



3DEXPERIENCE®

MBSE What Else...



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Agenda

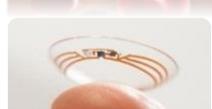
1. Introduction

2. MBSE : A prime Objective

3. “So what”: ...Beyond MBSE Processes

4. Conclusion

Cross-Industry Trends

Industries	Trends	Aerospace & Defense	Transportation	Healthcare	Buildings & EPU	Manufacturing	
Higher Connectivity & Intelligence	Social Systems	Smart & Autonomous systems in smart scene with interactions to other systems & humans					
	Autonomous Systems	Memorization & self learning capabilities					
	Responsive Systems	Ability to detect and respond to external changes					
	Environment Sensing Systems	Collecting, measuring & analyzing data					
	« Non aware » Systems	No reasoning capability					

Cyber Physical System of Systems: Complexity within & across Industries

Trend Analysis | Cyber-Physical Systems

TECHNOLOGY DRIVERS



Interoperability & Communications

Are key for large systems, bridging digital & physical system components, adaptive and predictive systems with distributed control. Common architectures such as in IoT are enabling structural consistency

Platforms

Open and collaborative engineering platforms are essential for spurring future investments, acceptance and use of innovative systems, providing a foundation for design, manufacturing and operations of CPS and CPSS.

Artificial Intelligence

Powered by Artificial Intelligence, Deep learning and new sensing capabilities, CPS open novel deployment frontiers in T&M, A&D, IE,... with advanced human in the loop systems for higher value Experiences

Systems Engineering

Multi-disciplinary System-level thinking is shaping future CPS. Availability, security & safety are assured by the application of integrated, multi-disciplinary scientific approaches to design & implementation

Societal Needs

Enabled by technologies and platform concept, pulled by new societal needs, the search for new ways to do business is accelerating

Digital Competitiveness

Growing amount of new business is created by blurring the digital and physical worlds, homeland security, energy, public health and safety, mobility

Smarter Everything

The smartness behind things, systems, and systems of systems represents the constant pursuit of productivity gain, payback driving the expansion of CPS

IT-OT Convergence

The convergence of IT and OT leads to blurred boundaries among departments and system lifecycle stages, with a need to increase cyber-security across all private and public sectors



01 01



BUSINESS DRIVERS

Smart Factory
market worth¹

\$205 Billion
(Year 2022)

Smart Healthcare Products
market worth²

\$58 Billion
(Year 2023)

Vehicle Systems, Data &
Services
market opportunity³

\$70 Billion
(Year 2030)

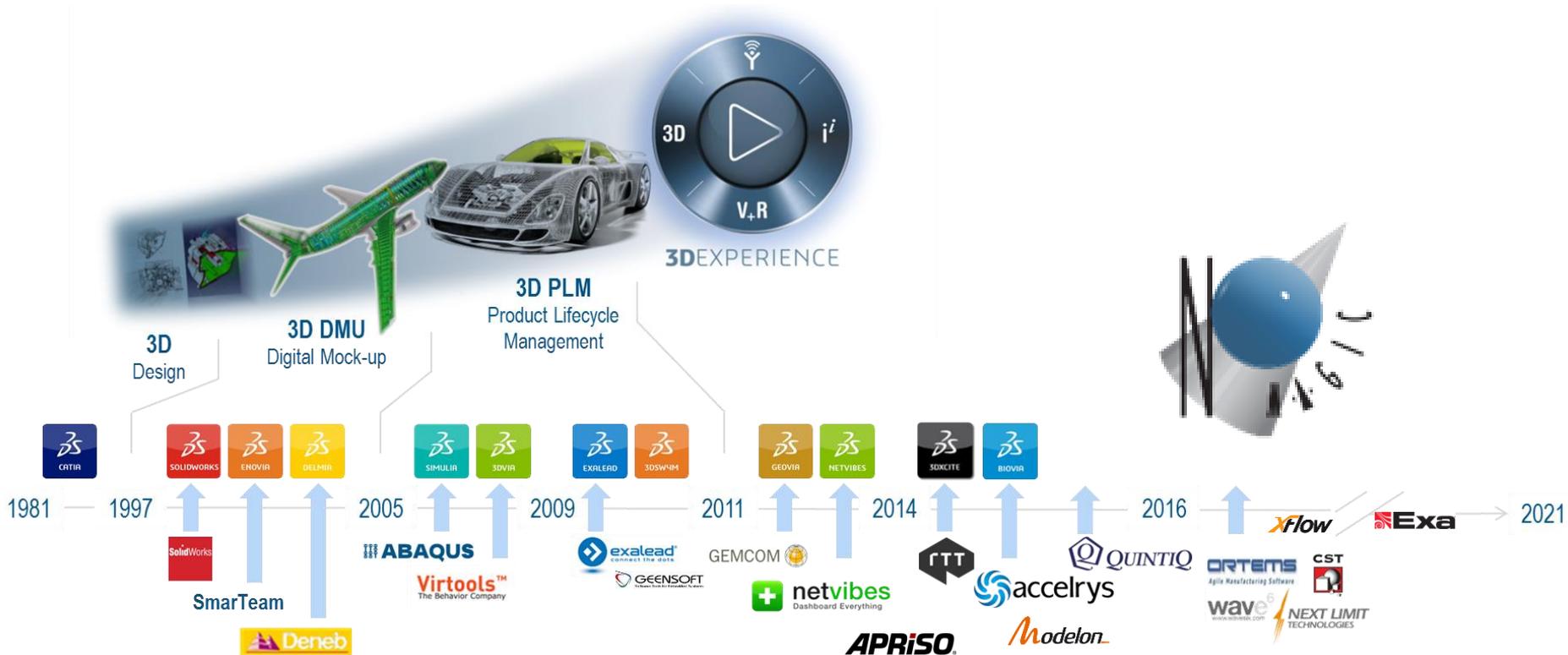
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1. Source: <https://www.marketsandmarkets.com/PressReleases/smart-factory.asp>
 2. Source: Transparency Market Research
 3. Source: Intel (<https://intelandmobileye.transactionannouncement.com/wp-content/uploads/2017/03/Intel-to-Acquire-Mobileye-.pdf>)

