



# IEEE ISSE 2022

8<sup>th</sup> IEEE International Symposium on Systems Engineering  
Vienna, Austria | October 24–26, 2022



## ISSE 2022 CONFERENCE PROGRAM

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## General Chair's Message



It is indeed a great pleasure to welcome attendees to the 8th annual International Symposium on Systems Engineering – and our first live, in-person Symposium in 3 years! Of course, the 3-year in-person hiatus was caused by the global Covid-19 pandemic, and while that virus is still with us, its effect has been substantially mitigated by effective vaccines, aided no doubt by some pretty special biometric systems engineering!

We are most pleased to have as our honored Keynote Speaker, the National Aeronautics and Space Administration (NASA) Deputy Associate Administrator for Programs, Dr. Wanda Peters. Dr. Peters has 35 years of scientific, engineering, and programmatic experience, including approximately 25 years in leadership roles. Her complete bio is included in the program booklet so we won't elaborate further, other than to say that we are exceptionally fortunate that Dr. Peters could join us this week.

As you all know, systems engineering is a life-blood and essential element in today's complex systems, and we might just focus on one amazing system accomplishment which many will tout as the scientific and engineering accomplishment and advancement of the decade – the new NASA James Webb Space Telescope. This amazing space-based telescope has enabled the world to look back in time to almost the very beginning. The systems engineering expertise that went into this marvel rivals any in recent history and underscores the exceptional value of the discipline in today's systems.



And many thanks to my valued friend and colleague, Dr. Paolo Carbone for putting together a wonderful program of technical papers. We hope you enjoy the Symposium, and the historic city of Vienna, Austria!

Bob Rassa,  
IEEE ISSE 2022 General Chair

## Keynote Speaker

**Dr. Wanda Peters**  
**Monday, October 24**  
**8:20 – 10:30**



Dr. Wanda Peters has over 35 years of scientific, engineering, and programmatic experience working for the federal government and private industry. She is a member of the Senior Executive Service of the United States of America. Presently, Dr. Peters serves as the Deputy Associate Administrator for Programs in the Science Mission Directorate (SMD), National Aeronautics and Space Administration (NASA) Headquarters. She is responsible for overseeing and assessing SMD's multi-billion dollar portfolio of over 125 missions. She started her career at NASA, Goddard Space Flight Center, in January 1990 as a support contractor and converted into the government in 2005. At NASA, Dr. Peters has worked in the areas of program, project and business management, institutional operations, mechanical systems engineering, space technology development, and safety and mission assurance.

Prior to joining the NASA family, Dr. Peters worked at the Naval Research Laboratory as a research scientist. Dr. Peters is a mentor and advocates for diversity, equity, inclusion, and accessibility in the workplace. She is a graduate and Senior Executive Fellow of the Harvard Kennedy School of Government. Dr. Peters received both a Ph.D. in systems engineering and a Master's in engineering management from George Washington University, a Bachelor of Science in engineering from the Catholic University of America, and a Bachelor of Science in biology from the University of Maryland, Eastern Shore. She is a native Washingtonian, is married and has two daughters.

## Special Sessions

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

**Organizer:**

Lorenzo Ciani

**Abstract:**

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

### Theoretical Foundations of System Engineering (THEFOSE)

**Organizer:**

Omar Hammami

**Abstract:**

System engineering has experienced multiple successes over the years in various industrial projects with a strong emphasis in defense and aerospace. Recently, system engineering have 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 (MDAO), etc. This session will also accept papers on the integration of the quantitative methods into SysML and its variants. This session will as well architecture frameworks and their theoretical foundations and complexity.

Finally, the session will also call for papers proposing new research directions and tutorial papers in the theoretical foundations of system engineering.



## Monday Technical Program

**08:20 - 10:30**  
**Symposium opening session and Keynote Speech**  
**Room: Ballroom A**

**10:30 – 11:00**  
**Coffee Break**

**11:00 – 12:40**  
**1B1- System Thinking Benefits**  
**Room: Ballroom A**  
**Session Chair:** Jeremy Daily (Colorado State University, USA)

**11:00 Systems Thinking and Model Based Systems Engineering's Utility to Solve Complex Organizational Problems - Cyber-Physical System Design Teams**  
*Martin Trae Span III (Colorado State University & United States Air Force, USA); Shwetha Gowdanakatte, Jeremy Daily, Indrakshi Ray and Kamran Shahroudi (Colorado State University, USA)*

