Project Performance International

Systems Engineering

Newsletter (SyEN)

SyEN #024 - October 5, 2010

Brought to you by Project Performance International

http://www.ppi-int.com/newsletter/SyEN-023.php

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 their 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 the notifying 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.

What's Inside:

READ ALL

A Quotation to Open On

Featured Article - Requirements Analysis that Works – the New Wave?

> ... READ MORE

Systems Engineering News

- Upcoming Submission Deadlines and Themes for INSIGHT
- New! BABOK® Guide Agile Extension and Learning Guide
- 3SL/Cradle: August 2010 Newsletter
- OMG Announces Availability of First Exam Level in Program to Certify Practitioners of Model-Based Systems Engineering Using SysML
- Systems Engineering Recognizes LAI Researchers
  ... READ MORE

Featured Society - Institute for Operational Research and Management Science (INFORMS)

> ... READ MORE

INCOSE Technical Operations - Transportation Working Group

> ... READ MORE

Systems Engineering Software Tools News

- Freeware Tool - DESIRe®
- Introducing Cameo Inter-Op

- Multiple Product Releases from No Magic
- Rommana 10.2 is Now Available for Free Download
  ... READ MORE

Systems Engineering Books, Reports, Articles and Papers

- New Book Series on Systems Thinking and Systems Engineering announced by College Publications
- A Journey Through the Systems Landscape
- The Next Great Challenges in Systems Thinking: A Defence Perspective
- Human Resources: Systems thinking - Help employees to see the big picture
- NASA Systems Engineering Education Initiative: Curriculum Development for Systems Engineering Education
  ... READ MORE

Conferences and Meetings

... READ MORE

Education and Academia

- First Penn State students graduate from online engineering program
- George Mason University: Introduction to Systems Engineering and Operations Research (SEOR) Online Short Courses and Certificate Program
- New @ Worcester Polytechnic Institute (WPI) – System Optimization Course
  ... READ MORE

Some Systems Engineering-Relevant Websites

... READ MORE

Standards and Guides

- ISO/IEC JTC 1/SC7 Interim Meeting
  ... READ MORE

Some Definitions to Close On - Business Analysis & Business Analyst

... READ MORE

PPI News

- SyEN Editor at RE 2010
- New 1-day Seminar on Cognitive Systems Engineering
- Welcome Clive Tudge, CEng MIET
- Robert Halligan Passes 100
  ... READ MORE

PPI Events

... READ MORE

A Quotation to Open On

"The great liability of the engineer compared to men of other professions is that his works are out in the open where all can see them. His acts, step by step, are in hard substance. He cannot bury his mistakes in the grave like the doctors. He cannot argue them into thin air or blame the judge like the lawyers. He cannot, like the architects, cover his failures with trees and vines. He cannot, like the politicians, screen his shortcomings by blaming his opponents and hope that the people will forget. The engineer simply cannot deny that he did it. If his works do not work, he is damned." - Herbert Hoover, 31st President of the United States

Featured Article

Requirements Analysis that Works – the New Wave?

Robert Halligan, FIE Aust
Managing Director, Project Performance International
Email: rhalligan@ppi-int.com

Introduction:

Innumerable studies have concluded that requirements problems are the single biggest contributor to cost overruns, schedule slippages and loss of capability in systems and software projects. Cost impacts alone of 10%, 20%, 50%, 80% and more are regularly reported by researchers and practitioners.

And yet, the cost of making substantial improvements in requirements quality is considerably lower than these cost impacts, typically 0.1 – 2% of total development cost - if appropriate skills and methods are applied.

Requirements analysis (the capture and validation of requirements through analysis of the problem domain) provides the tools for transforming the inadequate to the adequate, requirements-wise.

Objectives of Requirements Analysis:

The usual criterion for adequacy of a set of requirements is that, if the requirements set is satisfied, the level of risk associated with failing to satisfy the needs of relevant stakeholders is low – typically an expected loss of value of two or three percent, or less.

To this basic criterion can be added the dimension of time. Requirements change with time due to the problem space genuinely changing, and due to "what is possible in technology" triggering new requirements. So requirements analysis must be an ongoing activity, to a lesser or greater degree.

Types of Requirements Defects:

Potential areas of defect in requirements, individually and/or as a set, are:

a. correctness - refers to an absence of errors of fact in the specified requirement;

b. completeness - for a requirement individually, refers to the inclusion of all necessary information such that if the requirement is satisfied, the need will also be satisfied.

   completeness - for requirements as a set, refers to inclusion of sufficient requirements such that if the set is satisfied, the need will also be satisfied with only a small expected loss due to omissions;

c. consistency - requires that a requirement not be in conflict with any other requirement, nor be inconsistent internally;

d. clarity - requires that a specified requirement be readily understandable without semantic analysis;

e. non-ambiguity - requires that there be only one semantic interpretation of a requirement;

f. connectivity - refers to a property whereby all of the terms within a requirement are adequately linked to other requirements and to word and term definitions, causing each individual requirement to properly relate to each other requirement in a set. Connectivity problems typically show up as a result of inconsistent references to the same thing, logical non-sequitur, and incorrect cross-references;

g. singularity - refers to a property whereby a requirement cannot sensibly be expressed as two or more requirements having different actors (subjects), actions (verbs) and/or objects of action;

h. verifiability - refers to the existence of a finite and objective process with which to provide adequate evidence that a requirement has been satisfied in a solution;

i. modifiability - requires that:

i. necessary changes to a requirement can be made completely and consistently; and

ii. the same requirement is specified only once;

j. feasibility – for a requirement, requires that some means exist whereby the requirement may be satisfied;

feasibility – for a set of requirements, requires that some means exist whereby the requirements may be satisfied as a set;

k. balance – for a set of requirements, refers to the set being optimum, i.e., forming a part of an optimum solution to the higher (physical) level problem for which the item which is the subject of the requirements is a part of the solution;

l. functional orientation - requires that the set of requirements state what the system is to do, how well it is to do it, necessary external interface characteristics, environmental conditions under which other requirements are to be satisfied, any constraints on the utilisation of external resources, any requirements with respect to overall physical characteristics, and any other required qualities such as those related to reliability, maintainability, transportability, growth capability, safety, etc. Functional orientation requires that design requirements (i.e. solution directed in requirements) be confined to those design directions that can be justified on objective criteria. Possible justifications include greater requirer expertise than that of the developer (e.g., in cryptography), or net benefits from standardization.

Requirements analysis aims to reduce the level of risk arising from defects relating to the above characteristics to "low".

