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engineering

# preVIEW

International Council On Systems Engineering UK Chapter Newsletter

January 2004

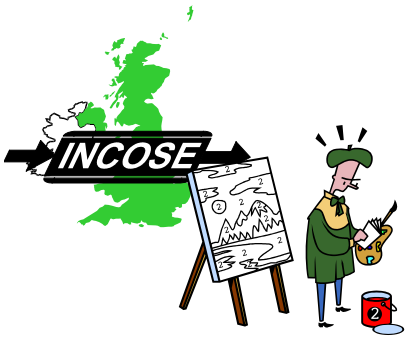
## INCOSE UK Celebrates 10 Years

2004 holds a number of anniversaries, for example it's the 200th anniversary of the first steam railway locomotive, and this coming September will be the 10th Anniversary of the formation of the UK Chapter of INCOSE making the organisation international.

A celebratory event is planned for September 2004 and further details will be announced in due course.

### New logo competition

To celebrate the 10th Anniversary of the UK chapter, the chapter board have decided to run a competition for a new INCOSE UK logo. The competition is open to all INCOSE UK members and we are looking for entries by the 31st March 2004.




The winner will be selected by the UK Chapter Board and will receive a copy of Prof Derek Hitchin's new book *Advanced Systems Thinking, Engineering, and Management*. The winner will be announced at the Spring Conference to be held on 26th to 28th April 2004.

As far as guidance to entrants, anything goes, but it should project a UK identity to the other INCOSE chapters. The INCOSE "pointer" is not an essential part of the logo. Designs do not have to be a fully finished electronic logo - sketches that can be worked up into a full design are fine.

Please send all entries to:
John Mead
J.Mead9@ntlworld.com or 20 Beehive Lane, Binfield, Berks RG12 8TU

## Election of INCOSE members

I am pleased to congratulate the INCOSE members recently elected to the Board of Directors and Member Board:

President Elect: Paul Robitaille
Treasurer: Pat Hale

Member Board Regional Representatives:
Cathy Plowman, Region I
Ralph Hill, III, Region II
Gert-Jan (Jack) Ransijn, Region III
Mike Eagan, Region IV
Jonette Stecklein and Steve Sutton, Region V

Let me express my gratitude to all the INCOSE members who ran for office. We appreciate the effort they invested in the election and look forward to their continued service to INCOSE.

I also wish to thank Ken Ptack for chairing the Nominations, Elections, and Leadership Development Committee; and Bill Miller, Christine Rusch, and David Wright who served on the Committee.

Finally, thank you to the INCOSE members who took the trouble to vote in the election – we appreciate your interest and participation!

John Snoderly
President INCOSE

INCOSE
INTERNATIONAL COUNCIL ON SYSTEMS ENGINEERING

## Something old something new

Get ready to enjoy some great tutorials at the INCOSE UK Spring Conference 2003. Every year we put on a selection of tutorials at the Spring Conference. They provide an opportunity to develop or extend your SE skills in the capable hands of some of the leading figures in UK Systems Engineering. Their commitment to INCOSE means that you get the very best at an affordable price.

We try to ensure that there are tutorials to suit a range of abilities and needs, from the novice Systems Engineer, to the career SE seeking skill development. The proposals received so far indicate that we are in for a vintage year, and the only problem that I am faced with is deciding how to down - select to a manageable number for the conference brochure.

We have been offered repeats of Matthew Hause's ever popular introduction to UML for SE, and the interactive and much acclaimed requirements management simulation from Bob Dale.

Continued page 2

Printing and distribution of Preview is kindly sponsored by University College London's Centre for Systems Engineering

UCL SYSTEMS ENGINEERING

## in THIS ISSUE

The tutorial call has lured Derek Hitchins from his burrow to offer "From Problem Space to System Solution". Peter Sydenham, another INCOSE stalwart, is proposing to talk about the SE extras needed in the detailed engineer's spectrum of knowledge, based on the contents of his new book.

Jon Holt is offering an intensive workshop where building Lego robots is used to provide a hands on appreciation of how ISO/IEC 15288 could be implemented on projects. Jeremy Dick in "Filling the Systems Engineering Sandwich" offers a process that combines requirements-driven and model-based system development.

Alan Smith of UCL has a pragmatic approach to systems engineering for small organisations, and Nick Foscoe has put in a late offer, no doubt to be based on his extensive consultancy for i-Logix. George Capel proposes a half day session to explain his SE model.

If this has whetted your appetite, or made you think of a colleague or mentee who would benefit from attending Tutorial, now is the time to stake a claim on the training budget. Combining a relevant tutorial with 2 days of thought provoking presentations, and an opportunity to network with Systems Engineers from different backgrounds, makes an excellent training package. And people new to INCOSE will of course get the opportunity to read the SE *Journal*, *Insight* and *Preview* over the coming year to back up the experience. What a bargain!

Full details of the final tutorial offerings will be published on the web site and the conference brochure soon. In the meantime, if you have any views on what makes a good tutorial or questions about the tutorial programme, then let me know.

Peter Lister
Siemens Transport Systems
Peter.lister@siemens.com

## In profile Col. David Wright, INCOSE Members Board Director, Region III

Colonel David Wright has a first degree in Physics. He is a member of the British Army's Royal Electrical and Mechanical Engineers, has held a variety of regimental appointments in UK, Cyprus, Germany and the Outer Hebrides, and has commanded units at all levels in the field force. He has spent a number of years at the Royal Military College of Science, Shrivenham, gaining an MSc in Guided Weapon Systems and later both teaching there and creating a new MSc Course in Defence Technology. He has held a wide variety of staff appointments in UK MOD and in the Procurement Executive. He was appointed Project Manager UNICOM in 1997, the Army's largest information system, and subsequently was for 4 years the Integrated Business Team Leader for Project DRUMM, a new logistic information system being developed for the Defence Logistics Organisation. During this time, has was awarded an MPhil degree for a programme of part-time research into the application of systems thinking to the problems of Defence acquisition. Since May 2002 he has been the Future Programme Manager for the Logistic Applications IPT. He is a Chartered Engineer, a Fellow of the Institution of Electrical Engineers, and serves on the Membership Board and Board of Directors of the International Council on Systems Engineering.

***"What are the different challenges you face between your last role as SEPDC chair for INCOSE UK and your new role as members board director?"***

I suppose the most obvious difference is that I am operating at an international level, and so it is important to think about the differences in culture represented in our extensive INCOSE membership. There are also the practical challenges, for example trying to hold a telephone conference when the Member Board representatives extend from the US West coast all the way to Australia. However, in many respects the challenges are the same. INCOSE is a volunteer organisation and we all have a lot of commitments on our time. I found it was quite difficult to find people to help out with the organisation of events in UK and the same is so around the Member Board table. But I would make a plea to UK members to offer their services in whatever capacity they can. There are many ways in which you can get involved, and I am sure you will experience the same rewards and professional satisfaction that I have in working amongst a group of like-minded people across the world in furtherance of such an important subject.

***"What do you believe are the different/same issues faced by the Systems Engineering community in the UK compared to the US and the rest of the world?"***

There are very many similarities between SE in the UK and other countries. There is the familiar struggle to get SE recognised as vital when tackling the creation of complex systems, and of course the very familiar arguments about the scope and definition of the discipline. In the US, the defence and aerospace community is very strong, but I would say we probably have a broader base of different application areas in UK. I think we also have a better understanding of the soft systems issues over here, and I would like to see us bringing this aspect of SE to the notice of the wider community in some way or other.

