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January 1-Day Event a Great Success!

The first of this year’s 1 day workshops took place in January. Organised by the Bristol Local Group, the event was designed to expose delegates to 3 different SE techniques which are promoted as good practice. The event was very well attended, being fully booked well before the day and feedback from those that attended was good. There is a full report from Ian Gibson of the Bristol Local Group on page 2.

Membership Continues to Soar

With what is becoming a pleasingly regular headline: membership numbers continue to be on the up-and-up. It looks like we are getting very close to 700 members now and we think we may be the fastest growing INCOSE chapter. Read more in Membership Memos on page 8.

New INCOSE President-Elect is a UK Member

Congratulations to our own Samantha Brown who was recently elected as INCOSE President-Elect. Samantha has been good enough to spend a little of her time telling Preview what she is doing at the moment. You can read the article on page 5.

QinetiQ Join UKAB

Membership of our UK Advisory Board continues to grow with the latest volunteer organisation being QinetiQ, represented by David Venn their Chief Systems Engineer, System Delivery Services from the Dorchester site.

Our President Andrew Daw is pictured countersigning the agreement at our Board meeting on 21st February. This brings the grand total of UKAB members to 21.

Editorial

Welcome to this Winter/Spring Edition of Preview, the quarterly newsletter of INCOSE UK.

Having finally got to the end of my first edition of Preview I am left with 2 thoughts: firstly one of gratitude to the previous editor Simon Hutton for getting things cued up to make this edition relatively easy for me to pull together; and secondly how it seems that even in that often news-light first quarter of the year there has been plenty going on in the world of INCOSE UK.

I’ve also very much enjoyed reading the healthy debate that seems to be going on in our community. The event write-ups and letters that we have received show that readers continue to have a keen eye and strong opinions and I encourage you to use the pages of your newsletter to continue this in the coming months.

Enjoy this edition, and please write and express your opinions!

Malcolm Gardner
Editor
INCOSE UK
This year was always going to have to be a bit different, with the International Symposium in Utrecht scheduled for the month after the usual slot for the UK chapter Spring Conference. Still, systems engineers are a resourceful lot with a good grounding in dealing with change, so it should have been no surprise to find out that an alternative plan was put in place, based upon a series of one day workshop style events spread around the country. It was, however, a surprise to be asked to organise the first one in Bristol workshop style events spread around the country. It was, however, something of a surprise to be asked to organise the first one in Bristol at a couple of months’ notice. Of course, with over three years of event organising under our belts, the Bristol Local Group is something of a well oiled machine by now, so we took to this task like ducks to water (hmmm, well something like that anyway)!

How the Day was Organised

The event itself built upon a similar event which we ran in 2007, but with the luxury of a whole day rather than a split afternoon and event session. The premise was to provide delegates with exposure to a set of three different techniques which are all promoted as good practice in their areas; within an overall systems engineering context, give them the chance to try out one particular technique in detail for most of the day with each group working upon the same problem statement; and then provide the opportunity to compare and contrast what they did and how they got on with the other groups. The end goal was that every delegate would leave the session with a better understanding of a particular technique, an appreciation of some other elements at the same time, and a set of diverse analysis approaches: 

- Rick Adcock (RCMS Shrivenham) – Architecting techniques;
- Matthew Hause (Artisan Software) – SysML and UML;
- Simon Hutton (Headmark Analysis) – Soft Systems Methodology.

They were ably assisted on the day by Richard Beasley (Rolls Royce), David Evans (BMT Sigma) and Phil Savvides (MoD DE&S), with the rest of the Bristol Local Group committee acting as representatives of the various stakeholders in the problem space. The event had 50 delegates and took place at BAWA in Filton. Bristol on 24th Jan 2008, and we would like to take this opportunity to thank them for doing an excellent job on the catering and general event support.

The Problem

So, on to the problem itself. We wanted something that was multi-faceted with plenty of scope for stakeholder interaction, with the additional desire for it to be something that would be both inspiring and outside of the scope of most attendees’ day jobs. After a bit of head scratching one clear candidate emerged: space travel. Now, whilst I am sure many of the delegates would have loved to have spent the day drawing pictures of space rockets, agonising over the decision on how many thrusters to have and whether warp drive was needed, as this was an exercise in systems engineering that was never going to be the task for the day. The problem that was set was to provide a mythical European Joint Aerospace Authority with supporting material for a study into its 100 year vision for the development of space travel. The full problem statement that Terry came up with pointed towards a future career as some kind of EU mandarin; the key statements were:

“Your proposals should include identification of key stakeholders, potential vehicles, necessary processes, candidate architectural concepts, including infrastructure elements, and a set of high level requirements to provide a framework to help direct the millions of our citizens efforts towards realising the strategic goals, to measure success against and provide platform for development and refinement of the vision with emerging new realities over the next 5 generations.”

This, I am sure you will agree, was a suitably wide ranging problem for the delegates to get their teeth into and for the techniques to show their utility and usefulness.

