advancing systems engineering

preVIEW

International Council On Systems Engineering UK Chapter Newsletter

March 2004

A gold circle for the UK Chapter

INCOSE UK's submission of its activities to INCOSE for the Chapters Award has resulted in INCOSE UK being awarded a 'Gold Circle' at the Winter Workshop in Oregon (see page 3). This award acknowledges the good work being carried out in the UK by its membership in spreading the gospel of Systems Engineering. The award also provides us with a good opportunity, in true INCOSE style, to give ourselves a 'pat on the back' and to thank everyone for all their hard work. I hope the award provides inspiration to continue the good work and for those members not actively involved to become more engaged – especially in local activities.

Doug Cowper
University College London

Ultra Electronics joins the UKAB

INCOSE UK is please to announce that Ultra Electronics has joined the UK Advisory Board (UKAB). This makes a total of seven industrial and academic organisations that have joined the UKAB since its launch at the end of 2002.

The purpose of the UK Advisory Board is to promote Systems Engineering in the UK, for the benefit of UK industry and with a shared aim of improving the quality and availability of skilled systems engineers. To this end, INCOSE UK seeks the support of Corporate Members to underwrite and promote the contribution of their engineers, as much as contributing financial support. The UKAB would set the agenda for Working Groups (consisting of their nominees plus additional INCOSE UK volunteers) to address issues of concern. Please turn to page 10 for news on one of these working groups.

If you would like to find out more about the UKAB and how your organisation may contribute, please contact Paul Davies on: 0116 2594174, or email on paul.davies@ukthalesgroup.com.

Spring conference - programme change

Please note that there has been an enforced programme change since our brochure containing final programme was printed and distributed.

The first paper in the modelling session "Stimulating capability in LUL" (Woops I expect that was supposed to be Simulating?) has been withdrawn.

In it's place we are very pleased to be able to offer Graham Bleakely whom many of you will know with.

System of Systems Modelling. C4ISR or the Department of Defence Architectural Framework (DoDAF as it is now known) is the framework used to define the contents of operational requirements documentation for the US Department of Defence (DOD). The resulting document is then used to define specifications and ensure operational and communication compatibility for the various nodes, systems and subsystems used to achieve a particular operational requirement.

To provide compliance to the DoDAF standard certain views are essential, however the notation of these views and the process used to generate them is not defined. This can lead to very informal representations, ambiguities, contradictions and inconsistencies in the documentation.

This paper presents a formal notation for mapping the essential views for compliance with the DoDAF standard, to a 'systems of systems model', contained within Statemate Magnum©, the system engineering tool from I-Logix. Although the framework is US based the methods and notations described, can be applied to UK programs which are looking to a more integrated 'systems of systems' approach to system specification. The results will show how the tools and methods proposed, overcome the problems outlined above.

John Mead
UK Administrator

New president elect for INCOSE UK

INCOSE UK is pleased to announce the appointment of Hillary Sillitto (Thales Optronics) as President Elect. I'm sure most of you have met or seen Hillary presenting at various INCOSE events – especially those of you from Scotland and will wish him luck with this new challenge.

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

in THIS ISSUE

In profile Peter Lister, Treasurer INCOSE UK

After taking a degree in Engineering at Fitzwilliam College Cambridge, I spent a year working in the Hi-Fi section of a music shop in Swindon (I was in Swindon a couple of years ago, and the John Holmes Music and Organ centre was still there in Faringdon road). This was a means of earning money while my friends and I tried to get a rock band going. You can judge the success of that venture by the fact that after a year I got a proper job with Marconi Avionics in Rochester. I was an electronics engineer working in the Gyro Division. This lasted just over a year before the long drag along the A25 (no M25 in those days) to visit my parents and parents-in-law persuaded me that it was a good idea to get a job with Smiths Industries in Basingstoke. This lasted about three years before I joined the Advanced Systems Department in Westland Helicopters and I became a Systems Engineer. Twenty Six years later, I think I am beginning to understand what Systems Engineering is all about!

Most of the time that I spent with Westlands, and later through my secondment to Aerosystems International, was spent working on the Sea King Replacement – what is now the Merlin. In addition I have worked on Apache, the Nimrod Replacement Project (leading the team that wrote the Performance Specification by which it was procured) as well as one or two ship programmes. In 2000 things were a bit slow at Aerosystems and I was tempted to take my Systems Engineering expertise to Siemens Transportation Systems in Solihull, where I now work on specifying Railway Signalling Systems as well as applying SE to the development of engineering and Project Management processes.

I have been a member of INCOSE since 1994. I joined just before the inaugural meeting of the UK Chapter, which I attended in September of that year. I got involved with the CMC and ended up writing (not to mention copying, sticking the stamps and labels on the envelopes) the Newsletter for many issues. In late 1999 I took over as President of the UK Chapter. When Matt Chittick decided he had had enough of being the Treasurer in 2002, I somewhat unwisely offered my services in the event that no-one else could be found. The rest, as they say, is history.

How does INCOSE UK's financial health compare with 5 years ago?

When I took over the Presidency there was virtually no cash in the bank. This was a serious position to be in because INCOSE UK is not equipped to borrow money, and without money to pay our doughty administrator there was a very real risk that the Chapter would fold.

After four or so years of running successful events we have built up a cushion of about £45,000 in the bank. This sounds like a lot, but remember that the annual turnover of INCOSE UK is now in the region of £85,000. We are certainly not at the point where we can put our feet up and watch the world go by, but we are secure in terms of the current financial model for the company.

How do you see INCOSE UK's finances changing over the next 5 years?

Unless there is a step change in how we operate – and I don't have a vision of what that might be – then I see the basic pattern remaining the same. The development of the UKAB has opened a new mechanism for corporate funding, although over the years INCOSE has always had corporate funding in one way or another. We used to get companies to sponsor events, either with direct funding or by providing services such as brochure preparation. Now we have secured regular funding through UKAB there is not the same emphasis on event sponsorship, and we buy our own brochures. This has helped to make event management less of a scramble. However, if there is anyone out there interested in one off sponsorship of an event we would be very glad to hear from them!

What impact has VAT had on INCOSE's accounts and activities?

When the accountants prepared the annual financial statement for 2002/03 it became apparent that turnover from our events was more than £65,000. Since events are clearly liable to VAT, and the VAT threshold is currently £58,000 there was no choice but to register for VAT. This has been a whole new learning experience both for myself as Treasurer and the Board as a whole. The VAT rules are a complete nightmare, but once you have worked out what sort of business you have, the actual mechanics are quite straightforward.