**11:25 Building a Semantic Layer for Early Design Trade Studies in the Development of Commercial Aircraft**  
*Andreas Zindel, Philipp Helle and Gerrit Schramm (Airbus, Germany); Sergio Feo-Arenis (Independent Researcher, Germany); Maged Elaasar (Jet Propulsion Laboratory, USA)*

**11:50 How does Systems Thinking support the understanding of complex situations?**  
*Susan Traeber-Burdin (Fraunhofer Institute FKIE, Germany); Margaret Varga (University of Oxford, Germany)*

**12:15 Safety Management Complexity: A Systems Thinking Approach**  
*Natalie Carter (Stevens Institute of Technology & Sandia National Laboratories, USA); Mo Mansouri (Stevens Institute of Technology & University of South-Eastern Norway, USA)*

**11:00 – 12:40**  
**1B2: Agile Development Methods**  
**Room: Ballroom B**  
**Session Chair:** Laurent Gasser (Thales, France)

**11:00 Transfer of DevOps to Multi-Disciplinary Systems**  
*Jan Vollmar and Birthe K Boehm (Siemens AG, Germany)*

**11:25 Analysis of the criteria for comparing Systems Engineering and agile methods**  
*Lynn Humpert and Enrik Mundt (Fraunhofer IEM, Germany); Lukas Bretz (Fraunhofer Research Institute for Mechatronic Systems Design IEM, Germany); Harald Anacker (Fraunhofer-Einrichtung für Entwurfstechnik Mechatronik IEM, Germany)*

**11:50 Agile Systems Engineering in Regulated Industries**  
*Lena Holzner, Abdelaziz Daroui, Sassan Mottaghian and Georg Großholz (Deloitte Consulting, Germany)*

**12:15 Functional Performance Metric as Effort Prediction**  
*Laurent Gasser (Thales, France)*

**12:40 – 13:50**  
**Lunch Break**

**13:50 – 15:30**  
**1C1: Engineering processes and systems**  
**Room: Ballroom A**  
**Session Chair:** Jean-Yves Choley (ISAE-SUPMECA & Quartz Laboratory, France)

**13:50 Risk Identification with Entity Attributes Diagrams in Business Process Modeling**  
*DeAndre A Johnson and James H. Lambert (University of Virginia, USA); Vidal Melo (University of Sao Paulo, Brazil)*

**14:15 Overview of the Engineering Change Management Process in a Complex Multi-Domain System**  
*Moritz M. Altnier (Mercedes-Benz AG & KIT - Karlsruhe Institute of Technology, Germany); Roland Winter and Ainhoa Ye (Mercedes-Benz AG, Germany); Carmen Winter (DHBW Stuttgart, Germany); Albert Albers (Karlsruhe Institute of Technology (KIT), Germany)*

#### 13:40 The Capability Concept in the Context of Systems of Systems: A Systematic Literature Review

Joyce D Martin (Mälardalens University, Sweden); Jakob Axelsson (Mälardalen University & RISE Research Institutes of Sweden, Sweden); Jan Carlson (Mälardalen University, Sweden); Jagadish Suryadevara (Mälardalens University, Sweden)

#### 15:05 Integration of technical processes: practical examples from the experiences made for the design of ITER fusion reactor systems

Giovanni Tenaglia, Stefano La Rovere and Benedetta Baldisserri (NIER S.p.A., Italy)

13:50 – 15:30

#### 1C2: Systems Societal impact

Room: Ballroom B

Session Chair: Andrew Demo (NASA Ames Research Center, USA)

#### 13:50 Exploring doctors' satisfaction with electronic health records and its features: A nationwide survey study

Safa Elkefi and Onur Asan (Stevens Institute of Technology, USA)

#### 14:15 Upgrading Approach for MaaS Level 4 Using UAF

Akira Ishizaka, Hiroki Ikegaya and Hidekazu Nishimura (Keio University, Japan)

#### 14:40 Citizen sensing system optimization for infrastructure monitoring: developing community currency model which incentivizes behavior changes of "citizen sensors"

Masanori Muto (Keio University)

#### 15:05 Methods for Developing Successful Systems Engineers

Andrew Demo (NASA Ames Research Center, USA)

