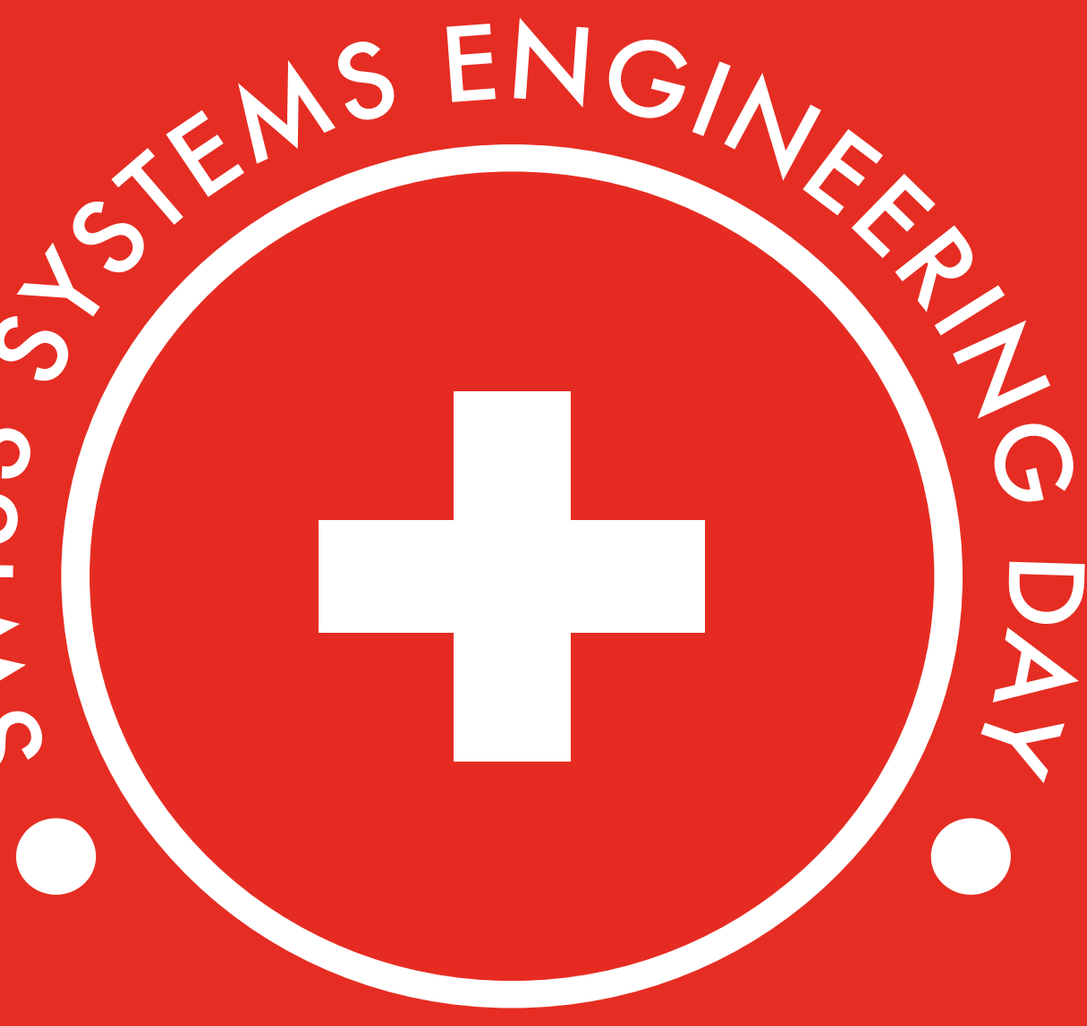


SWISSED20

CROSS-THINKING

CROSS

THINKING

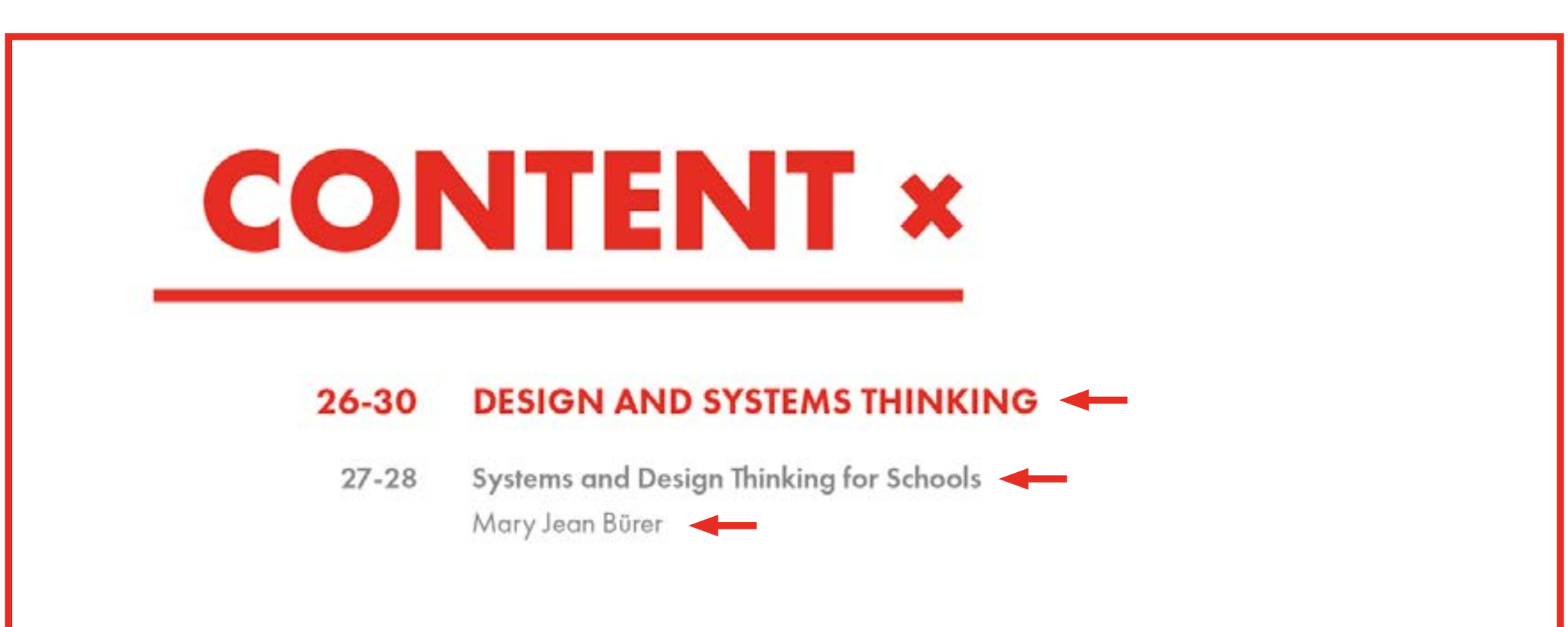
16. SEPT. 2020

Day Programme and Schedule

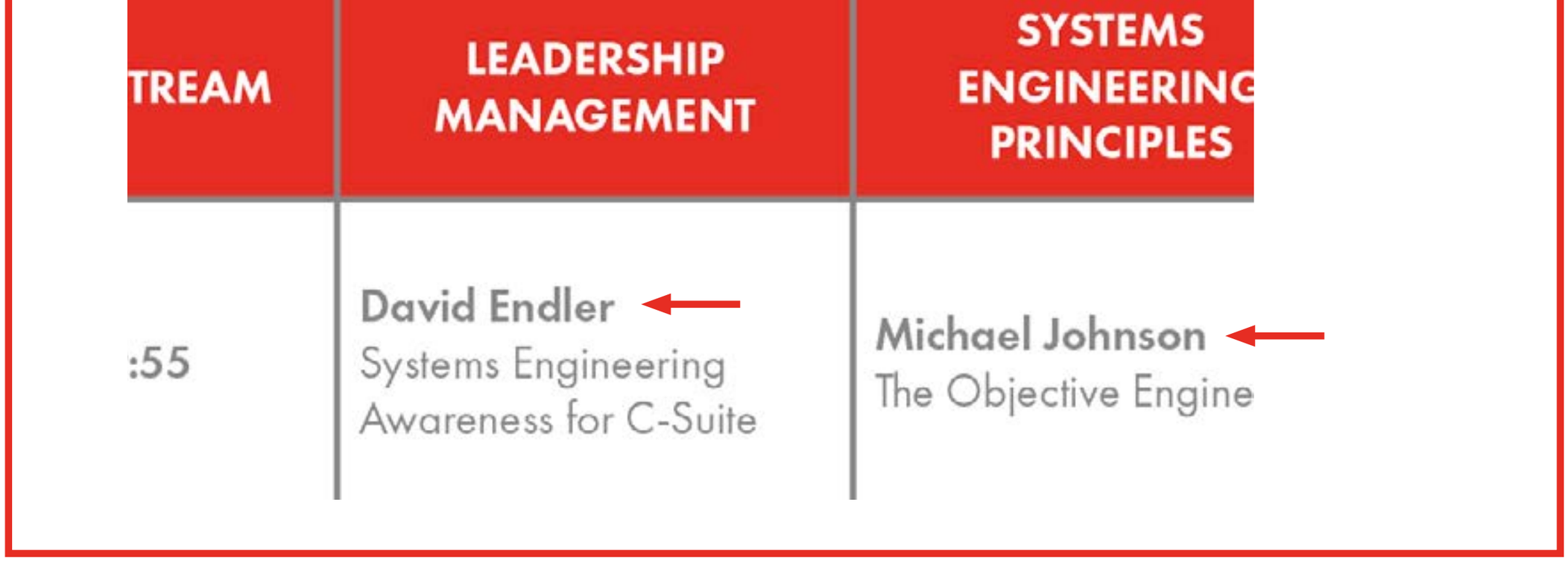
Using your digital programme...

To make it easier for you to navigate this digital PDF on your mobile device, we have made the abstract titles and presenter names on the **'contents'** and **'programme'** pages hyperlinked.

To view an abstract or bio, simply click the title or the presenter's name.



To navigate back to the contents or programme page, use the 'back' buttons at the bottom of each abstract/bio.



CONTENT ×

5 **ABOUT SWISSED**

6-7 **TECHNICAL PROGRAMME**

8 **SPONSORS**

9-12 **KEY NOTE PRESENTATIONS**

10-11 **Systems Thinking in the Age of Digital Ecosystems: Engaging with a Digitalised Sustainability Future**
Michael von Kutzschenbach

12 **Business Ecosystem Design: Bridging the Gap between the Product/Market-Fit and System/Actors-Fit**
Michael Lewrick

13-16 **LEADERSHIP MANAGEMENT**

14 **Systems Engineering Awareness for C-Suite**
David Endler

15-16 **Optima Connections - Applying Psychology with Systems Engineering to Realise Organisational Change**
Kevin Howard

17-25 **SYSTEMS ENGINEERING PRINCIPLES**

18 **The Objective Engineer**
Michael Johnson

19 **A Systems View of Systems Engineering - The Field in its Intellectual Context**
Marc-Andre Chavy-Macdonald

20-21 **The 3 System Architecture Views**
Jose Barros

22 **How to Avoid Informations Gaps in Projects**
Pawel Szymik-Kozaczko

23 **Reducing the Cost of Requirements Engineering**
Marco Di Maio and Colin Hood

24-25 **SE Principles as an Enabler to Introduce a System-of-Systems for Medtech Devices**
Christian Buser

CONTENT ×

26-30 DESIGN AND SYSTEMS THINKING

27-28 **Systems and Design Thinking for Schools**
Mary Jean Bürer