The end result is that you will notice that this year's Spring Conference bookings include VAT. For those of you who pay through your company (assuming that it is registered for VAT) this should not cause any problems. Companies are able to claim back input VAT (VAT charged on what you buy) by deducting it from their output VAT (VAT charged on what you sell). I am afraid that private individuals will see the VAT as a price increase, but there is nothing that we can do about this.

For various reasons, membership fees are exempt from VAT, so you will still be charged a straight £60 for the next membership year.

Overall, it is just one more complication for the Treasurer to contend with. Hopefully, once the processes are sorted out and understood the extra work will not be too great. There is one bonus; VAT accounting has forced me to set up a more rigorous invoicing procedure, which was really needed anyway. The records thus created will make it easier to prepare the data for the annual accounts, so hopefully we should see a benefit.

There is a financial benefit in that we will be able to offset our input VAT from our output VAT – previously we just paid the VAT due on things like the hotel bills for events. This should leave us with a net financial gain, which should allow us to hold the event prices down next year.

How are INCOSE UK's surplus funds used?

At the moment, surplus funds are held in the bank. We need to keep a substantial cash "float" to cover ourselves against a failed event, or a period without an event. I estimate that this "float" needs to be around £25,000. The Board are currently pondering how best to use the surplus over and above this amount, although we have to bear in mind that this is accrued capital. Yearly margins are currently around £10,000, so we could use about £20,000 as a "one-off" sum and then spend about £10,000 each year after that.

I suspect that at least some of this money will be used to fund additional professional assistance. The number of active volunteers is very small and the only way to do more appears to be to pay someone to do it for us. As you will appreciate, £10,000 per year will not buy very many person hours.

Another possibility is to use some money to develop regional groups and increase membership thereby. The trick is to find a way to do it whereby the money will extend the scope of what is on offer rather than simply pay for what gets done voluntarily at the moment. Paying £200 to hire a room in a Hotel where previously a company meeting room had been provided will increase costs, but won't on the face of it broaden INCOSE UK's outreach.

Of course, any suggestions on how the funds might be used will be very welcome.

What has been your greatest challenge as treasurer?

I don't think that there is any single challenge that has stood out, rather there seems to be a never ending stream of challenges. The first one I faced was trying to work out how the Direct Debit system worked and sort out a number of problems with individual DD arrangements. The next thing to hit me was checking the payment requests from INCOSE Central Office – you would not believe how complicated it is to track down who paid what, when and where to. Then there was the annual accounts to contend with, and now I am doing battle with VAT. I have had many requests to set up a card payment scheme, but this is a challenge that I will have to leave for a future date.

It is fortunate that since I work away from home during the week I can spend most weekday evenings doing bits of INCOSE work without upsetting my Wife. However, I would like to spend a bit more developing my German language skills, so hopefully there will be fewer accounting challenges in the future!

In profile next time, John Mead, Administrator, INCOSE UK

President's corner

In this newsletter I thought I would concentrate on a few of the many events that are happening in INCOSE, or which have happened in the last few weeks. This is the last newsletter issue before our next big event in the UK: the UK Chapter Spring Conference, "Moving the Profession Forward", on April 26th to 28th, with a day of tutorials followed by the main two day conference. It will be a very enjoyable and valuable event for all and a great opportunity to mingle with a wide range of people from across the systems engineering community, for you to hear about the excellent work and "best practice" being achieved by people from around the country, to "network", and, importantly, for you to influence and contribute to the way forward and the key issues that we tackle in the UK Chapter. I very much hope that you will be able to make it. Please get it into your diary now!

Looking further ahead there is the INCOSE annual International Symposium, "Systems Engineering, managing complexity and change", on 20th to 24th June in Toulouse. This is the first time that the International Symposium has been held in Europe since 1999, when the UK Chapter hosted a very successful event in Brighton …. the first time it had been outside North America. The International Symposium is always well worth attending and is an excellent opportunity to see the enormous range of activities that are underway in systems engineering. I very much encourage you to make it to Toulouse.

The last event I want to mention is the INCOSE International Workshop that was held in Portland, Oregon in January. This is another annual event, in workshop mode, that presents the strategic direction for INCOSE, the wide range of work being undertaken by the technical board and technical committees and tackles many key facets of systems engineering. Amongst the issues covered were "Architecture", "Education", "Systems Enterprises and Environment", "Systems Engineering Process", "Challenges and trends in Domain Areas" and many others and this illustrates the extremely active systems engineering community that exists and which we, as members, have many opportunities to engage with, contribute to and benefit from.

I would encourage you to engage strongly with all things "INCOSE", both in our UK Chapter, with our Spring and Autumn main events, our increasing number of local group meetings and our working groups on key topics, as well as in the international arena. If you have not yet fully realised the vast amount of exciting work that is going on in INCOSE that is of direct relevance to you as a systems engineer, then I encourage you to browse the INCOSE UK Chapter website (www.incose.org.uk) and the INCOSE corporate website (www.incose.org) , including of course the areas restricted to members only.

I look forward to seeing you at the UK Spring Conference in April and at future INCOSE events in the UK and around the world.

Prof Phil John
Cranfield University
Centre for Systems Engineering
President of the UK Chapter

Events calendar

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

May

11th - 12th May 2004 — Introduction to UML, IEE Systems Engineering PN Training Course, Hotel Russell, London UK
Tel: 01435 765647
Email: events@iee.org

26th May 2004 — Systems Engineering for Railways, IEE Systems Engineering & Railway PNs Seminar, Bloomsbury Training Centre, London UK

JUNE

20th - 24th June 2004 — 14th Annual International Symposium & 4th European Systems Engineering Conference - Toulouse, France
www.incose.org/symp2004/

JULY

13th - 14th July 2004 — Introduction to UML, IEE Systems Engineering PN Training Course, Hotel Russell, London UK
Tel: 01435 765647
Email: events@iee.org

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

November

8th - 9th November 2004 — INCOSE UK Autumn Assembly

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

d.cowper@ucl.ac.uk

A winter's tale - feedback from the winter workshop

You will probably know that INCOSE has just held its regular International Workshop in Portland, Oregon. This was a very successful meeting and a lot of good work was completed. You can now see information about the Workshop on the INCOSE web site, including the plenary presentations made by key leaders. Our new Director of Communications (David Long) has also just issued Key Messages from the event, which will give you information at the headline level about key decisions and important initiatives.

