PROJECT PERFORMANCE INTERNATIONAL

Systems Engineering Newsletter

SyEN

SyEN #016 - January 27, 2010

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What's Inside:

A Quotation to Open On

> *"I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do." - Leonardo da Vinci*

Dear Colleague,

SyEN is 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 stakeholder requirements and maximize value delivered to stakeholders in accordance with stakeholder values.

If you are presently receiving this newsletter from an associate, you may receive the newsletter directly in future by signing up for this free service of PPI, using the form at www.ppi-int.com. If you do not wish to receive future SE eNewsletters, please reply to this e-mail with "Remove" in the subject line, from the same email address. Your removal will be confirmed, by email.

We hope that you find this newsletter to be informative and useful. Please tell us what you think. Email to: contact@ppi-int.com.

Feature Article

Common Sense on Reliability Engineering

(Part 3 of 3)

Albertyn Barnard

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"Unfortunately, the development of quality and reliability engineering has been afflicted

with more nonsense than any other branch of engineering." - Patrick O'Connor

In previous parts of this series, Reliability was defined as the absence of failures in products and systems, and Reliability Engineering as the management function that prevents the creation of failures by people (such as systems engineers, design engineers, production personnel, users and maintenance personnel).

It was also argued that "absence of failures" can only be achieved in practice by preventing failures from occurring in the first place. The prevention of failure is only possible if we develop a thorough understanding of potential failure modes, and then take appropriate steps to prevent them from occurring. This understanding of potential failure modes is obtained by using "Analysis" and "Test" as design and production verification methods as indicated in Figure 1.

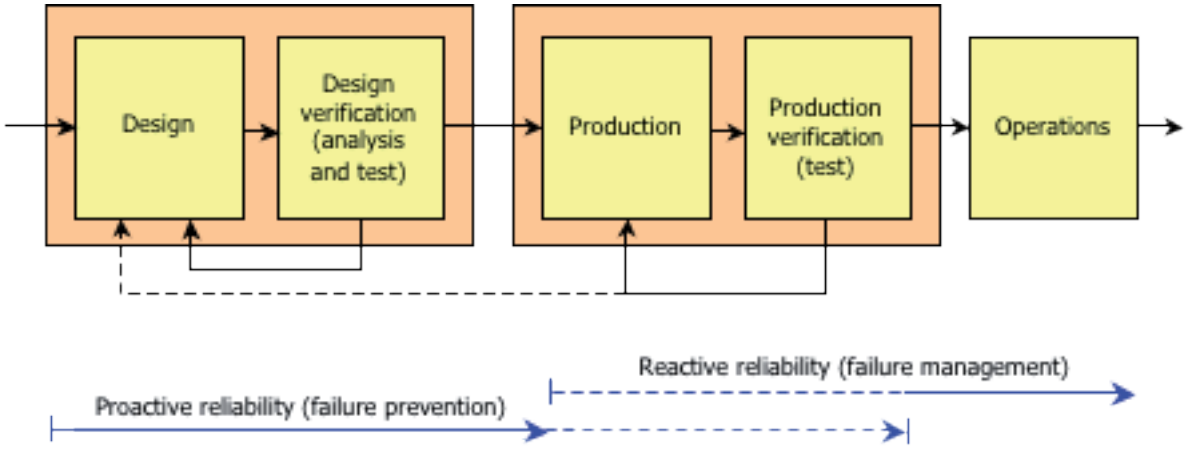


Figure 1: Verification of design and production

The second part of the series discussed “Analysis” in more detail, and referred to both design analysis (eg electronic component derating analysis) and failure analysis (eg Failure Mode and Effects Analysis). These theoretical analyses are all based on some model of the product or system, and not on the actual item. “Test”, on the other hand, is always practical, and involves both the design and the manufacturing processes. “Analysis” and “Test” are therefore complementary verification methods which are both essential in achieving high reliability.

What is meant by “Test” in this context?

Test as verification method is well known in systems engineering, since it is frequently used to demonstrate compliance with specifications. In some industries, as major part of “qualification”, it is used as important milestone in the development cycle (eg decision to proceed with production). However, to demonstrate compliance with a reliability specification is different to demonstrating compliance with other functional specifications.

The objective of compliance testing, also known as “success testing”, is to pass a specific test (eg measurement of electrical power at some maximum temperature). However, if the intention is to gain an understanding of potential failure modes, then we have to perform “failure testing”. Reliability tests should therefore be deliberately planned to cause failures, and not to demonstrate successful achievement of a specific parameter. In other words, **the objective of reliability testing should be to identify design and production weaknesses**. It is the practical equivalent of design and failure analyses!

Testing to cause failures is obviously in direct contrast with the conventional approach which treats reliability as a functional performance parameter that can be measured by testing items over a period of time whilst applying simulated or actual in-service conditions. It should be noted that reliability demonstration testing based on PRST (Probability Ratio Sequential Testing) is fundamentally inadequate and should not be used, especially not for development testing [1].

The modern approach to reliability testing is HALT or “Highly Accelerated Life Testing” [2]. One or more test items are subjected to stresses that generally far exceed the field environments (and therefore also the design specifications). No attempt is made to simulate the field environment, and the stresses usually include simultaneous all-axis random vibration (e.g. $50G_{rms}$ or more) and thermal cycling (e.g. 60 °C per minute or more). Figure 2 shows a typical HALT profile. It is interesting to note that correctly designed and manufactured commercial electronic products can function at the higher end of this profile (eg –70 °C to +110 °C at $50G_{rms}$)!