How the Groups Got On

The soft systems methodology group were the first group to start engaging with Stakeholders, which should come as no surprise as the methodology is more attuned to discourse with stakeholders to explore a problem, rather than presenting them with up front analysis. This group was soon creating a rich picture and gathering information on stakeholder needs. The architecting group was the next group to fully engage with stakeholders, which presumably reflected their need to get some of the top down structure in place first before seeking clarifications. The SysML group was the last group to engage with the stakeholders, and did it with much more up front modelling output than the other groups did. This presumably reflects the multiple viewpoint nature of SysML where a formal model tends to build up of domain language, problem elements and candidate solution elements at the same time, and of course the issue that Matthew had to cover the breadth of SysML in the session, which was probably a tall order in comparison to SSM for example, where the subtleties lie in the approach itself rather than the drawing notation.

By the end of the analysis session, all of the groups had a body of work that covered most aspects of the techniques that they were
using, albeit that some of the later elements were done more for completeness than actually being genuinely complete. Hopefully most of the delegates found the pace of the event to be pitched at the right level, with enough of an opportunity to try out and understand the various aspects of the techniques that they were using, but we would welcome further feedback in this area.

The next part of the day was devoted to a "show and tell" session from each of the groups back to the rest of the delegates. This was followed by pairwise comparisons between techniques, where the groups were split in half and then formed into new groups to compare: what they did, how they felt it worked, and whether there were areas where one technique strongly outperformed another one. This generated some interesting discussions, which we intend to explore in a future paper, but as a general theme: SSM scored highly on problem exploration where there is some uncertainty over what is required; Architecting scored highly on providing a means to "divide and conquer" a problem into manageable chunks; and SysML scored highly on formally defining the problem domain and solution space, and bringing rigour to the definition of the candidate solution elements.

How the Day Was Received

Feedback on the day was generally positive and delegates certainly seemed to enjoy themselves during the day. However, a particular issue was raised with having all of the groups in the same room. We had intended that having everyone together would give the event a bit of a buzz, rather than breaking off into separate classrooms for the day, but it seemed that at times there was a bit too much of a buzz for some.

Another issue was raised about the problem statement being a bit too high level to properly demonstrate the use of SysML, although this has not stopped the same problem statement being subsequently used (with permission) by Artisan in their workshops at the Integrated Enterprise Architecture event on 6th Feb. There certainly were a few issues with properly comparing SysML to SSM as they do tend to come at things from a different angle, but that ought to signal that there should be scope to use them as complementary methods. In fact, there is a probably strong case to suggest that some synthesis of all three techniques for exploring, structuring and analysing a problem could offer the best of all worlds. That is certainly something that we are intending to follow up in a future paper as an interesting line of research. In the short term, we intend to publish the various presentations onto the INCOSE UK website, along with any suitable outputs from the workshops and pairwise comparison exercise.

Once again we would like to thank all of those who contributed into making this a successful day, including the organising team, Dot-The-Eye Ltd for running the event booking website, John Mead, helpers on the day, the BAWA staff, and of course the delegates and we would like to wish the best of luck to the team organising the next INCOSE UK One Day Event in May.

Ian Gibson
On behalf of the INCOSE UK Bristol Local Group

Academic Session at the Autumn Assembly

A modest yet stalwart group attended the Academic Session at the Autumn Assembly. I provided a brief overview about ‘Training and Education’ including some results from the Spring Conference 2007 Academic Questionnaire. The results of the said questionnaire clearly indicate a desire for INCOSE to be proactive in the definition and development of academic curricula in Systems Engineering.

In my preamble I explored some of the What, How and Who’s of teaching and training with some consideration of the ConOps.

The group quickly developed into a very open, diverse and challenging discussion – hardly unexpected given the audience. Of particular note was the role of the ‘mentor’. All agreed that mentors provided an important role and I was the first to acknowledge that academic training can only go so far in developing competences. Good systems engineering practice includes adopting appropriate attitudes, knowing when to ask the right questions etc – something that comes from experience and through contact with competent practitioners.

I (somewhat controversially) raised the point that organisations must take a responsibility to adapt their structures and practices to obtain the greatest benefit from the training their employees may receive in academia. At the end of the day we all have to work together – of course.

Alan Smith
Director, UCL’s Centre for Systems Engineering
The discipline of systems engineering will become a key enabler for the successful development and commercialisation of products characterised by their multi-parameter capability and integration potential. Prime amongst such products are multi-functional micro and nano technologies (MNT) and their associated subsystems. These will impact a wide spectrum of applications within medical, automotive, aerospace and other markets. Systems engineering can offer methodologies, tools and processes to enable the efficient integration and exploitation of such disruptive technologies within both existing and evolving systems. Uniquely, systems engineering will provide the basis for a holistic approach to component design and technology deployment.

The UK's Centre of Excellence in Metrology for Micro and Nano Technology (CEMMNT), in collaboration with the Patent-DfMM project and the Systems Engineering Innovation Centre (SEIC), held a one-day workshop on 11th December 2007 at the SEIC, in Loughborough, United Kingdom to introduce designers utilising MNT to systems engineering, its benefits and the techniques that underpin this discipline. The event focused on methodologies, processes and systems engineering based tools, as applied to the design, integration and evolution of products embedding MNT.