**“Problems cannot be solved
with the same mind set that created them.”**

Albert Einstein

37 years of sustainable innovation & investments



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Dassault Systèmes with No Magic Inc.



Functional & Logical Design System Architect Role

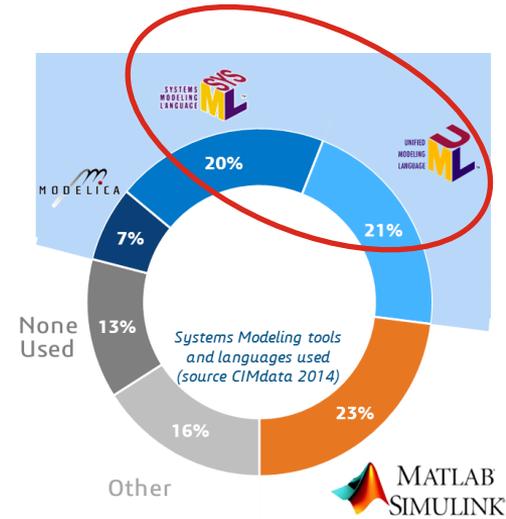


Compliance with industry-standard modeling languages

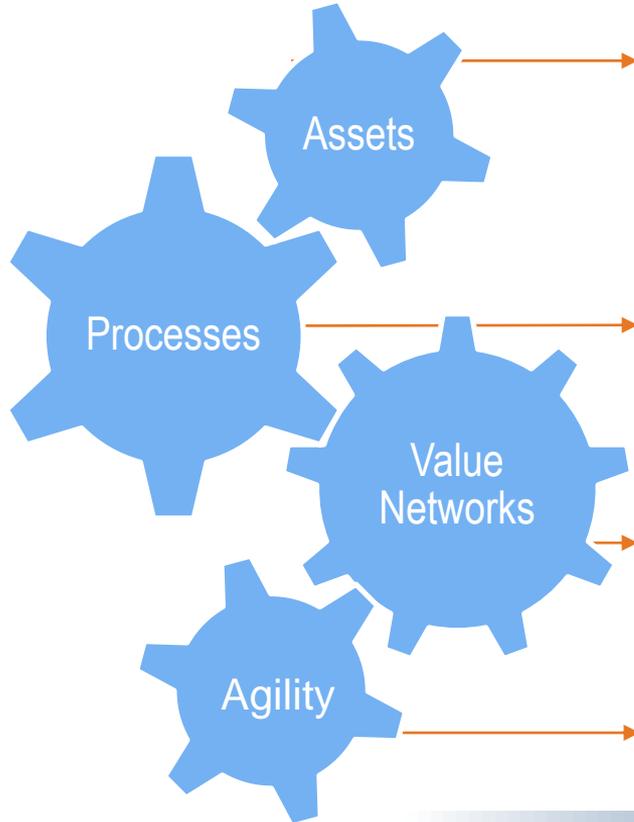
System of Systems

CPS Systems

Software



What Customers value the MOST



1

Increase Asset Value

Driven by the value of keeping it on and running

2

Improve Process Efficiency

Driven by new complexity and diversity, stringent quality & competitiveness needs

3

Enable Value Networks

Driven by disruptive business models where value network share intelligence to co-innovate and co-operate

