

Project Performance International

Systems Engineering

Newsletter (SyEN)

SyEN #008 - May 26, 2009

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Dear Colleague,

SyEN, an independent free newsletter containing informative reading for the technical project professional, with scores of news and other items summarizing developments in the field, including related industry, month by month. This newsletter and a newsletter archive are also available at www.ppi-int.com.

Systems engineering can be thought of as the problem-independent, and solution/technology-independent, principles and methods related to the successful engineering of systems, to meet requirements and maximize value delivered to stakeholders in accordance with stakeholder values.

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What's Inside:

Featured Article

- Cognitive Work & Systems Development – Gavan Lintern
... [READ MORE](#)

Systems Engineering News

- Guide to the Business Analysis Body of Knowledge (BABOK)
- Reforming Weapon Systems Acquisition
- Excited about CMMI for Services? You won't be alone at SEPG Europe
- Survey of Agile Systems Engineering Methods, Practices and Tools
- "SysML France" Association Launched
- Systems Engineering Jobs Website Launched
... [READ MORE](#)

Featured Society

- SAE Systems Engineering Cross-Industry Committee
... [READ MORE](#)

INCOSE Technical Operations - Infrastructure Working Group

... [READ MORE](#)

Systems Engineering Software Tools News

- Sparx Systems Enterprise Architect 7.5
- Artisan Software Tools: Artisan launches Artisan Studio: DoD Architect Edition
- Ravenflow Introduces First Low-Cost Solution for Business Requirements Definition
- ParaMagic™ plugin 16.0 is released
- LDRA TBreq v3.0 Launches Next-Generation Requirements Traceability Automation
- Seeking SEER for Hardware, Electronics & Systems 7.1 Beta Test Participants
- Siemens PLM Connection Americas 2009 User Conference

- AADL – Current Versions of AADL Tools
... [READ MORE](#)

Systems Engineering Books, Reports, Articles and Papers

- Prioritising requirements - how to do it and why it is critical to project success
- So you think you can't afford to come to IS09?
... [READ MORE](#)

Conferences and Meetings

... [READ MORE](#)

Education and Academia

- MSc in Human Centred Systems - Available Full-Time and Part-Time
- AutoModel - The Idea
- Postdoc position at CEA LIST
- Six post-doctorates on formal methods at INRIA
... [READ MORE](#)

Some Systems Engineering-Relevant Websites

- ... [READ MORE](#)

Standards and Guides

- OMG Advances Standards at Technical Meeting in Washington, D.C.
- AADL Revision A Released in January
- AADL as a Profile Under UML
- ISO Requirements Engineering Standard ISO/IEC AWI 29148
- Status of ISO/IEC 15289:2006 - Systems and software engineering - Content of systems and software life cycle process information products (Documentation)
... [READ MORE](#)

Some Definitions to Close On - Architecture

... [READ MORE](#)

PPI News

... [READ MORE](#)

PPI Events

... [READ MORE](#)

A Quotation to Open On

"Everything that can be invented has been invented" - Charles H. Duell, Commissioner, U.S. Office of Patents, 1899

Feature Article

Cognitive Work Analysis and Cognitive Systems Design

Gavan Lintern
Cognitive Systems Design
Dayton, Ohio 45431-1289, USA
qlintern@CognitiveSystemsDesign.net

Reprise

In the first of a series of articles for this newsletter, I defined Cognitive Work, Cognitive Systems Engineering, Human Systems Integration and Human Factors Engineering. In the second, I outlined some important features of the practice of Cognitive Systems Engineering, discussed the distributed nature of cognitive systems, introduced my personal perspective on design and introduced two popular frameworks (Cognitive Task Analysis and Cognitive Work Analysis) for Cognitive Systems Engineering. In the next two articles, I described each of these two frameworks. In this final article in this series, I will illustrate how these frameworks can complement existing Systems Engineering processes used in the development of large-scale socio-technical systems.

Cognitive Engineering For Systems Acquisition

Behavioral scientists who work on the periphery of systems engineering or systems acquisition management have an unfortunate tendency towards advising systems engineers how to do systems engineering (e.g., Pew and Mavor, 2008). The engineering disciplines involved in systems acquisition have a plethora of processes and products and it is not the job of behavioral scientists to assess whether those processes and products are suitable for the job at hand. In contrast, it is appropriate that behavioral scientists comment on the behavioral issues involved in the human systems integration. In my view at least, the quality of the efforts directed at human systems integration is variable and, in relation to cognitive issues especially, the conceptualization is impoverished and outdated. It has been my intent, in this series of articles, to offer a stronger conceptualization.

In doing so, there is no need for me to suggest that the systems acquisition process needs new products. There are already several that would seem to require cognitive engineering input. The US Department of Defense management acquisition framework, for example, calls for a human systems integration strategy, a manpower estimate report, an Information Support Plan and a training plan, which are obvious candidates for cognitive engineering input. It is not possible within the constraints of this paper to identify all of the ways in which the concepts and the tools of cognitive engineering might be employed within systems acquisition but in the following I will outline a selection of the ways in which each of the two cognitive engineering frameworks I have discussed might be used to address the design of cognitive support tools and workspaces, the design of teams and cognitive systems, and the design of training. All of these are relevant to at least one of the systems acquisition products called for by the Department of Defense management acquisition framework that I note above.

From the decision-centered perspective, judicious application of knowledge acquisition tools will identify problem areas in current work practices and will isolate leverage points that offer opportunities for high-value (but often low-cost) interventions.

From the cognitive systems perspective, progression through the framework of cognitive work analysis will identify the functional structure of the work domain, the outcomes to be achieved, the definition of human work roles, the collaborative processes that facilitate transactions between people (and also between people and artifacts) and the cognitive tasks and strategies to be used in the execution of the work.

Cognitive Support Tools, Cognitive Workspaces

Specifications for Cognitive Support Tools and Cognitive Workspaces will contribute at least to the human systems integration strategy and the Information Support Plan.

A decision-centered analysis might identify decision requirements, establish what might pose a cognitive challenge in making decisions, and develop design solutions that would resolve the challenges. The results of this analysis might be organized into a decision requirements table as shown in Table 1 (adapted from Crandell, Klein and Hoffman, 2006). The analysis is for the work of a weapons director on an Airborne Warning and Control System (AWACS).

