PREVIEW
The Newsletter of The International Council on Systems Engineering UK Chapter

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SUMMER 2016
'IMPROVE THE RESULTS OF YOUR PROJECTS

“The course was really excellent and the degree of learning outstanding. We are applying the concepts learned extensively” - delegate

“One of the best and most valuable professional development classes I have ever taken; relevance, substance & depth and breadth of presenters expertise. Wish I would have taken it earlier” - delegate

“The best thing about the course was the amount of detail presented, along with the supporting courseware material to bring back for study/reference” - delegate

“Brilliant! A real eye opener. I will return to my job with better ideas to improve the requirements.” - delegate

INCOSE UK members receive 10% discount
PPI is proud to be a UKAB member

EUROPEAN COURSES FOR 2016

SYSTEMS ENGINEERING
12 Sep - 16 Sep Munich, Germany
19 Sep - 23 Sep London UK
26 Sep - 30 Sep Madrid Spain
3 Oct - 7 Oct Manchester UK
24 Oct - 28 Oct La Spezia Italy
31 Oct - 4 Nov London UK
21 Nov - 25 Nov Eindhoven The Netherlands
5 Dec - 9 Dec Frankfurt Germany

SYSTEMS ENGINEERING MANAGEMENT
10 Oct - 14 Oct London UK
7 Nov - 11 Nov Amsterdam The Netherlands
7 Nov - 11 Nov Manchester UK

REQUIREMENTS ANALYSIS & SPECIFICATION WRITING
29 Aug - 2 Sep Amsterdam The Netherlands
28 Nov - 2 Dec London UK

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www.ppi-int.com
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The Editor reserves the right to carry out amendments to articles in this publication, in order to ensure that content is concise, consistent, grammatically correct and that it adheres to INCOSE UK’s in-house branding guide. Every effort will be made to supply a copy of any amended articles to the contributor prior to the magazine being released, but this cannot be guaranteed. Any final decision regarding content will ultimately rest with the Editor.
President’s Corner

Richard Beasley
INCOSE UK President

It hardly seems possible that I am writing my final President’s corner, and my two year tenure as president of INCOSE UK is nearly over.

When I starting drafting this, my first thought was to review what I had done as President. However, I soon decided that this was the wrong approach – INCOSE UK is bigger than any individual. So instead I am going to focus on what has happened over the last two years and why I believe INCOSE UK can look forward to a positive future.

Obviously there have been difficulties – that is inevitable in a growing organisation. However, I would like to thank my Council colleagues for the expertise they brought to the debates we had to have on the challenges and choices that face our organisation. Those debates enabled us to take decisions on the best way to move INCOSE UK forward into the future.

As I have already said, in this final piece I wanted to focus on and celebrate what has happened over the last two years, in particular on four opportunities that were, for me, real highlights.

1. The Progress on Professional Development

The opportunity for members of INCOSE UK to achieve UK professional registration (CEng, IEng, EngTech) has continued. At the same time the mechanism allowing the UK Chapter to administer and assist in the certification of members as systems engineers (through the INCOSE SEP programme) has also continued.

The arrangements for professional registration have changed recently but I believe those changes give a clear indication of our growing maturity in this field. Professional Development of individual members is one of the cornerstones of a professional society in the UK. I am proud to see that INCOSE UK continues to make strides in supporting our members.

2. The INCOSE International Symposium

This year the INCOSE International Symposium was held in Edinburgh. This was not strictly a UK event but the fact that it was held in this country made it a significant event for our
people. Importantly for us, key members of the organising committee were INCOSE UK members; notably Ian Gibson as overall project manager, and Claire Ingram as the technical programme lead.

When it was initially announced that the event would be in the UK (more than 18 months ago) I was determined that there would be a distinctly British event, and that the strength and character of the UK Chapter would be clear. From the feedback I have had, that goal was clearly achieved. One piece of unsolicited feedback from a senior INCOSE member said the event made him “proud to be British”. My thanks to all involved for contributing to a successful event.

3. “Think Engineer”

This is a magnificent product! My thanks go to Jon Holt for responding so positively to my throw away remark at my first meeting as President. My remark was in regard to our difficulties in producing clear agreed information about Systems Engineering. I felt that if we could explain Systems Engineering to children, then clearly we should be able to produce clear, agreed messages about Systems Engineering for “outreach”.

Jon picked up the idea and nine months later it became a reality. Reception has 100% positive and it gives me great pleasure to be associated with an organisation that can promote engineering and Systems Engineering in such an accessible and engaging way for children.

4. Systems Engineering and INCOSE UK Membership

Promoting the recognition of the importance of, and the uptake of, Systems Engineering in the UK is a core part of the INCOSE UK purpose and progress continues.

INCOSE UK is an affiliate member of the Engineering Council and as your President I have attended the Engineering Council’s AGM. It has been with pleasure that I have realised that the other attendees were becoming more aware of Systems Engineering and its importance – and thanking me for the efforts of INCOSE.

The membership of the INCOSE UKAB continues to grow, and more importantly, has become more diverse in terms of the industry sectors. INCOSE UK are part of discussions about UK Energy Policy and health care systems – in both cases there has been a realisation of both the need for a Systems approach and an approach to INCOSE to assist with understanding. The individual membership of INCOSE UK continues to steadily rise, and last I
heard was hovering tantalizingly below 1,000. All signs of positive growth.

