INCOSE UK

ASEC 2015

International Council on Systems Engineering (INCOSE) UK

Annual Systems Engineering Conference

17th – 18th November 2015

Crown Plaza, Heythrop Park, Enstone, Oxfordshire OX7 5UF

"Systems Engineering Comes of Age"

Last year was the 20th anniversary of the formation of INCOSE UK. This year, we are celebrating the "coming of age" of Systems Engineering in the UK, looking at contemporary art and practice, putting the discipline on a professional footing, and exploring how Systems Engineering can both apply in new areas, and learn from them in the process.

Once again, ASEC 2015 will be a 2 day event bringing together world-class presenters and practitioners, providing an excellent forum for networking and sharing experiences. This remains the UK's premier Systems Engineering event, and will feature:

- Keynote addresses given by an eminent speaker on each day:
  - Day 1: Deborah Seddon, Engineering Council UK.
  - Day 2: Prof Alan Winfield, Bristol Robotics Laboratory.
- Technical presentations on contemporary Systems Engineering theory and practice.
- Tutorials run by leading Systems Engineering practitioners.
- An academic research showcase poster competition.
- The conference dinner, with an entertaining after-dinner speaker.

Please join us whether you are an experienced Systems Engineering practitioner, new to Systems Engineering or want to find out if Systems Engineering is relevant to you.

For the latest information visit our conference web site: www.asec2015.org.uk

Welcome to ASEC 2015 – Time to look to the Future

Richard Beasley - President of INCOSE UK

I would like to invite you to join us at ASEC 2015, our annual Systems Engineering conference, where this year's theme is "Systems Engineering Comes of Age". We have put together a first class technical programme, reflecting the strength and diversity in Systems Engineering in the UK, together with two excellent keynote speakers and an entertaining after-dinner speaker. In addition you will be able to relax in the beautiful surroundings of Heythrop Park, and discuss the conference topics and other contemporary systems issues with the presenters, and with leading systems thinkers and engineers from the UK and abroad.

This year also sees some new innovations in the event, including a session on Certification using the new SE Handbook v4, briefings and working sessions for INCOSE UK Working Groups, and a new "Fringe" element designed to create a space in the programme for delegates to explore Systems Engineering issues through facilitated discussions. We are also showcasing some of the well-received UK papers from this year's 25th Anniversary International Symposium held in Seattle in July, as a prelude to next year when IS2016 will be held in Edinburgh.

During the event we hold our INCOSE UK Annual General Meeting, where we report back to our members on INCOSE UK's year, and our key activities – it's a great chance for new and established members alike to listen, and ask questions and make suggestions.

I hope I will meet as many of you as possible at ASEC 2015, and that we all have an informative, interesting, and enjoyable time.

Keynote Speaker: Deborah Seddon, Head of Policy and Standards, Engineering Council UK

Deborah Seddon is Head of Policy and Standards at the Engineering Council, the UK regulatory body for the engineering profession. Within 'standards', her main area of responsibilities include the UK Standard for Professional Engineering Competence (UK-SPEC) and the Information and Communications Technology Technician (ICT Tech) Standard. These set out the standards of professional competence and commitment that govern the award and retention of professional technician and engineer titles.

More broadly, Deborah's responsibilities include: individual and standard routes to registration, and the requirements governing these; ensuring that the standards remain appropriate; degree accreditation; approval of technician and apprenticeship qualifications; professional development matters; and the development of guidance for individual professional technicians and engineers.

Prior to joining the Engineering Council, Deborah led the Education and Learning team at the Institution of Civil Engineers, covering all levels from students to professional members. She previously held positions at the Architects Registration Board, the sustainability think-tank Forum for the Future, and the Medical Research Council, all concerned with education or practice.

Deborah has an honours degree in Biological Sciences and an MA in Higher and Professional Education. From 2004 to 2014, she was a governor and then Chair of governors at a primary school in South West London.

She is a member of the Board of Trustees of the Intellectual Property Regulatory Board (IPReg) and HEFCE's Strategic Advisory Committee on Quality, Accountability and Regulation.

Keynote Speaker: Prof Alan Winfield, Director of the Science Communication Unit at the University of the West of England

Alan Winfield is Professor of Electronic Engineering and Director of the Science Communication Unit at the University of the West of England (UWE), Bristol, UK, and Visiting Professor at the University of York. He received his PhD in Digital Communications from the University of Hull in 1984, then co-founded and led APD Communications Ltd until taking-up appointment at UWE, Bristol in 1991. Winfield co-founded the Bristol Robotics Laboratory and his current research is focussed on cognitive robotics.

