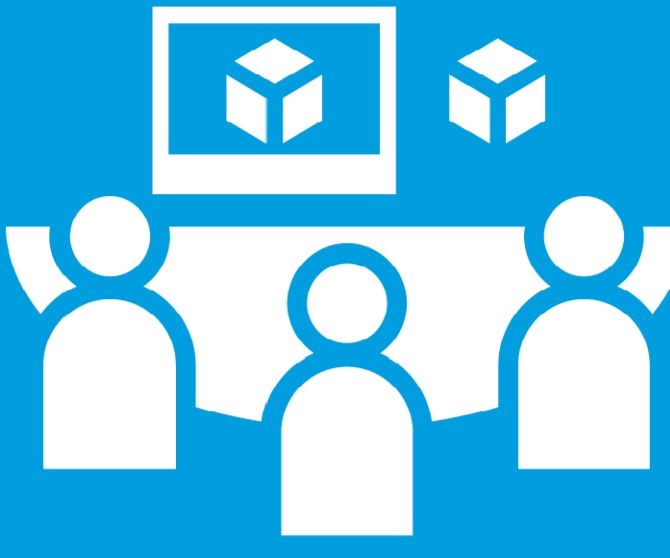


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N°4.4

Engineering and Multi-disciplinary Simulation



1. Context: Future vehicles



- ✓ Energy efficient
- ✓ Hybrid / more electrical / electrical
- ✓ Eco-efficient

Complex architecture & integration

Hot spots (new integrated electronics)



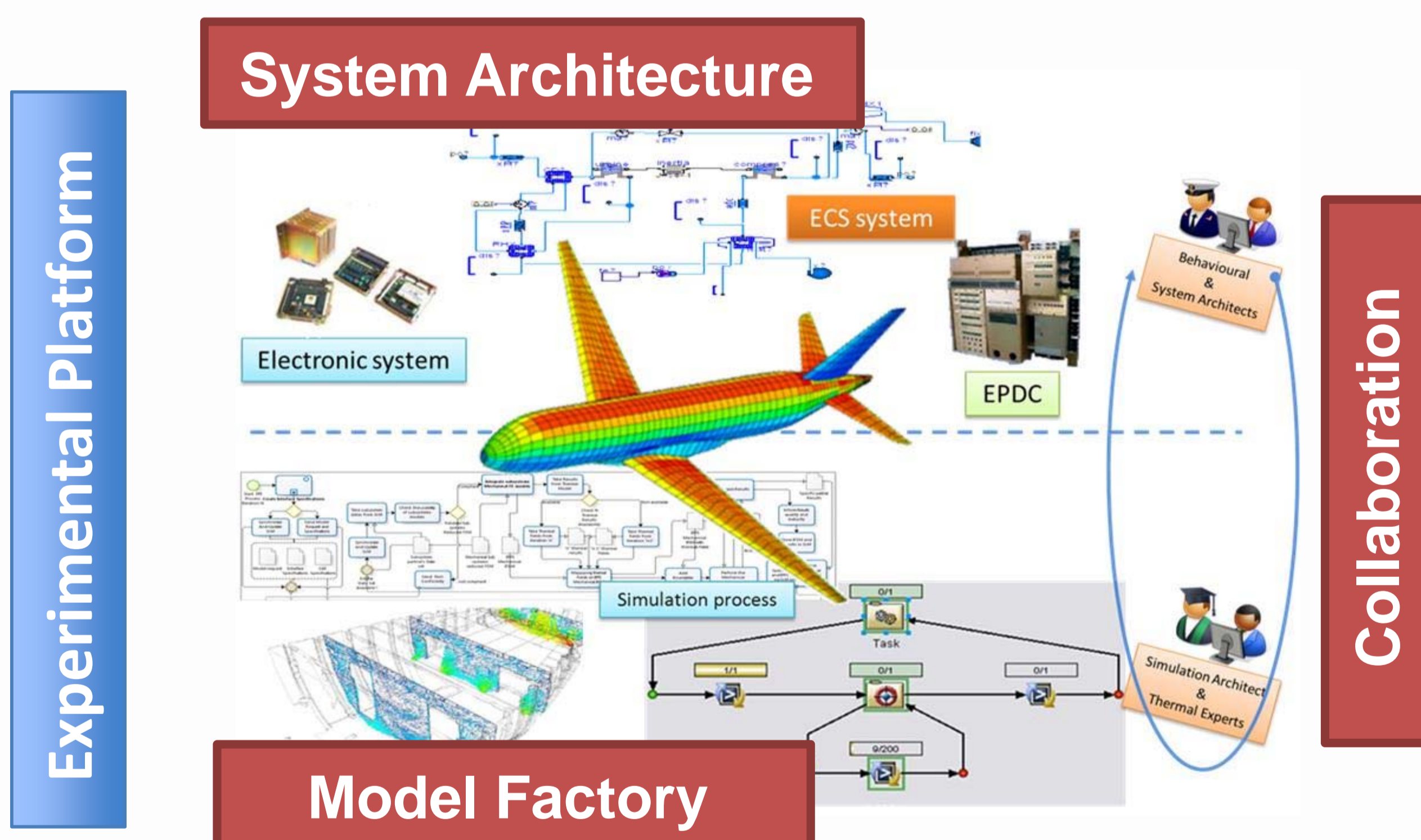
Coupled "multi-physics" behaviours

Complex functional / behavioural / physical links

More responsibility on larger system suppliers to provide innovative technologies and on vehicle manufacturers to integrate them in increasingly complex systems.