15:30 – 16:00

Coffee Break

16:00 – 18:10

#### 1D1: Model Based Systems Engineering I

Room: Ballroom A

Session Chair: Alexander Ahlbrecht (German Aerospace Center (DLR), Germany)

#### 16:00 Advanced Engineering Change Impact Approach (AECIA) - Towards a model-based approach for a continuous Engineering Change Management

Alex Martin (Karlsruhe Institute of Technology (KIT), Germany); Jerome Kaspar (Engineering Methods AG, Germany); Stefan Achilles Pfeifer (Fraunhofer-Einrichtung für Entwurfstechnik Mechatronik IEM, Germany); Constantin Mandel, Simon Rapp and Albert Albers (Karlsruhe Institute of Technology (KIT), Germany)

#### 16:25 Using MBSE With SysML to Analyze Change Impacts, Including Efforts, in Technical Systems

Claudius Ellsel (Technische Universität Berlin, Germany); Gökhan Senkal (IAV GmbH, Germany); Rainer Stark (TU Berlin, Germany)

#### 16:50 Model-Based STPA: Towards Agile Safety-Guided Design with Formalization

Alexander Ahlbrecht, Umut Durak and Wanja Zaeske (German Aerospace Center (DLR), Germany)

16:00 – 18:10

#### 1D2: Systems Security and Requirement Management

Room: Ballroom B

Session Chair: Paolo Carbone (University of Perugia, Italy)

#### 16:00 Cybersecurity in Industrial Control Systems - An integration of information technology and operational technology

Montri Wiboonrat (King Mongkut's Institute of Technology Ladkrabang & Faculty of Engineering, Thailand)

#### 16:25 Is Self-Sovereign Identity Really Sovereign?

Nitin Naik (Aston University, United Kingdom (Great Britain)); Paul Jenkins (Cardiff Metropolitan University, United Kingdom (Great Britain) & University of Portsmouth, United Kingdom (Great Britain))

#### 16:50 Systems-Engineering-based Requirements Reuse in Accordance with Stakeholder Needs in Automotive Product Development

Albert Albers (Karlsruhe Institute of Technology (KIT), Germany); Alexander Kubin (Karlsruhe Institute of Technology, Germany); Alexej Eckhardt (Ruhr University Bochum, Germany); Simon Rapp (Karlsruhe Institute of Technology (KIT), Germany); Christoph Kempf (Karlsruhe Institute of Technology, Germany)



**17:15 A Requirements Validation Framework for Major Infrastructure Projects**

Joseph Murphy, Charles E. Dickerson, Chris Goodier and Tony Thorpe (Loughborough University, United Kingdom (Great Britain));  
Sonia Zahiroddiny (High Speed 2 (HS2) Limited, United Kingdom (Great Britain))

## Tuesday Technical Program

**8:20 – 10:30**

**2A1: Medical Systems**

**Room: Ballroom A**

**Session Chair:** Lorenzo Ciani (University of Florence, Italy)

**8:20 Impact of patient-centered care on cancer beliefs and knowledge: a social cognitive theory application**

Safa Elkefi and Onur Asan (Stevens Institute of Technology, USA)

**8:45 Impact of mobile health on communication and quality of care perception among people with multimorbidity**

Safa Elkefi and Onur Asan (Stevens Institute of Technology, USA)

**9:10 A Bio-Mechanical System of Systems for Heart Failure Patients**

Marwan A. Simaan (University of Central Florida, USA)

**9:35 Patients' perceptions of Integrating AI into healthcare: systems thinking approach**

Bijun Wang and Onur Asan (Stevens Institute of Technology, USA); Mo Mansouri (Stevens Institute of Technology & University of South-Eastern Norway, USA)

**10:00 Caregivers' experience with telehealth during Covid-19: a quantitative study in the United States**

Safa Elkefi (Stevens Institute of Technology, USA)

**8:20 – 10:30**

**2A2: Model Based Systems Engineering II**

**Room: Ballroom B**

**Session Chair:** Thomas Peugeot (MOSS SAS, France)

**8:20 GONG: an open source Ontology Based System Engineering toolset**

Thomas Peugeot (MOSS SAS, France)

**8:45 Accelerating Simulation-Enabled Engineering**

Leonard Stepien (Universitaet Oldenburg & ITK Engineering GmbH, Germany); Sven Hallerbach and Frank Köster (German Aerospace Center (DLR), Germany)