**Highlights of the Day Included:**

- An overview and definition of *systems engineering* by John Hooper, the Director of Education Partnerships at Loughborough University. His overview was supported by a case study from the defence sector presented by INCOSE’s Technical Director, Samantha Brown of BAE Systems.

- Professor Andrew Richardson, from Lancaster University, provided an excellent introduction to the “design-for-X” (DfX) philosophies developed by the partnering organisations in the Patent-DfMM project. These apply to processes associated with complex, cost-sensitive, system evolution and their underpinning design strategies. They necessitate addressing testability, reliability, yield, packaging, disposal and assembly at the outset. Dr Stoyan Stoyanov, from the University of Greenwich, reinforced this message by outlining novel approaches to systems modelling philosophies and integrated modelling, which are developed to predict complex behaviour. Practical examples demonstrated how system-wide simulation and modelling are being used to increasingly identify optimal designs for manufacturing, assembly, packaging and test parameters across the entire lifecycle of MNT products and systems. Critically, Dr Stoyanov emphasised that the exploitation of simulation technologies is enabling companies to predict failure before it happens, improve quality and performance, generate knowledge of the process and deliver products to market effectively.

- Dr Mark Begbie, Technical Group Manager at the Institute for System Level Integration (ISLI), provided an interesting perspective on the historical evolution of MNT from a base technology through to its current “multi-physics” level of complexity. This evolution was strongly linked to the convergence of functionality and applications (phone, camera, MP3, etc.), which entailed a hierarchy of integration levels: wafer, component, subsystem, functional and application. Such upward scaling has driven the need for a systems engineering approach that encompasses multi-parameter, systems-level modelling, as well as a variety of test/verification tools. His perspective was given further credence by the market forecasts presented by Will Sargent and Ankit Shukla, from Frost & Sullivan, in their presentation on future trends for MNT.

- The spectrum of commercially available systems engineering tools and processes was outlined by John Hooper, as an introduction to a set of presentations outlining specific tools that benefit designers of products utilising MNT. In this context, Dr Gerold Schröpfer, of Coventor, provided an overview of CoventorWare™, a comprehensive integrated toolset for designing micro- and micro-fluidic systems, evaluating their performance in a surrounding system and optimising them for manufacturing. Hazel Woodcock, Senior Consultant at Telelogic, outlined the importance of requirements capture and management and how tools have been developed specially for this purpose, such as Telelogic’s DOORS™ (Dynamic Object Oriented Requirements System). Alison Desimone, from QinetiQ, outlined an approach for predicting disruptive and emerging technologies using a flexible process for textual analysis of scientific and technical information. Such predictive approaches closely aligned with the presentation on technology and applications road-mapping tools delivered by Dr Paul Palmer, the Director of the Electronic Enabled Products (EEP) KTN, based at Loughborough University.

- The event concluded with an invitation extended to the audience, by Doug Cowper, to join INCOSE. Doug, who is the INCOSE UK Chapter President-Elect, provided the audience with a comprehensive introduction to INCOSE, including the activities of the UK Chapter in particular.

Finally, as overall Chair and co-ordinator of the workshop, Dr Ayman El-Fatatry, of BAE Systems, voiced the hope that this event will signal the start of a new collaboration between two communities who share similar challenges, albeit on divergent scales!

For more information relating to this event and the contents of the presentations, visit [www.cemmnt.co.uk/news-and-events.php](http://www.cemmnt.co.uk/news-and-events.php)
Further Information:
The Centre of Excellence in Metrology for Micro and Nano Technologies (CEMMNT) provides seamless access for industry to measurement, characterisation and systems engineering equipment and expertise. CEMMNT’s inter-disciplinary knowledge is applied to accelerate product and process development across all industry sectors. [www.cemmnt.co.uk](http://www.cemmnt.co.uk)

The "Design for Micro & Nano Manufacture (Patent-DfMM)" Network of Excellence establishes a new technical community addressing the underlying engineering science to ensure that problems affecting the manufacture and reliability of products based on MNT can be eliminated before prototype and pre-production. [www.patent-dfmm.org](http://www.patent-dfmm.org)

The Systems Engineering Innovation Centre (SEIC) at Loughborough, focuses on systems engineering aspects which provide a framework for the integration of people, processes, tools and technology in order to improve the management of risk, product configuration and technology insertion for the development of innovative products. [www.seic-loughborough.com](http://www.seic-loughborough.com)

Samantha Brown: INCOSE President Elect

In this issue, Preview talks to Samantha Brown, newly-elected “President-Elect” of the International Council on Systems Engineering.

What’s it like being lined up for INCOSE’s top job then?
Having served as Technical Director for more than three years, I’m pretty familiar with the ways of working within the Board of Directors and the organisation as a whole – although, as with any new role, there are always things to learn. Leadership in INCOSE is not a job for those who like to issue instructions and expect them to be followed, or even those who like things to be predictable. The organisation is literally alive with incredible intellect and one of the roles of its leaders has to be to try to harness that for the good of the members, the organisation and systems engineering at large.