29-30 **A Systems Approach to the Analysis of an Oilfield Equipment Installation Failure**
Marco Serra

31-36 MODEL-BASED SYSTEMS ENGINEERING

32-33 **Enabling Feature Branches for Systems Engineering**
Daniel Siegl

34 **Bridging the Gap Between Systems Engineers' Architecture Models and Model-Based Design**
Vasco Lenzi

35 **Using MBSE for the Clearspace-1 Mission**
Hannes Bartle

36 **The World Behind the SysML Diagrams**
Tim Weilkiens

37-43 DIGITAL TWIN

38 **Model-Based Systems Engineering Supporting Cognitive Twin Development**
Jinzhi Lu

38-40 **Digital Twin Facilitated Stakeholder Identification**
SSSE Roundtable

41-42 **Towards Bridging Multiple Gaps - Between Domains, Disciplines, Departments, Lifecycle Phases**
Christian Kehrer

43 **Systems Thinking Along the Entire Lifecycle of a Product in an Ever Smarter World**
Ital Bolliger

CONTENT ×

44-47 **INNOVATION**

45 **How to Improve Efficiency of a Product Management Department**
Wojciech Ozimek

46-47 **Foresighting the Future to Create Actionable Innovation**
Shaun West

48-50 **RELIABILITY**

49 **Assuring Systems Reliability in Highly-Regulated Industries and Cloud-Native Services**
John Lunney and Sebastian Klabes

50 **Dependability Engineering - A Highly Crucial Element within Systems Engineering**
Thomas Hott

ABOUT SWISSED ×

SWISSED20 is the 7th annual symposium of the Swiss Society of Systems Engineering (SSSE). SSSE acts as the Swiss Chapter of the International Council on Systems Engineering (INCOSE).

This one-day event brings together first-class presenters and practitioners, to share knowledge and experience on how to plan, develop and manage systems in an efficient and successful way.

This year, our conference will be run as an in-person event in Zürich, with virtual attendance and live streaming also made possible for those who cannot attend physically due to constraints presented by COVID-19.

