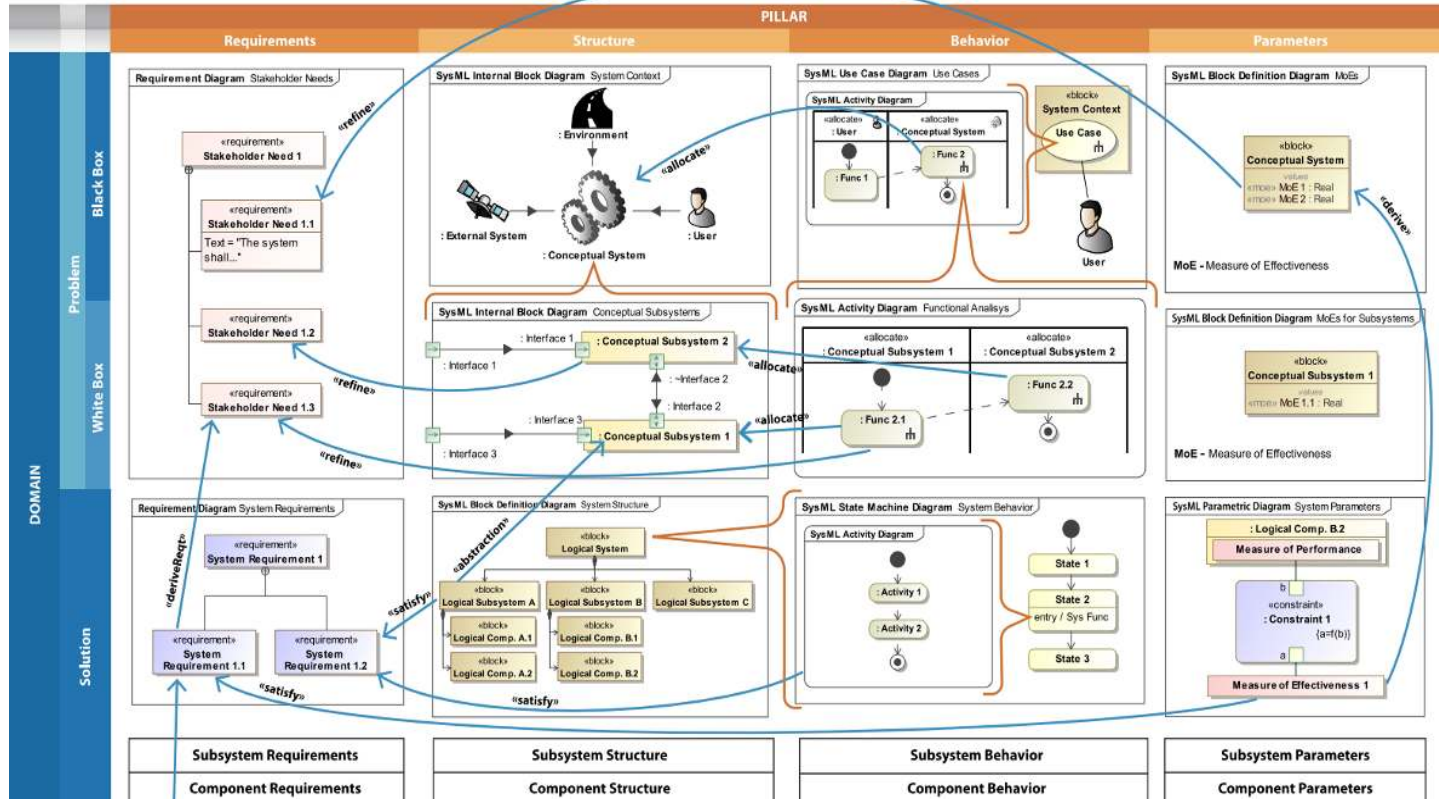
System Specification

Detailed Design

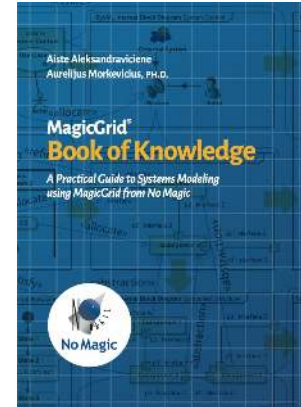


DASSAULT
SYSTEMES

From Requirement to Innovation – Magic Grid

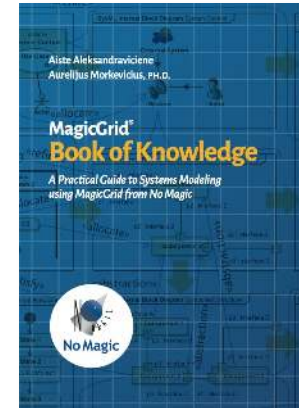
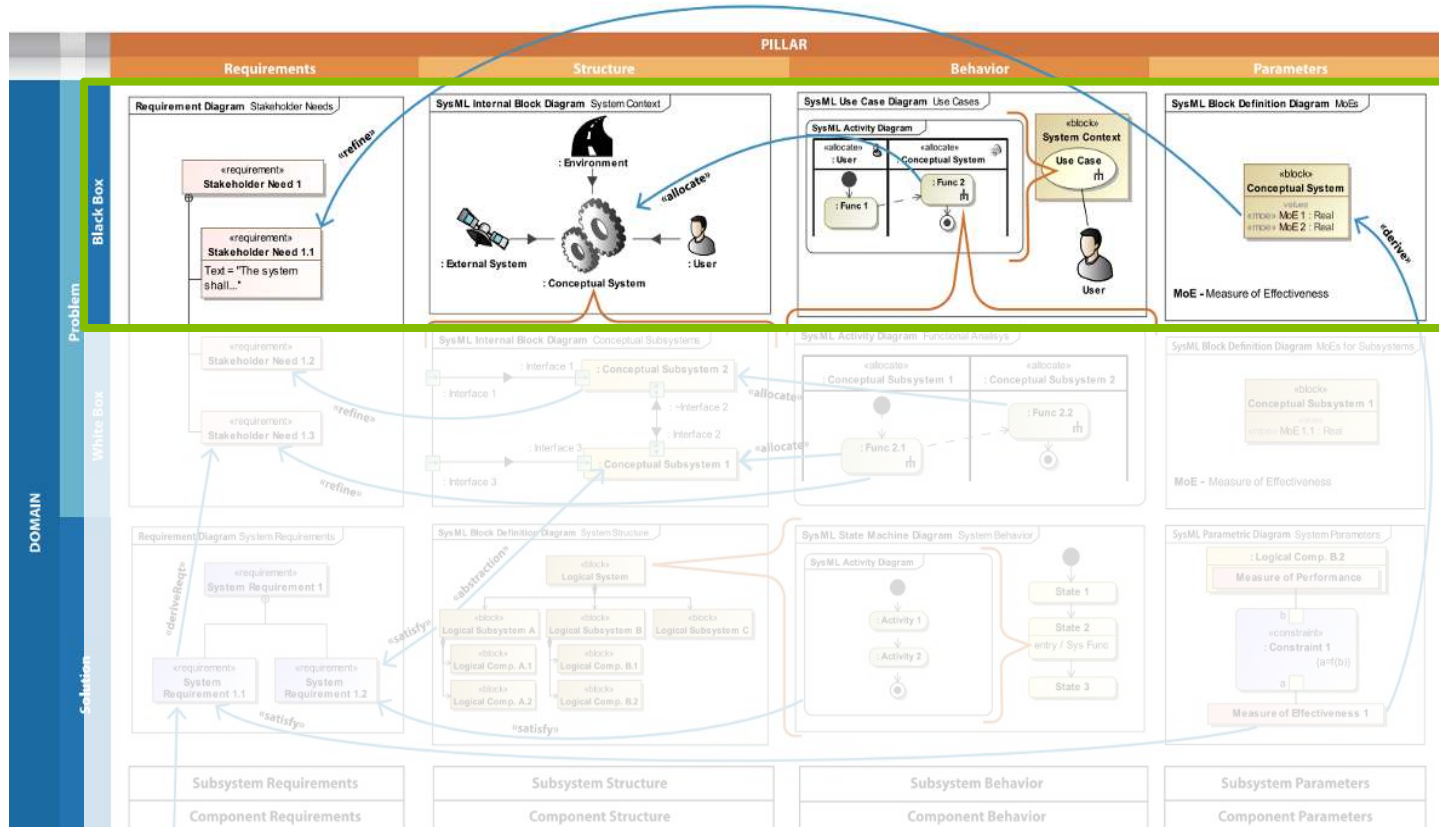


