IFAC Triennial International Conference

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

10th IFAC Manufacturing Modelling, Management and Control Conference

Call for Papers - Invited Session

From document-based to data and AI-based through model-based System Engineering: challenges and issues, works and results, perspectives

Session code: ax3an

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Session outline

Model Based Systems Engineering (MBSE) is considered as a way in System Engineering that promotes a formalized application of modeling and concerns any kind of system of interest, especially complex products in various domains, large production systems or logistic support systems. MBSE is then in opposition with more classical approaches that remain document-centric. Expected advantages of using MBSE are mainly to gain agility, efficiency, economic performance and relevance of design results face to stakeholders' requirements in order to progress in confidence and step by step, verifying and validating as early as possible, then tracing choices and decisions, until a 'successful system' is obtained (INCOSE 2014).

Over the past decade, data-based approaches and techniques, and in particular Artificial Intelligence (AI), have emerged and become increasingly important throughout the engineering and development phases of a complex system. More and more data are indeed available and it seems appropriate to use these ones in order to support, guide and help engineers during design and development phases.

So crossing and bridging the apparent gap between MBSE, data-based and AI approaches is of a great interest and offers various opportunities for a team in charge of designing, realizing, exploiting, maintaining then dismantling any complex system.

An additional challenge is brought by the fact that historically, engineering of complex projects especially manufacturing infrastructures has been strongly based on document-centric approaches and siloed way of sharing information. Subsequently, transitioning from these historical data organization and repositories ensuring production continuity as well as change management entails significant constraints on intermediary and final goals and situations.

Furthermore, the more transversal and global overview provided by combination of model-based, data-based and AI of both engineering and operation of complex manufacturing systems (life sciences, energy, defense, transport, …) enables more anticipation and efficiency in process reconfiguration and/or dismantling.

This session aims to point out the best of research and application works around MBSE, data-based and AI approaches and their common use when applied particularly to large products, manufacturing systems or logistic support systems. It could be question of:

- Success stories or conversely pitfalls that researchers and industry have now to face.
- Challenges and barriers associated to crossing MBSE and data-based approaches.
- Problems, works in progress and opportunities of research and development in this domain.

This session is opened to papers presenting both industrial and academic points of view, applications and research works in progress aiming to formalize, use and improve methodologies, methods, principles, tools, application cases in industry and pragmatic returns of experiments.

The proposed topics addressed by this session may concern (but are not restricted to):

- Data-Based, IA, and model-based approaches and impacts on various processes: Requirements engineering, Architectural engineering, (early) Verification and Validation, Architectural evaluation, Decision aid, Commissioning or Dismantling…
- MBSE and AI mix: MBSE for AI and reversely AI for MBSE
- Typologies, natures, properties and objectives of models in MBSE to be of great interest: checkability, executability, formal analysis…
- Numeric and data-oriented representation building and exploitation of complex systems: hybrid approaches of representation of simulation, from Digital-Mockup to Digital Twin, tooling…
- Knowledge and model reuse, pattern definition, rules extraction, ontology...
- Modeling languages for various purposes: from SysML, Modelica, Simulink, xFFBD, ... to new DSML (Domain Specific Modelling Languages) emergence, needs, usages…
- Evolutions of requested abilities and roles, new researchers and industrialist profiles, impacts on organizations and on business processes: acceptation, deployment, usages, training…

Important dates

December 25th, 2021: deadline for submission of full-length draft papers
February 15, 2022: notification of paper acceptance
March 15, 2022: final paper submission and early registration
June 22/23/24, 2022: conference, Nantes, France

Instructions for authors

See details in conference web site https://hub.imt-atlantique.fr/mim2022/
To prepare your paper, please refer to https://www.ifac-control.org/conferences/author-guide