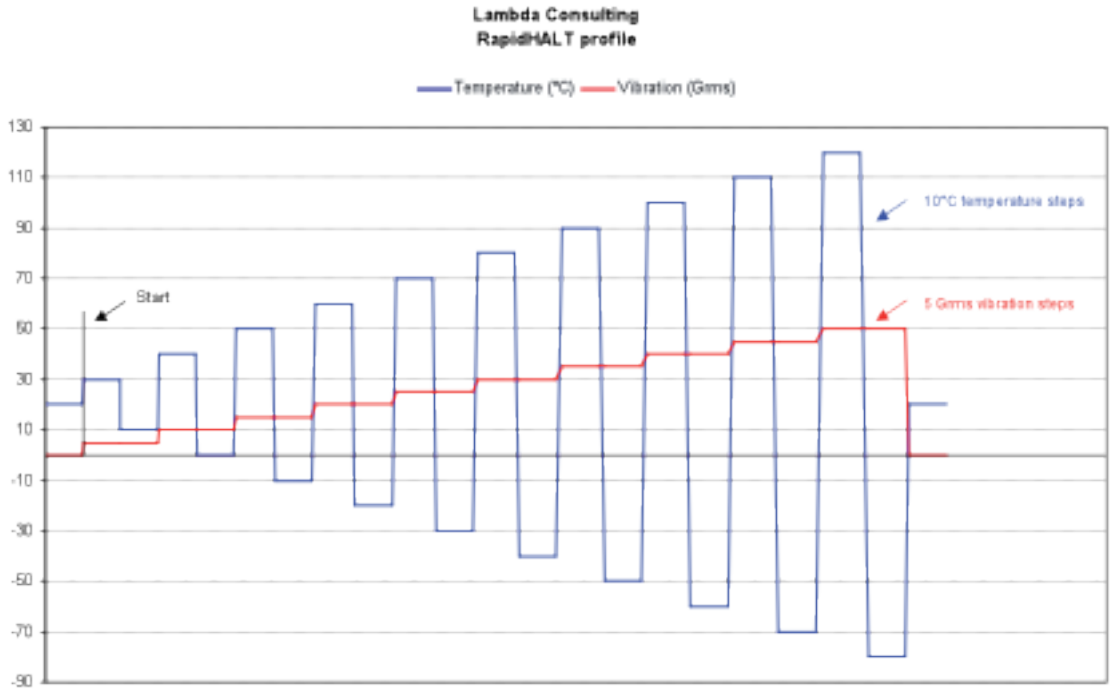


Figure 2: Test profile used in HALT

When a failure mode is observed during test, the test is stopped to investigate the cause of failure. This implies that the test item or items should be functioning during test, and that adequate failure detection should be possible. The actual stress levels during test are not important, since we are more interested in the specific failure mode. During HALT, both operational and destruct limits can be determined, although some companies prefer not to test to destruction (due to high cost of test items).

In HASS or “Highly Accelerated Stress Screening” accelerated stresses are applied in production in order to shorten the time to failure of any defective units. While HALT is used during design, HASS is used during production. The application of these methods requires the use of special test equipment to subject development models or production units to environmental stresses far beyond specification levels. Figure 3 shows typical HALT chambers.

Figure 3: Typical HALT chambers

In recent years, HALT and HASS have become the accepted methods for reliability testing in many diverse industries [3]. Although the concepts of HALT and HASS are still questioned by some people, they are proven methods to identify design and production weaknesses. Identification of these "improvement opportunities", as explained previously, is an essential step in the prevention of equipment failure in the field.

REFERENCES

[1] *Test Engineering : A Concise Guide to Cost-effective Design, Development and Manufacture*, Patrick DT O'Connor, John Wiley & Sons, 2002

[2] *Accelerated Reliability Engineering : HALT and HASS*, Gregg K Hobbs, John Wiley & Sons, 2000

[3] GEIA STD-0009, *Reliability Program Standard for System Design, Development and Manufacturing*, Information Technology Association of America, 2008

BIOGRAPHY

Albertyn Barnard received the degrees M Eng (Electronics) and M Eng (Engineering Management) from the University of Pretoria in South Africa. He has provided consulting services in reliability engineering to the defence, nuclear, aerospace and commercial industries since 1982. He provides training in reliability engineering to local industry and at post-graduate level at the University of Pretoria. He has presented numerous technical papers at local and international symposia, and won the Ad Sparrius Best Paper Award at the 2004 INCOSE SA conference, as well as the Gold Award at the 2009 International Applied Reliability Symposium Europe. He has been a member of the management committee of INCOSE SA for a number of years, and served as President of INCOSE SA in 2008. His company, Lambda Consulting, specialises in reliability engineering activities applicable to the development phase of products, with emphasis on reliability analysis of electronic design and HALT (Highly Accelerated Life Testing). Lambda Consulting established the first commercial HALT laboratory in South Africa in 2008.

Systems Engineering News

Breaking News: Artisan, Aonix merge; Now they're Atego

SysML and embedded systems modeling tools provider Artisan Software has merged with embedded Java and Ada tools provider Aonix to form Atego, which will focus on safety-critical systems and software, the company has announced. James B. Gambrell, the former CEO of Artisan, will become executive chairman of Atego, with responsibility for the new company's strategic direction and future acquisition opportunities. Pierre Cesarini, the former CEO of Aonix, will serve as CEO of Atego and will be responsible for worldwide operations.

Artisan Studio remains the company's flagship software for modeling, with support for UML, SysML and architectural frameworks, while Artisan Workbench remains the company's development framework. Aonix brings in the PERC product line for application development in Java and Ada. Terms of the transaction were not disclosed.

More information

Sustainability Institute Calls For Tapping Systems Thinking Potential in UN Process

"Copenhagen, Denmark, December 8, Bas de Leeuw, Executive Director of the Dana Meadows Sustainability Institute in the USA pointed to the untapped potential of systems thinking for better achieving the sustainable consumption and production agenda. Individuals need to be empowered to "be the change in the world they want to see", he said. Bas spoke at an event organized by the Climate Sustainability Platform, an open forum for climate negotiators, sustainability influencers and people from developed and developing countries across the world, moderated by the Sri Lanka based Centre for Environment and Development (CED), organised back to back with the Copenhagen Climate Change talks.

Jeffery Barber, a long time sustainability campaigner from the USA, said that it is the movement of people and their initiatives around the world that will lead the way. Uchita de Zoysa, CED, said it is not 'development' that people around the world are asking for, rather 'happiness for future generations." The Platform plans to be an active contributor to the upcoming two-years of UN negotiations on an international ten-year framework on Sustainable Consumption and Production, with the first events scheduled for May 2010, New York."

More Information

Formal Methods in Aerospace: Techniques from Logic, Mathematics and AI

A Special Issue of the Journal: Annals of Mathematics and Artificial Intelligence

Call for papers: Deadline: 10th March 2010

More information

Call for Human Factors Presentations

The American Institute for Aeronautics and Astronautics (AIAA) Space Operations and Support Technical Committee (SOSTC) will hold its 16th Annual Improving Space Operations Workshop on 25-26 May 2010, at the NASA Goddard Space Flight Center (GSFC).