Techniques of Requirements Analysis

The requirements analysis process used and recommended by the author is illustrated in Figure 1.
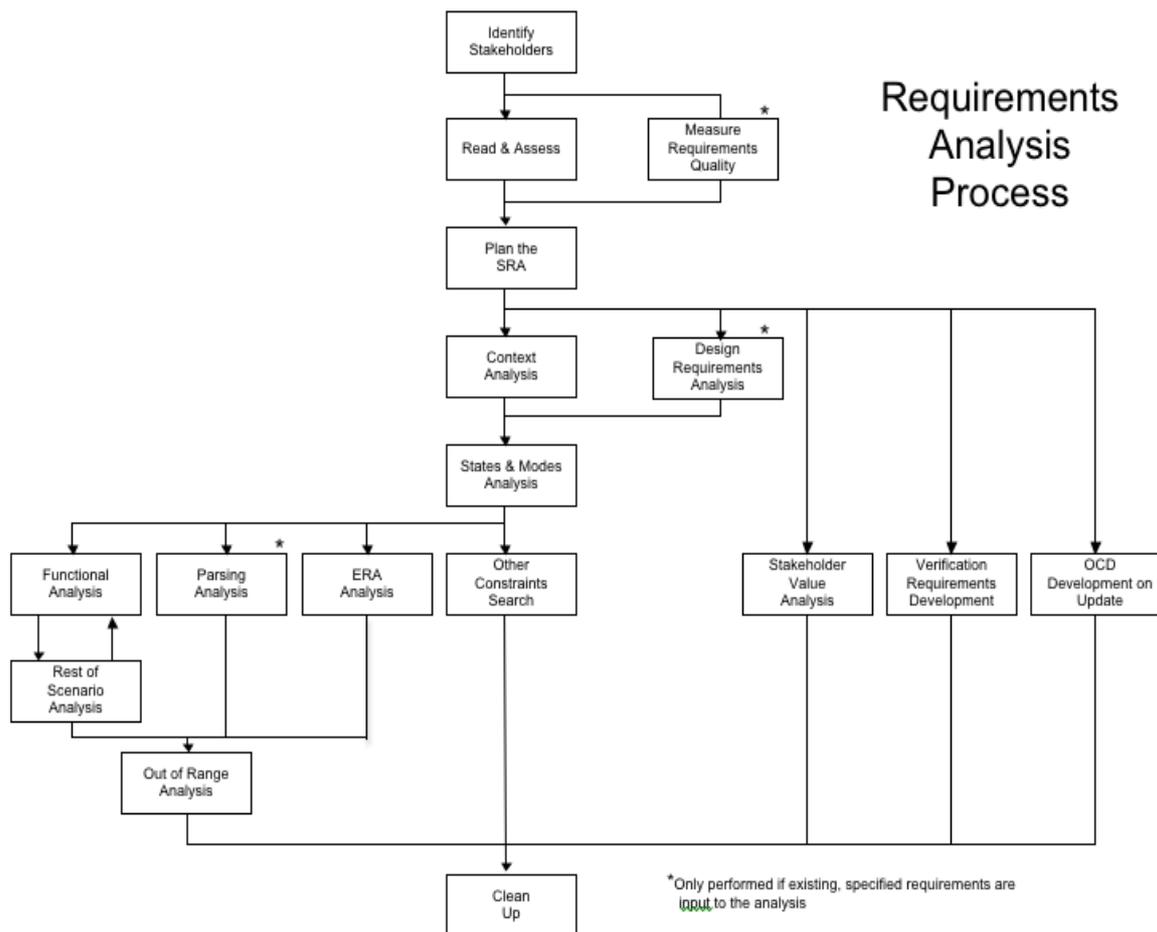
**Figure 1: An Effective Requirements Analysis Process**

The set of techniques which combine to comprise a very effective and efficient requirements analysis methodology is described below:

a. Stakeholder Identification. The objective of stakeholder identification is to identify stakeholders who are potential "owners" of requirements, or who can facilitate effective communication relating to requirements. These stakeholders are subsequently encouraged to make input into the definition of the requirements, are consulted regarding requirements issues, and are invited to "sign-off" on their subsets of requirements.

b. Document Review. Documents, if any, which contain or relate to intended use, requirements, and goals are examined, with a view to identifying key issues that should be resolved with stakeholders before requirements analysis proceeds too far. This review provides input into the planning for conduct of the requirements analysis.

c. Context Flow Analysis. This analysis tracks the state of the world outside of the system on a whole of life basis, from system cradle to system grave. All requirements of the system originate in these contexts, with one class of exception. Stakeholders are mapped to the contexts, often resulting in the identification of additional stakeholders. The main work product of this analysis is subsequently used to structure analysis work, checks and dialogue with stakeholders. See Figure 2.
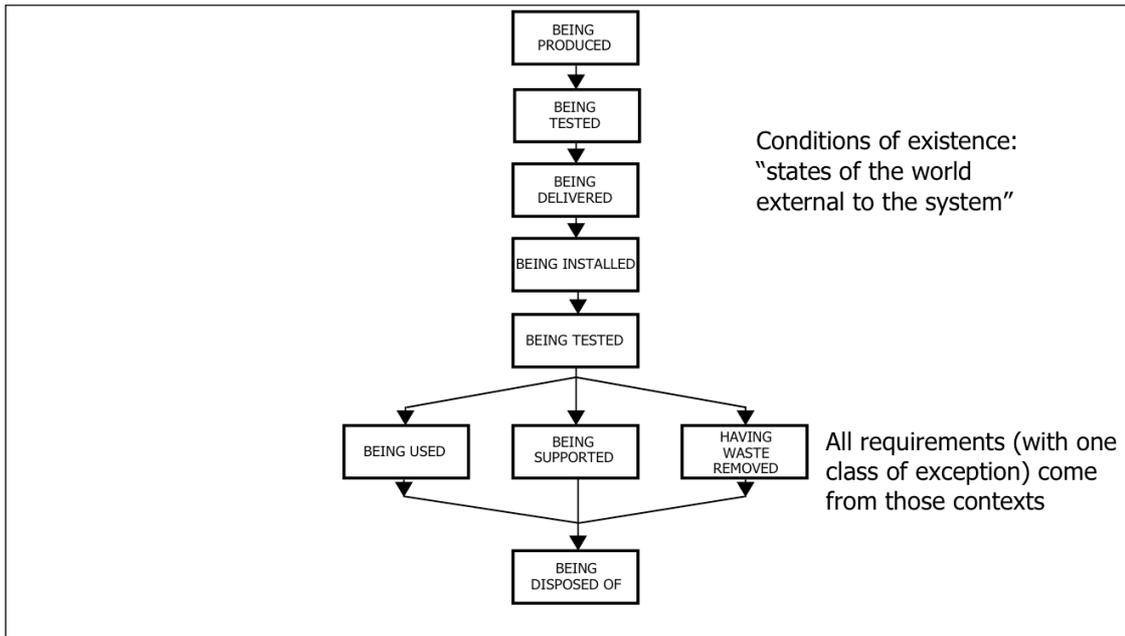