Of course the challenges remain. As INCOSE UK grows ad offers more benefit to members, we must ensure that we have the financial cover to provide this. It means we will need to become more cost conscience and ensure that all we do is cost effective and provides value for our members and our vision. Hence some of the changes your have seen including Preview being published electronically.

There is much to done but I am confident that INCOSE UK will continue to thrive.

It has been a privilege and a pleasure to be its President for two years and I hope to see as many of you as possible at ASEC 2016, before I formally hand over to Ivan Mactaggart, our president-elect, on 15 November 2016.

Happy thinking and best regards.
NEWS FROM...

THE WORLD OF ENGINEERING

Bloodhound Speed Attempt

The Bloodhound SSC team has announced that the vehicle’s first World Land Speed Record attempt will take place in October 2017. Read the full article on The Engineer here.

Decline in Popularity for STEM Subjects

The Training Journal reports that KS1 and KS2 children are not carrying forward their interest in STEM subjects further levels.

Tesla Gigafactory

BBC News carries an article about Tesla Motor’s ‘Gigafactory’, a site that - when completed - will extend to 3,200 acres and have the largest physical footprint of any building in the world.

Engineering the Rio Olympics

If you had wondered about all of the engineering that goes into preparing for the Olympics, then Engineering.com have an infogram covering the role that it has played in the run up to Rio 2016.

‘Neural Dust’ Offers New Possibilities in the Field of Electroceuticals

Researchers at the University of Berkeley, California have built the first dust-sized, wireless sensors that can be implanted in the body; read the full story here.
The 4th Nordic Systems Engineering Tour (NoSE) in May was a great event. I was lucky enough to be invited to speak at all of the locations, together with three other international speakers – Peter Gorm Larsen of Denmark, Bo Oppenheim of the USA and Mike Nicolai of Germany. The tour started in Helsinki on Monday, then headed to Stockholm for Tuesday, Copenhagen on Wednesday (in collaboration with the Systems Engineering Spring School), Hamburg on Thursday and finally Warsaw. Each event was enriched by talks from local speakers. In Hamburg it was Tim Weilkiens, a co-sponsor, and he continued on with us to Warsaw.

My talk was on the Return on Investment of Systems Engineering. It was based on my presentation to ASEC a couple of years ago and the full-day tutorial that I run on the same subject. Bo spoke on his specialist subject, Lean SE, and was typically challenging. After spending time with Elon Musk’s companies, he firmly believes that nearly all defence and aerospace projects waste over 80% of their time and money compared to what could be achieved. And he backed it up with hard numbers. Mike and Peter spoke on different aspects of keeping multi-model MBSE designs and architecting in step with each other, and supporting trade studies. These were certainly not topics for MBSE beginners. The full presentations are available from the NoSE website, but are password protected for attendees only. This protection might be waived after a while – anyone interested should contact either Tim (Tim.Weilkiens@oose.de) or Erik Herzog, the Swedish organiser (herzog.erik@gmail.com).

Audience sizes were typically around 30, but larger in Copenhagen because of the summer school. Though smaller than a UK event, they were pretty good for the smaller INCOSE Chapters in geographically much larger countries. The level of interest, challenging questions and networking was very high throughout and different in each location.

You might imagine that delivering the same talk five times in five days and listening to the same talks from the other speakers, would get tiring and repetitive, but the different angles found by the different audiences (including the co-presenters) kept it fresh.

Somebody suggested that we deliver each Nordic Systems Engineering Tour 2016

Paul Davies
Former INCOSE UK Chapter President
others’ presentations towards the end of the week, but there were no takers. Keeping cool was the biggest problem throughout, as it was close to 30 degrees for the whole week. Finally the weather broke on the Friday afternoon in Warsaw, with the most spectacular thunderstorm I’ve ever seen lasting nearly six hours!

The camaraderie built between us travelling between tour venues endures – we all (except Bo) pitched up at the IS2016 in Edinburgh and greeted each other like long-lost friends despite it only having been two months. If anyone offers you the chance to take part in NoSE 2017, or in future years, jump at it!

**INCOSE UK Release Updated Z3 Guide**

*Hazel Woodcock*

*INCOSE UK Communications Director*

We are pleased to announce that the INCOSE UK Z3 Guide has recently been updated.

This guide covers the business case in support of Systems Engineering and aims to cover -in brief - the benefits that can be obtained by adopting a thorough Systems Engineering approach early on in a project.

The guide is available for download as a PDF, along with all of the other INCOSE UK Z Guides, on the [INCOSE UK website here](#).

I would like to take the opportunity to thank Paul Davies for the hard work that he has put in to this guide. It is another excellent resource that we can offer as a society, to help promote Systems Engineering as good practice.
In Memoriam – Philip Keith M’Pherson (“PKM”)
Born 1927, died 27 April 2016

Paul Davies
Former INCOSE UK Chapter President

It is with great sadness that we report the death of Philip M’Pherson earlier this year. Philip was a practitioner, educator and intellectual leader in Systems Engineering for over 45 years and an early and inspirational member of the UK Chapter of INCOSE. His appreciation for precise mathematical modeling in complex system design was honed back in the fifties with UK Atomic Energy Authority (UKAEA), where Sir John Cockroft appointed him to form and run a new Dynamics Group to invent the complex dynamic control systems needed for safe nuclear power generation. Before that, his applied research for the Royal Navy on gyrodynamics and submarine inertial navigation systems, with time at MIT mastering matrix algebra, added mathematical prowess to his naval engineering and gunnery background.