He is passionate about communicating research and ideas in science, engineering and technology, and was awarded a Senior Media Fellowship in 2009. Winfield led UK-wide public engagement project Walking with Robots, awarded the 2010 Royal Academy of Engineering Rooke medal for public promotion of engineering. His book, Robotics: A Very Short Introduction, was published by Oxford University Press in September 2012, and he blogs about robots, open science and related topics at http://alanwinfield.blogspot.com

After-Dinner Speaker: Chris Binns, Chief Engineer, Crossrail Ltd

Chris is the Chief Engineer for Crossrail Limited, and is the Technical Authority for this exciting programme, delivering the East – West rail link through London. He leads the Chief Engineers Group, discharging his accountability through a team of Heads of Disciplines and technical specialists, as well as Engineering Managers embedded within the Delivery Teams.

Prior to joining Crossrail in July 2015, Chris was with Network Rail, and since 2009 was the Head of Engineering accountable for all technical matters and systems safety for the Thameslink Programme.

Chris joined Network Rail shortly after its formation in 2003, in order to build a signalling scheme design team, as part of a corporate strategy to in-source technical expertise previously outsourced by Railtrack. By the end of 2008, the team had been built from zero to around 240 people, and was recognised as having successfully delivered direct savings in signalling development and design.

Chris previously held positions as Managing Director for Bombardier Transportation (Signal) UK Ltd, Technical Director for Adtranz (Signal) UK Ltd, and Head of Engineering for GEC – Alstom Signalling Ltd.

While Chris's career spans over thirty years in the railway industry, he also spent three years with Logica Inc. based in Boston in the mid '90s, and led a team designing Digital Interactive TV for various telecoms providers – a fascinating departure from safety critical systems design, into the faster-moving commercial world.

Academic Research Showcase Poster Competition

We are pleased to announce that we will once again be holding an Academic Research Showcase poster competition, and there will be posters on display at the event. Delegates will have the opportunity to read the posters and discuss the research findings with the poster authors throughout the event.

A Guide to the Event Programme

Event Structure

Each day of the conference consists of the following elements.

Morning Sessions

Each day starts with a Keynote speaker in the main conference theatre, followed by a technical presentation. After the coffee break (allowing delegates to explore the exhibition area and poster competition), the conference will continue with presentations in the main theatre, supplemented by opportunities to attend a session on how to become certified using the new INCOSE Systems Engineering Handbook v4, or to attend a briefing/working session run by an INCOSE UK Working Group (note that there will be 3 of these each day).

Afternoon Sessions

The afternoon sessions offer the opportunity for delegates to choose between different tracks within the conference:

- The main conference theatre offers back-to-back sessions of two presentations each, covering contemporary topics expected to be of general interest to the audience, with a tea break half way through
- There are two tutorials running each day in parallel to the main conference session, which need to be booked in advance when booking for the conference. Details of these tutorials can be found on page 12. Attendance at these tutorials will be strictly limited on a first-come-first-served basis when booking
- A new "fringe" element will take place in the session after lunch, featuring a facilitated "unconference" element
- A further opportunity to attend a Working Group session is available in the final session of each day

Signposting

Each presentation has been characterised in two dimensions, indicating the content and target audience.

Accessibility. This indicates the level of knowledge required by the delegates to fully understand the paper and gain the maximum benefit from its content. There are three levels here: 'Beginner' which is aimed at people who are new to the topic and will typically hold the Awareness level of competence in this area; 'Practitioner' which is aimed at people who have performed some work in this area and are looking to increase their knowledge and who will typically hold the Supervised Practitioner or Practitioner level of competence; and 'Advanced' which is aimed at people with extensive experience and who are looking to hone their skills and knowledge in the area and who will typically hold the Expert level of competence.

Application. There are three levels here, which are: 'Research' aimed at new ideas that have been carried out as part of a research project; 'Case Study' that details examples of how Systems Engineering good practice has been applied on real projects, showing real results; and 'Good Practice' that details how mature Systems Engineering practices are being disseminated, deployed and adopted.

These are indicated on the following pages using a set of icons depicted below.

Accessibility:


Beginner


Practitioner


Advanced

Application:


Research


Case Study


Good Practice

So for example, a presentation containing a Case Study, and aimed at Practitioners would have the following set of icons after the title:


We hope that this will assist delegates in choosing which elements of the event programme they will attend.

This symbol indicates that the paper was presented at the INCOSE International Symposium 2015.

Programme at a glance

Please note: each morning there will be a plenary session in the conference theatre, with additional parallel elements in the second morning session. Each afternoon you have a choice of either attending the conference theatre sessions, parallel elements, or selecting one of two concurrent tutorials/workshops. These are limited to a maximum of 30 delegates each.

Although INCOSE UK will make every effort to provide the programme as advertised, it may become necessary, for reasons beyond our control, to make changes to speakers and/or to the timing and content of the programme. INCOSE UK will not be liable for any costs incurred by delegates in relation to such changes.

Registration is open each day from 08:00.