***"How do you see INCOSE central being influenced by Europe and the UK, especially as the next president of INCOSE is a European?"***

Although a large proportion of INCOSE's members and many of its chapters are in the US, my experience is of a central organisation that is very aware of the needs of its international membership and both open and receptive in its outlook. It is really important that we continue to find good candidates in our elections for regional representatives, so that the needs and interests of European members can be made known to the organisation. But there are also lots of other ways to exert our influence, for example by taking part in technical working groups, and in other efforts such as the SE Handbook revision team. These are the best ways in which to influence and shape the way INCOSE develops and serves its members.

***"How do you plan to improve communication between the various INCOSE boards and the membership?"***

When the Member Board was established in January 2003, we decided that communication was one of our main purposes. We have tried to improve communication in both directions. We worked closely on the member survey which took place in the spring, and we are continuing to analyse the many useful comments which members raised. We are also planning the next survey which is likely to be shorter and more targeted at areas of concern. We were instrumental in getting the BoD to issue Key Messages from each of their quarterly meetings so that members can see what issues are being considered, and what decisions being made. I hope you have seen these Messages, either by email or through the UK Newsletter. We are also working with the INCOSE Director of Communications, a post which is to be filled by the outgoing Member Board Chairman David Long in January, to use additional communication channels and to make further improvements. I have detected a rather worrying trend amongst some members who criticise certain aspects of INCOSE activity, but at the same time are reluctant to step forward to help address the problems. While we will continue to listen as best we can, I would appeal again for people to get involved rather than just sitting back and complaining.

***"What are your views on the US's approach to the certification of Systems Engineers, given the comments raised at the Autumn Assembly?"***

I have already passed on the comments which UK members raised in Milton Keynes. I have also made formal comments in a similar vein on the detailed plans which are being developed by the Certification Working Group. We have to recognise that there are wide variations across the world in how formal recognition of SE's should be handled. The main focus of the current effort is on the US market, but the team recognise the need to expand their work soon to see how best it can be made to fit with each overseas national circumstance. I expect some countries to adopt the US model wholesale, some to adopt it with changes, and others who are already well served who will not adopt Certification at all. What we will need is some effort in each national chapter to work out the best scheme. In the UK, I expect this work will emerge from our cooperation with the IEE.

**In** profile next time, Peter Lister, Treasurer, INCOSE UK

## President's corner

Happy New Year to all our members. I hope you all had a great Christmas and New Year. I'm sure that many of us, as systems engineers, will have been keeping a very interested eye on the events surrounding the Beagle 2 mission to Mars and will have felt the disappointment that the project team must have gone through over the period from Christmas Day into the first week or so of the New Year, when it became apparent that contact with the craft could not be established. Those of us who have been involved in large development projects will remember the nervousness of the first trial but in most projects one can see everything that is happening, often with extensive instrumentation so that even if something goes wrong the trial yields information about what has happened, one can look for the "lessons learned", correct the errors and conduct another trial, with eventual success, albeit at increased cost and time. My sympathies go out to the Beagle 2 team since they must feel a great sense of frustration that they are unlikely ever to find out what happened to the craft. Did it make a successful descent? Did it land successfully? Did its deployment fail somehow? In such a complex and hazardous mission there are numerous possible failures and without the communication links any telemetry on board is of course totally lost. However, the team are to be congratulated on having the vision and courage to embark on such a mission, with of course significantly smaller resources than the corresponding American project, and on getting so far successfully. The mission certainly raised public awareness and excitement about space systems projects and, together with the announcement by President Bush of the American intent to undertake manned missions to Mars in the coming decades, it raises some very interesting systems engineering discussions. Not least is the question of whether such missions should be manned or unmanned. As modern information (and other) technologies enable us to conceive and implement sophisticated uninhabited systems with varying degrees of autonomy, the question of the balance between human and technological issues becomes increasingly common ... and critical ... for systems engineers. I would welcome any thoughts you may like to send in to the newsletter editor on this topic. Should President Bush's vision of missions to Mars be manned or not?

On another topic: this year sees the 10th anniversary of our Chapter. The UK Chapter has the distinction of being the first to form outside North America and we have been an active, enthusiastic and valuable contributor to INCOSE ever since. We are also one of the largest Chapters. To mark the Anniversary the UK Board is planning an event, probably around September to match the actual month. We would be very keen to hear from anyone who was involved in the early days ... particularly in the inaugural event at Shrivenham. We have the group photograph of that event and of course many of those present are still actively engaged in the Chapter and they deserve particular thanks for their enthusiasm, commitment and contributions over the years. When we try to contact those present in the coming months there will, no doubt, be some who have moved, retired etc and are difficult to trace and there may even be some who do not appear in the photograph at all. So, if you know of someone who was at the UK Chapter inaugural event please ask him or her to contact us. We would like to make this important anniversary as memorable as we can and the inaugural pioneers deserve special mention.

Prof Phil John
President of the UK Chapter

## Systems engineering innovation centre in the east midlands

Loughborough University and BAE SYSTEMS are well advanced in their plans for establishing a £59 million Systems Engineering Innovation Centre (SEIC), in partnership with the East Midlands Development Agency (*emda*), which is investing £4.5 million towards this venture in order to help enhance the performance of East Midlands businesses.

The centre, which will be sited at Holywell Park on the Loughborough University campus, is aimed at improving the engineering skills for innovative companies in the region and the UK. This may include diverse disciplines such as mechanical, electrical, electronic and software engineering working in tandem with people, processes, tools and technology to develop integrated systems and capabilities. The Centre will also help companies adopt new and emerging technologies in this field through teaching and training.

This investment will be focused on setting up state-of-the-art research facilities, including synthetic environment laboratories, virtual engineering and rapid prototyping capabilities, conference and exhibition facilities as well as a highly integrated communications infrastructure. Such an infrastructure will position the SEIC to fully address modern day challenges associated with increasing product complexity, degree of integration, risk and novelty.

To date, this new UK initiative has set up a programme of research which is focused on systems engineering, in general, and the salient issues associated with the development and evolution of complex and inter-active technologies, in particular such as;

- Evolving system complexity through change in requirements and/or uncertainty
- Product evolution, lifecycles and obsolescence: basically, from concept through to sustainable maintenance
- Human factors and human interactions: Man-machine integration within the ambient, intelligent, environment
- Information and data processing, knowledge management and data dissemination, exploitation and security
- Intelligent autonomy and decision making
- Monitoring and diagnostics; leading to self analysis, re-use and reconfiguration and, possibly, self-assembly
- Modelling, simulation and prototyping

For the East Midlands, aerospace, automotive and transport, food and drink processing, medical technologies as well as the clothing and textiles industries will benefit greatly from the expertise that this systems engineering centre will offer.

Martin Briggs, chief executive of *emda*, said: "Our ambition to make the East Midlands a top 20 region by 2010 can only be achieved if businesses, our partners and the people who live and work in the region come together and put their hopes and dreams into making it happen. The development of this centre will be a key way to do this, narrowing the productivity gap between our global competitors and ourselves. It will support existing East Midlands manufacturing companies to

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If you are looking to contact the Systems Engineering Community in the UK, why not place an advertisement in preview?

For more information about our competitive rates please contact:

John Mead on 01344 422325
or
email: john.mead9@ntlworld.com

exploit new ideas to increase profitability and improve their processes. The centre will also attract businesses from outside the region to use its services.

The SEIC will aim to enhance and deliver engineering capability and meet future customer requirements with increasing pace and quality through the coalescence of five attributes, namely technology, people, knowledge, process and facilities within a systems engineering framework to deliver a holistic, enhanced and optimised capability.