At City University in London, he set up the Department of Systems Science in 1972 – probably the first “Systems Professor” in Europe. His knowledge, passion and tenacity led the department into a position of intellectual leadership in applying Systems Thinking. After retiring from academic life, he developed the Inclusive Value Methodology (IVM™) to provide a mathematically valid measurement of all the tangible and intangible assets of projects and organizations. His lasting contribution to Systems Engineering was his clarity of understanding and quantifying the dynamic relationships among and within complex systems.

After early education at Winchester and Marlborough Schools - excelling in Mathematics - Philip went straight into the Royal Navy in 1944, spending a total of 15 years in dark blue. “It was the Navy”, he told us, “that discovered I had a brain”, and sent him to the Massachusetts Institute of Technology in 1954 for a Masters degree, to learn state of the art inertial navigation and bring it back. From then on, he was regarded as a pioneering boffin; with the Admiralty, then the UKAEA, then headhunted by St John’s College at Oxford University as their first Fellow in Engineering, specialising in Control Systems.

The prevailing view of the time was that there
was no adequate theoretical basis, nor a suitable corpus of knowledge, for systems to be a university subject. However, City University in London gave PKM the opportunity of a Chair - initially in Production and Control Engineering - to thrash out a science of systems, and the department morphed into Systems Science. Forming a hand-picked multi-disciplinary team, he brought Hard Systems into its own as a subject, and established the pre-eminent department in the UK, launching many successful Systems programmes. Philip stayed at City for 22 years, latterly as Pro Vice Chancellor, before retiring as Emeritus Professor in Systems Engineering and Management in 1987. Where he (and City) led, others followed – Bath, Loughborough, and Heriot-Watt. PKM would admit only to “being co-parent of Systems Science”, because he knew of one other person in the USA doing something similar at the time, and was far too modest ever to blow his own trumpet.

The legacy of Philip's achievements is under-recognised, perhaps because he was so far ahead of his time. In addition to those noted above, here are some highlights worthy of note and remembrance:

- First systemigram (see picture), drawn in 1946 (age 19) to represent water and steam leaks from the ship’s engine. He added the artistic flourishes himself, and called it “the bashful chicken”


- 1987-2004, research into Inclusive (including intangible) Value Measurement, for various enterprises in the financial, IT, infrastructure and government sectors; deemed too commercially valuable and sensitive to publish! This was undertaken in response to the drastic public spending cuts of the early 1980’s, specifically to demonstrate the difference between cost and value.

- Recipient of the INCOSE Pioneer Award, 2007

I count myself extremely fortunate to have known PKM and worked with him for a little while. Not only did he have an insightful and incisive mind, but he was also a thoroughly decent gentleman.
Why did I choose to be a systems engineer?

As a mechanical engineer I have always been drawn towards being able to understand the interfaces with other disciplines, and how they integrate with other functional areas within a programme / project. I chose to follow Systems Engineering practices quite early on during my career and have never looked back.

Within High Speed 2 Ltd (HS2 Ltd), my key responsibilities include the development and management of Department for Transport (DfT) Sponsor’s requirements. I derive these requirements into Technical Specifications for our three delivery Units: Construction, Development and Railway Operations.

I work closely with the Internal Sponsor team to promote Systems Thinking and oversee the technical processes and their integration with the wider business. A typical day for me at HS2 is championing and influencing parts of the business to take a ‘Systems Thinking’ approach. This ensures everyone is clear and aligned, so that we deliver the right optimised solution and output for any given activity.

Being able to see the bigger picture and understand how each part fits within that is key, to avoid any wasted efforts and minimise risk.

Education / Qualifications to become a systems engineer?

I graduated from Brunel University with a BEng degree in Engineering Science & Technology. I chose a degree that offered an industrial placement and I was fortunate to be offered an opportunity to work for 3M UK Plc (Head Office in Bracknell). This provided me the foundation of my Systems Engineering knowledge and awareness, although I didn’t realise its true potential until much later in my career.

In 2003, I joined Network Rail and worked across a variety of major multidisciplinary programmes over the course of 12 years, including West Coast Route Modernisation (WCRM), North London Rail Infrastructure Programme and East London Line. I joined HS2 Ltd in 2012 to help embed Systems Engineering practices into the organisation.

What is it about Systems Engineering that you find so compelling?

I am passionate about promoting the use of Systems Thinking and applying System Engineering approaches across large multidisciplinary projects. This is one of the main reasons I became one of co-chairs for the INCOSE UK Transportation Working Group; always seeking to share best practises, lessons learnt across different industries and sectors. Most of the challenges we all face are similar, just the complexity, scale and its application varies.

Systems Engineering and its application within the rail sector still varies today and there has been some great work that has been achieved to
date and in the pipeline, however we need to ensure we keep spreading the benefits of what SE can provide if adopted early on Programmes and ensure we have a transportation network that is fully integrated and developed.

In my experience we need to adapt the language to suit the audience - most of the time the term SE tends to “switch” people off, so by adapting the language we can help build that general awareness and sense of need and importance.

**What advice would you give a systems engineer just starting out in their career?**

Drawing from my own experiences, it is important to raise the fact that there really isn’t a glass ceiling that can’t be pushed open, through hard work, focus and determination. Sure, there will be challenges along the way. Championing ‘Systems Thinking’ whenever the possibility arises and ensuring that everyone around you is clear and aligned is key, so that you are able to make informed decisions to deliver optimised outcomes.