Cognitive Requirements (AWACS)		
Cognitive Requirements	Difficulty	Solution
Detect and track primary threats	When monitoring multiple contacts, screen clutter can generate confusion & degrade situational understanding The weapons director must sustain her/his attention & monitor all displayed tracks to determine history & possible hostile intent while compensating for her/his own limited memory span	Symbols for flagging major threats (e.g., high, fast aircraft)
Estimate intercept geometry	Considerable screen distance between target aircraft & intercepting aircraft	Decision support system to estimate intercept geometry

Table 1: A fragment of a decision requirements table for an AWACS weapons director

The first cognitive requirement listed in Table 1 is to detect and track primary threats. This task becomes difficult when the weapons director must monitor several contacts because screen clutter can generate confusion and degrade situational understanding. It is also difficult because the weapons director must sustain her/his attention and monitor all of the displayed tracks to determine history and possible hostile intent while compensating for her/his own limited memory span. The solution for these cognitive challenges lies in development of symbols for flagging major threats (e.g., high, fast aircraft).

The second cognitive requirement listed in Table 1 is to estimate intercept geometry. The difficulty in satisfying this cognitive requirement lies in the fact that there can be a considerable screen distance between the target aircraft and the intercepting aircraft. The solution to this problem lies in development of a decision support system that will estimate the intercept geometry.

A cognitive systems analysis will overview the entire suite of information needs for the particular work domain under analysis. Figure 1 depicts an information workspace for military analysis of insurgent operations which shows, among other things, the values and priorities of the allied and insurgent forces, the information resources available to the planners, the defensive and offensive resources available to allied and enemy forces and a situation map (Lintern, 2006). The workspace is organized as a multi-panel format that permits seamless navigation to and selection of constellations of information from a larger information set by use of standard search, selection and manipulation tools such as a point-and-click and drag-and-drop.

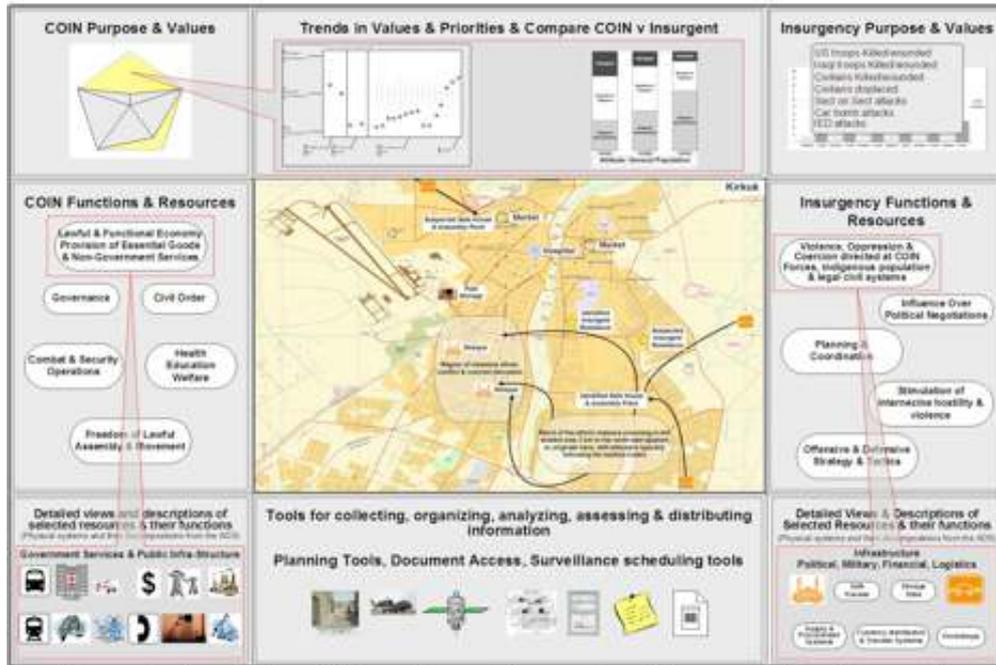


Figure 1: A prototype information workspace for military analysis of insurgent

Teamwork, Cognitive Systems

Specifications for design of teams and cognitive systems will contribute at least to the human systems integration strategy, the manpower estimate report and the Information Support Plan.

Following the decision centered framework, Klinger and Klein (1999), in an analysis of an emergency response team, sought to identify key decision makers and senior staff members with final responsibility for outcomes. They also sought to identify tasks that were often not finished and the essential transactions. They assessed how the various work products were used and how staff members assisted each other. From this analysis, Klinger and Klein clarified roles and developed recommendations for rationalizing work processes and work roles, which led to elimination of redundant tasks and redundant staff.

Following the cognitive systems framework, I have analyzed the targeting cell of an air operations Center and developed recommendations for restructuring the work to rationalize work packages and communications overhead, and for developing effective systems to support coordination with elements both inside and outside the targeting cell (Lintern, 2007). The current organization of the targeting cell has three persons assigned to assessing a target and planning an attack (a targeteer, a rerole coordinator and an attack coordinator), each whom deals with a part of the problem and then hands the result of their work to the next person in the sequence.

My analysis led to recommendations for combining these different but inter-related work tasks into a single modular work package (identified in Figure 2 as the targeting officer) on the assumption that the individuals assigned to the different tasks had similar skills and authority. This type of design results in fewer transactions between workers and reduces communications overhead. As shown in Figure 2, high workloads can be accommodated through a flexible strategy of adding targeting officers to work concurrently on different targets as the need arises.

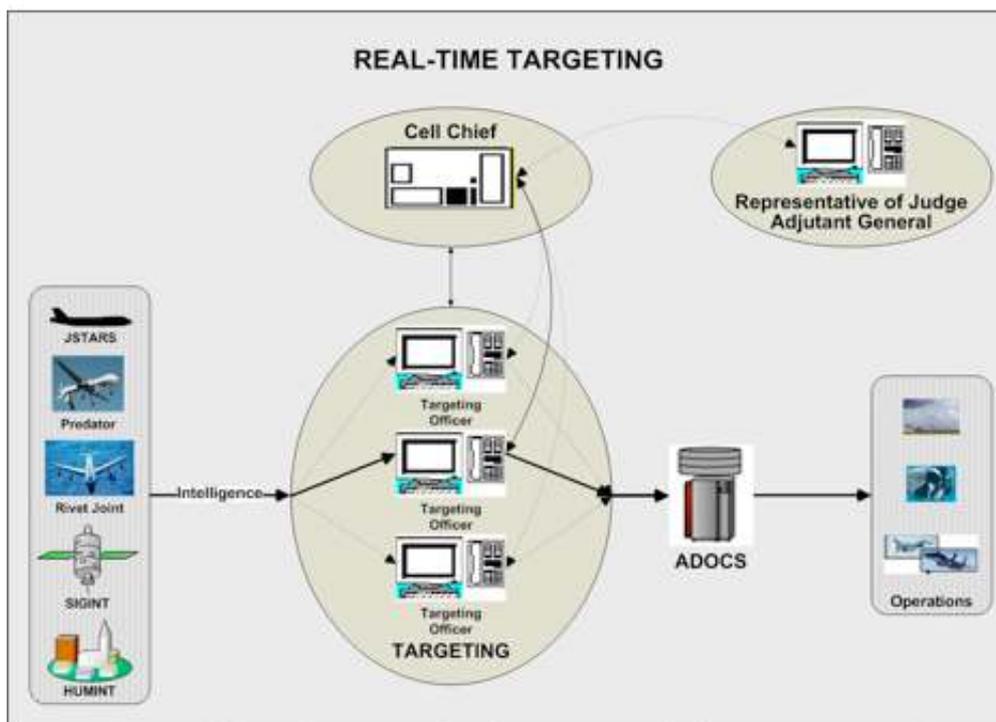


Figure 2: A modular work structure for the targeting cell of an air operations Center