Figure 2: Context Flow Diagram

d. Context Analysis. This analysis identifies/validates mainly external interface requirements. The analysis also contributes to environmental requirements. Context analysis helps identify additional stakeholders in the system: owners of interoperating systems; individuals who will interact with the system; and organisational entities with which the system will interface. Context analysis sets the foundation for subsequent capture and validation of required functionality. See Figure 3.
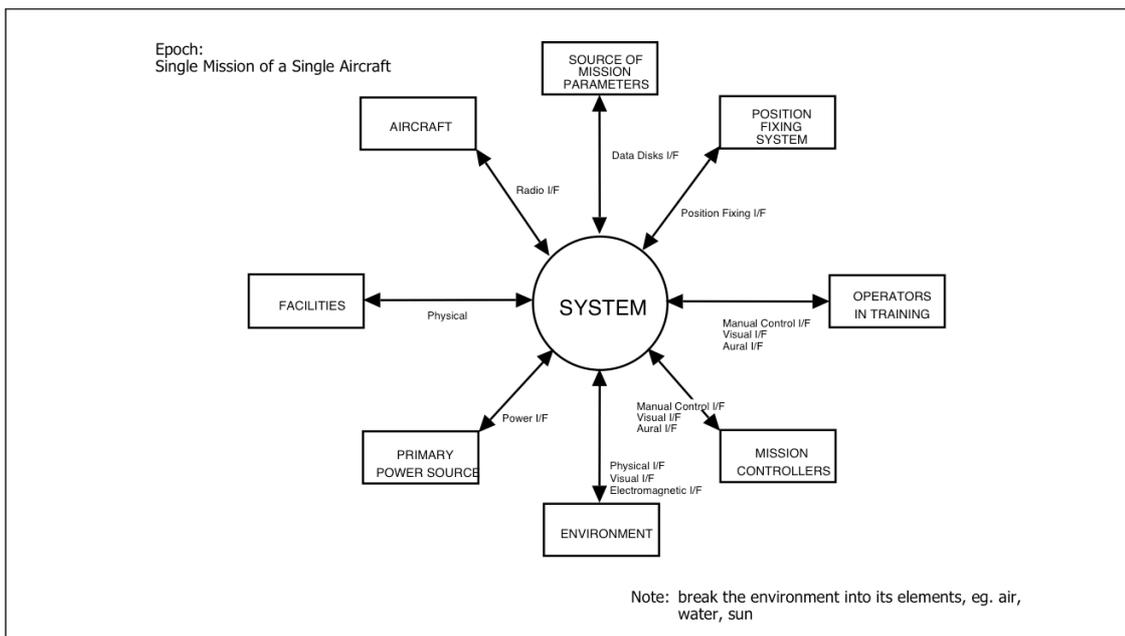
Figure 3: Context Diagram

e. States and Modes Analysis. This is a high ROI analysis, which establishes the big-picture dynamics required of the system, expressed in terms of states & modes. States and modes analysis often identifies major requirements issues. The analysis also establishes preconditions for subsequent precise and concise specification of the requirements captured in other analyses. See Figure 4.
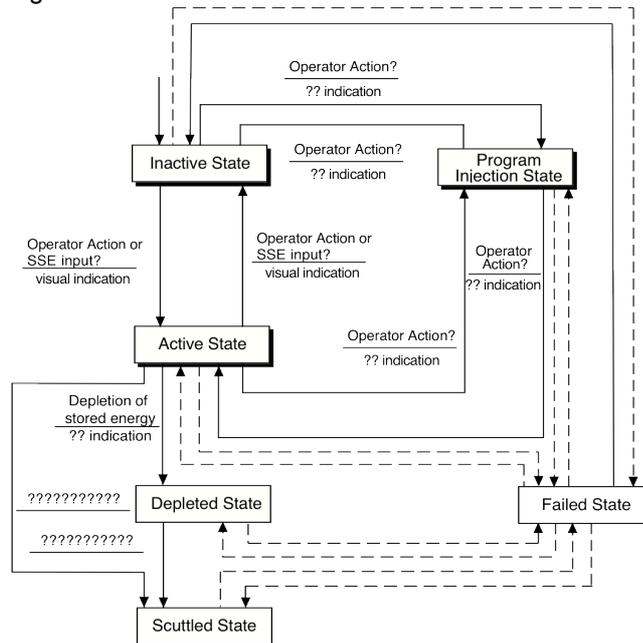
Figure 4: States Transition Diagram

f. Functional Analysis. This analysis is conducted within a modelling boundary which encapsulates enough of the problem, including functional aspects of operational scenarios, to capture and validate the required system functional and performance requirements. The result is a set of functional and performance requirements which is sufficiently complete and is at precisely the correct level of abstraction, neither too broad nor at a level of abstraction which directs the implementation of the system, as opposed to capturing the need. Use cases are a basic form of functional analysis; more robust functional modelling techniques can be used for more demanding applications.
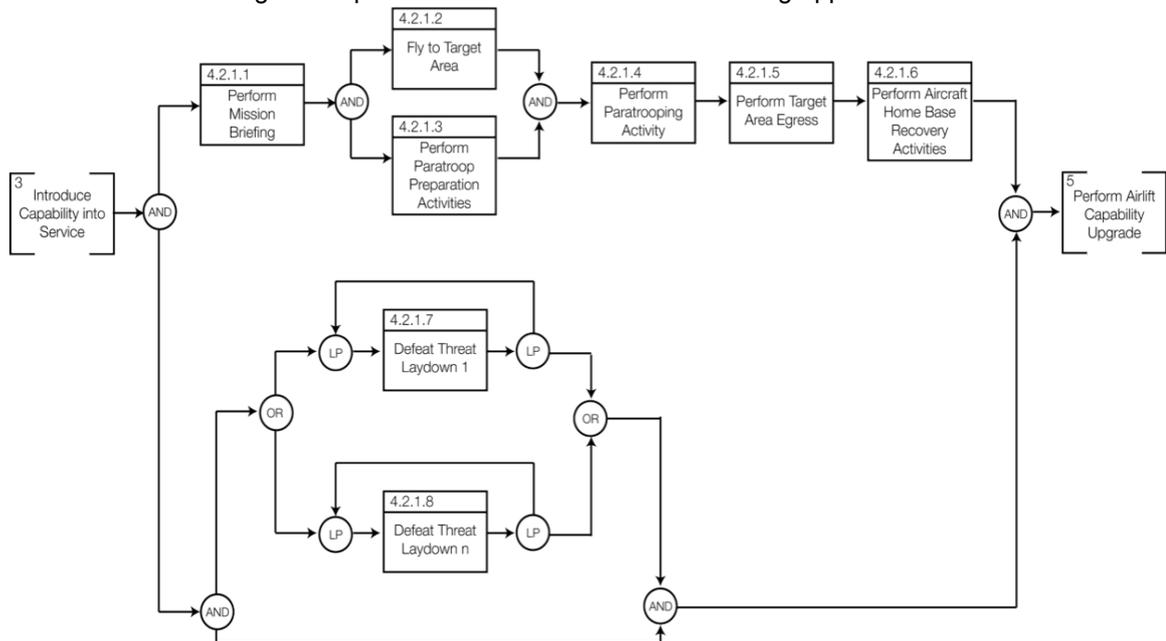
Figure 5: Functional Flow Block Diagram

g. Rest of Scenario Analysis. This analysis, conducted iteratively with functional analysis, identifies/validates environmental requirements, physical requirements, resource requirements and contributes additional content to external interface requirements.