**9:10 Fostering Model Consistency in Interdisciplinary Engineering by Linking SysML and CAD-Models**

Thomas Schumacher and Dennis Kaczmarek (Technische Universitaet Clausthal, Germany); David Inkermann (Technische Universität Clausthal, Germany); Armin Lohrengel (Technische Universitaet Clausthal, Germany)

**9:35 Application and Adaptation of a Process Model for Data-Driven Validation of the System of Objectives**

Steffen Wagenmann (Karlsruher Institute of Technology & TRUMPF Machine Tools SE & CoKG, Germany); Artur Krause (Albstadt University of Applied Science, Germany); Simon Rapp and Albert Albers (Karlsruhe Institute of Technology (KIT), Germany); Nikola Bursac (Technical University of Hamburg, Germany)

**10:00 Towards Articulating Failures for Building Resilience in Robot Swarms: A Case Study in Model-Based Systems Engineering**

Arsalan Akhter (Worcester Polytechnic Institute, USA); Shamsnaz V Bhada (Worcester Polytechnic Institute, USA); Kleo Golemi, Joseph Murphy, Alexander M. Wyglinski, Carlo Pincioli and Khai Yi Chin (Worcester Polytechnic Institute, USA)

**10:30 – 11:00**

**Coffee Break**

**11:00 – 12:40**

**2B1: Model Based Systems Engineering III**

**Room: Ballroom A**

**Session Chair:** Claudio Zuccaro (University of Applied Sciences Munich, Germany)

**11:00 Collaboration between System Architect and Simulation Expert**

Heinrich Wagner and Claudio Zuccaro (University of Applied Sciences Munich, Germany)

**11:25 Reduced Order Modeling of a Heat Exchanger with a Stacking Ensemble to reduce Computational Inefficiencies**

Vinayak Vijaya Chandran and Roopa Adepu (Collins Aerospace, India)

**11:50 System modeling process with SysML assuming the use of models**

Hiroki Umeda (Japan Aerospace Exploration Agency & JAXA, Japan); Yasushi Ueda, Shohma Takatsuki, Tsutomu Kobayashi, Atsushi Wada, Yutaka Komatsu, Naoki Ishihama and Takanori Iwata (Japan Aerospace Exploration Agency, Japan)

**12:15 Functional Cost Modelling & Management**

Abdelaziz Daroui, Georg Großholz, Lena Holzner and Sassan Mottaghian (Deloitte Consulting, Germany)

**11:00 – 12:40**

**2B2: Risk management**

**Room: Ballroom B**

**Session Chair:** Masanori Muto (Mitsubishi Research Institute & Keio University, Japan)

**11:00 Obstacles of System-of-Systems**

Bedir Tekinerdogan (Wageningen University, The Netherlands)

**11:25 Measuring Health Systems Resilience: A Comparative Study Of Turkey's Health System During Covid-19 Pandemic**

Özgür Erol and Hakan Tozan (Istanbul Medipol University, Turkey); Kübra Çakır, İdil Doğan and Dilara Bacacı (Istanbul Medipol University, Turkey)

**11:50 Safe Integration of Autonomous Machines in Underground Mining Environments**

Julieth Patricia Castellanos Ardila, Hans Hansson and Sasikumar Punnekkat (Mälardalen University, Sweden)

**12:15 A Risk Analysis Study: Model Development for Risk Mitigation and Systematic Approach to FTI System Design Activities**

Osman Birkan Ozseven (Turkish Aerospace, Turkey); Safak Tambova (Germany); Halil Helvacı (University of Kentucky, USA)

**12:40 – 13:50**

**Lunch Break**

**13:50 – 15:30**

**2C1: Data, models, simulations**

**Room: Ballroom A**

**Session Chair:** Dennis Hillig (Hamburg University of Technology, Germany)

**13:50 Multi domain physics-based modeling for finding root cause of pressure oscillations on aircraft landing gear brake control system**

H K Pavan Kumar Kollipara and Venkateswaran Krishnasamy (Collins Aerospace, India); Venkata Kaushik Belusonti (NONE & Ratheon Technologies, USA); Suk-Min Moon (Collins Aerospace, USA)

**14:15 Towards a Data Engineering Process in Data-Driven Systems Engineering**

Patrick Petersen, Hanno Stage, Jacob Langner and Lennart Ries (FZI Research Center for Information Technology, Germany); Philipp Rigoll (FZI Forschungszentrum Informatik, Germany); Carl Philipp Hohl and Eric Sax (FZI Research Center for Information Technology, Germany)