Apart from being President-Elect, what else are you doing now?
I’m lucky that at the moment I’m part way through a 4-year full-time Engineering Doctorate in Systems Engineering at Loughborough University. The doctorate is sponsored by BAE Systems and they are also supporting my role in INCOSE. I find the two complement each other in all sorts of ways. It’s quite a commitment to become a full time student again, but it is a real luxury to have time to take a step back from the frontline and think. Too often we are faced with familiar problems and complexities, but we often don’t have time to look for proper solutions. My research lets me do just that. I’m using systems engineering at an organisational level and looking at areas where soft and hard systems techniques can work together. After 20 years in industry, I’m used to problem solving, but it is great to be able to look for proper systems engineering solutions. And really having to think about my systems engineering is good for my INCOSE role too!

How did you get involved in systems engineering?
Like most Preview readers, I did my first degree – which happens to be in Mechanical Engineering – at a time when Systems Engineering didn’t exist on the undergraduate menu. The application of concurrent engineering in a manufacturing environment brought me into systems engineering more than 10 years later, and I have never looked back. I believe that systems engineering demands people who can take a ‘big picture’ view and see connections and interrelationships – something which I have found comes naturally to me.

So where do you see INCOSE going over the next few years?
Systems Engineering is still a relatively new discipline, and INCOSE is a young organisation. That provides both opportunities and challenges. What is obvious is that systems engineering isn’t just a “fad”. As systems become ever more complex and interrelated, it is becoming increasingly important. INCOSE needs to reflect that growing importance and embrace systems engineering across domains and across the world. At the same time, we mustn’t forget that there are still real systems engineering needs in “western” aerospace and defence industries, where INCOSE really started. This isn’t a pursuit of growth for its own sake. We need to strike a balance, and foster the synergy that we know exists.

I’m really delighted to have the chance to lead the organisation at such an exciting time and look forward to increasing interaction with the UK Chapter in the coming years.

International Symposium... don’t forget to register

18th Annual International Symposium of INCOSE, 6th Biennial European Systems Engineering Conference

INCOSE 2008
Systems Engineering for the Planet
The Netherlands
15-19 June

Registration opens March 2008, see more at [www.incose.org/symp2008](http://www.incose.org/symp2008)
Letters to the Editor

It is nice to see Preview stimulating a little debate. These letters have been received recently and are published without change; responses and healthy debate are encouraged!

Sent: 30 November 2007 08:52
Subject: INCOSE "preview" - Autumn Assembly 2007

Dear Editor,

The article “Applying Systems Engineering to INCOSE UK Session” described the INCOSE Development Model. In it, “balanced loops” were stated to be “considered stable”.

Well, the so-called “balanced loop” is a feedback loop and control engineers spend their life worrying about instability in them. Instability is only too common. It usually takes the form of cycling of one sort or another. If non-linear elements are part of the loop, then stability may depend upon the current operating conditions and the detailed characteristics of the system elements. The INCOSE Development model shown in “preview” will certainly contain many very non-linear elements. Although stability is highly desirable and feedback loops can supply it, they do not always do so. Stability can be very difficult to achieve and this may be particularly so with the highly complex interleaving and overlapping of the many feedback paths in the INCOSE model.

It may also be worth observing that “re-enforcing loops” are ultimately stable “in the large”, since although they may kick-off by moving rapidly away from their initial operating point, in the end a physical, financial, societal or other limit will constrain their further growth and they thereafter stably remain at a new operating point on that limit.

So, balanced loops can be unstable and re-enforcing loops can be stable.

Steve Walder-Davis

Sent: 29 November 2007 22:20
Subject: INCOSE Preview - Autumn 2007

Dear Sir,

I have recently facilitated a Business Analysis workshop where we attempted to perform some SWOT analysis. Although all the Business Stakeholders present claimed they were proficient in this skill, it quickly became apparent that some misunderstanding existed. I have subsequently been collecting papers and well structured examples in order to increase understanding within the group. I was pleased therefore that the Autumn edition of Preview (Page 15), described a recent SWOT analysis conducted during the Autumn Assembly. Unfortunately however, I have to report that the analysis recorded makes the same fundamental mistakes exhibited originally by the Business Stakeholders.

The four quadrants of a SWOT Analysis are used to describe the positive and negative factors, both internally and externally, of an organisation. The internal factors are:

Strengths, those capabilities which the organisation does well, and Weaknesses, those capabilities which the organisation does not do as well as it would like.

Complementary to these are the external factors:

Opportunities, those environmental circumstances which may (if utilised) have a positive impact on the organisation, and Threats, those environmental circumstances which may (if not mitigated) have a negative impact on the organisation.

It is often useful when completing the quadrants to ask a series of question about the organisations such as:

Strengths:
What are your advantages?
What do you do well?

Weaknesses:
What could be improved?
What is done badly?

Opportunities
Where are the fortunate circumstances facing you?
What are the interesting trends?

Opportunities, those environmental circumstances which may (if utilised) have a positive impact on the organisation.

Threats
What obstacles do you face?
What are your competitors doing?
Are the required specifications for your job, products or services changing?

While I was pleased to read that the group within the autumn assembly had framed their analysis by first defining the requirements the organisation was attempting to meet, I was disappointed to note they then made the all too common mistake of confusing Opportunities with Strategies. i.e. rather than listing positive external circumstances they have listed actions intended to turn Weaknesses into Strengths. They therefore failed to capture any Opportunities.