h. Entity Relationship Attribute Analysis. ERA analysis provides input to capture/validation of additional information content of external interface requirements, and some aspects of functional requirements. The analysis is most relevant to data-oriented systems.
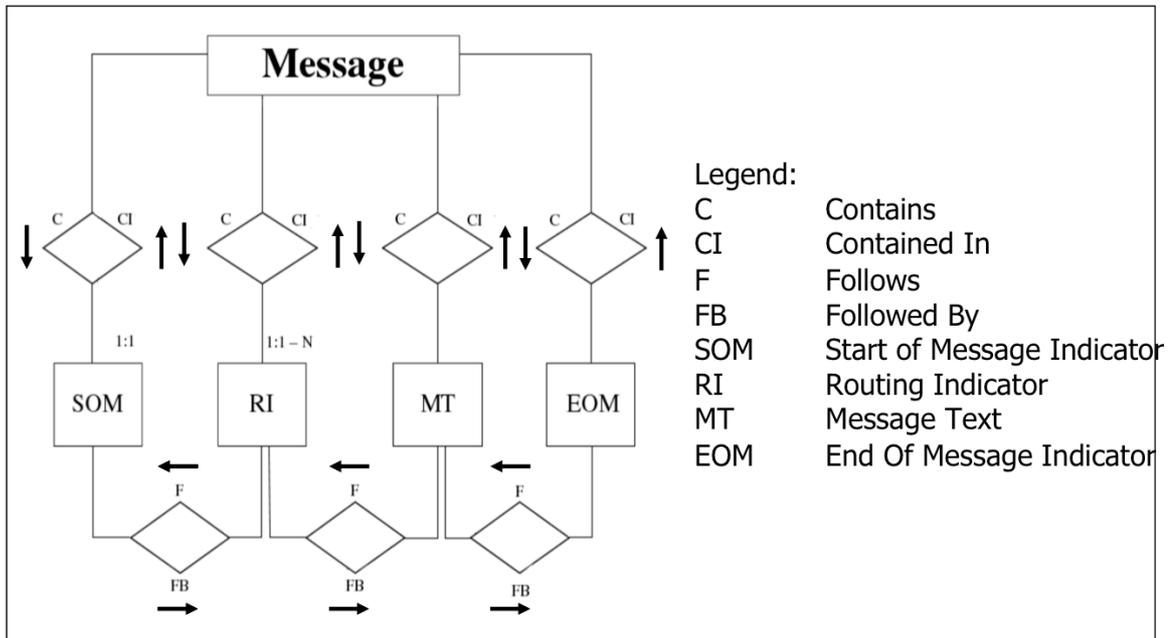
Figure 6: Entity Relationship Attribute Diagram

i. Parsing Analysis. Parsing analysis is a text analysis technique for identification of errors, incompleteness, inconsistency, lack of clarity, ambiguity, lack of verifiability, and infeasibility, in textually stated requirements. The basis of the technique is illustrated below:
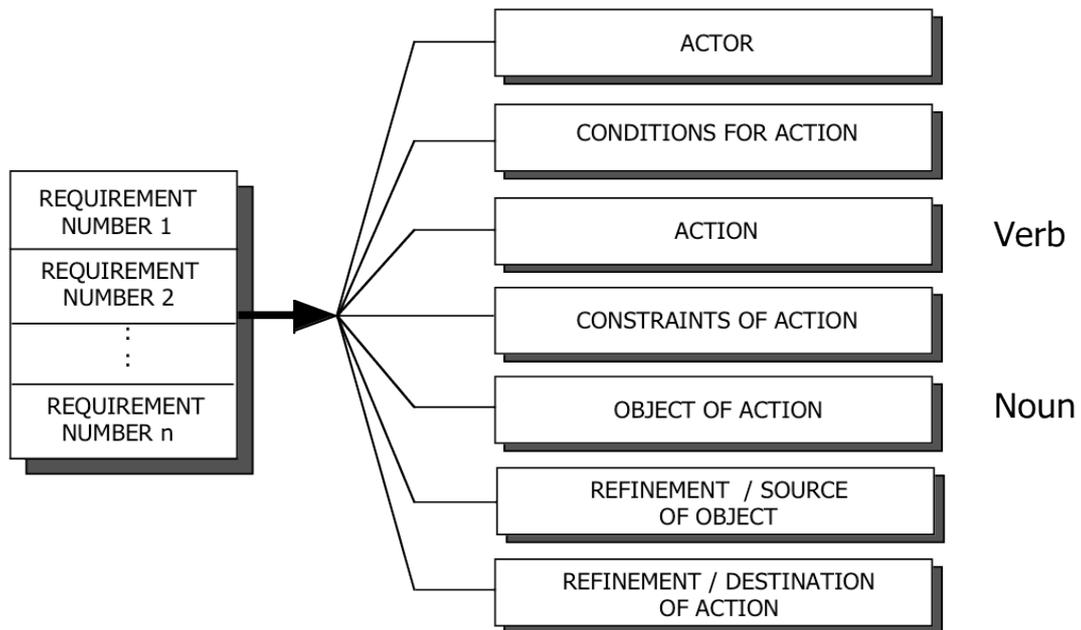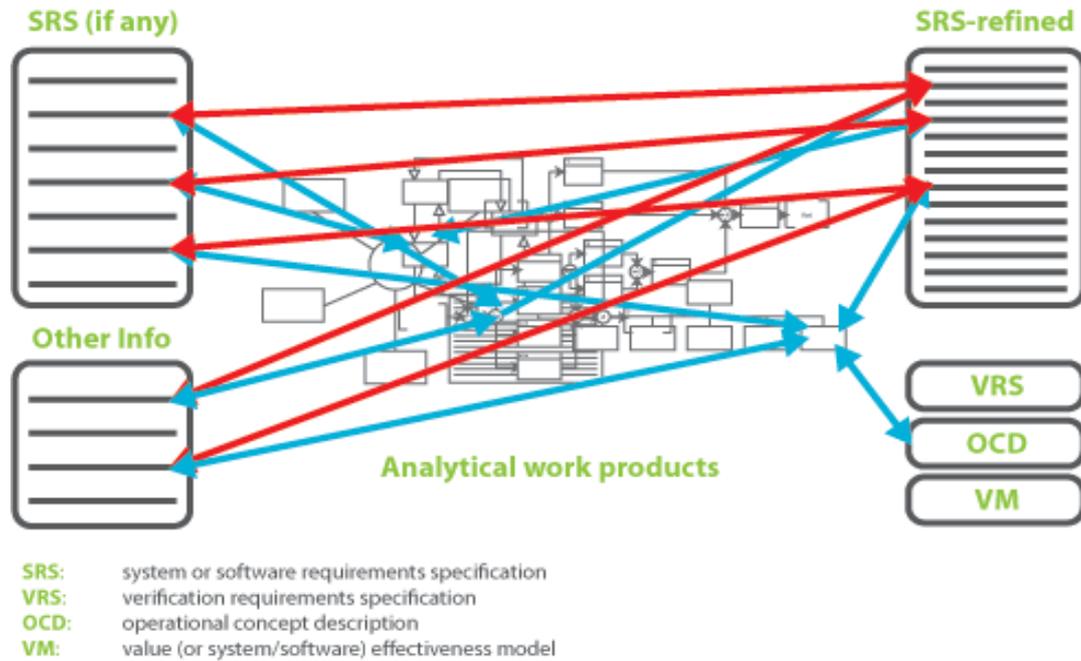

Figure 7: Parsing Template

The parsing template also provides an excellent aid to writing good requirements the first time, and for rewriting defective requirements.

j. Out-of-Range analysis. This analysis captures and validates any requirements that relate to defective inputs or outputs or abnormal conditions of use/support/disposal. The requirements from this analysis can make the difference between a system that will be effective in the real world, and a system that could be effective only in the ideal world.

k. Other Constraints Search. This activity looks for requirements which are ordained from on high (such as from statute law, applicable regulations, policy, governing standards, directives).

l. Clean-Up. This activity verifies the refined requirements set, looking for residual defects in the work products of the analysis. Keyword searching is used in combination with specific verification criteria.