4

Accelerate Innovation

Driven by fast moving players and new comers on high value segments

From VALUE to Engineering Challenges

Accelerate Innovation

Reduce by 15% the requirement management time

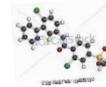
Improve Engineering productivity by 20%

Reduce rework loops by 50%

Save 30% of validation costs



Openness & Collaboration



DIGITAL CONTINUITY



Modularity - Product lines



AGILE PROCESSES



VIRTUALISATION

Openness: Standards & Tools support

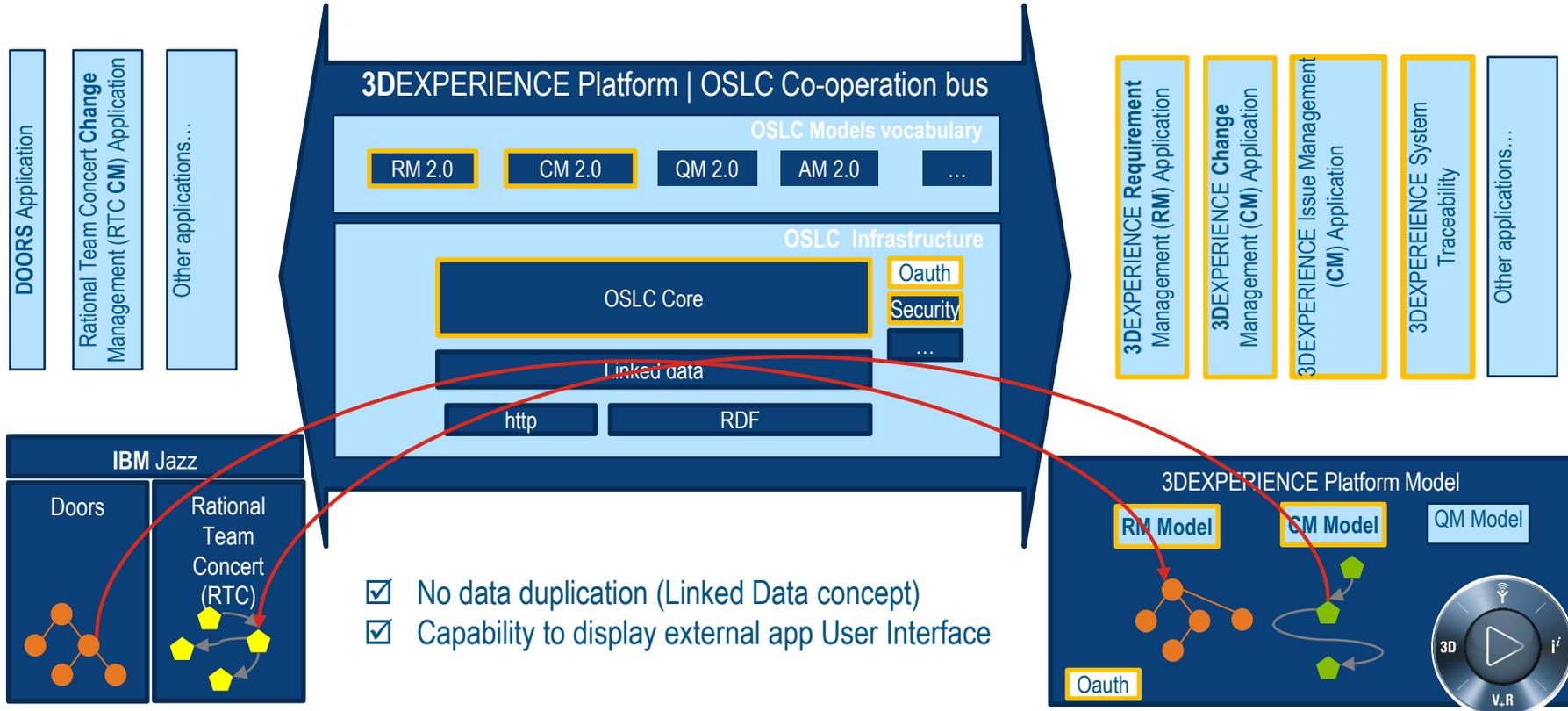


Adopt and Drive **Standardization initiatives** with **Industry Communities**

Support **Industry Standards** and Provide **Connectors** to external legacy tools used by our Customers, **power' by 3DEXPERIENCE Platform**