The organiser of the Human Factors track is looking for presentations on Human Factors in operational environments. Topics could include error management, training, risk mitigation and management, resilience architecting/engineering, and Human Systems Integration, to name a few areas. Expertise is welcome from all high risk, high consequence industries such as ground, ocean, air, or space transportation, power generation and distribution, healthcare, petrochemical plants, etc.

The format for the track has not been determined, and suggestions are welcome. In past workshops there were 30 to 60 minute sessions, including question and answer time, depending on the number of presenters. There will be sessions morning and afternoon on both days of the workshop.

Presenters will be responsible for their own travel and lodging. Cost for the workshop will be around US$ 75, however, the organiser is trying to negotiate a discount for presenters.

If you have questions, please contact: David Fuller, dfullermail-workshop@yahoo.com

INCOSE Cited In Article on Systems Engineering Careers

From http://www.incose.org/newsevents/news/details.aspx?id=187

Dr Donna Rhodes was interviewed by Diversity Careers about systems engineering alongside representatives from CAB companies Rockwell Collins and Northrop Grumman. INCOSE is also mentioned. The entire article can be found at http://www.diversitycareers.com/articles/pro/09-decjan/chg_tech_systems.htm

NASA 2010 Systems Engineering Excellence Award

NASA's Office of the Chief Engineer has announced the recipients of the first NASA Systems Engineering Award, including two people from NASA Ames Research Center. Bill Borucki, will receive a methodology award for the Kepler mission, and Daniel Andrews will receive a project award for the LCROSS mission.

More information

EuSEC 2010 Newsletter #2

http://www.incose.se/eusec2010/Newsletter_2.pdf

Overhauling Europe's Increasingly Crowded Airspace

European airspace is among the busiest in the world and faces a number of challenges: growing demand for air travel (beyond the current economic downturn), the European governments' strong political will to tackle environmental and global warming issues, the need to significantly reduce ATM costs (which amount to some €8 billion each year in Europe), the nationally rather than globally designed air routes and air navigation service provision, and the constraints linked to the large areas of European airspace reserved for military use.

More information

Systems Engineering - Volume 13 Issue 1 (Spring 2010)

Now available:

- Obstacles to the flow of requirements verification (p 1-13) - Alan B. Marchant
- The Concept of Reference Architectures (p 14-27) - Robert Cloutier, Gerrit Muller, Dinesh Verma, Roshanak Nilchiani, Eirik Hole, Mary Bone
- Development of the multiregional inoperability input-output model (MRIIM) for spatial

explicitness in preparedness of interdependent regions (p 28-46) - Kenneth G. Crowther, Yacov Y. Haimes
- Harmonizing high performance computing (HPC) with large-scale complex systems in computational science and engineering (p 47-57) - Clyde Chittister, Yacov Y. Haimes
- Assessing stakeholder evaluation concerns: An application to the Central Arizona water resources system (p 58-71) - L. Robin Keller, Craig W. Kirkwood, Nancy S. Jones
- Human view dynamics - The NATO approach (p 72-79) - Holly A. H. Handley, Robert J. Smillie
- SysML modeling of off-the-shelf-option acquisition for risk mitigation in military programs (p 80-94) - James A. Constantine, Senay Solak
- Systems analysis of emerging IPTV entertainment platform: Stakeholders, threats, and opportunities (p 95-107) - Shantnu Sharma

More information

EU project readies UML/SysML-based HW/SW codesign tool

Anne-Francoise Pele

EE Times

(01/06/2010 11:49 AM EST)

PARIS — A first technology solution has emerged from the European Union's Framework7 SATURN project: a UML/SysML-based hardware/software co-design solution based on Artisan Studio, a modeling suite from Artisan Software Tools Ltd. (Cheltenham, England).

The UML/SysML-based hardware/software co-design solution uses an enhanced SysML profile linked to a SystemC code generator for Artisan Studio, the company claimed. This generates executable SystemC which is then translated into VHDL for execution in an FPGA.

More Information

System Dynamics Society Sale

The Systems Dynamics Society is losing its storage space and needs to lighten its inventory. From now until March 31, 2010, SDS is offering the following items at substantial savings:

Conference Proceedings

Complete your collection or get the special System Dynamics Conference Proceedings you always wanted. During this limited period, many conference proceedings are available at a cost of only US$5.00 each plus shipping.

System Dynamics Review

If you need some issues to complete your collection, or would really like a specific issue, this is a great opportunity. ONLY from now until March 31, 2010, current members of the Society may purchase back issues of the System Dynamics Review at a substantial discount. Single issues and double issues will be only US$5.00 each plus shipping.

Additional Items Available.

More information

Featured Societies - Systems Dynamics Society

The System Dynamics Society is an international, nonprofit organization devoted to encouraging the development and use of system dynamics and systems thinking around the world. With members in fifty-five countries, and sixteen Chapters worldwide, the Society provides a forum in which researchers, educators, consultants, and practitioners in the corporate and public sectors interact to introduce newcomers to the field, keep abreast of current developments, and build on each other's work.

System dynamics is a methodology for studying and managing complex feedback systems, such as are found in business and other social systems. In fact, system dynamics has been used to address practically every sort of feedback system. While the word system has been applied to all sorts of situations, feedback is the differentiating descriptor here. Feedback refers to the situation of X affecting Y and Y in turn affecting X, perhaps through a chain of causes and effects. The link between X and Y, and the link between Y and X, cannot be studied independently to predict how the system will behave. Only the study of the whole system as a feedback system will lead to correct conclusions.

The methodology:

- identifies a problem,
- develops a dynamic hypothesis explaining the cause of the problem,
- builds a computer simulation model of the system at the root of the problem,
- tests the model to be certain that it reproduces the behavior seen in the real world,
- devises and tests in the model alternative policies that alleviate the problem, and
- implements this solution.

Rarely is it possible proceed through these steps without reviewing and refining an earlier step. For instance, the first problem identified may be only a symptom of a still greater problem.

The field developed initially from the work of Jay W. Forrester. His seminal book "Industrial Dynamics" (Forrester 1961) is still a significant statement of philosophy and methodology in the field.

The Society's annual international conference is held alternately in North America and Europe, with occasional appearances in Asia and the Pacific Rim. These conferences, and the meetings of local chapters and interest groups, introduce newcomers to the field, keep practitioners aware of current developments, and provide unparalleled networking opportunities. Printed proceedings for most previous conferences can be ordered from the Society.

Special Interest Groups of the Society are active in the following fields:

- Business
- Education
- Energy
- Environmental
- Health Policy
- Information Science and Information Systems
- Inter- and Intranational Conflict
- Model Analysis
- Psychology
- Security.