CATIA | Magic

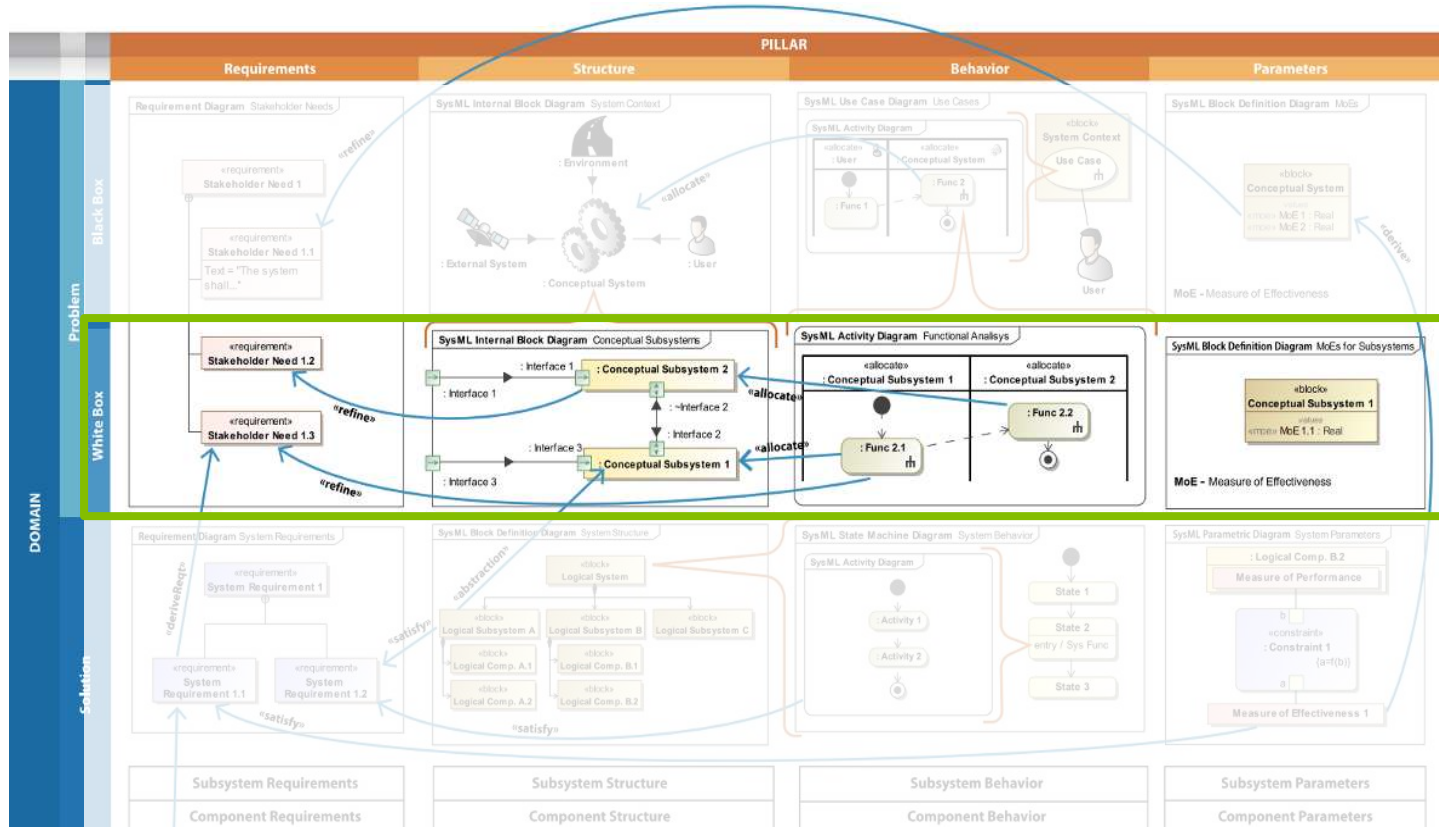


DASSAULT SYSTEMES

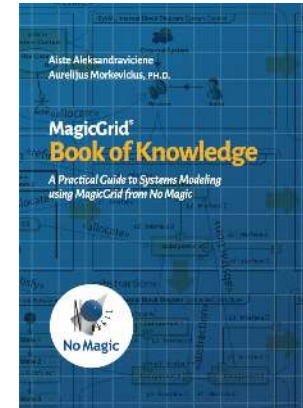
From Requirement to Innovation – Magic Grid



