The SAVOIR Roadmap for Model-Based Avionics

Towards Digital Continuity

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General Context: MBSE

MBSE is a general trend in order to deal with the time – quality – **complexity** – cost battle.

- **Time**: we have to communicate *more often* (iteration, access to consistent data)
- **Quality**: we have to *continuously increase* the *confidence* of the information exchanged
- **Complexity**: we need to be able to *succinctly* communicate (abstraction, depth, purpose)
- **Cost**: we need to *detect / prevent* potential *problems* as *early* as possible

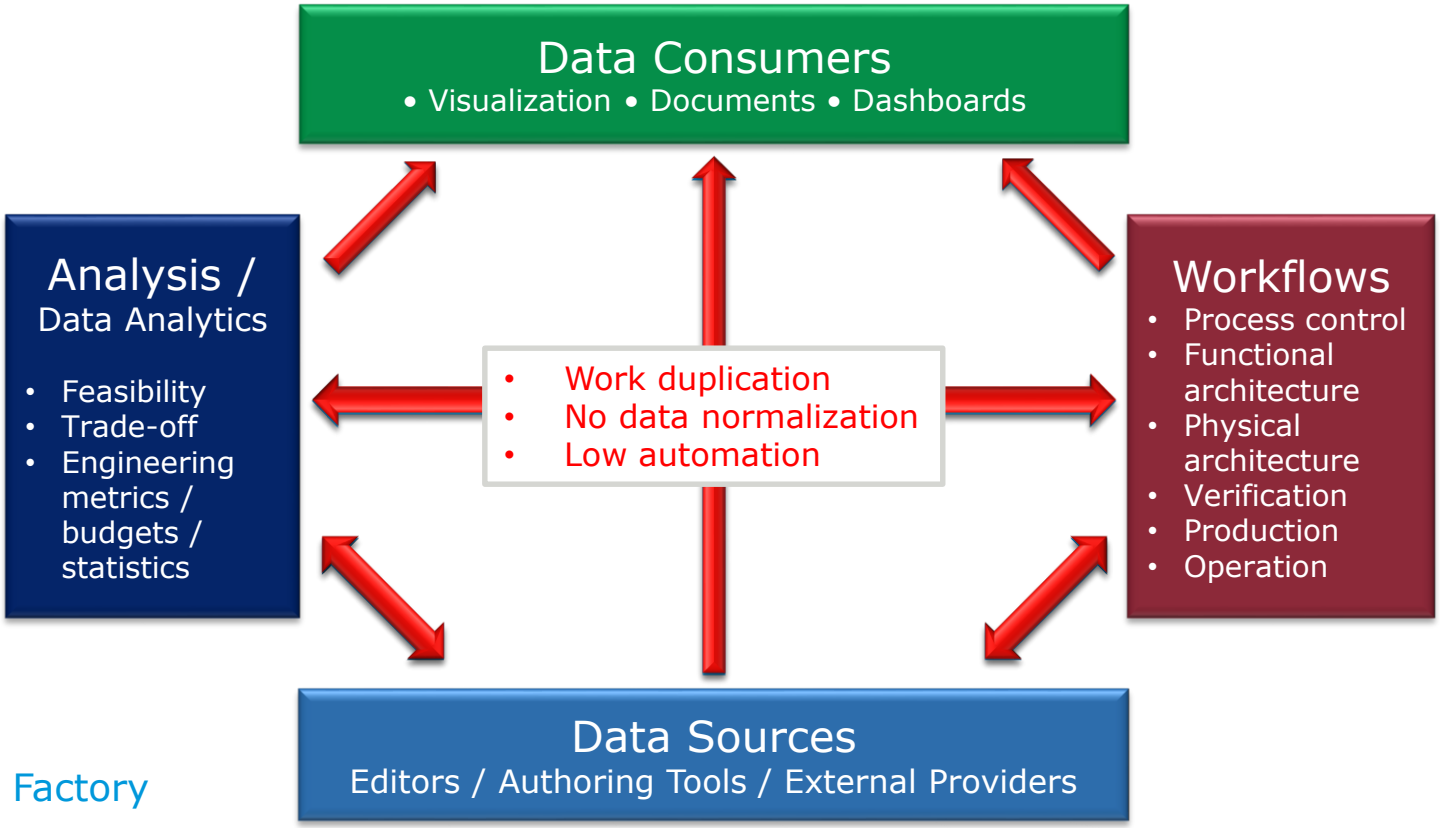
MBSE addresses these concerns by:

- Providing an explicit notation to create models (abstractions of the real world)
- Providing means to construct and continuously verify the model (internal consistency)
- Providing means to validate models (to check external consistency)