Chapter Awards

One of the important events at the Workshop is the assessment of submissions to the annual Chapter Awards programme. David Long gathered a group of volunteers together and completed this task and I would like to announce the results of the 2003 programme. Congratulations to the following chapters for the contributions they have made and their achievements over the last year. These chapters will be formally recognized at the International Symposium in Toulouse, France.

President's Award for Outstanding Chapter - Washington Metropolitan Area Chapter

Director's Award for Most Improved Chapter - South African Chapter

Circle Awards

Region I
Heartland Chapter - Silver Circle

Region II
Los Angeles Chapter - Silver Circle
San Diego Chapter - Silver Circle
Silver State Chapter - Silver Circle
Southern Arizona Chapter - Bronze Circle

Region III
United Kingdom Chapter - Gold Circle
South African Chapter - Bronze Circle

Region IV
Crossroads Chapter - Bronze Circle
Fingerlakes Chapter - Bronze Circle

Region V
Chesapeake Chapter - Gold Circle
Southern Maryland Chapter - Gold Circle
Washington Metropolitan Area Chapter - Gold Circle
Hampton Roads Area Chapter - Silver Circle
North Texas Chapter - Silver Circle
Space Coast Chapter - Silver Circle

It is important that we aim to have vibrant chapters serving the needs of members at a local level. The Awards programme is designed to help every chapter to thrive and I hope that all chapters will try to submit for this year's Awards so that we can recognize your achievements at the 2005 IS in Rochester, NY.

Colonel David Wright
Chair, INCOSE member Board

Key messages from the international workshop

The annual International Workshop provides INCOSE members the opportunity to come together and collaborate on a broad range of projects. In January 2004, approximately one hundred fifty working group members and leaders from across the INCOSE global family gathered in Portland, Oregon to work together on current projects and new initiatives. For those unable to attend, the opening and technical plenary briefings are now available in the Members' Area at http://www.incose.org/membersonly2004/.

While the International Workshop represents an annual opportunity to meet and focus on INCOSE initiatives, distributed teams continue to work on these projects throughout the year. As you review the materials from the workshop, if you find a topic of interest, please contact the project lead. Your contributions can certainly make a difference as we strive to advance INCOSE and the systems engineering profession.

In a new style of operation, the members of the Board of Directors made extensive presentations to the attendees during the Monday Opening Plenary laying out accomplishments for the preceding year and the plans and priorities for the coming year. In this way, the BoD wants to provide improved transparency and accountability. More details on the BoD presentations, including "Agenda 2006," are available in the Members' Area of the website and will also be published in the forthcoming April 2004 issue of INSIGHT.

Agenda 2006. After welcoming the new BoD members and thanking John Snoderly for his enormous contributions during the past two years, Heinz Stoewer, INCOSE President for 2004-2006, opened the International Workshop by presenting "Agenda 2006." Establishing the INCOSE vision for 2006 and beyond, the agenda highlights three key themes:

1. High value products and services for INCOSE (the prerequisites)
2. Outreach, outreach, outreach! (the enablers)
3. Organizational development (the engine)

The objective is to increase recognition of INCOSE as the foremost international professional organization for the engineering of systems, and broadening and strengthening INCOSE's base while uniting corporate, technical, chapter, and member groups as a close INCOSE family.

Heinz further emphasized the following points:

* The business environment for systems engineering is changing globally
* Systems engineering must strongly orient itself towards supporting enterprise competitiveness
* Market demand is the starting point for our products with market push a necessary condition for broad use
* Communication, marketing, and outreach are part of every member's job
* Outreach to and dialogue with commercial engineering communities will become a priority initiative for all of INCOSE
* A coherent strategic framework with short- and long-term organizational and technical components will enable us to run INCOSE in a more business-like manner
* Maintaining INCOSE as a "learning organization" will lead to continuous organizational development and improvements
* Teamwork across the entire organization is fundamental to achieving our high objectives

Top Five for 2004. During the International Workshop, the Corporate Advisory Board (CAB), Technical Board (TB), and Member Board (MB) worked with the project leaders for INCOSE's top five initiatives for 2004:

1. Complete the classification of all existing INCOSE products and make them available to members on the web.
2. Implement the Guide to the Systems Engineering Body of Knowledge and populate it.
3. Complete the INCOSE Technical Vision of the future of systems engineering.
4. Revise the SE Handbook to version 3.
5. Implement the systems engineering certification program.

In addition to supporting the completion of the technical project plans, each board has appointed representatives to these integrated project teams. The technical product plans for the INCOSE Top Five will be available in the Members' Area of the website by February 15.

INCOSE Technical Vision. Approximately fifty international leaders and experts in the field of engineering of systems - including

INCOSE members and other engineering practitioners - met after the International Workshop to take the next step in developing the INCOSE Technical Vision. With the INCOSE Perspectives document as an input, seven groups blended their knowledge and vision of technologies, challenges, and other conditions shaping our future in order to develop a vision of the systems engineering state of the art in 2010 and 2020. During 2004, teams will continue to revise and refine this material into a cohesive technical vision to guide INCOSE and the worldwide systems community to pursue the most promising paths for advancing systems engineering research and practice. A first draft will be available for members during the International Symposium in Toulouse.

Certification. To better communicate the past, present, and future of this initiative, the Certification Working Group met with workshop attendees to discuss the SE certification program (the briefing, along with a compilation of frequently asked questions and answers, will be posted to the INCOSE Members' Area by February 15). To facilitate continued dialog, the MB volunteered to serve as a collection point for questions, working with the Certification Working Group to answer the questions and add them to the FAQ on the certification page. The Certification Working Group is currently finalizing the program risk assessment, operational plan, and business plan with the assistance of many other INCOSE members. Heinz Stoewer confirmed INCOSE's determination to move forward with this initiative, provided the next steps are assured as top quality and a sufficiently strong business case is delivered to the March 2004 session of the BoD.

SE Handbook 2.0a. An editorial committee led by Terje Fossnes and Kevin Forsberg has produced a revision of the current SE Handbook. The primary objectives of this effort are to improve consistency, reduce redundancy, and remove DoD-specific terminology and acronyms. Now available for review, a technical committee review copy can be found in the Members' Area of the INCOSE website (comments are due to the editorial committee by March 15). INCOSE anticipates publishing SE Handbook 2.0a in June with general (and free!) availability to attendees at the International Symposium in Toulouse.