From Requirement to Innovation – Magic Grid

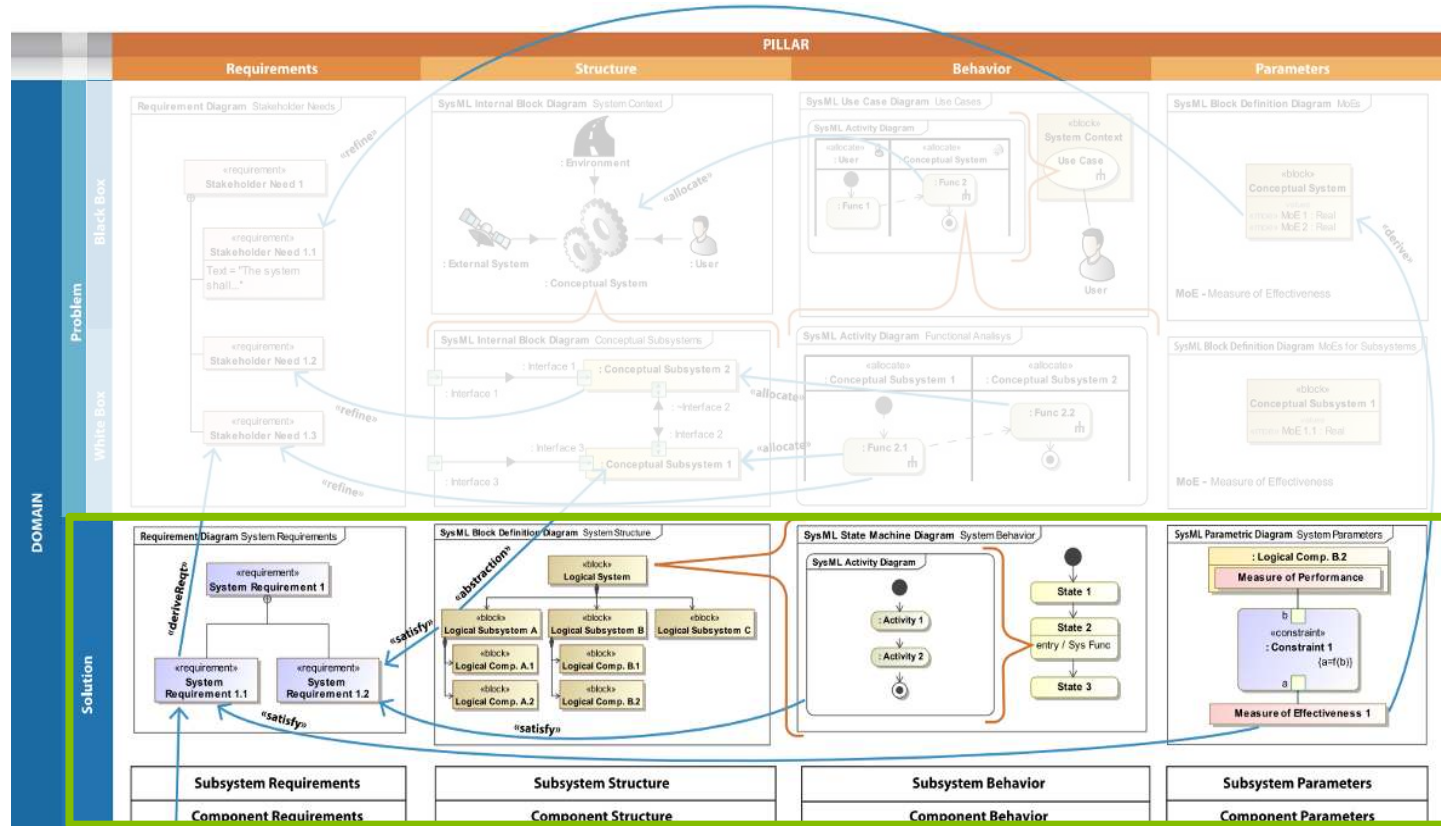


CATIA | Magic

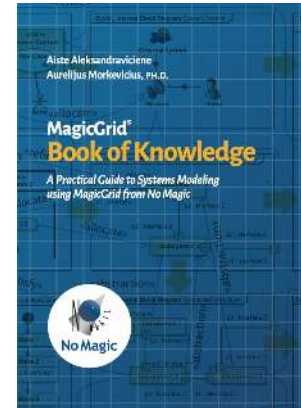


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From Requirement to Innovation – Magic Grid