ISBN | 978-3-033-08087-4

PROGRAMME ×

Morning Schedule

TIME	STREAM 1	STREAM 2	STREAM 3
8:00	Doors Open and Registration		
8:45	**WELCOME**		
8.55	**Keynote Presentation: Systems Thinking in the Age of Digital Ecosystems: Engaging with a Digitalised Sustainability Future.** Presented by Michael von Kutzschenbach		
STREAM	**LEADERSHIP MANAGEMENT**	**SYSTEMS ENGINEERING PRINCIPLES**	**DESIGN AND SYSTEMS THINKING**
9:55	**David Endler** Systems Engineering Awareness for C-Suite	**Michael Johnson** The Objective Engineer	**Marco Serra** A Systems Approach to the Analysis of an Oilfield Equipment Installation Failure
10:25	**Kevin Howard** Optima Connections: Applying Psychology with Systems Engineering to Realise Organisational Change	**Marc-Andre Chavy-Macdonald** A Systems View of Systems Engineering: the Field in its Intellectual Context	**Mary Jean Bürer** Systems and Design Thinking for Schools
10:55	**REFRESHMENTS**		
STREAM	**MODEL-BASED SYSTEMS ENGINEERING**	**SYSTEMS ENGINEERING PRINCIPLES**	
11:15	**Hannes Bartle** Using MBSE for the Clearspace-1 Mission	**Jose Barros** The 3 System Architecture Views	
11:45	**Tim Weilkiens** The World Behind the SysML Diagrams	**Pawel Szymik-Kozaczko** How to Avoid Information Gaps in Projects	
12:15 - 13:30	**LUNCH**		

PROGRAMME ×

Afternoon Schedule

TIME	STREAM 1	STREAM 2	STREAM 3
13:30	Sponsor Pitch: Altran and Dassault Systèmes		
13:45	**Keynote Presentation: Business Ecosystem Design - Bridging the Gap between the Product/Market-Fit and System/Actors-Fit** Presented by Michael Lewrick		
STREAM	**DIGITAL TWIN**	**SYSTEMS ENGINEERING PRINCIPLES**	**MODEL-BASED SYSTEMS ENGINEERING**
14:45	**SSSE Roundtable** Digital Twin Facilitated Stakeholder Identification	**Marco Di Maio and Colin Hood** Reducing the Cost of Requirements Engineering	**Daniel Siegl** Enabling Feature Branches for Systems Engineering
15:15	**Ital Bolliger** Systems Thinking Along the Entire Life-Cycle of a Product in an Ever Smarter World	**Christian Buser** SE Principles as an Enabler to Introduce a System of Systems for MedTech Devices	**Vasco Lenzi** Bridging the Gap Between Systems Engineers' Architecture Models and Model-Based Design
15:45	**REFRESHMENTS**		
STREAM	**DIGITAL TWIN**	**INNOVATION**	**RELIABILITY**
16:05	**Jinzhi Lu** Model-Based Systems Engineering Supporting Cognitive Twin Development	**Wojciech Ozimek** How to Improve Efficiency of a Product Management Department	**John Lunney and Sebastian Klabes** Assuring Systems Reliability in Highly-Regulated Industries and Cloud-Native Services
16:35	**Christian Kehrer** Towards Bridging Multiple Gaps - Between Domains, Disciplines, Departments and Life-Cycle Phases	**Shaun West** Foresighting the Future to Create Actionable Innovation	**Thomas Hott** Dependability Engineering - A Highly Crucial Element within Systems Engineering
17:05	**CLOSING**		
17:20	**Apéro**		

SPONSORS ×

PLATINUM SPONSORS

ALTRAN

DASSAULT SYSTEMES

GOLD SPONSORS

ALTEN

SE-TRAINING
www.se-training.net

SILVER SPONSORS

SOFTACUS
Business and IT Solutions

BACK TO CONTENTS BACK TO PROGRAMME

KEY NOTE × PRESENTATIONS

Michael von Kutzschenbach

Michael Lewrick

Systems Thinking in the Age of Digital Ecosystems

Engaging with a Digitalised Sustainability Future

KEYNOTE

Michael von Kutzschenbach
University of Applied Sciences and Arts Northwestern Switzerland

Traditional organizational structures and cultures are challenged in today's world where nothing about business is usual anymore. Pandemic outbreaks, human-made environmental disasters, as well as the growing importance of artificial intelligence and new technologies, are forcing a rethink about the "taken for granted" in management.

Recognizing the shift from a physically connected world economy to a networked economy, the ecosystem metaphor has gained attention and led to intensive discussions in management circles around the technological and social implications of digital ecosystems.
The notion of ecosystems doesn't directly address the related issue of the sustainability of the system. There are examples of natural ecosystems that have died out for a number of reasons. Thus, an important challenge for organizations is to develop the capacity to organize for continuous learning in loosely-coupled systems.

Conceptualizing digital ecosystems as complex socio-technical...

...systems requires that we think differently and frame problems in completely new ways. Applying an inquiry and structuring process based on Aristotelian causality, the use of systems thinking for analysis and communication, and an innovation process based on the logic of effectuation, we argue that managers will be better equipped to tackle the resulting wicked problems.

Consequently, Aristotelian causality is a powerful framework for the engagement process that links systems thinking and effectuation in a natural way. The organization's learning capability is shown to be a key element in the engagement process.

BACK TO CONTENTS

BACK TO PROGRAMME

Business Ecosystem Design

Bridging the Gap Between the Product/Market Fit and System/Actors Fit.

KEYNOTE

Michael Lewrick
Deloitte Switzerland

We have been recently observing a transition from centralized platforms to truly decentralized business ecosystems. Customers are buying combined services, products and experiences that have been developed primarily based on customer needs. For the creation of such unique value propositions, different actors are needed who work together in one system to create these propositions. Such business ecosystems do not emerge by themselves, they have to be designed and orchestrated. Business ecosystem design has established itself as its own discipline.

The basis for the approach and methodology is on the one hand the Design Thinking Mindset, which focuses on the customer and his needs, and on the other hand Systems Thinking, which has the ambition to understand and design complex structures. Business Ecosystem Design is bridging the gap between the Product/Market-Fit and the System/Actors-Fit.

BACK TO CONTENTS BACK TO PROGRAMME

LEADERSHIP MANAGEMENT ×

David Endler

Kevin Howard

Systems Engineering Awareness for C-Suite

LEADERSHIP MANAGEMENT

David Endler
Systems Engineering Consultant

Almost every paper on systems engineering starts with a statement that today's systems are growing in scope and complexity. At the same time, systems engineering leaders face the challenge to justify frontloading efforts to their management, and executives want to know why their projects have significant cost and schedule overruns.

This leads to questions like :

- Why can't systems engineers implement the direction set by upper management?
- Do systems engineers communicate their concerns in an ineffective way?
- Do leaders ignore the concerns brought forward by their systems engineers?

It seems that a deeper understanding of both sides' needs and concerns is needed to resolve the conflict. The author reflects on his experience gathered in almost 20 years of experience in various projects and industries.

BACK TO CONTENTS BACK TO PROGRAMME

Optima Connections

Applying Psychology with Systems Engineering to Realise Organisational Change

LEADERSHIP MANAGEMENT

Kevin Howard

Optima Systems Consultancy

Businesses are systems too. At the core of any business are the people, and businesses operate only because of the people within them: everything in these systems is about people.

We present Optima Connections, connecting structured approaches to Systems Engineering with Psychology and Transformation Delivery, to improve the way that businesses operate and change. There are four elements to Optima Connections:

1.) The Generalised Business Model that identifies interfaces and ensures coherence.

2.) An Interpersonal Behaviour Competence to evaluate readiness for change.

3.) An operating model framework that ensures completeness and coverage.

4.) An incremental model for development, delivery, and embedding of change.

These combine to provide a comprehensive framework of structures, processes, technological systems, and the people within the organisation to better understand behaviours and performance, and focus change on the most critical aspects without breaking those parts that work.

Together these tools provide an insight to a number of aspects of a business that contribute to both good and bad characteristics:

- People interfaces and information exchange paths, both necessary and unwanted.
- Culture that forms within and between elements of the business
- Operational processes, their effectiveness and efficiencies
- Individual blockers to change, whether technical or human

With this information, Optima Connections allows us to make more appropriate, better focused, and more inclusive interventions that support successful change. Our focus is on working with people to design and activate the organisational changes that are needed.