Documents ➔ Models

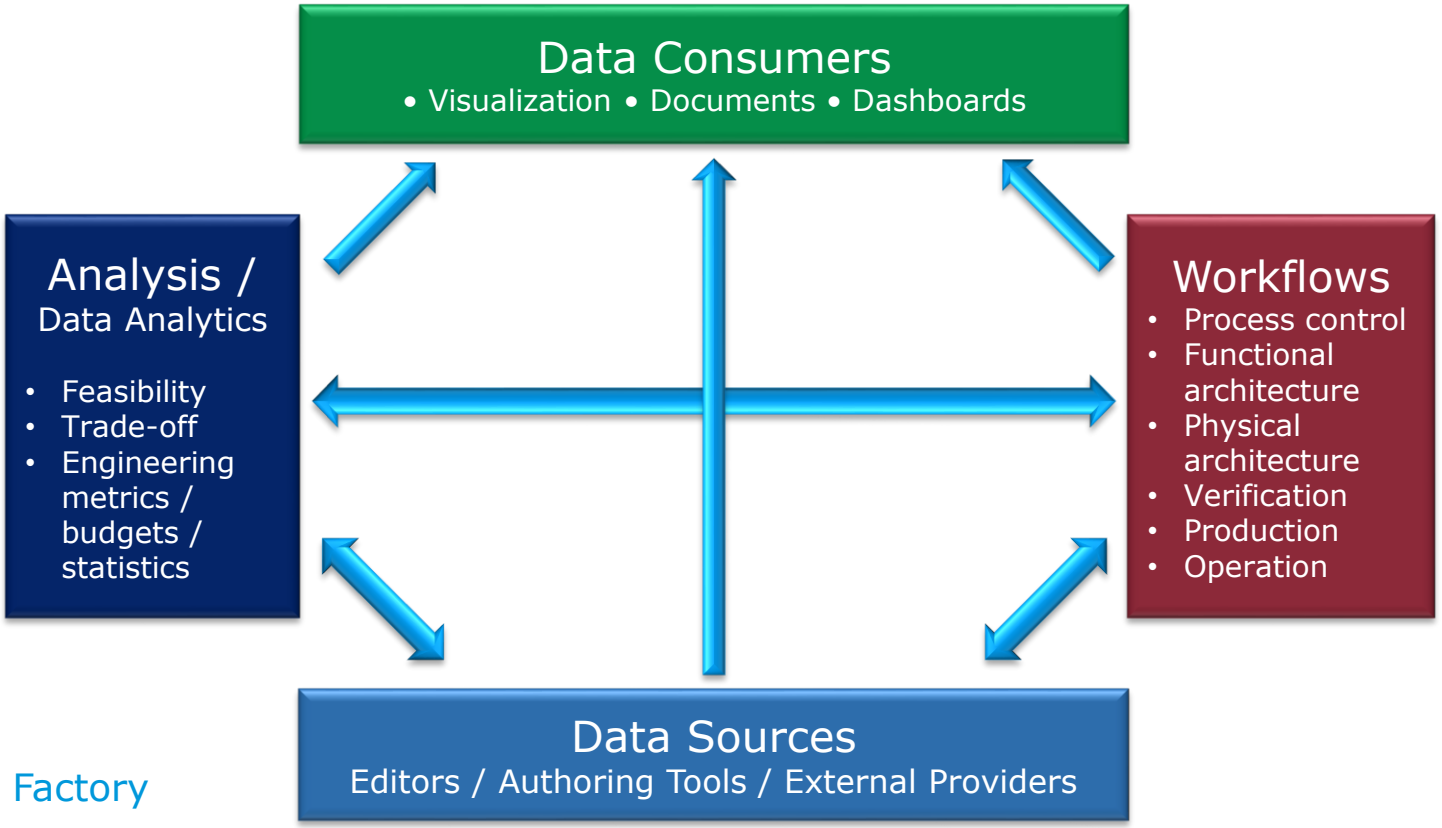
Consistency of models ➔ Digital Continuity

