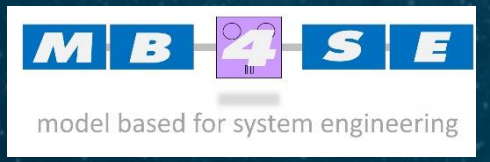
Implementing OSMoSE – LSIs point of view – June 2021



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Agenda

Overall System Modelling
OSMoSE
For Space System Engineering

Purpose/benefit of the ontology

Adoption of the ontology

Challenges to implement the ontology

Evolution of the ontology

Purpose / Benefit / Scope

- Purpose of OSMoSE:
  - Achieve interoperability in the data exchanges with customers and suppliers
  - Keep semantic integrity in the data during the exchange.

  - Gradual implementation strategy: LSIs + agencies first (easier), downwards along the supply chain in a 2nd step (more complex for SME in term of tools and associated investment)

- Expected benefits of OSMoSE:
  - Unambiguous exchanges
  - More efficient exchanges (less effort to reshape what is received, to adapt to what is received, to understand what is received)
  - Have more frequent exchanges as they are easier up to true collaborative engineering

- Scope of the ontology:
  - Initial focus on System Engineering
  - Scope to be widened to cover most engineering / management disciplines(e.g. quality, PM)

Adoption

- We already have a good starting Point:
  - Similar “ontology first” approach among the LSIs (Exago in TAS, SECAM in Airbus, OHB MBSE method)
  - Similar level of maturity wrt. benefits of ontology
    - are inputs for OSMoSE
    - Not absolute convergence with OSMoSE as wider scope than only Space (in Thales and Airbus Group) => might require additional needs for interoperability
- Ontology in ORM is not a language operationally used by LSIs in their engineering environment architecture => need adaptation.
- Configuration management at data level (in stead of document) is a challenge and this is a pre-requisite for OSMoSE exchages

- We are currently evaluating how to adopt OSMoSE proposed approach and what is the impact on our current (or foreseen) engineering environment.

IT-related challenges 1

Use cases of Exchanges using the OSMoSE

- exchange from a single source of data (current situation)
  - for a single tool, it is only an exporter from tool to tools. E.g. spec from Doors to Excel => Doors export re-import in Excel to be OSMoSE compatible.
    - => IT-challenge low

- Develop exchange from several sources of data (new, enabled by OSMoSE)
  - different approaches in terms of implementation (digital ecosystem) among LSIs to be set OSMoSE compatible with deeper impact on digital ecosystem
  - exporter from digital ecosystem (*) to digital ecosystem needed. E.g. exchange of a set of data composed of synchronised requirements and functional model => from Doors / Capella to Doors NG/ SysML
  - => IT challenge very high

(*) digital ecosystem: set of integrated tools together with associated process and methods

IT-related challenges 2

- Develop collaborative / concurrent data sharing (as opposed to discrete exchange of data bulk)
  - review only on OSMoSE data with adequate tool to support this digital review process (e.g. what about the diagrams for instance ?)
  - Need to develop such OSMoSE-speaking tools to enable digital review based on OSMoSE
  - Accessibility of the data (in terms of tool and knowledge): should not require huge infrastructure to be implementable in SME
  - => IT challenge very high

- Maintain the collaborative / concurrent data sharing environment
  - => IT challenge high

Process-related challenges

Overall System Modelling
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Engineering Process is related to ontology content / development

- Ontology contains some process aspects (e.g. IVV)
- OSMoSE perimeter may not be aligned with LSI ontology perimeters
- The process defines which part of the ontology will actually be used and at which step of the life cycle :
    - This is not part of the OSMoSE activities so far
    - this will make the link between ECSS processes and semantic of exchanged data
    - permit to define precisely what has to be exchanged during project and when (a kind of “semantic DRL”)

Evolution

Managing the evolution of the Ontology: need for strong synchronisation (due in particular to impact on engineering ecosystem) :

- Semantic is stable by nature, but relations between elements might be adapted
- Evolution of the technology might have an impact on the ontology especially at physical levels
- Development of OSMoSE ontology will require several development cycles
    - Pratical use will show the design flaws

Method and Tools R&D to based on OSMoSE so that OSMoSE can naturally evolve, and that the output of the R&D are more easily spread in the European Space community: e.g. FDIR study based on Capella concepts should be replaced by the same study based on FDIR concepts of OSMoSE, R&D on model quality to be looked at ontology level and not directly at tool level.

Thank you for your attention