Finding the balance and also the courage to pick yourself up during those lows, to get back on that journey to achieve your ultimate goal, is essential. It has a sense of achievement that can’t really be explained. This is where I always advise those who I mentor or coach, to keep the end goal in sight.

A great boss at 3M always said to me “divide and you will conquer”, which has worked for me. If you haven’t got yourself a coach or mentor, get yourself one as it really does help to talk. Finally, I would say that being a systems engineer has provided me with a sense of fulfilment and achievement – no one day is the same, and it’s incredible to have a career that really is that rewarding.
INCOSE International Symposium 2016

Attracting 849 paying delegates from 31 countries, this was the best-attended International Symposium outside the USA ever.

Introduction

Richard Beasley
INCOSE UK President

The annual INCOSE International Symposium was held in Edinburgh this year from 18 - 21 July, with a series of pre-meetings, tutorials and workshops the weekend before.

It is important to emphasise that this was an event run by and for INCOSE International and the UK Chapter had no direct involvement as a Chapter. However, as reported below, the members of the UK chapter made a significant contribution to the planning, operation and content of the event. Of course the location meant there was a strong UK Chapter turnout for the event. The organising committee had three UK Chapter members – Ian Gibson (Project Manager), Claire Ingram (Technical Programme) and Richard Beasley (Master of Ceremonies).

Attending the International Symposium certainly felt strange. There was no time difference, no difficulty with foreign money (although the Scottish bank notes made it feel “abroad” for an Englishman) and no jet-lag to worry about. The event certainly had a “British flavour” and some of the innovations (a conference fringe, tool vendors panel show) had their origins in ASEC 2015. There were also some brand new ideas, such as a slot for the poster / key reserve papers to give a brief presentation. Some of these special events are reported separately.

The main core of the event remained constant, with up to eight separate tracks with papers, panels, roundtables and tutorials, along with four plenary sessions with awards and five keynote speeches (these can all be found on the INCOSE You Tube channel).
One highlight of the plenaries was Jon Holt reading “Think Engineer”, resulting in the sale of our entire stock (120 copies) within four hours.

During the four days over 850 paying delegates attended the conference, making it a record for an INCOSE Symposium outside the USA, and the third highest attended event ever. There were over 100 delegates from the UK Chapter.

Normally when reporting from an INCOSE International Symposium it is relatively easy to report on the UK papers. This year there were 22 papers with a UK author, so unfortunately there is not room to report on them all.

The UK was also heavily represented in various panels and involved in other events - all too numerous to mention.

Awards were received by Gary Smith as co-author of a best paper, Rick Adcock and Mike Wilkinson for Outstanding Service and the UK Chapter won a Platinum Award (the highest level achievable) in the INCOSE Chapter Awards. Congratulations to all!

The event was a tremendous success by all measures – the attendance, the technical content, the smooth running, and the “tone / feel” of the event. This was predominantly down to the Project Manager, our own Ian Gibson. The event took more than eighteen months of planning and whilst I am sure there were moments of stress and anxiety, they did not show. Certainly as Master of Ceremonies I always was sure of what Ian wanted, and that all was under control. Obviously the experience of running many events in the UK is paying off.

I hope that all INCOSE UK members who attended not only enjoyed the experience but also learnt more about Systems Engineering and made new contacts in our profession. Hopefully the sharing and developing ideas through discussions will continue. It became clear that INCOSE members have taken to social media - on the last day of the conference ‘#incoseIS’ had 1,253 Tweets generating 647,782 impressions. People unable to attend reported enjoying the commentary.

Richard Beasley

The International Symposium Committee, with the notable presence of multiple INCOSE UK members
Around 60 people packed the Mercat Bar just down from the EICC for an evening of questions, drinking and general international socialising at the IS2016 Pub Quiz.

For many it was their first experience of the format, which was a traditional British pub quiz except that teams were rewarded with an extra Joker for having three or more nationalities (which all teams managed to achieve).

Since the evening was clearly one of Professional Development (?) it was appropriate that the quiz was hosted by Ian Presland, the UK Chapter’s Professional Development Director, who posed questions as diverse as “What country has the tallest men in the world?” and ”What does the “D” in Alan D. Harding stand for?”

It was clear that a fun time was had by all - even after it was announced that the UK Chapter President’s team had won!
INCOSE IS2016 Fringe Events

Hazel Woodcock
Communications Director

Monday: Magic

Jon Holt (Scarecrow Consultants) is not only a systems engineer and author of text books and children’s books, but also a member of the Magic Circle.

With around 30 people in the room, this was not going to be a close up magic show, and there was not really enough time to set up for a major escapology event, so Jon chose to read our minds.

The inside of a systems engineer’s head is not normally considered a safe place to be, but Jon bravely dived in. The audience drew simple systems, Jon did not see those drawings, and yet managed to reproduce them along with an ‘associated’ word. A fine example of mind reading, some subliminal Systems Engineering and solid entertainment.

Tuesday: Tool Vendors Panel Show

While not technically part of the Fringe, this was a ‘special’ and I will cover it here. This was a panel consisting of David Long from Vitech, Steve Rooks from IBM, Aurelijus Morkevicius from No Magic and Matthew Hause from PTC. Jon Holt from Scarecrow Consultants chaired the session. The questions were well thought out to be both entertaining at a superficial level, and informative in their detail.

There was more agreement than disagreement among the tool vendors. This discussion did not reach the performance, feature or service trading discussions where the differences will become significant. The landscape is moving and all the vendors are working to be (or stay) one step ahead of both their competition and their customer’s needs.
Tuesday: Have I Got Systems Engineering For You

This session was an irreverent panel show based on elements from several UK news panel shows.