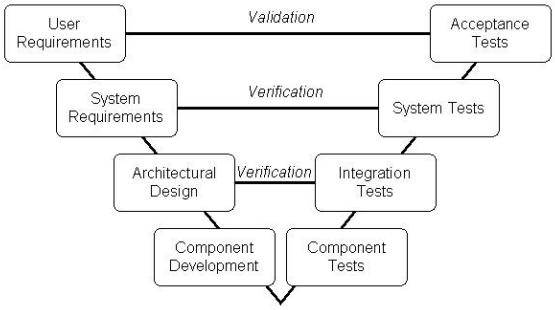
Systems engineering is also at the core of many future products and the skill itself is becoming the future face of engineering. In this context, training opportunities at the Centre are expected to play a very important role in enhancing the UK's overall competitiveness.

For more information please visit the website http://www.seic-loughborough.com or to register a company interest please call 01509 225874

Ayman El-Fatatry
Customer manager, SEIC
Loughborough University

# Soft systems—another layer to the 'V'?

*Father Brown laid down his cigar and said carefully: "It isn't that they can't see the solution. It is that they can't see the problem". (G K Chesterton, 1929)*



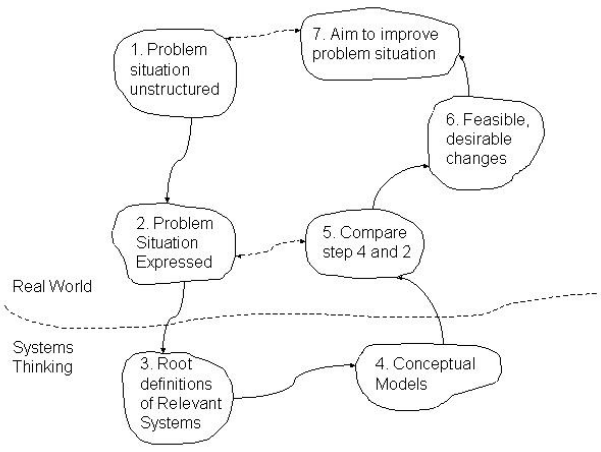

**Introduction**

Dr Sue Holwell gave a fascinating insight into soft systems thinking during the recent Autumn Assembly. This article is based on some experiences applying Soft Systems Methodology (SSM), and offers thoughts on how soft thinking could complement 'hard' systems engineering. However, the intention is to stimulate a lively debate so I look forward to your critical appraisal!

**Hard Systems Thinking**

Our minds solve problems by applying a framework of ideas, concepts and methods to an area of interest through our individual perceptions, experience and understanding of reality. Some areas of interest are clearly defined and quantitative problems, allowing us to re-use scientific theories and common themes whilst progressively developing a solution to that problem. Systems engineering is an example of a framework for dealing with these hard problems. The systems engineering life cycle can been illustrated as a V-model, with the requirement definition and system design activities linked to associated validation and verification activities. The emphasis is on the progressive reduction of risk and the delivery of a balanced system that meets defined user needs. It would be fair to state that the hard systems approach assumes a goal - problems can be solved by the progressive definition and realisation of tangible solutions.

**Soft Systems Thinking**




Hard problems are relatively straightforward to visualise, decompose and understand at varying levels of abstraction. However, real world systems include humans and depend on the unpredictable responses and conflicting objectives, perceptions and attitudes inherent with a human activity system. These soft problems are harder to understand and define, so can only be tackled by improving the problem situation rather than by solving the problem outright. Perhaps we could look at soft systems as assuming situations can be improved by human activity and may be supported by tangible solutions.

**Soft Systems Methodology**

Soft systems methods have developed to take a systemic approach to unstructured problems, recognising as Chesterton did that it is as important to see the problem, as it is to find a solution. There are several, including ETHICS, Multiview and SSM. The latter was developed to tackle unstructured problems through a holistic approach based on systems theory, recognising that systems are embedded in a wider human and organisational context. The original version of SSM is a seven-stage model, although the methodology has evolved into a framework for exploration based on interacting logical and cultural streams of analysis. The original model is illustrated here as a sequential process, in spite of Checkland's observation that "thinking of SSM as a seven stage process is how neophytes regard it. More sophisticated users who have internalised the mosaic of activities tend to use it much more flexibly." This neophytic author would never lay claim to sophistication!

Applying SSM

- Combining SSM with other methodologies has been the subject of considerable research, often highlighting the potential conflict between soft and hard paradigms. The alternatives can be summarised as:
- Embedding into other methodologies by applying SSM to investigate discrete issues within, for example, the feasibility stage of a structured analysis. Whilst beneficial for understanding issues better, this approach does not take advantage of the holistic nature of SSM and the richness of the findings can be lost.
- Using SSM at a macro-level as an overarching framework, with hard methods embedded within the methodology. For example, describing current systems using data-flow diagrams or entity relationships can complement the use of rich pictures to express the problem situation at step 2. Alternatively, a hard methodology can be used to realise steps 6 and 7, the definition of feasible and desirable changes and action to improve the situation.

The controlled transition from SSM to a structured method, retaining the softer concepts to demonstrate that the situation has been improved is the approach proposed here as an additional layer to the V-model.

**The Problem Situation**

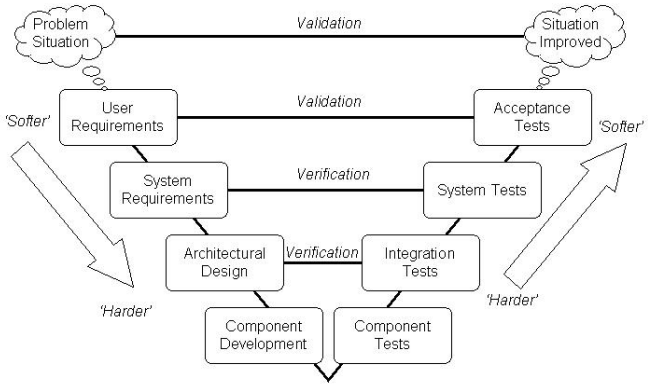
SSM encourages the analyst to explore the problem situation rigorously, rather than to develop a solution to a perceived problem, or even to define a problem that fits the preferred solution (you will recognise my MOD background!). This problem and solution independent thinking identifies conflicts and stakeholders that would not otherwise arise. For example, applying SSM during a study into a marine safety management information system identified a mutual dependency between marine safety and environmental legislation and policies. It is unlikely this dependency would have been identified so early in the project under a hard systems approach, and may only have been understood after the system was implemented. The systems thinking phase of SSM defines root definitions and builds conceptual activity models that are independent of physical systems – they comprise human activities that may or may not require tangible solutions, or enhanced processes, or improved operator skills and training. Agreed and so defensible root

definitions and conceptual models will be free of individual preconceptions and promote a true capability gap analysis of the problem situation. Having assessed how well each required activity is conducted in the real world, we can use the shortcomings as the basis for developing and justifying the user requirements. Thus it is sensible that a soft systems analysis precedes the definition of the user requirements and the transition into the hard world of solutions.

**The Situation Improved**

Having defined requirements, designed, implemented and integrated the system components, we verify and validate the system. Validation is the confirmation that the requirements for a specific or intended use have been fulfilled. A hard methodology validates the system through objective evidence, ensuring that the actual system meets measurable stakeholder needs. However, there are numerous examples of a new system having a negative effect, even though the system meets accepted requirements. Social and cultural influences and the impact of a new system on the operational and organisational context are often ignored by a hard approach. The SSM conceptual models can be reused during the acceptance processes by providing three overarching success criteria defined as the '3 Es':

- Efficacy (Does the means work)
- Efficiency (The amount of output against the amount of resources used)




- Effectiveness (Is the transformation meeting the longer term aim)

We can use the conceptual models as a final check that the delivered system has improved the problem situation by comparing the conceptual activities against the problem situation that now includes the new system, and by validating the new real-world situation against the 3Es.