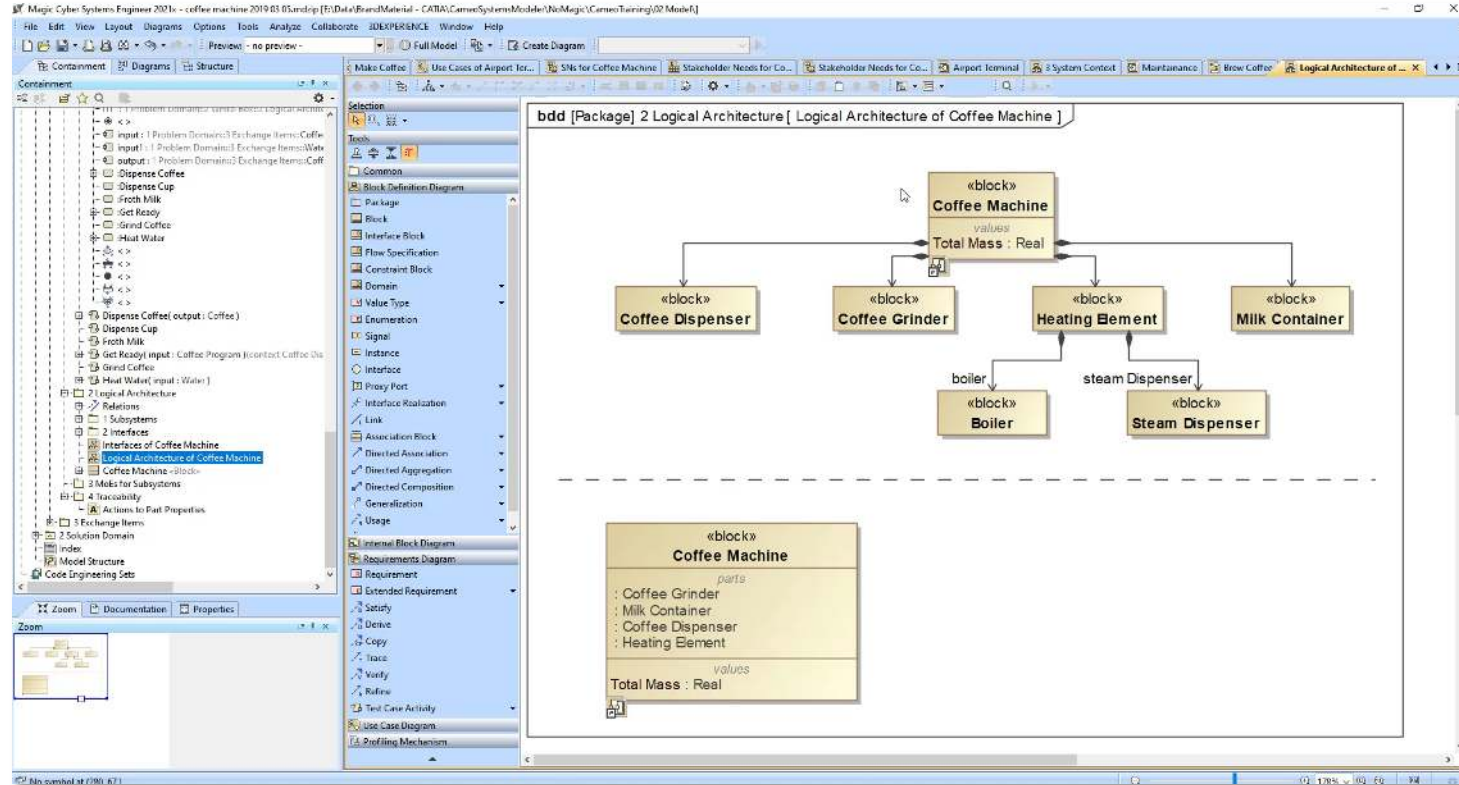


CATIA Magic

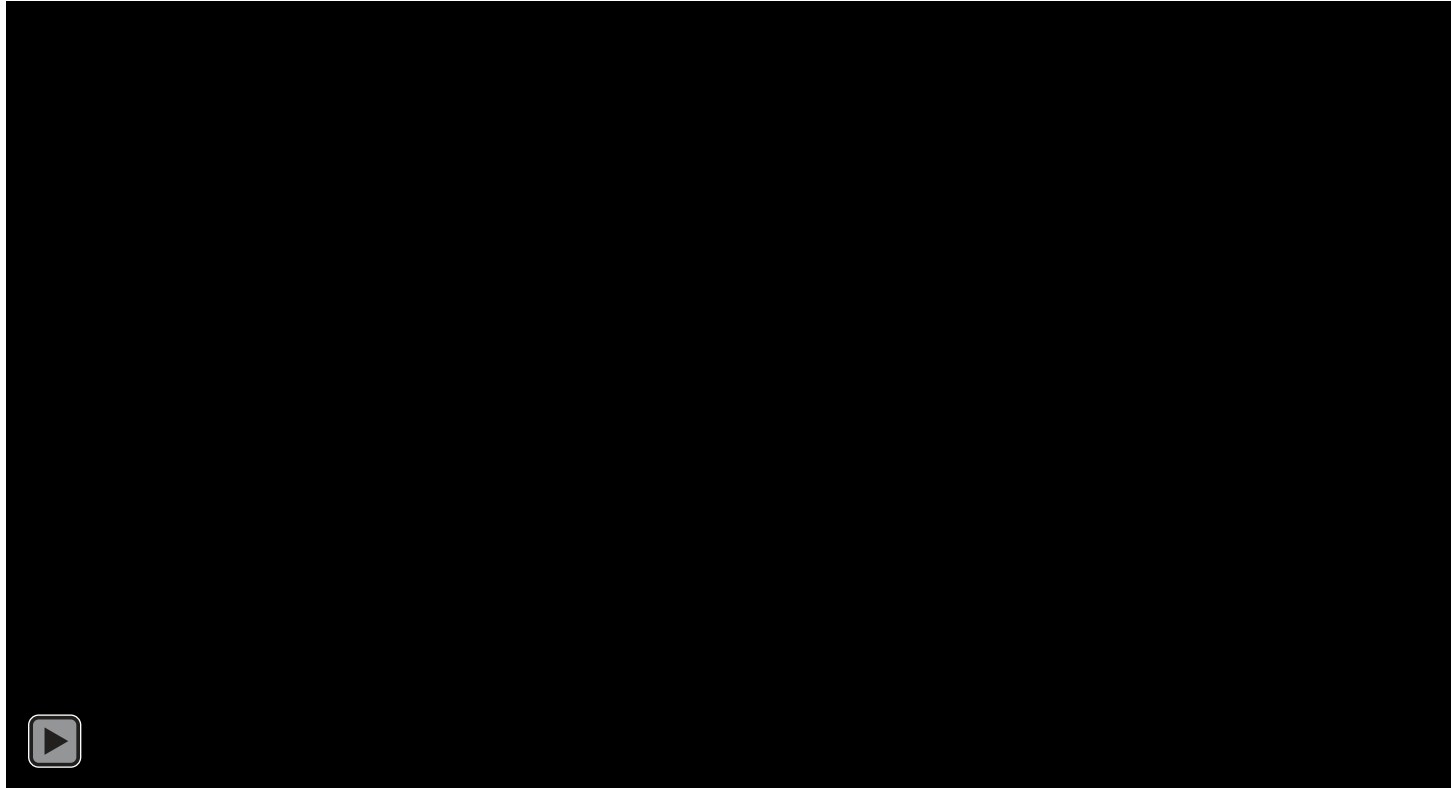


DASSAULT SYSTEMES

From Requirement to Innovation – Demo Example



From Requirement to Innovation – Demo Example

