# How modeling and simulation methodology can introduce a real preventive approach in systems development

PAPER Pascal DDMS M&S business change leader Modeling & Simulation stream AIRBUS SaS June 18, 2019

# 1) Key Takeaways

- 1. Opportunity to drastically reduce preventively at all levels:
  - 1. Specification errors (spec validation vs upper level need)
  - 2. Design errors (design verification vs validated specification)
- 2. In line with overall DDMS V&V strategy program



DDMS new or improved Capabilities\* (Processes + Methods + Tools + Competencies and other enablers)

# 2) DDMS Organization and Business

### **DDMS** Ambitions

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



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# 2) DDMS Organization and Business

### 5 levers to achieve DDMS Ambitions



## 3) Goals and Challenges



## 3) A Potential answer (1/4): Property Modeling Methodology®



### 3) A Potential answer (2/4): Specification capture & validation

### Spec model

# Extend/Retract



2-1) Formal validation

- > Goal is to remove from specification models
  - ✓ Logical holes (logical completeness)
  - Logical contradictions (logical correctness)

#### ➤ <u>Way</u>:

- Instrumentation Resource: proof means
- ✓ Human Resource: Modeler
- ✓ Computation Resource: SDLV prover

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### 2-2) Factual validation

- > Goal is to reach an agreement among relevant stakeholders on
  - Factual completeness: stakeholders jointly consider all needs covered
  - Factual correctness: stakeholders jointly consider simulated behaviors are the right ones
- ➢ <u>Way</u>:
  - ✓ Instrumentation Resource:
  - Validation bench
  - ✓ Validation scenarios

✓ Human Resource: Relevant stakeholders



### 3) A Potential answer (3/4): Design capture & verification



✓ **Subsystem** vs **System** specification model **completeness and correctness** are established by **simulation** 

### 3) A Potential answer (4/4): Requirement refinement & validation



### ➢ Goals:

- ✓ to **refine** system **requirements into** subsystem requirements
- ✓ to **validate** the refinement (system req > subsystem req)

### ➢ <u>Way</u>:

- ✓ Refinement based on Suh's zig-zagging concept
- ✓ Validation: SDLV prover & simulation

### 3) A Potential answer (4/4): Requirement refinement & design verification



## Achievements...

- First version of PMM referential is available (MATHWORKS PMM environment, practical Training...)
- Airbus Helicopters pilot projects (H160/Lgs and RACER/Fuel) demonstrated the relevance of PMM/MATHWORKS solution in this context
  → request to generalize this approach on next programs

# ...and Outlook

- Pilot launched to evaluate Streamline test activity (Product Verification)
- Pilot planned in AIRBUS/Civils (Thrust Reverser function, supplier involvement, early & global Engineering/Industrialisation/Service optimization...) to investigate to added value in overall DDMS perimeter
- Industrialization of current PMM referential launched

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## **Concluding Remarks**

- It is key to driving Modelling & Simulation tool by a sound SE methodology
- User Change mindset
- Approach in line with DDMS V&V strategy and main goals
- Enabler for Project management & Quality management convergence