The Society publishes a peer-reviewed journal, The System Dynamics Review. This journal is published quarterly by John Wiley & Sons, under the editorship of Brian Dangerfield of the University of Salford and an international editorial board. The Review publishes high quality, peer-reviewed advances in systems thinking and system dynamics and their applications to societal, technical, managerial, and environmental problems.

Membership of the System Dynamics Society is open to all individuals. Opportunities for corporate sponsorship also exist.

Website: www.systemdynamics.org

INCOSE Technical Operations

INCOSE Human Systems Integration (HSI) Working Group

http://www.incose.org/practice/techactivities/wg/hsi/

Definition

Human Systems Integration: interdisciplinary technical and management processes for integrating human considerations within and across all system elements; an essential enabler to systems engineering practice.

Charter

To facilitate embedding Human Systems Integration within Systems Engineering, promoting the benefit of placing the proper focus on the role of people in the development and operation of systems. Our vision is to see Human Systems Integration embedded in Systems Engineering practices, leading to the efficient delivery of effective systems.

Leadership

Co-Chair: Jen McGovern Narkevicius, Jenius LLC

Co-Chair: Ajoy Muralidar, Naval Surface Warfare Center - Dahlgren

Contact HSI Working Group for additional information or to join this group.

Accomplishments/Products

- Appendix M: Human Systems Integration, SE HDBK v3.1
- HSI Seminars delivered at IS07, IS08, IS09
- HSI Theme Issue of INSIGHT, Apr08
- Cognition Theme Issue of INSIGHT, Apr09
- HSI Tutorials delivered at IS08, IS09

Current Projects

- **Project 1:** Defining relationships between systems engineering practice and HSI practice
- **Project 2:** Clarifying HSI and contributing domains acronyms and word use
- **Project 3:** Influence HSI inclusion in SE documents and standards
- **Project 4:** Outreach – Joint INCOSE/HFES HSI Interest meeting at Human Factors and

Ergonomics Society Meeting October 2009

- **Project 5:** Identify potential HSI Key Performance Parameters, Measures of Performance, Measures of Effectiveness, and requirements

Systems Engineering Software Tools News

3SL/Cradle: January 2010 Newsletter

http://www.threesl.com/pages/webletter-January10/index.php

Artisan Systems Engineering Webinar - Tue, 26 January 2010

The systems engineering webinar covers the following topics:

- Introduction to systems engineering
- Defining systems engineering
- The need for systems engineering
- Systems engineering best practice
- Key concepts: life cycles, process, systems and projects
- Systems modeling
- Systems engineering competency
- Further information sources

More information

Systems Engineering Books, Reports, Articles and Papers

Open System Engineering Environment (OSEE)

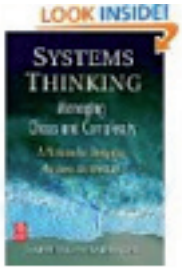
The Open System Engineering Environment (OSEE) project provides a tightly integrated environment supporting lean principles across a product's full life-cycle in the context of an overall systems engineering approach. The system captures project data into a common user-defined data model providing bidirectional traceability, project health reporting, status, and metrics which seamlessly combine to form a coherent, accurate view of a project in real-time. By building on top of this data model, OSEE has been architected to provide an all-in-one solution to configuration management, requirements management, testing, validation, and project management. All of these work together to help an organization achieve lean objectives by reducing management activities, eliminating data duplication, reducing cycle-time through streamlined processes, and improving overall product quality through work flow standardization and early defect detection.

Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture

By Jamshid Gharajedaghi

Publisher: Butterworth-Heinemann, Publication Date: May 24, 1999

ISBN-10: 0750671637, ISBN-13: 978-0750671637



Product Description:

In a nutshell, this book is about systems. This book is written for those thinkers and practitioners who have come to realize that while the whole is becoming more and more interdependent parts display choice and behave independently, and that paradoxes are the most potent challenge of emergent realities.

With a practical orientation and yet a profound theoretical depth, the book offers an operational handle on the whole by introducing an elaborate scheme called iterative design. The iterative design explicitly recognizes that choice is at the heart of human development. Development is the capacity to choose; design is a vehicle for enhancement of choice and holistic thinking. ‘Designers’, in this book, seek to choose rather than predict the future. They try to understand rational, emotional, and cultural dimensions of choice and to produce a design that satisfies a multitude of functions. They learn how to use what they already know and also about how to learn what they need to know.

The imperative of interdependency, the necessity of reducing endless complexities, and the need to produce manageable simplicities require a different mode of thinking, a holistic frame of reference that would allow us to focus on the relevant issues and avoid the endless search for more details while drowning in proliferating information. While organizations as a whole are becoming more and more interdependent the parts display choice and behave independently. This is the dilemma this book tries to resolve. It is a unique, cutting edge work, with a practical orientation and yet a profound theoretical depth, which goes far beyond what is currently available.

Leading edge systems thinking and practice that goes far beyond what is currently available

It deals with the whole, both conceptually and practically, written in a reader-friendly style

Five real cases cited to demonstrate practical application of theories discussed

More information

Essentials of Project and Systems Engineering Management

By Dr. Howard Eisner

Publisher: Wiley; 3 edition, Publication Date: March 14, 2008
ISBN-10: 0470129336, ISBN-13: 978-0470129333

Product Description:

The Third Edition of Essentials of Project and Systems Engineering Management enables readers to manage the design, development, and engineering of systems effectively and efficiently. The book both defines and describes the essentials of project and systems engineering management and, moreover, shows the critical relationship and interconnection between project management and systems engineering. The author's comprehensive presentation has proven successful in enabling both engineers and project managers to understand their roles, collaborate, and quickly grasp and apply all the basic principles.

Readers familiar with the previous two critically acclaimed editions will find much new material in this latest edition, including:

- Multiple views of and approaches to architectures
- The systems engineer and software engineering
- The acquisition of systems
- Problems with systems, software, and requirements
- Group processes and decision making
- System complexity and integration

Throughout the presentation, clear examples help readers understand how concepts have been put into practice in real-world situations.

With its unique integration of project management and systems engineering, this book helps both engineers and project managers across a broad range of industries successfully develop and manage a project team that, in turn, builds successful systems. For engineering and management students in such disciplines as technology management, systems engineering, and industrial engineering, the book provides excellent preparation for moving from the classroom to industry.