The panel consisted of two teams, ‘The long and the short’ (David Long and Duncan Kemp) and ‘The ex cons’ (Stephen Cook and Suja Joseph-Malherbe). Quiz master was Jon Holt and Hazel Woodcock kept score. There was a large audience, resulting in standing room only for latecomers.

A thoroughly enjoyable session, very light hearted, but with some serious Systems Engineering content.

Final scores: Long and Short 179, Ex Cons 201, Jon 0, Audience 910.
Wednesday: Unconference Goldfish Bowl

The Unconference session worked on the principle that the people in the room were the right people, and the topic chosen was the right topic. The shortlist of topics was:

- Where Next: What do you do with what you learn here?
- What Next: The new bandwagon; MBSE -> Agile -> ???
- Who Next: Applying SE Principles to the education system
- Changes: A systems engineer should be able to initiate and complete change.

The third of these topics was selected, and the goldfish bowl was commenced. The rules of the goldfish bowl are as follows:

- Only people in the speaking circle can sit (5 chairs available)
- Only people in the speaking circle can speak
- Tap someone who is sitting on the shoulder to take their seat
- When you are tapped on the shoulder, you leave your seat
- Hazel and Emma can break, make and change rules

These rules were followed with great diligence, and after a slightly slow start, the turnover of people in the speaking circle was good. We had a dozen or so participants, and Notes were captured by Emma and Hazel on the flip chart.

The notes have now been written up and are available on LinkedIn.
INCOSE IS2016 Fringe Events

Thursday: Social

This was a social event as well as a technical one, and after the conference close, the final fringe event was in the unofficial INCOSE IS2016 bar, The Jolly Botanist.

The bar was packed, a few ‘normal’ people and a… well we never really decided on the collective noun for systems engineers, but a lot of us.

As the bar became more full, groups left in search of food, less crowded spaces or quieter corners for conversation. Many of these groups of friends were completely unacquainted at the start of the week, and there were almost certainly more connections made in LinkedIn than in Facebook. Not just social and enjoyable, but useful as well.

INCOSE IS2016 Tweets
**Richard Payne** @riffo Jul 20

The Systems of Systems track at #incosels runs all day today. Looks to be an exciting programme of talks!

**Paul Schreinemakers** @PSchreinemakers Jul 20

30% of traffic jams in cities caused by people looking for a parking spot, a 📈 to Julie Alexander #incosels

**Sonia** @Soniabahromody Jul 19

NASA highlights the importance of a Systems Engineering Management Plan and Configuration Control #incosels

**Hazel Woodcock** @hitch Jul 19

Phil McPherson, an insightful and incisive mind and a thoroughly decent gentleman. #incosels
Think Engineer received a big publicity boost during the International Symposium (IS) thanks to a live reading by its author; INCOSE UK’s Technical Director, Jon Holt.

Jon took to the stage of one of the halls at the Edinburgh International Convention Centre and read through the book, with the pages appearing supersized on the screen behind him. If you weren’t there on the day, you can watch the video of it on the INCOSE YouTube channel here.

The reception amongst the delegates was so positive that the INCOSE UK stand at International Symposium sold all of its 120 copies of the book in a matter of hours! Those who did manage to get their copy on the day were taking advantage of Jon’s presence to get photos and signatures - you can see some of the many shots from the day overleaf.

For those you who were unable to get a copy on the day, we have since restocked and you can purchase them directly from the INCOSE UK web store here.

‘Think Engineer’ is also available in bulk orders and can be custom printed to include company branding and information, for use as a promotional item for your organisation. If you would like additional information regarding this, please email us via thinkengineer@incoseonline.org.uk.
BE RECOGNISED FOR YOUR SYSTEMS ENGINEERING SKILLS

At 2 hours in length and based on over 280 pages of literature, the INCOSE CSEP examination tests even the most experienced engineers.

CTI’s CSEP Exam Preparation Course provides the perfect grounding to take the INCOSE Knowledge Examination with confidence.

Our CSEP pass rate is 99% for delegates who have taken the exam within 4 weeks of attending CTI’s CSEP training.

UPCOMING 5-DAY COURSE DELIVERIES

<table>
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<tr>
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<td>Oct 24 - Oct 28 2016</td>
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<tr>
<td>Nov 28 - Dec 2 2016</td>
<td>Amsterdam, The Netherlands</td>
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<td>Apr 3 - Apr 7 2017</td>
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Find out more by visiting our website.
www.certificationtraining-int.com
Professional Development with INCOSE UK

Lynn Davis
Professional Development Coordinator

Certification

The number of INCOSE members applying for SEP through the UK online system continues to grow.

Below are numbers of members achieving SEP Certification through the UK online system, along with the total number of UK Chapter members who are certified.

<table>
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<th>Level of SEP</th>
<th>UK accredited</th>
<th>Total UK (from INCOSE central records)</th>
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<tbody>
<tr>
<td>ASEP</td>
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We have added four more CSEPS to our list in recent weeks. Congratulations to Andy Martyniuk, Jack Kebbell, Katherine Heathcote and Katy Pilkington for achieving this. There has also been lots of interest in ASEP in recent months, with Mark Best, Matthew Mendell and Robert Welby passing the certification exam to become accredited.

We now have thirteen CARs making up the UK review team, with Michael Gainford and Nick Young recently completing the training. We are very grateful for the efforts of all our reviewers who regularly complete reviews for INCOSE Central alongside our own.