**14:40 Classification of Engineering Models by Physical Effects**

Patrick Jagla (RWTH Aachen University & Institute for Machine Elements and Systems Engineering, Germany); Georg Jacobs and Joerg Berroth (RWTH Aachen University, Germany); Gregor Höpfner (iMSE RWTH Aachen University, Germany)

**13:50 – 15:30**

**2C2: Systems architecture**

**Room: Ballroom B**

**Session Chair:** Jacqueline Henle (FZI Research Center for Information Technology, Germany)

**13:50 Extended RFLP for complex technical systems**

Iris Graessler (Paderborn University - Heinz Nixdorf Institute, Germany); Dominik Wiechel (Paderborn University & Heinz Nixdorf Institute, Germany); Christian Oleff (Heinz Nixdorf Institute - Paderborn University, Germany)

#### **14:15 A viewpoint-based evaluation method for future Automotive Architectures**

Jacqueline Henle, Laurenz Adolph and Carl Philipp Hohl (FZI Research Center for Information Technology, Germany); Eric Sax (Karlsruhe Institute of Technology, Germany)

#### **14:40 Development of System Alternatives using Generative Engineering**

Bastian Menninger, Joerg Berroth and Georg Jacobs (RWTH Aachen University, Germany)

#### **15:05 Definition and use of logical and physical architecture within vehicle concept development**

Jonas Krog (Technische Universität Braunschweig & Volkswagen AG, Germany); Arne thom Suden and David Schneider (Technische Universität Braunschweig, Germany); Thomas Vietor (TU Braunschweig, Germany)

#### **15:30 – 16:00**

##### **Coffee Break**

#### **16:00 – 18:10**

##### **2D1: Requirements and Validation**

##### **Room: Ballroom A**

**Session Chair:** Daniel Preuss (University of Paderborn, Germany)

#### **16:00 Requirements Engineering for the Development of Disruptive Systems Engineering Innovations**

Maximilian Vierlboeck and Roshanak Rose Nilchiani (Stevens Institute of Technology, USA); Anirban Ganguly (O. P. Jindal Global University, India); Christine Edwards (Lockheed Martin & Stevens Institute of Technology, USA)

#### **16:25 Validation of Obstacle Detection for Rail Vehicles using a dynamic Ground Truth System**

Andreas Krutz and Georg Schott (Siemens Mobility, Germany)

#### **16:50 Stochastic Scenario Exploration with Constrained Parameters for Aircraft System Virtual Testing**

Dennis Hillig and Frank Thielecke (Hamburg University of Technology, Germany)

#### **17:15 Efficient Extraction of Technical Requirements Applying Data Augmentation**

Iris Gräßler (University of Paderborn, Germany); Daniel Preuß (Paderborn University, Germany); Lukas Brandt (Atos Information Technology GmbH, Germany); Michael Mohr (EDAG Engineering GmbH, Germany)

#### **16:00 – 18:10**

##### **2D2: Special Session THEFOSE**

##### **Room: Ballroom B**

**Session Chair:** Omar Hammami (ENSTA, France)

#### **16:00 Structure Preserving Transformations for Practical Model-based Systems Engineering**

Siyuan Ji (University of York, United Kingdom (Great Britain)); Michael Wilkinson (BAE Systems Maritime, United Kingdom (Great Britain)); Charles E. Dickerson (Loughborough University, United Kingdom (Great Britain))

#### **16:25 Grid connected Hybrid Energy Multi level inverter for power distributed systems using ANFIS Controller**

Manikandan M, Pranaya P, Sony Lingala, Vamshi Ch and Ravindar Bhurke (Jyothishmathi Institute of Technology and Science, India)

#### **16:50 Consistency of multiple system engineering models of a fixed wing drone**

Julien Vidalie (Supméca - Quartz Laboratoire & IRT SystemX, France); Imane Bouhali (ENS PARIS SACLAY, France); Faïda Mhenni (ISAE-Supméca & Laboratoire Quartz, France); Michel Batteux (IRT SystemX, France); Jean-Yves Choley (SUPMECA & Laboratoire Quartz, France)

#### **17:15 Natural Language Processing of Specifications for a Prototypical Avionic System to Generate System Design: A Case Study**