More information

UML 2 and SysML: An Approach to Deal with Complexity in SoC/NoC Design

OVERVIEW: UML is gaining increased attention as a system design language, as indicated by current standardization activities such as the SysML initiative and the UML for SoC Forum. Moreover the adoption of UML 2 is a significant step towards a broader range of modeling capabilities. This paper provides an overview of the impact of these recent advances on the application of UML for

SoC and NoC development, proposes a model-driven development method taking benefit of the best techniques recently introduced, and investigates the design of power efficient systems with UML.

More Information

A Structured Approach for Reviewing Architecture Documentation

Robert L Nord, Paul C. Clements, David Emery, & Rich Hilliard

CMU/SEI-2009-TN-030

This technical note proposes a structured approach for reviewing architecture documentation. Given the critical importance of architecture to software project success, it follows that the architecture cannot be effective unless it is effectively captured in documentation that allows the architecture's stakeholders to understand and use the architecture in the way it was intended. The approach does not assume a particular architecture methodology or a particular architecture documentation practice, although it was conceived in the context of the International Organization for Standardization (ISO) Recommended Practice for Architecture Description of Software-Intensive Systems and the SEI Views and Beyond approach to documenting software architectures. Like both of them, our approach is centered on the stakeholders of the artifact, engaging them in a focused, guided way to ensure that the documentation carries sufficient quality to enable them to do their jobs and to help them point out gaps and weaknesses. Our approach is not intended as a complete framework for architecture evaluation; rather it is meant to be used within such a framework, when one is available.

More information

Change Impact Analysis for SysML Requirements Models based on Semantics of Trace Relations

Authors: ten Hove, D.; Göknil, A.; Kurtev, I.; van den Berg, K.G.; de Goede, K.
Editors: Oldevik, J.; Olsen, G. K.; Neple, T.; Kolovos, D.
Date: 2009-06-23

Summary: Change impact analysis is one of the applications of requirements traceability in software engineering community. In this paper, we focus on requirements and requirements relations from traceability perspective. We provide formal definitions of the requirements relations in SysML for change impact analysis. Our approach aims at keeping the model synchronized with what stakeholders want to be modeled, and possibly implemented as well, which we called as the domain. The differences between the domain and model are defined as external inconsistencies. The inconsistencies are propagated for the whole model by using the formalization of relations, and mapped to proposed model changes. We provide tool support which is a plug-in of the commercial visual software modeler BluePrint.

More information

Systems Thinking or Systems Engineering

Kate M. Gill

Abstract: The problem faced by most systems organisations is how to develop and sustain staff with the appropriate systems skills and experience. To date, much has been made of the delineation of systems thinking and systems engineering. In this research, the partitioning of 'thinking' and 'engineering' has been explored using Discourse Analysis (DA) of interviews with a small systems team working within the Defence Science and Technology Laboratory (Dstl). The research explores the perceptions of staff that are working and delivering in systems roles, and was undertaken to support systems capability development within Dstl and to answer the question ''what do we need to do know, to set the scene for the future?''.

More information

Systems of Systems — An Opportunity for Engineering and Society

Vernon Ireland
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Abstract: Criticisms of engineers, as not being adequately aware of global political and societal issues, not understanding cross and multicultural issues, and, not understanding international business, is noted. The education of engineers is also criticised as not using a project approach rather than a more general problem solving approach. Current project models in use in the industry are examined for possible models for use and a relatively new model of system of systems (SoS) is focussed on. SoSs address the integration of independent autonomous systems.

They provide paradoxes and experience of these will develop engineers. Top-down requirements of SoS, rather than the bottom-up approach of systems engineering, brings engineers more into the public arena. The architecture of the SoS model may cope with the complexity of managing response to projects such as climate change; its breadth and greater prominence may attract a broader range of participants to engineering.

More information

Modeling: Archetypes vs. Stock & Flow

"I have come to understand from a number of sources that there exists some controversy regarding the basis of model development. As I understand it there are those that seem to feel there is great value in beginning with the Archetypes and elaborating them as warranted by the actual environment being modeled. And, there seem to be those that contend that it is better to begin with the basic Stock & Flow components and build the model from essentially nothing but an understanding of the environment being modeled. So which is best? Yes, you guessed it, "It Depends!"

Does the value of something flow from what it is, or what it accomplishes? What I offer here is somewhat of an autobiographical journey to whatever level of understanding I now possess, on my way to whatever is to follow."

More information

Five Maxims about Emergent Behavior in Systems of Systems

Author: John Morley

“A highway traffic tunnel is open on both ends. There are no traffic signals to control speed or obstacles to prevent vehicles from traveling at the posted speed limit. In fact, typically there are signs that encourage drivers to maintain their speed as they approach and enter a tunnel.

Yet, traffic often slows just before the entry to a tunnel. Why? What force causes this behavior? View the highway-tunnel-automobile combination as a system of systems, and you can call the slowing of traffic an emergent property.”

More information

International Journal of Intelligent Defence Support Systems (IJIDSS)

Volume 2 - Issue 3 - 2009

Special Issue on Systems Engineering Education

More information

The Competencies of a Business Analyst

By Narain Balchandani

Competencies are described as the ability to do a particular activity to prescribed standard.

The competencies can be classified into three categories

1. Behaviour Skill and Personal Qualities
2. Business Knowledge
3. Techniques

More Information

Assessing EA Maturity isn’t all that helpful – Here’s a Better Approach

“Most current discussions on EA Maturity focus on backward-looking metrics and score them based on levels that are similar to the Capability Maturity Model (CMM) process improvement system developed by the Systems Engineering Institute at Carnegie Mellon University. Over the past several years we have started to develop a different opinion about using CMM-type assessments for enterprise architecture processes.”

More information

A Summary of the System Safety Systems-of-Systems (SoS) Workshop at ISSC 2009

by Howard Kuettner, Arch McKinlay and Dave West, Presenters

A tutorial on “Systems-of-Systems (SoS) Safety” was presented by Arch McKinlay and Dave West at the 27th International System Safety Conference on August 7, 2009. If you attended this workshop, you now understand the challenges facing the safety community when working Systems-of-Systems (SoS).

West began with a survey of the current status, maturity of the sub-disciplines and the opportunities for advancing state-of-the-art system safety as applied to SoS. West defined SoS as “a collection of physically disconnected systems, usually with functionally specialized capabilities, that operate in concert to accomplish a common objective.” McKinlay defined SoS as “a large widespread collection of networks of systems functioning together to achieve a common purpose.”