Day 1: Tuesday, 17th November - Morning

08:50 - 09:00	Introduction to Day 1
09:00 - 09:45	Keynote Speaker: Deborah Seddon, Head of Policy and Standards, Engineering Council UK
09:45 - 10:30	IS2015 Best Paper – "When Two is Company but Three is not a Crowd"
10:30 - 11:00	**Coffee**
11:00 - 12:30	"Integrating Requirements Engineering Practices"
12:30 - 13:30	**Lunch**

Day 1: Tuesday, 17th November - Afternoon

	Conference Theatre		Tutorial		Tutorial
13:30 - 15:00	"Exploiting Model-Based Systems Engineering"	OR	"Using EARS+ (Easy Approach to Requirements Syntax Plus) to vary the level of detail in Natural Language requirements" *Alistair Mavin (Rolls-Royce)*	OR	"Let's stay in, this is better than playtime!" – How to become a STEM Ambassador and meet real Systems Thinkers!" *Steve Dimelow (Rolls-Royce)*
15:00 - 15:30	**Tea**				
15:30 - 17:00	"Are You Being Served?"				
17:00 - 17:45	INCOSE UK Annual General Meeting				
19:00 - 19:30	Pre-Dinner Drinks				
19:30 - 22:00	**Conference Dinner** - Guest speaker: *Chris Binns (Chief Engineer, Crossrail)*				

Day 2: Wednesday, 18th November - Morning

08:50 - 09:00	Introduction to Day 2
09:00 - 09:45	Keynote Speaker: Prof Alan Winfield, Director of the Science Communication Unit at the University of the West of England
09:45 - 10:30	"Unravelling the Knowns and Unknowns"
10:30 - 11:00	**Coffee**
11:00 - 12:30	"Using Models to Understand Complex Situations"
12:30 - 13:30	**Lunch**

Day 2: Wednesday, 18th November - Afternoon

	Conference Theatre		Tutorial		Tutorial
13:30 - 15:00	"SE in Non-Traditional Situations"	OR	"We Chose MBSE: What's next?" *Dr. Aurelijus Morkevicius (No Magic Europe)*	OR	"Systems Engineering for Strategy Design" *Dr J. Pedro Mendes (University of Lisbon, Portugal)*
15:00 - 15:30	**Tea**				
15:30 - 17:00	"Integrating SE with P3M"				
17:00 - 17:15	President's Closing Remarks				

See following pages for details of all presentations, tutorials and workshops.

See page 13 for the parallel elements (CSEP, Fringe, & Working Group sessions)

Day 1 : Morning Sessions - Presentation Abstracts

AM - Session 1.1: INCOSE International Symposium 2015 Best Paper

09:45 - 10:30

When two is good company, but more is not a crowd
Andy Nolan, Andy Pickard (Rolls Royce),
Jennifer Russell (WSP Parsons Brinckerhoff) and
William Schindel (ICTT System Sciences)

This paper summarises an approach to improve the effectiveness of the review (inspection) process. Effectiveness here is defined as the ability to reduce the number of defects escaping a review activity.

By carefully pairing up developers and reviews, Rolls-Royce was able to halve the rate of occurrence of defects in software, with no change to the process or tools, and with no changes to the team or the effort required to perform the reviews.

The method hinges on an understanding of the capability of the developers and reviewers and making sure that only select pairings of team members are allowed.

The paper illustrates an example of the practice when applied to software code review but the principle can be applied to any development process. The code review process is an example of the principle but the philosophy can be applied to many more areas of the system development process. The paper ends by illustrating other ways to benefit from this approach.

AM - Session 1.2: Integrating Requirements Engineering Practices

11:00 - 11:45

Integrating Requirements Engineering Into a Project:
A Case Study From The Nuclear Decomissioning Sector
Dave Burton, Dan Wilson (Frazer-Nash Consultancy), Alex Jones (Sellafield)

Within the UK, nuclear decommissioning is a sector in which the application of formal Systems Engineering is in its infancy. We examine how Systems Engineering has been applied to a major nuclear decommissioning project, integrating Model-Based approaches with the existing documentation set. Taking a Systems Engineering approach has identified inconsistencies between systems, and allowed 'business as usual' requirements to be challenged to help ensure the asset designed is fit for purpose but not over-engineered. The approach has also identified to the project the need to consider non-engineering elements of the design in order to deliver the overall capability....

11:45 - 12:30

From Catalogues to Models: transitioning from
existing requirements techniques to MBSE
James Towers (Scarecrow Consultants)

There is a growing consensus that the levels of complication we face in modern Systems Engineering (SE) projects cannot be controlled via a traditional document-centric approach. This is encouraging organisations to adopt a Model-Based Systems Engineering (MBSE) approach. However the transition is not always straightforward. Organisations with a mature document-centric requirements practice often have a significant investment in both existing tools and processes. The move to MBSE raises several questions about how these tools and processes 'fit' in the new world. Often the conclusion is a hybrid approach which attempts to get the maximum benefit from existing assets while attempting to 'cherry pick' the best bits of MBSE. This may, however, introduce more problems than benefits and can prevent an organisation from realising the full benefits of MBSE such as automated model checking.