Systems Engineering - Before



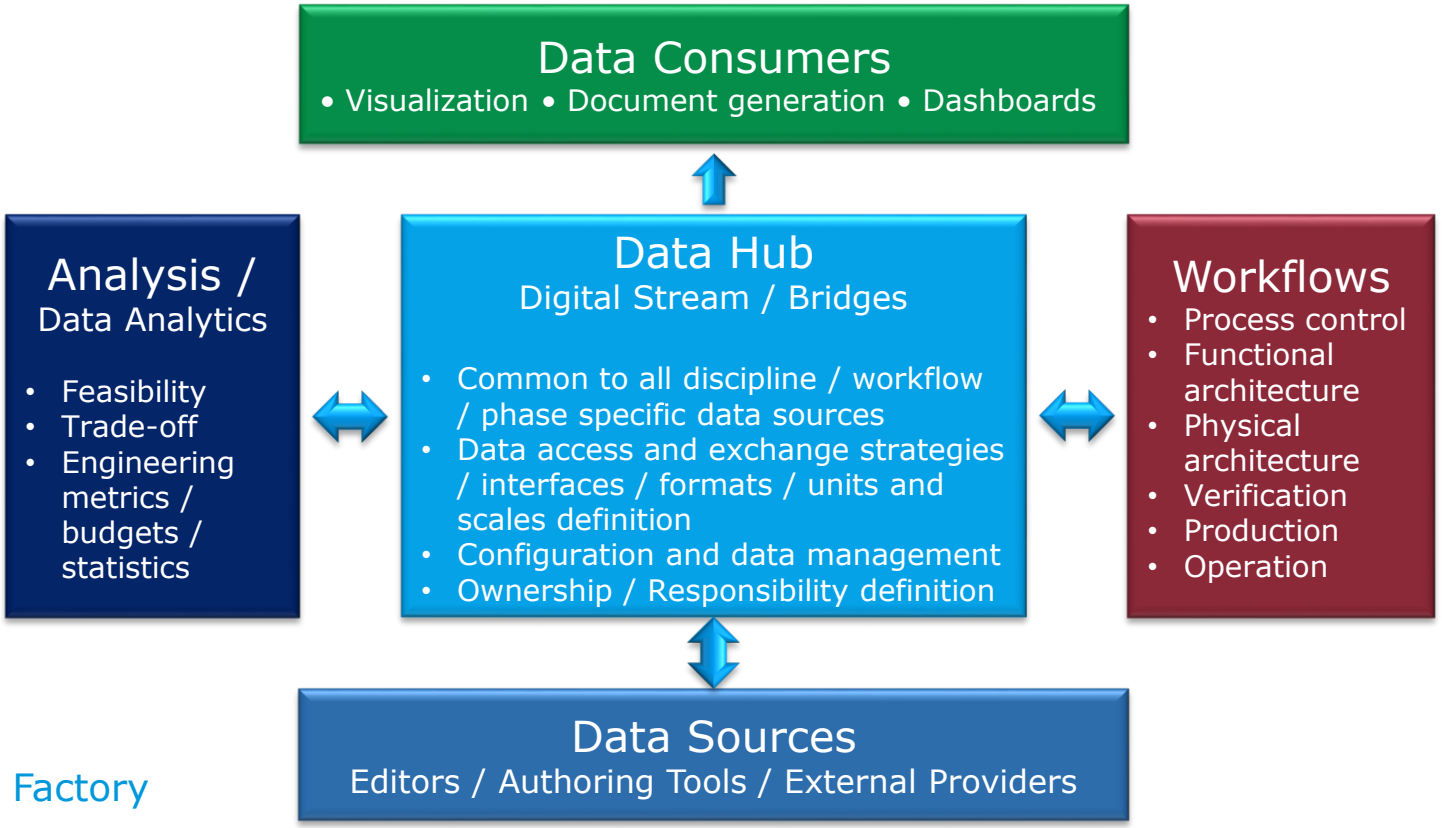
System Factory

Systems Engineering - After



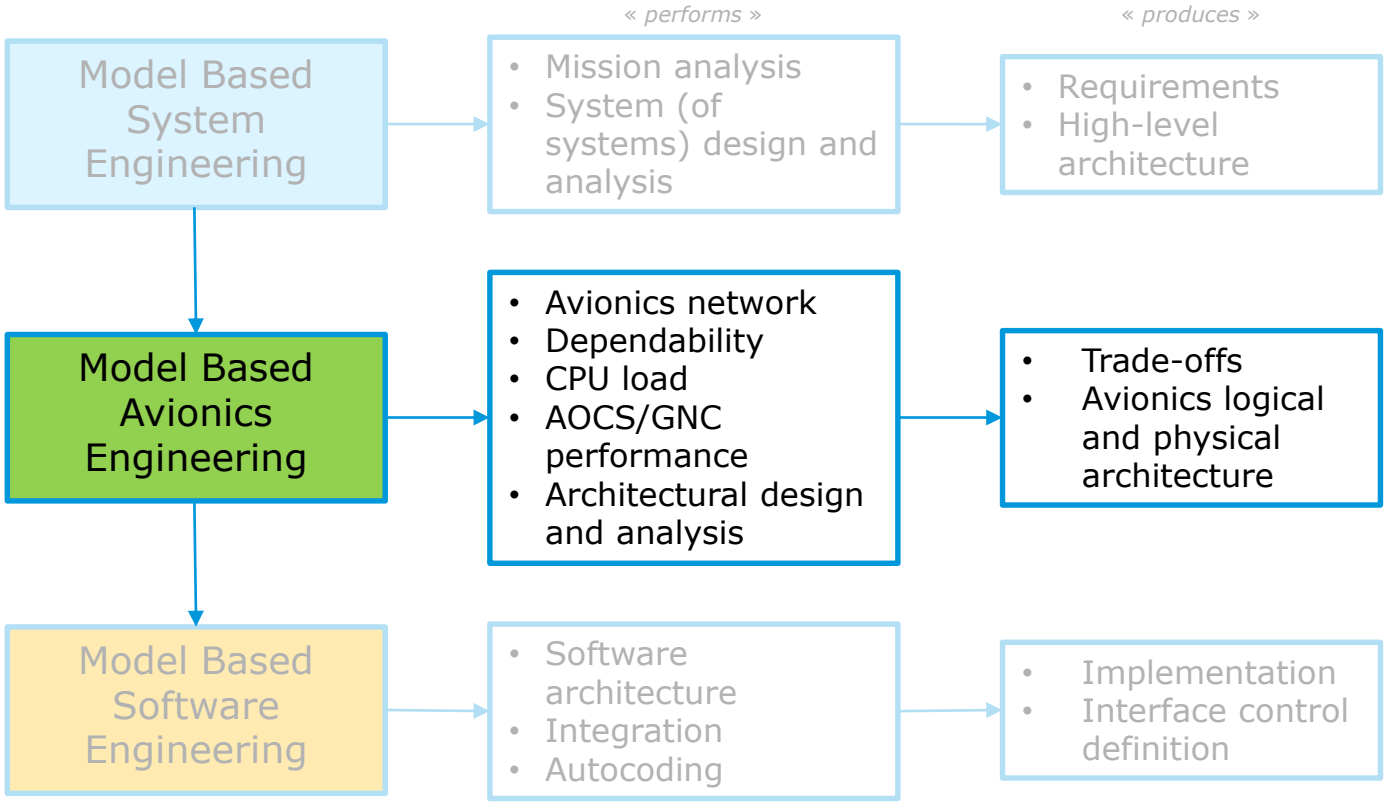
System Factory

Systems Engineering - After



System Factory

From System to Avionics



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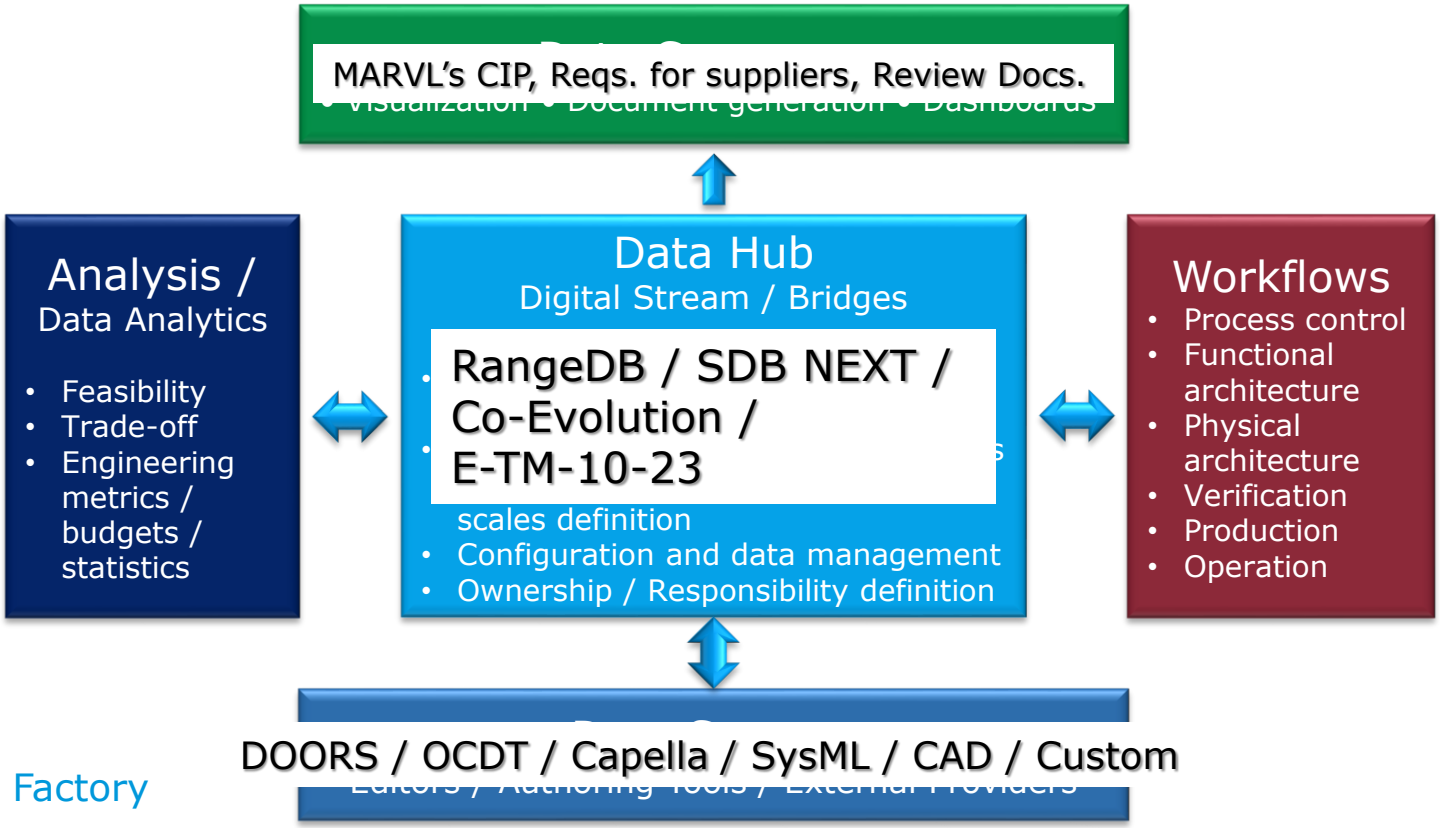