Thus we have introduced an additional layer to our familiar "V" model, with a transition from soft to hard thinking as we refine the problem situation into a statement of requirement, and then from hard to soft as we ensure the system delivers the requirements within the operational context and does improve the situation:

Summary

To summarise the ideas outlined above:

- Hard system engineering progressively develops a tangible solution to a problem; soft system thinking improves a situation through supported human activity.
- SSM can be applied at a micro or macro level, or as an additional layer to a systems engineering framework.
- A soft systems approach encourages a holistic view of the situation rather than focusing on the perceived problem or solution. This identifies the real stakeholders, avoids 'solutioneering' and scopes the problem in the context of legacy systems and processes.
- The root definitions and conceptual modelling encourage stakeholder involvement and buy-in during the early stages of a project, and provide an abstract representation of what is needed to develop and justify the user requirements.
- Maintaining the rich pictures, root definitions and the conceptual models provides a vehicle to demonstrate that the system has improved the problem situation – another layer to the "V"!

Simon Hutton
Principal Consultant, 3SL
simon.hutton@threesl.com

1. Arnold et al: "*Systems Engineering – coping with complexity*" (1998).
2. Mumford: "*Effective Requirements Analysis and Systems Design: The Ethics Method*" (1995).
3. Avison and Wood-Harper: "*Multiview: An exploration in Information Systems Development*" (1990).
4. Checkland: "*Systems Thinking, Systems Practice*" (1981).
5. Checkland: "*Soft Systems Methodology and its relevance to the development of information systems*" (1995).
6. CCTA: "*Applying Soft Systems Methodology to an SSADM feasibility Study*" (1993).
7. ISO 15288: "*Systems Engineering – System life cycle processes*" (2002).
8. Checkland and Scholes: "*Soft Systems Methodology in Action*" (1990).

## Events calender

### FEBRUARY

5th - 6th February 2004

6th Annual Conferencee of the UK Chapter of the Systems Dynamics Society. For more information visit Www.uksds.org

17th February 2004

Stevenage Local Group "Beagle 2 - Systems Engineering the Final Operations Phase and the Search for Contact" at EADS Astrium, Stevenage, start 6pm

### APRIL

15th April 2004

Stevenage Local Group "Systems Engineering - A global Perspective" by Robert Halligan at EADS Astrium, Stevenage

26th - 28th April 2004

UK Spring Symposium. Details to be announced

### JUNE

20th - 24th June 2004

14th Annual International Symposium & 4th European Systems Engineering Conference - Toulouse, France
www.incose.org/symp2004/

## Planned events:

### London local group

**Mid** April 2004

"Systems Engineering Management Plan Workshop" venue TBC

**End** June 2004

"West Coast Main Line Requirements Case Study" Network Rail, Eversholt Street TBC

If you have an event you would like published in Preview then please contact:

d.cowper@ucl.ac.uk

# Book reviews

## Successful proposal strategies for small businesses 3rd edition by Robert S. Frey


**Overview**

A large number of INCOSE members are part of small consultancies, software houses, or even one man bands.

One area in which SMEs consistently under perform in is the preparation and presentation of proposals, and to be honest it's the one area a small business has to be highly effective in, because without this much neglected skill your business as a whole will fail.

Proposals are neither a black art nor a product list. They are the basis of your contract with the client and the final proof that you meet their overt and implied needs.

Any book that can give you a hand in managing and designing the process and content of these critical documents is a boon, and this handbook definitely contains some good points. Howeer, it is extremely focused on winning US Government business and the resource level assumed within a bidding company is higher than a lot of members' companies could field. But in the context of bidding for US Government work I'd put this down as an essential reference, and it also contains some good solid ways of improving your proposal game.

The following review looks at the Organisation and Content of the book, and highlights some of the more universally applicable processes and advice that are buried, though not too deeply, in it.

**Organisation**

Even though this book is intended to be a reference work and not a teach yourself proposal management text the structure still is overly focused on winning Federal Government business. It doesn't work up from general proposal principles and methods and then apply them to specific situations; this tome dives straight into getting business and business support from the State.

However the book is clearly laid out, and as you would expect from a proposals professional, pretty clearly written, though it suffers from a slight overdose of consultancy speak and the American habit of using three long words when one short one will do.

**Content**

Unless you are going to partner with a US company, or bid for federal business yourself, you don't really hit generally useful principles and systems until around page 135 of this 500 plus page book.

However, when you finally find them it's good stuff, though the level of resources assumed for a genuinely small company is rather high.
It uses a life cycle model that is fairly complete and comprehensive, though it still focuses to an extreme extent on selling to the US government.

Most importantly it hammers home the essential lesson that a proposal is not something you need to run off as an afterthought, or as a document set that requires little or no creative thought. It is a core company activity that is essential to close a deal, and requires its own systems and management to ensure an effective final product.

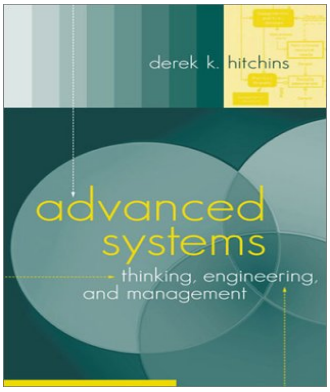
This book includes a CD ROM which contains a number of good links for the American user, and sample PDFs for printing out forms shown in the book. It's a nice touch and a useful resource, though Microsoft Word and / or Excel would have been more useful.

**Conclusion**

This is not a 'must have' book if you are solely concerned with work in the UK.
However if pitching for major US Federal Government work, or partnering with a prime contractor that is, I'd consider this an essential reference, even if it's just to give you the specific Federal bid vocabulary.
Also as an aid to pitching to the EU this book would be a useful guide.
ISBN 1-558053-332-9 Hardback Publishers Artech House retail £69-00. pp533

Ian Brogan
Henry Butcher International Ltd

## Advanced systems thinking, engineering, and management by Derek Hitchins




In some ways I feel very under qualified to review this book; I've never considered myself a 'proper' Systems Engineer, or indeed an improper one. So I felt a certain degree of fear in reviewing Professor Hitchins' latest work, thinking that I'd bounce off it.

Well I haven't, the chief reason being not my innate brilliance but the author's care and attention. His book is written in a crystal clear and lucid style that I wish was more common in technical works, which are usually couched in pseudo technical terminology that obscures the content and does not illuminate the subject.

This clear style is supported by the breadth and depth of the author's knowledge and experience, which provides a solid base for what I have found to be an excellent book.

Instead of the IT bias of a lot of Systems Engineering books, or a focus purely on aerospace and defence sector, the book includes a wide range of examples from marketing, social engineering and history, demonstrating that Systems Thinking and Systems Engineering can define, and help solve, a problem in any field.

This breadth of examples not only shows the general applicability of Systems Thinking and Systems Engineering beyond the 'big shiny toys' of major technological processes and projects; it also helps engage the reader and shows that the general principles used have a utility that should have a much wider spread of application, not only for the good of Systems Engineering as a discipline but for general welfare as well.