More information

SWAT - Seize the Accomplishment

By Timothy Johnson

Publisher: Lexicon Publications; 1st edition (January 10, 2010)

ISBN-10: 1934417025, ISBN-13: 978-1934417027

Product Description:

Systems **W**orking **A**ll **T**ogether

Are you accomplishing important things in your life and at work?

When it comes to accomplishment, Toby Donovan is stumped. He has been charged with leading a difficult team tasked with overhauling the call center, and his boss is breathing down his neck. But Toby has a secret weapon: his cousin and best friend, Rex, who is a SWAT Commander. Using the simple concepts of systems thinking, Rex shows Toby how to seize the accomplishment, whether it s a bad guy holed up in a stronghold or a business process which is slowing down the entire organization. Follow along as the story of Toby unfolds and he figures out how Systems Working All Together can be the best Special Weapons and Tactics available.

More information

Conferences and Meetings

From Systems Thinking to Systems Doing 

19 January 2010, 15.30-18.30, IVA conference center “Bankettsalen”, Grev Turegatan 16, Stockholm

More information

INCOSE 2010 International Workshop

7 - 10 February, 2010. Phoenix Marriott Mesa, Mesa, Arizona.

More information

Semantic Models for Adaptive Interactive Systems

In conjunction with 2010 International Conference on Intelligent User Interfaces (IUI 2010) in Hong Kong, China, on February 7th, 2010

More information

1st Workshop on Semantically-Enabled Systems Engineering (SENSE-2010)

15 - 18 February, 2010. Andrzej Frycz Modrzewsk Cracow College, Krakow, Poland.

More information

IESS 1.0: First International Conference on Exploring Services Sciences

17 - 19 February, 2010. Geneva, Switzerland.

More information

The 1st Workshop on Model Based Engineering for Embedded Systems Design

March 12, 2010 - Dresden, Germany

More information

DoD Architectures: System of Systems Engineering Forum 

15 - 17 March 2010, Washington, DC, United States

More information

Automatic Verification and Analysis of Complex Systems 

1st AVACS Spring School

15-19 March 2010, Oldenburg, Germany

More information

CSER 2010 8th Annual Conference on Systems Engineering Research

17-19 March, Honoken, NJ, USA

More information

Sixth Workshop on Model-Based Testing (MBT 2010) 

Satellite workshop of ETAPS 2010

March 21, 2010, Paphos, Cyprus

More information

Track on REAL-TIME SYSTEMS at ACM SAC 2010

21 - 26 March, 2010. Sierre, Switzerland.

More information

7th Workshop on System Testing and Validation (STV10) 

In conjunction with IEEE ECBS 2010, Oxford, UK

March 22-26, 2010

More information

The Third Edition of the Requirements Engineering Track (RE-Track'10)

22 - 26 March, 2010. Sierre, Switzerland.

More information

Systems Engineering Lean Enablers and Leading Indicators 

23 March, 2010. Laguna Cliffs Resort, Marriott Hotel - Dana Point

More information

2010 IEEE International Systems Conference 

April 5-8, 2010, Hyatt Regency Mission Bay Spa and Marina, San Diego, CA

More information

Quality of Model-Based Testing (QuoMBaT 2010)

April 10, 2010. Paris, France

More information

CHI 2010 (ACM Conference on Human Factors in Computing Systems)

10 – 15 April 2010, Atlanta, GA, USA

More information

5th International Workshop on Model-Driven Development of Advanced User Experience and UI Engineering

Organised at CHI 2010

10 – 15 April 2010, Atlanta, GA, USA

More information

2010 Spring Simulation Multiconference (SpringSim'10) 

April 11 - 15, 2010, Florida Hotel and Conference Center; Orlando, FL, USA

More information

Symposium On Theory of Modeling and Simulation - DEVS Integrative M&S Symposium (DEVS'10)

April 11 - 15, as part of the 2010 Spring Simulation Multiconference at the Florida Mall Hotel and Conference Center in Orlando, FL, USA

WER'10: 13th Workshop on Requirements Engineering

April 12-13, 2010 - Cuenca, Ecuador

More Information

Agent-Directed Simulation Symposium (ADS 2010)

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

More information

Second NASA Formal Methods Symposium (NFM 2010)

April 13 - 15, 2010, USA

More information

COFES: Congress on the Future of Engineering Software (COFES) 2010

15 - 18 April, 2010, Scottsdale, Arizona, USA.

More information

Lean Software & Systems Conference 2010 

April 21-23, 2010, Atlanta

More information

2010 The 2nd IEEE International Conference on Systems Engineering and Modeling (ICSEM 2010)

23 to 25 April 2010, Bangkok, Thailand

More information

22nd Annual Systems & Software Technology Conference (SSTC 2010)

26-29 April 2010, Salt Palace Convention Center, Salt Lake City, Utah

More information

Systems Engineering and Test Evaluation (SETE) 2010

3 - 6 May, 2010, Stamford Grand, Adelaide.

More information

The 2010 International Symposium on Collaborative Technologies and Systems (CTS 2010)

May 17-21, 2010, The Westin Lombard Yorktown Center, Chicago, Illinois, USA

More information

Software Process Improvement and Capability Determination (SPICE) 2010

18-20 May 2010 - Pisa, Italy

More information

EuSEC 2010: Systems Engineering and Innovation

23 - 26 May, 2010, Stockholm, Sweden.

More information

Siemens PLM Connection Americas 2010 

Gaylord Opryland, Nashville, TN

May 24 – Thursday May 27, 2010

More information

The 22nd International Conference on Advanced Information Systems Engineering (CAiSE'10)

07-11 June 2010, Hammamet, Tunisia

More information

21st IEEE International Symposium on Rapid System Prototyping

June 8-11, 2010, George Mason University, Fairfax, Virginia, USA

More information

2nd International Workshop on Future Trends of Model-Driven Development (FTMDD 2010) NEW

In conjunction with the 12th International Conference on Enterprise Information Systems (ICEIS 2010)

8 - 12 June, 2010, Funchal, Madeira - Portugal

More information

2nd International Workshop on Advanced Enterprise Architecture and Repositories (AER 2010) NEW

8 - 12 June, 2010, Funchal, Madeira - Portugal

More information

The Fourth IEEE International Conference on Secure Software Integration and Reliability Improvement (SSIRI 2010) NEW