The application of structured approaches to Systems Engineering, Transformation Delivery with Psychology, allows us to guide structured business change that is implemented more effectively, including a more robust people perspective. This results in improved design and stronger implementation of change driven by and for the organisation.

A case study covering the application of Optima Connections is included.

BACK TO CONTENTS BACK TO PROGRAMME

SYSTEMS ENGINEERING x PRINCIPLES

Michael Johnson

Marc-Andre Chavy-Macdonald

Jose Barros

Pawel Szymik-Kozaczko

Marco Di Maio & Colin Hood

Christian Buser

The Objective Engineer

SYSTEMS ENGINEERING PRINCIPLES

Michael Johnson

SE-Training GmbH

Objective is defined (of a person or their judgement) as: "not being influenced by personal feelings or opinions in considering and representing facts."

Most people consider themselves to be objective in their judgements. In Engineering the truth is, quite simply, always the truth. One usually finds out the truth in Engineering (especially at the verification phase). This truth can often be delivered with a certain bitterness that leads those reflective engineers to consider: "Did we truly do enough to suppress our own biases earlier on in the lifecycle? Or did we make poor judgements because we unfairly favoured certain facts that at that time, were convenient to favour?"

In this presentation, we will review several cases highlighting the need for a greater emphasis on this quality that is crucial to successful engineering teams.

BACK TO CONTENTS BACK TO PROGRAMME

A Systems View of Systems Engineering

The Field in its Intellectual Context

SYSTEMS ENGINEERING PRINCIPLES

Marc-Andre Chavy-Macdonald

EPFL Space Centre

Systems Engineering as a field of human knowledge has a history, geographical provenance, and "intellectual ancestry", which largely shape where it is most practiced (domains, countries, industries). However, several other fields exist which share the goal: "make stuff in a better way, from a holistic/sustainable point-of-view". For example, Design Engineering/Thinking, Product Lifecycle Management, Quality Function Development, Concurrent Engineering, Agile etc.

We will map out these fields, placing Systems Engineering itself, as a field & profession, within its broader context. We will show which fields are closest, discuss how to exchange ideas, and ultimately how to broaden & advance our community.

BACK TO CONTENTS

BACK TO PROGRAMME

The 3 System Architecture Views

SYSTEMS ENGINEERING PRINCIPLES

Jose Barros

Consultant Engineer

How do we go from a given set of requirements or design inputs to a good design? And how do we iterate the loop correctly in case something changes, e.g. the requirements?

In a nutshell: iterate between the three architecture views, until you have a self-consistent concept. When something changes, identify which architecture view is most relevant and start from there, then iterate the others. Always iterate!

1. Functional Architecture
   - Processes/Behavior and their relations
   - Evidence of emergent behavior or that they cover the requirements/use cases

2. Technology Architecture
   - Choice of technology/phenomena and their interactions
   - Evidence of function coverage and Rationale/Criteria for those choices

3. Layout /Physical Architecture
   - Subsystems and interfaces
   - Reasoning and evidence of functional coverage by the layout

+ Additional Architecture information
  - Boundaries, enabling and control systems, resources, etc.
  - Users / Actors, other stakeholders
  - Evolution trend, Technical Risk and Opportunity evaluation

+ Consistency and Rationale
  - Global Reasoning and Evidence that the 3 views are consistent and the architecture is in line with the enterprise bigger picture
  - Traces between the three views
  - Reasoning for accepting the current level of iteration and move on

BACK TO CONTENTS

BACK TO PROGRAMME

How to Avoid Information Gaps in Projects

SYSTEMS ENGINEERING PRINCIPLES

Pawel Szymik-Kozaczko
Rokanan

Information gap is a common phenomenon in project teams. Ensuring the business and technical requirements are aligned is one of the main difficulties from the beginning of any project.

During a new technical design project, there are stages of refining the concept, each stage creating a new piece of information that extends or replaces some portion of the existing one. Not all stakeholders are particularly interested in all the aspects, therefore some of the information might not be understood and ultimately ignored; this leads to an information gap. This causes a discrepancy in the requirements and expected results of the project.

During this presentation, we will discuss methods to identify and avoid information gaps at all project phases.

BACK TO CONTENTS BACK TO PROGRAMME

Reducing the Cost of Requirements Engineering

SYSTEMS ENGINEERING PRINCIPLES

Marco Di Maio and Colin Hood
Technische Hochschule Ingolstadt | Colin Hood Systems Engineering

Requirements Engineering (RE) is central to the successful development of complex systems. Therefore, IT has high visibility and management support, which is good - because it sponsors the activities -, and bad - as it leads to RE becoming a driving force with incentives to create additional requirements, rather than to reduce their total number.

This presentation addresses this problem and presents a guideline for measuring the Cost of Requirements as well as practical solutions for reducing that cost. It illustrates these with a case study from a recent industry project and repeatedly invites the listeners to discuss the issues at hand.

BACK TO CONTENTS BACK TO PROGRAMME

SE Principles as an Enabler to Introduce System-of-Systems for Medtech Devices

SYSTEMS ENGINEERING PRINCIPLES

Christian Buser
UNITY AG

Acute care medical devices like ventilators, infusion pumps or patient monitors are an integral part of the clinical care environment for high-acuity patients. Gathering of physiological and technical device data with patient-connected medical devices is crucial for caregivers to achieve improved patient outcome and enables diverse clinical applications.

The lack of interoperability between medical devices of different vendors and the clinical applications due to missing standards has been identified as one of the major challenges for developing an effective interoperable clinical application system-of-systems. The publication of the IEEE 11073 SDC standard series and HL7 FHIR facilitates closing of this gap by introducing these international standards to share physiological data.

One remaining challenge lies in the strategy and rethinking of business and mission analysis of the manufacturers. Current...

market leaders cannot secure their position anymore with a stand-alone product but will focus on core functions of a subsystem. The system-of-systems approach will force manufacturers to turn competitors into collaborators.

Consequently, to achieve an automated clinical application system-of-systems, where different devices from different manufacturers co-operate, share data, and control each other in closed loop algorithms, challenges arise in the regulatory domain. The responsibility of bringing a device to the market and ensuring the proper functionality within a system-of-systems has to be clearly assigned to the different stakeholders (manufacturers, vendors, users) participating in this ecosystem.

To ensure this, predefined terms like manufacturer, responsible organization, system boundaries and intended purpose need to be rethought to address new requirements to the validation and registration responsibilities of a product in the context of a system-of-systems.

Systems Engineering methods offer a way to tackle those challenges. Therefore, we propose a cross disciplinary strategy by defining roles and responsibilities within the context of systems en-gineering to resolve the challenges and ensure future market competitiveness.

BACK TO CONTENTS BACK TO PROGRAMME

DESIGN AND SYSTEMS THINKING ×

Mary Jean Bürer

Marco Serra

Systems and Design Thinking for Schools

DESIGN AND SYSTEMS THINKING

Mary Jean Bürer

HEIG-VD of the HES-SO (The Applied Sciences University of Western Switzerland)

Teens need self-confidence that comes from a sense of worthiness. Meanwhile a sense of worthiness goes well beyond a sense of accomplishment linked to academic success.

Teaching in today's typical schools often lacks the connection to our real society, therefore leaving students to feel disconnected from the rest of the world. They are unable to see how they could integrate themselves into society with purpose. Young people may also feel that all the efforts they make in school will in fact have no concrete value in their lives. Employers also expect more from young people, in a more complex world.

