17th IFAC Symposium on Information Control Problems in Manufacturing

7-9 June 2021 Budapest

Invited Session (session code : 75wqi)

Model-Based Systems Engineering and Design of the Future: state-of-the-art, new trends and challenges.

Invited Session jointly organized by Co-Chairs:

David Gouyon (CRAN UMR CNRS 7039, Université de Lorraine) david.gouyon@univ-lorraine.fr
Eric Bonjour (ERPI – Université de Lorraine) eric.bonjour@univ-lorraine.fr
Alessandro Golkar (Skolkovo Institute of Science and Technology), A.Golkar@skoltech.ru
Eric Levrat (CRAN UMR CNRS 7039, Université de Lorraine) eric.levrat@univ-lorraine.fr

Systems Engineering is a transdisciplinary approach to enable the design, the successful realization, use, and retirement of manufacturable and operable systems. The systems engineers have to verify that the engineered system satisfies the needs of stakeholders involved throughout its life cycle. Alternative solution concepts and architectures are generated and evaluated with multiple criteria. Enabling systems and services have to be co-engineered with the system and with the objective to find the best tradeoffs for the overall behavior and performance of these systems, while avoiding or minimizing adverse unintended consequences.
Systems engineers use many kinds of models to represent different views of the system (operational, functional, structural, behavioral, parametric…) and to verify the system behavior and the satisfaction of requirements such as availability, safety, mass, or power consumption. A strong current trend is Model-Based Systems Engineering (MBSE) is "the formalized application of modeling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases" (INCOSE, 2007).

The digital transformation of development and the MBSE principles open new opportunities to support the development of efficient, safe, manufacturable and operable complex systems with an executable MBSE approach grounded on a Modeling & Simulation approach supporting System Engineering goals. However, the progression of MBSE adoption is slow due to different reasons, among which we can cite: the system complexity is constantly growing; there is a lack of models to early detect and correct specification and design errors; model interoperability and reuse are poorly supported; and simulation outcomes are not enough trusted.

Increasingly important topics in Systems Engineering include the role of executable languages and models of systems, the concurrent use of physical and virtual prototyping, as well as the deployment of agile processes. Systems Engineering considers "both the business and the technical needs of all stakeholders with the goal of providing a quality product that meets the user needs" (INCOSE). Systems Engineering may be applied not only to products and services in the private sector but also to public infrastructures and sociotechnical systems whose precise boundaries are often challenging to be defined.

The session aims to provide researchers and practitioners implementing Systems Engineering opportunity to meet, exchange and discuss their experiences on the basis of which to establish future collaborations and synergies. The main topics of interest include, but are not limited to:

• Needs and Requirements formalization	• Human Factors / Human-Systems Integration
• System Architecture generation and evaluation	• Reliability / Availability / Maintainability
• Architectural Design & System Integration	• Safety / Security
• Verification / Validation	• Logistics / Supportability
• Model-Based Systems Engineering (MBSE)	• Life-cycle Costing or Value / Economic Evaluation
• Modeling and Simulation	• Environmental Compatibility, sustainability
• Formalization and reuse of SE knowledge (models, patterns…)	• SE Processes
	• Agile & Lean Systems Engineering
• Product Line Systems Engineering	• Project Planning / Assessment / Control
• Systems of Systems Engineering (SoSE)	• Decision Analysis / Management
• Transition / Operation / Maintenance	• System and technology roadmap
• Risk / Opportunity Management / Tradeoffs	• Systems Science, Systems Thinking
• Configuration / Information Management	• Systems Dynamics, systems complexity

Contributions in all application domains are welcomed.
General call for papers for the INCOM 2021 conference: https://incom2021.org/assets/files/incom2021_flyer.pdf

IMPORTANT DATES:

Draft paper submission: 7th November 2020
Notification of acceptance: 15th December 2020
Camera-ready final manuscripts: 1st February 2021
Early registration deadline: 8th February 2021
Late registration deadline: 1st April 2021