If you are interested in finding out how to become a CAR and what is involved in the role please contact Lynn Davis on 01460 298 217 or via profdev@incoseonline.org.uk

Professional Registration

Since our last edition of Preview, INCOSE UK has announced their change in registration agreement. INCOSE UK Professional Development Director Ian Presland has written a detailed report on this overleaf, in order to provide more information to members.

The Secretariat is currently contacting all those registered with INCOSE UK to discuss their specific circumstances. The transfer is expected to take place during the autumn and full details of how to apply, along with examples of forms and other information, will be available during ASEC 2016.

Several members who are interested in applying through our new agreement have already come forward to be part of the first cohort. If you are interested in finding out more about the process please contact Lynn Davis on 01460 298 217 or via profdev@incoseonline.org.uk
INCOSE UK and the Society of Environmental Engineers Announce Partnership Agreement

Ian Presland
Professional Development Director

In early June, INCOSE UK Council announced its decision to end the professional registration agreement with the Institution of Engineering and Technology (IET) and to seek a new professional development partner. We recently announced our new partner as the Society of Environmental Engineers (SEE). This article explains the background to this important change.

We had been in a constructive dialogue with the IET for many months to try to create a bespoke service tailored to the needs of our members when applying for Professional Registration. Key changes we desired included improvements to the fee collection mechanism to align with INCOSE membership renewals and a greater involvement of trained INCOSE UK System Engineers in the mentoring, application and review of applications from our members.

However, our membership pool represented only a very small proportion of total IET professional registrants (0.4% in 2015) and it became clear in our discussions that the significant changes we had hoped for were neither financially nor operationally viable for the IET due to the mismatch in size of our respective organisations.

With this in mind, INCOSE UK liaised closely with the Engineering Council to find a suitable alternative partner capable of working with us to provide the type of relationship we sought. One key point often misunderstood is that any Professional Registration agreement, such as that we had with the IET, is merely an enabling mechanism for INCOSE UK member registration. It does not matter to the Engineering Council whether the registration is facilitated via an IET agreement or via an agreement with another organisation, as long as the organisation is recognised as a licensed Professional Engineering Institution. In all cases INCOSE UK members are deemed to be registered through INCOSE UK and not the facilitating institution.

We investigated a number of potential alternative partners, but the Society of Environmental Engineers (SEE) offered an interesting proposition contrasting greatly to the ‘corporate’ nature of our previous agreement. The SEE developed as a partnering organisation after our relationship with the IET was established and now supports Professional Registration for eight other societies. In the SEE, we believe we have found an experienced partner familiar with the needs of the smaller Professional Affiliate and able to respond accordingly.

As an example, with our new SEE agreement, there will be no requirement for ‘membership’ as
was the case previously; simply an annual handling charge. This reflects the “facilitative” nature of the new agreement: now you need only be a member of INCOSE UK to become Professionally Registered. We believe this will be a distinct advantage to those members whose employer will only reimburse membership fees for a single professional institution.

But there are many other benefits of the new arrangement. The SEE actively encourages affiliated societies to become fully involved in the complete registration process for their members. Forms are dual branded, affiliates process payments and, most importantly, the affiliates are invited to take part in the Professional Review Interview. This last point was a key area of concern from some of our members when they provided feedback from their own reviews.

Although the SEE is not as well-known as the IET, the status of registrants with the Engineering Council is completely unchanged. The SEE Professional Registration process is still through the Engineering Council and, as with all societies offering professional registration, is closely monitored to ensure it adheres to strict regulations associated with EngTech, IEng and CEng. (In other words, gaining professional registration – for example - as a Chartered Engineer through the SEE agreement is absolutely identical to gaining professional registration as a Chartered Engineer through the IET agreement or indeed through any other similar agreement).

Professional Development of systems engineers is core to the purpose of INCOSE UK, and being able to offer a route to Professional Registration through the IET was a significant step-up in benefits to our members in 2011. We could not have got to where we are today without the support, help and guidance from the IET over the past five years. We have also agreed with the IET that our new professional partnering arrangements have no bearing on our continuing strategic technical relationship and plan to work even more closely with the IET to strengthen technical links, something we know which remains of high importance to our members.

As we move into this new era partnered with the SEE, we are very excited by a number of new possibilities and opportunities created through our new agreement. In the coming years, we strongly believe that these will enable us to improve, evolve and grow the Professional Registration programme for systems engineers for the benefit of our members.

For more information, please call Lynn Davis on 01460 298 217 or email profdev@incoseonline.org.uk
We have recently reviewed the operating costs for the INCOSE UK Secretariat and one of the areas that came to our attention was our Direct Debit (DD) system. We found that the manual creation and renewal of DDs was consuming a disproportionate amount of Secretariat time and the Council has reluctantly decided to withdraw this facility with immediate effect.

An email was sent advising all members who pay by DD in July. We are now in the process of cancelling all remaining DD mandates and we would ask you to use the online renewal service in future. You may wish to cancel your DD with your bank, but in any case it will not be activated by us. You do not need to take any other action until you receive a membership renewal notice from the Secretariat. This will happen shortly before your current membership expires - for example if you renewed in June 2016 this will be in May 2017. The online renewal system will send you an email containing links and information on how to renew. You will also be automatically asked to renew if you logon at www.incoseonline.org.uk when your membership has less than 30 days remaining.