There is market demand for creative thinkers, entrepreneurial spirits, and people with the ability to actively integrate other people's views and work across disciplines. Yet these skills are not developed through schooling until university level, and sometimes they are lacking there as well.

What is missing is teaching: 1) with mindfulness, 2) for more human-centric problem solving, 3) for creativity and learning to use one's heart-mind-body when dealing with problems, and 4) how to solve problems by linking solutions...

What can be done?

First, instructors need support on how to teach with mindfulness, and for a human-centric society, using design thinking and systems thinking. Second, we need to create more opportunities to connect students to real-life problems, allowing them to contribute to solutions, leading to empowerment, a sense of belonging and purpose, and increased motivation.

In this presentation I will explore such initiatives and outcomes to date. I propose key insights for the development of future programs. In particular, I argue for the need to co-create such tools with teachers themselves, and the need to provide such tools to teachers for use in their classrooms. In this way, teachers themselves can drive the movement towards a new way of teaching the next generation.

BACK TO CONTENTS

BACK TO PROGRAMME

A Systems Approach to the Analysis of an Oilfield Equipment Installation Failure

DESIGN AND SYSTEMS THINKING

Marco Serra

Engenya GmbH

Identifying the root causes of a system failure goes well beyond the resolution of its physical manifestation. This is because the process of exposing and tracing the causes of failure back to the root invariably makes a statement about people's choices and actions. Consequently, as much as this is a technical activity, it is also political. Understanding who the stakeholders are, what their stake is, the full context within which the system operates and defining clear and achievable goals for the investigation represent critical elements in determining how to frame it to ensure widespread buy- in and to ensure that the root cause is identified.

In this instance, we uncover the benefits of adopting a systems approach in such an investigation by studying the installation failure of a dual electronic submersible pump assembly in a North Sea oil well. The investigation initially had to overcome the bias of experience and the scepticism of some stakeholders, but once the objectivity and effectiveness of the process were...

demonstrated in practice, cooperation was ensured and the system was studied and modelled at different levels of abstraction to ultimately isolate the root cause of the failure.

Design and process changes were recommended and put into practice, resulting in the subsequently successful installation of the dual electronic submersible pump system. More significantly though, this experience resulted in the operator making advanced analysis part of the design process for subsequent systems.

BACK TO CONTENTS BACK TO PROGRAMME

MODEL-BASED SYSTEMS ENGINEERING ×

Daniel Siegl

Vasco Lenzi

Hannes Bartle

Tim Weilkiens

Enabling Feature Branches for Systems Engineering

MODEL-BASED SYSTEMS ENGINEERING

Daniel Siegl
LieberLieber Software GmbH

Model-Driven Systems Engineering (MBSE) is no longer an experimental method today, but has established itself as an accepted standard for covering traceability requirements as well as for describing architecture and design. During a product development cycle the different models go through various iterations of changes and releases.

Apart from base-lining and variant management, configuration management enables product releases, analyses of design as well as further development happening all at the same time with different configurations. For these purposes, the advantages of version-based systems have been successfully used for decades in the development of the source code.

Thus, our goal was to reuse these established configuration management processes from software development for all artefacts - and models. This includes the possibility to work with features branches within your engineering teams and across organizational borders...

In this presentation, we will discuss requirements and challenges for the modelling tools regarding configuration management and show best practices in the automotive domain.

BACK TO CONTENTS

BACK TO PROGRAMME

Bridging the Gap Between SE's Architecture Models & Model-Based Design

MODEL-BASED SYSTEMS ENGINEERING

Vasco Lenzi
MathWorks

Systems engineering is a challenging problem, and often the tools used to tackle these challenges do not connect well to the other tools used throughout the design process. Architecture models combine with simulation contribute to create a unified modelling environment, enabling the use of a single platform throughout systems engineering, design, implementation, and verification processes tools.

In this talk, we present a workflow for systems engineering and architectural modelling with a tight connection to Model-Based Design.

Highlights:

1.) Building a bridge between early architecture work and downstream design
2.) Creating architecture models and extending the language through stereotypes and profiles
3.) Analysing architectures
4.) Moving to design and implementation

BACK TO CONTENTS BACK TO PROGRAMME

Using MBSE for the Clearspace-1 Mission

MODEL-BASED SYSTEMS ENGINEERING

Hannes Bartle

ClearSpace SA

Over the last few years, a lot of research effort has been put into space debris and its removal from earth orbit but only a handful of missions attempted to demonstrate key technologies. In an effort to mitigate the increasingly problematic amount of space debris, the EPFL spin-off ClearSpace is conducting the first active debris removal (ADR) mission.

Engineering such a mission is very complicated due to the fact that some key sensors and algorithms and the mechanical capture system have yet to be developed. Model-based systems engineering provides a structured and concise way to model the mission and all the surrounding activities.

We will present the approach taken to model the ClearSpace-1 mission, i.e. the behavior of the spacecraft and the ground segment. Furthermore, we will demonstrate how analyses based on this model can be used to aid in the system engineering process.

BACK TO CONTENTS BACK TO PROGRAMME

The World Behind the SysML Diagrams

MODEL-BASED SYSTEMS ENGINEERING

Tim Weilkiens

oose Innovative Informatik eG

Behind the SysML diagrams lies a world full of valuable data. It is more than an organization of graphical elements. Let's talk about using SysML also as a data tool and not only as a drawing tool. In addition to the values, the SysML data also contains semantic information about essential systems engineering concepts.

The data within the SysML is already part of SysML v1 and will be much better supported by the next generation of the modelling language SysML v2.

The presentation will show you some simple, practical modelling guidance as well as an outlook on SysML v2. So, you can start immediately and can plan your MBSE strategy in the longer term.

BACK TO CONTENTS BACK TO PROGRAMME

DIGITAL TWIN ×

Jinzhi Lu

SSSE Roundtable

Christian Kehrer

Ital Bolliger

MBSE Supporting Cognitive Twin Development

DIGITAL TWIN

Jinzhi Lu
EPFL

Cognitive Twins (CT) are proposed as Digital Twins (DT) with augmented semantic capabilities for identifying the dynamics of virtual model evolution, promoting the understanding of interrelationships between virtual models and enhancing the decision-making based on DT. The CT ensures that assets of Internet of Things (IoT) systems are well-managed and concerns beyond technical stakeholders are addressed during IoT system development.

In this paper, a Knowledge Graph (KG) centric framework is proposed to develop CT. Based on the framework, a future tool-chain is proposed to develop the CT for the initiatives of H2020 project FACTLOG. Based on the comparison between DT and CT, we infer the CT is a more comprehensive approach to support IoT-based systems development than DT.

BACK TO CONTENTS BACK TO PROGRAMME

Digital Twin Facilitated Stakeholder Identification

DIGITAL TWIN

SSSE Roundtable
SE Group Zürich.

The identification and management of stakeholders remains one of the most difficult tasks in a complex system development project; not identifying critical stakeholders can easily lead to project failure.

For last year's SWISSED, we developed a comprehensive view on the product lifecycle integrating digital twins, called "Systemsland". The integration of digital twins into the product lifecycle not only promises to greatly increase the value for the end user, they can also help to identify and communicate with the stakeholders.