Day 1 : Afternoon Sessions - Presentation Abstracts

PM - Session 1.3: Exploiting Model-Based Systems Engineering

13:30 - 14:15

MBSE and the Silver Bullet: A Modern Fairy Tale

Alex Stevenson (Objektum Solutions), Julian Johnson (Holistem Ltd)

Much like the events found in fairy tales, implementing Model-Based Systems Engineering (MBSE) is all too often regarded as a mystical weapon that will effortlessly dispatch the evils of modern Systems Engineering. Unfortunately, in the real world, effortless solutions exist only for the most trivial problems which the transition to an MBSE approach is not.

The successful implementation of a system modelling capability is often discussed in terms of the three pillars of MBSE; language, method and tool. While it is true that the pillars form the core of any modelling approach and getting them wrong will likely result in failure it is not true that getting them right is all that is required to ensure success.

Any change in an organisation is likely to encounter some resistance and adoption of MBSE is no exception. Organisations must fully understand and communicate the reasons and impact of MBSE in order to mitigate resistance when encountered. This requires that projects examine the reasons for adopting MBSE and understand that doing so will not only involve an investment in both time and money but that rewards will not be reaped immediately nor can they be accurately measured against Systems Engineering activities in isolation.

Failure to fully comprehend where MBSE adds value results in an unrealistic expectation of its "silver bullet" effect that can ultimately lead to a decision to revert to document centric Systems Engineering practices.

14:15 - 15:00

Requirements Based Testing and MBSE in Defence

Mark Williamson (SyntheSys)

For the last 25 years SyntheSys has been delivering Systems Engineering consultancy in support of the procurement and through life capability of tactical data links, a range of encrypted communications systems which can operate individually or as an integrated communications environment, essentially a system of systems.

These systems are based on military standards which are verbose documents managed through a complex change management system, with all participating nations contributing and agreeing on changes to the standard. The issue is further compounded by the structure of the requirements within the standard, as these generally do not follow best practice in requirements writing techniques. The tactical data link implementation on a military platform should support the standard, however the interpretation of verbose requirements within the standard is an ongoing issue. Where there is room for misinterpretation of the requirements, there is the possibility of differing implementation and interoperability issues are created.

SyntheSys took the approach that testing of the platforms should be carried out against the standard hence Requirements Based Testing. To address the verbose nature of the standards, UML modelling of the standards was carried out. For the most part, the requirements are transactional with a number of stimuli, constraints, processing and result. This lends itself well to State Machine and Sequence diagrams. By creating a visual and functional model of the standards, ambiguity is minimised and the complexity of the processing is managed. With a dynamic UML model of the transactional processing it was then possible to create meaningful test cases based against the standard and Requirements Based Testing supported by Model-Based Systems Engineering was a reality for the Tactical Data Link domain.

Day 1 : Afternoon Sessions - Presentation Abstracts

PM - Session 1.4: "Are You Being Served?"

15:30 - 16:15

Understanding Services: Understanding Stakeholders
John Davies (University of Leeds)

There are lots of different services already operating in general use, new ones are being developed driven by the move from customers owning equipment to it being provided by suppliers as a service. We all know what services are, we use them every day. All the systems we develop and deliver end up providing or supporting some sort of service. The aim of the INCOSE UK Service Systems Engineering Working Group is to identify areas of the engineering lifecycle, methods, techniques that need to be different for delivering services as against 'traditional Systems Engineering' for delivering products.

When INCOSE was formed there were various definitions of 'What is a System?' it took time to sort out but now is no longer an issue. Today the established standards: SeBOK, Systems Engineering Handbook, DoDAF, MoDAF, Open Group, ITIL, CMMI, all have different definitions of 'What is a Service?' These differences are not just differences in wording but driven by stakeholder views and can lead to major issues of what is expected in delivering services. To understand and successfully deliver services, we need to understand and relate all stakeholder views and definitions as a prerequisite, and then use them within our engineering of services.

We have established Case Studies for Services that cover various areas of interest for businesses in INCOSE UK. The use of the term 'Service' has been extracted from literature together with definitions. Soft Systems Methodology has been used to provide World Views of the various Stakeholders. The definitions have been grouped, related and where necessary re-worded to provide a map of terms. These have then been tested against the Use Cases to see where and how they apply. This has provided further insight into the Use Cases and the Services they represent that can be used in the engineering of Services by the general INCOSE membership.

16:15 - 17:00

Have I Got Tools For You?
Jon Holt et al

This light-hearted panel session will see a collection of tool-vendor representatives and MBSE consultants pit their wits against each other, answering questions from both the panel chair and the audience.

MBSE methods have become part of the mainstream in most industries, but it is rare that any tool can be used straight out of the box without serious thought being given to aspects such as tailoring, processes and metamodels. Why not hear from the experts about how to approach such matters, in a quick-fire relaxed manner.

We intend to provide a facility for delegates to suggest questions and topics in advance of the conference.