June 9-11, 2010, Singapore

More information

Model-Based Verification & Validation from Research to Practice NEW

2nd Workshop in conjunction with SSIRI 2010

June 9-11, 2010, Singapore

More information

PETRI NETS 2010

21-25 June, 2010, Braga, Portugal

More information

ACSD 2010: 10th International Conference on Application of Concurrencyto System Design

Collocated with Petri Nets 2010

June 21-25, 2010, Braga, Portugal

More information

ISARCS 2010 - 1st International Symposium on Architecting Critical Systems

Federated with CompArch 2010

June 23-25 2010 Prague, Czech Republic

More information

16th International Working Conference on Requirements Engineering: Foundation for Software Quality (RefsQ 2010)

30 June – 2 July, 2010, Essen, Germany

More information

2010 International Conference on System Science and Engineering (ICSSE2010) NEW

July 1-3, 2010, National Taipei University of Technology, Taipei, Taiwan

More information

20th Annual INCOSE International Symposium (IS10)

11 - 15 July, 2010, Rosemont, IL, USA.

More information

2nd International Workshop on Model-Driven User-Centric Design & Engineering (MDUCDE'10)

September 1st & 2nd, 2010, Valenciennes/France

More information

European Systems & Software Process Improvement and Innovation

1-3 September 2010, Grenoble Institute of Technology, France

More information

8th International Symposium on Automated Technology for Verification and Analysis (ATVA 2010) NEW

21-24 September 2010, Singapore

More information

54th Annual Meeting of the Human Factors and Ergonomics Society NEW

September 27-October 1, 2010, San Francisco

More information

The 18th International Requirements Engineering Conference (RE 2010)

Sep 27, 2010 - Oct 1, 2010, Sydney, Australia

More information

Fifth International Conference on Graph Transformation

27 September - 2 October, 2010. University Of Twente, Enschede, The Netherlands

More information

Fourth Asia-Pacific Conference on Systems Engineering (APCOSE 2010)

4 - 6 October, 2010. Keelung, Taiwan.

More information

Sixth Nordic Conference on Human-Computer Interaction (NordiCHI 2010)

October 16 – 20, Reykjavik Iceland

More information

Complex Systems Design & Management 2010

October 27-29, 2010, Paris, France

More Information

29th International Conference on Conceptual Modeling 

1-4 November 2010, Vancouver, BC, Canada

More information

2010 IITA International Conference on Control, Automation and Systems Engineering (CASE 2010)

Nov 7, 2010 - Nov 8, 2010. Taipei, Taiwan

More information

ICECSE 2011 "International Conference on Electrical, Computer and Systems Engineering"

January 25-27, 2011, Dubai, United Arab Emirates

More information

Education & Academia

Immediate Postdoctoral Opening in Requirements Engineering at Masdar Institute

Masdar Institute of Science and Technology has an immediate postdoctoral opening in requirements engineering for sustainable systems in duration of up to 2 years (with possibility to extend).

Requirements: PhD with specialization in software engineering, systems engineering, or requirements engineering, and interest in applying your knowledge to advanced energy systems and smart power grids.

More information

NEW! Spring 2010 Course: SYS/SDOE 750 Advanced System and Software Architecture Modeling and Assessment

This course presents the fundamentals of complex systems architecting using the Object Modeling Group's (OMG) SysML. It addresses the differences between functional decomposition and object oriented decomposition while architecting complex systems. Emphasis is placed on modeling mission objectives to the definition of the system level architecture. Topics include identification of system level architecture alternatives and considerations, including definition of objectives for physical (hardware) and logical (software) structure, information and system assurance, behavior, cost, performance and human integration based on the system concept at every level of system

decomposition. System of System (SoS) architecture is examined, addressing composition of multiple systems and engineering new, emergent behavior in the SoS. Examples used will come from a variety of operational environments (e.g. communications systems, space systems, weapon systems, etc) Special consideration is given to the importance of effective construction and transitioning of the SysML models to software engineering for software intensive systems projects. Prerequisite: SYS 625 and 650.

More information

SystemWiki.org Online Courses on Systems Thinking and System Dynamics

An effort has been started to weave appropriate pieces of SystemWiki.org content into online courses relating to Systems Thinking and System Dynamics. Moodle is being used for course development and from the experience associated with creating the first course it is evident that course development is going to take quite some time. A long time not because Moodle is difficult to use, there is just a lot of definition involved in the process.

More information

Some Systems Engineering-Relevant Websites

http://pascal.computer.org/sev_display/index.action

Find authoritative definitions for software and systems engineering terms in SEVOCAB. A project of the IEEE Computer Society and ISO/IEC JTC 1/SC7, SEVOCAB includes definitions from international standards. You can search for a term as defined in the standards, or for all the definitions in a source standard. To give you an understanding of related concepts, SEVOCAB will return any definition for the term, as well as all the definitions that use the term.

http://www.nasa.gov/offices/oce/appel/pm-development/pm_se_competency_framework.html

The NASA Project Management and Systems Engineering Competency Framework consists of five Project Management competency areas, three Systems Engineering competency areas, and five competency areas common to both the Project Management and Systems Engineering communities.

Standards and Guides

New SC7 Standards Published

Posted by François Coallier

ISO/IEC 16326:2009 - Systems and software engineering -- Life cycle processes -- Project management

ISO/IEC TR 24766:2009 - Information technology -- Systems and software engineering -- Guide for requirements engineering tool capabilities

ISO/IEC TR 20000-3:2009: Information technology -- Service management -- Part 3: Guidance on scope definition and applicability of ISO/IEC 20000-1

ISO/IEC 19770-2:2009: Information technology -- Software asset management -- Part 2: Software identification tag

ISO/IEC 26513:2009: Systems and software engineering - Requirements for testers and reviewers of user documentation

More information

ISO/IEC TR 24766:2009: Information Technology - Systems and Software Engineering - Guide For Requirements Engineering Tool Capabilities

Requirements engineering (RE) is an essential process of the systems and software engineering life cycles. RE has been established as an ISO/IEC standard life cycle process in both ISO/IEC 15288:2008, Systems and software engineering — System life cycle processes and ISO/IEC 12207:2008, Systems and software engineering — Software life cycle processes.

This Technical Report provides guidance on desirable capabilities of RE tools. It supplements ISO/IEC 14102:2008, Information technology — Guideline for the evaluation and selection of CASE tools, which details a set of evaluation criteria for CASE tools without referencing a specific activity or service area.