With each digital twin being a specialist for a particular phase and perspective of the product, they are at the same time an ideal vehicle to identify and include stakeholder sub-sets who share an interest in that aspect. Indeed, digital twins enable stakeholder identification long before they become interested in a project or product, e.g. it is possible to identify potential stakeholders for decommissioning already during a product's design phase...

This presentation discusses the potential of using digital twins to better understand and manage all stakeholders by concentrating on stakeholder sub-sets that are identified using digital twins.

This approach enables their identification potentially well ahead in time, reducing the risks stemming from non-identification and potentially improves the product by identifying and incorporating their needs into the product's design.

BACK TO CONTENTS

BACK TO PROGRAMME

Towards Bridging Multiple Gaps

Between Domains, Disciplines, Departments and Lifecycle Phases

DIGITAL TWIN

Christian Kehrer
ALTAIR Engineering GmbH

The growing interest in approaches for Systems Engineering, virtual commissioning, predictive maintenance or Digital Twins, in general offers both – the risk of getting drown in buzzwords as well as the awareness for huge benefits closing gaps.

In preference of the second fact, we will focus on the chances and solution approaches for filling some of these terms with content. Across all industries, successful product development requires a holistic system understanding. In that sense, the combination of knowledge in collaborative engineering processes and the increased use of common methods creates shared values.

Only a holistic digital product representation allows system level decisions and the identification of optimization potential. The collaboration of different domain experts in a unified environment ensures consistent and synchronous workflows, facilitates quicker and more profound decisions, and accelerates successful product development. Sequential work is avoided and tasks, historically ...

dependent on each other (i.e. controller design and optimization wait for physical hardware development), can be executed in parallel.

Two key factors must work in order to deliver that comprehensive system understanding:

- Openness and interoperability of the individual tools, e.g. in use of tool-independent standards
- Communication between development disciplines and departments

Beside the explanation of technical solutions to connect multiple physical domains within multi-physics simulation models, virtual engineering disciplines along the V-cycle and different departments across the development, we will provide an overview of different projects that close the feedback loop between development and operation.

This will illustrate, why combining simulation and real data in a closed loop, generates the greatest possible added value of a Digital Twin and how extended system understanding leads to more precise requirements and better forecasting quality.

BACK TO CONTENTS BACK TO PROGRAMME

Systems Thinking Along the Entire Lifecycle of a Product in an Ever-Smarter World

DIGITAL TWIN

Ital Bolliger
Dassault Systèmes

Systems Thinking enables us to better create innovative products and transform our business. Properly applied as a Model Based Systems Engineering approach, it allows us to virtually experience and validate products long before they actually exist in reality. This now only empowers our engineers, but all stakeholders along the entire lifecycle to understand their product and its interaction with a more and more connected ecosystem.

This new level of understanding lets us imagine new experiences never before conceptualised, and allows us to bring them to reality in a much shorter time than ever before.

BACK TO CONTENTS BACK TO PROGRAMME

INNOVATION

Wojciech Ozimek

Shaun West

How to Improve the Efficiency of a Product Management Department

INNOVATION

Wojciech Ozimek
Rokanan

According to Frost&Sullivan, only one in 300 innovations will generate real growth for companies. There are many frameworks and tools such as Design Thinking that relate to product development and management, but there has only be one organisation over the last 50 years that has focused on the unique set of integrated activities involved in the entire product lifecycle - Product Development and Management Associate (PDMA)

In this presentation, we will discuss a real case study of how we used PDMA best practices to create a New Product Development (NPD) audit method and how it was used to improve efficiency of an NPD department.

BACK TO CONTENTS BACK TO PROGRAMME

Foresighting the Future to Create Actionable Innovation

INNOVATION

Shaun West
HSLU

This presentation project is focused on foresight or longer-term radical innovation based on a planning model of three horizons, highly actionable. The presentation describes a model initially developed by the principal researchers at Stanford University for long-term innovation. The model has been proven to work with European firms (e.g., Airbus, Syngenta, Volvo); however, it requires further changes to adapt it to Switzerland. The dominant model addresses three innovation horizons, whereas we want to extend it to four horizons.

The presentation described some reflections on further refinements in the process, including adding Horizon 4, which we think should lead to a self-help "foresight cookbook".
This will be achieved by describing the approaches through an action research approach that will allow for reflection from multiple workshops with both firms and mixed student groups (with up to 200 international students).

The work presented will describe three key results of the study:

- an actionable foresight innovation process; ...

- some of the radical innovations that have come out of the processes
- clarify how this can help firms be more innovative in a changing environment.

The weakness within the firms of the approach has been associated with the "innovation readiness and capacity" of the firm. The researchers consider that this needs to be measured so that innovation can be more readily accepted. To do this they present an innovation readiness check (based on a survey methodology) to help measure this key success factor.

BACK TO CONTENTS

BACK TO PROGRAMME

RELIABILTY

John Lunney & Sebastian Klabes

Thomas Hott

Assuring Systems Reliability in Highly-Regulated Industries & Cloud-Native Services

RELIABILITY

John Lunney and Sebastian Klabes

Google | SE-Training GmbH

Systems reliability is arguably the most important attribute of quality and performance. An unreliable solution disrupts customer business and end-user trust. We present both reliability approaches from highly-regulated industries and Site Reliability Engineering from Google. The structure of the talk will be as follows:

[1] The authors of this presentation firstly introduce why systems reliability is so important.
[2] The authors will present the approaches to assure systems reliability in the design and in the operation phase.
[2a] John (Google) will give an overview of the systems reliability assurance in a non-regulated industry.
[2b] Sebastian (Siemens) will give an overview of the systems reliability assurance in a regulated industry.
[3] The authors will conclude on the pro's and cons of their approaches and will conclude on a few simple best practices to assure systems reliability for everyone (regulated or non-regulated industries).

BACK TO CONTENTS BACK TO PROGRAMME

Dependability Engineering

A highly crucial element within Systems Engineering

RELIABILITY

Thomas Hott
ALTEN

Any system must provide two things to be truly successful: the right functionalities with the right performance characteristics AND high dependability (in German “Verlässlichkeit”). Obviously, the second aspect becomes the more important the more safety/security critical a system is and/or the more relevance a system has within a value chain.

While standards and regulations do detail very well for almost any industries what should be done, the actual application of state-of-the-art Dependability Engineering is lagging behind in many companies. In consequence many companies suffer a lot from quality problems in their products, causing substantial losses in profits, reputation and market share. But worst of all, it forces the best people to spend a lot of their scarce time on problems caused in the past, instead of spending it on creating real value and safeguarding the companies’ future.

This talk will introduce key concepts and key practices one should know, respectively apply, in order to create highly dependable systems – and hence increase profits, reputation and market share.

BACK TO CONTENTS BACK TO PROGRAMME

SWISSED20 PRESENTERS ×

Michael von Kutzschenbach

University of Applied Sciences and Arts Northwestern Switzerland

Prof. Dr. Michael von Kutzschenbach (PhD) is a practitioner and an academic in the field of sustainable businesses. He is an acknowledged expert in sustainability, feedback systems thinking, and organization development and provides seminars and corporate training internationally.

He is the founder of mvk – Kutzschenbach Institute for Sustainability Studies and a member of the "Deutsche Gesellschaft für System Dynamics e.V." He has published widely on the complex challenge of managing sustainability and feedback systems thinking.

Currently, he is working at the University of

Applied Sciences and Arts Northwestern Switzerland at the Institute of Management. His research focuses on the application of feedback systems approaches for working with complex socio-technical problems in an increasingly digital world.