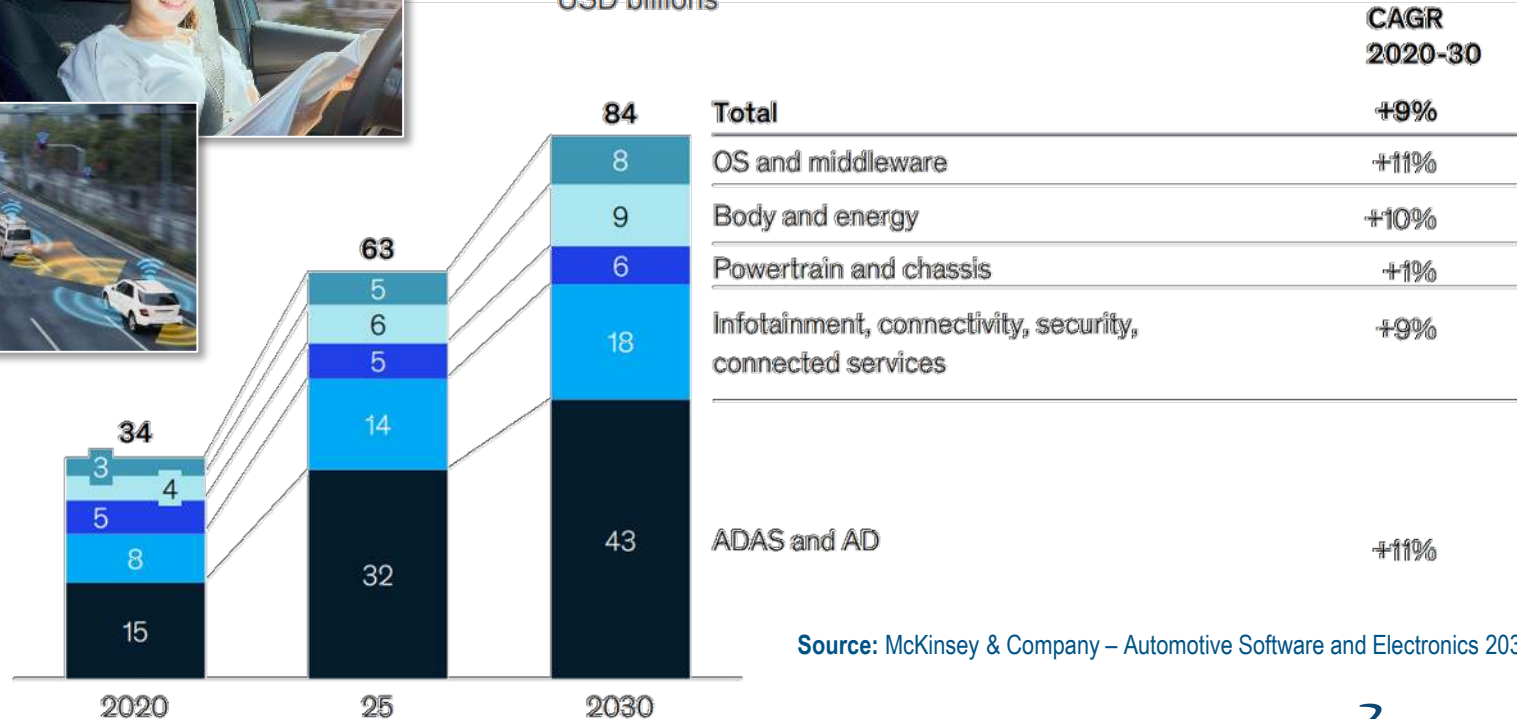


Automotive Transformation & Embedded Software



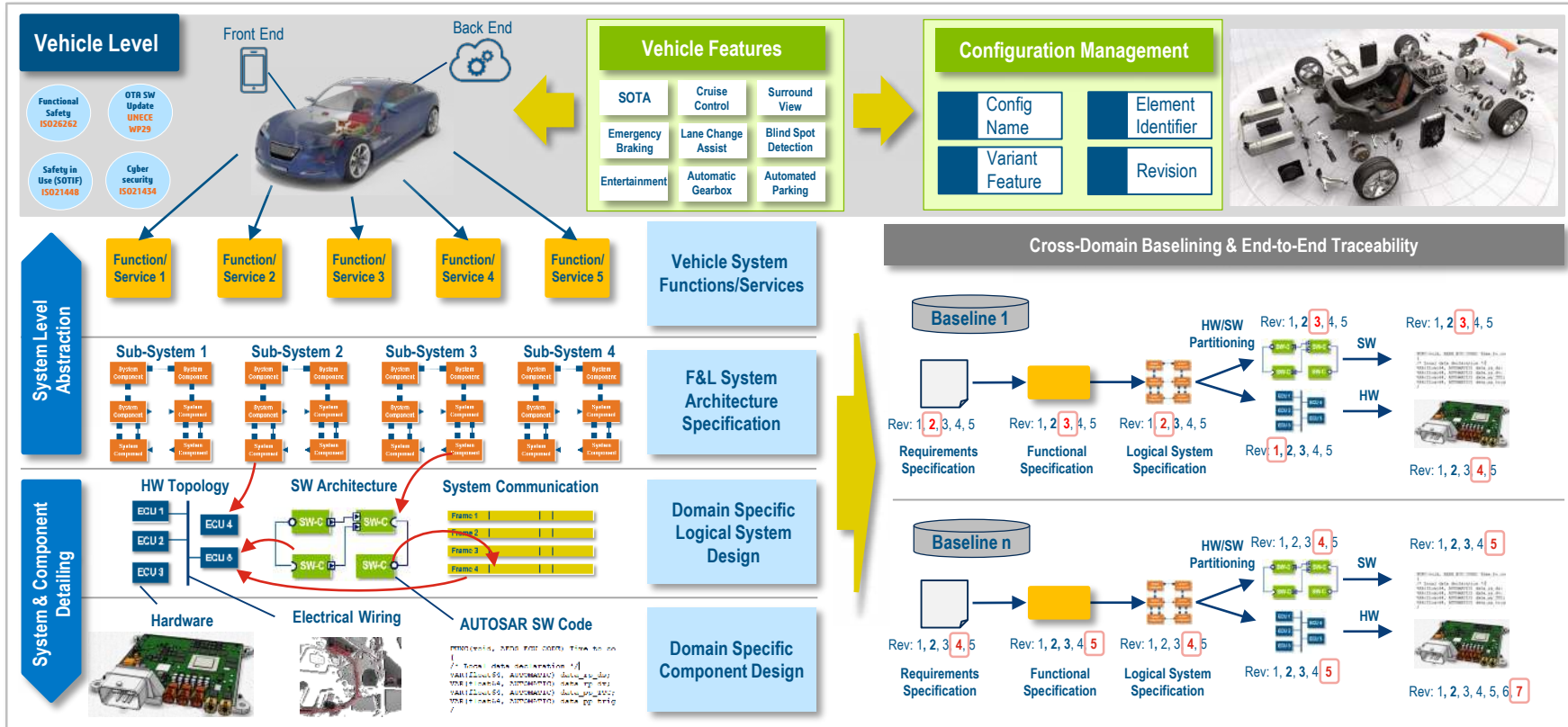
Breakdown of SW development efforts into domains