More information

Some Definitions to Close On

Systems Engineering

An inter-disciplinary approach and means to enable the realization of successful systems.

Source: International Council on Systems Engineering; Electronic Industries Alliance Systems Engineering Capability Maturity Model EIA 731-1

Date published: various

Systems engineering is an interdisciplinary field of engineering that focuses on how complex engineering projects should be designed and managed. Issues such as logistics, the coordination of different teams, and automatic control of machinery become more difficult when dealing with large, complex projects. Systems engineering deals with work-processes and tools to handle such projects, and it overlaps with both technical and human-centered disciplines such as control engineering and project management.

Source: Wikipedia: Systems engineering

Date published: 10 December, 2009

An interdisciplinary approach that encompasses the entire technical effort, and evolves into and verifies an integrated and life cycle balanced set of system people, products, and process solutions that satisfy customer needs.

Source: EIA Standard IS-632, Systems Engineering

Date Published: December 1994.

An interdisciplinary, collaborative approach that derives, evolves, and verifies a life-cycle balanced system solution which satisfies customer expectations and meets public acceptability.

Source: IEEE P1220, Standard for Application and Management of the Systems Engineering Process, [Final Draft], IEEE 1220-1994

Date published: 1994

A comprehensive, iterative technical management process that includes translating operational requirements into configured systems, integrating the technical inputs of the entire design team, managing interfaces, characterizing and managing technical risk, transitioning technology from the technology base into program specific efforts, and verifying that designs meet operational needs. It is a life cycle activity that demands a concurrent approach to both product and process development.

Source: DSMC (Defense Systems Management College)

Date published: Unknown

The application of System Engineering theory to a specific system.

Source: European Cooperation for Space Standardization, ECSS-E-10A

Date published: 19 April 1996

A robust approach to the design and creation of systems to accomplish desired ends.

Source: NASA

Date published: Unknown

The interdisciplinary approach governing the total technical effort required to transform a requirement into a system solution.

Source: IEEE P1220 early draft

Date published: Not known

A comprehensive, iterative technical process to:

(a) Translate an operational need into a configured system meeting that need through a systematic, concurrent approach to integrated design of the product and its related manufacturing, test, and support processes;

(b) Integrate the technical inputs of the entire development community and all technical disciplines (including the concurrent engineering of manufacturing, logic, and test) into a coordinated effort that meets established program cost, schedule and performance objectives;

(c) Ensure the compatibility of all functional and physical interfaces (internal and external) and ensure that system definition and design reflect the requirements for all system elements (hardware, software, facilities, people, and data);

(d) Characterize technical risks, develop risk abatement approaches, and reduce technical risk through early test and demonstration of system elements.

Source: United States Department of Defense, DoDI 5000.2

Date published: Unknown

A logical sequence of activities and decisions that transforms an operational need into a description of system performance parameters and a preferred system configuration.

Source: MIL-STD-499A, Engineering Management,

Date published: 1 May 1974 - Now cancelled.

Systems Engineering is an interdisciplinary, collaborative approach to the engineering of systems (of any type) which aims to capture stakeholder needs and objectives and to transform these into a description of a holistic, life-cycle balanced system solution which both satisfies the minimum requirements, and optimises overall project and system effectiveness according to the values of these stakeholders. Systems engineering incorporates both technical and management processes.

Source: Robert Halligan

Date of publication: 2003)

The problem-independent and technology-independent principles and methods used for the engineering of systems.

Source: Robert Halligan

Date of publication: 2006

An approach to the engineering of systems based on systems thinking and principles.

Source: Robert Halligan

Date of publication: 2006

Project Performance International News

2009 Sees PPI More Successful Than Ever!

2009 opened on a cautious note with the effects of the GFC coming to understanding/further speculation. Yet with the end of the year PPI can look back with great pride and state that it was the most successful year for the company since establishing in 1992.

The year saw PPI deliver numerous courses on 6 continents including the following countries:

- Australia
- Brazil
- Canada
- Israel
- Japan
- Netherlands
- Poland
- South Africa
- Spain
- Turkey
- United Kingdom
- United State of America

PPI - An Update

PPI has many new and exciting developments close to announcement – new courses in project processes; a major upgrade to the Systems Engineering Goldmine; a huge, searchable definitions database; and more. In the meantime, PPI continues to do what it does best – helping projects succeed. PPI is delivering projects-related training over January to March 2010 in Israel, Singapore, The Netherlands, U.S.A., Australia, the United Kingdom, Italy, Japan, Poland and Brazil, to clients across all sectors.

Project Performance International Events

Systems Engineering 5-Day Courses

Upcoming locations include:

- Melbourne, Australia
- La Spezia, Italy
- London, UK
- Pretoria

View 2010/2011 Systems Engineering Course Schedule

Requirements Analysis and Specification Writing 5-Day Courses

Upcoming locations include:

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

View 2010/2011 RA&SW Course Schedule

OCD/CONOPS 5-Day Courses

Upcoming locations include:

- Las Vegas, USA
- Pretoria, South Africa
- Adelaide, Australia

View 2010/2011 OCD/CONOPS Course Schedule

Software Engineering 5-Day Courses

Upcoming locations include:

- Amsterdam, The Netherlands
- Melbourne, Australia
- Pretoria, South Africa
- Las Vegas, USA

View 2010/2011 Software Engineering Course Schedule

Cognitive Systems Engineering 5-Day Courses

Upcoming locations include:

- Melbourne, Australia
- London, UK
- Las Vegas, USA
- Adelaide, Australia

View 2010/2011 Cognitive Systems Engineering Course Schedule

PPI Upcoming Participation in Professional Conferences

- May 3 - 6, 2010 - **SETE 2010** - Adelaide, SA, Australia (Sponsor/Exhibiting)
- May 23 - 26, 2010 - **EuSEC 2010** - Stockholm, Sweden (Sponsor)
- July 12 - 15, 2010 - **INCOSE International Symposium 2010 (IS10)** - Chicago, IL, USA (Sponsor/Exhibiting)

Kind regards from the SyEN team:

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Training Quicklinks

Systems Engineering
OCD & CONOPS
Requirements Engineering
Specification Writing
Software Engineering
Tender Evaluation
Requirements Analysis
Cognitive Systems Engineering

Systems Engineering NEWSLETTER

SyEN makes informative reading for the project professional, containing scores of news and other items summarizing developments in the field of systems engineering and in directly related fields.

Hear about relevant courses in your area