



Modeling and Simulation @Airbus

a fundamental digital transformation axis
across product, manufacturing and support
in service

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DDMS

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AIRBUS

DDMS @ Airbus

OUR CHALLENGES

Step change in our operational efficiency across the whole lifecycle of our programs and products



Increase maturity

Product Industrial system Operability



Robust production ramp-up

Design for Manufacturing Robust production set-up Flexible production update



Sustainable

Improve the global carbon footprint of 30%



Enable customization

Product line, Decoupling Modular approach



Quality

Mastering of our industrial system Continuous improvement of the cost



Support Services ambitions



Cut the development Lead Time

Start of concept / MG3 to Entry Into Service



Zero AOG

Operational availability & reliability



Customer Loyalty

Maintain the customer satisfaction



Aviation Safety

Accident rate -20%



Design for value

DDMS five pillars

Transformation & competences

Identify and develop key skills and competences to the business and existing programmes

Modelling and simulation

Allow to have a virtual world to be able to model and simulate the A/C, the industrial system and services



Co development & Integration

Make all the disciplines (engineering, manufacturing, customer services, supply chain of the partners) working together in a single process and single environment

Digital continuity

Every time you change a data everybody get access to this data and know what is the impact of the modification we have done on the complete tool chain



PRODUCT LINE



Product line

Find a way to produce the A/C in order to reuse parts



5 pillars provide capabilities to the business to create values on the programme

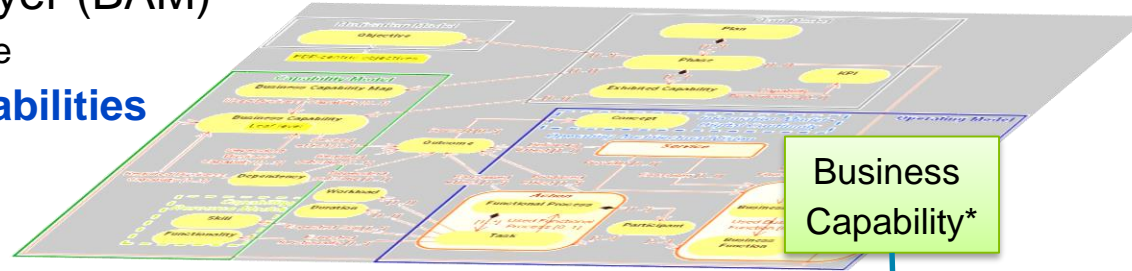
DDMS overall architectural framework

Airbus Business Concept of Operations

Business architecture layer (BAM)

Processes architecture

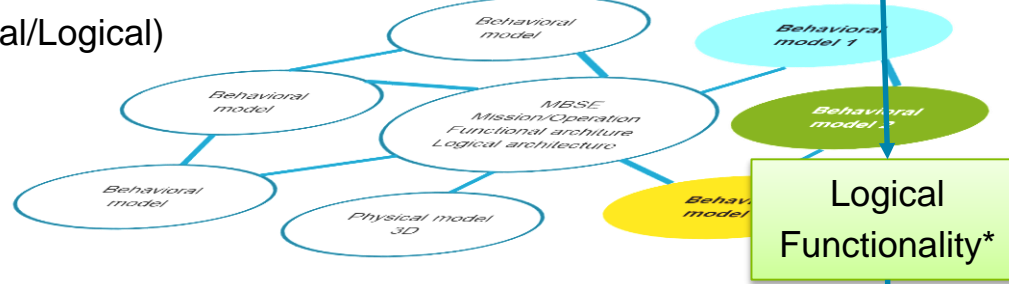
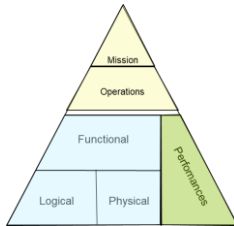
→ Airbus Business Capabilities



Business Capability*

Models architecture layer:

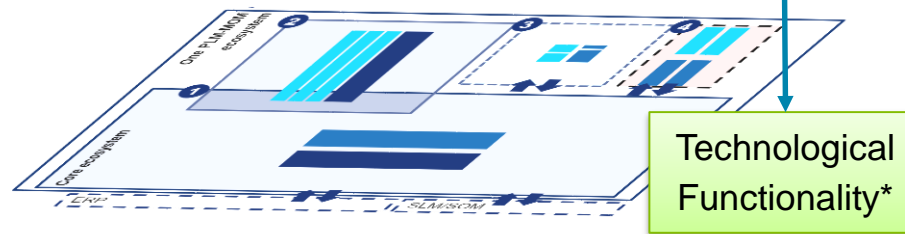
- MBSE (Mission/Operation/Functional/Logical)
- Physical (3D)
- Behavioral models (performances)



Logical Functionality*

Tools architecture layer

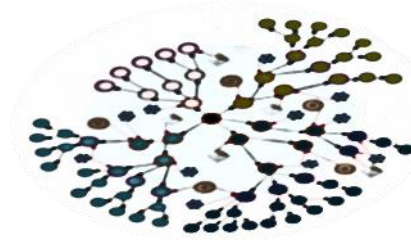
3Dx + non-3Dx (categories 1+2+3+4)
(MBSE ateliers = 2,3 or 4)



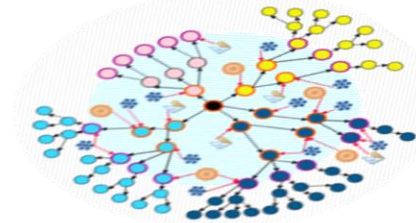
Technological Functionality*

* BAM Definitions

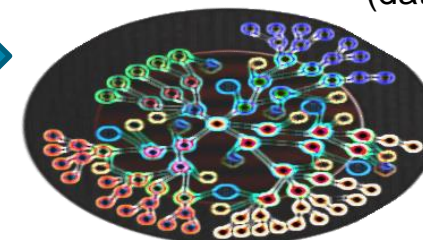
Global META META MODEL
(conceptual ontology)



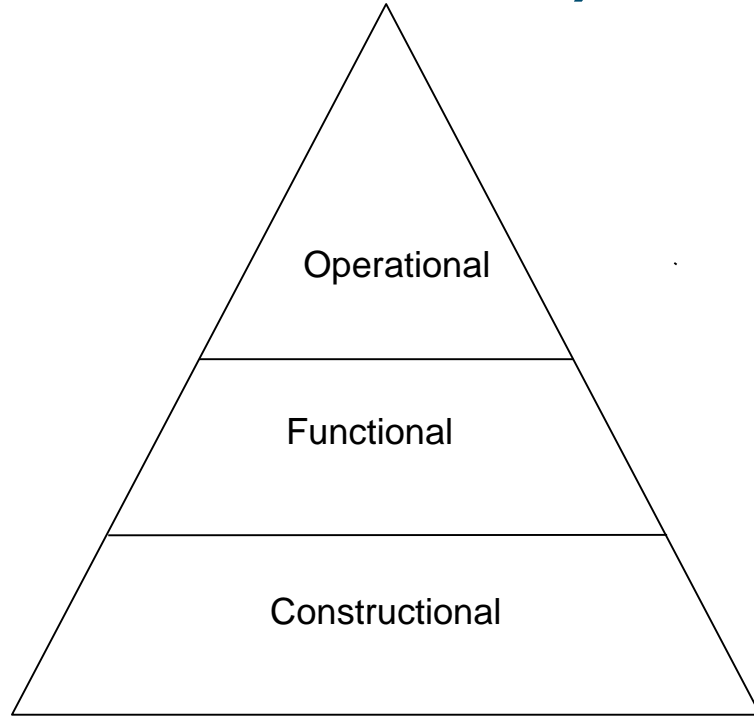
Global META MODEL
(objects¶meters ontology)



