Chapter Updates
Check out our latest reports from the UK Chapter, as well as our regular professional development updates.

2017 Annual Report
Read last year’s Annual Report and see a full summary of our ongoing activities.

Features
Including event reports, as well as one-off piece from one of our Early Careers Forum members.
99% OF OUR DELEGATES PASS THE INCOSE KNOWLEDGE EXAM ON THEIR FIRST ATTEMPT.

We’ll show you how ...
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Hello and welcome to Spring/Summer edition of Preview magazine.

We have lots of content for you this issue, including our regular President’s Corner from Ivan Mactaggart (see over), and our usual professional development update on page 8.

Features in this issue include a report by Karl King from the recent requirements management joint event between the Institution of Railway Signal Engineers (IRSE) and INCOSE UK. This oversubscribed event took place at the University of Birmingham and all of the sessions generated a great deal of healthy discussion. Read the full report on page 7.

On page 11 you can read more about INCOSE UK’s latest new publication; the Agile Systems Engineering Guide. This was produced to provide some high level guidance in what is meant by Agile Systems Engineering and how it should be approached, and all INCOSE UK members are entitled to a free PDF copy of this document.

In this issue we include a copy of the 2017 INCOSE UK Annual Report. This was delivered in brief at last year’s Annual General Meeting (AGM), and details the key developments within the Society that have taken place over the past year, including sections such as finance, professional development and awards - you can read it from page 12.

As a one-off feature this issue we have a piece from Early Careers Forum (ECF) member Lilian Knight, from Thales. On page 18 she discusses her time in Systems Engineering so far, as well as her tips for other early career systems engineers.

One of the most well-attended Bristol Local Group (BLG) over the past year was Dr Jean Boulton’s talk on ‘Embracing Complexity’. Dr Boulton’s work is renowned in her field and Tim James, the BLG Secretary has written a comprehensive report on her talk, including a summary of resources for those who would like to learn more. You can read from page 20.

Finally, other INCOSE UK news is detailed on page 23, including a summary of this year’s membership survey and a welcome to our newest member of the UK Advisory Board (UKAB); OptimaSC.

As ever, if you would like to include an article in future editions of Preview magazine, then please email us at publications@incoseonline.org.uk to discuss your idea.

I hope that you enjoy the issue.
It seems hard to believe that we are already more than halfway through 2018.

This year’s Training Day took place last month at the Marsh Farm Hotel near Swindon, and I would like to thank all of the delegates who joined us at this year’s event, as well as all of the trainers who ran the courses - the feedback that we received has been very encouraging. I hope that everyone who attended felt that they gained some useful knowledge and they have been able to apply this in their daily role.

With this year’s Training Day already behind us, the focus has now firmly turned towards the UK Chapter’s flagship event, the Annual Systems Engineering Conference (ASEC). ASEC 2018 will be taking place at Cranfield University from 21 - 22 November and preparations are already well underway.

I am pleased to confirm that this year’s flyer is now available and has already been sent out in hard copy to members of our UK Advisory Board (UKAB). Soft copies of this are also available for download via the event website at www.ASEC2018.org.uk - I would very much encourage all our members to download a copy and share it with any colleagues or SE contacts who you think may be interested.

This year’s ASEC will also mark the election for a number of Council positions, namely President-Elect, Professional Development Director and Outreach Director. If you have ever considered standing for the INCOSE UK Council then I would urge you to consider entering a nomination for this year’s elections. Further details regarding the elections will be released over the summer. Further details will be released in ePreview 72 at the end of July.

As I mentioned in the Winter edition of Preview, INCOSE UK was fielding a proposal to produce a special edition of our excellent publication Think Engineer, in conjunction with members of our UKAB. I am pleased to confirm that this project will be going ahead, and that these should be working their way to schools and libraries by the end of July. I would like to thank the corporate members who are collaborating with us on this project and through our members’ extensive STEM outreach activities, I am looking forward to seeing even more of these books work their way in to the hands of our future systems engineers.

INCOSE UK relies on volunteers in these Council positions to help us continue to grow and develop, but these roles can also be hugely rewarding and beneficial to the individuals who hold them.

This year’s ASEC will also be another opportunity for INCOSE UK to present its Outstanding Service Award to individuals or groups who have gone above and beyond in their efforts to support both the society, and the wider Systems Engineering Community. Now is the time to consider whether there are any candidates that you would like to put forward for this year’s awards, before the nominations window opens over the summer. Further details will be released in ePreview 72 at the end of July.

Finally, I would like to close by offering my congratulations to our latest ASEPs; Adrian Allan; Rob Black; Tony Gibson; Alisdair Gillespie; Maciej Karbowski; Anish Kharkar; Maciej Kluz; Malcolm Risely; Emma Sawford; Ramin Yasseri, and; Max Walker, and also our five newest CSEPs; Kevin Gedge; Kate Habgood; Giles Kendrick; Paul Sibson, and; Colin Williams. Professional development is a key aspect throughout our careers in engineering, and it is encouraging to see so many of our members committing to this by undertaking their SEP certification.

In this issue of Preview, we have a full copy of the 2017 Annual Report, which was delivered in brief at the AGM at ASEC 2017. This report gives a complete summary of all of the society’s activities over the previous calendar year. I’m delighted to report that 2017 was a strong year for INCOSE UK and although there are a number of challenges on the horizon, I feel that we are in a good position to address them throughout the rest of 2018.

I would also like to offer my congratulations to Patrick Gorman on achieving his CEng through INCOSE UK.

Enjoy the issue.
The purpose of the INCOSE Empowering Women as Leaders in Systems Engineering (EWLSE) group is to increase participation of women in Systems Engineering and engineering leadership. It also seeks to; broaden awareness of the current situation of women in Systems Engineering and engineering leadership through research; remove obstacles for women seeking leadership roles in related engineering fields; enable success through collaboration with professional societies, industry, government, academia, and individual advocates, and; to celebrate the benefits of diversity throughout our culture.

There is currently an opportunity for you to get involved with the EWLSE; they are currently inviting everyone to submit papers focusing on diversity in Systems Engineering and related systems areas, for consideration for publication in INCOSE’s journals.