Day 2 : Morning Sessions - Presentation Abstracts

AM - Session 2.1: Dealing With Uncertainty

09:45 - 10:30

Unravelling the Knowns and Unknowns
Rob Behan (Scarecrow Consultants)

In February 2002 the US Secretary of Defense, Donald Rumsfeld, gave a Department of Defense News Briefing where he made the now famous statement in answering a question to him relating to Iraq and weapons of mass destruction. In this statement, Rumsfeld talked about known knowns, known unknowns and unknown unknowns.

Although criticised by the press and others as being gibberish, within the Systems Engineering community this statement was recognised as giving a framework for categorising our understanding, or lack thereof, of a system.

This paper will discuss the various Systems Engineering techniques that can be used to address the investigation and understanding of the Rumsfeldian knowns and unknowns.

AM - Session 2.2: Using Models to Understand Complex Situations

11:00 - 11:45

Model Based Systems Engineering in Automotive Industry: Challenges and Solutions
Andrew Howells, Yike Fang, Iain Aitchison (Changan UK),
Prof. Jon Holt, Simon Perry (Scarecrow Consultants)

Changan is China's fastest growing automotive manufacturing business, working its way towards becoming one of the world's leading automotive companies. Changan UK R&D Centre Limited (CAUK) is one of nine worldwide centres of engineering excellence specifically focusing on powertrain research, design and development including pioneering System Engineering good practice for Changan's next generation of eco-friendly vehicles.

With the support of industry expertise, an enhanced MBSE approach has been developed and applied to a strategically important hybrid vehicle project. Constraints, such as market competition and increased demands of standards and legislation relating to hybrid technologies have proven to be key factors that have driven the underlying MBSE approach.

This paper discusses the practical issues of adopting MBSE including the development of people (competence), processes (the approach) and tools (including tool chains and interoperability).

Examples of the techniques used and the benefits against more traditional approaches, e.g. textual based engineering, are also discussed.

11:45 - 12:30

Integrating an Upgraded Constituent System in a System of Systems: A SysML Case Study
Claire Ingram, John Fitzgerald (Newcastle University),
Prof. Jon Holt (Scarecrow Consultants), Nico Plat (West Consulting BV)

A System of Systems (SoS) relies on each constituent system contributing towards achieving some global emergent behavior. Integrating constituent systems can be particularly challenging for SoS engineering, partly because of the independence of the constituents and the difficulty of producing a realistic, scalable test environment before changes are deployed to the live environment. For this reason modelling and simulation can be important tools for regression testing within an integration scenario. We provide a worked example of an SoS integration scenario using a traffic management system as demonstrator, employing a structured, model-based framework (the COMPASS Integration Framework) designed for integrating CSs in a variety of SoS integration scenarios. The Framework is designed to be used with architectural modelling views (we use SysML for our case study). Finally, we provide some pointers for future work and next steps.

Day 2 : Afternoon Sessions - Presentation Abstracts

PM - Session 2.3: SE in Non-Traditional Situations

13:30 - 14:15

A novel methodology for the application of Middle-Out, Model Based Systems Engineering Techniques for City Waste Management Systems Development

Christopher Bouch, Dexter Hunt,
Susan Lee, Christopher Rogers (University of Birmingham),
Richard Kenny and Tommy Wallace (Birmingham City Council)

A holistic approach to urban development is required to meet global sustainability goals. Part of the challenge involves finding an effective response to the increasing volumes of solid waste being generated in cities. The European Commission has developed a thematic strategy, and issued directives, on the prevention and recycling of waste. The United Kingdom has introduced legislation in line with these, and is working to develop its own waste management strategies against a very complex background. This paper describes a novel methodology for the application of middle-out, Model-Based Systems Engineering techniques to help with this, using the city of Birmingham in the United Kingdom as an example. The methodology creates repeatable and objective models of existing waste management systems and links them to city management accounts to provide a foundation for the design of new and improved systems and business models.

14:15 - 15:00

Finding the 0.01%, The England Rugby Player Pathway: Systems Engineering in Sport.

Ivan Mactaggart
and Martin Mactaggart (Rugby Football Union)

Systems Thinking and the principles of Systems Engineering are regularly applied in domains other than 'traditional SE' but for many the understanding of the application of SE is still confined to the development of complex products such as aircraft, rail networks, etc. We forget that the most complex systems are organic: the human being is a complex system and a team of human beings is an incredible example of a System of Systems (SoS).

The world of sport, in particular the development of teams, is a notable example of a non-traditional domain that successfully uses the principles of SE, albeit with differences in language. In order for England rugby to be successful it needs to produce players on a regular basis with the ability to perform at the highest level. Whilst the programme is yet to be formally validated, this paper will illustrate how the Rugby Football Union (RFU), the governing body for the sport in England, is taking a systems approach to the development of young players in order to create high performing Systems of Systems, or teams.

