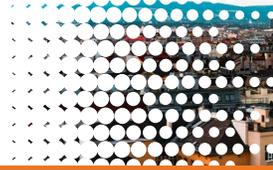# IEEE ISSE 2022

8th IEEE International Symposium on Systems Engineering

Vienna, Austria | October 24-26, 2022

CALL FOR PAPERS

GENERAL CHAIR

Bob Rassa
Raytheon (Retired), USA

TECHNICAL PROGRAM CHAIR

Paolo Carbone
University of Perugia, Italy

Rob Vingerhoeds
ISAE-SUPAERO, France

Chris Zhang
University of Saskatchewan, Canada

IMPORTANT DATES

JUNE 25, 2022

Abstract (Industry papers)

Manuscript (Academic/Research papers) Submittal

Special Session Proposals Deadline

JULY 22, 2022

Acceptance Notification

AUGUST 10, 2022

Final Paper Submission

IEEE
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IEEE SYSTEMS COUNCIL

2022.ieeeisse.org

This symposium seeks to create an interactive forum for the advancement of the practice of systems engineering across the multiple disciplines and specialty areas associated with the engineering of complex systems. The symposium will provide a venue for systems engineering practitioners, managers, researchers, and educators to exchange innovative concepts, ideas, applications and lessons learned addressing:

» Applications-oriented topics on large-scale systems and systems-of-systems in topics noted below

» Systems engineering, education, standards, processes and methodologies for the system-of systems environment

» Research opportunities and results relating to systems-of-systems

TOPICS

» System Architecture and Architectural Frameworks

» Engineering Systems-of-Systems

» Risk Management of Complex Systems Environment

» Systems Reliability

» Engineering Processes for Complex Systems - Includes Process

» Improvement and Quality Management

» Product Lifecycle Management Processes and Tools for System-of-Systems - Includes Configuration Management

» Configuration Management, Requirements Management, Data Management Strategy

» (CMS) and Integrated Logistics Support

» Service Oriented Architectures

» Cyber Security Issues and Approaches for Complex Systems

» Enterprise Systems Engineering

» Modeling and Simulation

» Agile Development Methods of System-of-Systems

» Model-Based Systems Engineering

» Systems Verification and Validation

» Systems Engineering Competency, Education and Training

» Program/Project Management for Complex Systems

» "Systems Thinking" Benefits

» Technology Transfer Between Academia and Industry

» Societal and Political Impacts of Systems and Systems Design

» Diagnostics, Prognostics, and Enterprise Health Management

» Research in Systems Engineering

» Software Systems Engineering

» System-level design

» HW/SW co-design

» Virtual prototyping

SYSTEMS CONSIDERATIONS ABOUT

» Autonomous Systems

» Energy Management and Sustainability, including Renewable Energy

» Space and Communications Systems

» Medical Systems

» Transportation Systems

» Gaming and Entertainment Systems

» Sensors Integration and Application for a Net-centric Environment

» Disaster response

» Global Earth Observation

» Large-Scale Systems Integration (in any application area)

SPECIAL SESSIONS

Reliability, Availability, Maintainability, and Safety (RAMS) in Systems Engineering : new perspectives for research and industry

LORENZO CIANI, UNIVERSITY OF FLORENCE, ITALY

Nowadays in many contexts it is mandatory to fulfill performance of Testing and Diagnostics, Reliability, Maintainability, Safety and Risk assessment. Such tasks play a fundamental role in different fields of application (energy, transportation, information and communication technology, logistics, etc.) and are considered as fundamental in high-tech industry and plants. This Special Session represents an interesting opportunity for engineers and researchers who work in this area to meet and discuss about live issues. In particular, useful and beneficial discussion can be promoted with the aim to provide an increasing of knowledge and an easier diffusion of the most recent developments.

Topics: Prospective authors can provide original contributions in this topic which can cover, but not only, the following aspects:

- Condition monitoring and maintenance of industrial process, plants and complex systems
- Fault detection and diagnosis in Systems Engineering
- Evaluation of Reliability, Availability, Maintainability and Safety (RAMS), Risk assessment and management for Systems Engineering
- Impact of RAMS requirements in systems application devoted to Life and Society, environment and new energy sources
- Testing and Diagnostics (Destructive and Non-destructive Testing, Vibration monitoring, Built-in Test Equipment and Automatic Test Equipment, etc.) in the design of
complex systems

Model-Based Sustainable Systems Engineering Context

PROF. PIERRE DE SAQUI-SANNES, INSTITUT SUPÉRIEUR DE L'AÉRONAUTIQUE ET DE L'ESPACE, FRANCE

In 2015, the seventeen Sustainable Development Goals were formally adopted by the UN in by the General Assembly of the United Nations (UN) as its 2030 agenda for sustainable development.

Sustainability awareness has accordingly become a concern shared by many research programs and industry projects.

Design of sustainable systems requires evolutions in terms of thinking the systems themselves.

It also requires to revisit system engineering so as to rely on practices, in particular Model Based Systems Engineering, that will be sustainable by themselves.

This special session welcomes contributions that address sustainability awareness at the system level, at the systems engineering level, and both.

