

Minutes

Organisation: A joint meeting of the INCOSE UK Architecture and MBSE Working Groups

Topic: Architecture & MBSE Joint Workstream

Date: Tuesday, 5th November 2019

Location: Institute for Future Transport and Cities, Coventry University

Host: Stephen Powley, Coventry University

Attendees

1. **Alex Toth** - JLR - Systems Lead Enabling technologies - Link together MBSE and Architecture, align SysML(ish)
2. **Neil Burt** - QuinetiQ - Senior Systems Lead - General interest in aligning the two
3. **Urte Steponkute** - Leonardo UK - MBSE Lead - Interested in finding commonality,
4. **Philip Jackman** - Leonardo Ops Analysis - How to get from where we are to where should be
5. **Nic Plum** - Freelance In Aerospace, ex CSE - Currently in renewables - independent auditor, doing lots with models, views that MBSE is SysML
6. **Jon Symons** - Rolls Royce Bristol - Defence Engineering Lead Systems Architect, lead MBSE initiative - crosses over with systems architecting and MBSE roles
7. **Filippo Farina** - Rolls Royce - Systems Architect & Systems Engineer
8. **Iain Cunningham** – Vector, automotive tool vendor -
9. **Stephen Powley** - University - Enterprise systems of systems, understanding automotive enterprises are secure, particular focus on evaluation - interest to know differences between the two
10. **Mole Li** - Rolls Royce - Systems Engineer, defining MBSE standards and approaches etc - identify how other organisations are handle cross functional boundaries
11. **Warren Quinn** – Roke - Lead Architect - Like to clarify the ontologies
12. **Mike Wilkinson** - Co-chair AWG - BAE Chief Technologist, how to implement MBSE across the board - interested in understanding joint element
13. **Ian Clark** - Chair MBSE Interest Group - MBDA Lead on Generic Systems Architecture, 4 nation programme - would like to explore own ideas, and challenge them
14. **Jason Gollaglee** - Technical Lead for Systems Engineering & Design Capability (Scribe)
15. **Charles Dickerson** - Professor and chair of SE at Loughborough, previously director of architecture for US Navy, now focus is on commercial industry -
16. **Bruce McNaughton** - Started career in computer company, worked with Architecture working group's BA BT - integrating architecture & model-based lifecycles
17. **Yike Fang** - ZF - Systems Engineer in System Safety Security - integrated system safety and security architecture - how do you put MBSE and architecture together
18. **James Towers** - Scarecrow Consultants, MBSE WG Chair

Agreement of Terms of Reference (ToR)

- Meeting frequency discussed as every 6 weeks for start up
- Suggestion that individual work streams will need leads, could reduce work effort
- Suggestion of a co-chair to reduce effort for the group.
- Discussed the idea of Venn diagram that covers intellectual differences
- Taking a concerns-based approach to tackle the differences
- 12 - discussed Arch & APM group development of common touch points as a guide for defining boundary
- Z/Omega - guides are abstract and give a rounded view
- Suggestion to look at a poster option for ASEC 2020 as a first step
 - Joint paper to communicate progress of group at ASEC 2020 seem feasibility
- ASEC papers
 - ABSTRACT March 2020
 - Paper submittal June/July 2020
 - Look at a paper, even if the topic is a literature view
- Insight Magazine
 - Use ASEC as testing ground, then move onto INSIGHT and international publications

Topics in Scope

- Need to bound what types of architecture and modelling are in scope
- 9 - currently exploring ontologies, looking for opportunities to bounce and challenge ideas
- Role definitions - competency -
 - Belbin test for testing personality
 - Point raised that 20% (un-tested) do not have the capability for Systems Thinking
 - 15 - architect should be master of conceptualisation
- Discussed the confusion of architecture and design, the representation is different, but the activities should still be common.
- Discussed the continuum of document-based vs model-based architecting. Paper on the use of model theory could provide a means to resolve this
- 15 - are we open to working with OMG? Agreed that we are. Axiomatisation, normalisation, of architectures and systems. Opportunity to get OMG involved for developing frameworks. Also discussed MDA from OMG, and how it can be used for relating MBSE and architecture.

Architecture Definition - 12,15

- Paper is defining architecture definition, and the definition of architecture
- Attempts to reduce the confusion from architecture and model
 - Through first model theories
 - Tarski Model theory - represented by predicate calculus
 - Category theory
- Need both the definition of a design, for precision, and a prose
- Provides definition for class, structure, elements etc.

- Traces back to ontologies from John Sowa
 - needs both junction and structure for structure.
 - Structure is collection of objects that expresses a defining property
- 18 - model is a collection of objects and therefore only consists of structure. Behaviours are an external language used to discuss a type of structure
- PAPER DEF - Architecture is structural type in conjunction with consistent properties that can be implemented in a structure of that type
- PAPER DEF - System is a set of interrelated elements that comprise a whole, together with an environment
- Includes a historical survey and different definitions of terms, and how they relate to standards and MDA
- Provides a definition for model validation
- Meta Object Framework aligns with John Sowa's Concept -> Relation -> Concept.
 - Relationship is a specialisation on concept
- Provides a distinction of architectural terms
- Engineering is a practice of concept realisation in which relations between structure and functionality are modelled using the law of science for the purpose of solving a problem or exploiting an opportunity.
- Discussed Model Driven System Design (MBSD)
- Constraint Driven Design
 - Use of constraints to scope the solution (design) space from the problem (objective) space
 - Focuses on the optimisation of the design space, not the design objective
- ROSETTA
 - Use of multiple maximal orthotopes to constrain the solution (design) space
- Will be posted on archive, just submitted, will be published through IEEE Access before year end

Hot Topics in MBSE - 17

- SysML 2:
 - Comments raised that integrated validation is only on a view, not validation of the model.
 - Debates around the concept of a requirements in future SysML 2

Discussion of Work Stream

Work Streams:

- Key concepts, scope and overlap
 - 12(own), 2
- Landscape, Ontologies:
 - 3 (own), 5, 9, 14, 16
- Architecting processes using models:
 - 15(own), 11, 16, 14
- Managing the transition:
 - 18, 3, 4, 8

- Includes enterprise transition and role competencies
- Different kinds of models:
 - Discussion around the purposes of models
 - 12,
- Architecture models as part of 'digital engineering':
 - 14, 12, 11
- Idea is that work streams (ideally lead) present updates at subsequent joint work stream meetings

Review:

- Identified the issue in getting individuals to review. Suggestion that community should be either active participants, or reviewers of work stream outputs

AOB

- Next meeting will be scheduled for early 2020, 16/01/2020
- (ACTION) 14 to publish meeting minutes
- (ACTION) 14 (Arch) & 3 (MBSE WG) to ask questions regarding funding as co-chairs
- (ACTION) 2 - Explore options for Bristol QinetiQ to host next meeting.