A Voting Technical Board Chair. Under INCOSE's current governance structure, the TB Chair attends the BoD meetings as a non-voting participant. While the input and opinions of the TB Chair are already carefully considered, the Board of Directors would like to formalize this by making the TB Chair a voting member of the BoD. This would parallel the voting representation of the CAB and MB. Necessary changes to the bylaws and governance structure will be placed on the 2004 ballot for member approval in October.

INCOSE Foundation. INCOSE is currently reviewing a proposal to form the INCOSE Foundation, a charitable organization advancing the development and image of systems engineering through funded scholarships, research, and international forums. An informal survey of individuals and organizations indicates clear financial support and backing from many sources. There is strong support for moving forward and having the foundation in place by the 2004 International Symposium. Preliminary material will be posted to the Members' Area of the website shortly. Before moving forward, INCOSE would like to hear your thoughts on the Foundation. So, please review the posted material and provide your thoughts to Bill Ewald, Director for Strategic Presence.

INCOSE Website. In December 2003, INCOSE selected MetroStar Systems as our technology partner in developing the new INCOSE website. At the International Workshop, a formal web steering group was formed to help guide the implementation. The new website will feature two primary areas: a new public site to better represent INCOSE and system engineering, as well as a collaborative Microsoft SharePoint site to better support INCOSE's many distributed teams. The new website is on schedule for roll-out at the International Symposium in Toulouse.

Code of Ethics. The Board of Directors has approved an INCOSE code of ethics. Derived from more general ethical principles, the code of ethics provides guidance to INCOSE members and other systems engineering practitioners in the form of basic principles of conduct.

New INCOSE Ambassadors. INCOSE is pleased to announce six new ambassadors - John Hsu, Ashok Jain, Valkand Jhaveri, Jerry Lake, Jean-Philippe Lerat, and Philip Rust - bringing the total number of INCOSE ambassadors to sixteen. Under the leadership of Bill Schoening, Director for International Growth, these individuals are chartered to advance our society and our profession in areas of the world where INCOSE has minimal presence by (i) understanding the needs of the systems engineering community, (ii) communicating the value of INCOSE, and (iii) encouraging establishment of new chapters, individual, corporate, or academic affiliations.

Questions and comments in regards to this note should be directed to David Long, long@incose.org.

David Long
Director for Communications
International Council on Systems Engineering

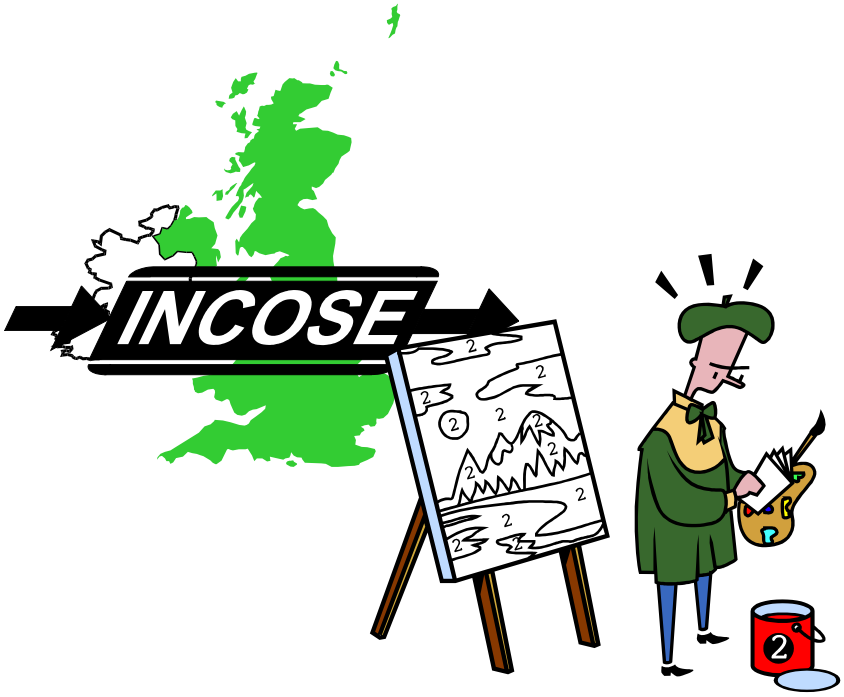
Editor's note

Last month we had a bumper edition with lots of book and software reviews which I hope you found interesting and useful. This month we have a special feature for business looking at how you can gain immediate financial benefit from conducting research and development through the DTI's Knowledge Transfer Partnerships and the Inland Revenue's R&D Tax Credits. There are other schemes for levering the UK's technology base within universities and if you would like to find out more please contact me or your local university.

I hope you all got you entries in for the logo competition. I look forward to seeing some of the entries and await the result!!

Finally, as Spring is upon us and your lawn needs cutting, it is time to start booking your place at the Spring Conference, which this year is being held in Tewkesbury, Gloucestershire (not Tewksbury, USA) at the Hilton Puckrup Hall. Again the event has a full two-day programme of papers and a day of tutorials and will also give you ample opportunity to network with other people in the field of Systems Engineering, from a range of industrial backgrounds.

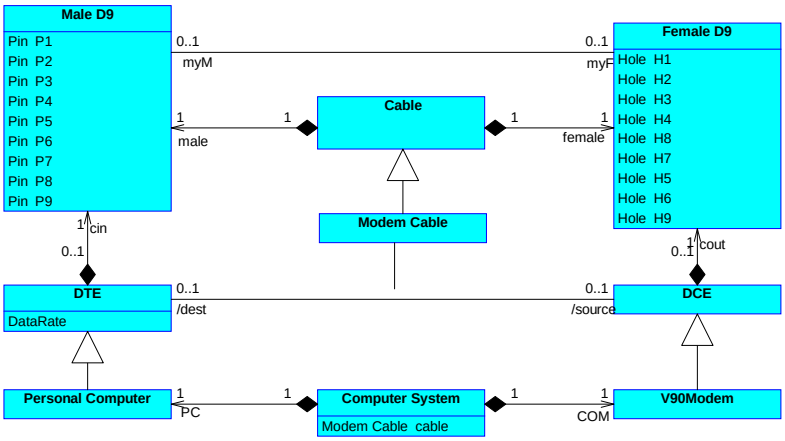
Doug Cowper
Editor, Preview



The UML™ for systems engineering initiative - part three

In the last two articles we looked at the background to SysML, which areas of UML may be modified to support systems engineering, and at some of the new diagrams. In this article, we will look at some of the modifications that will be made to the Structure Diagram, a new UML 2.0 diagram. This diagram is used to show structures, parts of those structures, ports, which are the interfaces to the structures and their contained elements, and connectors, which connect Structured Classes and parts. In this article, I will concentrate on the extensions made for SysML. For more information on the Structure Diagram, refer to the UML 2.0 specification.