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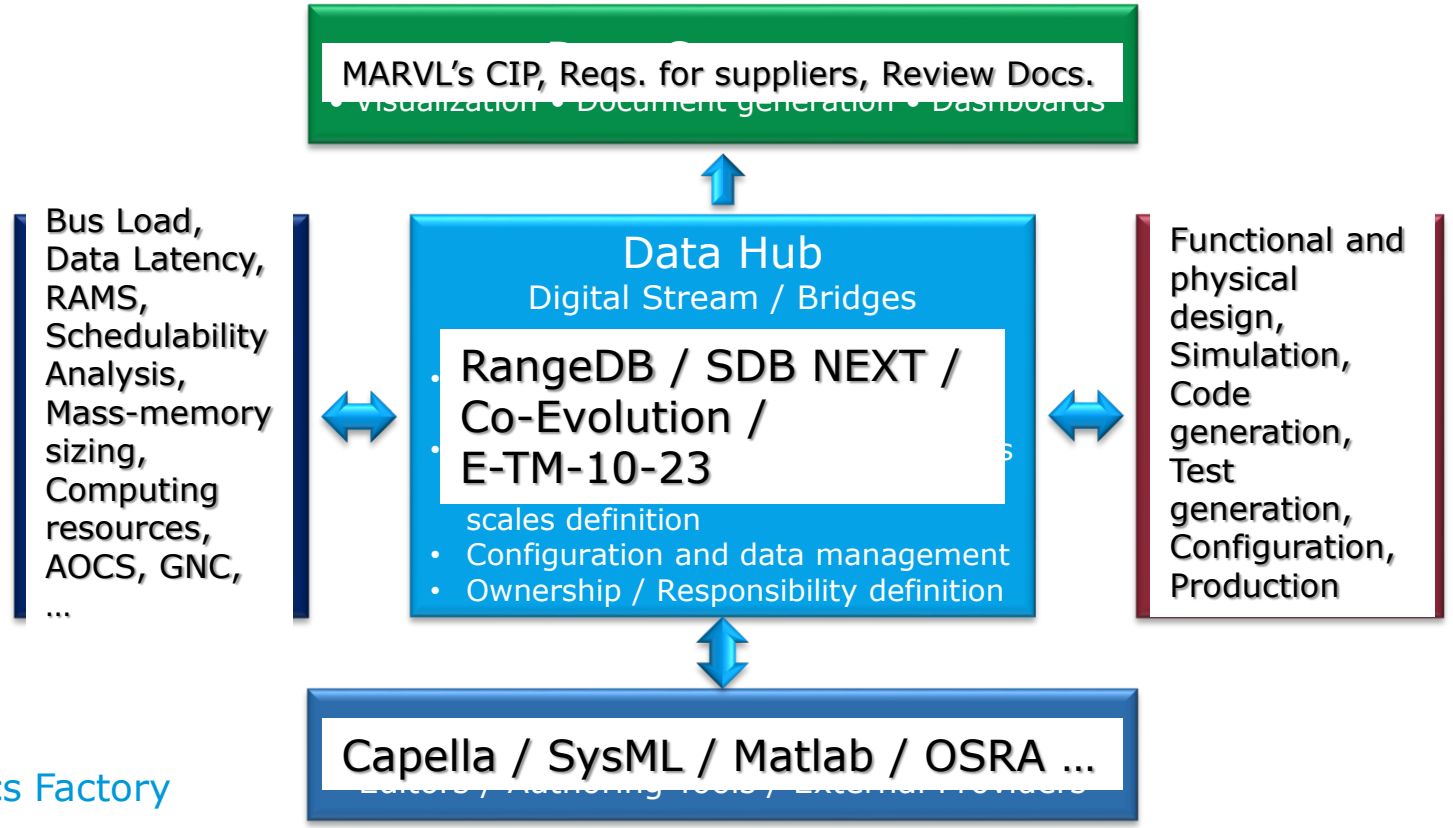
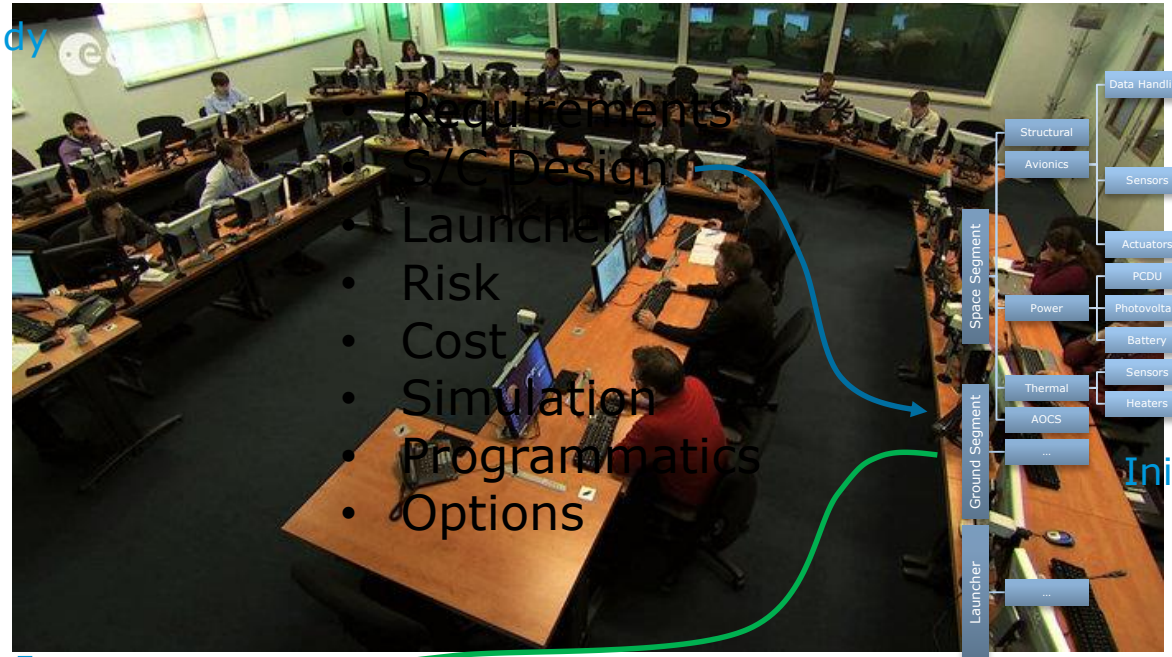