The EWLSE group invite articles on any topic relevant to diversity, equity, and inclusion in systems related fields across industry, government, and academia. They are especially interested in papers addressing topics that show the importance and value of diversity in enabling, promoting, and advancing Systems Engineering and systems approaches to address complex societal and technical challenges for a better world.

If you would like to take part, please submit a 500 word abstract to the EWLSE Publications Committee (ewlsepubs@incose.org) by 31st July 2018.

For further information about the EWLSE group, please visit the INCOSE website here.

INCOSE UK 2018 Annual Elections

The INCOSE UK Council will be looking for new volunteers for this year’s annual elections - if you have been looking for an opportunity to gain more volunteering experience, then this could be your opportunity.

As in prior years, the INCOSE UK Annual General Meeting (AGM) will be taking place at this year’s ASEC conference.

During the AGM there will a number of positions on the INCOSE UK Council that will be reappointed. The roles that are up for election this year are:

- President-Elect
- Professional Development Director
- Outreach Director

If you have thinking about volunteering with INCOSE UK, then taking a place on the Council could be the perfect role for you. We will be releasing an edition of ePreview around the end of July that will be full of extra information regarding the election process and how to get your name in the running.

If you would like to find out more details in the meantime, then you can find them on the INCOSE UK website here.

To read the Terms of Reference for every role on the UK Council, including those that are up for re-election this year, please visit this section of the website.
IRSE and INCOSE UK on Requirements Management

Karl King reports on the second IRSE - INCOSE UK joint seminar on Systems Engineering, which took place earlier this year at the University of Birmingham.

On 19th April 2018 the Institution of Railway Signal Engineers (IRSE) and the International Council on Systems Engineering’s UK Chapter (INCOSE UK) Railway Interest Group, held their second joint seminar on Systems Engineering at the University of Birmingham in the UK. The specific subject discussed was requirements management for Train Control and Communications Systems, exploring the complexities of specifying, developing and managing the requirements of projects within the industry.

The event was jointly sponsored by WSP and Frazer-Nash Consultancy, and supported by the University of Birmingham, who provided the venue. It followed on from the first highly successful seminar held two years ago on the general principles of Systems Engineering. The topic of requirements management is both highly relevant at the current time within the industry, and is also the foundation of which all Systems Engineering is built upon.

The event opened with a presentation from Michael Morua of Frazer-Nash Consultancy, who gave an overview of the definition of what a requirement actually is and how it is important to develop and manage them correctly. Tanya Galliara from Systra Scott Lister then presented the first case study on requirements management for the HS2 Mainline North Programme. Baney Young from Network Rail gave an update on Network Rail's current developments in their approach to requirements management, followed by her colleague Kevin Gedge. on the company's use of Goal Structuring Notation to manage requirements on the Northern Hub project.

Adam Rixon from WSP then led the breakout session by splitting the attendees into groups to determine an optimal solution to a non-railway problem based on a set of requirements. This exercise focused on what makes for a "good quality" requirement set, highlighting that some types of requirement are, in practice, more useful than others for achieving the desired outcome. The exercise stimulated considerable discussion during the feedback session after lunch, not least about the extent to which standards and process-based statements do (or do not!) make for good requirements.

The third case study was presented by Frans Heijnen who described the EULYNX project, which is very much a requirements-focused one aimed at improving the potential for integrating different suppliers' products into a signalling and control system. Andrew Woods from Siemens presented the final case study, on an equipment supplier's experiences of managing and delivering the requirements of projects during stages 5 to 8 of Network Rail's GRIP process.

Bruce Elliott from Altran closed the event with a summary, presented with a dash of humour, illustrating how requirements management can cause projects to fail rather than succeed in delivering them on time and to budget.

The event was very well attended (indeed, over-subscribed) by an excellent cross-section of industry representatives, and all the sessions generated a great deal of healthy discussion. It was widely agreed that the industry now needs to embrace requirements management more fully and systematically, and that this will be essential for the successful delivery of complex projects in the future. The IRSE and INCOSE UK hope to hold a further Seminar on aspects of Systems Engineering in 2019, and possibly even make it a regular annual event to maintain the momentum towards better Systems Engineering within the railway industry.
Professional Development Update

Words: Lynn Davis, INCOSE UK Professional Development and Membership Manager | Images: Respective individuals

Certification

INCOSE UK offers a professional certification programme for its members. Certification is based around the need to ensure that those working in a given discipline have a basic level of competence and experience to call themselves practitioners. For UK systems engineers, it provides recognition of competence in Systems Engineering which may be a useful specialist differentiator when applying for work in combination with professional registration (CEng, IEng etc.). Certification also gives INCOSE UK members the opportunity to engage in professional development in the early stages of their Systems Engineering career, then progressing towards CSEP and eventually ESEP.

UK Chapter applications

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 total number of UK Chapter members who are certified.

<table>
<thead>
<tr>
<th>Level of SEP</th>
<th>UK accredited</th>
<th>Total UK (from INCOSE Central records)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASEP</td>
<td>40</td>
<td>49</td>
</tr>
<tr>
<td>CSEP</td>
<td>25</td>
<td>60</td>
</tr>
<tr>
<td>ESEP</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

We would like to send Congratulations to the following members who have attained ASEP and CSEP since March 2018:

**ASEP**

Our latest ASEPs are Adrian Allan, Rob Black, Tony Gibson, Alisdair Gillespie, Maciej Karbowski, Anish Kharkar, Maciej Kluz, Malcolm Risely, Emma Sawford, Ramin Yasseri and Max Walker.

**CSEP**

Congratulations to our newest CSEPs, Kevin Gedge, Kate Habgood, Giles Kendrick, Paul Sibson and Colin Williams.
INCOSE UK members who wish to apply for CSEP should be aware that the areas of competence into which they must categorise their experience has changed.

From late June 2018 the areas defined as part of the UK application became:

- Requirements Engineering
- System and Decision Analysis
- Systems Integration
- Architecture/Design Development
- Verification and Validation
- System Operation and Maintenance
- Risk and Opportunity Management
- Technical Planning
- Technical Monitoring and Control
- Acquisition and Supply
- Information and Configuration Management
- Speciality Engineering
- Organisational Project Enabling Activities
- Lifecycle Process Definition and Management

The good news is that the online form and guidance has been updated and prepopulated with the new areas in a drop-down menu. The guidance notes and INCOSE UK U1 have also been updated with definitions of the new areas for those who require them.