SysML extends UML classes, which describe the parts of an object, and

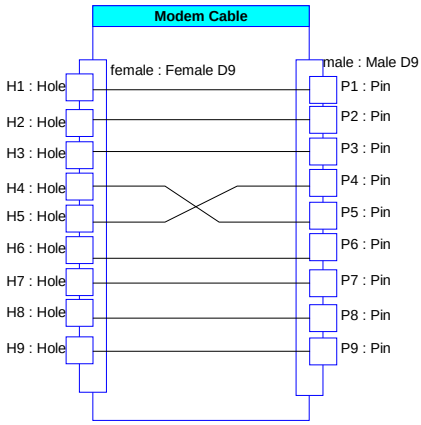


links between the parts. Each instance of the Structured Class has the same pattern of interconnected parts. This means that complex architectures can be defined and reused throughout the model. The structure of these Classes may be applied recursively to define hierarchical composition of arbitrary depth. Of course, structure is not exclusively through recursive decomposition, as a component based architecture based on a network or collaborating components is equally valid. Structured Classes can represent any level of the system hierarchy, including the top-level system, a subsystem, or logical or physical component of a system or environment.

Parts are roles in a Structured Class that are filled by particular objects when the class is instantiated. Similarly, connectors between the parts/roles are filled by links between the particular objects when the Structured Class is instantiated. Ports are a special kind of part that gives access to internal structure from the outside of a composite object. In SysML, unlike UML, Ports can also be complex hierarchical structures. Composite class structures can be the basis for defining interactions between parts. Part connectors can support many forms of interaction, from static, such as a force balance across a physical interface, to dynamic, such as continuous flow of current through a terminal or a discrete series of calls to software services.

This will allow Systems Engineers to more correctly describe systems with UML that are not purely software.

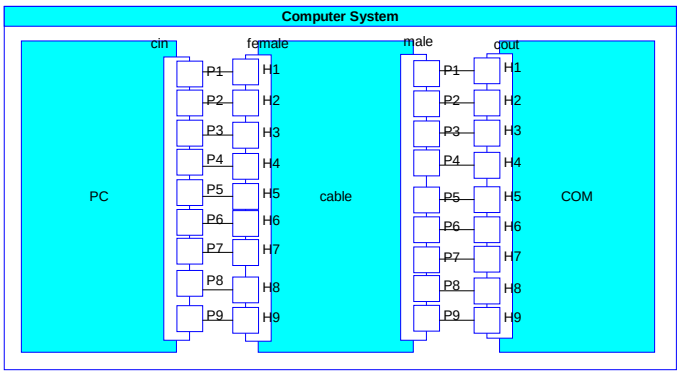
To illustrate these concepts, I'll use the well-understood example of a modem connecting two computers together. The class diagram above shows a Computer System class at the bottom, with a Modem cable attribute. The Cable class in the centre is a composite aggregation of a Male D9, and a Female D9 class. The Male D9 contains numbered Pins and the Female D9 contains numbered Holes. These D9 classes are also associated with each other. Finally, towards the bottom of the diagram, the Modem Cable is a type of Cable that connects a DTE and DCE, which contain respectively Male and Female D9 classes. A Personal Computer is a type of DTE, and a V90 Modem is a type of DCE.



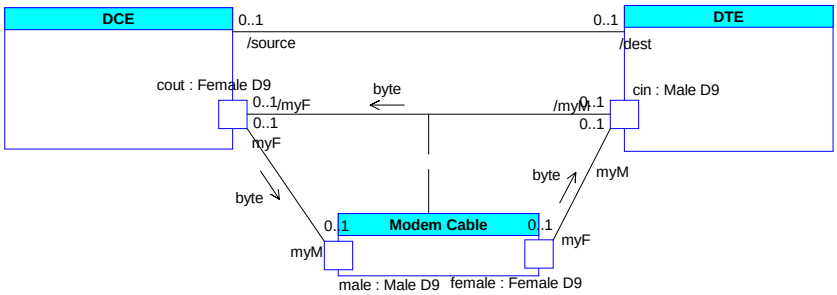
This is illustrated in the following SysML System Structure Diagram. The DCE and DTE are connected, with roles marked as source and destination. The Modem Cable is the association class modelling the connection between the two ports, which are marked as Male and Female D9 connectors. There are flows shown on the connections showing bytes flowing between the two systems in this example. Structure Diagrams can also depict the flow of electrical characteristics of the connectors such as voltage or current.

The Modem Cable is detailed next. As shown in the class diagram, it contains two ports, a Male D9 and a Female D9. Again, the Female D9 contains 9 Holes and the Male D9 contains 9 Pins. This type of complex interface would not be possible with UML 2.0. Also note that it is possible to show crossovers in the modem cable. The example shows a crossover between Pins and Holes 4 and 5.

In the final diagram, all this is brought together. The Computer System



is made up of a Personal Computer (PC), and a COM device, which is an instance of a Modem, which is connected together by the cable. Flows can also be shown on the links, if required. As with the rest of SysML, work is still being done on these diagrams and may change before the final specification is released. This is currently scheduled for August 2004.



As always, SysML, Systems Modelling Language, and the SysML logo are trademarks of the SysML Partners. UML is a registered trademark of the OMG. Some of the information in this article has been obtained from the Systems Modelling Language™: SysML™ version 0.3 (first draft).

If you have any questions, please feel free to email me at MatthewH@Artisansw.com.

These can be obtained from the OMG and SysML web sites. More information on SysML in general can be found at www.sysml.org.

Matthew Hause
Artisan Software Ltd.

Spring conference update

The plans are laid, the speakers booked, the brochure is printed and distributed and the telephone has started ringing. The most frequent question? Are there any places left we want to send three people.

Twenty-one bedrooms booked before the end of last week and one registration received. Nothing changes, however Support Shop tell me that they are flowing in now.

There has apparently been a lot of support for and questions about the tutorials, with people as usual wanting to go to more than one which are happening at the same time. Not much we can do about that. However we do end up cancelling some if they do not get enough bookings so get your bookings in fast.

Having got the information on the streets, quite a lot earlier than we have managed in recent times, I went off to take another look at the venue –cos it is a bit complicated and they did not have a floor plan. They do now! The things you have to do!