Avionics Factory

Use Case

Initial Study



Initial Model

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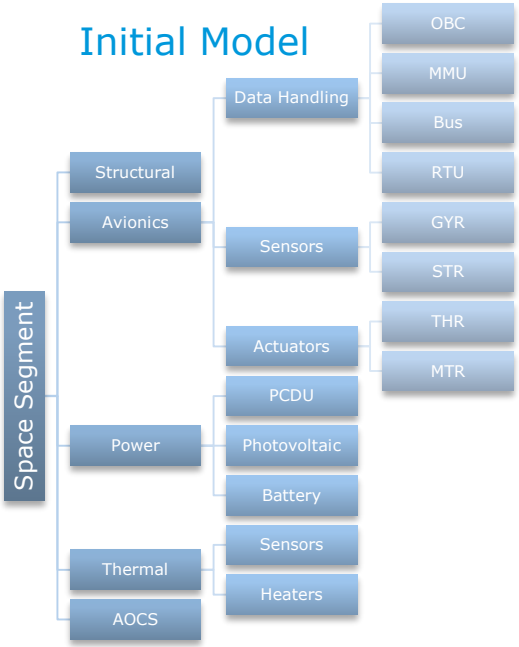
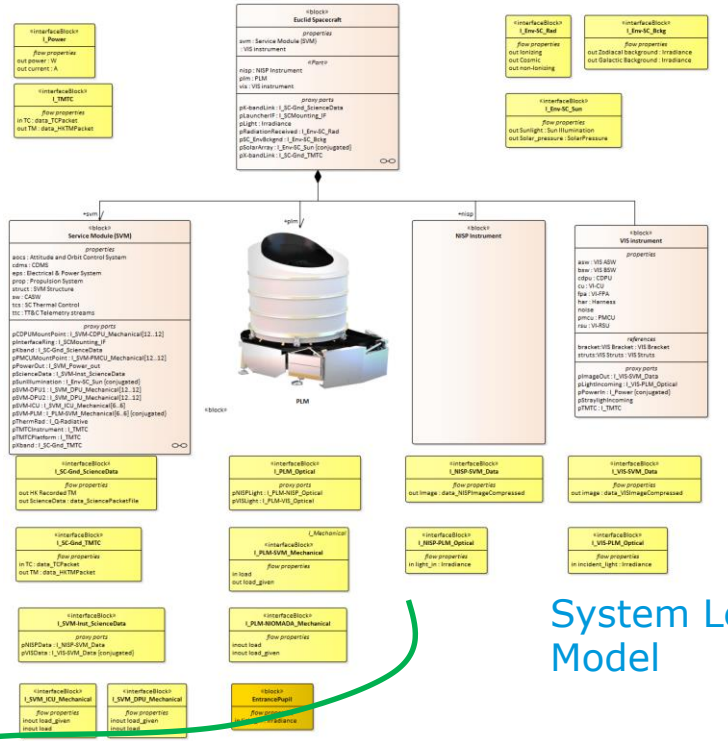
Use Case