If you have already begun an application this will remain in the system. Those areas which remain the same will retain your experience as previously documented. Those where the definition has changed will require you to recategorise your experience.

If you have any concerns about these changes or would like some further information please contact Lynn Davis on 01460 298217 or profdev@incoseonline.org.uk

Professional Registration

'Professional registration provides a benchmark through which the public, employers and their clients can have confidence and trust that registered engineers and technicians have met globally recognised professional standards.'

Why become professionally registered?

The benefits of professional registration as an Engineering Technician (EngTech), Incorporated Engineer (IEng), Chartered Engineer (CEng) or Information and Communications Technology Technician (ICTTech), include:

1. Improved career prospects and employability

Professional registered status shows employers that you have and are committed to maintaining and enhancing the knowledge, skills and competence required to meet the engineering and technological needs of today. The prestige of your title will improve your CV and may lead to wider employment options, career progression and promotion.

2. Higher earning potential

Engineering Council research indicates that those holding the titles EngTech, IEng or CEng continued to enjoy pay increases above the national average throughout the recession. As a professionally registered engineer or technician you are likely to enjoy higher earnings across your working life. This is because employing registrants brings benefits to your employer, such as increased customer confidence. This could help them to win more contracts, in turn improving their bottom line.

3. Demonstration of a professional attitude valued by employers and customers

Professional registration demonstrates your commitment to professional standards, and to developing and enhancing your competence. Your title proves that you have a positive attitude and the drive to succeed within the engineering profession. These are attributes that are highly valued by employers and customers. It shows that you will work safely in a way that contributes to sustainable development and that you have committed to complying with codes of conduct.

4. Enhanced status leading to higher self-esteem

Respondents to the Engineering Council's registrant surveys repeatedly report enhanced status as the key driver to become professionally registered. Professional registration is achieved through peer recognition of competence and commitment to society, the profession and the environment. This brings a great sense of achievement, credibility with colleagues and students, respect from the wider industry and, for many individuals, boosts self-esteem and confidence.

5. International recognition of competence and commitment

The UK Standard for Professional Engineering Competence (UK-SPEC), against which individuals are assessed for EngTech, IEng or CEng registration, is well respected across the world. The Engineering Council also works with many international engineering organisations to promote recognition of the standard and titles overseas. This helps to facilitate the international mobility of professionally registered engineers and technicians.

6. Evidence of expertise

Professional registration shows employers, peers and the public that you have spent a number of years developing your skills, knowledge and understanding within your field and have clearly demonstrated your competence and commitment.
7. Greater influence within own organisation and industry
The post-nominals EngTech, IEng and CEng are well respected internationally and demonstrate your level of skills, knowledge and understanding within the profession. As a registrant you will also belong to a network of experts in your field through membership of a professional engineering institution. This offers opportunities for involvement in influential activities, such as reports and campaigns as well as access to lifelong learning.

8. Recognition as a Counter-signatory
The UK Passport list of occupations for a counter signatory includes 'engineer - with professional qualifications'. This is the document referenced by the Joint Money Laundering Steering Group (JMSLG) when defining an 'appropriate person' to certify copy documents used as proof of identity where business is not carried out face-to-face. Therefore, professionally registered engineers are accepted as certifiers of documentary evidence of customer identity, as may be required to open a bank account for example.

Apply with INCOSE UK

The application process for professional registration with INCOSE UK can be accessed via the 'My Profile' area of the website. Once registered, applicants can access forms and guidance to work on their draft application.

Following submission and payment, the application undergoes administrative checks by INCOSE UK. Once these are complete, the next step for INCOSE UK members is submission to the SEE registration committee. This group meet on agreed dates throughout the year to review applications and transfers.

The dates for 2018 are as follows:

- Wednesday 12th September 2018
- Wednesday 5th December 2018

Applications should reach INCOSE UK via the application upload and payment system a minimum of two weeks before the meeting is due to allow sufficient time for checks to be carried out.

Save the date

Annual Systems Engineering Conference 2018

Systems Engineering guidance

INCOSE UK has now published domain specific guidance for systems engineers preparing an application for professional registration. The guidance links specific guidance to each area of the UK-SPEC assisting systems engineers in documenting their experience. It is available to all members beginning the professional registration process via the INCOSE UK website and is also available to buy as a hard copy in the INCOSE UK online store.

Finally, we would like to congratulate Patrick Gorman in recently achieving CEng with INCOSE UK. Patrick received congratulations direct from INCOSE UK President Ivan Mactaggart, at the recent Training Day event.

If you are interested in finding out more about the process please contact Lynn Davis on 01460 298217 or profdev@incoseonline.org.uk.
We are delighted to announce that INCOSE UK’s latest new product is now available, the Agile Systems Engineering Guide.

This document has been produced by the INCOSE UK Agile Systems Engineering Working Group to provide some high level guidance in what is meant by Agile Systems Engineering and how it should be approached. It is based on practice from a range of sectors, including aerospace, defence, rail, automotive and information services.

Despite its successes, there is increasing dissatisfaction with a conventional ‘V Model’ Systems Engineering approach as defined in the INCOSE Systems Engineering Handbook (Walden et al., 2015). Even effective Systems Engineering can be time consuming and expensive.

INCOSE UK members are entitled to a free soft copy of this guide. Members can also obtain a physical copy of the publication at a discounted rate. Please visit the INCOSE UK online store to access this product - you will need to be logged in to access your free PDF copy.

Non-members can purchase both physical versions and PDF copies via the INCOSE UK online store.
I am delighted to report that 2017 was a strong year for INCOSE UK. Financially we returned a small profit - the first for three years - and we continue to strengthen our operating model so that we can continue to invest in delivering our Mission and Vision. However, as the Financial Summary highlights, there are some challenges for 2018.

In September 2017 I was delighted to be invited to the Engineering Council’s Affiliates Seminar to present our new Guidance in the Interpretation of UKSPEC. The guide - endorsed by the Engineering Council - is now available to download for free for all members, and is another clear demonstration of our continued commitment to encouraging all systems engineers to seek appropriate professional registration.