There was a need, however, to identify command responsibilities and specialty skills to ensure that these were not folded into the modular work packages. Additionally, the analysis identified activities that, while not designated as contributing to work products, were nevertheless essential; such things as trash disposal, meal breaks and rest breaks.

This strategy rationalizes but does not eliminate the need for communication. The analysis identified the generic nature of the remaining communications in terms of physical structure (face-to-face versus geographically distributed) and style (command, instruction, advisory, simple, complex or creative discussion). The aim was to establish what style of information exchange was desirable (push, pull, broadcast, interactive engagement) and the implications of that for technological support. While the dominant focus was on communications systems that connect geographically distributed workers, even face-to-face discussions might be enhanced with supportive technologies in the form of display systems that can be consulted during the discussion and recording systems that store records or summaries of the discussion.

Training Support

Specifications for Training Support will contribute at least to the training plan.

A decision-centered analysis might lead to recommendations about how to practice time-pressured decisions in order to build skill with recognition-primed decision making and how to design appropriate training scenarios for that effort. Additionally, recommendations based on that analysis would emphasize the explicit training of coordination, collaboration and information sharing skills and also team processes and team activities such as how members can support each other and how they might back each other up.

As outlined by Lintern and Naikar (1999, 2000), a cognitive systems analysis will overview the entire suite of training needs for the particular work domain under analysis. The results of this analysis will potentially be used to specify a suite of training technologies ranging from web-based learning systems through part trainers is up to full-mission simulators. Additionally, the analysis will point to the pedagogical requirements for structuring effective training interventions; such things as the use of problem-based learning (Liu, Williams & Pedersen 2002), part training (Wightman & Lintern, 1985), adaptive training (Lintern & Gopher, 1978) and augmented feedback (Lintern, 1980).

In a particularly innovative study, Naikar and Saunders (2003) have demonstrated how the two frameworks can complement each other in the development of simulator-based training of technical skills for error management within the cockpit of a high performance aircraft.

Discussion

I have, in this final article in this series, outlined a role for different cognitive tools for a small subset of the products required by the US defense acquisition management framework. A complete answer to the question of what support can be provided by Cognitive Systems Engineering for the development of standard systems acquisition products would require a more lengthy account than is possible here and so my intent was to demonstrate, by selective illustration, that the potential contributions of Cognitive Systems Engineering are specific but that they have to be targeted to the requirements.

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Systems Engineering News

Guide to the Business Analysis Body of Knowledge (BABOK)

The Business Analysis Body of Knowledge® (BABOK®) is the collection of knowledge within the profession of Business Analysis and reflects current generally accepted practices. As with other professions, the body of knowledge is defined and enhanced by the Business Analysis professionals who apply it in their daily work role. The BABOK® Guide describes Business Analysis areas of knowledge, their associated activities and the tasks and skills necessary to be effective in their execution. The BABOK® Guide is a reference for professional knowledge for Business Analysis and provides the basis for the Certified Business Analysis Professional™ (CBAP®) Certification.

All IIBA® members can download a complimentary PDF copy for their own use.

[More information](#)

Reforming U.S. Weapon Systems Acquisition

U.S. Senators Carl Levin (D-MI) and John McCain (R-AZ) have demonstrated that Department of Defense spending reform is important enough to merit bipartisan action by co-sponsoring S. 454, the Weapon Systems Acquisition Reform Act of 2009. This legislation could be a step toward creating a more cost-efficient Department of Defense.

[More information](#)

Excited about CMMI for Services?

Do you want to learn more about CMMI for Services (CMMI-SVC), the newest model that extends the CMMI Product Suite to cover the establishment, management, and delivery of services? There will be a special focus on CMMI-SVC at SEPG Europe 2009, 9-12 June in Prague, Czech Republic, including:

- A keynote presentation by SEI Director and CEO Paul Nielsen on CMMI-SVC and the role it will play in the services sector, which makes up 80 percent of the world economy
- A half-day tutorial and separate presentation on how CMMI-SVC along with ITIL was implemented in a project to provide

information about healthcare and medical services within the United Kingdom (see the online [Program at a Glance](#) for session abstracts)

- A special evening session led by the SEI's CMMI-SVC Lead Eileen Forrester

The organisers invite you to join the community of European process champions to share ideas, discuss hot topics, and learn from other organizations who are using process management like CMMI-SVC to improve their business performance and lay the foundation to emerge from this tough economy stronger than before.

Survey of Agile Systems Engineering Methods, Practices and Tools

Many system engineering programs are facing an increased emphasis on rapidly developing products and services to meet immediate, mission-critical needs. As a result, development cycles are more often being measured in months or weeks. Traditional system engineering approaches are being pressed into service to address these challenges, but the fit is not always good. Unfortunately, there has so far been only limited research into the unique challenges of these environments and the "agile" system engineering approaches that can address them. To address this need, the Systems Engineering Research Center is gathering preliminary data on system engineering methods, processes, and tools that are being successfully used in such environments.

Note: This is an invitation-only survey and is password protected. If you are interested in participating and have not received an invitation with the password, please request one by sending an email to Dr. Richard Turner, Distinguished Service Professor, at rturner@stevens.edu.

[More information](#)

"SysML France" Association Launched

For those interested in French discussions/information on SysML, the "SysML France" association has just been launched.

[More information](#)

Systems Engineering Jobs Website Launched

SystemsEngineeringJobs.com is a UK-based, international, cross-industry jobs board which brings together systems engineering professionals and employers who utilise the systems engineering approach to project lifecycles.