Initial Model





System Level Model

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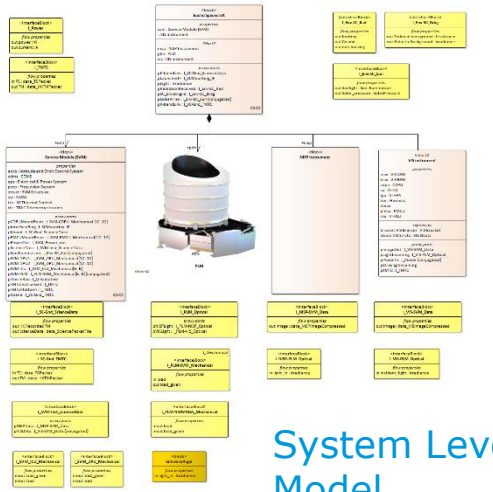
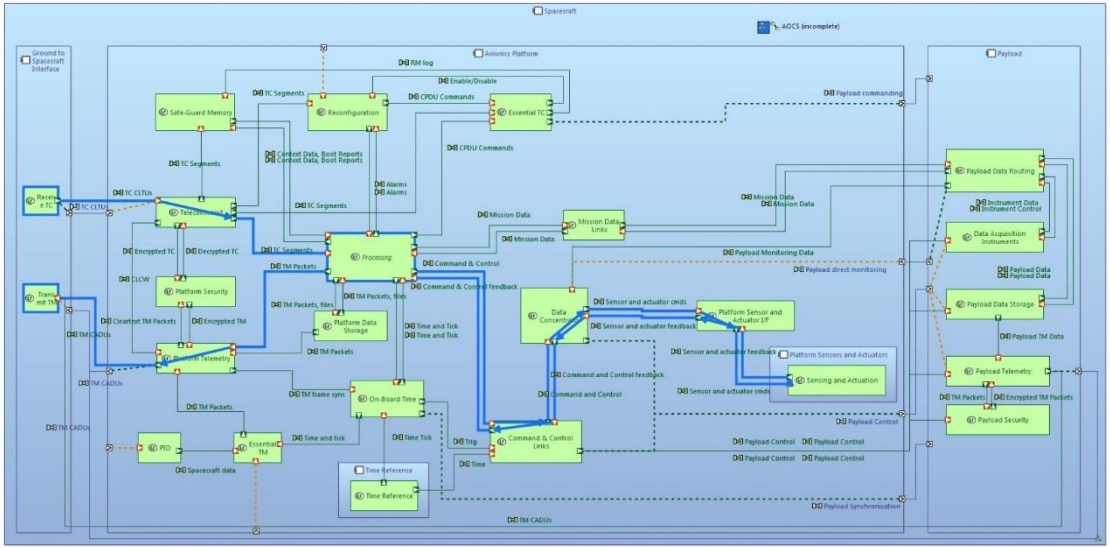
Use Case



System Level Model

Logical Architecture



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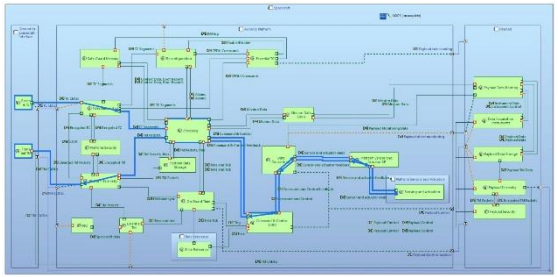
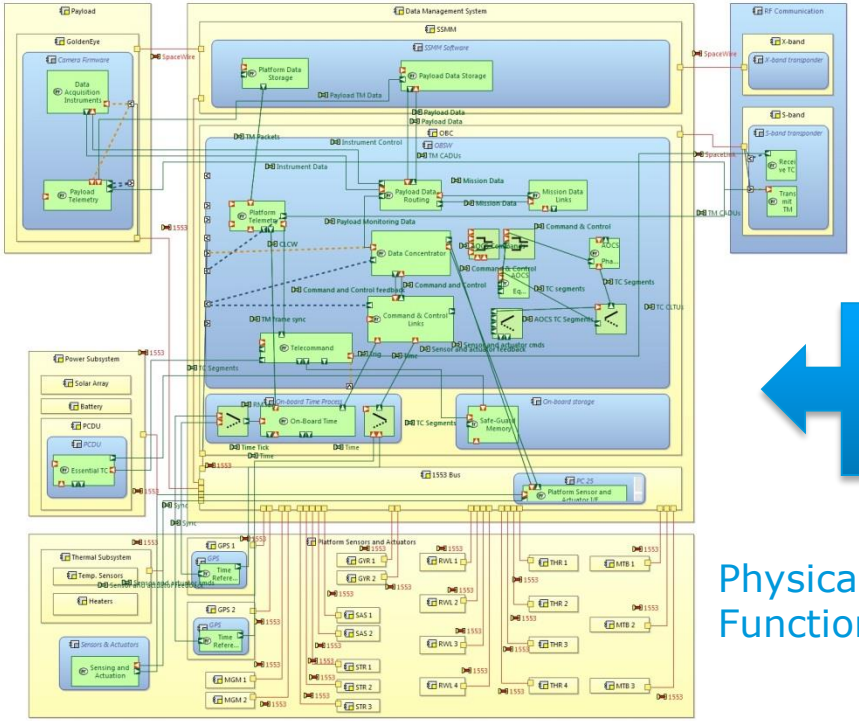
Use Case

Logical Architecture





Analysis / Tradeoff

Physical Architecture / Function Allocation

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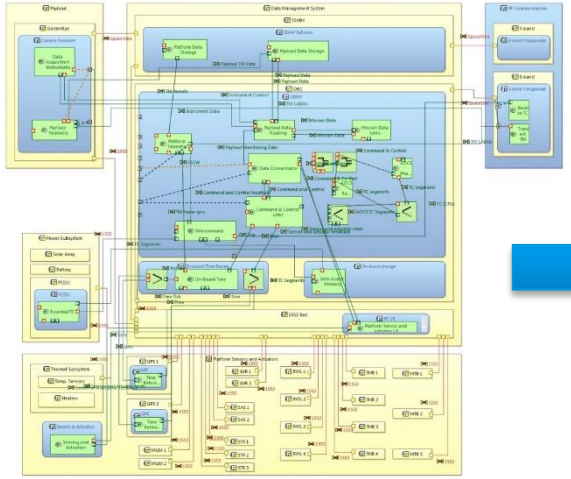
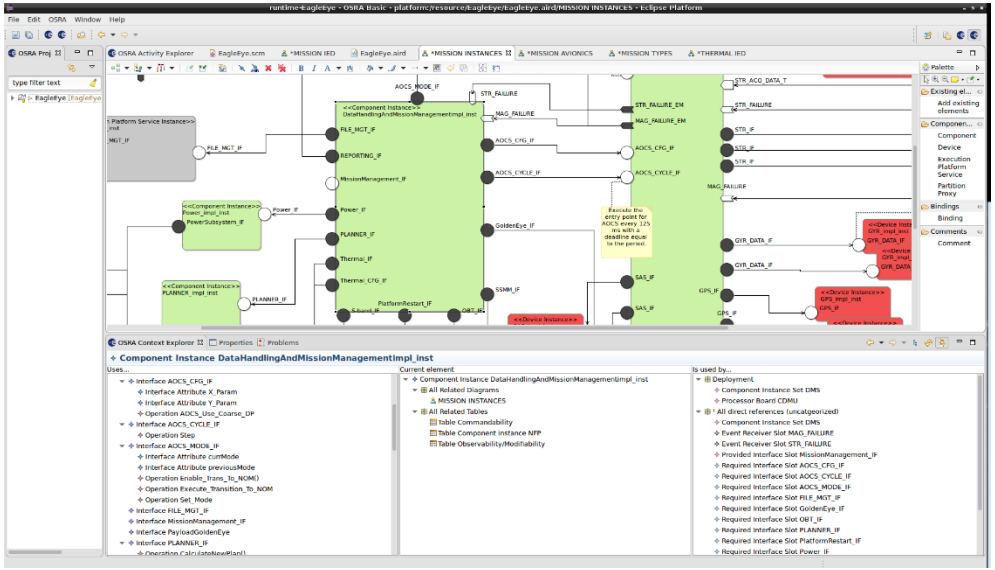
Use Case