BACK TO CONTENTS BACK TO PROGRAMME

Michael Lewrick

Deloitte Switzerland

Michael Lewrick, PhD, has worked very intensively with the mindset in recent years, which enables us to solve different types of problems. He is the author of the international bestseller "The Design Thinking Toolbook" and "The Design Thinking Playbook", in which he describes the mindful transformation of people, teams and organizations. He works intensively with universities and companies and places the self-efficacy of people, in personal and organizational change projects, at the center of his activities. In recent years, he has expanded his toolbox towards the design of business ecosystems. As an internationally recognized expert in the field of digital transformation and the management of innovation, numerous...

companies have developed, sharpened or scaled ecosystem strategies with his help. Michael will present at SWISSED20 first excerpts from his new book on "Business Ecosystem Design".

BACK TO CONTENTS BACK TO PROGRAMME

David Endler

Systems Engineering Consultant

Dr. David Endler is a systems engineering consultant, trainer and coach (freelancer). He is Technical Director of INCOSE (2019-2021) and a member of the Swiss Chapter of INCOSE. In his professional career which started in 2002, David has been involved in various systems engineering projects in the aerospace, marine, automotive and renewable energies industry. Today, he's teaching systems engineering courses to share his lessons learned. He holds a PhD in Physics (Dr. rer. nat.) from University of Hamburg.

BACK TO CONTENTS

BACK TO PROGRAMME

Kevin Howard

Optima Systems Consultancy

Dr. Kevin Howard is a Systems Engineer with many years experience in application of SE and MBSE to challenging technical problems. This experience has taught him that people present the greatest challenge in SE, so he has just completed a post graduate qualification in Pyschology and is now working to combine this learning with the principles of Systems Engineering to realise more meaningful and focused design of organisations.

BACK TO CONTENTS BACK TO PROGRAMME

Michael Johnson

SE-Training GmbH

Mike has worked leading challenging product development and engineering management roles across the Healthcare, Space and Defence Industries.

He is passionate about complex product development and especially the application of Systems Engineering. He is one of the founders of the Swiss Society of Systems Engineering (SSSE). In addition, Mike is the co-founder of SE-Training GmbH, specialising in the delivery of high quality cross-functional Engineering training services.

BACK TO CONTENTS

BACK TO PROGRAMME

Marc-Andre Chavy-Macdonald

EPFL Space Centre

Dr. Chavy-Macdonald has spent over 6 years at the cutting edge of systems engineering & design methodology, performing research with ESA, the University of Tokyo, MIT, and ispace Inc., resulting in over 15 refereed publications.

Previously, he was a space environment and radiation specialist with ESA. Passionate about innovation, he has diplomas in technology & innovation management, and experience with several start-ups. He is the co-founder of a systems consultancy.

He is currently with the EPFL Space Center (eSpace). His interests include...

System-of-Systems modelling & formal scenario planning for space logistics, and deploying Concurrent Design methodology improved with Design Research.

BACK TO CONTENTS

BACK TO PROGRAMME

Jose Barros

Consultant Engineer

Jose Barros draws from his diverse background as Engineer, Project Manager and Applied Physics graduate to gain insights on Systems Engineering and instrument development topics.

In his projects as a consultant or contractor, he has worked on many regular deliverables such as requirements, feasibility, architecture, prototypes, testing or processes for operations. He started out with a focus on optics and lasers, gradually shifting to medical devices and diagnostics.

The goal of his side project is to create a hands-on tutorial or guideline on systems engineering and project management, very accessible for...

SE starters and project stakeholders, while still useful for the seasoned engineer. Ideally he would achieve this as a collaborative effort involving other contributors and reviewers.

He further likes sports, organizing group activities, writing and of course spending time with friends and family.

BACK TO CONTENTS BACK TO PROGRAMME

Pawel Szymik-Kozaczko

Rokanan

Pawel lives in Regensdorf, Switzerland and is an experienced innovation implementation consultant. Pawel has a vast experience in knowledge management, business process improvement, quality improvement, process and data mining.

He has led knowledge management units and worked as a project manager in global projects.

BACK TO CONTENTS BACK TO PROGRAMME

Marco Di Maio

Technische Hochschule Ingolstadt

Marco is professor of Systems Engineering at the Technical Hochschule Ingolstadt. Before that, he was the managing director of projectglobe ltd. a consultancy specialising in Model Driven Engineering (MDE). Major customers are the fusion research community and the 3D laser welding and robotics industry. Marco holds a PhD in nuclear engineering and Master's Degrees in Mechanical Engineering and Operational Research. He has developed complex diagnostics for the world's largest fusion laboratory earning him a world-wide patent. Marco managed various innovation projects in the automotive industry before co-founding...

projectglobe with the express purpose to devise novel methods and tools for the effective support of Systems Engineering.

BACK TO CONTENTS BACK TO PROGRAMME

Colin Hood

Colin Hood Systems Engineering

Colin Hood started work in the Electrical and Electronic industry in 1977 and has been a Systems Engineer since 1985. Colin Hood is a founding member of the International Requirements Engineering Board, and has been a member of INCOSE since 1999.

Colin is an expert in Requirements Engineering and Requirements Management. Requirements Management is the interface between Requirements Engineering and all Systems Engineering processes such as Risk Management, Project Management, Change Management, Version Management...

Configuration Management, Verification and Validation.

He specialises in supporting individuals and organisations with the challenging times that improvements of new working methods and tools bring.

BACK TO CONTENTS BACK TO PROGRAMME

Christian Buser

UNITY Schweiz AG

Christian Buser graduated in 2010 in Biomedical Engineering from ETH Zurich. He started his professional career as a development engineer in an engineering consultant company. After a few years, he joined a startup in the aerospace industry. At Marenco Swisshelicopter AG he became Head of Engineering and led the analysis, verification and validation teams for seven years. In addition, he was heavily involved in the general setup and development of the company, in specific the engineering department. Currently, Christian Buser works as a Senior Consultant for UNITY Schweiz AG with a focus on Systems Engineering and process management.

BACK TO CONTENTS BACK TO PROGRAMME

Mary Jean Bürer

HEIG-VD of the HES-SO

Mary Jean Bürer works mostly in the field of energy, climate change and sustainability. She is experienced in using design thinking, and occasionally systems thinking, to help companies develop new business models and innovative products in the energy sector. She is increasingly exploring the use of design thinking to help people increase motivation and stimulate changes in organizations. Beyond that she is passionate about helping young people discover the value of design thinking and other tools for social impact and other higher purposes.

BACK TO CONTENTS BACK TO PROGRAMME

Marco Serra

Engenya GmbH

Marco holds a Masters Degree in mechanical engineering from the University of Pretoria, South Africa (1993); a Masters Degree in Engineering and Management from the Massachusetts Institute of Technology, USA (2002).

He also has twenty five years of experience in modeling and simulation of engineering systems, structural and fluid mechanics, technology development and expert witness support. Independent consultant since 2003 working in the aerospace, defense, automotive, and oil & gas industries.