Conclusion:

SRS:	system or software requirements specification
VRS:	verification requirements specification
OCD:	operational concept description
VM:	value (or system/software) effectiveness model

Figure 8: Approach to Requirements Analysis

Methods exist to perform requirements capture and validation both efficiently and very effectively. The methods rely, not on requirements elicitation per se (which is neither efficient nor effective), but on elicitation of responses from stakeholders to specific requirements issues identified mainly through effective analysis.

Copyright Project Performance International 1992 - 2010.

Systems Engineering News

Upcoming Submission Deadlines and Themes for INSIGHT

INSIGHT is the newsletter of International Council on Systems Engineering. It is published four times per year (January, April, July, October). INSIGHT features status and information about INCOSE's technical work, local chapters, and committees and boards. Additionally, related events, editorials, book reviews, trends, and how-to-do articles that are pertinent to the many aspects of a systems engineer's job are also included, as space permits.

Upcoming submission deadlines and themes for INSIGHT

Issue	Submission Date for General Articles	Theme	Theme Editor
4th Qtr 2010	15 Oct 2010	Systems Development from Deep Sea to Deep Space: Lessons from the Johns Hopkins Applied Physics Lab	Mike O'Driscoll and Sam Seymour
1st Qtr 2011	15 Feb 2011	Knowledge Management for Systems Engineering	Regina Griego
2nd Qtr 2011	15 May 2011	Systems of Systems and Self-Organizing Security**	Rick Dove, Ken Kepchar, Jennifer Bayuk
3rd Qtr 2011	17 Jul 2011**	2011 International Symposium Coverage: Denver, Co, USA	TBD
4th Qtr	15 Oct 2011	AFIS 2010	Hervé Panetto

| 2011 | 15 Oct 2011 | APUS 2010 | Herve Panetto |
| 1st Qtr 2012 | 15 Feb 2012 | INCOSE Authors | Cecilia Haskins |

**Submission deadline moves according to International Symposium date

More information

New! BABOK® Guide Agile Extension and Learning Guide

The IIBA® Professional Development team announced that two new resources are available for IIBA members:

1. Introduction to the Agile Extension
2. BABOK® Learning Guide

More information

3SL/Cradle: August 2010 Newsletter

In this issue:

1. 3SL Newsletters
2. Newsletter Contents
3. 3SL Website
4. Need Help?
5. Cradle-6.3 Release
6. Supported Platforms
7. Cradle Gateway
8. Improved PDF and Visio Integration
9. Integration with OpenOffice
10. New Discussion Mechanism
11. Item Specific Alerts
12. Baseline Comparison Report
13. Wider Database Fields
14. Create Projects Remotely
15. Mixed Office Installations
16. Old Versions of Cradle

More information

OMG Announces Availability of First Exam Level in Program to Certify Practitioners of Model-Based Systems Engineering Using SysML

OMG™ announced that "Model User," the first exam in the OMG Certified Systems Modeling Professional™ (OCSMP™) program is now available. The program's sponsors IBM®, Lockheed Martin, Sparx Systems and No Magic, Inc., and partnership with UML Technology Institute Co., Ltd. (UTI), have made construction and validation of the exams possible. For more information, please visit http://www.omg.org/ocsmp.

More information

Systems Engineering Recognizes LAI Researchers

Systems Engineering Journal recognized Donna Rhodes, Ricardo Valerdi, and Garry Roeder with its 2010 outstanding paper award for their article, "Systems Engineering Leading Indicators of Assessing Program and Technical Effectiveness." The paper was judged to have made an outstanding contribution to systems engineering theory, practices, and perspectives.

More information

Featured Societies

Institute for Operational Research and Management Science (INFORMS)

The Institute for Operations Research and the Management Sciences (INFORMS) is a member-based society based in the U.S.A.

INFORMS defines Operational Research to be the discipline of applying advanced analytical methods to help make better decisions. The Institute defines Management Science to be an interdisciplinary branch of applied mathematics, engineering and sciences that uses various scientific research-based principles, strategies, and analytical methods including mathematical modeling, statistics and algorithms to improve an organization's ability to enact rational and meaningful management decisions.

Management science can be practiced on three levels:

- A fundamental level that lies in three mathematical disciplines: probability, optimization, and dynamic systems theory,
- A modeling level that builds models, gathers data, and analyzes them mathematically, and
- An application level, just as any other engineering discipline that has strong aspirations to make a practical impact in the real world.

INFORMS is the largest professional society in the world for professionals in the field of operations research (O.R.), management science, and business analytics. INFORMS aims to serve the scientific and professional needs of Operations Researchers and those in the Management Sciences, including educators, scientists, students, managers, and consultants. The Institute serves as a focal point for O.R. professionals, permitting them to communicate with each other and reach out to other professional societies, as well as the varied clientele of the profession's research and practice.

Some of the services INFORMS provides include:

- Publishing 12 scholarly journals that describe the latest O.R. methods and applications, and a membership magazine with news from across the profession.
- Organizing U.S. and international conferences for academics and professionals, as well as for members of the society's special interest groups.

INFORMS is governed by a 15-member Board of Directors, supported by a substantial number of Committees. INFORMS offices are located in Maryland and Rhode Island, U.S.A.

Within INFORMS, Communities are independent bodies that bring together people who share special technical interests or geographical locations. INFORMS societies are the flagships of the INFORMS communities. The societies are significantly larger than sections, chapters, or fora, and focus on a common theme. The societies are currently:

- Applied Probability
- Computing
- Decision Analysis
- Information Systems
- Manufacturing & Service Operations Management
- Marketing Science
- Military Applications Society
- Optimization
- Simulation
- Transportation Science & Logistics.

INFORMS sections are technical interest groups devoted to advancing the professional interests of members in specialized and technical aspects of the profession. Sections are smaller, focused bodies of INFORMS. The sections are currently:

- Artificial Intelligence
- Aviation Applications
- Behavioral Operations Management
- CPMS: The Practice Section
- Data Mining
- eBusiness
- Energy, Natural Resources & the Environment
- Financial Services

- Group Decision & Negotiation
- Health Applications
- Location Analysis
- Multiple Criteria Decision Making
- Organization Science
- Public Programs, Service and Needs
- Quality, Statistics, and Reliability
- Railway Applications
- Revenue Management and Pricing
- Service Science
- SpORts
- Spreadsheet Productivity Research Interest Group
- Technology Management
- Telecommunications.

INFORMS chapters are mainly U.S.-based, with international chapters in Japan, South Korea, Poland, and Taiwan.

More information: http://www.informs.org

INCOSE Technical Operations

Transportation Working Group

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

Charter

Promote the development and tailored application of Systems Engineering (SE) best practices to ground systems, including public and private interests and seamless inter-modal interfaces with emphasis on roadways, rail, bus and metro.