3DEXPERIENCE Platform and

<http://www.oasis-osl.org>



→ Linked Data

Collaborative Processes

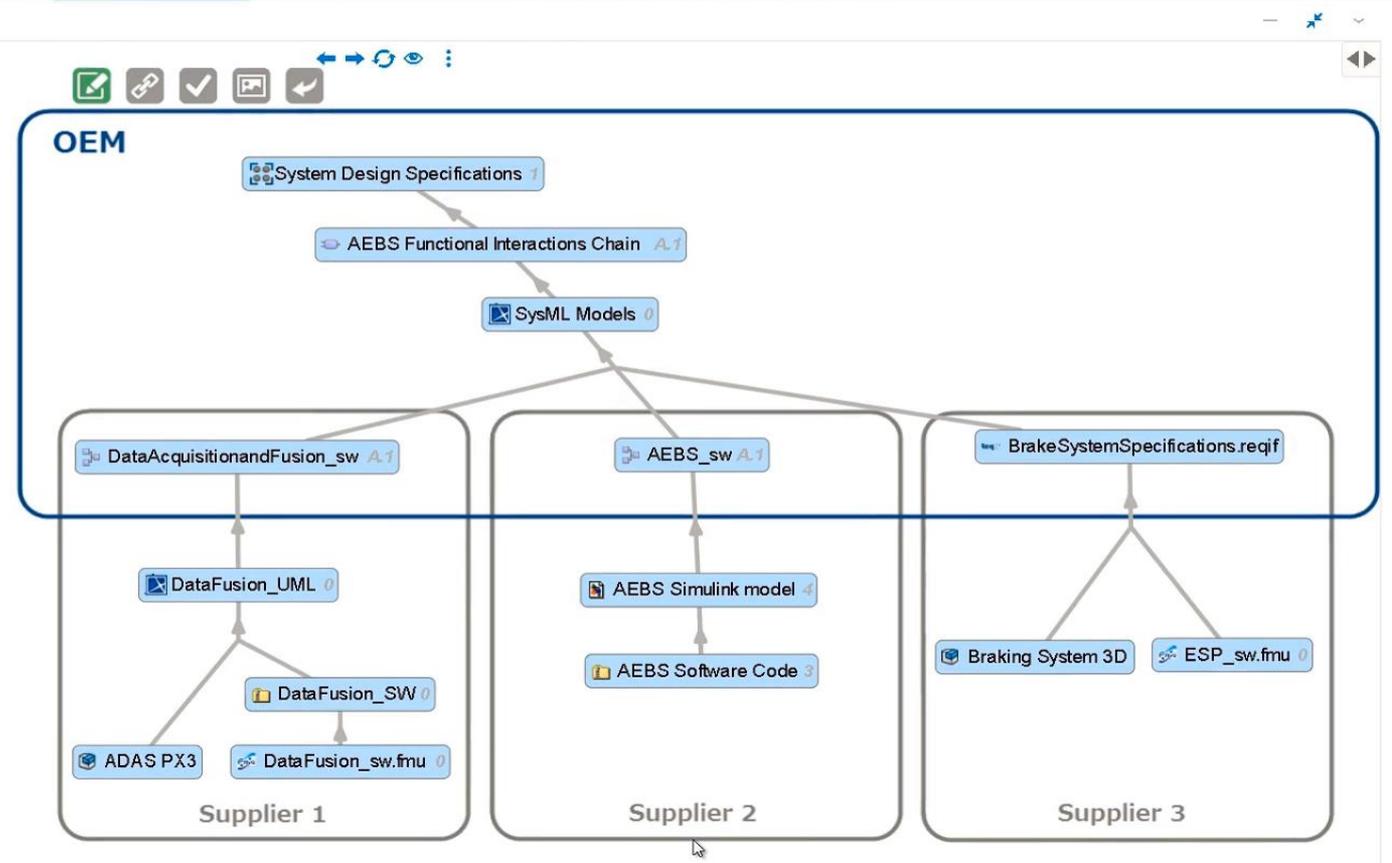


ONE Systems Engineering PLATFORM

**Break the silos,
to boost INNOVATION**

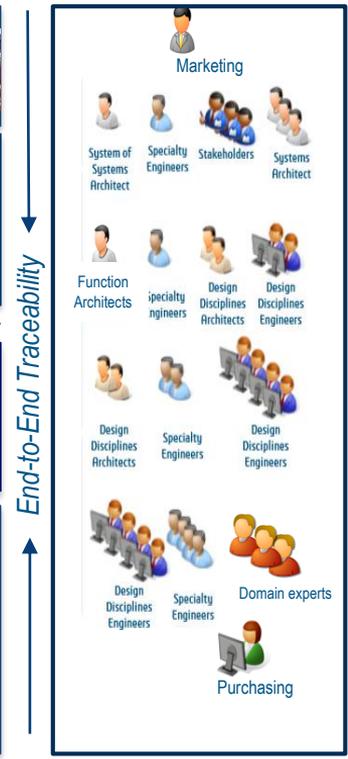
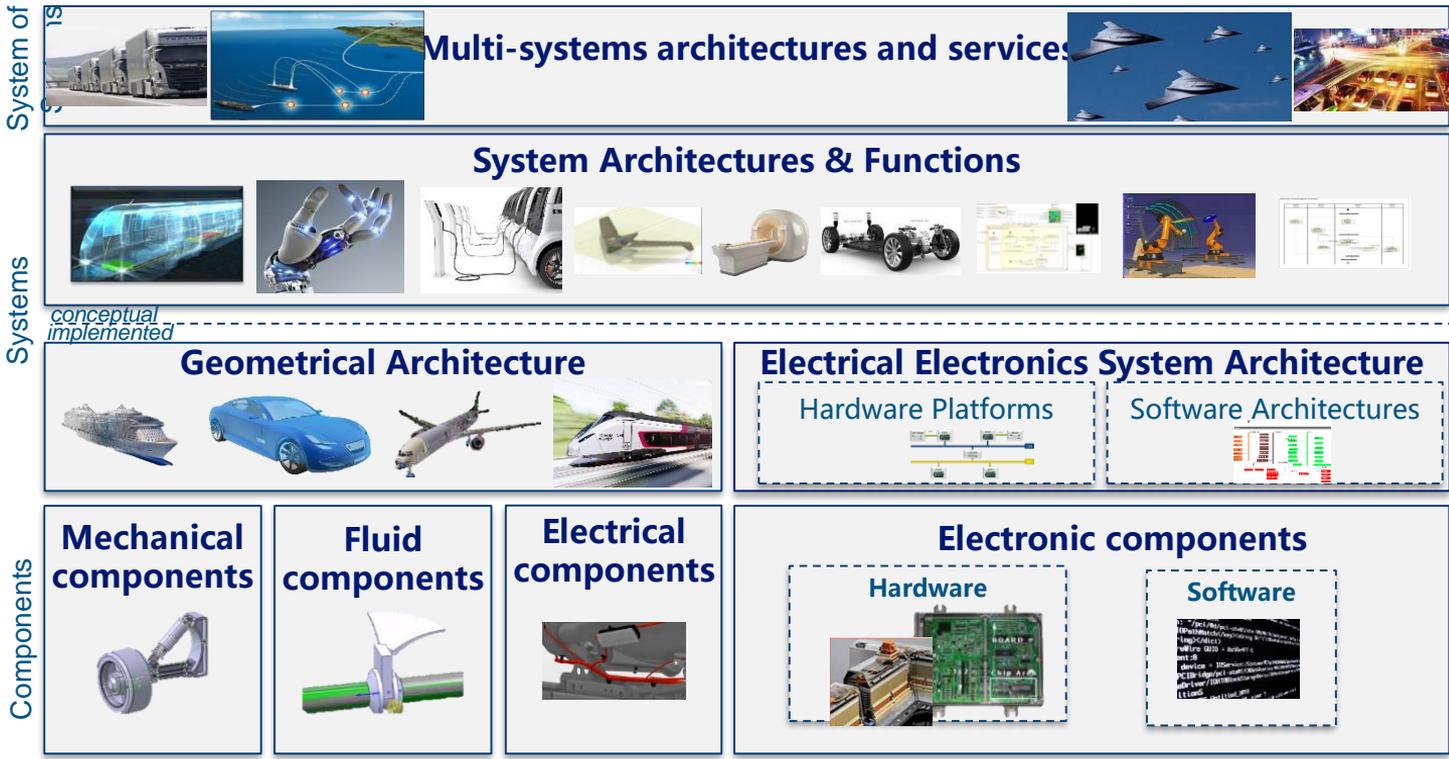
- ▷ Validate best alternatives at conceptual level with **Early Validation**
- ▷ Improve productivity, re-usability & quality with **digital continuity**
- ▷ Streamline and accelerate **OEM & Suppliers Collaboration**
- ▷ Decrease testing time & cost with **Virtual Integration & Validation**

- Suppliers Packages
- Workspace
 - AEBS Supplier Package
 - 1. Technical Specification
 - 2. Supplier deliveries
 - Hardware
 - Software
 - AEBS ARXML (AUTOSAR) Drop2.zip 3
 - AEBS Simulink model 4
 - AEBS_sw.fmu 3
 - AEBS_SW_Code 3
 - Test_Report_B12.doc 1
 - Airbag Control Unit Supplier Package
 - Dashboard HMI Supplier Package
 - ESP Supplier Package
 - Sensors Data Fusion Package
 - SIMULIA Samples
 - OEM Supplier Collaboration - v3 A
 - Deliveries_Review 0
 - Issues
 - Change Management