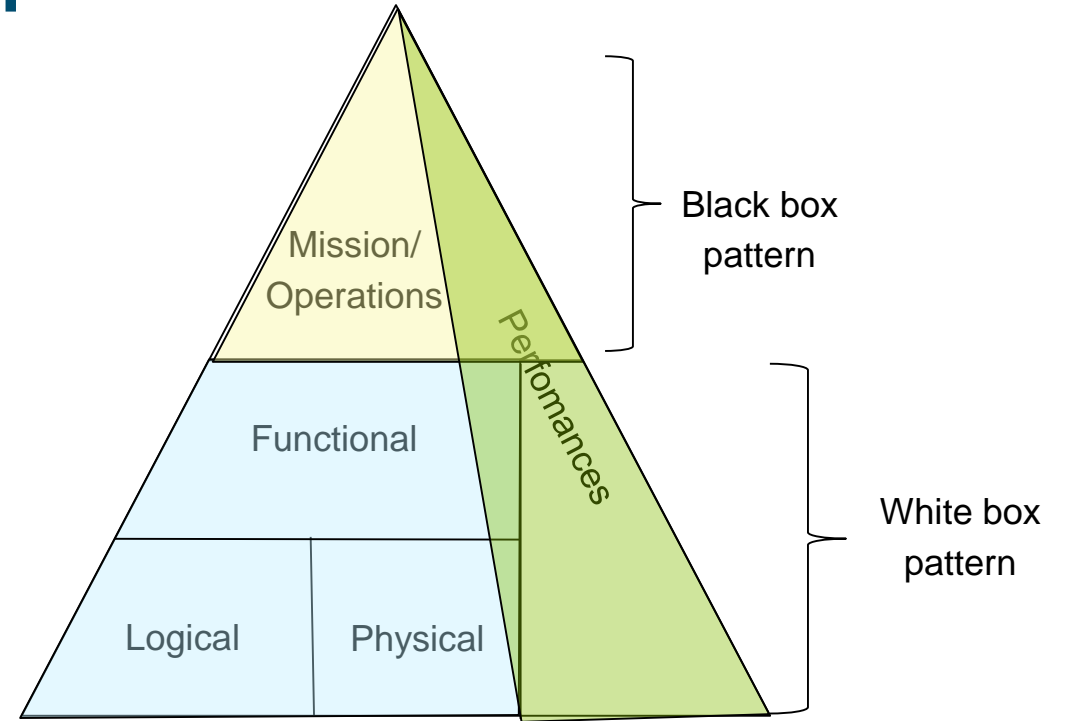
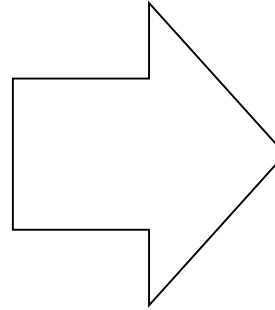
Global DATA MODEL
(datas ontology)



SOI (System of Interest) M&S generic pattern

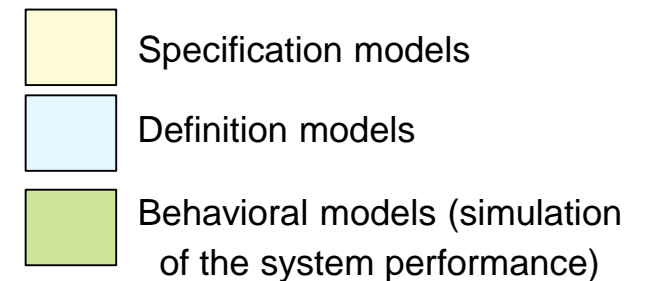


« Traditional System Engineering decomposition pattern »

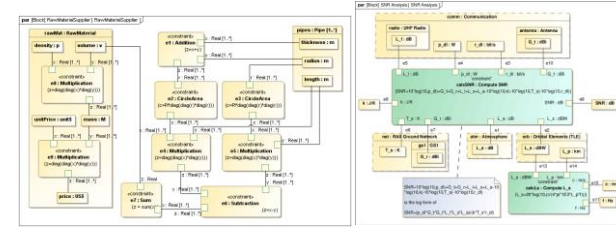


« Airbus M&S generic pattern »