More importantly the audience that can appreciate this book is a lot wider than INCOSE members; give this book to any decent undergraduate studying the "Hard" or "Soft" sciences or any form of engineering and they will obtain a direct benefit from it. Those more numerate in marketing and business studies would also have no difficulty in deriving considerable benefit from it, as it shows a route beyond the basic flowcharts and pseudo statistics that are usually used for problem definition, decision making, planning and management.

The book's accessible style is also complemented by a logical structure and a sensible chapter length, and the content supported by a wide range of exercises. These aren't trivial factors; ensuring accessibility is a responsibility that many an author does not fulfill. This is a mistake that Professor Hitchins does not make.

The author works from basic principles of Systems Philosophy to practical Systems Engineering, and moves on to practical Systems Methodologies. He also unfolds a five-layer classification for systems engineering, from artifacts to socio-economic systems. This shows that systems thinking isn't concerned with a reductionist view of a problem, and doesn't have to grind things down to a featureless paste,

which is then injected into a project management mould.

It shows a problem as something "alive", dynamic and non-linear. In the past, as a marketer of SE tools (3SL's Cradle), I've noted a fixation on a more linear, project management style of SE that generates something which may be less effective and efficient than a true holistic and organismic approach, but gives you something that you can show as a to-do list and a set of activities that can easily be understood and cost-accounted.

The author recognises and highlights this fundamental practical problem at the heart of the promotion of the practice of holistic Systems thinking and Engineering: proving that you actually get a business benefit.

We 'know' that SE can make a programme or project much more likely to succeed, more efficient and effective, more able to adapt to changing circumstances, more able to respond to stakeholder needs. Indeed we 'know' that the application of Systems Thinking at the definition stage of a problem should mean a solution would be delivered that actually solves a real problem. The lack of business-orientated metrics that Systems Engineers can use to demonstrate benefit is one of the most serious difficulties that face INCOSE members, and again Professor Hitchins shows this in a strong, lucid style.

This book's appeal also benefits from the personality and opinions of the author. A lot of writers in the management and technical area try hard to wipe their personal imprint from the page, in an attempt to be balanced. Well, Professor Hitchins has strong opinions and although more experienced and skilled practitioners than I may disagree with some of those opinions, his reasoning and the basis behind them is rigorous and accessible. This is another hook that engages the reader.

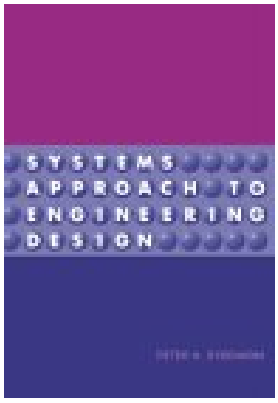
I think anyone with a serious interest in SE, its basis, and practice will want this book. In fact the only niggles I have concerning it are the book's format; its classic text book size and mono printing reduce the legibility of some of the otherwise excellent diagrams. I also prefer fat margins for pencil notes; and this is one book where you end up writing a lot of notes.

This is a book that should have a permanent place on any Systems Engineer's bookshelf, except that you'll keep taking it down to read. Of greater importance is that it can be read with equal benefit and interest by a wide range of professionals in so many other fields.

Ian Brogan
Henry Butcher International Ltd

## **Systems** approach to engineering design by Peter Sydenham

**ISBN 1-58053-479-1 published by Artech House**
**(www.artechhouse.com)**
**£62.00**




In this book, Professor Peter Sydenham has set out to cover the application of Systems Engineering from the point of view of a team leader in an engineering design environment. In doing so he looks beyond the purely technical aspects covered in most first engineering courses and addresses the many other issues that a competent engineer has to consider. The book is targeted at those who aspire to team leadership or want to take on increased team interfacing responsibilities. It builds on the material provided in engineering courses to provide a bridge into the real world of engineering design.

Professor Sydenham has developed the content for this book over 15 years of delivering courses to new and mature students, graduate and undergraduate engineers, and applied scientists. You can therefore be assured that the content has been thoroughly field tested and improved by user feedback. He has been an enthusiastic member of INCOSE for many years and has made frequent contributions to both UK and International events.

The book starts in a fairly conventional way for an SE book by addressing Systems Thinking, Systems Engineering, Systems Design and Project Management. It then covers Design Team Formation and Staff Selection, which are "soft" areas that have an enormous impact on the quality and productivity of a design team. Despite its importance, this aspect of Systems Engineering is seldom discussed. A design team needs IT support, and so the next chapter covers IT in Support of Design. At this point the book moves into what for me are its most interesting sections, with chapters covering a wide range of design considerations:

- The Design and Development Task
- Design Concept and Requirements Development
- Establishing and Selecting Design Choices
- Optimising a Design Suitability and Operability Aspects of a Design
- Legal and Security Issues
- Prototyping and Modelling in Design

The more difficult issues such as design optimisation are seldom covered in standard engineering texts. There is a tendency to develop tunnel vision when designing a new artefact, and to move rapidly to the first solution that comes to mind. This solution may be adequate, but it is unlikely to be a worldbeater. The techniques identified in the book provide the means to examine an emerging design and look at ways to improve the less successful aspects. Some complex concepts are covered, which may prove a challenge for some readers – particularly those less experienced – but they are necessary for a complete coverage of the subject. Keeping the book to a manageable size means that some areas are only covered in a fairly superficial way. There is sufficient information for the reader to determine whether a particular approach is likely to benefit the task in hand, however, full implementation will require following up on some of the extensive references. The message from the book is that there are many techniques and approaches that can be used to enhance the design process.

Good use is made of examples to illustrate the points. The examples cover a range of industries and situations which should provide a better understanding of the issues involved.

Another feature of the book is that it makes it very clear that the engineer is likely to need support from specialists from other disciplines (e.g. legal, commercial, marketing etc.) to achieve the desired result. This is an important lesson – the design process needs much more than pure engineering, and the designer needs to be aware when assistance is needed. Overall the book is ideal for introducing new graduates to the complexities of real life design situations. More experienced engineers will also fill gaps in their knowledge from the book, and will want to keep a copy on their bookshelf for ready access when a new engineering challenge presents itself.

Peter Lister
Siemens Transport System

## **Software** review

## **Software** review - office undermined? Keynote might make the difference between giving Microsoft money or not

**Overview**

Remember overhead projectors? Used to be that making easily smudged, hard to correct, transparencies was a pain that every lecturer and business presenter had to endure.

Now every graduate student and salesman uses computer generated presentations, producing effects that would once have taken a mainframe to produce. To a greater extent than even their dominance of the word processor market, Microsoft could claim that they control the presen-

tation software market through their excellent product PowerPoint. I really mean it when I say an excellent product, I have made a lot of presentations, and PowerPoint is a relatively easy to use program with a host of useful features. If you're a professional presenter then PowerPoint is as important to you as Quark is to a graphic designer or Excel is to an accountant.

What this means in practice is that you end up with a very expensive piece of software; buy PowerPoint unbundled from Office and it can cost around two thirds the price of the complete suite. Ouch! Even with bulk discount or without VAT you are talking a bit more than lunch money to get this useful tool.

Until now you didn't have much choice, in fact in the Mac universe (like the DC comic universe but with less spandex) you had absolutely no choice - until now.

Keynote 1.1 is the very creditable release of Apple's home grown stand alone presentation program, and it's impressive, though not perfect. However, even in this early version, unless you have a really pressing need to use the other parts of the suite, such as document collaboration, you don't need to buy Office or PowerPoint to produce a very classy, professional presentation that is distinct, but not to way out.