To access the online renewal system you will need your membership number and your INCOSE UK website password. If you have forgotten your password, please contact Sophie Storey (membership@incoseonline.org.uk) to reset.

This online renewal system automatically generates a receipt for each payment and your membership records are updated accordingly. As part of this process you will also be prompted to update your membership details to ensure that we have your current contact information.

We now offer discounted rates for members who purchase a three or five-year membership, which may go some way to replacing the benefits of DDs.

I appreciate that some may be disappointed with this change, but I hope that members can see our logic in attempting to get the best value from the money that we spend on our Secretariat. We also believe that by using this process, members’ details are more likely to be kept up to date, thus we can ensure that they are aware of the latest INCOSE UK news events and benefits.

If you require any further assistance or information, please contact our Membership Coordinator Sophie Storey via email (membership@incoseonline.org.uk) or on 01460 298 217.
The present incumbents of the posts of Finance Director and Technical Director will have to stand down this autumn and either be re-elected, or new individuals found to fill the posts.

There will also be a vacancy for the post of President Elect, as Ivan Mactaggart automatically advances into the post of INCOSE UK President. All three appointments automatically have places on the INCOSE UK Council, and the President Elect and Finance Director will also become legally registered directors of INCOSE UK Ltd.

For anyone who is interested in applying for one of these positions, the election process operates as follows:

Nominations can only come from the current INCOSE UK membership - with the agreement of the nominees - and must be submitted in writing to the INCOSE UK Secretariat, by Friday 9th September 2016.

Nominations Papers must:

- Indicate the position applied for
- Include the names and signatures of a proposer and a seconder (both of whom must be current members of INCOSE UK)
- Include a brief 250 - 350 word personal statement/election address, giving the candidate's qualifications and reasons for candidacy

Once the nominations and personal statements have been received, they will be published on the election pages of the INCOSE UK website for members to read, as well as being released in additional INCOSE UK publications.

Elections will take place online using the INCOSE UK website; voting will commence on Friday 14th October 2016 and close on Sunday 13th November 2016.

Candidates do not have to attend the Conference or the AGM and if only one candidate stands for a position, that individual - being unopposed - will be duly elected.

In the event of no nominations being received for any of the positions by Friday 9th September 2016, the Council may decide to appoint someone to the vacant position(s). The results will be announced at the AGM on Tuesday 15th November 2016.

Nomination forms can be downloaded from the INCOSE UK website here.
The UKAB has continued to grow. Over recent months multiple new members have joined, the most recent being the Energy Systems Catapult and Analog Devices.

The Energy Systems Catapult is a not for profit company, whose aim is to bring together the worlds of industry, academia and government. By doing so they hope to build a consensus on the transition pathways to a future energy system and to accelerate the development of new technology-based products and services in the energy sector.

Analog Devices is a world leader in the design, manufacture and marketing of a broad portfolio of high-performance analog, mixed-signal and digital-signal processing integrated circuits. They were formed in 1965 and have grown to a company of more than 9,000 employees with over 100,000 customers worldwide.

I would like to welcome these new members and look forward to the fresh perspectives and contributions that they will undoubtedly bring to the Advisory Board in the future.

The last UKAB meeting on 6 July 2016, was kindly hosted by HORIBA MIRA at their Technology Park in Nuneaton. During a break in the meeting attendees were given a tour of the park, allowing them to see all of the facilities available at Europe’s largest transport technology R&D cluster.
INCOSE UK Annual Systems Engineering Conference
Scarman House, Warwick Conferences
15th-16th November 2016

“Building on Success”

This year marks the 22nd anniversary of the formation of INCOSE UK. The theme this year will be focussed on “Building on Success” with sub-themes of:

- Pushing the boundaries of SE Practice
- Realising the value of SE
- Applying SE in Context
- The evolution of a Systems Engineer

Who will benefit from taking part in ASEC 2016?

- Those involved in the resolution of complex socio-technical systems problems and who want to find out how Systems Engineering can be of use to them.
- Organisations looking for innovative solutions to Systems Engineering problems, or wishing to showcase their Systems Engineering expertise.
- Practitioners needing to keep up-to-date with the latest developments in Systems Engineering or wanting to participate actively in the evolution of the discipline.
- Academics, researchers and students, who will have the opportunity to showcase their research and research group through the poster sessions – funding opportunities are available.
- Systems Engineers who want to meet and network with other like-minded professionals.

For those working towards ASEP or CSEP, attendance at ASEC 2016 will earn you PDUs.

See our website: www.ASEC2016.org.uk for more information.

Further details and prices can be found overleaf

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Autonomy in vehicles is becoming increasingly common and poses a complex problem for the automotive industry. This article covers the Systems Engineering challenges from two perspectives of autonomy in vehicles, those for on and off-highway applications.

Firstly, looking at the directly affected stakeholders for road vehicles:

- **Owner** – the introduction of autonomous vehicles is opening up the option of vehicles as a service, rather than the traditional ownership model. An example of this is the UK Autodrive project, which in one application aims to develop autonomous pavement-based pods which can be used to travel around cities. The project also intends to deliver a first wave of connected and autonomous road-based passenger cars.

- **Driver/users** – their mobility needs can be met whilst also allowing the driver to spend their time productively during their journeys. However, this conflicts with the traditional driving need that a vehicle is rewarding and enjoyable to drive. As ever, the safety, reliability, security and availability of the vehicle are still key requirements of the user.

- **Other road users and pedestrians** – autonomous vehicles must integrate into the current infrastructure safely and predictably.