- The « Airbus M&S generic pattern » enables to structure the definition/analysis of any SOI (System of Interest), defining the first level for the generic breakdown structures for A/C, Industrial System and Service
- The parametric description of the SOI is defined within those structures

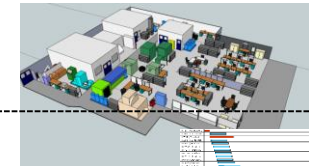
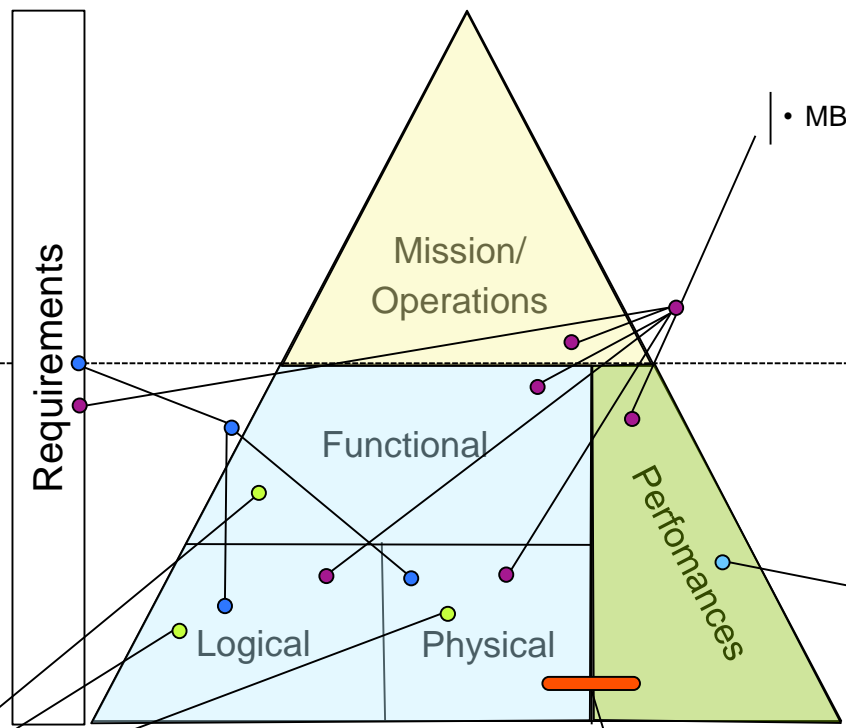


Industrial System Models & Generic Decomposition Pattern



• MBSE (Functional/Logical Architectural) models for assessment & simulation

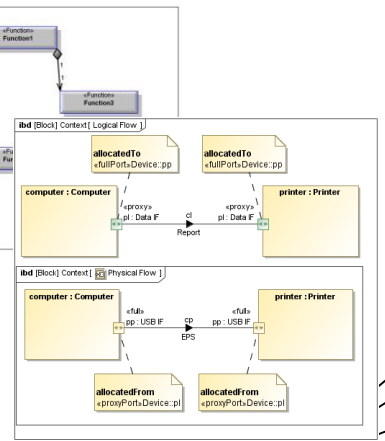
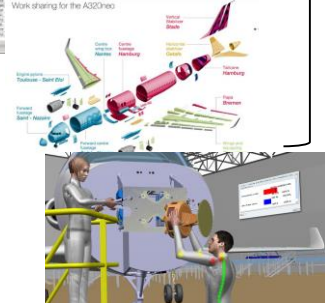
Black box pattern



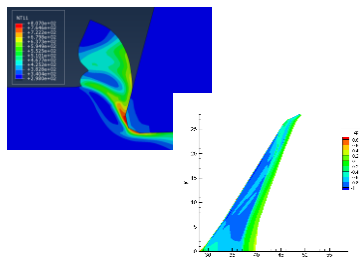
Category	Value
Category 1	10
Category 2	20
Category 3	30
Category 4	40
Category 5	50
Category 6	60
Category 7	70
Category 8	80
Category 9	90
Category 10	100