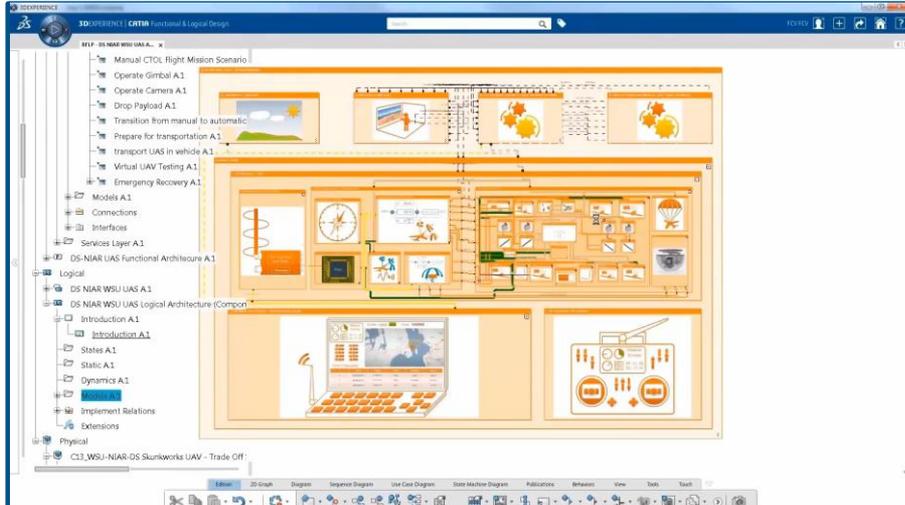




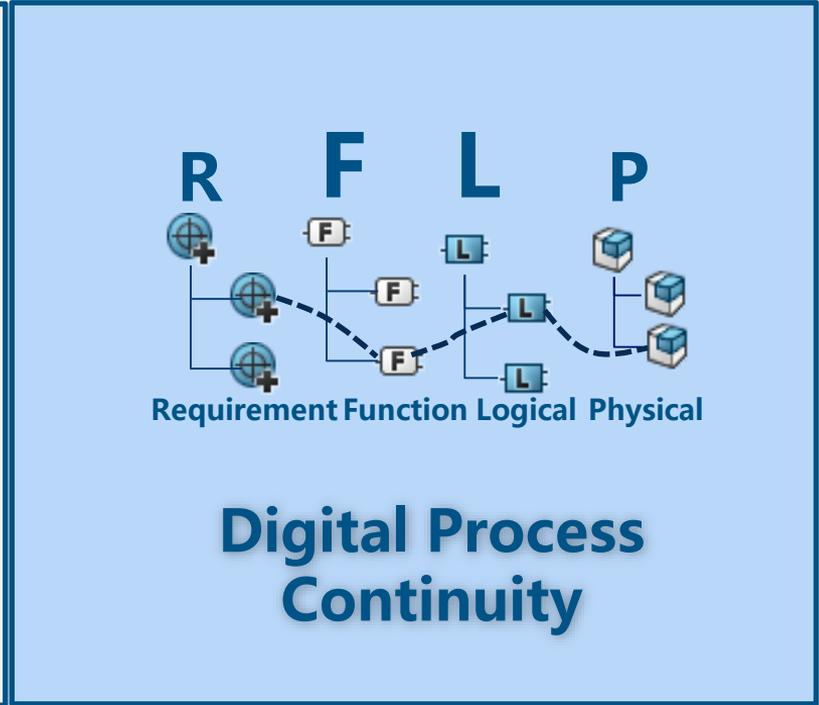
Systems Engineering for ALL



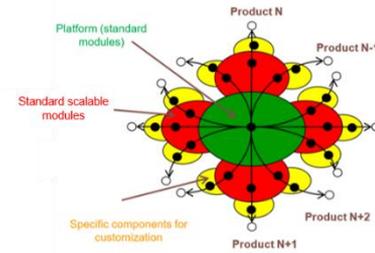
RFLP as main PILAR



Multi-scales
Systems



Modularity & Product Lines



Top-Down Architecture Definition of Assets

Flexible architecture
Definition & Simulation

150% PBS

- ▶ KPI: Reduction of **P/N diversity** in product line

Semi-automated Generation of Product Variants

Generative design

Configuration resolution

- ▶ KPI: **Design lead time** reduction
- ▶ KPI: Design cost reduction