[More information](#)

Featured Society

SAE Systems Engineering Cross-Industry Committee

SAE is a non-profit educational and scientific organization dedicated to advancing mobility technology to better serve humanity. Over 90,000 engineers and scientists, who are SAE members, develop technical information on all forms of self-propelled vehicles including automobiles, trucks and buses, off-highway equipment, aircraft, aerospace vehicles, marine, rail, and transit systems. SAE disseminates this information through its meetings, books, technical papers, magazines, standards, reports, professional development programs, and electronic databases. SAE International has more than 121,000 members - engineers, business executives, educators, and students from more than 97 countries.

SAE operates via sections and affiliates worldwide, from USA to Belarus, India to Venezuela.

The SAE Systems Engineering Cross-Industry Committee has been newly chartered as a focal point for systems engineering interests within the SAE. About 500 SAE members are understood to be aligned with the interests of this Committee. Confirmed Committee appointments include:

- Motorsports - Peter Tkacik
- Academia - Subra Ganesan
- Global - Manaswini Rath.

The Committee coordinates a systems engineering session – approximately 18 papers at the annual SAE World Congress. A session is also conducted at AeroTech.

INCOSE Technical Operations

Infrastructure Working Group

<http://www.incose.org/practice/techactivities/wg/infrastructure/>

by Erik W. Aslaksen

Charter

The purpose of the Infrastructure WG is to provide a forum to address and document the application of Systems Engineering principles to the development and technical management of infrastructure systems. The WG brings together designers, builders and operators of infrastructure systems (transportation, energy and communications).

Leadership

Chair: Alain Kouassi

Co-Chair: Jan de Liefde

Co-Chair: Neil Snyder

Contact Alain.kouassi@incose.org for additional information or to join this group.

Accomplishments

The Infrastructure Working Group is one of the most active working groups within INCOSE, and this year it even won the Outreach Award for its activities. It currently has over 40 members located worldwide, with varying degrees of active involvement.

The WG is involved in a number of activities related to applying or promoting systems engineering in the infrastructure sector. One area involves looking at the processes and guidelines currently used in the infrastructure sector and assessing the extent to which they overlap with the systems engineering standards and guidelines, in particular ISO15288:2002. A comparative analysis of the US Dept. of Energy Guidance document DOE 200.1-1 and ISO15288 was recently completed and documented, and a current activity is mapping best practices and lessons learned from large infrastructure projects in Europe (the NETLIPSE project) onto the ISO15288 processes.

Other activities include the development of a Life Cycle Model for infrastructure projects, based on some work being undertaken by the Dutch Ministry of Public Works. The WG also work closely with the INCOSE Resilience WG on resilience issues, as resilience is an issue of obvious importance to infrastructure projects.

The WG holds regular telephone conferences, and progress meetings are held at the International Workshop at the beginning of the year and the International Symposium in the middle of the year (this year in Singapore).

Planned Work

- Assess the State of SE practices in the Infrastructure World
- Assess the State of SE tailored process in each application domain
- Interface with other application sectors
- Investigate INCOSE Events as qualified CEUs for PEs

Products to be developed

- SE Life Cycle models across areas of practice (Government, Engineering Consulting, and Suppliers/Builders)
- Collecting "Best Practices"
- Mapping DOE Guidance to ISO 15288
- Draft MOU between INCOSE and ASCE
- Identify and develop sector-based processes

Systems Engineering Software Tools News

Sparx Systems Enterprise Architect 7.5

Sparx Systems recently introduced version 7.5 of their Enterprise Architect UML based modeling and design tool.

[More information](#)

Artisan Software Tools: Artisan launches Artisan Studio: DoD Architect Edition

Artisan Software Tools, claiming to be the world's largest independent supplier of industrial-grade, collaborative modeling tools for complex, mission and safety-critical embedded systems and software, has launched Artisan Studio: DoD Architect Edition and Artisan Studio: DoD Advanced Architect Edition, responding directly to the architectural framework needs of the US DoD, its suppliers and DoDAF users.

[More information](#)

Ravenflow Introduces First Low-Cost Solution for Business Requirements Definition

Ravenflow™, claiming to be the leader in Business Requirements Definition™, announced the standalone release of RAVEN Express, the industry's first requirements definition product that is integrated directly into Microsoft Word. Priced under \$500, this new version of RAVEN Express will offer the highest-value and lowest price entry-point in the requirements definition marketplace.

[More information](#)

ParaMagic™ plugin 16.0 is released

ParaMagic™ 16.0 claims a dramatic expansion of the power of SysML parametric simulation, allowing users to integrate Microsoft Excel®, MATLAB®/Simulink®(The MathWorks, Inc.) and Mathematica®(Wolfram Research, Inc.) into their MagicDraw SysML models.

[More information](#)

LDRA TBreq v3.0 Launches Next-Generation Requirements Traceability Automation

LDRA, claimed to be the provider of the most complete automated software testing technology with tools covering the most critical phases of the software development lifecycle, announced TBreq v3.0, which provides next-generation management and complete automation of requirements traceability with software testing and verification. For industries such as avionics, medical, defence, and nuclear where requirements traceability consumes a significant portion of project budget, TBreq v3.0 automates the management of software requirements, enabling developers to reduce software errors, project costs and resource constraints.

[More information](#)

Seeking SEER for Hardware, Electronics & Systems 7.1 Beta Test Participants

Galorath is currently preparing SEER for Hardware, Electronics & Systems (SEER-H) version 7.1 for beta test. If you are interested in getting a preview of this major upgrade, please contact kimko@galorath.com.

[More information](#)

Siemens PLM Connection Americas 2009 User Conference

The Siemens PLM Connection Americas 2009 User Conference will take place in Nashville, USA over 1-4 June, 2009.

Siemens PLM (product lifecycle management) software currently offers out-of-the-box industry-specific solutions for a wide variety of industries.

Multiple aspects of the product lifecycle are addressed, including:

- Bill of Materials Management
- Community Collaboration
- Compliance Management
- Engineering Process Management
- Enterprise Knowledge Management
- Lifecycle Visualization
- Manufacturing Process Management
- Maintenance, Repair & Overhaul
- Mechatronics Process Management
- Portfolio, Program & Project Mgmt.
- Reporting & Analytics
- Simulation Process Management
- Supplier Relationship Management
- Systems Engineering & Requirements Management.

[More information](#)

AADL – Current Versions of AADL Tools

Some current versions of AADL tools are:

- OSATE 1.5.7 (Also hosted by Gforge)
- Ocarina 1.1 (or v1.1 with PolyORB-HI AADL)
- ADeS 0.3.0 (Now hosted by Gforge)
- STOOD 5.2.2

[More information](#)

Systems Engineering Books, Reports, Articles and Papers

Prioritising requirements - how to do it and why it is critical to project success

By Alex P on April 5th, 2009

This article is the first in a series on requirements prioritisation. It explores why it is critical to project success to prioritise requirements, why it can be unsuccessful and describes one technique to achieve consensus.