Some of our other significant successes:

- Early Careers Forum - in April the Advisory Board (UKAB) hosted a concept event to explore the viability of an INCOSE UK Early Careers Forum. Around 40 early career systems engineers from across the UKAB membership came together to discuss their early career challenges and to identify opportunities for INCOSE UK to provide support. I am delighted to inform you that following the success of this event the INCOSE UK Council endorsed a proposal for establishing a forum which stood up formally at ASEC 2017.

- INCOSE UK Systems Summit, running parallel to ASEC Professor Jon Holt facilitated a workshop drawn from key leaders and influencers from across the UK to discuss some of the most significant systems challenges.

- The Arnold and M’Pherson Lectures. To honour the memory of two icons of Systems Engineering ASEC key note addresses were renamed; Day One address now known as the Phil M’Pherson Lecture and Day Two the Stuart Arnold Lecture. I was deeply honoured that members of both families were able to attend and on behalf of INCOSE UK I was able to host them at our ASEC Dinner.

Of most importance, INCOSE UK is driven by the efforts of its volunteers. There are, and will continue to be, excellent opportunities for INCOSE UK members to get involved. I look forward, in my final year as President, to continuing to working with the INCOSE UK Council, our Advisory Board and Secretariat, to continue developing INCOSE UK for the benefit of our members and the global Systems Engineering community in 2018 - The Year of Engineering!
INCOSE UK has a healthy financial reserve, sufficient to maintain medium-term stability. In the 2016/17 financial year INCOSE UK returned a small profit of £3,056, which was the result of significant efforts to look to assure long-term sustainability whilst continuing to invest in member benefits. The situation was enhanced by a profit sharing arrangement with INCOSE International for the International Symposium in Edinburgh, which realised a £22,562 return for INCOSE UK.

Overall income has increased since 2010; however, this has also led to an increase in costs which has not been mitigated by the increased income over the period. There are several factors that led to this; an outdated Chapter Model, and; the costs of operating a complicated professional registration scheme by arrangement through a third party professional engineering institution. Additionally, significant investment has been made to introduce a Certification scheme. INCOSE International have commissioned a Central Governance and Finance team to produce a new Chapter Model, which it is hoped will mitigate the imbalance between individual member administration costs/income in 2018. The INCOSE UK Council decision to move to a more appropriate professional development arrangement in 2016 has reduced - although not eliminated - overall costs, and it remains unlikely that professional registration activities will achieve cost neutrality in the short to mid-term. Certification is starting to produce an income, although again it will some time before this achieves cost neutrality.

2016 saw an extended decline in sterling to US dollar rates, which continued to increase our payments to the INCOSE International office. 2017 started to see a more positive trend, however the overall effect was negative for the financial year. The introduction of the new Central Operating Model is expected to help stabilize fluctuations in exchange rates.

The INCOSE UK Council has explored a number of opportunities to increase revenue and the introduction of new publications such as 'Think Engineer' and the 'Don't Panic!' series are encouraging. The re-introduction of a Direct Debit mechanism for individual membership fee payment will also be explored in 2018 to assess the potential of reducing the operating costs of member administration.

Events, specifically our Annual Systems Engineering Conference (ASEC) continue to produce a strong return, and the continued investment by UK Systems Engineering organisations, through their Advisory Board membership, provide an environment to continue to invest where appropriate.

In summary the 2016/17 financial year returned a profit for the first time in three years. There are sufficient reserves to maintain the mid-term viability, although until the new Chapter Model is implemented and its effects known - alongside the introduction of new revenue opportunities - more work is needed to assure long-term financial sustainability, without reducing a wide and valued portfolio of benefits to our members.
Structure and Governance

The structure of INCOSE UK at the end of 2017 is as follows:

- Tanya Galliara as Events Director for three (3) years
- Hazel Woodcock as Communications Director for three (3) years
- Ian Gibson as Outreach Director for One (1) year (in line with the Council election cycle)

Overview of INCOSE UK Activity

There has been a large amount of activity in 2017. A summary of the key activities that took place over the year have been broken down in the sections that follow.

Technical Section

INCOSE UK has published the first book in the Don't Panic! series. This book has been very popular, with sales continuing steadily both in the UK and internationally. INCOSE UK is also intending to publish a new Z-Guide in the next year and work on Z0 is already underway.

The development of an initial INCOSE UK Architecture Framework has started, having secured funding from both the INCOSE Foundation and INCOSE UK. This is a longer ongoing project as there has previously been no model.

The initial development of the INCOSE UK Endorsed Training Provider scheme is currently being trialled, with the intent to look at the feedback given and further improve and develop the scheme before rolling it out.

The INCOSE EMEA workshop in September was an opportunity for us to offer our own workshop session, looking at the 'INCOSE UK Enterprise Architecture' and this was a success. A case study was also published as a paper at ASEC 2017 by the INCOSE UK President Ivan Mactaggart and INCOSE UK Technical Director Professor Jon Holt, which focused on INCOSE UK and how we as a Chapter deliver the INCOSE missions. This paper was also very well received.
There were over 30 meetings of the various INCOSE UK groups over the course of 2017. Current active groups are as follows:

<table>
<thead>
<tr>
<th>Working Groups</th>
<th>Interest Groups</th>
<th>Local Groups</th>
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<tbody>
<tr>
<td>Agile Systems Engineering</td>
<td>Model Based Systems Engineering</td>
<td>Bristol</td>
</tr>
<tr>
<td>Architecture</td>
<td>Railway</td>
<td>Midlands</td>
</tr>
<tr>
<td>Human Centric Systems Engineering</td>
<td></td>
<td>North West</td>
</tr>
<tr>
<td>Model Based Systems Engineering</td>
<td></td>
<td>Scottish</td>
</tr>
<tr>
<td>Systems Engineering and Quality Management</td>
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<td>South Coast</td>
</tr>
<tr>
<td>Systems Engineering and Project Management (SEPM)</td>
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<td></td>
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<tr>
<td>Service Systems Engineering</td>
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The highlights from 2017 were as follows:

- Training Day 2017 at Engineers House in Bristol
- Joint event with the IET: "Architecture for Complex Systems"
- ASEC 2017 at The Slate, Warwick University
- 30+ Local, Working, and Interest Group meetings

Events have only grown and improved over the years and after six very successful years as Events Director, Ian Gibson stepped down from the role and we welcomed Tanya Galliara to the INCOSE UK Council, in November 2017. Guided by Tanya, INCOSE UK anticipates our events to continue going from strength to strength.