Physical Architecture



Software Architecture

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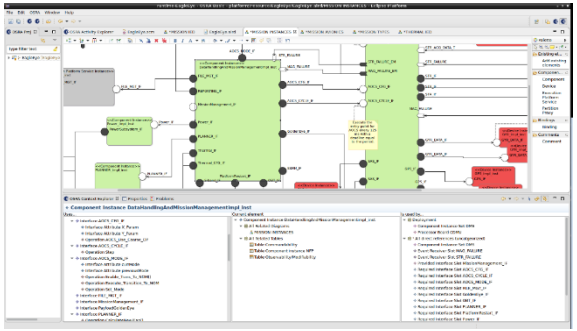
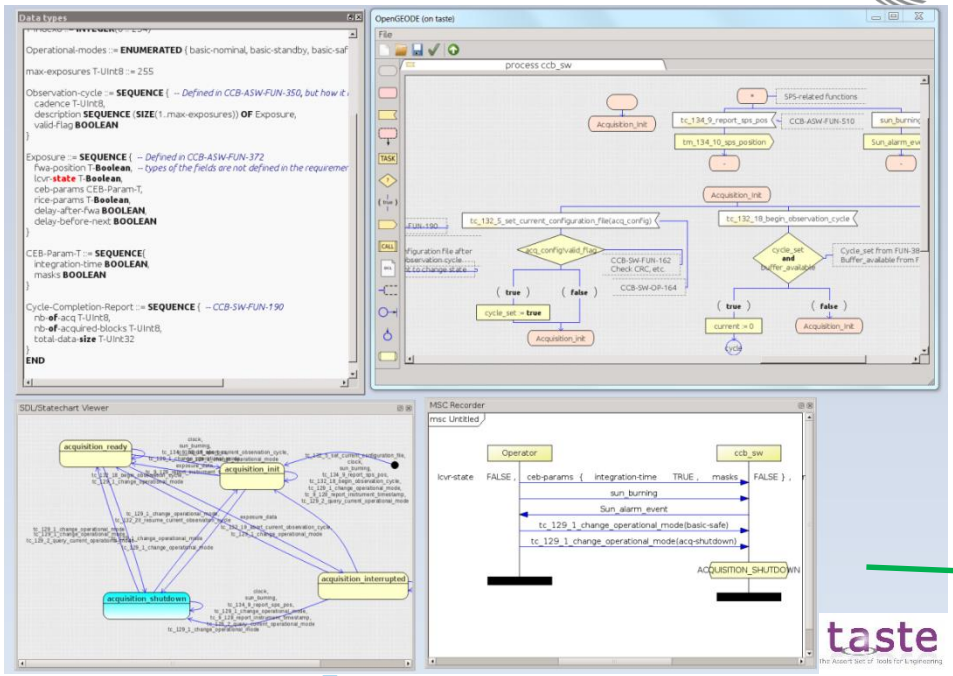
Use Case

SW Implementation / Deployment



Software Architecture



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MODEL-BASED AVIONICS ROADMAP

User Needs

- Streamline the production of avionics systems.
- Manage the increasing complexity of missions.
- Support the production of systems compliant to ECSS standards through process guidance and automation.
- Ensure the consistency and completeness of requirements and design.
- Ensure the continuity of designs through automation to avoid human errors when transitioning across project phases.

User Needs

- Encourage the development of robust architectures and reuse in order to improve the cost and schedule characteristics of avionics projects.
- Improve the communication between engineering disciplines in order to coordinate their efforts while maintaining a centralized source of information (model coordination database or single source of truth).
- Improve customer-supplier communication workflows through automation.
- Support and automate the requirements and design change workflows.