[More information](#)

So you think you can't afford to come to IS09?

[Joe Kasser](#)

So you think you can't afford to come to Singapore for the International Symposium because your employer won't fund the trip. Perhaps you need to apply some systems thinking and view the situation from another perspective like 'can you afford NOT to come?'

Consider some of the issues. The obvious one is the cost. Take a lifecycle perspective. First of all the costs are probably tax deductible. This means that depending on your tax bracket, up to 40% of the costs are covered by your tax claim. Then, are you thinking of purchasing new clothes in the near future. Expect to pay between one third and one half in Singapore for equivalent or better quality. Do you need a new or replacement pair of eye glasses? Expect to pay between one third and one half in Singapore for equivalent or better quality. These two purchases and the tax deduction could cover most of the costs of coming to the International Symposium. Talk to your supervisor; ask for the time and part of the expenses. A willingness to pick up some of the costs will make an impression. You don't have to tell them how you plan to make up the rest of the costs.

Singapore does not need to be an expensive place to stay. There are a number of lower cost hotels near the convention centre and the nearby food courts provide inexpensive meals with menus from all parts of Asia as well as western food with an Asian touch. There are even some food courts, yes more than one, inside the convention centre. They are safe to eat at for westerners. I've been eating in them for six months with no problems. You can eat well for \$10 to \$20 (Singapore dollars) a day at the food courts. However, alcohol is one of the few expensive things in Singapore. If you want wine with your food you'll probably have to eat at a more expensive restaurant and expect to pay at least double your local prices for the drinks. If you want a stronger drink later in the evening then you might want to consider the do it yourself duty free option. There is even a

duty free shop in the airport arrival hall for your convenience.

Still not convinced? What about the intangibles? What about the knowledge you will acquire and the people you will meet and network with in Singapore? There are a few ground breaking papers on the program. Can you afford to miss them and what is more to the point, miss the opportunity to discuss them with the speakers? The keynote speakers this year should be interesting rather than providing an opportunity to catch up on your jet lag. The Host Committee is arranging for special networking icebreaking identification to place on your name badge to help you identify people with similar interests. Getting to know people and working together in the special interests groups is a great way of becoming known in the field and when the jobs come back, knowing people increases the probability of being hired for the job you want. When I first started going to INCOSE's symposia I generally met people with similar interests sharing the taxi on the way to the airport after the symposium. The icebreaker identifications will help speed up the networking process.

How committed are you to systems engineering? Aren't you concerned about the Seldon Crisis facing Systems Engineering? Systems engineering as you know it may not exist in one to five years. Is that good or bad and why? You need to come to the symposium and hear the issues discussed in the academic forum and talk to the key people during the networking time. Not sure what the crisis is all about, well ask me to give your chapter a remote presentation on the topic and enlighten you. Those of you who have heard my Leverhulme Lecture on "Systems engineers – the wizards of modern society" (see http://therightrequirement.com/III/leverhulme_lectures.htm) or other speakers and Webinars know how well the distance mode presentation can work.

If are seriously committed to systems engineering, then you need to be here and more importantly to be seen to be here. Several years ago I asked the exhibitors at the Australian Systems Engineering, Test and Evaluation (SETE) Conference why they exhibited given that very little business was being done. The general response was that they were there to show that they were still in business. Should you not be doing the same? Yes the recession is hurting, but it will end eventually. The complex problems facing society needing the systems approach to provide solutions will not go away on their own. Sooner or later people who can perform the activities known as systems engineering will be hired. You need to be seen as having a commitment to both systems engineering and improving your mastery of the discipline and what better way to separate you from the herd than by being at the symposium in Singapore. I'll ask the host committee to provide each delegate with a Merlion lapel pin that you can proudly wear on your name badge at future symposia to signify that you were at the Singapore Symposium.

There are still a few people kicking themselves for missing the symposium in Australia in 2001. Singapore promises to be even better. The Asia Pacific Systems Engineering Conference (APCOSE) is collocated with the Symposium. Your registration gets you into both events. Do you really want to miss the opportunity to meet your counterparts from the East and discover the similarities and differences for yourself? Globalisation means that you are going to be working with overseas counterparts sooner or later. Knowing people personally can make a difference to your career. This is the opportunity to meet systems engineers from the Asia-Pacific region in person and start to build friendships. As Region VI representative to the INCOSE Member Board, I met wonderful and interesting people. I count myself fortunate to know them. Let me introduce them to you, and then have them introduce you to people they know who share similar interests. Can you really afford to miss this opportunity?

Lastly, much of the success of Singapore can be attributed to systems engineering. There is a great deal of interest in systems engineering education. If you have experience that you are willing to share either by teaching (courses or by being a guest speaker on someone else's course) or by having your experience documented in the form of a case study, come to Singapore a day early and meet some of the academics and staff at the Temasek Defense Systems Institute at the National University of Singapore to start to build a relationship and discuss how we can work together. Technology has broken the distance barrier (we need to work on the time barrier, linking to a class over the Internet at 0330 your local time sucks!).

Singapore is also well placed for a vacation in South East Asia. There are a number of low cost airlines that fly from Singapore to neighbouring countries. You can look up tours from Singapore on the internet or check with the tour provider arranged by the Host committee at <http://www.luxury.com.sg/incose.html>. Asia is externally different from the Anglo-Saxon and European worlds in so many ways. The sights and aromas are strange and exciting. Why not plan an extended vacation as part of the Singapore experience? As the TV commercials for a well known credit card state – the card can be used for certain expenses, but there are others that are priceless. Coming to Singapore for the symposium and leveraging on the experience is priceless and how well you do it will demonstrate your ability as a systems engineer.

Feel free to contact me via Skype, email or phone if you have any questions or need some written support.

Lower the cost even more by taking advantage of the early bird registration rate reduction. See you in Singapore at the symposium.