Architecture and integration have become driving differentiators between competing vehicle concepts.

2. Objective: New engineering paradigm



- **Connect physics-based disciplines** (aerodynamics, mechanical, thermal, electromagnetics, etc) **with system architecture**
- **Develop new roles**, e.g. Simulation Architect, Model Production Manager – and related skills/knowledge/training

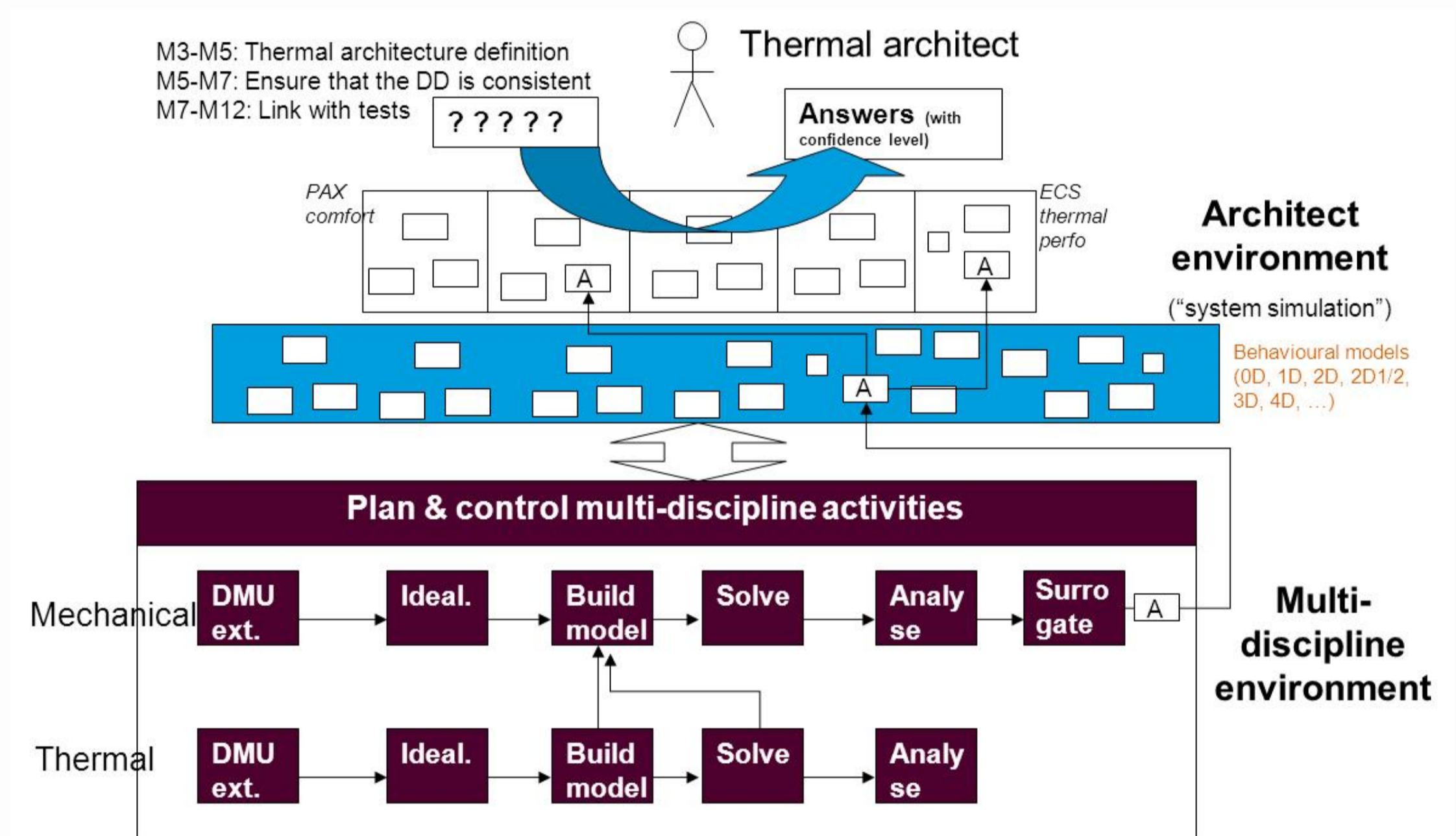
3. Innovations

Architecture modelling and simulation

Decision making support and architecture selection

Methodologies for System Synthesis Based on Collaborative Multiscale Multiphysics Simulation and Estimation

Multi-physics behaviour modelling in relation with vehicle topology (SysML, Modelica)



Model Factory

Coupling mechanisms between physics

Production of models with the "right quality"

Re-use of models, anticipation of model needs

Configuration management and traceability of models and simulations

Collaboration on models and simulations

Exchange and sharing of models

Models as "black-boxes" – IP protection

Collaborative simulation management

Standards (STEP AP209, FMI, etc)

4. Expected results

Engineering methods and process (e.g. architect cockpit and decision support, linkage between vehicle architecture views, model identity card, model production mechanisms, model exchange/sharing processes)

Demonstration on industrial cases (EADS/Airbus and Renault)

Training courses related to the new roles developed