INCOSE Transportation Working Group

Within the field of ground transportation, we support INCOSE's mission to advance the art and practice of Systems Engineering. We are an international collaboration and our members represent Owners, Consultants, Suppliers, and Academics.

Major challenges face ground transportation projects, including:

- New technology applications and their integration with legacy systems
- Requirements management and change management in dynamic environments over multi-year project development cycles
- Definition of systems verification and validation processes that ensure the Owner gets a system that performs as expected over its lifecycle

Failure to address these challenges properly has resulted in projects that did not deliver their required benefits and exceeded their budgets and schedules. We all have a stake in improving project delivery and we believe that the application of SE will enable the success of the complex projects that will provide the means to move more people and goods securely and efficiently.

Invitation

Join the Transportation Working Group

We invite you to join us and become part of the solution. We are working towards adapting SE best practices to benefit ground transportation projects. We convene regularly via webcasts and conference calls and meet at INCOSE International Symposiums and Workshops. We have activities underway to address the ground transportation aspects of SE issues such as:

1. Lack of SE Resources / SE Knowledge in the ground transportation sector
2. Need for common SE Terminology and Process & required Cultural Shift/Organizational change
3. Articulating the SE Value Proposition, Metrics & Benchmarking for ground transportation
4. In-Service challenges / Incremental Migration

5. Scaling the application of SE for ground transportation
6. External Communication & Outreach across ground transporation sector

We also collaborate with INCOSE Chapter groups active in the field such as the UK Rail Interest Group

There is no charge to INCOSE members to join the Working Group. If you wish to join or simply have questions, please contact the Transportation WG.

What We Produce!

The following are papers and presentations that the Working Group has recently developed. Feel free to use these as reference material, or provide your input to the working group directly.

- Building a Systems Engineering Capability (PowerPoint presentation) (Size: 3.79Mb)
- Building an SE Capability Flyer (Size: 417K)
- The Value Proposition for Systems Engineering in Railways and Transit for Engineering Practitioners (long version) (Size: 111K)
- The Value Proposition for Systems Engineering in Railways and Transit for Senior Management (short version) (Size: 9.8K)

Upcoming Events:

We are looking forward to these exciting events in 2010: the International Symposium in Chicago, Illinois, USA, scheduled for July 11-15, 2010 at the O'Hare Hyatt Regency. Full program details and registration information for this event can be found at http://www.incose.org/symp2010 (includes details on SE Tutorials: basic and advanced levels offered throughout the Symposium.)

The Transportation Working Group has organized a Transportation related program of events. Highlights include industry roundtable discussions, panel and paper presentations, and technical tours. As further details and anticipated attendance of industry leads become available, they will be posted here. Please check back periodically for updates.

A publicity flier outlining Preliminary Transportation Program Highlights is attached for use; please download and distribute to industry colleagues who should attend.

- IS 2010 Transporation Flyer (PDF) (Size: 180 Kb)
- IS 2010 Transportation Program (Word) (Size: 94 KB)

Benefits of attending this event includes the ability to:

- Collaborate with industry colleagues practicing SE
- Exchange emerging best practices and experiences
- Interact with Industry Executives
- Share tailoring approaches to applying SE within rail/transit (organization, project level)
- Expand network of experienced SE practitioners working across many domains

Previous Events:

The 19th Annual INCOSE International Symposium (IS09) was held in Singapore during July 2009. The Transportation Working Group presented the following papers:

- Building a Systems Engineering Framework for London Overground using Experiences from the East London Line Project (ELLP) (Size: 368k)
- Automated Metro-Ensuring Safety and Reliability with Minimum Human Intervention (Size: 126k)

The 18th Annual INCOSE International Symposium (IS08) occurred in Utrecht, Netherlands in June of 2008. The following is a presentation made by the Transportation Working titled Tailoring Systems Engineering to Transit - Optimizing In-Service Systems. (Size: 3.27Mb) The following Rail Transit Events Flyer highlights the various sessions that were held at IS08. (Size: 934k)

Leadership

Co-Chair: Duncan Kemp, Department for Transport (UK)
Co-Chair: Anne O'Neil, MTA New York City Transit (USA)

Contact Transportation Working Group (TransportationWG) for additional information or to join this group.

Systems Engineering Software Tools News

Freeware Tool - DESIRe®

HOOD Group: Freeware Tool - DESIRe® is claimed to support authors writing or checking requirements in the quality assurance of requirements written in the natural language. It is a software tool that in the chosen requirement, depending on the words used (e.g. ambiguous words and verbs etc.), displays predefined questions in a popup window. These are questions regarding possible weaknesses in the requirement. By mentally answering these questions, the idea is for the requirements author to then rework the wording of the requirement as necessary. This ensures that basic rules for requirements, such as completeness, consistency, understandability etc., are followed and the quality of the requirement is improved.

DESIRe® is available for Microsoft® Office Word and IBM® Rational® DOORS®.

If you are interested in, just download it. http://DESIRe.HOOD-Group.com

Introducing Cameo Inter-Op

No Magic announced the release of Cameo™ Inter-Op 1.0.

Cameo™ Inter-Op is an integral part of No Magic's Cameo™ Suite, claimed to provide true interoperability to the industry by enabling connectivity between different vendors of modeling, architecture, and requirements tools. This effort was initiated by the earlier releases of No Magic's MagicRQ and Cameo DataHub, along with the opening up of the core XMI format of MagicDraw's meta data and diagram information.

More information

Multiple Product Releases from No Magic

No Magic announced the following product releases –

August 23, 2010: MagicDraw version 16.9, Cameo Business Modeler, SysML Plugin, and UPDM Plugin.

August 30, 2010: Cameo Team Server 4.1, Cameo Requirements+ 4.1 Release, Cameo DataHub 4.1 Beta, Cameo Workbench 1.0.

More information

Rommana 10.2 is Now Available for Free Download

Rommana 10.2 brings over 45 new features in different Rommana Components.

More information

Systems Engineering Books, Reports, Articles and Papers

New Book Series on Systems Thinking and Systems Engineering announced by College Publications

Co-Edited By:
Harold "Bud" Lawson, Stevens Academic Fellow
Jon Wade, Stevens Distinguished Research Professor

ABOUT THE SERIES

Systems Thinking has grown during the 20th century into highly useful discipline independent theories and practices. Systems

Thinking focuses upon understanding the holistic properties of complex systems and, in particular, the dynamic relationships that arise in the interactions of multiple systems in operation.

Systems Engineering has gained momentum during the latter part of the 20th century and has led to engineering related practices and standards that can be used in the life cycle management of complex systems. Systems Engineering focuses upon transforming the need for a system into a set of capabilities, requirements, functions or objects, that guides the production of products and services that meet the need in an effective manner.

The combination of Systems Thinking and Systems Engineering is of particular interest in establishing the capability to "think" and "act" in terms of systems.

This series publishes books and proceedings that are related to Systems Thinking or Systems Engineering or both subjects.