Advertising and discussion of events has grown noticeably via email and on various social media channels, which has encouraged a positive dialogue and helped INCOSE UK improve preparation and take advantage of promotion for various events over the year.

Notable events for the future include:

- Training Day 2018 on 6th June at Marsh Farm Hotel, near Swindon
- ASEC 2018 in November at Cranfield University
- ASEC 2019 in November at the Royal Armouries Museum in Leeds
**Professional Development**

INCOSE UK has successfully renewed our Engineering Council Affiliate membership. This is in line with our expectations.

We have also successfully transferred all remaining INCOSE UK professional registrations to the SEE. We now have five formally trained professional registration interviewers and mentors in place and, rather encouragingly, we are starting to see an increase of transfers from other professional institutions to INCOSE UK.

In 2017 INCOSE UK published a guidance document for interpreting the UK-SPEC. This was formally presented to and approved by the Engineering Council, and is now available from INCOSE UK.

We have also made it easier and more accessible for professionally registered members to keep track of their registration by putting our membership and renewal portal live online. We have seen increased engagement from members as a result of this, and we believe that these efforts will prove to be very beneficial to INCOSE and the UK Chapter.

A third U-Guide was also added to the free literature offered by INCOSE UK. This document is an overview on CPD and is an excellent addition to the professional registration and certification guides.

In an effort to further promote professional development, INCOSE UK are more frequently presenting this opportunity to UKAB companies and, since this effort was implemented, we have seen a positive effect and an increase in interest and awareness from UKAB companies and individuals.

**Certification**

As of September 2017, the UK Chapter has:

- 7 ESEPs
- 57 CSEPs
- 30 ASEPs

At the INCOSE UK Training Day 2017, we offered the opportunity for candidates to sit the SEP exam onsite. This was very successful and we intend to continue offering this at events.

INCOSE UK has successfully completed a pilot on behalf of INCOSE for a Competence-based version of the CSEP experience assessment. This involved 7 candidates from 5 UKAB organisations. The required levels were met by all and now they only need to pass the SEP exam. In the new year we will publish a full report and technical paper to allow a full assessment of the pilot, and we extend our gratitude to the candidates, the assessors, and their employers.

**Communications Section**

Over the course of the year, INCOSE UK has had a focused task of improving engagement with members and has invested a more concentrated effort in our communication and periodicals. Both Preview and ePreview have seen a consistent and more stable readership due to this and we intend to continue on this path in the following year to improve numbers further.

There have also been more structured electronic and social media campaigns. Engagement via our social media channels has increased drastically but the INCOSE UK blog has seen slightly less improvement in comparison. Again, we take this approach into next year and look forward to seeing even better results.

According to the results of our membership survey, the three largest sectors that our members work in are Aerospace & Defence, Transportation, and Consultancy respectively. The survey also showed that a large portion of our members reside in the south of the UK and - of the lower number who live in other areas of the country - the majority are located in the Manchester area.
The UKAB provides a forum for UK Systems Engineering organisations to influence the activities that INCOSE UK undertakes, and the Systems Engineering best practice that INCOSE UK promotes.

Over the past year the UKAB has been working to develop the Early Careers Forum, which has proven to be very successful. This original idea was tabled at the UKAB meeting in April 2017 and resulted in a very productive and enthusiastic workshop, which generated a host of initial ideas for the forum. Omer Elroubi was initially asked to act as interim Chair. Omer has since been elected as the Chair of the Forum and has been vital to developing the network, ideas, and progression of the ECF and Terms of Reference. The inaugural meeting was held at ASEC 2017 and we continue to support the group in its further development.

INCOSE UK has been probing further into establishing what UKAB members would like to gain from INCOSE. After presenting these ideas to our Chapter, we have established a series of prioritised recommendations that we can jointly pursue.

Alongside the UKAB meetings hosted by various companies, we have been making a focussed effort to run parallel sessions increasing awareness of Systems Engineering within the hosting company, and how professional registration and certification can be beneficial to members of the SE community.

The UKAB is supporting a review of the strawman that has been produced by the Organisational Capability Working Group, with the intent of recommending how it should be progressed and implemented.

### INCOSE UK Awards

#### Professional Registration

The following individuals achieved Professional Registration in 2017:

- CEng: Richard Brookes
- CEng: David Ferguson
- CEng: Ian Gibson
- CEng: Daniel Munoz
- CEng: Chris Payze

#### INCOSE Systems Engineering Certification

The following individuals achieved INCOSE Systems Engineering Certification in 2017:

<table>
<thead>
<tr>
<th>ASEP</th>
<th>CSEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colin Bach</td>
<td>Ian Ridpath</td>
</tr>
<tr>
<td>Steve Bremner</td>
<td>Sarah Routley</td>
</tr>
<tr>
<td>Matthew Harris</td>
<td>Ian Smith</td>
</tr>
<tr>
<td>Cliff Cheesman</td>
<td>Catherin Stace</td>
</tr>
<tr>
<td>Tim Kerby</td>
<td>Philip Savvides</td>
</tr>
<tr>
<td>Paul A Makselon</td>
<td>Andy Ure</td>
</tr>
<tr>
<td>Grant More</td>
<td>Richard Whittle</td>
</tr>
<tr>
<td>Tanya Galliara</td>
<td>Philip Jackman</td>
</tr>
<tr>
<td>Ian Smith</td>
<td>Robert Welby</td>
</tr>
</tbody>
</table>

#### Outstanding Service Award Recipients

The following individuals were recognised for their outstanding service on behalf of INCOSE UK:

<table>
<thead>
<tr>
<th>Model-based Systems Engineering Working Group</th>
<th>Bristol Local Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>For their dedication to INCOSE UK and Systems Engineering as a whole. This group has consistently been putting forward papers and knowledge for ASEC and have been so successful that they have decided to slit into separate groups.</td>
<td>For consistently striving to maintain the continuity of the group through the delivery of high-quality and interesting events.</td>
</tr>
</tbody>
</table>
Focus on... Early Careers

An active member of INCOSE UK’s new Early Careers Forum, Lilian Knight from Thales talks to us about her time in Systems Engineering so far, as well as her tips for other early career systems engineers.