**Ease of Use**
**Interface**

The term nice and clean comes to mind, there's a lot less clutter than the default set-up of PowerPoint. When you have a fair idea of what to do with PowerPoint that clutter becomes very useful, initially it's a pain in the rear.

On starting the program you get a default theme choice view, you do not get as many themes for a presentation as you do in PowerPoint, but they look a lot more up-to-date. That's not a trivial point, remember if you're presenting to a corporate executive they will have seen enough of the standard backgrounds that they will subconsciously tune out your presentation, unless you are very lucky. If you presenting at a conference (I used to produce them so take my word on this) your audience will have seen around 500 slides over a two-day event. Hence anything new you can get in backgrounds, without being tacky, is a definite advantage.

The interface as a whole is nice and crisp and doesn't blind you with radio buttons, compared with PowerPoint for the Mac, simplifying the interface considerably.

Why am I harping on about the simplicity of the interface? For the practical reason that in even the most enlightened, well resourced companies the first thing that gets cut is IT training, and some poor unsuspecting is usually told that they will "Pick it up as they go along".

Every hour you have to apply to learning a package in this organic manner is an hour subtracted from your primary work task, recreation or sleep. If you add in human nature that means two days before the essential presentation date you'll allocate some time to learning and doing, which will quickly mutate into thrashing about and panicking.

One very useful part of this program is the Navigator, which gives you a pdf style thumbnail view, and the ability to both indent and group slides. This is a powerful facet of Keynote, instead of having a monolithic slab of a presentation you can create groups of slides that cover a particular part of your pitch or subject and move them around or delete at will, without having to switch through various views, as you do in PowerPoint.

This means if you have a large company presentation or a library of presentations it's extremely easy to edit on a group basis. It also makes making this sort of library much easier to build and maintain, and though we all love being creative (yes you do) libraries are great labour savers and increase quality control, if managed and reviewed properly.

Aligning elements in Keynote is a doddle, using the Arrange menu you can align and distribute the objects in Keynote very easily. An X,Y co-ordinate box and a yellow alignment line pop up automatically, and you don't have to use the pointer to grab a particular part of the object boundary to move it, just click and hold the button down inside the object and move it.

I'm doing my testing on a 15" G4 PowerBook and in terms of WYSIWYG it's spot on, it looks as though I'm using a much higher level of graphical background, much more like the finished product on the projector's screen.

**Inserting and Animating Graphics, Adding Tables and Charts**

Graphics, spreadsheets, links to other files, all make their way into a presentation, though, whatever program you're using, links to other files are always a bit iffy, avoid if you can.

**Inserting Graphics**

Basically very easy, as in PowerPoint grabbing the corner handle allows you to resize.

**An Inspector Calls...**

Apple has introduced a very interesting way of managing the appearance and behaviour of objects within slides, by using a set of Inspectors. You can see in Keynote the effect of Apple's DTP and graphic design heritage, and this is especially strong in the Inspector floating palette approach. In addition the program gives, compared to PowerPoint, a considerable advance on the control of an image, including control of the opacity on the inserted image: This precision is a very welcome change from the hacking around one usually has to do in PowerPoint.

I like the way the floating Inspector palette gives a centralised control point for managing various aspects of the slide's objects.

Animation is via the Build inspector, where you can "Build In" and "Build Out" an object. It's a lot easier to get round than the Custom Animation box you get in PowerPoint, a lot clearer and a lot quicker to use.

**Tables and Charts**

In this area I personally find clear superiority over PowerPoint, it is extremely easy to produce a table, you just press the button on the tool bar and you get the appropriate Inspector palette pop up.

Again crisp and sensible, easy to use and configure.

**Charts**

Again, you click the appropriate button and just do it, its simplicity becomes boring!

**Transitions, beyond fade**

This isn't something I can show in print, so I've taken the liberty of using Keynote's ability to turn a presentation in to a QuickTime movie to show the way you can change from slide to slide. This and the "with graphics version" of this review can be seen on www.foxpop.co.uk. The only thing I will say is that, compared to the actual presentation itself, the QuickTime movie isn't as crisp, but it shows that in the major attention keeping area of transitions this is a superior program to PowerPoint Again this is controlled from the Inspector palette, as are the majority of the stylistic elements of the program.

**File Formats**

The main thing that will turn Keynote from a smart bit of software to a useful business tool is the non-Keynote file formats you can save its results in, and how effective it is in exchanging presentations with PowerPoint.

**PDF Export**

This is a very useful format, great for emailing as it shrinks the size right now, and for those that might not have PowerPoint a very useful way of sending a simplified slide show. In addition, as a non-executable file, a PDF is less likely to be blocked by anti-virus programs.

**QuickTime Movie Export**

This a very useful way of sending a file to someone else, and it preserves the eye-catching transitions

**PowerPoint**

The killer bit, and it's not perfect, but its very close.

**PowerPoint Export**

Apart from a couple graphics that needed tweaking it's fine, you end up with a nice, clean PowerPoint presentation, with the transitions changed to standard PowerPoint ones.

**PowerPoint Import**

Here's where the bug bites, I tried to import some pretty complex PowerPoints with plenty of imbedded graphics, tables and other elements and it didn't work. However simpler PowerPoints no problem, clean transference.

I've checked other reviews of this package, and this is not flagged as a general problem, and the corporate PowerPoints I was using are heavily customised, but from my own experience I can only give a 50% mark on PowerPoint import.

**Conclusion**

So should you put your hand in your pocket and buy Keynote 1.1? With a couple of provisos the answer is yes, but there are those two provisos.

If you are a professional presenter, and you use a Mac, and you feel that perfect integration with PowerPoint isn't the absolute top of your agenda then buy Keynote, even if you already have PowerPoint. The more polished graphical themes and the transitions it uses are worth, for such a professional, the £79.99 price tag. If you have AppleWorks (which the original of this review was written with), and again no great collaborative need for Office, but want or need to give good presentations again it's a no-brainer, buy it. You get great presentation software and save yourself a shed-load of money compared with buying PowerPoint or Office.

Only if you have to do a lot of collaborative work, or you are the lone Mac man in a sea of Windows in your firm, or you are going to need the heavy duty power of Word and/or Excel do you need to buy Office, and if you have you might as well use PowerPoint, which is as I said at the beginning, is a great presentation package.

I've only scratched the surface of Keynote, but it has all and more of

the killer application attributes of PowerPoint. By the way top-notch documentation is provided in the guise of a very good manual and quick start guide.

Keynote is interesting in another context; as time goes by the relatively high cost of Microsoft products, and the lack of a user centric ethos in their interface design, reduces their attractiveness, and as their file formats are duplicated in any rival product the need to have them to ensure compatibility is lessened, if not completely eliminated.

If you have a Mac and don't have Office, Keynote and AppleWorks reduces the need for Microsoft's productivity suite by a considerable amount.

Ian Brogan
Henry Butcher International Ltd

## The big event

## INCOSE UK spring conference 2004, April 26 -28 ( plus perhaps some golf on the Sunday 25th )

This is our main UK event each year being spread over three days. Most of you are familiar with the format now but just in case – it is a whole day of tutorials on the Monday adequately described by Peter in another article herein.

On both Tuesday and Wednesday we have presentations on topics which we believe are topical and full of interest partly because the members helped to choose them. In addition on those two days we have a number of exhibition stands where providers of Systems Engineering tools, software or services in some form display their wares to help you overcome your workday problems, often giving you the opportunity to try the wares. Plus of course loads of networking time.

There is also the event dinner where we assemble around the dinner table and in addition to listening to the experience or tales of an after dinner speaker we listen to those of others or tell our own. A fairly liberal amount of lubrication is normally consumed to keep the vocal chords working.