BACK TO CONTENTS

BACK TO PROGRAMME

Daniel Siegl

LieberLieber Software GmbH

Daniel has been involved with model-based engineering since 2000. He first experienced model-based engineering with Together, and then moved on to the current focus: Enterprise Architect by Sparx Systems. He gained deep experience handling critical software projects around the world in the IT, apparel and footware industries. The next logical step was to join European-based LieberLieber, the Enterprise Architect Specialists, in 2006. In 2009 he became CEO, and in his role as developer of international business he also became CEOof LieberLieber Software Corp, based in Houston, TX, in 2014.Daniel is heavily involved with LieberLieber's Automotive and Logistics clients,

helping them to build tools to develop their products in a more efficient way. He is passionate about UML/SysML, embedded systems, and industry standards like AUTOSAR. He is an experienced speaker, a founding member of the Enterprise Architect User Group and represents LieberLieber at the Object Management Group. Daniel lives with his family in Vienna, Austria.

BACK TO CONTENTS BACK TO PROGRAMME

Vasco Lenzi

MathWorks

Vasco Lenzi is a senior application engineer at MathWorks Switzerland. He specializes in design automation with emphasis on multidomain modelling, control design, verification, and deployment. He collaborates with industrial automation and machineries, automotive, and medical companies. Prior to joining MathWorks in 2016, Vasco worked as a development engineer on the modelling and simulation of engines at Liebherr Machines Bulle. Vasco also worked as a control software developer at the Institute of Dynamic Systems and Control, ETH, with active participation in Formula Student competitions. He holds a B.S. in mechanical engineering and an M.S. in energy sciences from ETH Zurich.

BACK TO CONTENTS BACK TO PROGRAMME

Hannes Bartle

ClearSpace SA

Hannes Bartle is a system engineer at the EPFL Space Center (eSpace). He obtained his M.Sc. in Electrical Engineering from Aarhus University in 2019. While doing his Bachelor degree at Airbus Defenece and Space Germany, he worked under Prof. Jens Eickhoff on the "Flexible LEO Platform", the spacecraft platform that will be used on the ClearSpace-1 mission.

BACK TO CONTENTS

BACK TO PROGRAMME

Tim Weilkiens

oose Innovative Informatik eG

Tim is a consultant and trainer, author, publisher, lecturer, executive board member of the German consulting and training company oose, and active member of the OMG and INCOSE organizations.

He wrote parts of the initial SysML specification, co-chairs the SysML 1.7 working group, and is a track lead of the SysML v2 submission team.

As a consultant, Tim has advised many companies in different domains. The insights into their challenges are one source of his experience that he shares in his books and presentations.

BACK TO CONTENTS BACK TO PROGRAMME

Jinzhi Lu

EPFL

Jinzhi Lu was a research scientist at SCI-STI-DK. Ph.D. in Division of Mechatronics, Department of Machine Design, ITM School from 2014 to 2019. Currently, he is a CSEP (04944) qualified, a senior member of China Council on Systems Engineering (CCOSE) and co-founder of MBSEWiki in Chinese.

He is also a TC member of IEEE SMC MBSE Group and MBSE an consultant in ANSYS China, a PC member of INCOSE IS, IEEE SOSE and worldcist conferences, and a reviewer for IEEE ACCESS and Information & Communications Technology Express.

BACK TO CONTENTS BACK TO PROGRAMME

Christian Kehrer

ALTAIR Engineer GmbH

Christian is a leading Business Development Manager for systems simulation and related applications at Altair. In this role, he is responsible for consulting with customers and establishing solutions based on their needs for system simulation and connected products. Before joining Altair in 2017, he worked at both ITI GmbH and the BMW Group. He holds a Mechanical engineering degree in the field of automotive engineering from TU Dresden in Germany.

BACK TO CONTENTS

BACK TO PROGRAMME

Ital Bolliger

Dassault Systemes

As Client Executive at Dassault Systèmes, Ital Bolliger has been responsible for guiding European companies from various industries through their Digital Transformation for the last 10 years. In the recent past his major focus laid on the transformation of Life Science companies, in particular Medical Device manufacturers, where Systems Thinking becomes more and more relevant for creating new patient experiences.

BACK TO CONTENTS BACK TO PROGRAMME

Wojciech Ozimek

Rokanan

Wojciech Ozimek is an Innovation and Product Management Consultant and Trainer. His speciality is product introduction – GoToMarket planning and execution. He built product management capabilities in manufacturing and IT companies in Poland and worked as a communication and organisational change consultant during digital transformation projects in companies like Rolls-Royce.

He is the co-author of the "Guide to the General Theory of Innovation" - the systemic innovation handbook.

BACK TO CONTENTS

BACK TO PROGRAMME

Shaun West

HSLU

Shaun West lectures in Smart Service Innovation at the Lucerne University of Applied Sciences and Arts. In his role, Shaun works closely with industry to better understand the application and development of Smart Services in industrial environments. He collaborates with several universities, including Stanford, Aston Business School, Florence, and Bergamo. He is now leading a Swiss 1MUSD project that is focused on the application of Smart Twins in complex industrial application. His experience in digital services dates from the 1990s when National Power was selling its power plant improvement services to other power companies. He worked from GE Energy Services where he was rescuable...

for the contracting advanced service agreements on advanced turbines. As the VP Business Development at Sulzer, he led the external growth for the division (seeing it grow from 200M CHF sales to 500M CHF, today 800M CHF). He also led the development and rollout of the long-term service business from what had traditionally been a transactional sales business. Shaun holds an MBA from HEC (Paris) and a PhD from Imperial College (London). He lives close to Zurich in Switzerland.

BACK TO CONTENTS

BACK TO PROGRAMME

John Lunney

Google

John is a Site Reliability Engineering manager at Google Switzerland. His global team manages the infrastructure for G Suite, productivity apps for businesses and schools, including Gmail, Meet and Calendar.

Before Google, he worked on several lexicography projects for the Irish language, and holds a degree in computational linguistics from Trinity College in Dublin, Ireland.

John has an interest in the forerunners of Systems Engineering, including cybernetics and the work of Stafford Beer.

BACK TO CONTENTS BACK TO PROGRAMME

Sebastian Klabes

SE-Training GmbH

Sebastian has authored and reviewed numerous publications and likes to implement systems engineering principles.

After working at the Institute of Transport Science of RWTH Aachen as research associate, he worked at the German Aerospace Centre as Project Officer and as Project Systems Engineer at Bombardier.

Currently, Sebastian is heading the RAMS department at Siemens' Mobility division. He is actively involved in the committee of the Swiss Society of Systems Engineering, is a certified Systems engineering professional and is giving systems engineering training at Siemens...

Sebastian enjoys approaching organisational and technical challenges with a ‘rock solid’ systems thinking approach.

BACK TO CONTENTS

BACK TO PROGRAMME

Thomas Hott

ALTEN

Dr. Thomas Hott studied physics in Heidelberg, where he made his PhD in the field of particle physics in 1997.

In the following 8 years he worked as Technical Coordinator for the construction and commissioning of several large-scale physics experiments at the particle accelerators at DESY (Hamburg) and CERN (Geneva). In 2006 he joined DESY again, becoming the Technical Leader for the construction of the European X-Ray Free-Electron Laser Facility, a 1.3 billion Euro project.

In 2012 Thomas Hott moved to industry, joining VESDO, a company...

specialised in anti-counterfeiting measures for the pharmaceutical industry. In May 2016 he joined ALTEN Switzerland AG, a leading engineering & technology consulting firm, where he serves as Technical Director. – He has a strong passion for Systems Engineering and Dependability Engineering in particular.

BACK TO CONTENTS BACK TO PROGRAMME