Words: Lilian Knight | Images: Lilian Knight

When did you first become aware of Systems Engineering (SE) as a discipline, and how did you end up working in this field?

As a Physics Graduate, I only became aware of Systems Engineering when I started the graduate scheme at Thales UK. Thales takes on a mix of Electronic, Hardware, Software and Systems Engineers and although I was originally taken on as a Sensors Hardware Engineer, after 6 months I moved across into the Systems Discipline - I much preferred a top level understanding of projects and their capability; rather than a deep focus on specific areas of technology.

What is it that most enjoy about working in SE?

I love the 'bigger picture' thinking that is required of System Engineering - I naturally want to understand the interactions of everything within the projects I work on; and Systems Engineering is just a formal method to support that thinking. I also like how it can be applied to any problem - some of the projects I have been involved with recently have been more around people management - but context diagrams, developing use cases and techniques to understand stakeholders have all be incredibly useful tools to frame the scope of these projects.

Where are you hoping to take your SE career in the longer term?

I want to gain enough experience in all parts of a project lifecycle that I could take on a Systems Engineering Management role within a project. I also would like to gain experience on a variety of different types of project, in the hope that in the future I could lead a team of Systems Engineers in all aspects of a really complex project.

In your experience, what do you think are the best ways for Early Career systems engineers to get more involved within INCOSE UK?

I think the best thing for an Early Careers Systems engineer, is just to get along to one of the free local events, which are run at various sites across the UK. It may feel intimidating at first, but they attract wide audiences - from complete beginners to systems experts and so they are a great opportunity to learn something new and grow your systems network. My first session was down in Southampton two years ago, all about the growing complexity of Systems Engineering within the Rail Industry; and even today I come across people I met for the first time at this event!

What professional development opportunities do you see as most important for Early Career systems engineers?

For me I think it's important for Early Careers Systems Engineers to understanding the breadth of tools and techniques that exist within the realm of System Engineering. It is important to spend some time learning what is out there and what methodologies and approaches are available - you don't have to be an expert in all of them, but it's always good to know what you don't know! Early in a career its easy just to do what the person before you has always done, but actually sometimes being new is a great opportunity to try something different! And if you are willing to try something different; there is always someone in INCOSE who can give you some guidance or support on how to do it!

What advice would you give to any graduates who are considering a career in this sector?

I would advise graduates considering a career in Systems Engineering to get out and talk to some Systems Engineers. Systems Engineering can be called different things to different people with different companies, and its can be hard to define exactly what they do. Have a chat and see if you like the sound of the sort of things they have to think about and work on - and if it sounds like it makes sense to you, don't be afraid just to give it a go!

Biography

Lilian graduated from Durham University in 2013 with a Master's Degree in Physics. She was then accepted on to the Graduate Scheme at Thales UK, working within the Land and Air Systems domain in Basingstoke. She spent the first year of her career as a Sensors Engineer before moving into a Systems Engineering role, working on a development project for a helicopter defence system. In January 2017 she moved into the Thales Corporate Engineering team as part of the Systems Engineering Leadership team, helping to manage to the skills of the engineering workforce and develop good System Engineering practices across Thales UK. Lilian has been keenly involved in many outreach programmes during her career so far, working to encourage students of all ages into careers in STEM subjects.
Student Awards 2018
Call for Participation

Due to the EMEASEC 2018, the GfSE Student Awards 2018 are open for participants from the INCOSE Sector 2 (EMEA)

Conditions of Participation

- Paper (10 to 15 pages) about your bachelor thesis, master thesis, or equivalent
- Your paper considers a systems engineering subject
- Your bachelor thesis, master thesis, or equivalent has been accepted by your university between 1 January 2017 and 15 August 2018
- Your university resides in the INCOSE Sector 2 (EMEA), or you are a permanent resident of an EMEA country
- Your paper is written in English or German
- Your paper may be published by GfSE – The German Chapter of INCOSE – without restrictions
- You are willing to present your paper on 7 November 2018 at the EMEASEC 2018 in Berlin in English, if invited to the final round

Awards

1. Price: €1500
2. Price: €800
3. Price: €500

Other participants of the final round receive €300. An INCOSE and local chapter membership is offered to all participants of the final round being free of charge for one year.

Contact

Gesellschaft für Systems Engineering e.V.
Herman-Köhl-Straße 7
28199 Bremen
Germany

E-Mail: studentawards@gfse.de or studentenwettbewerb@gfse.de

Submission closes 31 August 2018

Content of Submission

The following information needs to be contained in your submission

- Your paper in PDF
- Evidence for the acceptance of your bachelor thesis, master thesis, or equivalent by your university, including title, tasks, and date of acceptance
- Intellectual Property Release (Form A)

All rules governing the GfSE student awards and corresponding forms are available from the GfSE homepage http://www.gfse.de/, or the EMEASEC 2018 homepage https://www.incose.org/EMEASEC2018
A Bristol Local Group Bumper Audience

In April, the Bristol Local Group had the good fortune to convince Jean Boulton, the distinguished lead author of "Embracing Complexity", to give a talk. Jean spoke about complexity theory and its implications for managing organisations.

Jean is a strategy consultant and part-time academic at both Bath and Cranfield universities. She teaches, consults, researches and writes about the implications of complexity thinking to management, research and policy development. Her background in theoretical physics, coupled with her hands-on engagement in the fields of management and social research give her a multi-faceted, and practical perspective.

Jean was a wonderfully engaging speaker and the bumper crowd of circa 50 people, both new faces and old, were not disappointed. Her argument centres on the notion that we've adopted the wrong type of science to understand the social world, and in particular, the management of organisations. Complexity science, she argues, provides a better 'fit' with the social and natural world and emphasises the middle ground - between overly managing/specifying and laissez-faire. Complexity science reminds us that most issues of significance have no easy answers.