I was also a little concerned to see what the conference Ballroom looked like. It was a bit dark in January when I went first time and it was not being used and it was not very warm. It is always too hot for some and cold for others but we do try our best. The ballroom was now being set up for dinner: 5 round tables of ten and loads of room for another 5 I thought: another 7 they said. It would be good to think that we will fill it. It has a nice high ceiling with tiny spots and although the sun was beaming in as well it looked very good for a conference dinner. The bar is a long way away so we should not have to do much drinking: - only kidding.

I hope that you all like the idea of the reception on the Monday evening although it obviously will not be convenient for every one. We have space for fifty but can readily expand to take 80 so please try to stay if you are at a tutorial or even come early if you are not participating until Tuesday.

Is anyone planning to bring their wives / husband etc as there is tons to do with a full Living Well Health and Fitness Centre and steam room, spa, beauty rooms (what do they do in there?) and solarium to provide complete mind and body revitalisation. All of this (and a golf course) within 140 acres of glorious parkland on the edge of the Cotswolds. Meanwhile you will be trying to build a better robot or mine marbles in wherever. I forgot to mention the golf course, or to be honest I was saving it up! Looks good – sculptured into the backdrop of the Malvern Hills the brochure says. I have not been on it but am hoping to get in a round on the Sunday afternoon. Any one else? We have three at the moment but if you are able to do come and join in but it will help if you can let me know in advance. £20 a round. The hotel has a wealth of brochures (describing local activities and places to visit) which I both picked up and then mislaid so it will be even more of an adventure finding it yourself.

I hope you will be encouraged and interested in the model of Beagle 2 and Mars Express that EADS Astrium are proposing to bring and display. Despite having mislaid it upon arrival on MARS it was a great achievement getting it there without a budget to match such ambitions we are advised. Although Systems Engineers always say that do they not? Learn more of the whole project from Lester Waugh over the Tuesday and Wednesday.

Well the scene is set the menus chosen all we have to do is get our bookings in as early as we can and we will do the rest. Another innovation this year is to stop taking bookings a week ahead so that we can print and post the handbooks, produce the CDs, you always moan if they are late and if everything is not on it. This year we will not wait if your paper or your booking is not in so remove the proverbial digit and get the information in. We have found you a little extra time but do not waste it. And the other innovation: for us any way is a Best Paper award based upon delegate opinions input on the questionnaire. I am looking forward to it. I hope that you are. C U There!

John Mead
UK Administrator

Business research and development

Knowledge transfer partnerships - building effective relationships between UK higher education and industry

Knowledge Transfer Partnerships

A number of recent Government initiatives have sought to promote enterprise, innovation and increased productivity by maximising the contribution of science and technology to the UK's economic development – and thus to the quality of our lives.

A major component of these strategies is support for Universities to translate their research, and the skills of their students, to the community in the form of social, economic and cultural progress. A range of incentives and funding mechanisms have been established to encourage Universities to participate in industrial collaborations that range from short-term, tactical, consultancy to long-tem 'blue sky' strategic research partnerships. In all cases the aims is to provide a responsive, flexible response to all such opportunities and to forge lasting, mutually beneficial, relationships.

One of the longest standing and most successful of these schemes has recently been re-launched under the title of Knowledge Transfer Partnerships or KTP.

KTP (formerly Teaching Company Schemes) part-fund almost 1000 research positions that enable Universities such as UCL to employ recent graduates (called associates) to work within a company on a research or development project under the joint supervision of the industrial partner and a UCL academic.

Typical projects can run over one, two or three years. The research and/or development activity at the core of such projects is always targeted towards the development of products or services that are likely to lead to a 'step change' in the performance of the host company.

KTP programmes in which UCL participates deliver benefits to all parties involved by:

- Helping **Businesses** gain access to the wealth of knowledge at UCL and, where appropriate, emerging technologies or management techniques. In addition companies gain a highly skilled employee, whom they might not otherwise be able, to deploy on medium term R&D projects that are of direct benefit to their business.
- Enabling **UCL** to develop long term collaboration with a range of businesses and thus improving the relevance of its teaching and research activities.
- Giving **Associates** industry based training that will enhance their careers - around 70% of participants in KTP Programmes are offered permanent employment by their 'host company'.

Each KTP Programme is part-financed by a Government grant made to the academic partner. This is complemented by funds from the company with the balance of funding varying between Small and Medium Sized Enterprises (SMEs) and larger companies. Government funding covers up to 60% of the eligible costs to support the employment of the Associate and the active participation of the academic supervisor for an average of a half-day per week throughout the project.

A representative **annual** budget for a Teaching Company Scheme with a small company in London is given in Table 2 - showing that a company investment of £16,800 per annum can leverage a grant in excess of £35,000 thus facilitating the employment a full-time associate supported by a leading University Academic.

Recent partnerships undertaken by UCL (Table 1) give a flavour of the diversity of projects that can be supported through this mechanism and the practical benefits that these can offer to participating organizations.

If you would like to investigate how KTP might benefit your organisation please contact your local KTP coordinator through the KTPOnline site at www.ktponline.org.uk or Mr Duncan Bull, Business Development Manager, University College London T: 020 7679 4920 E: d.bull@ucl.ac.uk

David Chapman
University College London

Table 1 representative Knowledge Transfer Projects recently initiated at UCL

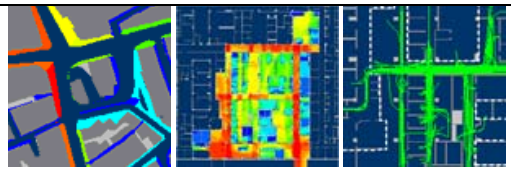
PCA Plowman Craven & Associates W: www.plowmancraven.co.uk	3D terrestrial models of built environments that efficiently use 3D measurement data from laser scanning systems in the production of accurate 3D computer graphics models. The development of new accurately rendered model products that enable the company to expand into new markets. 
intelligent space Intelligent Space Partnership W : www.intelligentspace.com	 The development of a software system for pedestrian movement analysis and modelling, which will be used to predict foot traffic in transportation, urban development and building design projects.
ucas.com Universities and Colleges Admissions Service Ltd. (UCAS) W: www.ucas.ac.uk	 The development of a national demographic information system and produce a pilot web-accessible tool for use by students which will aid their selection of course and HE institution.
Longdin & Browning Measured Excellence Longdin & Browning (Surveys) Limited W: www.longdin.co.uk	 The integration of emerging panoramic range imaging technologies with existing survey techniques and modelling/mapping software.