ABOUT THE PUBLISHER

College Publications is run by academics for academics to serve the academic community. It aims to:

- Provide the academic community with a non-profit making, highly prestigious publishing outlet that will break the monopoly that commercial publishers have.
- Publish books that can be purchased at reasonable prices, making information accessible to all.
- Show that academics no longer need to be controlled by commercial interests!

CONTACTS

Do you have a book in mind or under development that would be appropriate for this Series? If so, please contact one of the Co-Editors or College Publications as noted below.

Harold "Bud" Lawson – bud@lawson.se
Jon Wade – jon.wade@stevens.edu
Jane Spurr – jane.spurr@kcl.ac.uk

College Publications: http://www.collegepublications.co.uk

A Journey Through the Systems Landscape

Harold "Bud" Lawson
Lawson Konsult AB and Stevens Academic Fellow
College Publications (8 Jun 2010)
ISBN-10: 1848900104
ISBN-13: 978-1848900103

About the book:

Systems are everywhere and affect us daily in our private and professional lives. We all use the word "system" to describe something that is essential but often abstract, complex and even mysterious. However, learning to utilize system concepts as first class objects as well as methodologies for systems thinking and systems engineering provides a basis for removing the mystery and moving towards mastery even for complex systems.

This journey through the Systems Landscape has been developed to promote learning to "think" and "act" in terms of systems. A unique aspect is the introduction of concrete system semantics provided as a "system survival kit" and based upon a limited number of concepts and principles as well as a mental model called the system-coupling diagram. This discipline independent presentation assists individuals and is essential for building a learning organization that can utilize a systems approach to achieving its enterprise goals.

The eight chapters are presented as stops along a journey that successively build system knowledge. Each chapter terminates

with a Knowledge Verification section that provides questions and exercises for individuals and groups. Case studies reflecting the utilization of the system related concepts, principles and methodologies are provided as chapter interludes.

More information

The Next Great Challenges in Systems Thinking: A Defence Perspective

David Oxenham
Defence Science and Technology Laboratory, UK Ministry of Defence, Salisbury, Wilts, UK

Abstract

Defence research and development is superbly rich in the challenges of designing highly complex technologically based systems. These present very difficult systems thinking problems that will have to be solved if a systems approach is to be successfully applied to creating and sustaining the military capabilities and forces that the UK will need for the twenty-first century. Beginning with the nature of capability and introducing the concepts of capability engineering and through-life capability management, this paper explores the nature of these challenges from the perspectives of history and the author's experiences in working with colleagues in the UK and Allied defence acquisition communities. In his analysis, he identifies four 'next great systems thinking challenges': language, complexity, longevity and agility, overcoming each of which will require innovation in research and the development of new systems engineering and systems thinking practices. Looking further ahead, the author lists some of the emerging problems for defence, where taking a systems thinking approach could be particularly critical for success: demography, skills, education and human factors; security and the complexity of joined-up government; and the pace of technology advance. These are candidates for future next great challenges. Concluding, he notes that systems thinkers in defence are not alone. Complex capability engineering problems can also be found in energy, air and rail transport, complex IT networks, major civil engineering projects, and medicine and health care. Defence can learn a lot from systems thinkers in the civil world, and the civil world can learn a lot from defence.

More information

Human Resources: Systems thinking - Help employees to see the big picture

By Daniel Schroeder, for BizTimes, Published June 25, 2010

Question:

"As the HR director at my company, I'm spending more time mediating conflicts between work areas. No one seems to see the big picture: that we are here to help one another so the company can meet the customers' needs. There's a lot of competition, blaming and accusing. What can I do to help people see we're all in this together?"

Answer:

This is a very common concern. We work with clients to address these kinds of concerns every day. Organizations of all kinds and types are filled with barriers, turfs, territories, and silos. Employees who operate inside these boxes tend to adopt a defended and guarded perspective along the lines of, "We've got our act together … the problem is over there, with those people … they are the ones messing things up." This kind of parochial thinking is, of course, misguided. The adage that, "A chain is only as strong as its weakest link" is applicable here. If Department A is going great-guns but Department B is spinning its wheels, then Department B's futility will dictate how the organization's processes ultimately perform.

So what can you do to encourage your employees to start to sing from the same song sheet? Unleash the power of systems thinking. Systems thinking is a term that was most popularly explored by Peter Senge in his book, "The Fifth Discipline." According to Senge, systems thinking has to do with, "Seeing interrelationships rather than things, seeing patterns of change rather than 'static snapshots' . . . It is a discipline for seeing the 'structures' that underlie complex situations, and for discerning high from low leverage change."

More information

NASA Systems Engineering Education Initiative: Curriculum Development for Systems Engineering Education

This program is a part of a larger initiative endorsed by NASA's Exploration Systems Mission Directorate (ESMD) to address

systems engineering at the university level. Significant involvement of university faculty in all aspects of NASA's Systems Engineering Education Initiative gives the greatest opportunity for long-term curricular change. ESMD in partnership with the University of Texas at Austin developed an undergraduate systems engineering curriculum. The intent of this development effort was to use UT-Austin's Department of Aerospace Engineering as a test bed for the systems engineering materials, particularly as a prerequisite to the required senior design class. Following the pilot instruction of the space systems engineering course at UT-Austin, the curriculum was made available to interested universities.

More information

Conferences and Meetings

KSE 2010 - The Second International Conference on Knowledge and Systems Engineering NEW

October 7-9 2010, Hanoi, Vietnam
More information

IFM 2010: Integrated Formal Methods 8th International Conference

October 11 – 14, 2010, Nancy, France
More information

ISDEA2010 - 2010 International Conference on Intelligent System Design and Engineering Application NEW

October 13-14, 2010, Changsha / China
More information

INCOSE LA Mini-Conference 2010

October 16, 2010, Loyola Marymount University, Los Angeles, USA
More information

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

October 16 – 20, Reykjavik Iceland
More information

World Engineering Congress and Exhibition: ENGINEERING 2010 – ARGENTINA: "Technology, Innovation and Production for Sustainable Development"

October 17 - 20 2010, Buenos Aires, Argentina
More information

International Conference on Lean Enterprise and Systems (LESS 2010)

October 17 – 20, 2010, Helsinki, Finland
More information

International Institute of Business Analysis (IIBA) Conference

October 17-21, 2010, Alexandria, VA, USA
More information

Business Analysis Forum NEW

October 17-22, Hilton Alexandria Mark Center, Alexandria, VA, USA
More information

SPLASH 2010 Workshop on Flexible Modeling Tools

October 18, 2010, Reno Nevada, USA
More information

Dynamic Languages Symposium 2010

Co-located with SPLASH 2010
In cooperation with ACM SIGPLAN (PENDING)
October 18, 2010, Reno, Nevada, USA
More information

SoS 2010 - Special Session on System of Systems (SoS'10) NEW

At International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT-2010)
Oct 18, 2010, Moscow, Russia
More information

SEAri Research Summit 2010

October 19, 2010, MIT Media Lab, Cambridge, MA, United States of America
More information

Leaders for a New Climate: Systems Thinking and the C-ROADS Simulation NEW

Oct 19-21, 2010, MIT Sloan School of Management, Cambridge, MA, United States of America
More information