Complexity thinking is an alternative to reductionism and determinism

Jean gave us a tour of complexity theory and how it differs from linear thinking derived from Newtonian science. It is these linear and reductionist "Newtonian" approaches that constitute what is "scientific" in the minds of most managers. However, assuming there are simple cause and effect relationships between actions and outcomes can lead us into trouble when we face complex problems in open systems, and those are the types of problems we are faced with in organisations every day. In complex environments, what emerges when you take action is unpredictable and nonlinear. This is the VUCA world of volatility, uncertainty, complexity and ambiguity.

Jean began by differentiating between the two mainstream scientific viewpoints that have converged to dominate the management of our organisations, markets and societies. The first of these is the Newtonian, mechanical world view which when applied to managing the social world, implies that everything moves in a predictable, deterministic, linear fashion. The second is based on equilibrium thermodynamics and underpins classical economic theories. They assume most situations are near equilibrium and things will naturally return to that equilibrium if they move away. It creates the idea that economies, communities, organisations and markets are relatively stable and predictable. Jean suggested that neither of these classical theories of physics is suited to dealing with the complex, inter-dependent multi-faceted world in which we live and neither gives good guidance as to how best to manage organisations.

This should be familiar territory for systems engineers. After all, the discipline is about seeing and designing a coherent whole and integrating the parts. However, complexity thinking goes a step further and warns against a mindset of optimal "design" in relation to organisations. It is certainly important to consider how to design organisations and processes to fit the purpose of the organisations, and take into account its customers and suppliers and the dynamics of its market place. In addition, complexity thinking focuses our attention on how we design structures and processes that can enhance learning and can themselves evolve and adapt to changing circumstances. Enhancing systemic working is also a key design feature; sometimes organisations seek to centralise certain functions (such as purchasing), regionalise others (such as stock control) and localise others (such as sales). Designing
organisations that facilitate working across functions at each level can enhance adaptability in a VUCA world.

Reductionist thinking has brought about many advances in science and technology and does also have a place in management. Standardisation and economies of scale are desirable where they are appropriate, but can also mitigate against adapting to local contexts and changing conditions and can weaken links and synergistic working between functions. The danger is that we fall into a trap of believing that standardisation and optimisation are the "scientific" way of organising ourselves. Examples of this type of thinking include the following beliefs about organisations:

- They behave like machines and are predictable
- Departments can be dealt with independently
- Successful change can happen top down
- One method or "best practice" can work everywhere
- The future is predictable and follows from the past
- People behave rationally and like parts of a machine
- Measurement leads to control and clarifies what to do next
- Projects, functions, groups can largely be treated independently of each other and can successfully follow a controllable process

This is the world of budgets, PMOs, long-term strategic plans and simple methods of evaluation and performance management. In adopting "machine thinking", there is also an implicit assumption that organisations don't need to learn or adapt, that nothing new can emerge and that the future is just a continuation of the present.

**How is complexity thinking different?**

To quote Jean:

"Complexity science is the study of the evolution of systems that are open to their environment. It explores how the reflexive interdependence of constituent elements leads to self-organisation and the emergence of new characteristics in a way that is shaped by, but not determined by history."

Jean says that complexity science is grounded in evolutionary theory, and is how physics is in tune with evolution; yet emphasises that "survival of the fittest" is more like "survival of those ecologies most able to prosper in a given environment or context". It shows that what emerges is very much context/environment dependant; that which is a strength in one context, may well be a weakness in another, and that the nature of contexts and environments are often beyond our control. "They change in ways that are not random but neither are they predictable", Jean says. "Human systems behave more like living organisms than like machines."

**What does this mean for management?**

Jean said that in her experience, organisations are too often managed towards "economies of scale" and efficiencies are sought through hierarchical standardisation, and top down, "command and control". This can result in ultimately unhelpful behaviours focused on hitting out-of-date targets or taking the line that following process trumps 'doing the right thing'. It would be better to actively work to understand what really matters to our customers, service users, stakeholders, and society.

It follows that this is best done by those who understand the context and the customers/stakeholders, so this should include those at ground-level as well as those in more senior positions. In relation to organisational change and development, much more emphasis needs to be placed on "bottom up", localised organisation rather than top-down machine like focus - albeit situated within clear principles and intentions, with strong review, learning and sharing processes.

This stance is not proposing that we should forget about reductionist and deterministic approaches to management. Complexity thinking is a middle ground between thinking we can predict and control everything, and thinking we know nothing. Complexity thinking is not advocating a laissez-faire approach - rather, it is bringing our attention to the fact that many things are interconnected and beyond our direct control, whether we like it or not - and to ignore that uncertainty can bring failure.

**Match your approach to the context**

Another key theme from Jean's talk is that the approach you use, hard or soft, tight or loose, reductionist or systemic depends on the stability of the environment and the degree of control you have. We need to ask ourselves where we sit on those continua. How volatile, uncertain, complex and ambiguous is our situation? The approach, tools and methods we pick should be influenced by the answers to those questions.

So called "Best Practices" might have been the best practice for the originator organisation, with its particular capabilities and challenges and context, but there is no reason to imagine said practice is "best" for another organisation, situation or context. The discipline of "Organisational Change Management" has become about linear project management approaches and PMO. Complex environments require more adaptive approaches to design and implementation, as well as a process that allows for constant review and adaptation of objectives. Strategy and implementation become a reflexive cycle of evolutionary adaptation in a broadly described direction, whilst maintaining an openness to other paths, rather than a "designed" and specified endpoint.

It is vital to create organisations, departments and teams that can adapt and respond to changes in their environment, both
opportunities and threats. They need to be able to sense and detect those changes as well as change in response, so regular review of purpose and objectives is essential. It is better to have an organisation that can do this, than to pursue an idealised designed form significantly different to what you have today and work towards it. Step by step is best.

Conclusion

In essence, the heart of Jean’s message is to free oneself from the mechanistic "scientific" ideas that are prevalent in management today as the world does not work like a machine. Think freely and work to gain a deep understanding of the problem you are trying to solve and the context it sits within, as well as the journey that brought the organisation to this point. It is no good to pretend the world and decisions we face are simple when they are not. Similarly, it is no good applying standard "best practices", when reality is more nuanced, and each organisation and context is unique.