Table 2. Typical annual costs associated with a KTP programme

Direct Costs	Eligible costs	Company Contribution (40% of costs)	Grant Contribution (60% of costs)
Associates employment costs	26,250	10,500	15,750
Academic support	11,625	4,650	6,975
Associates development (approved personal development and business training courses)	1,625	650	975
Travel and Subsistence	1,000	400	600
Equipment (normally computing) consumables and other costs	1,500	600	900
Totals	42,000	**16,800**	25,200
Indirect costs			
Constribution to institutions overheads calculated at 46% of grant contribution to direct staff			10,454
Maximum grant available (p.a.)			**35,654**

R&D tax credits – is this innovation stimulant passing you by?

In 2000, the UK Government announced in its budget that it was introducing special tax relief (R&D tax credits) for small and medium size companies (SMEs) who invest in research and development. The aims of this tax relief were to:

- allow companies to claim enhanced tax relief for their qualifying R&D spending
- encourage UK R&D, and
- promote investment in innovation

The tax relief allows an SME to claim 150% of its R&D expenditure against tax if it incurs the expenditure on its own behalf or if it sub-contracts the R&D to someone else (e.g. another SME, a large company, or a non-taxpayer such as a university or charity). After consultation, the UK Government extended the scheme to include large companies, which was announced in the 2002 budget. Under the R&D tax credit scheme, a large company (or an SME doing subcontract work for it) can claim 125% R&D tax relief. This means it can deduct 125% of the qualifying current spending on R&D when it calculates its taxable profits, instead of the normal 100%.

Despite this opportunity to stimulate industrial R&D in the UK it appears from the Lambert report that companies are not taking advantage of these tax credits. One of the reasons for this poor uptake has been blamed on red tape. The definitions of what does and does not qualify as R&D are ambiguous.

A recent revision (January 2004) of the research and development tax credit, designed to clarify what does and does not constitute R&D, has won support from the Confederation of British Industry. The measures were trailed in the chancellor Gordon Brown's pre-budget report, which also announced that the credit is to receive greater funding to allow more companies to participate.

Central to the reforms of the R&D tax credits are new draft guidelines on the definition of R&D. The old wording was criticised as being too complex and imprecise during a consultation exercise in 2003. These reforms have been welcomed by the Confederation of British Industry (CBI).

The new guidelines state that "R&D for tax purposes takes place when an overall project seeks to achieve an advance in science or technology". This means that individual activities, within a large project, that directly contribute to the resolution of scientific or technological uncertainty or turn a scientifically possible process into a cost-effective, reliable and reproducible one count as R&D.

The major change in the definition is that certain indirect activities related to an overall project can now count as R&D. These must contribute to the research work even if alone they do not contribute to the resolution of scientific uncertainty. This can include administration and equipment costs; training of researchers; research by students and researchers carried out at universities; research to devise new scientific or technological testing, survey, or sampling methods; and feasibility studies to decide on the direction of an R&D activity.

These reforms should make the R&D tax credit scheme even more attractive to UK industry and hopefully will achieve its goal of encouraging more innovation from the industrial sector. If you would like to find out more about how your organisation can take advantage of R&D tax credits, please visit the Inland Revenue website at www.inlandrevenue.gov/r&d.

Doug Cowper
University College London

Your comments

Delighted to see Ian Brogan offering alternatives to the Powerpoint monopoly in preview. There is also Star Office from Sun. I have used version 5.2 which had an excellent alternative to Powerpoint - some glitches on import/export, but only minor ones. 5.2 was free, and the subsequent releases are nearly that.

From a lifecycle point of view, looking at the flow of information that is used in a presentation, where it comes from and where it goes to, a website is a better resource than a Powerpoint presentation. I am still working out how to adapt the format for presentations, but it isn't hard to get something workable though not slick. I expect that using Flash on the website would enable one to compete with the Hitchins of this world.

Brian Sherwood Jones
Process Contracting Limited
http://www.processforusability.co.uk
Http://www.outsourcing-users.com

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:
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c/o UCL Business
2-16 Torrington Place, London WC1E 7HN

INCOSE UK corporate advisory board (UKAB) - systems engineering core competencies workshop

On 4th February 2004 at EADS Astrium, Stevenage, the UKAB held a workshop to formalise its requirements for a set of Systems Engineering Core Competencies and to identify and time table how these requirements might be achieved. The aim of the workshop: "*to agree objectives, products and milestones that will enable the UKAB to compare their requirements for Systems Engineering Core Competencies with other activities. Where there is overlap the UKAB can collaborate and where there are gaps the UKAB can establish working groups*".

The focus of the workshop was on competencies that are core to "Systems Engineering". It was acknowledged that to be a good "Systems Engineer" an individual needs not only the Systems Engineering core competencies but also competencies from other disciplines, for example project management, domain knowledge, for example the industrial sector in which the individual is working, and skills generally recognised as being required by all engineers, for example, communication.

The workshop started with a round table perspective from each organisation. The following summary points were noted:

- Definition of SE profiles is immature although there have been some attempts at core competencies
- Need to understand what SE is and what the competencies are
- Need to be able to identify what SE is
- Competencies need to be built up in layers
- Need a common methodology
- Need to cater for lots of companies with their own way of working
- Need to identify common job roles & profiles
- Need to enable identification of where people with SE skills are within an organisation
- Need to address how to measure the skill levels
- Not all System Engineers do SE and not all people doing SE are called System Engineers
- A person does not need to be a domain specialist to be a Systems Engineer
- Need a nationally agreed set of competencies (answer to this is not yet available)

- SE is for multidisciplinary engineering
- Need a set of core competencies to identify training needs and to be able to design training courses
- Provides academic with a framework to conduct research and to publish
- SE core competencies should be manageable (the number in profile), measurable, define what it is and what it is not and should be useful for assessing individuals and teams

The workshop discussed the various points relating to the round table perspectives and agreed upon the following UKAB objectives for SE Core Competencies:

"*A measurable set of core competences for systems engineering which will achieve national recognition and will be useful to the organisations represented around the table. To be proposed by the end of March 2005*".

The workshop proposed a range of approaches including how to gain acceptance to be nationally recognised. The workshop agreed that national acceptance was a downstream activity and that it was important to make a start by producing a set of SE Core Competencies that were useful and acceptable to the organisations represented round the table.