This approach was then verified by showing that for each of the Strategies (mistakenly listed under opportunities) one or more Weaknesses would be addressed.

The correct approach however is to formulate Strategies as a fifth list which maintain the Strengths, address the Weaknesses, make use of the Opportunities and mitigate or address the Threats.

It should also be noted, that since presumably the group were unaware of the internal / external distinction of the categories, or perhaps exhibiting ‘group think’, some items appear under the wrong headings:

Weakness 3 - “Lack of awareness of SE across academia” must be an external factor, since it would appear implausible for there to be a lack of SE awareness amongst academics within INCOSE (i.e. members), this therefore must be a Threat.

Similarly:
Threat 3 - “Volunteer organisation” is a Weakness (although some may argue a Strength) unless this status is imposed by external factors such as legislation or policy of the parent body.

Yours Sincerely,

James Towers BEng(Hons) MIET
Consultant Systems Engineer
Object Flow Limited
I Wandered Lonely as a Cloud...

by Simon Hutton

I took the dog for a walk along our local beach last weekend, the first time this year it was safe to go without being sand blasted, blown over or washed away by waves from the Irish Sea. On a clear day we can see Blackpool Tower and the grey sticks that make up the off shore wind farm near Walney Island. There have been on shore wind farms in the Lake District for some time, dotted around the fells to take advantage of the steady wind that starts in the Atlantic and has little to slow it down before it makes landfall. It explains why the trees around here generally lean towards the North-East! Moving the turbines off shore is supposed to improve efficiency – more wind and bigger blades means more electricity, with the bonus of fewer complaints from locals who are not happy with this unsightly, noisy invasion of Wordsworth’s golden daffodils.

As we wandered through the dunes it struck me that off shore wind farms would make a great systems engineering case study. All the right ingredients are there, including a disparate set of stakeholders with conflicting requirements, political constraints, technology to grapple with and real engineering problems – none of this make-it-up-as-you-go-along software ‘engineering’! The sea-going wind turbine is considerably larger that it’s land-locked cousin, and the ones off Walney measure over 75m high with a blade diameter of 100m. The 30 turbines in this particular farm produce up to 200MW of electricity, enough to supply 70,000 households on a windy day.

When we look at the wind farm from a systems engineering perspective we find a rich source of material that demonstrates the benefits of taking a whole-system, whole-life view. Putting wind farms in the windiest, remote places invariably makes installation and maintenance difficult, with teams having to travel by Landover or even by helicopter to service the turbines. So much for no carbon emissions or low through life costs! We could spend hours discussing environmental and disposal issues, and the recent revelation that “environmentally friendly” long-life light bulbs are an environmental disaster waiting to happen because of the mercury content highlights what happens if we don’t think through-life whilst claiming to be environmentally friendly. At some stage in the future we are going to have a lot of rusting metal posts in remote parts of the country, all strung together by redundant power cables.

Thinking across the life cycle also forces us to think beyond the system we are developing to solve our problems. We are good at concentrating on system design and demonstrating that we will meet stakeholder requirements, but we often forget to constrain ourselves with the practicalities of converting sketches on a blackboard into something that is technically and commercially viable. All too often systems fail and projects are cut not because they will not meet the requirement, but because implementation is impractical. All too often the “implementing system” is forgotten or ignored until too late, which is a shame as this can be the most interesting and challenging part of the entire project!

As wind turbines become commodity products with mature technology and commercially viable manufacturing processes there is a drive to improve profit by getting as much energy out of each turbine. Increasing rotor size to increase unit output makes an offshore wind farm an attractive proposition, but is does raise an important question – how do you get these huge structures into position? Offshore turbines are usually 5 miles from land in 20m of water, and require foundations 60m deep to support the tower and blades in the strong winds they are designed to operate in. I have had little success erecting a rotary washing line that can withstand the winter gales in our back garden, so can appreciate the problem!

The answer has come from China in the form of a purpose-built ship with legs! The Resolution is a £60 million jack-up barge with six legs that stick up when the barge is transiting with the turbine foundations or tower. Once in position the legs are mechanically lowered to penetrate 5m into the seabed, providing a stable platform. As the legs push down the barge is raised out of the water, and the on-board crane is then used to position the foundations and tower.

Large electricity generating wind turbines are becoming common-place and we tend to take the technology and supporting infrastructure for granted. The move to bigger turbines off shore reminds us that the implementation system is often as important, costly and difficult to design and build as the system we think we are interested in. Off shore wind farms provide a good reminder that it is always worth considering the practicalities of manufacturing, installation, test and disposal as you design your system - you may discover where the real cost and technical risk really lies!

Simon Hutton
Headmark Analysis
The push to join INCOSE, which we see whenever we advertise and hold an event, reverts to a lower level in between events but still continues. After the one day event in January we broke the 670 barrier – our highest ever and we are now approaching even closer to the 700 mark. This is way above the numbers reached during the last membership year, which makes us one of the fastest growing Chapters. Included in this number are our usual mix of between 10 & 20 located overseas who choose to be allocated to the UK chapter. This currently includes Australia, Greece, Singapore, Spain, France, Poland, Brazil, Finland with one each in Italy with 3 and USA with 4.