White box pattern

- Cost models
- Ergonomics score models
- Line Balancing models
- Ramp up models
- Workload models
- Workforce models
- Flow simulation models
- Layout models
- Environmental footprint models
- Logistic models
- Quality Model



• Descriptive models



Multi-physics models

- Finite elements models
- CFRP component manufacturing models
- Metallic component manufacturing models
- Assembly models

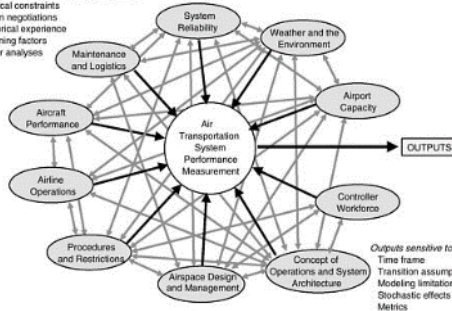
- Specification models
- Definition models
- Behavioral models

Overall framework and GLOBAL optimization strategy

System Of System



Inputs derived from
Budget size and allocation
Technical limitations and opportunities
Political constraints
Union negotiations
Historical experience
Planning factors
Other analyses



SoS parameters

Sol

Product + Support & services
(from Manufacturing to Decommissioning)



Sol

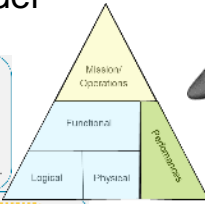
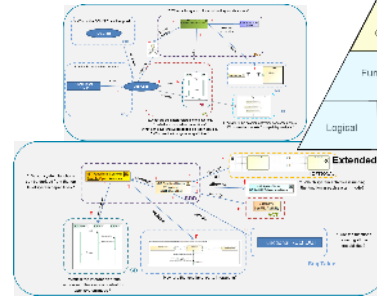
Manufacturing + Supply Chain
(Enabling systems)



M-O-F-L
SysML model

P

3D model

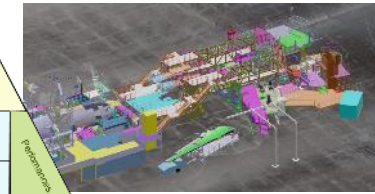
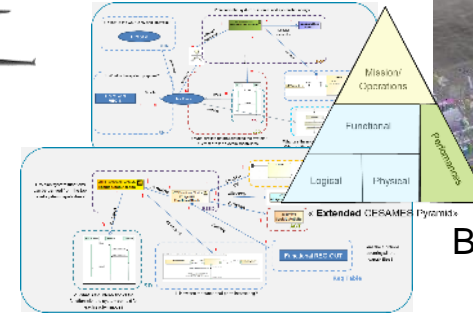