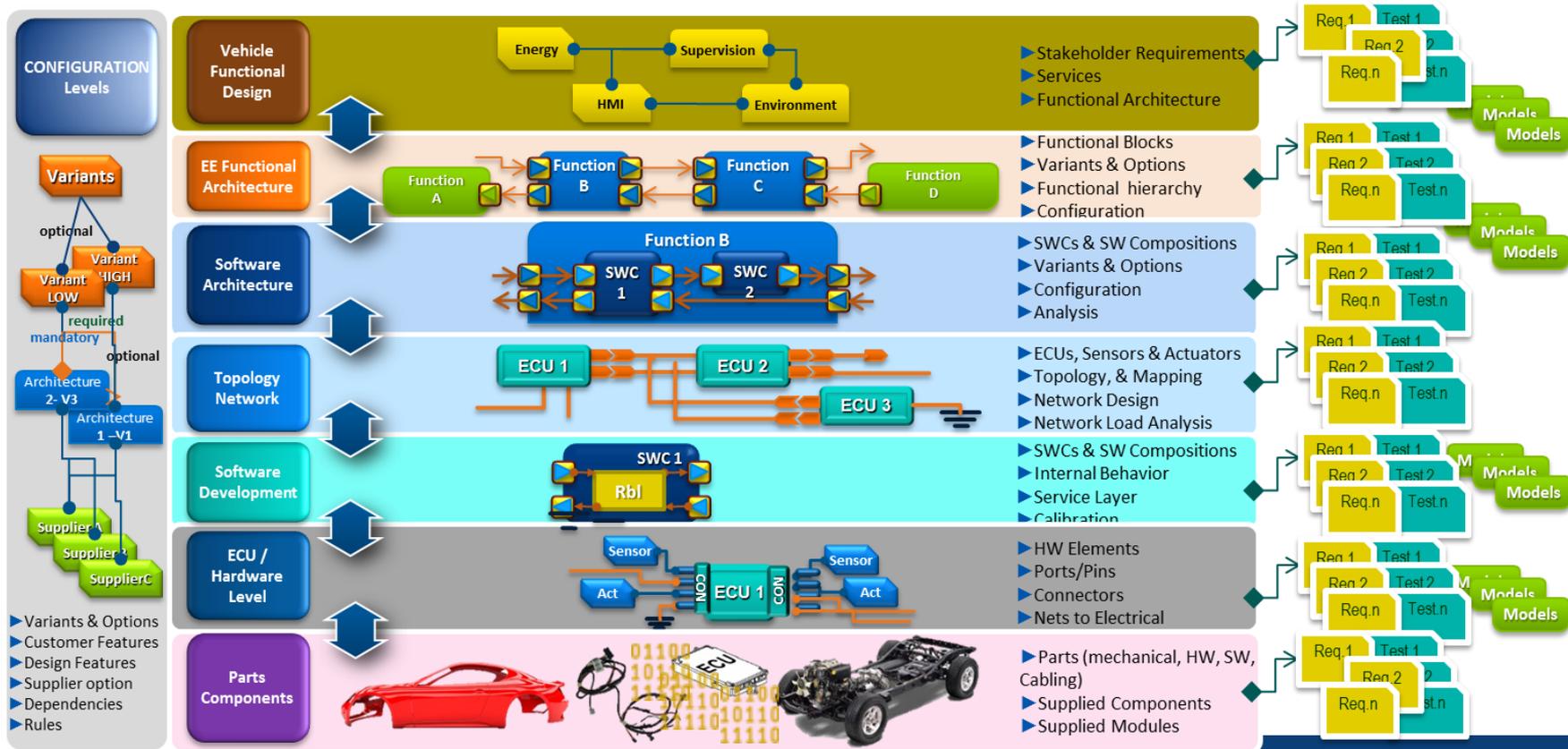
Manufacturing in product line mode

Product variant assembly

Assembly line reconfiguration

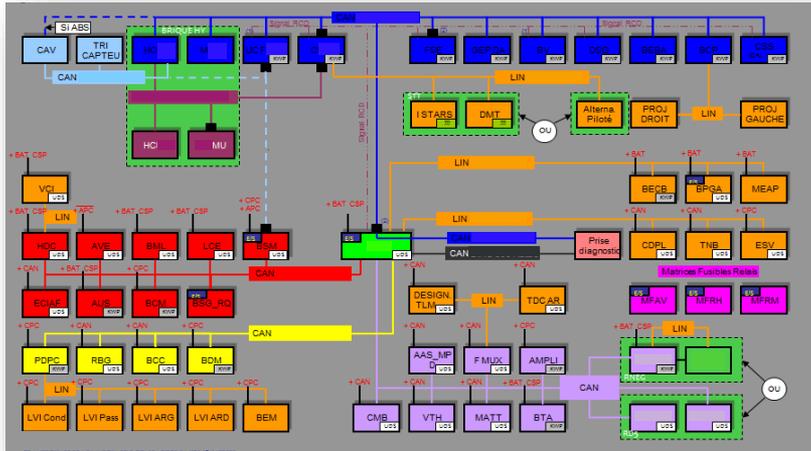
- ▶ KPI: **Manufacturing lead time** reduction
- ▶ KPI: **Manufacturing cost** reduction
- ▶ KPI: **Reconfiguration time** reduction

Digital Continuity | Cross Processes, cross Disciplines

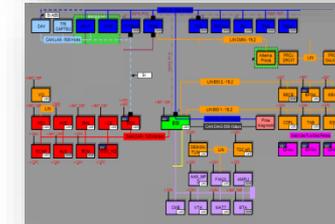
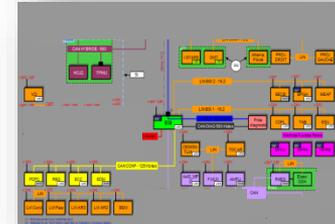
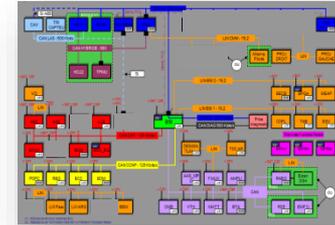
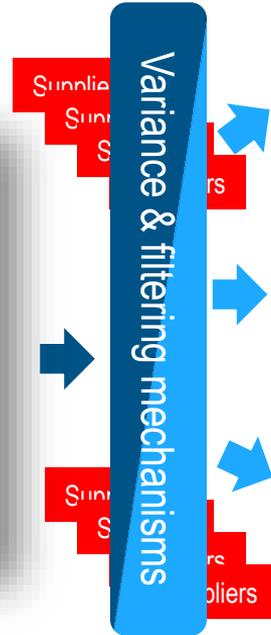