Day 2 : Afternoon Sessions - Presentation Abstracts

PM - Session 2.4: Integrating SE with P3M

15:30 - 16:15

Application of a systems approach to exploit value from coherence in UK Defence

Dr Ann Fitchett (UK Ministry of Defence), Kevan Boll (Atkins)

UK Defence is an increasingly complex enterprise endeavouring to deliver capability within a constrained budget. Key issues and risks for UK Defence are the incoherencies that emerge in such a large enterprise and the missed opportunities for a common approach. To address this, the MOD is establishing a single integrated framework of internal controls as part of newly established corporate governance arrangements covering the entire department. Defence Authorities have been appointed to deliver value for Defence by managing pan-Defence risks and for ensuring coherence across the Defence enterprise.

The challenge for a Defence Authority is therefore to identify, implement and sustain the necessary controls, services and functions that deliver value, and to ensure that they form a coherent whole with other Defence Authorities. At the same time, the Authority must strike a balance between the need for regulation versus business and operational freedoms.

This paper describes how a defence capability, Systems of Systems and Systems Engineering lifecycle and information model was exploited by the Defence Authority for Technical and Quality Assurance. It also outlines an initial operating model and technical control framework that is aligned with Defence's implementation of Project, Programme and Portfolio Management, and the new Defence Operating Model. It describes the value of the Defence Authority as a systemic response to organisational complexity and the emergent risks, issues and opportunities faced by Defence.

16:15 - 17:00

Valuing our place in the world - Using Systems Engineering in Programme and Project Management

Andrew Gray (BMT Hi-Q Sigma), Ken Richardson (Roke Manor Research)

With a "coming of age" comes an increasing sense of awareness, and of responsibilities outside one's immediate circle. For systems engineers, this is where the discipline is able to fulfil its potential to support, define and drive an organisation's activities to solve complex problems. Programmes and projects need both technical and managerial leaders who understand and support each other's needs and challenges, and who consequently can work in an integrated way to achieve success.

The INCOSE UK/APM Joint Working Group on Systems Engineering (SE) and Project/Programme Management (PM) Integration has been addressing shared understanding of mutual dependencies. It is seeking to promote the benefits of systems thinking across the wider decision making community, and how to deliver these benefits.

One particular area of the Group's work has been the analysis and integration of thinking in life cycle and process definitions. In this area the Group has continued to develop the narratives of past ASEC events to arrive at a comparison and categorisation of different SE and PM life cycle representations, and an analysis of where SE and PM processes touch, overlap and underpin each other.

Categorising the range of different life cycle representations helps communicate the importance of understanding and selecting the correct life cycle. By then introducing a joint conceptual representation of an integrated life cycle model, it is possible to explore and articulate touch points between the two disciplines as examples of the wider synergies that can be achieved.

These synergies demonstrate how a range of different systems-based skills and techniques can be used to deliver projects and programmes successfully and illustrate the worth of Systems Engineering beyond traditional preconceived boundaries.

On INCOSE UK's 21st anniversary, can we give the SE community the keys to unlock the barriers between SE and PM?

Afternoon Tutorials / Workshops

*Booking is required for the marked sessions.

Day 1: 13:30 - 17:00

Using EARS+ (Easy Approach to Requirements Syntax Plus) to vary the level of detail in Natural Language Requirements*

Alistair Mavin (Rolls-Royce)

Black box system requirements are often written in unconstrained natural language (NL), which is inherently imprecise. During system development, any problems in system requirements inevitably propagate to lower levels. This creates unnecessary volatility and risk, which impact programme schedule and cost. To mitigate this problem, there is a need to provide simple, practical guidance for authors of NL requirements. Easy Approach to Requirements Syntax (EARS) is a philosophy for authoring NL requirements through the application of a template with an underlying ruleset. EARS has proved popular with practitioners because it is lightweight, there is little training overhead, and the resultant requirements are easy to read.

This interactive tutorial will:

- introduce the EARS+ approach
- illustrate worked examples of both simple and detailed requirements
- demonstrate the evolution of requirements through the development lifecycle
- include a group discussion on the benefits of adopting the approach

Participants be provided with a quick reference guide and will leave with a working knowledge of EARS+, ready to apply the approach to their own requirements.

Let's stay in, this is better than playtime!" – How to become a STEM Ambassador and meet real Systems Thinkers!*

Steve Dimelow (Rolls-Royce)

The aim of the tutorial is to share my experiences of presenting STEM to Key Stage 1 to 3 children with INCOSE UK members so that they may be inspired to become ambassadors. The aim is also to encourage new ambassadors who are not sure how to proceed and to trade ideas with experienced ambassadors.

I will include how to pitch STEM information to differing age groups and how to make this fun with 2 way dialogue. I will cover the planning and running of a school event along with the design/build/test activities that engage children and the presentation material that I've used.

The tutorial covers what I do as an ambassador and how you could get started as an ambassador. It also covers INCOSE's input and what INCOSE UK members can add that other engineers may not. The tutorial finishes with a typical 20 minute presentation featuring Jet Engine (Suck Squeeze Bang Blow) demonstration and balloon car build and racing for all participants.