USD billions

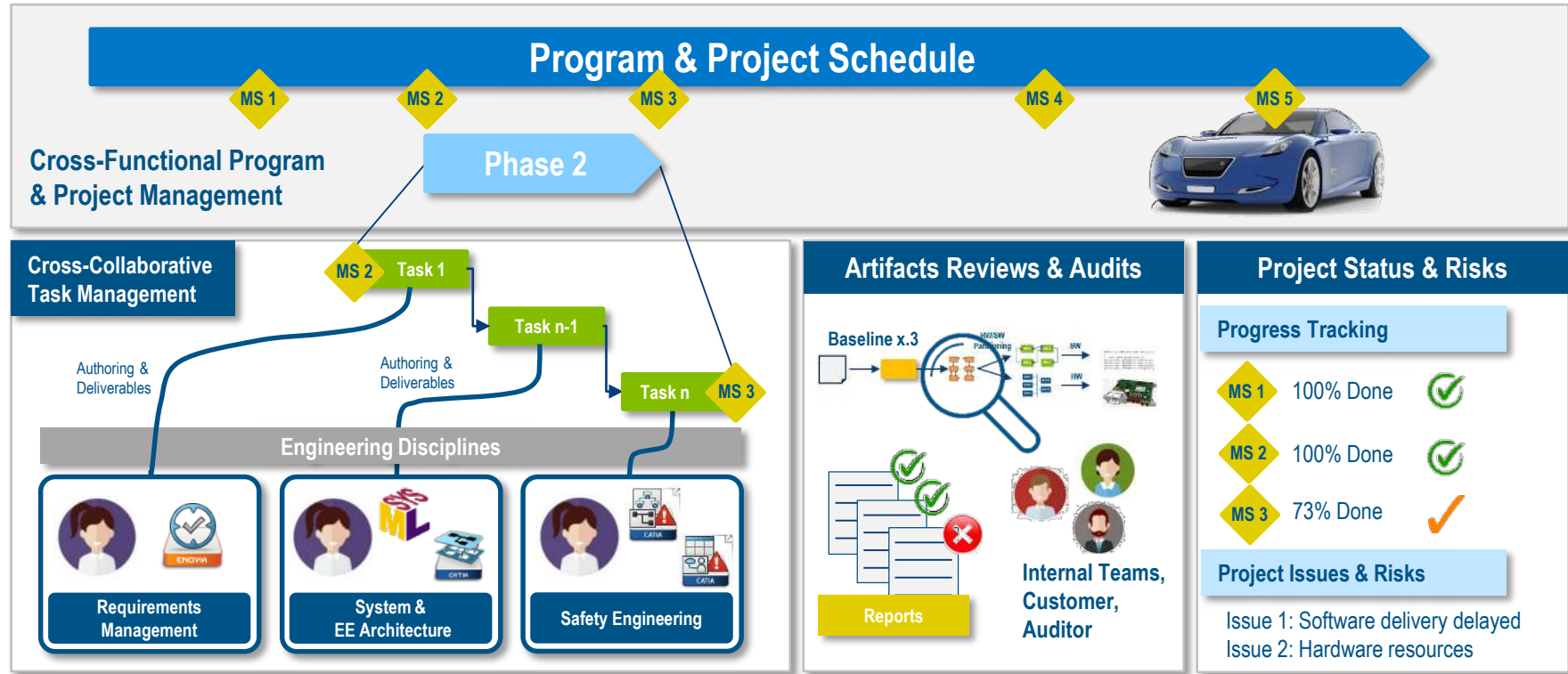


Source: McKinsey & Company – Automotive Software and Electronics 2030

Software Defined Vehicle – System & SW Federation



Project Management & Engineering Execution



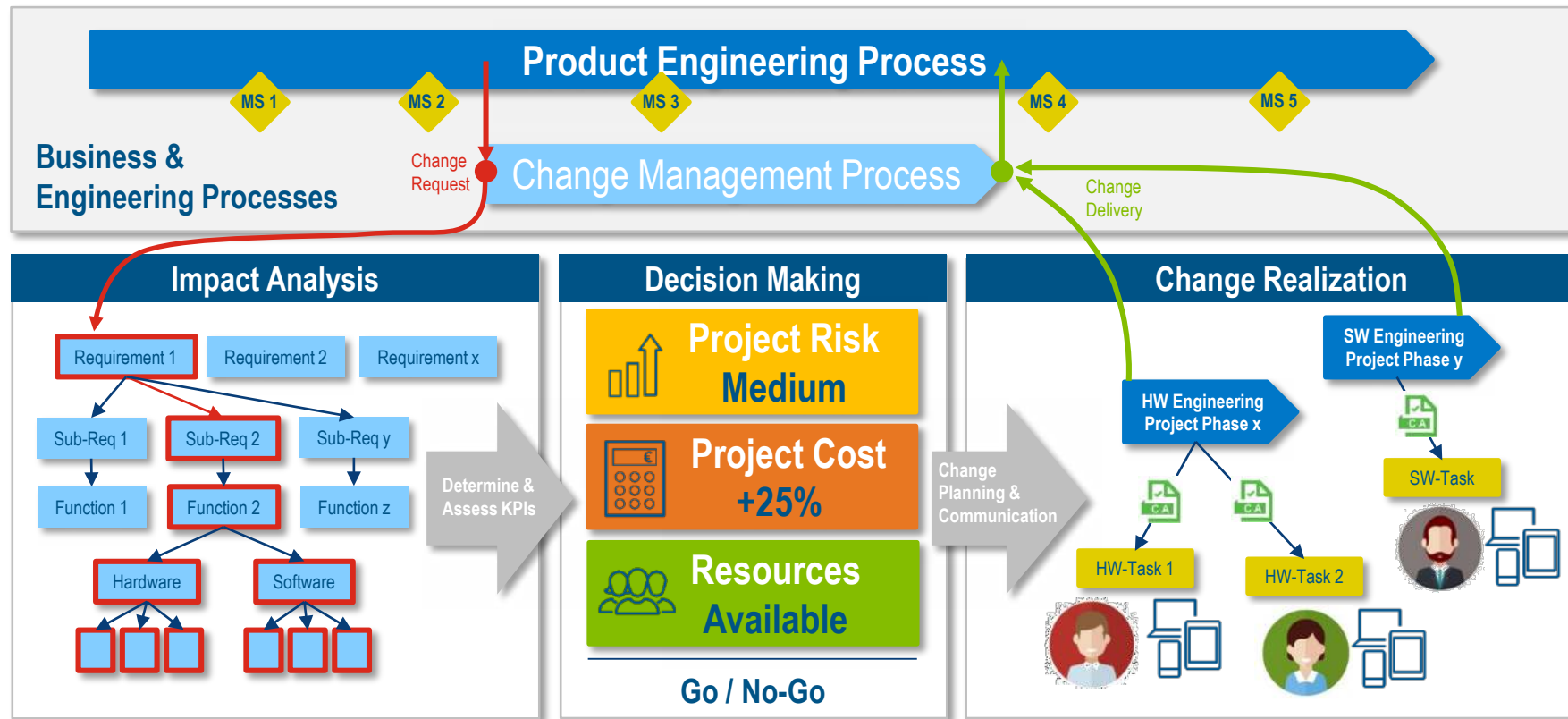
System & SW Federation – AEBS Function Example