Given that it takes a couple of weeks after writing this for a printed copy arriving through your letter box and you sitting down to read it we could be at 700 already! If by chance you are not a member now may be a good time to join and perhaps become number 700.

John Mead
Administrator
INCOSE UK

Outrageousness is best served VERY rarely, although I did have a delicious chance over Christmas while writing to a friend. She had recently recovered from cancer and I wanted to make her forget her recent struggles. What I wrote was: 'Whilst the last century saw us having to learn to keep the peace despite our limited resources, this century we will have to learn to work together to deal with climate change.'

It is a rather global statement, isn't it? Yet, it holds some rather fundamental truths. In fact, if you examine it closely, you learn a lot of things that are not only applicable to the human race, but also to systems engineering. So let's take a closer look at it.

The first is we are working in a world of limited resources. I don't know about you, but I seem to be forever looking for cheaper ways of doing the same thing. This leads to using what is there, which leads to using what infrastructure is around, whether it be big things like harbours, using telephone lines for the internet and so on, or smaller systems like using second-hand cars or old plant pots.

Whilst in the short term this may save on costs, in the longer term it can turn out to be more expensive. One such example is the space industry continuing to use one-off rockets for launchers instead of reusable re-entry vehicles. Why? The industrial base is set up to build rockets with all its support in keeping the technological expertise in place. If we had known in the middle of the last century of how technology would develop, would we have started with the one-off use rockets at greater overall expense? I am sure you can think of many other examples.

This also leads to what I term 'layered infrastructure', i.e. putting infrastructure on infrastructure. For instance, airfields started off being flat strips of land where aircraft could take off and land. Now we have a whole Air Traffic Management industry with its radars and communications, all the transport capabilities (trains, roads, car parks etc) to and from those airfields, and the industrial capacity to maintain and run those airfields.

By adding onto the infrastructure incrementally, we are almost sure to end up with a non-optimal service. When does it become cost-effective to demolish what you've got and start from scratch? And have we got the resources to do so?

Oops! I think I'm going round in circles!

From the corner... by our regular contributor

My statement also points out that we have and continue to learn. In systems engineering, some learning can be done by analysing a problem and coming to sensible conclusion. However, it seems most learning in such a complex subject is by trying something out and seeing how it works, which of course requires resources.

One aim for a good systems engineer is to move from this trial and error basis of learning to being able to use sensible analysis. So what analysis techniques do we have to help us? There are quite a few that help with certain aspects e.g. UML. But we still have to learn new analysis techniques, which takes us back to learning by trial and error, which in turn requires resources. This sounds like the infrastructure problem above, only this time the infrastructure comprises systems engineering techniques.

Oh dear. I'm still going round in circles.

Another interesting feature of the statement is we have to learn to deal with climate change. What would this entail? Firstly we have to know what the full problem is. Yes we know that global warming is leading to changes in the weather and ocean currents, but we are not sure what those changes will be in the future. So we need to improve our analysis techniques of the complex climate system. As noted above this will need resources, which will inevitably burn more fuel, which in turn will increase global warning.

Oh no! Another exasperating circle.

Even if we did understand the full problem, we would still have to systems engineer a solution. That solution would have to be learned by trial and error, which would need resources, which will inevitably burn more fuel, which in turn will increase global warning. Talk about a circle squared!

All these problems could be more efficiently answered if we could anticipate consequences better. But do we do anything to increase the reliability of those anticipation techniques? Do we improve the prediction of project risks, say? Do we anticipate correctly what new technology is going to be available in five, maybe even ten years time? Do we know what infrastructure will be available in thirty years time? Are you really sure a second Channel Tunnel will not have been built by then, say?

So how do we improve the reliability of anticipation, especially in complex systems engineering projects?

Any ideas?

C. B. Server
UK Advisory Board (UKAB)

INCOSE UK is supported by the following organisations that make up the UK Advisory Board. The UKAB is chaired by Ayman El-Fatatry, of BAE Systems, and advises the Board on aims and strategy, and co-ordinates working group activities with the Technical Director, Andrew Farncombe.

**UKAB Contacts**

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</table>
Rail Interest Group (RIG)

The INCOSE UK Rail Interest Group (RIG) exists:

• To provide a forum for those interested in Systems Engineering in rail to network in a less formal environment, to exchange good practice and to provide mutual support in an area which can require some sustained perseverance;

• To promote, improve and share the practice of Systems Engineering within the rail industry;

• To foster connections with other professional bodies within rail and thereby promote cross fertilisation of knowledge and experience across sectors and community disciplines;

• To promote awareness of INCOSE UK and encourage membership within the rail industry.

For further information see www.incose.org.uk/rig.htm.

Architecture Working Group (AWG)

The aims of the AWG are:

• To provide guidance and advice to UK systems engineering community on architecture practice;

• To exert influence over the use of architecture concepts within the UK systems engineering community;

• To liaise with other systems engineering groups involved in architecture work.