Requirements and Specification

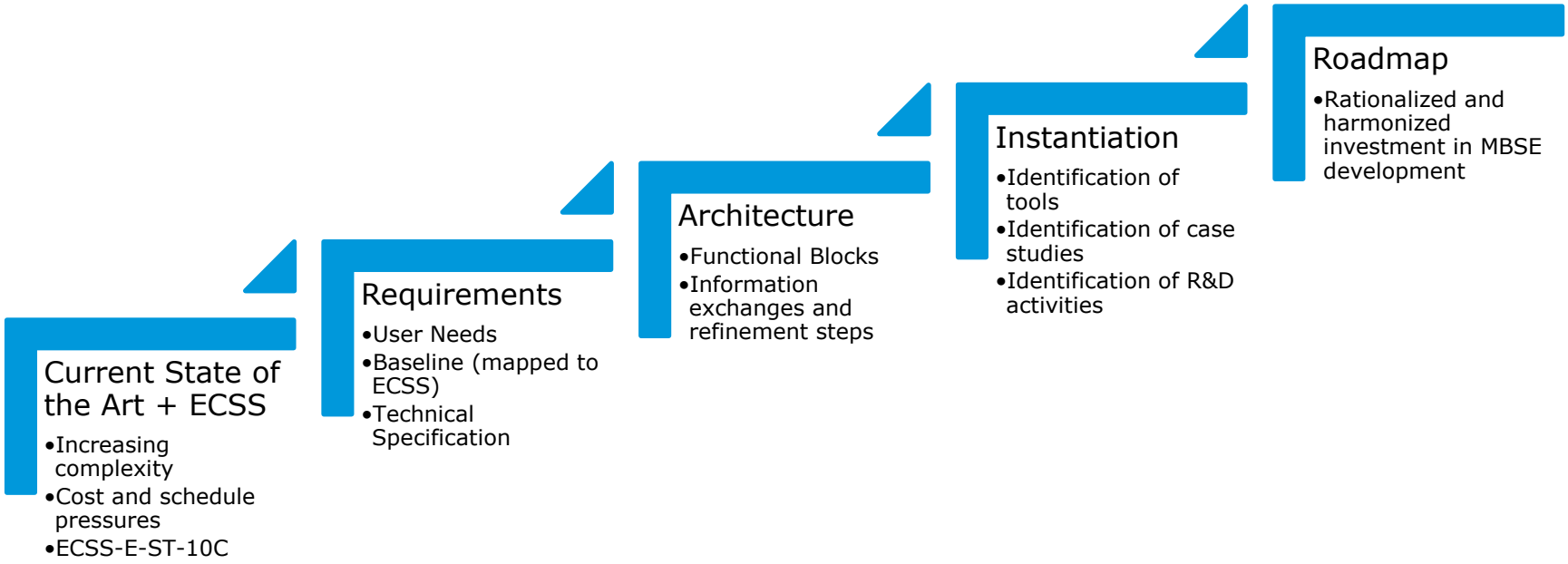
We have produced **initial requirements** for the following categories:

- Avionics Requirements Engineering
- Assurance of Design and Requirements Consistency (ECSS-E-ST-10C Req. 5.2.1c)
- Assurance of Model Continuity
- Support of Model and Product Reuse
- Improvement of Interdisciplinary Communication (ECSS-E-ST-10C Req. 5.3.4e)
- Change Process

Plus an initial **technical specification** of the avionics factory**:**

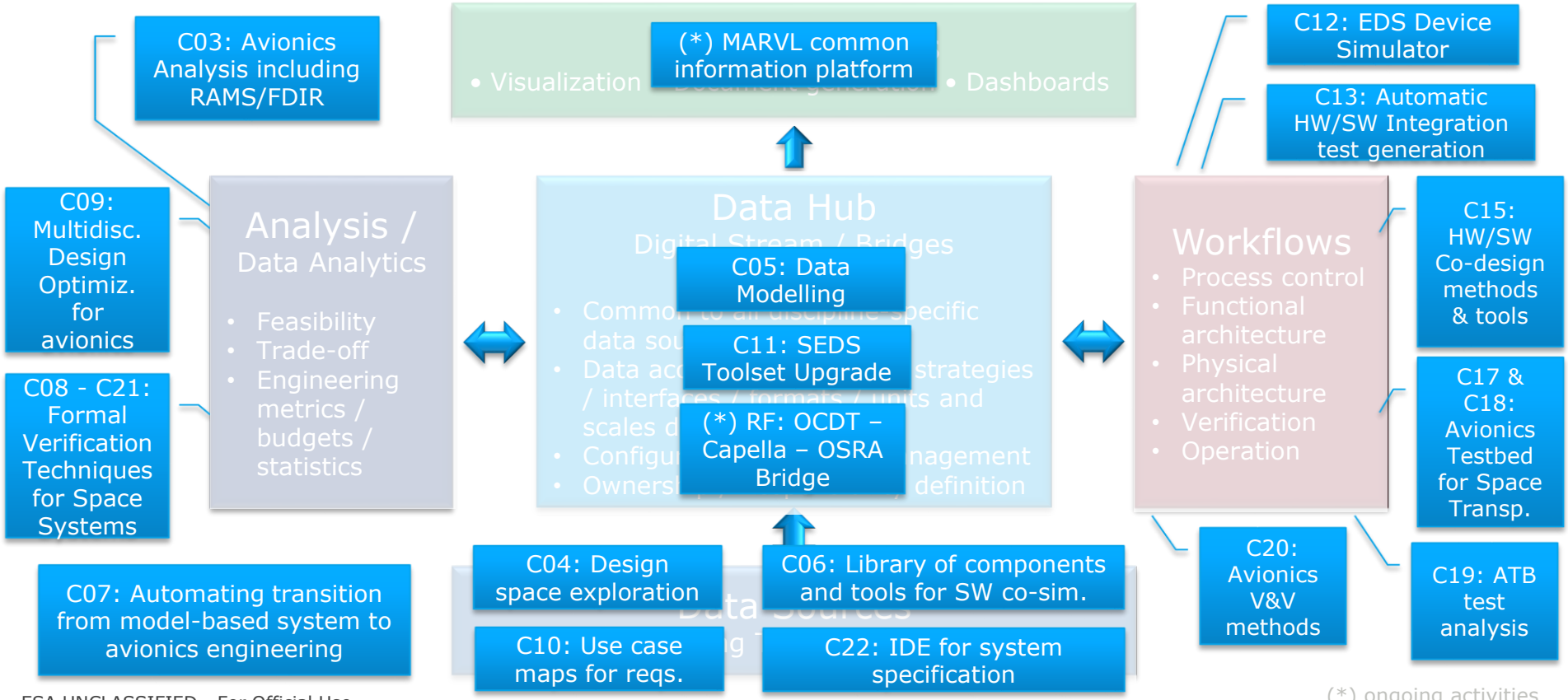
- General Avionics Development
- Optional Usability Requirements

Roadmap



- We have mapped the model-based avionics activities from the harmonization roadmap from last year. They seem to cover most of the domain.

Avionics Factory – Roadmap Activities



(*) ongoing activities

Your Contribution

Details on the activities identified are provided in the avionics harmonisation roadmap.

It is available at:

http://essr.esa.int/

In the SAVOIR project.

Further Work

- Collection of information on tools for avionics factories, in particular their capabilities with respect to the requirements and their interoperability.
- Hands-on experience on modelling activities and the implementation of bridges between modelling tools.
- Further research to better represent the software/microelectronics aspects of model-based avionics engineering.
- Further research on the verification and validation aspects of MBAE
- Implement the activities that result from your expression of interest.