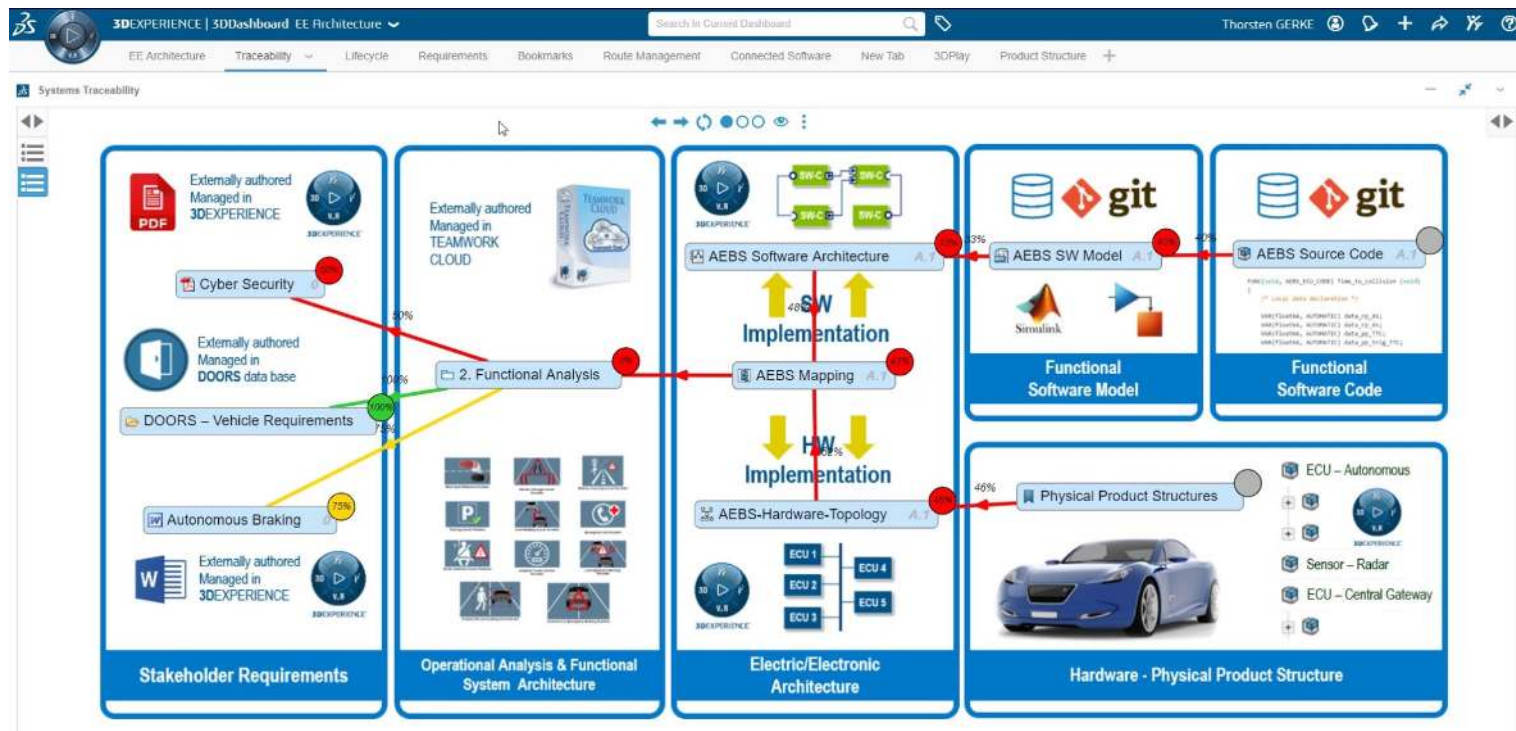
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Agile Change Management & Impact Analysis