Conferences and Meetings

Early Aspects at ICSE: aspect-Orientated Requirements Engineering and Architecture Design (EA 2009)

to be held in conjunction with ICSE 2009: 31st International Conference on Software Engineering 09, May 18, 2009, Vancouver, Canada

[More information](#)

isee's partner WSP presents an iThink and STELLA workshop

20 - 21 May, 2009. North Yorkshire, UK

[More information](#)

Software & Systems Engineering Essentials 2009

Steigenberger Hotel Berlin, Los-Angeles-Platz 1, 10789 Berlin, Germany Workshops - 25th May 2009, Conference - 26th & 27th May 2009

[More information](#)

ICMISE 2009: International Conference on Medical Information Systems Engineering

Tokyo, Japan, May 27-29, 2009

[More information](#)

EJC 2009 - 19th European Japanese Conference on Information Modelling and Knowledge Bases

Maribor, Slovenia, June 1-5, 2009

[More information](#)

13th IFAC Symposium on Information Control Problems in Manufacturing

June 3 - 5 2009. Moscow, Russia

[More information](#)

The 21st International Conference on Advanced Information Systems (CAiSE09)

June 8 - 12, 2009. Amsterdam, The Netherlands

[More information](#)

RefsQ`09 The 15th International Working Conference on Requirements Engineering: Foundation for Software Quality

June 8 - 9, 2009. Amsterdam, The Netherlands

[More information](#)

Exploring Modeling Methods in Systems Analysis and Design (EMMSAD) 2009

Held in conjunction with CAiSE' 09. June 8 - 9, 2009. Amsterdam, The Netherlands

[More information](#)

The 10th Workshop on Business Process Modeling, Development, and Support (BPMDS'09)

Held in conjunction with CAiSE' 09. June 8 - 9, 2009. Amsterdam, The Netherlands

[More information](#)

5th International Workshop on Enterprise & Organizational Modeling and

Simulation (EOMAS 2009)

Held in conjunction with CAiSE' 09. June 8 - 9, 2009. Amsterdam, The Netherlands

[More information](#)

The First International Workshop on Domain Engineering

In conjunction with CAiSE 2009, June 9, 2009, Amsterdam, The Netherlands

[More information](#)

International Workshop on Value-driven Engineering of Systems of Things (VEST 2009)

Held in conjunction with CAiSE' 09. June 8 - 9, 2009. Amsterdam, The Netherlands

[More information](#)

SEPG Europe 2009 - Software and Systems Process Improvement Conference

June 9 - 12, 2009. Prague, Czech Republic

[More information](#)

6th International Conference on Remote Engineering and Virtual Instrumentation (REV 2009)

June 22 - 25, 2009. Bridgeport, CT, USA

[More information](#)

PETRI NETS 2009

June 22 - 26, 2009. Paris, France

[More information](#)

TiSto 2009 - International Workshop on Timing and Stochasticity in Petri nets and other models of concurrency

A satellite event of Petri Nets 2009 30th International Conference on Application and Theory of Petri Nets and Other Models of Concurrency. June 23, 2009. Paris, France

[More information](#)

5th European Conference on Model-Driven Architecture Foundations and Applications

23 - 26 June 2009. Enschede, The Netherlands

[More information](#)

21st International Conference on Computer Aided Verification - CAV 2009

26 June - 2 July 2009. Grenoble, France

[More information](#)

Platforms for Analysis, Design and Verification of Embedded Systems (ADVES)

27 June 2009. Grenoble, France

[More information](#)

SENSUS 2009 Summer School

29 June - 3 July 2009. Keszthely, Hungary

[More information](#)

The 21st International Conference on Software Engineering and Knowledge Engineering (SEKE 2009)

Hyatt Harborside at Logan Int'l Airport, July 1 - 3, 2009. Boston, USA

[More information](#)

SSIRI 2009 - The 3rd IEEE International Conference on Secure Software Integration and Reliability Improvement

8 - 10 July 2009. Shanghai, China

[More information](#)

T4CIA'09 - Testing Technologies and Tools for Critical Industry Applications

The 1st Workshop in conjunction with SSIRI 2009

8 - 10 July 2009. Shanghai, China

[More information](#)

WER'09: 12th Workshop on Requirements Engineering

July 16 - 17, 2009. Valparaiso, Chile

[More information](#)

INCOSE 19th Annual International Symposium (IS) 2009

July 20 - 23, 2009. Singapore

[More information](#)

3rd Annual International Workshop on Requirements Engineering for Services (REFS'09)

In conjunction with COMPSAC 2009, July 20 - 24, 2009. Seattle, Washington

[More information](#)

2nd IEEE International Workshop on Industrial Experience in Embedded Systems Design (IEESD 2009)

In conjunction with COMPSAC 2009, July 20 - 24, 2009. Seattle, Washington

[More information](#)

2009 International Conference of the System Dynamics Society

July 26 - 30, 2009. Albuquerque, New Mexico

[More information](#)

PICMET '09 Conference: "Technology Management in the Age of Fundamental Change"

August 2 - 6, 2009. Hilton Portland and Executive Tower, Portland, Oregon, USA

[More information](#)

Improving Systems and Software Engineering Conference (ISSEC 2009)

Co-located with the 6th Annual Project Management Australia Conference (PMOZ 2009). August 10 - 12, 2009. Canberra, Australia

[More information](#)

Workshop on Logical Aspects of Fault Tolerance (LAFT)

(affiliated with LICS 2009). August 15, 2009. University of California, Los Angeles, USA

[More information](#)

17th IEEE International Requirements Engineering Conference (RE'09)

31 August - 4 September 2009, Atlanta, Georgia, USA

[More information](#)

Workshop on Collaboration and Intercultural Issues on Requirements: Communication, Understanding and Softskills (CIRCUS)

In Conjunction with 17th IEEE International Requirements Engineering Conference (RE'09).

31 August, 2009. Atlanta, Georgia, USA

[More information](#)

Doctoral Symposium at RE'09

1 September, 2009. Atlanta, Georgia, USA.

[More information](#)

4th International Workshop on Requirements Engineering Visualization (REV'09)

31 August, 2009. Atlanta, Georgia, USA.

[More information](#)

4th International Workshop on Requirements Engineering Education and Training

31 August, 2009. Atlanta, Georgia, USA.

[More information](#)

2nd International Workshop on Managing Requirements Knowledge (MaRK '09)

In conjunction with the 17th IEEE Requirements Engineering Conference

1 September, 2009. Atlanta, Georgia, USA

[More information](#)

2nd International Workshop on Requirements Engineering and Law

In conjunction with the 17th IEEE Requirements Engineering Conference

1 September, 2009. Atlanta, Georgia, USA

[More information](#)

1st Workshop on Service-Oriented Business Networks and Ecosystems (SOBNE '09)

1 September, 2009. Auckland, New Zealand.

[More information](#)

European Systems & Software Process Improvement and Innovation

(EuroSPI2)

September 2 - 4, 2009. University of Alcalá, Spain

[More information](#)

3rd International Workshop on Enterprise Modeling and Information Systems Architectures

10 - 11 September, 2009. Ulm University, Germany

[More information](#)

AIAA Space 2009 - Joint Space Systems Engineering and Economics Track

Within the conference is a joint Space Systems Engineering and Economics Track that has room for slots for four space systems engineering papers. September 14 - 17, 2009. Pasadena, CA, USA

[Download Call for Papers](#)

[Additional Conference Information](#)

Third IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO'09)

(IEEE approval pending)

September 14 - 18, 2009. San Francisco, USA

[More information](#)

SEPG Asia-Pacific 2009

September 16 - 18, 2009. Osaka, Japan.