The AWG holds regular meetings, but conducts a lot of its work ex-committee. Its principal communications method for formulating and discussing concepts, guidance and advice is the AWG Wiki (www.ukawg.org). Parts of the wiki are open to the public. INCOSE members can get wider access, including the ability to comment on the material the AWG is generating, to the wiki by emailing their name and affiliation to register@ukawg.org.

Participation in the AWG is open to all, by invitation of the Chairmen. If you wish to participate in the AWG, then again email register@ukawg.org.

Bristol Local Group (BLG)

Do you live or work within striking distance of Bristol? Have you always wanted to share your ideas, but never found the time? Well, the perfect opportunity is now here to share ideas and meet with like minded colleagues in an easy going evening atmosphere. Attendance to Bristol Local Group events will not be restricted to INCOSE members and, where possible, will be free of charge. The objectives of the BLG are:

• To provide a forum for existing INCOSE members to network in a less formal environment;

• To promote and improve the practice of Systems Engineering;

• To foster connections with other professional bodies within the same regional area and thereby promote cross fertilisation of knowledge and experience across sectors and community disciplines; and

• To promote awareness of INCOSE UK and encourage membership.

BLG V&V Workshop Report

On 28th November the Bristol Local Group held a workshop on: How V&V applies across the system lifecycle. Colin Brain of SE Validation Limited introduced the workshop to the 24 people who attended, and drew a sharp distinction between validation – “are we building the right thing?” and verification – “are we building the thing right?”

The workshop then split into three discussion groups. Colin led one on: V&V of Service Oriented Architectures, the other two were on: V&V of non-functional needs/requirements at the system level, led by Richard Maguire, also of SE Validation Limited and on: Coherent V&V across multiple system levels, led by Richard Beasley, System Engineering Specialist, Rolls Royce plc. During their discussions, each group was asked to address the same set of questions as they related to their topic. The wash up session was chaired by Rick Adcock from Cranfield University and included group feedback and a plenary discussion.

All groups emphasised the importance of separating the ‘V’s in V&V. Verification and validation are fundamentally different processes and this needs to be recognised during the whole of the systems engineering lifecycle. The difficulty of developing good specifications was highlighted, particularly in the context of service oriented architectures, but the importance of doing this was fully recognised and, in addition, that of building trust between suppliers and customers, which is a vital prerequisite to managing shortcomings and changes to the specification. The discussion highlighted the relative infancy of system engineering processes in industry with several speakers emphasising the lack of application of known good practice. Particular examples were raised of requirements being set that were impossible to verify.

The groups were in agreement that poor verification or validation resulted in sub-standard system performance and cost and time over-runs, so it is surprising that there is not more interest in getting it right in projects. The importance of the whole team understanding the boundaries and the contexts for systems developments was raised, but it was acknowledged that roles and responsibilities for driving verification and validation were often unclear in complex programmes.

Colin Brain
Mike began his long and distinguished career as an undergraduate apprentice with A V Roe & Co in 1963 going on to work in the Aerodynamics Department, Flight Simulation and Flight Control Sections at Hawker Siddeley Aviation until 1968. He gained a PhD in ‘Synthesis of Optimal Modal Control Systems’ from the University of Salford in 1972.

While at Salford, Mike built an international reputation in Systems Engineering, particularly with regard to the development of super-value, advanced technology, highly integrated complex systems for the defence industry. Also at Salford, Mike worked with the USAF Flight Dynamic Laboratory at Wright Patterson AFB for many years on the development of active control applications for the YF-16 and Advanced Fighter Technology Integration programmes.

From the mid-1980s, his interests widened to include land and seas systems and his long-term association with BAE SYSTEMS involved both research and the development of new Systems Engineering courses for the Company. The first Advanced Systems Engineering MSc Course was offered in 1987 followed later by the one week short course in Systems Engineering: both of these courses are still servicing the needs of BAE SYSTEMS engineers today.

In 1998 he was headhunted by Loughborough University to take up a position as Professor of Systems Engineering where he played a key role in establishing the Systems Engineering Innovation Centre and continued to work with a range of national / international industrial and academic institutions on defence related topics such as evolvable systems, ‘smart’ and ‘open’ systems architectures, architectures for intelligent autonomous systems, decision making in autonomous systems and Systems Engineering techniques for capability development. In recognition of his expertise he became UK Panel Member for the NATO Systems Concepts and Integration Panel, a member of the UK National Advisory Committee for Systems Engineering and of the Royal Academy of Engineering Working Party on Systems Engineering.

Mike had huge experience of applying systems ideas and approaches to the development of large scale defence systems – he was a ‘real’ Systems Engineer and his knowledge and unique perspective will be sadly missed.

International Symposium

18th Annual International Symposium of INCOSE, 6th Biennial European Systems Engineering Conference
15-19 June, the Netherlands

Theme: “Systems Engineering for the Planet”

The symposium theme “Systems Engineering for the Planet”, addressing the expanding scope of Systems Engineering application and responsibility. Examples of this expanding scope are Safety & Security, Disaster control, Resource efficiency, Infrastructure, Transportation systems, Climate Impact, Water Management, Education & Government, Sustainable developments... you name it.