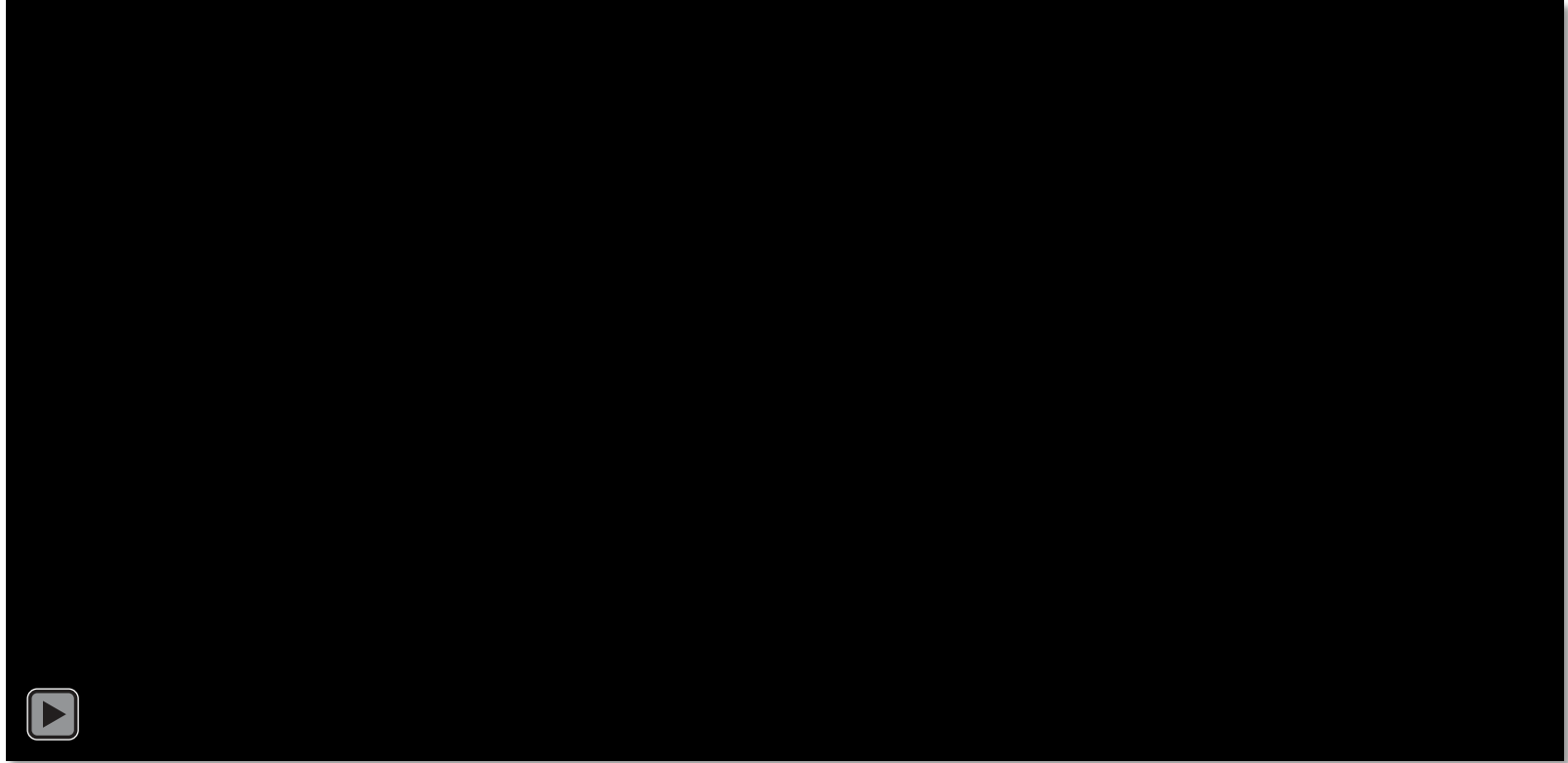


System Traceability & 3DEXPERIENCE Openness

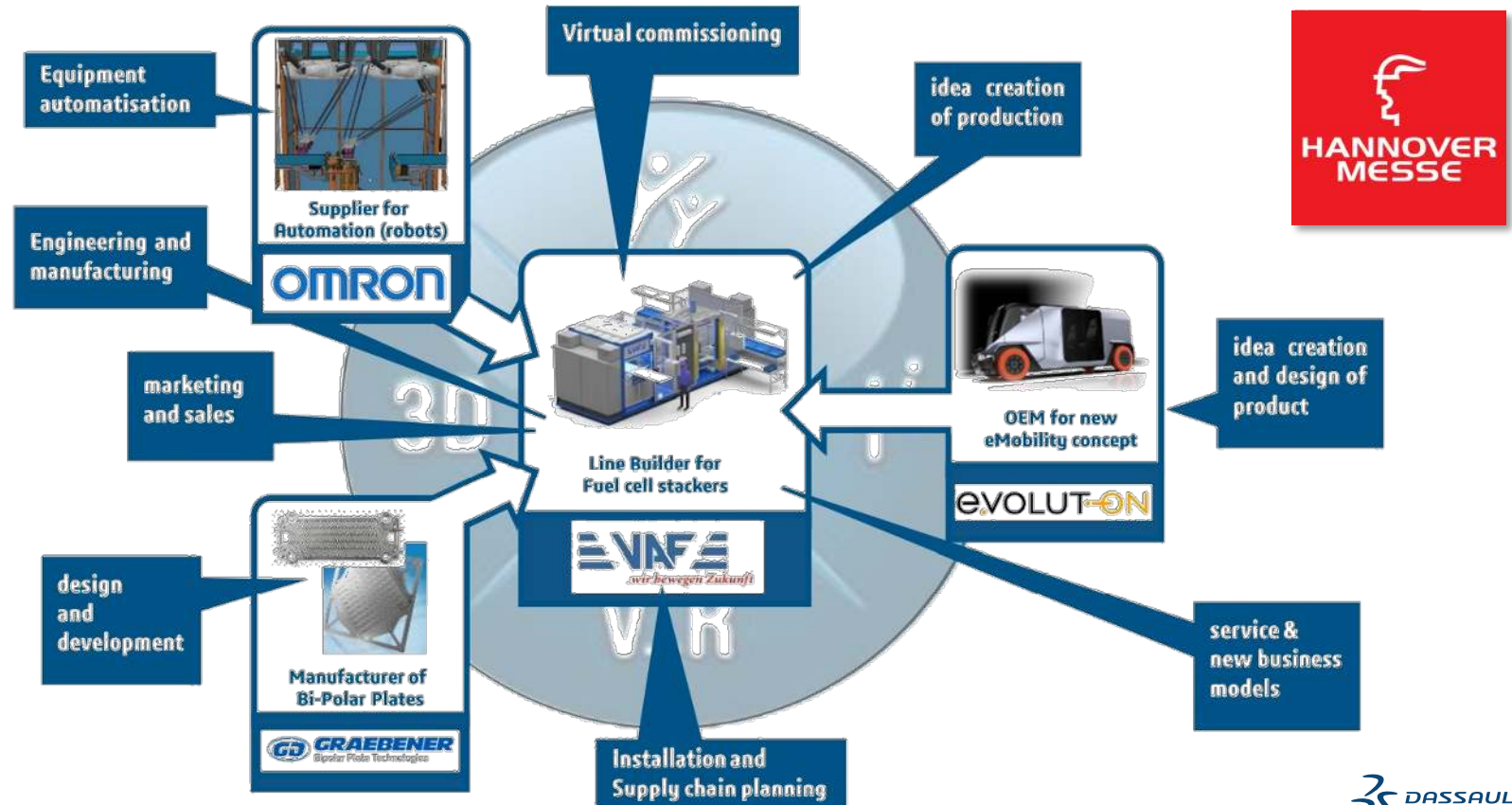


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System Traceability & 3DEXPERIENCE Openness



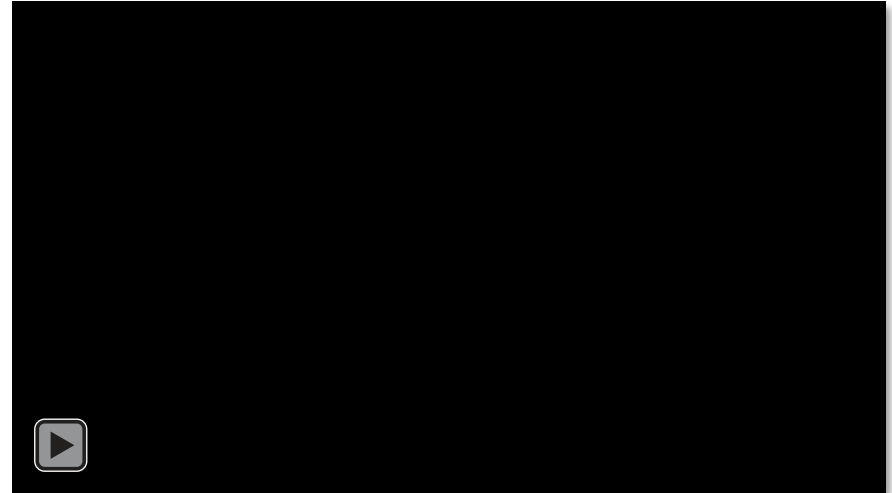
MBSE for Sustainability in Manufacturing Systems



Fuel Cell Manufacturing Process Experience



Fuel Cell Stacking Process



Virtual Commissioning

Equipment Optimization – Energy Consumption



Systems Engineering

Full traceability from the physical product to the requirements

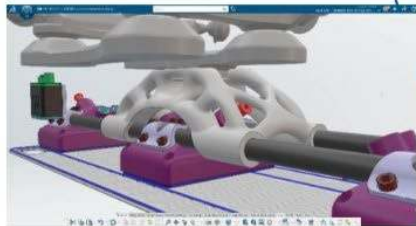


Test Management

Ensure compliance with requirements and manage test plans

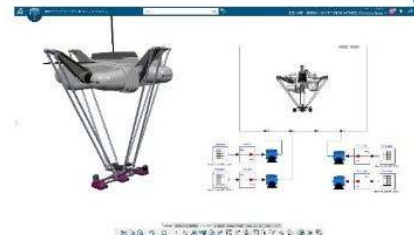


3DEXPERIENCE®



Generative Design

Generate functional CAD concepts and select the best lightweight design



Behavior Modeling

Accelerate understanding and validation of complex systems through early virtual simulation

Equipment Optimization – System & Mechanical



3DEXPERIENCE®