[More information](#)

ICAPS 2009 Workshop on Verification and Validation of Planning and Scheduling Systems (VV&PS 2009)

September 19 - 20, 2009. Thessaloniki, Greece.

[More information](#)

14th System Design Languages Forum

September 22 - 24, 2009. Ruhr-University of Bochum, Germany

[More information](#)

ICISE 2009 - International Conference on Industrial and Systems Engineering

September 23, 2009, Toronto, Canada

[More information](#)

Ninth International Workshop on Automated Verification of Critical Systems (AVoCS 2009)

Swansea University Computer Science, September 23 - 25, 2009.

[More information](#)

Workshop "Games, Business Processes and Models of Interactions"

September 28, 2009, University of Lubeck, Germany.

[More information](#)

Workshop "Integration Engineering" held at the annual meeting 2009 of the Gesellschaft fuer Informatik e.V. (GI)

October 2, 2009, University of Lubeck, Germany.

[More information](#)

ACM/IEEE 12th International Conference on Model Driven Engineering Languages and Systems (formerly the UML series of conferences)

4 - 9 October, 2009, Denver, Colorado, USA.

[More information](#)

Track Systems Engineering 2009

7 - 8 October, 2009, Munich, Germany.

[More information](#)

International Conference on Man-Machine Systems (ICoMMS)

11 - 13 October, 2009, University of Malaysia Perlis.

[More information](#)

Symposium on Automotive/Avionics Systems Engineering SAASE 2009

14 - 17 October, 2009, San Diego, CA, USA.

[More information](#)

12th Annual Systems Engineering Conference

26 - 29 October, 2009, San Diego, CA, USA.

[More information](#)

Formal Methods for Industrial Critical Systems (FMICS) 2009

2 - 3 November, 2009, Eindhoven, The Netherlands.

[More information](#)

16th International Symposium on Formal Methods (FM2009)

2 - 6 November, 2009, Eindhoven, The Netherlands.

[More information](#)

28th International Conference on Conceptual Modeling

9 - 12 November, 2009, Gramado, RS, Brazil.

[More information](#)

Workshop on Requirements, Intentions and Goals in Conceptual Modeling

9 - 12 November, 2009, Gramado, RS, Brazil.

[More information](#)

Agent-Directed Simulation Symposium (ADS 2010)

12 - 15 April, 2010, Orlando, Florida, USA.

[More information](#)

Education & Academia

MSc in Human Centred Systems - Available Full-Time and Part-Time

Centre for HCI Design, City University London

City University London's MSc in Human-Centred Systems is claimed to equip graduates with techniques and theories with which to design, implement and evaluate interactive computing systems for the widest range of users. Graduates will be taught knowledge and skills for:

- Designing advanced human-computer interactions
- Analysing requirements for systems that involve people and computers
- Designing and conducting complex evaluations of interactive computing systems
- Designing and evaluating systems for people with disabilities and the elderly
- Designing effective information visualizations
- Supporting creative and innovation design activities

Linking user-centred design to mainstream development approaches, e.g. the UML.

[More information](#)

AutoModel - The Idea

This research project is based on a scholarship in cooperation with the university of Karlsruhe, Germany.

AutoModel is an approach to improve the requirements engineering process during software development. It deals with natural language descriptions, their flaws and last but not least their conversion into UML. AutoModel is an add-on to already existing requirements engineering processes.

[More information](#)

Postdoc Position at CEA LIST

The Laboratory of Model Driven Engineering for Embedded Systems, part of the CEA LIST (450 researchers in the field of software-intensive systems, see www-list.cea.fr), has an open position for a postdoc in the area of Model-Driven Engineering and Distributed Real-Time, Embedded Systems.

[More information](#)

Six post-doctorates on formal methods at INRIA

INRIA is seeking six post-doctorate researchers to participate in the largest European R&D initiative of the Artemisia program: project CESAR. The six participating research teams : AOSTE, ATLANMOD, ESPRESSO, POPART, S4, TRISKELL address research on formal methods for heterogeneous, model-driven, embedded software design that covers the automotive, aerospace and rail application domains of the project.

[More information](#)

Some Systems Engineering-Relevant Websites

<http://www.weibull.com>

Online Reliability Engineering Resources for the Reliability Professional.

<http://sarahsheard.blogspot.com>

<http://ucsoft.blog.com/>

A blog by Jerry Zhu on requirements engineering and software engineering.

<http://sys-eng.blogspot.com/>

Reflections, thoughts, ideas, definitions, concepts, and conclusions related to a random list of systems.

Standards and Guides

OMG Advances Standards at Technical Meeting in Washington, D.C.

Members of the OMG met in Washington, D.C. during the week of March 23-27, 2009. At this meeting, nine specifications and two final reports finished the adoption process and were approved by the OMG Board of Directors.

[More information](#)

AADL Revision A Released in January

Architecture Analysis & Design Language (AADL) Document Number: AS5506 Revision A was published in January 2009 by the SAE Issuing Committee: As-2 Embedded Computing Systems Committee.

This standard defines a language for describing both the software architecture and the execution platform architectures of performance-critical, embedded, real-time systems; the language is known as the SAE Architecture Analysis & Design Language (AADL). An AADL model describes a system as a hierarchy of components with their interfaces and their interconnections. Properties are associated to these constructions. AADL components fall into two major categories: those that represent the physical hardware and those representing the application software. The former is typified by processors, buses, memory, and devices, the latter by application software functions, data, threads, and processes. The model describes how these components interact and are integrated to form complete systems. It describes both functional interfaces and aspects critical for performance of individual components and assemblies of components. The changes to the runtime architecture are modeled as operational modes and mode transitions.

[More information](#)

AADL as a Profile Under UML

The UML profile of AADL is in informal ballot. A summary of the profile is at <http://www.aadl.info/aadl/currentsite/uml.html>. If you are interested in providing feedback on the UML profile, please contact the SAE AS-2C (AADL) Subcommittee at standard@aadl.info.

A draft of the Behavior Annex is in review by the SAE AADL Subcommittee.

ISO Requirements Engineering Standard ISO/IEC AWI 29148

The standard ISO/IEC AWI 29148 "Software and systems engineering - Life cycle processes - Requirements engineering" is presently under development by ISO/IEC JTC 1, SC7, WG 7, with the official status of "New project registered in TC/SC work programme". It is understood that some work has been accomplished in development of this new standard.