Generative Approaches

E/E platform: from generic to project

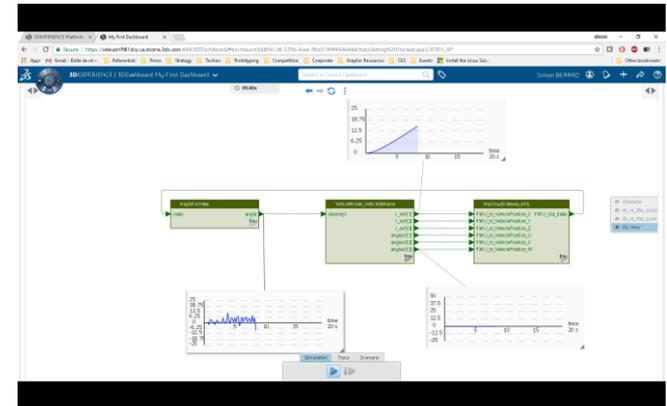
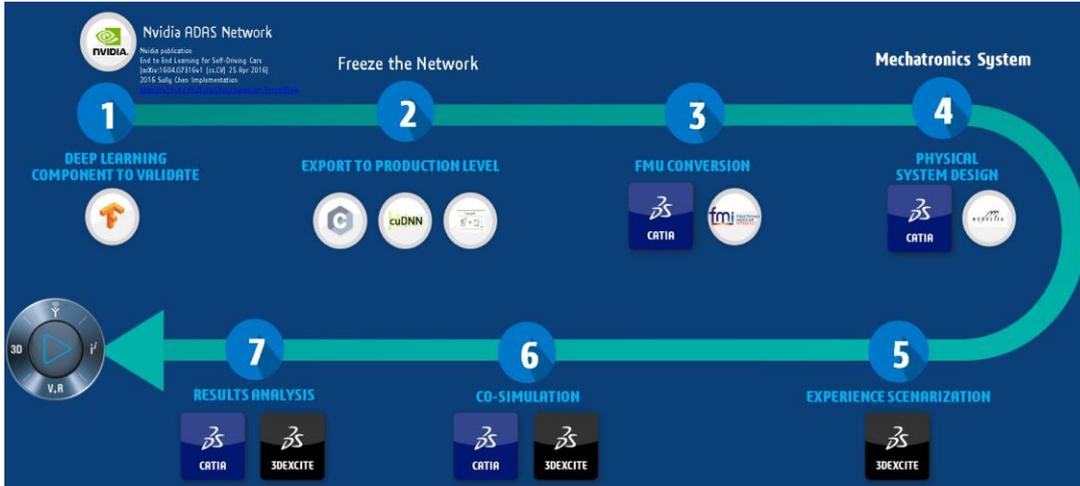


Generic E/E platforms



Vehicle Project:
E/E architecture variants & configurations

Virtualization



Disruptors

Alibaba

On Singles Day, 100,000 cars were sold on Alibaba's Taobao and Tmall shopping platforms...

In the physical world, the Alibaba "car vending machine" will allow buyers to browse cars on their smartphones and press the buy button, which then releases the car from a vertical display tower.

<https://www.telegraph.co.uk/business/2017/08/08/chinese-firm-alibaba-open-car-vending-machine-next-year/>



Kalashnikov

The brand with the reputation for making the world's most reliable firearm have already produced a modular "Ovum" personal shuttle for use at the FIFA World Cup 2018. In August 2018 they unveiled a retro-styled EV concept car, which they claim will compete head-to-head with Tesla



<https://www.pistonheads.com/news/general-pistonheads/kalashnikov-launches-electric-car/38644>

Lyft

Valued at \$15.1bn in mid-2018, Lyft is a significant threat to traditional OEMs. Founder and President John Zimmer has gone on record to predict that "By 2025, private car ownership will all-but end in major U.S. cities."



<https://medium.com/@johnzimmer/the-third-transportation-revolution-27860f05fa91>

DASSAULT SYSTEMES



The 3DEXPERIENCE Company

- 15 000 passionate people
- Solution for Business transformation from Product to Consumer Experience

... a true passion for the Engineering of Systems



Partnering with innovation leaders in 12 industries



Tackling Complexity Challenges in all sectors



Investing for the Future Industry Renaissance Workforce of the Future

- Materials
- Cyber Physical Systems & CPSS
- Robots / Cobots
- Smart Cities
- Value Chain
- Internet of Experience