New! Sub-Theme Tracks

A novelty for this event will be a set of 3 Sub-Theme Tracks, focussing on the application of SE in complex consumer and industrial systems, transportation systems and water management & flood control. Each of these STT's will span one day and address the topic via an introduction, several related papers, an on-site visit and a closing panel discussion.

Technical Program

The INCOSE International Symposium in 2008 provides this year’s premier international forum for participants from Government, Industry and Academia to learn more about Systems Engineering, and to share knowledge on the most recent innovations, trends, experiences and concerns within the profession of Systems Engineering. The Technical Program is the core of the Symposium, and the common focal point for networking for the more than one thousand participants who will attend the 4-days event.

In addition to the high quality paper presentations and panel discussions, tutorials addressing different in-depth topics will be held throughout the Symposium. This year ALL the tutorials will be available to the delegates to sign up for, at no extra cost – just note your preference during registration.

The Technical Program will address general Systems Engineering topics, (for different experience levels), in addition to thought provoking presentations related to the Symposium Theme: “Systems Engineering for the Planet”.

“Systems Engineering for the Planet” is concerned with achieving balanced solutions that account for the social, technological, economic, environmental, and political constraints, in whatever your system or product of interest may be. This concerns the traditional Systems Engineering areas within INCOSE e.g. the defence industry for security & terrorism control; the aerospace industry for transportation systems; and space industry for earth oriented satellite systems. Examples of other systems from newer areas within INCOSE include the civil construction industry and automobile industry, to name just a few of the diverse span of interest areas.

Website and Registration

Registration opens soon, so keep an eye on the conference web site at www.incose.org/symp2008

"Come and join us to make this a great event!"

Paul Schreinemakers, General Chair of the Host Committee
Events

Dates to Note

- 22 May 2008 sees our second 1-day symposium in Loughborough, details and registration to follow by end of March.
- It is proposed to hold a joint IET/INCOSE event on Architecture, the event will take place in London, details to be confirmed.
- 24-25 November, INCOSE UK Autumn Assembly. Our annual 2 day event featuring presentations and workshops on current Systems Engineering issues. This event is still in its planning stage. Anyone who has a suggestion on possible session themes for this event should send them to r.d.adcock@incose.org

Planned Events

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<tr>
<th>Date</th>
<th>Type</th>
<th>Location</th>
<th>Theme</th>
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<tbody>
<tr>
<td>22 May 2008</td>
<td>1-Day Symposium</td>
<td>Loughborough</td>
<td>Technology Lifecycle Management</td>
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<tr>
<td>15-19 Jun 2008</td>
<td>INCOSE International Symposium</td>
<td>The Netherlands</td>
<td>SE for the Planet</td>
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<tr>
<td>Date tbc</td>
<td>1-Day Symposium</td>
<td>London</td>
<td>An IET/INCOSE event on architectures and architecting, detail tbc</td>
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<tr>
<td>24-25 Nov 2008</td>
<td>INCOSE UK Autumn Assembly</td>
<td>TBC</td>
<td>Range of workshops on Systems Engineering topics of interest, includes annual INCOSE UK AGM</td>
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<tr>
<td>Jan/Feb 2009</td>
<td>1-Day Symposium</td>
<td>Opportunity for local communities to help run a 1 day event, with support from UK events committee</td>
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<tr>
<td>27-30 Apr 2009</td>
<td>INCOSE UK Annual Spring Conference</td>
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<td>May/Jun 2009</td>
<td>1-Day Symposium</td>
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<td>Sept/Oct 2009</td>
<td>1-Day Symposium</td>
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<tr>
<td>Nov 2009</td>
<td>INCOSE UK Autumn Assembly and AGM</td>
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Events Notices

We would like to continue the 1-day events into 2009. Local members in Bristol and Loughborough have already taken up the challenge of helping to organise a national 1-day event in their area. These events are run under the UK events team, with fully support given in budgeting, organisation and on-line registration. Local organisers are asked to come up with a theme and content and local organising support to help run the event. If you think you might be interested, contact me at r.d.adcock@incose.org for more details.

Rick Adcock
Events Director
INCOSE UK

If you have an event you would like to have publicised to the UK Systems Engineering Community through Preview or ePreview, or wish to contribute an article, please contact:

Newsletter Editor
Malcolm Gardner
malcolmg@obsgroup.uk.com
or call 01582 713737

Communications Director
Gordon Woods
gordon.woods@incose.org

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Not an INCOSE Member?
Join INCOSE UK To-day!

What would I be joining?
By joining the UK Chapter you also obtain full membership of INCOSE.

How do I join?
Download the application form and direct debit form from our web-site at www.incose.org.uk/joining.htm or contact John Mead at john.mead@incose.org.

What are the benefits?
- A UK and world-wide forum for systems engineering
- UK and International Interest groups, Working Groups and Conferences
- A chance to influence the way Systems Engineering develops
- The opportunity to network and learn from other Systems Engineers
- Regular newsletters and Journal from INCOSE and the UK Chapter.

What does it cost?
Full members pay £72 per annum (reducing to £68 if paying for a full year by direct debit). Students pay £20 per annum.

Membership subscriptions are allowed for tax relief. The UK Chapter has been approved by the Board of Inland Revenue under Section 201 Income and Corporation Taxes Act 1988.