This project will provide a unified treatment of the processes and products involved in engineering requirements throughout the life cycle of systems and software. There are two aspects of the planned document: guidance on applying the process provisions of ISO/IEC 15288 and ISO/IEC 12207 related to requirements engineering; and normative provisions for the content (as well as guidance regarding format) of the resulting specifications of requirements.

The conformance provisions of the new document will be phrased in a manner that makes it possible for users to claim conformance to either the process provisions or the documentation provisions or both.

Status of ISO/IEC 15289:2006 Svstems and software engineeringa - Content of

systems and software life cycle' process information products (Documentation)

The standard ISO/IEC 15289:2006 assumed the status of "Standard to be Revised" on 28 April, 2009.

Some Definitions to Close On

Architecture

Oxford English Dictionary (1): The style of a building as regards design and construction.

Oxford English Dictionary (2): The conceptual structure and logical organization of a computer or computer-based system.

Wikipedia: The word "architecture" comes from the Latin *architectura* and that from Greek *αρχιτέκτων* (*architectu*), "master builder", from the combination of *αρχι-* (*archi-*), "chief" or "leader" and *τέκτων* (*tekton*), a "builder" or "carpenter". While the primary application of the word "architecture" pertains to the built environment, by extension, the term has come to denote the art and discipline of creating an actual (or inferring an implied or apparent) plan of any complex object or system.

IEEE Standard for Architectural Description of Software-Intensive Systems (IEEE P1471/D5.3): The fundamental organization of a system embodied by its components, their relationships to each other and to the environment and the principles guiding its design and evolution.

Dictionary.com: the character or style of building: the architecture of Paris; Romanesque architecture.

Dictionary.com: a fundamental underlying design of computer hardware, software, or both.

Kruchten: The Rational Unified Process, 1999: An architecture is the set of significant decisions about the organization of a software system, the selection of the structural elements and their interfaces by which the system is composed, together with their behavior as specified in the collaborations among those elements, the composition of these structural and behavioral elements into progressively larger subsystems, and the architectural style that guides this organization---these elements and their interfaces, their collaborations, and their composition.

Rechtin 1992: Systems architecture: The underlying structure of a system, such as a communication network, a neural network, a spacecraft, a computer, major software or an organization.

Kruchten 1994: Software architecture deals with the design and implementation of the high-level structure of the software. It is the result of assembling a certain number of architectural elements in some well-chosen forms to satisfy the major functionality and performance requirements such as scalability and availability. Software architecture deals with abstraction, with decomposition and composition, with style and esthetics.

Garlan 1994: A critical aspect of the design for any large software system is its gross structure that is, its high-level organization of computational elements and interactions between those elements. Broadly speaking, we refer to this as the software architectural level of design.

B Hayes-Roth 1995: The architecture of a complex software system is its "style and method of design and construction".

MIL-STD-499C Draft 24 March 2005: A structure of components, their relationships, and the principles and guidelines governing their design and evolution over time.

Space & Missile Systems Center, USAF, Systems Engineering Primer & Handbook: A book on system architecting identifies eight different definitions of system architecture published by various technical organizations and authors. Most of these definitions have to do with some representation of the elements of a system and the way they are structured, interconnected, or organized. Thus, a functional architecture usually refers to some representation of the tasks or functions that a system is to perform and the organization or relationship among the functions. Similarly, a physical architecture usually refers to some representation of the structure or organization of the physical elements of the system. The elements of a physical architecture can represent hardware, software, or both.

Interpretation: The common themes that can be drawn from these definitions are concept, structure and design. A definition of architecture that I find of great practical use is "the conceptual design (noun) of an item, structurally and/or logically" - Robert Halligan.

Project Performance International News

Managing Technical Projects 2-Day Course in Brazil

Design, develop, produce and deliver a 2-day course on systems engineering management in 5 days start to finish – yes we can! Whilst not the way PPI would choose to work, when a client needs the impossible, we will try to move heaven and earth to make it happen. In this case, this month (April 2009), we did.

New PPI LinkedIn and Twitter

PPI has also created a LinkedIn group for past delegates. The aim of this group is to encourage discussion between past course delegates and to create a community in which you may ask questions or gain assistance from like-minded people.

Managing Director and Course Presenter, Mr. Robert Halligan, will be posting links to useful articles and tweeting Systems-Engineering related quotes regularly on the social networking platform, Twitter.

- [Past delegates join PPI's LinkedIn Group](#)
- [Follow Mr. Robert Halligan on Twitter](#)

Project Performance International Events

Robert Halligan Addresses RESG in London

On Wednesday 29th April the Requirements Engineering Specialist Group (RESG) of the British Computer Society hosted a free informal talk by the well-known consultant and trainer, Robert Halligan (Managing Director, Project Performance International). The venue was the Old Crown pub, New Oxford Street, a small, cosy London pub where the group enjoyed an after-work drink and chatted with Robert and others with an interest in software requirements and business analysis!

Systems Engineering 5-Day Courses

Upcoming locations include:

- Amsterdam, The Netherlands
- Melbourne, Australia
- Adelaide, Australia
- Brisbane, Australia
- Melbourne, Australia
- Munich, Germany

[View 2009 Systems Engineering Course Schedule](#)

Requirements Analysis and Specification Writing 5-Day Courses

Upcoming locations include:

- Cape Town, South Africa
- Las Vegas, USA
- Amsterdam, The Netherlands

[View 2009 RA&SW Course Schedule](#)

OCD/CONOPS 5-Day Courses

Upcoming locations include:

- Melbourne, Australia
- Adelaide, Australia

[View 2009 OCD/CONOPS Course Schedule](#)

Software Engineering 5-Day Courses

Upcoming locations include:

- Munich, Germany
- Adelaide, Australia
- Amsterdam, The Netherlands

[View 2009 Software Engineering Course Schedule](#)

PPI Upcoming Participation in Professional Conferences

- 30 June - 2 July, 2009 - **Defence + Industry 2009** - Adelaide, Australia (Exhibiting)
 - 20 - 23 July, 2009 - **INCOSE International Symposium 2009** - Singapore (Exhibiting)
-

Kind regards from the SyEN team:

Robert Halligan, Managing Editor, email: rhalligan@ppi-int.com

Alwyn Smit, Editor, email: asmith@ppi-int.com

Julie May, Production, email: jmay@ppi-int.com

Michael Halligan, Production, email: halliganm@ppi-int.com

Project Performance International

PO Box 2385, Ringwood, Vic 3134 Australia

Tel: +61 3 9876 7345

Fax: +61 3 9876 2664

Web: www.ppi-int.com

Email: contact@ppi-int.com

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