Looking at the wider picture rather than just the issues directly relating to the vehicle, for road vehicles their context can vary drastically depending upon the target markets, and could involve a variety of configurations. Recognising changes in the context of the vehicle is a major challenge, especially given the current legislation on autonomous vehicles, which can change between countries or states. For the UK, a consultation is currently underway by the government to gather feedback on their “pathway to driverless cars”. This document proposes changes in insurance, the Highway Code and Construction and Use Regulations to adapt to this emerging area.

The current trends in passenger and commercial vehicle development show a step-wise increase in the level of driving automation, through “driver assistance” (e.g. lane keep assist, park assist, adaptive cruise control), to “partial automation” (e.g. Tesla’s auto-pilot) where the driver should keep their hands on the wheel. The next step of “conditional automation” is towards the driver only being there to respond and re-gain control if necessary, whereas “high automation” and “full automation” do not require any driver intervention. Google’s fleet of vehicles is considering the latter end of this scale, with consideration of the vehicle being designed for passengers, not drivers.

There are technical challenges in the development of the vehicle itself, including techniques such as sensor (data) fusion, understanding the road markings and signage.
driving patterns (e.g. the collision this year between an autonomous vehicle and a bus, as the system made an incorrect assumption of what the bus would do) for each of the different territories, the considerations of the HMI, safe states in the case of faults and also the availability of partial or assistance functions when not fully autonomous.

The control strategy of such vehicles needs to balance the sometimes conflicting requirements of:

- Providing maximum efficiency
- Reducing traffic congestion
- Reasonable journey time
- Responding safely
- Cost (always a key in the automotive world)

HORIBA MIRA has been involved in a research project to develop a Network Guided Vehicle, a highly automated demonstration platform for testing driverless technologies.

For the future of autonomous vehicles interactions, either car-to-car or car-to-infrastructure will become an enabler, producing a system of systems. Such interfaces will need to be well managed for this kind of infrastructure to succeed, suggesting a need for standardisation of data content and protocols between the original equipment manufacturers (OEMs) and suppliers. This interface needs to be sufficiently protected from cyber-security threats as vehicles and infrastructure become more interconnected, considering the risks of interfering with either inter-vehicle communications or even ‘over the air’ software updates. The possibility of hacking autonomous vehicles is a concern from both the perspectives of protecting passengers in cars from malicious control during operation, but also concerns of theft of either the vehicle or of goods in commercial vehicles.

In the defence and off-highway industries there are also a number of opportunities to exploit autonomy, with each industry having its own context and challenges. One example being Volvo Construction Equipment, where the first steps towards machinery being used without an operator on-board have been made. The environment and regulations on this machinery pose a specific challenge in the way the system will be developed.

In a similar manner, HORIBA MIRA have developed a capability in Unmanned Ground Vehicle technology (as initially developed in a Remotely Operated Vehicle) that is currently being advanced from remote operation into having full autonomous modes.

Autonomous vehicle development is likely to consider the technology being used extensively; a wider systems thinking approach must be adopted to take into consideration the greater impacts of how people and vehicles interact, including the social and economic impacts of their adoption. The non-functional requirements or “ilities” (such as reliability, availability and maintainability) also need a significant consideration throughout the lifecycle and should be aligned as much as possible with traditional Systems Engineering processes.

Standards such as ISO 26262 and the current recommended practice in SAE J3061 are both paving the way from the safety and cyber-security perspectives respectively.
UK Advisory Board Members
UK Advisory Board Members
## INCOSE UK Event Calendar

This calendar is a summary of events at the time of going to press. For the latest, up-to-date information please visit the Events page on the INCOSE UK website.

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>Organisation &amp; Location</th>
<th>Description</th>
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<tbody>
<tr>
<td>12/09/2016</td>
<td>Swiss Chapter</td>
<td><strong>SWISSED 2016</strong>&lt;br&gt;The Swiss Systems Engineering Day 2016 (SWISSED 2016) will take place at Kongresshaus Zürich again on Monday, September 12 2016. This year, international guests can indulge in almost a whole week of interesting topics, since SWISSED 2016 will be held in conjunction with the 4th European STAMP Workshop (Tuesday, September 13 - Thursday, September 15 2016). STAMP introduces a systems approach to safety and security. You can sign up jointly for both events for special rates, see here</td>
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<tr>
<td>15/11/2016</td>
<td>UK Chapter</td>
<td><strong>INCOSE UK Annual General Meeting</strong>&lt;br&gt;This year’s INCOSE UK AGM will be held in the afternoon of the first day of ASEC 2016.</td>
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<tr>
<td>15/11/2016 - 16/11/2016</td>
<td>UK Chapter</td>
<td><strong>Annual Systems Engineering Conference (ASEC) 2016</strong>&lt;br&gt;This year’s theme is ‘Building on Success’ to follow on from last year’s 21st anniversary. To keep up to date on developments throughout the summer, visit the ASEC 2016 website here.</td>
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<tr>
<td>25/11/2016 - 26/11/2016</td>
<td>UK Chapter</td>
<td><strong>National Engineering &amp; Construction Recruitment Exhibition</strong>&lt;br&gt;Whether you are an experienced engineering or construction professional looking for your next step up the career ladder, or a recent graduate looking to kick-start your career within the industry, the NECRE offers a vast array of interesting job opportunities.</td>
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The North-West (NW) Local Group are currently planning their next meeting. To receive further updates on this, please check the NW Group page on the **INCOSE UK website here**.