I understand that we have a pretty good response to the Call for Papers and I know this is true of the tutorials. We still have space for more exhibitors. We are also keen to seek sponsorship of brochure printing and CD production etc in return for advertising your name / logo / product in the process. This helps us reduce the overall cost and financial risk of the event. Alternatively you may, for a small fee, take advantage of having your advertising material placed in the delegate packs whether you are going to be in attendance or not.

If you have a paper that you are keen to present to the members please call Dipesh as it may just fit into a hole he may have. A late potential tutorial provider could always contact Peter Lister just in case he has had a drop out.

For further details on any of the above please contact:

John.Mead9@ntlworld.com
or 01344 422325.

## Help! spring conference 2004

The running of our events seems to be conducted by an ever reducing number of people these days – or is it just that the amount of work grows. Anyhow there are a number of things which you could help us with whether you are going to be there or not, although of course we hope you will be!

Jobs like producing address labels, adjusting the Central Heating, answering members questions, putting up signage, collecting the money, selling the CDs, taking bookings for dinner, communicating with management, managing, changing this , changing that it just goes on. You could help!

I am very pleased that all of you, (except two) have agreed to distribute ten flyers each to help spread the word. This is very important both to attract new people from different engineering areas and to bring in more people to distribute them next time. I was a wee bit disappointed that only two people so far have volunteered to do more than ten which would really help. I hope that every one will distribute a few brochures when they are available as well.

I do not know how many of you have volunteered to help Dipesh sort / select the papers that have been offered, but I suspect that he could do with some help although it is getting late.

We could do with someone, I guess with your company support, to collect up the material for putting on the conference CD and getting a quotation for production and delivery etc. We could do with a volunteer to help run the exhibition. Peter may need some help on the Monday to run the tutorials

Other tasks at the event include stuffing advertisers material into the delegate packs together with the event handbooks, CDs, questionnaires etc, selling CDs from earlier events, controlling the environment –tricky one this because at the same time that some one is too hot there is always someone that is too cold. Managing the audiovisual equipment and the rest of the room facilities –assisting with the registration desk during busy times. Booking people in for dinner, sorting out the badges, putting up signage.

This is the event for " Moving the Profession Forward" so whether you can help before the event or at it please call John 01344 422325 or John.Mead9@ntlworld.com. To help with the technical programme or to join one of the special interest groups please call Dipesh on 0207088 5448 or Pateldipesh9@aol.com. Get more from the event by putting more in!

## Editor's note

Now that the season of over indulgence is over, it's time settle back into a new year of resolutions and diets. I hope that one of your resolutions will be to attend the Spring Conference (note the name change to avoid confusion with the main international INCOSE symposium) in April or the international event in June. This year the travelling will be easier for us Europeans as it is to be held in Toulouse.

We have reviewed the feedback on the Newsletter from the Autumn Assembly and most of it is very favourable. We would like to thank you for your comments and we have taken on board your comments. If you have comments on the newsletter you don't need to wait until an event, please send them to d.cowper@ucl.ac.uk. For those of you who expressed an interest in submitting articles of interest to the members, we would urge you to send them in.

On a final point, we have not received any SE questions or comments to keep this part of the newsletter running. Please do send us your views so we can keep this as a vehicle for the SE debate section.

Doug Cowper
Editor, Preview

If you have a question you would like answered by our panel of experts or a point of view you would like to share with Preview readers then please send to:

d. cowper@ucl.ac.uk

or write to:
Preview
c/o UCL Business
2-16 Torrington Place
London WC1E 7HN



## Around the regions

### London

The 4th meeting of the London Local Group was held at University College London on the 21st January marking the group's 1st anniversary. The meeting welcomed Prof. Annik Fet from the Norwegian University of Science and Technology who is the Education Director of INCOSE's Norwegian Chapter (my counterpart) and is visiting the UK for six weeks.

The topic of the evening was "bring-a-model" and the group also held their AGM to ratify the group's officers:

- Group Co-ordinator – Derek Price (Parsons Brinkerhoff)
- Meeting Organiser – Doug Cowper (UCL)
- Communications – Margaret Myers (American University in London)
- Group Co-ordinator – Kuldeep Gharatya (London Underground)
- Deputy Meeting Organiser – Dipesh Patel (Tube Lines Ltd)
- Deputy Meeting Organiser – Kevin Tarling (Parsons Brinkerhoff)
- IEE Liaison – Mike Hayward

A draft forthcoming programme was also presented:

**Mid April 04**
"Systems Engineering Management Plan Workshop" venue TBC
**End Jun 04**
"West Coast Main Line Requirements Case Study" Network Rail, Eversholt Street TBC
**Mid Oct 04**
"Heathrow's Terminal 5" BAA, Victoria TBC

Other suggested topics that the steering committee will explore are:

- A workshop by Praxis
- Hosting the Olympics as a logistics exercise

A range of models were presented from the abstraction of the London Underground map (presented by Kuldeep Gharatya), which we all know and love, to my own model train set (modelling a railway in OO – but not object orientation). The group was disappointed that Prof. David Stupples could not bring along Niomi Campbell, however he did entertain us with his experience of a 'spoof' research proposal for a holographic model for use in air traffic control (the research proposals were being selected on 1st April) that eventually turned into a real programme. The idea was complemented for being very innovative and he was then face

with the reality of having to deliver it. This has lead to some interesting technology and applications for using holographics for spatial computer modelling.

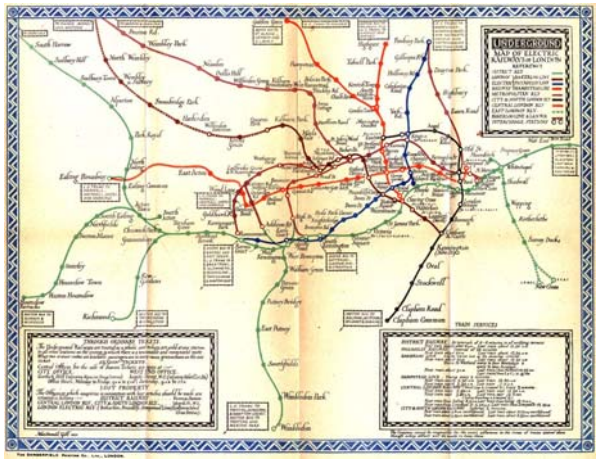
The models provoked a wide discussion on the use of models, from the under use of spatial mock-ups to explore ergonomic layout to the use of the London Underground Map to navigate above ground! The meeting also discussed the limitations of models. For example, models that were based on untested assumptions and/or were designed for a particular purpose, can end up being inappropriately used throughout the life of a project and may even be used to form the basis of acceptance testing. This can lead to project development being based on invalid models leading to down stream problems. The group also discussed the role of models in decision making. Some non-technical decision makers may be swayed by the model and may make the wrong decisions as a result.

It was generally felt at the meeting that there is a lot more to debate on the subject of models and it was suggested that a follow up event (possibly jointly with the IEE) should be held to explore this topic further. The topic would appeal to a wider audience.

The next London Local Group event is scheduled for April and will be a workshop on Systems Engineering Management Plans. Further details will be published in due course.