Topics: Prospective authors can provide original contributions in this topic which can cover, but not only, the following aspects:

- Systems Evolution to comply with new laws and regulation
- Designing systems with sustainability awareness in mind
- Refactoring systems models to cope with evolutions of the originally models systems
- Optimizing simulation and verification of models to efficiently checked refactored models
- Multi paradigm modeling to cover systems engineering as well as social and environmental

Resilience of Agent Systems: Modeling, Design and Operation Management

WENJUN ZHANG, DEPARTMENT OF MECHANICAL ENGINEERING, UNIVERSITY OF SASKATCHEWAN

TAN ZHANG, COLLEGE OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING, SHENZHEN UNIVERSITY

A generic model of many complex dynamic systems is that the system consists of a group of agents, which could be intelligent and non-intelligent. The word 'intelligent' refers to being able to learn, to change, and to making decision, while the word 'non-intelligent' refers to missing one, two or all of the three intelligent behaviors. The complexity refers to uncertainty of changes in the structure of each agent and the communication among agents. It is worth to mention that such a system differs from traditional multi-agent systems, in which all agents are intelligent, in that in such a system, non-intelligent agents need "help" from intelligent agents. Such a system may be called the under-intelligent agent system.

Resilience of a system makes sense to the ability of a system on its own resource to recover from an unexpected partial damage of the system and/or unexpected damage of environments. How to model, design and manage the operation of both intelligent agent systems and under-intelligent agent systems to improve their resilience is an important question. The management of operation includes planning, scheduling, coordination and execution.

The purpose of this special session is to bring together researchers to share knowledge of design and operation management of both under-intelligent agent systems and intelligent agent systems.

Critical Systems and Infrastructure

HAIFENG ZHU, OTIS ELEVATOR COMPANY

FUHUA MA, PRATT & WHITNEY

Critical systems and infrastructure, in particular aerospace systems, are often complex and pose significant challenges to systems engineering. Similar to the Aerospace Systems Engineering session in IEEE SysCon, this special session welcomes a broader discussions on systems engineering issues related to aerospace and all critical systems/infrastructures (such as automotive, elevators, medical, etc.) that include but are not limited to: Systems Issues, Requirements and Architecture, Physics Modeling, Simulation and Analysis, Systems Integration & Verification, Autonomous Systems, Robotic Systems, Sensors Integration & Application, Human Machine Interfaces, Cybersecurity and Critical Communication Systems. Authors may submit theoretical or practical use case papers in aerospace and other critical systems areas.

SPECIAL SESSIONS

Current Trends and new perspectives in Reliability, Availability, Maintainability, and Safety (RAMS) for Complex Systems

LORENZO CIANI, UNIVERSITY OF FLORENCE, ITALY
MARCANTONIO CATELANI, UNIVERSITY OF FLORENCE, ITALY

Nowadays in many contexts it is mandatory to fulfill performance of Testing and Diagnostics, Reliability, Maintainability, Safety and Risk assessment. Such tasks play a fundamental role in different fields of application (energy, transportation, information and communication technology, logistics, etc.) and are considered as fundamental in high-tech industry and plants. This Special Session represents an interesting opportunity for engineers and researchers who work in this area to meet and discuss about live issues. In particular, useful and beneficial discussion can be promoted with the aim to provide an increasing of knowledge and an easier diffusion of the most recent developments.

All papers and abstracts should be submitted electronically to the EDAS IEEE ISSE 2022 submission portal at **http://edas.info/N25708**.

Theoretical Foundations of System Engineering (THEFOSE)

OMAR HAMMAMI, ENSTA PARISTECH, FRANCE

System engineering has experienced multiple successes over the years in various industrial projects with a strong emphasis in defense and aerospace. Recently, system engineering has gained several contributions from theory however the field still lacks a strong theoretical foundation. This request for more theoretical foundations come from both academia and industry in order to make the best of system engineering practices and experience in increasingly multidisciplinary projects. Several research topics need to be addressed such as formal definitions of system engineering terms and concepts, systems semantics, complexity theory of multidisciplinary systems, formal analysis of system engineering processes and standards but also all theoretical computer science impacts on languages (e.g. SysML) and tools used by system engineers. This session contributors will also provide papers discussing the integration of quantitative methods into MBSE methods and processes. Examples of quantitative methods include formal methods, value-driven design, petri-nets, design space optimization, etc. This session will also accept papers on the integration of the quantitative methods into SysML and its variants. Finally, the session will also call for papers proposing new research directions and tutorial papers in the theoretical foundations of system engineering.

The special session's organizer is Omar Hammami from ENSTA ParisTech which is located at 828, Bvd des Maréchaux 91762 Palaiseau cedex FRANCE. If you have any questions please contact him at **hammami@ensta.fr**.

Submission procedure Research and application papers: These are long manuscripts addressing novel ideas and theoretical issues. For this category, authors should submit either the full manuscript (up to 8 pages in length) or, alternatively, an extended abstract of at least four (4) pages. A clear statement of contribution is required. The papers should also include an introduction, background, theory, results, and validation. All papers and abstracts should be submitted electronically to the EDAS IEEE ISSE 2022 submission portal at **http://edas.info/N25708**.