These ideas should feel familiar to systems engineers, as should be the concepts of complexity and emergence. We just need to be sure to bring them to bear in the way we manage our organisations as well as products for our customers. In particular, we need to be careful with the idea of "design" when applied to organisations, as complexity thinking tells us it’s better to evolve to future forms rather than undertaking radical redesign in a single step.

The end...

If you are interested in learning more, I can highly recommend Jean’s book, Embracing Complexity.

Jean also posts updates about her work and where she will be talking on the "Embracing Complexity" Facebook page, and she also has a website: www.embracingcomplexity.com.

Jean has also been invited to teach a module on the long-standing Masters on Holistic Science at Schumacher College, starting this autumn. This is a unique masters in that it explores the science of complexity and systemic thinking in some depth, whilst also looking at its implications for the way we live and work.
2018 Membership Survey

Summary of results

A big thank you to everyone who took the time to complete our recent membership survey. Your feedback was very helpful in providing the INCOSE UK Council with a picture of our members and what Society resources they find most useful, which will contribute towards informing our future decisions.

Some of our key findings are shown below:

63% The proportion of respondents who engage with INCOSE UK in respect of their ongoing professional development

73% The proportion of respondents who engage with the Society through our events

95% Proportion of respondents who have utilised some of the Society’s free publications (including U-Guides, Z-Guides and free PDF publications)

100% Proportion of respondents who make use of the Society’s website to access resources

Key reasons for membership

“One of the best communities of like-minded people who encourage knowledge sharing in Systems Engineering”

“To support the cause of Systems Engineering and to ensure those that can help take the discipline forward have the resources to do so”

“It’s the professional institution that is closely aligned with my work as a Systems Engineer. It gives access to useful resources for ongoing professional development”

INCOSE UK Welcomes Optima SC to the UKAB

Earlier this year, it was the UK Chapter’s pleasure to welcome a new member to the UK Advisory Board (UKAB). Pictured is the INCOSE UK President Ivan Mactaggart (L) with OptimaSC’s Managing Director, Chris Lamb (R) during a visit to OptimaSC’s site to sign the Memorandum of Understanding.

Optima Systems Consultancy was founded to provide independent Systems Engineering and Management Consultancy to the Defence, Aerospace, Communications and Information Systems, Transport and Utilities sectors. Since its foundation OptimaSC has continued to grow rapidly and now has a wide range of experienced consultants and experts.

Chris Lamb, OptimaSC Managing Director said, “It’s good to be re-engaging with the INCOSE UKAB, having previously been Chair of the UK Advisory Board. Our team at OptimaSC have a wealth of experience to contribute to the development of Systems Engineering in the UK, and we look forward to supporting the INCOSE UK Chapter”.

INCOSE UK look forward to working with them to advance best practice within Systems Engineering in the UK.
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<tr>
<th>Date</th>
<th>Location</th>
<th>Details</th>
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<tr>
<td>16th July</td>
<td>INCOSE UK Chapter</td>
<td><strong>Service Systems Engineering Group</strong></td>
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| 10:30 - 14:30        | Babcock International, Devonport House, Durley Park, Keynsham, Bristol, BS31 2AT | Review of Service Systems Engineering Handbook. Agenda includes:  
- Where have we got to where are we going  
- Definitions of Characteristics  
- Guidance for early Lifecycle Stages - taken from ASEC18 paper  
For full details, please visit the event calendar here. |
| 25th July            | INCOSE UK Chapter               | **Early Careers Forum**                                                                                                                                                                                                                                                                                                             |
| 10:00 - 16:00        | Leonardo, 300 Capability Green, Luton, LU1 3PG | Leonardo have kindly agreed to host the ECF at their Luton site with a number of items on the agenda, from senior engineers talking about their career paths, to a walkabout tour of some of Leonardo's sensing products, leading into their integration lab where they perform integration tests of one of their most important products.  
This is a great chance to get more involved with the Early Careers Forum (ECF). Find out more details via the INCOSE UK website here. |
| 5th November - 8th November | INCOSE EMEA | **EMEASEC 2018 Conference**                                                                                                                                                                                                                                                                                                           |
| Full days            | Mercure Hotel, Stephanstraße 41, 10559, Berlin, GERMANY | The EMEASEC conference gives industry, organizations, educators, researchers, and government the opportunity to showcase cutting edge practice and research. EMEASEC 2018 provides the opportunity to network with professionals from many domains in in EMEA and Germany.  
For full details, please visit the EMEASEC 2018 website. |
| 21st November        | INCOSE UK Chapter               | **UK Chapter Annual General Meeting (AGM)**                                                                                                                                                                                                                                                                                           |
| Afternoon            | Cranfield University, Cranfield, Bedford, Bedfordshire, MK43 0JR | This will take place on the afternoon of the first day of ASEC, and all UK Chapter members are welcome.  
You do not have to be an ASEC 2018 delegate to attend this. |
| 21st November - 22nd November | INCOSE UK Chapter | **Annual Systems Engineering Conference 2018**                                                                                                                                                                                                                                                                                         |
| Full days            | Cranfield University, Cranfield, Bedford, Bedfordshire, MK43 0JR | The Annual Systems Engineering Conference (ASEC) is INCOSE UK's flagship annual event and brings together a wide range of professionals from a variety of backgrounds, with the common interest of building upon their Systems Engineering (SE) knowledge and sharing ideas with their peers.  
To keep abreast of updates as they are released, please visit www.ASEC2018.org.uk. |
Systems Engineering Certification

INCOSE UK is offering fully administered on-site SEP Certification exams. There is a growing presence of INCOSE UK Certification in the Systems Engineering community; don’t let your team get left behind.

INCOSE UK: Professional Development Together

Email: profdev@incoseonline.org.uk

DON’T PANIC!

An honest, straight-forward, and simple introduction to the world of model-based systems engineering that anyone can understand.

This absolute beginner’s guide will help you to start to implement model-based systems engineering in your future projects.

The first book in the “Don’t Panic!” series is available on the INCOSE UK Web Store now.