Behavioral models

M-O-F-L

P

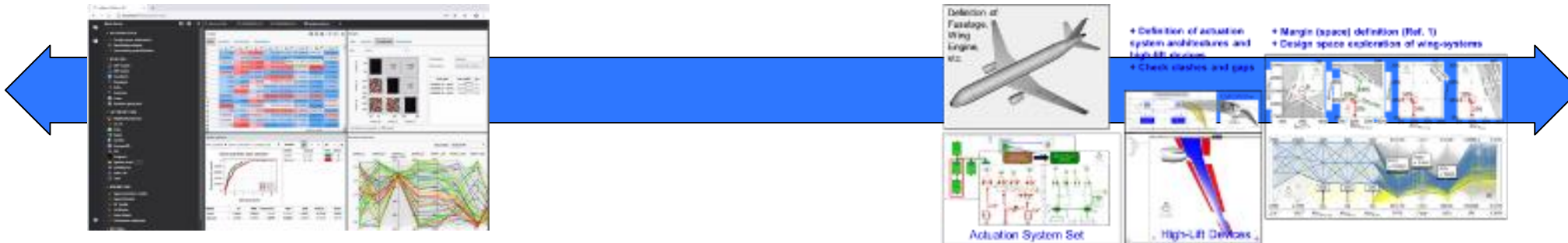
3D model



Behavioral models

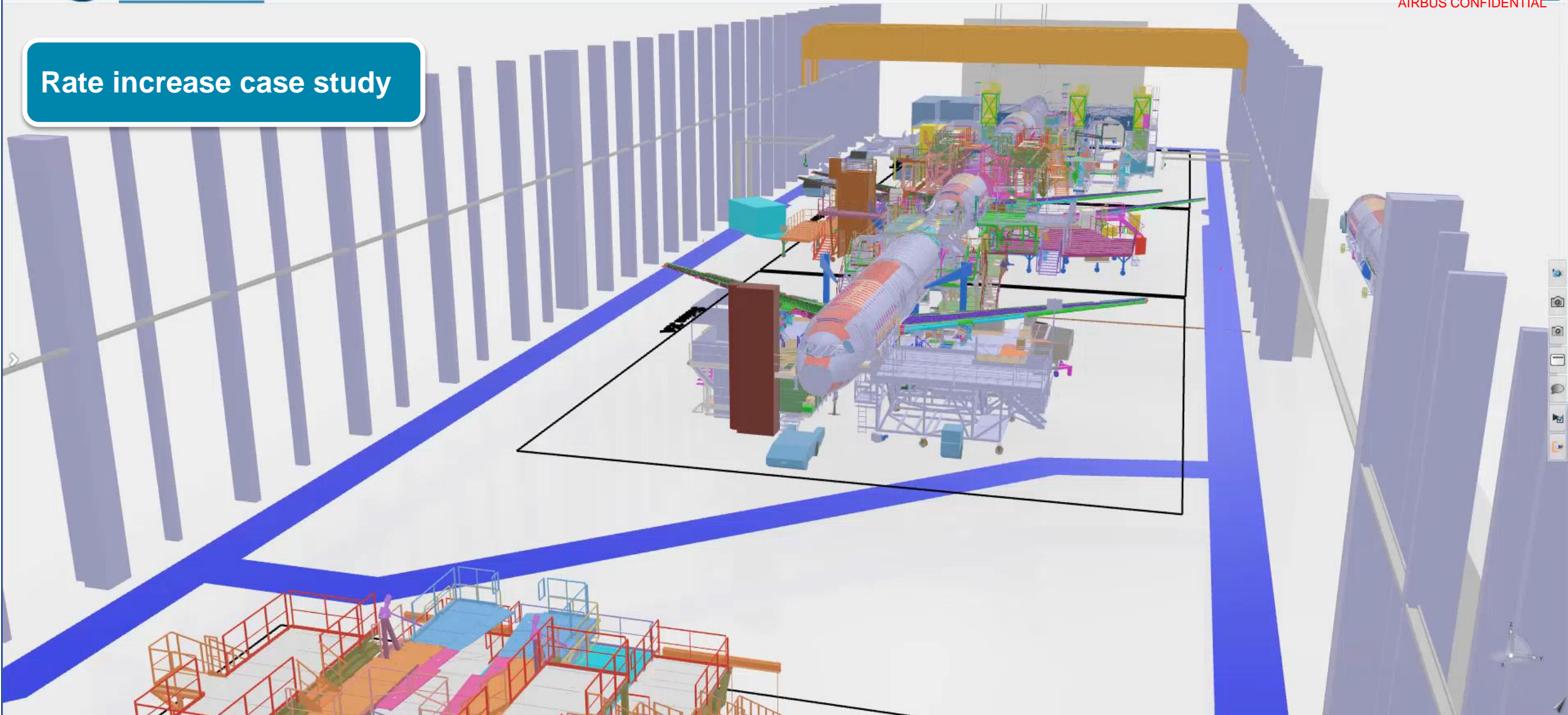


Multi-disciplinary/Multi-domains OPTIMIZATION*
across Product/Industrial system/Service





Rate increase case study





We Make It Fly

AIRBUS