Day 2: 13:30 - 17:00

We Chose MBSE: What's next?*

Dr. Aurelijus Morkevicius (No Magic Europe)

Model-Based System Engineering (MBSE) promises to increase in productivity by shifting from documents to models. However, to reach this promise organisation needs to implement proper practices to enable productive modelling that delivers high quality models. When the decision is made to go with the MBSE or the task is given to investigate whether MBSE is worth the investment for the organisation, a long journey begins. The journey that requires knowledge, patience, and guidance to make the paradigm shift (from document-centric to Model-Based SE) rewarding, or to at least prove that it can be rewarding.

Nowadays, MBSE is enabled by Systems Modelling Language (SysML). However, SysML is neither an architecture framework nor a method. This opens discussions of how to structure the model, what views to build, which artefacts to deliver and in what sequence. Organisations not complying with a standardised approach end up having differently structured models with different set of views. It results in the loss of capability to interexchange, loss of capability to communicate with other teams, overhead in tool customisation, and specific training needs. Moreover the models become impossible to integrate and reuse.

In this tutorial, a framework for MBSE called the Magic Grid is used. The framework consists of viewpoints and aspects organised in a grid view, where each cell is an artefact or a set of artefacts to deliver in the modelling process. It is based on existing studies in the field and real-life findings in managing models for organisations from different Systems Engineering domains. The tutorial is followed by a real world examples in a form of a case study modelled in Cameo Systems Modeler™ software.

Systems Engineering for Strategy Design*

Dr J. Pedro Mendes (University of Lisbon, Portugal)

The aim of the tutorial is to solve a business strategic management case study using Systems Engineering techniques while walking the participants through a sequence of steps from problem analysis to implementation.

Participants will read the case text (1½ pg) and then be asked (a) what is the parallel with any business situation they may be familiar with and (b) if anyone is familiar with strategy reporting (SWOT…). After setting the context, the tutorial follows a stepwise TV-cooking format:

1. Problem modelling 1: participants define variables, use cases, sequences in SysML format and then are shown the same pieces put together in a full model;

2. Problem modelling 2: participants define the structure of decisions and processes (parametrics) and then are shown the same pieces put together in a full model;

3. Solution identification: the problem model is "cooked" into a System Dynamics simulation and then the participants discuss the results and how the solution is documented back into SysML;

4. Risk analysis: the participants perform a partial HAZOP, build fault trees for the solution, and identify implementation tasks, the basis for the implementation project.

Additional Programme Elements

ASEC 2015 - A Slightly Expanded Conference

This year, the INCOSE UK Annual Systems Engineering Conference contains a number of new side elements, taking advantage of the extra room available at Heythrop Park.

- Working Groups will have the opportunity to bid for up to 3 sessions each day to conduct working group business or engage with delegates who may not normally be able to attend their meetings
- Marking the issue of ISO15288:2015, and the launch of the INCOSE SE Handbook v4, there will be a session each day focused on how to maximise the chance of success when completing your INCOSE CSEP and ESEP Certification application, which will also address major changes in the new handbook
- Finally, in a nod to next year's International Symposium in Edinburgh, we are going to have a "Fringe" session each day. The aim of the Fringe is to provide a space where delegates can explore and unpack aspects of Systems Engineering theory and practice, engaging with each other through facilitated discussions. These sessions will be as much about the intellectual journey as the final destination, and our intent is to use social media before the event to generate a set of topics to seed the delegates' choice of subjects to address. If this goes well then expect to see it repeated at IS2016 in July next year!

These additonal elements will take place in parallel to the main conference as indicated below.
*Booking is required for the marked sessions.

Day 1 and Day 2: Parallel Elements

				Breakout		Breakout
10:30 - 11:00	**Coffee**					
11:00 - 12:30	Plenary Session	CSEP and the updated SE Handbook v4*	OR	Working Group Session	OR	Working Group Session
12:30 - 13:30	**Lunch**					
13:30 - 15:00	Plenary Session	Fringe		Tutorials*		Tutorials*
15:00 - 15:30	**Tea**					
15:30 - 17:00	Plenary Session	Working Group Session				

Registration and Event Prices

Registration

Visit our online registration facility at www. ASEC2015.org.uk.

Here you can register for the event, book accommodation and pay by card through a secure payment facility with Lloyds Cardnet via SagePay. Options to pay by cheque or company order are also available.

If you are unable to take advantage of our on-line registration facilities, please contact the INCOSE UK Secretariat either by email at: enquiries@incoseonline.org.uk or by telephone: 01460 298217 or fax: 0845 280 5304.

Prices and Accommodation

The event prices for INCOSE UK members are:

	1 Day	2 Days
Member Rate	**£300**	**£550**
Student / Senior Member	**£150**	**£275**

Non-members are welcome, but you will be charged an **additional £105** (VAT exempt) that will give you the benefits of INCOSE membership for one calendar year. Student membership for non-members is an **additional £35** (VAT exempt). The senior rate only applies to those already registered as INCOSE Senior members.

Prices include lunch and morning and afternoon coffee on each day.