Candice Chambers, Siddhartha Bhattacharyya and Nasheen Nur (Florida Institute of Technology, USA)

#### **17:40 Towards Digitalization of Physical Effect Libraries**

Maximilian Meissner, Simon Dehn, Georg Jacobs, Joerg Berroth and Julius Berges (RWTH Aachen University, Germany); Christian Guist (Bauhaus-Universität Weimar, Germany)

## Wednesday Technical Program

**8:20 – 10:30**

**3A1: Model Based Systems Engineering IV**

**Room: Ballroom A**

**Session Chair:** Vincent Chapurlat (IMT Mines Alès & Laboratoire des Sciences des Risques (LSR), France)

### **8:20 Examples of AI-based Assistance Systems in context of Model-Based Systems Engineering**

Elena Schröder (Technische Universität Berlin & Einstein Center Digital Future, Germany); Ruslan Bernijazov (Fraunhofer Institute for Mechatronic Systems Design IEM, Germany); Marc Foullois (Fraunhofer Institute for Mechatronic, Germany); Michael Hillebrand (Heinz Nixdorf Institute, Germany); Lydia Kaiser (Technische Universität Berlin, Germany); Roman Dumitrescu (Fraunhofer-Einrichtung für Entwurfstechnik Mechatronik IEM, Germany)

### **8:45 A theoretical, methodological and technical contribution for modeling and V&V in MBSE context**

Vincent Chapurlat (IMT Mines Alès & Laboratoire des Sciences des Risques (LSR), France); Blazo Nastov (Axelience, France); Jérémy Bourdon (IMT Mines Alès, France)

### **9:10 Modeling Inclusive Systems in SysML**

Maisa Cietto (USP, Brazil); Nasrine Damouche and Pierre de Saqui - Sannes (ISAE-SUPAERO, France); Ombeline Aiello (ISAE-SUPAERO & ONERA, France); Eric Razafimahazo and Rob Vingerhoeds (ISAE-SUPAERO, France)

### **9:35 Implementation of Systems Engineering: A maturity-based approach**

Daria Wilke (Fraunhofer IEM, Germany); Stefan Achilles Pfeifer (Fraunhofer-Einrichtung für Entwurfstechnik Mechatronik IEM, Germany); Rebecca Heitmann (HARTING Applied Technologies GmbH, Germany); Harald Anacker and Roman Dumitrescu (Fraunhofer-Einrichtung für Entwurfstechnik Mechatronik IEM, Germany); Volker Franke (HARTING Applied Technologies GmbH, Germany)

### **10:00 Guidelines for systematic functional decomposition in model-based systems engineering**

Jerome Kaspar, Nicolae Cioroi, Martin Bauch and Sven Kleiner (Engineering Methods AG, Germany)

**8:20 – 10:30**

**Systems Chapter Community Discussion**

**Room: Ballroom B**

**Session Chair:** Fabrice Labeau (McGill University, Canada)

**10:30 – 11:00**

**Coffee Break**

**11:00 – 12:40**

**3B1 - Systems RAMS**

**Room: Ballroom A**

**Session Chair:** Lorenzo Ciani (University of Florence, Italy)

### **11:00 An Electromagnetic Gripper for Multiple Picking of Iron Laser-Cut Parts**

Elia Landi, Ada Fort, Valerio Vignoli and Marco Mugnaini (University of Siena, Italy); Marco Barbieri (ROGGI srl, Italy)

### **11:25 A first proposal of a data-driven reliability life cycle for complex systems**

Marcantonio Catelani, Lorenzo Ciani and Gabriele Patrizi (University of Florence, Italy)

### **11:50 Low-cost accurate inductive system for thickness measurement of industrial ferromagnetic plates**

Matteo Intravaia, Ada Fort and Marco Mugnaini (University of Siena, Italy); Federico Carli (University of Pisa, Italy); Federico Micheletti and Elia Landi (University of Siena, Italy); Marco Barbieri (ROGGI srl, Italy)

### **12:15 Design and Implementation of a Low Cost System for Accurate Impedance Spectroscopy**

Alessio De Angelis, Francesco Santoni, Antonio Moschitta and Paolo Carbone (University of Perugia, Italy)

**11:00 – 12:40**

**Business Meeting with Chapter Chairs:**

**Room: Ballroom B**

**Session Chair:** Fabrice Labeau (McGill University, Canada)