For more information about the London Local Group, please contact: Kuldeep Gharatya on 020 7027 or email: Kuldeep.gharatya@tube.tfl.gov.uk

Doug Cowper
University College London



## Stevenage

17th February 2004
INCOSE Stevenage
Beagle2 Systems Engineering the Final Operations Phase and the Search for Contact

Beagle2 - Europe's first space probe to the red planet, this talk discusses systems engineering during the final phases of Beagle 2 mission, from separation from Mars Express through to the landing on Mars and the subsequent engineering and mission control to determine the fate of this intrepid adventurer. The talk will also discuss the value of the mission and whether there are any benefits and lessons learnt to be gained for any subsequent missions.

Could anybody wishing to attend please email me by 10th February with their names, address, nationality and telephone number please so that I can do the security arrangements. @ les.oliver@astrium.eads.net <mailto:les.oliver@astrium.eads.net>

Meet at the Reception of EADS Astrium, Gunnels Wood Road, Stevenage, SG1 2AS. At 6pm

Agenda for the meeting of the INCOSE 'Stevenage area' Regional group.

6.00 - 6.30 Arrival and Refreshments
6.30 - 6.45 INCOSE News and regional events
7.00 - 8.00 Beagle 2 - Systems Engineering the Final Operations Phase and the Search for Contact
8.00 - 9.00 Refreshments and Networking

The Stevenage Local Group will be holding a presentation on "Systems Engineering - A Global Perspective" presented by Robert Halligan. The event will be held at EADS Astrium, Stevenage on the 15th April 2004. For more information please contact Les Oliver: les.oliver@astrium.eads.net or 01438 773615

Les Oliver
Military Communication Systems
EADS Astrium UK

## Bristol and Thames Valley

INCOSE UK are looking for volunteers to rekindle the Bristol and Thames Valley Local Groups. If you are interested in helping re-establish these groups please contact: Dipesh Patel on 020 7088 5448 or email: dipesh.patel@tubelines.com

**How do you get involved with regional activity?**

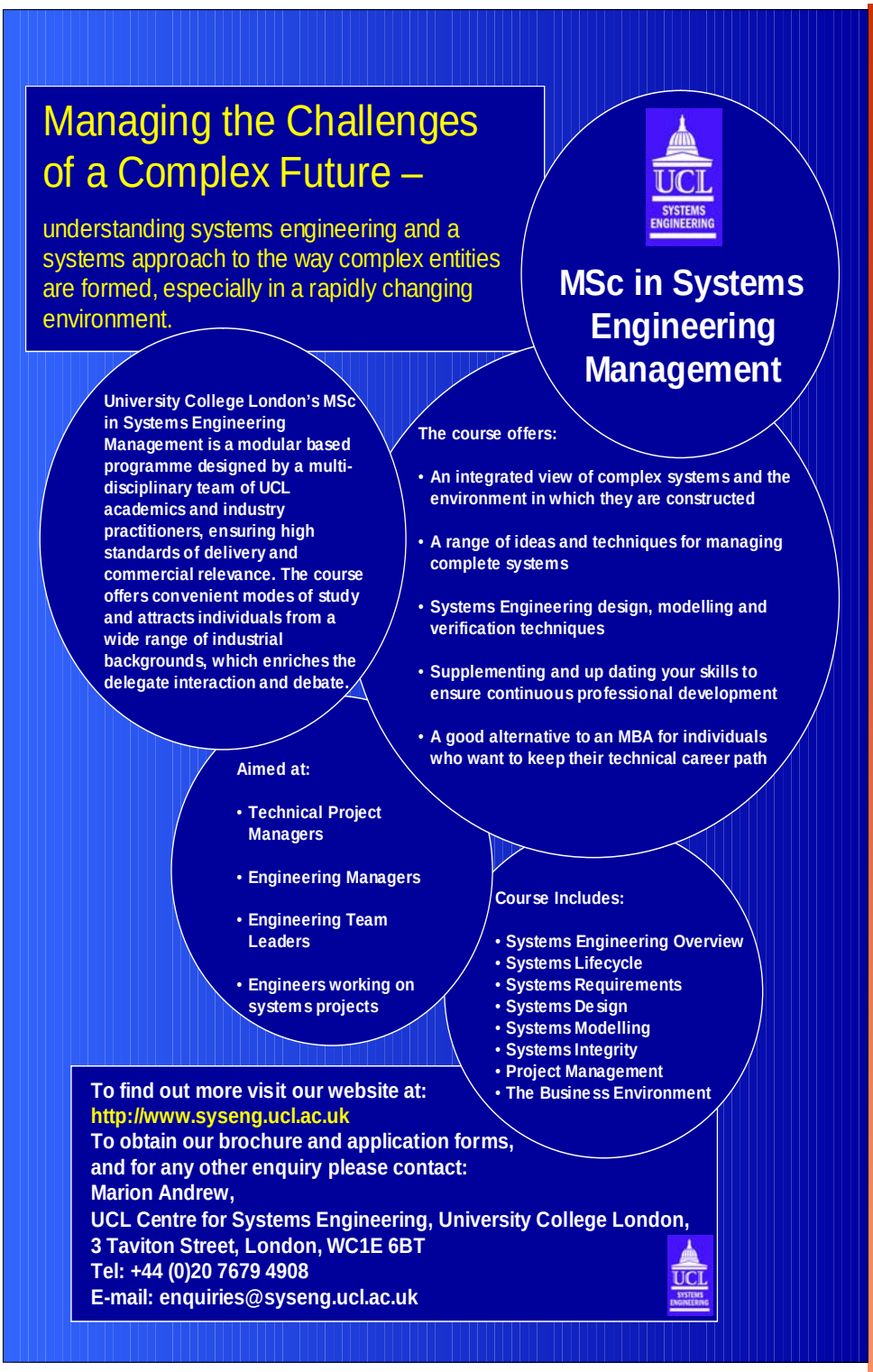
Are you looking to participate in local INCOSE activities?

or

Are you looking to set up a regional group?

For more information about regional activities or how to go about setting up a regional group, please contact:

John Mead on 01344 422325
or email: john.mead9:ntlworld.com

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GENERAL DYNAMICS United Kingdom Ltd.

# Who to contact

### President of the UK Chapter
Prof Phil John
Cranfield University
RMCS Shrivenham,
Swindon. SN6 8LA
T: 01793 785720
F: 01793 783192
E: p.john@rmcs.cranfield.ac.uk

### Treasurer
Peter Lister
Siemens Transportation Systems Ltd
4 Highlands Court
Cranmore Avenue
Shirley, Solihull
B90 4LE
T: 0121 7134311
F: 0121 7134360
E: peter.lister@siemens.com
peter@lister.globalnet.co.uk

### Past President
Paul Davies
Technical Manager
Thales Sensors
Scudamore Road
Leicester, LE3 1UA
T: 0116 2594174
F: 0116 2876677
E: paul.davies@ukthalesgroup.com
paul.davies523@ntlworld.com

### President Elect
Post vacant

### UK Administrator
John Mead
20 Beehive Lane
Binfield
Berks. RG12 8TU
T: 01344 422325
E: john.mead9@ntlworld.com

### Secretary
Allen Fairbairn
Elipsis Ltd
3 Trinity Road,
Folkstone, Kent. CT20 2RQ
T: 01303 850255
F: 01303 246265
E: allen@elipsis.com

### Chairman of the SEPDC
Dipesh Patel
Requirements Manager
JNUP (Projects Delivery)
Tube Lines
15 Westferry Circus
Canary Wharf
London E14 4HD
T: 020 7088 5448
E:Dipesh.Patel@tubelines.com

### Chairman of the CMC
Post vacant

### Academic Liaison
Doug Cowper
UCL Business, University College London
London. WC1E 7HN
T: 020 76796825
F: 020 76796508
E: d.cowper@ucl.ac.uk