Overnight accommodation will be charged at £110 per night for bed and breakfast (standard room, single occupancy, no concessions). The conference dinner is included for those who book accommodation for the night of Tuesday 17th November.

Non-residents who wish to attend the conference dinner will be charged an **additional £35.00**

All prices quoted here are exclusive of VAT (add 20%).

Venue and Travel Information

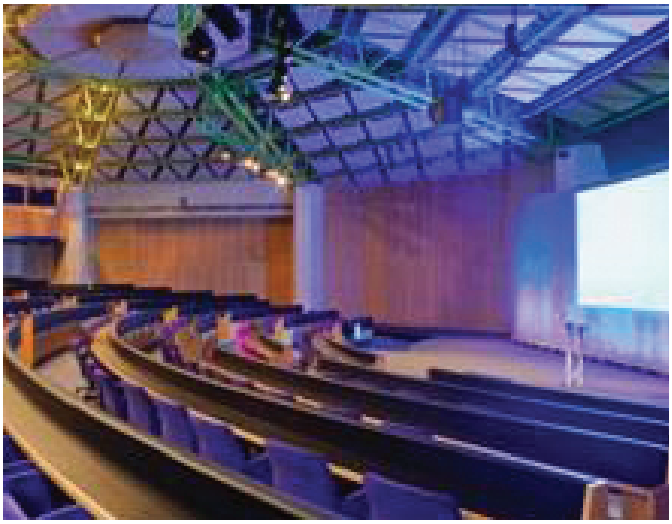
The venue for ASEC 2015 will be the Crowne Plaza Hotel, Heythrop Park Resort, Enstone, Chipping Norton, Oxfordshire, OX7 5UE (postal purposes only) or OX7 5UF (SatNav).

Car Parking

Free car parking is available in a car park to the front of the venue.

Directions

For detailed directions, see the venue website:
www.heythroppark.co.uk/contact.php



Associate or Certified Systems Engineering Professionals (ASEPs or CSEPs)

INCOSE Associate or Certified Systems Engineering Professionals (ASEP or CSEP) receive 1 PDU (Professional Development Unit) for every hour they attend the conference (up to a max 120 PDUs). Furthermore, if you are already an ASEP or CSEP, but are not currently a member of INCOSE, joining INCOSE when registering for ASEC 2015 will earn you an additional 5 PDUs for your year of membership.

About INCOSE

The International Council On Systems Engineering (INCOSE) is a not-for-profit membership organisation founded to develop and disseminate the interdisciplinary principles and practices that enable the realisation of successful systems. INCOSE has grown significantly since its formation in 1990.

Today, there are nearly ten thousand members representing a broad spectrum - from student to senior practitioner, from technical engineer to programme and corporate management, from science and engineering to business development. Members work together to advance their technical knowledge, exchange ideas with colleagues, and collaborate to advance Systems Engineering.

In the UK, membership numbers have grown steadily, with 50 at our inaugural event in September 1994 in Shrivenham, and rising from 350+ members in 2003 to over 900 members at the end of July 2015. A key goal for INCOSE UK is to achieve a steady and sustained increase in the number of members, further broadening the base of the membership to include new industrial domains.

INCOSE UK's governance arrangements include the Advisory Board which has now grown to over 38 organisations from across industry, government and academia, spanning both traditional and non-traditional Systems Engineering domains.

Registration now open - please book early

Please use the online facility at www.asec2015.org.uk to register and pay for your attendance.

HAVE YOU CONSIDERED CERTIFICATION?

INCOSE UK now offers Certification through an online process based in the UK

INCOSE Systems Engineering Certification provides an internationally recognised independent accreditation of an individual's Systems Engineering knowledge and experience.

The benefits:

- Global recognition of your Systems Engineering capabilities
- A competitive advantage in your career and portable Systems Engineering qualifications recognised across industries
- A structured approach to recognising your Continuing Professional Development

The Associate (ASEP), Certified (CSEP) and Expert (ESEP) qualifications cover the breadth of Systems Engineering at increasing levels of leadership, accomplishments and experience.

ASEP is targeted at junior and maturing systems engineers. A great starting point for engineers transitioning from other disciplines. An examination based qualification.

CSEP is targeted at practitioner systems engineers with workplace experience in Systems Engineering. An examination forms part of this qualification along with relevant experience verified by industry professionals.

ESEP is targeted at senior Systems Engineering leaders with recognised systems accomplishments, who have substantial Systems Engineering leadership experience. The basis of this qualification is a formal interview with accredited Systems Engineering experts.

Marking the issue of ISO15288:2015, and the launch of the INCOSE SE Handbook v4, there will be a session each day at ASEC2015 focussed on how to maximise the chance of success when completing your INCOSE CSEP and ESEP Certification application, which will also address major changes in the new handbook.

If you are interested please book the ASEC session or find out more at the Professional Development information stand during coffee break and lunch each day. Or contact us at:
profdev@incoseonline.org.uk

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