The following approach was agreed:

1. An initial list of SE Core Competencies should be produced using lists that already have been produced by the UKAB organisations. This list to include identification of whether the competency is Core or on the Boundary of SE.
2. A review should be conducted to identify SE Core Competencies from the following best practice: ISO15288, CMMI, EIA731, INCOSE SEBok & Handbook Version 2, and the NASA Handbook.
3. A workshop to debate the initial list of SE Core Competencies from the UKAB members and those identified from best practice. The workshop will also review the applicability of the SE Core Competencies for other sectors, for example Rail and Health. If the workshop is unable to review the applicability to other sectors representatives from these industries will need to be sought to assist the process.
4. The output of Workshop is an Initial draft of SE Core Competencies, Initial Definitions & a Revision of this Plan with the allocation of tasks, (Health Check - Rail, Health, Automotive - All need to consider who for the health check).
5. Definition of SE Core Competencies and Measures. This activity will be split among the UKAB representatives and will involve regular review meetings TBD.
6. Workshop to review the relationship between Systems Engineering and the Systems Engineer and the team.
7. A draft report to be produced giving the list of SE Core Competencies, their definitions and measures and their relationship to a Systems Engineer or a project team.
8. The draft report will be circulated to seek views and opinions from the SE community.
9. The comments received back from the SE Community will be incorporated into the report.
10. The SE Core Competency report to be presented at the INCOSE Spring Conference 2005.
11. Seek national acceptance.

The workshop concluded by agreeing that the output from the day's activities should be presented to both INCOSE UK members and the DTI Systems Engineering National Advisory Committee.

Doug Cowper
University College London

Around the regions

There is little to report in this edition of Preview from the Local groups, apart from the forthcoming event on the 15th April where the Stevenage Local Group have Robert Halligan giving a global perspective on Systems Engineering to be held at EADS Astrium, Stevenage, for more information please contact Les Oliver: les.oliver@astrium.eads.net.

Recently I plotted the postcodes of the INCOSE UK membership database onto a map to obtain an idea of how the membership is clustered. The results of this are shown on the map below. Interestingly I plotted on the London and Stevenage Local Groups, which are already active, and noted the potential for other local groups. These areas of critical mass are: Preston, East Midlands, Bristol (dormant group), South Coast (dormant group) and Thames Valley (dormant group).

So if you are interested in either starting or rekindling a local group, please contact any of the members of the UK Chapter board, see back page, or contact Les Oliver or myself for first hand experience of setting up a local group.

Doug Cowper
University College London

How do you get involved with local activity?

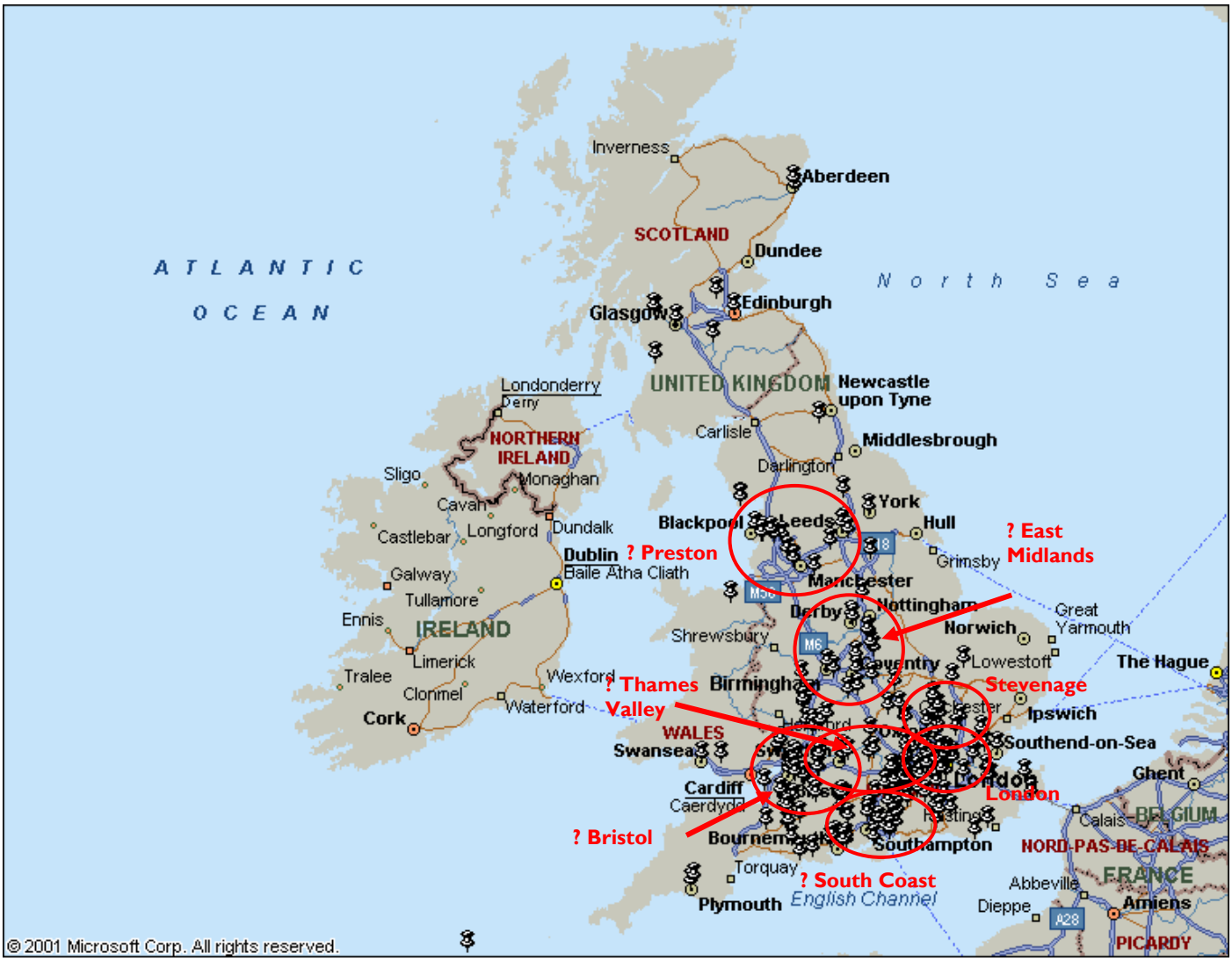
Are you looking to participate in local INCOSE activities?

or

Are you looking to set up a local group?

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

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



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