FMCAD 2010 - Formal Methods in Computer Aided Design

October 20 – 23, 2010, Lugano, Switzerland
More information

MIT Systems Thinking Conference

October 21-22, 2010 , MIT Media Lab, 14 Ames St., Cambridge, Massachusetts, USA
More information

NDIA 13th Annual Systems Engineering Conference

October 25-28, 2010, Hyatt Regency Mission Bay, San Diego, CA, USA
More information

Requirements Days 2010

October 26 – 28, 2010, München, Germany
More information

2010 Huntsville Simulation Conference (HSC2010) ⩘ NEW

October 26-28, 2010, Huntsville Marriott, Huntsville, Alabama, USA
More information

5th International Workshop on Enterprise Integration, Interoperability and Networking (EI2N'2010)

October 27-28, 2010, Hersonissou, Crete, Greece
More information

Complex Systems Design & Management 2010

October 27-29, 2010, Paris, France
More Information

15th Annual INCOSE Region II Fall Mini-Conference ⩘ NEW

October 30, 2010, National University - La Jolla Campus, San Diego, CA, USA
More information

12th IEEE International High Assurance Systems Engineering Symposium (HASE 2010)

Co-Located with the 21st IEEE International Symposium on Software Reliability Engineering (ISSRE)
November 1-4, 2010, San Jose, CA, USA
More information

29th International Conference on Conceptual Modeling

1-4 November 2010, Vancouver, BC, Canada
More information

Seventh International Workshop on Web Information Systems Modeling (WISM 2010)

(Held in conjunction with ER 2010)
November 1-4, 2010, Vancouver, BC, Canada
More information

25th International Forum on COCOMO and Systems/Software Cost Modeling ⩘ NEW

November 2-5, 2010, University of Southern California, Los Angeles, CA, USA
More information

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

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

No Magic World Conference

November 7-10th, 2010, American Airlines Conference Center, Fort Worth, TX
More information

INCOSE UK Annual Systems Engineering Conference 2010 (ASEC10)

November 8-10, 2010, Heythrop Park Hotel, Chipping Norton, Oxfordshire, UK
More information

SEPG Latin America 2010

November 10-12, 2010, Medellín, Colombia
More information

Association for the Advancement of Artificial Intelligence (AAAI)
Fall Symposium: Complex Adaptive Systems: Resilience, Robustness, and Evolvability

November 11 - 13, 2010, Arlington, VA
More information

5th Trends in Enterprise Architecture Research (TEAR2010) workshop

November 12, 2010 as part of the Enterprise Engineering Week at the Delft University of Technology, Delft, The Netherlands from the 9th of November to the 12th of November
More information

CMMI 10th Annual Technology Conference and User Group

November 15-18, 2010
Hyatt Regency Tech Center – Denver, Colorado, USA
More information

Third IEEE International workshop UML and Formal Methods

Held in conjunction with the 12th International Conference on Formal Engineering Methods, ICFEM 2010
November 16th, 2010, Shanghai, China
More information

5th International Forum on Engineering Education (IFEE2010) & European SDPROMO II Conference

November 23 - 25, 2010, Sharjah-Dubai, UAE, United Arab Emirates
More information

1st International Chemical and Environmental Engineering Conference 2010

November 26 - 28, 2010, Kuala Lumpur, Malaysia
More information

22nd International Conference Software & Systems Engineering and their Applications (ICSSEA 2010)

December 7-9, 2010, Paris, France
More information

National Institute of Technology – National Systems Conference 2010

December 10-12, 2010, National Institute Technology Karnataka, Surathkal, India
More information

ICISE 2010: International Conference on Intelligent Systems Engineering

December 18, 2010, Bangkok, Thailand
More information

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

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

Second International Conference on Exploring Services Sciences (IESS 1.1)

February 16-17-18, 2011, Geneva, Switzerland
More information

Second ACM/SPEC International Conference on Performance Engineering (ICPE 2011)

March 14-16, 2011 Karlsruhe, Germany
More information

Design, Automation & Test in Europe

March 14-18, 2011, Grenoble, France
More information

26th Symposium On Applied Computing

March 21 - 25, 2011, Tunghai University, TaiChung, Taiwan
More information

Requirements Engineering Track – 4th Edition

part of the 26th ACM Symposium on Applied Computing
March 21 - 25, 2011, Tunghai University, TaiChung, Taiwan
More information

IWEI 2011 - The International Working Conference on Enterprise Interoperability

March 22-24, 2011, Stockholm, Sweden
More information

MoBE-RTES 2011 - 2nd IEEE Workshop on Model-based Engineering for Real-Time Embedded Systems (MoBE-RTES 2011) ⩓ NEW

Mar 28, 2011
More information

REFSQ 2011 - 17th International Working Conference on Requirements Engineering: Foundation for Software Quality ⩓ NEW

March 28-30, 2011, Essen, Germany

More information

IEEE International Systems Conference

April 4-7, 2011, Montreal, Quebec, Canada
More information

Risk-Based Approaches to Major Decisions (Risk '11)

May 13 - 14, 2011, Falmouth, Cornwall, United Kingdom
More information

FM 2011: 17th International Symposium on Formal Methods   NEW

June 20 - 24, 2011, Lero, Limerick, Ireland
More information

The 32nd International Conference on Application and Theory of Petri Nets and Concurrency (PETRI NETS 2011)   NEW

11th International Conference on Application of Concurrency to System Design (ACSD 2011)
June 20-24, 2011 Kanazawa Cultural Hall, Kanazawa, Japan
More information

INES 2011 - 15th IEEE International Conference on Intelligent Engineering Systems 2011   NEW

June 23-25, 2011, Poprad, High Tatras, Slovakia
More information

SoSE 2011 - 2011 6th International Conference on System of Systems Engineering (SoSE)   NEW

Jun 27 - 30, 2011, Albuquerque, New Mexico, U.S.A
More information

19th IEEE International Requirements Engineering Conference   NEW

August 29 – September 2, 2010, Trento, Italy
More information

Education & Academia

First Penn State students graduate from online engineering program

University Park, Pa. - Neil Barnas has just completed a rigorous master's degree program at Penn State, but instead of joining fellow graduates for commencement ceremonies Aug. 14, at University Park campus, the Air Force captain will be preparing for his new assignment at the F-35 Joint Strike Fighter Program Office, a Department of Defense unit involved with aircraft weapon systems for the U.S military and its allies. Barnas is one of 27 working professionals from around the nation who are the first graduates of the new Master of Engineering in Systems Engineering program offered by Penn State Great Valley School of Graduate Professional Studies and delivered online through the University's World Campus.

More information

George Mason University: Introduction to Systems Engineering and Operations Research (SEOR) Online Short Courses and Certificate Program

The series of twelve non-credit online synchronous short courses and the related certificate program, Introduction to Systems Engineering and Operations Research (SEOR), offers an opportunity for engineering professionals to increase their technical knowledge of systems engineering and operations research and to enhance their ability to engineer, optimize, plan, integrate, and manage the design of complex systems.

The program is offered by the Systems Engineering and Operations Research Department. All courses are taught by The Volgenau School of Information Technology & Engineering faculty and industry experts. All short course instructors are at the forefront of their field, and have extensive experience in applying their knowledge to contemporary real-world application. The knowledge you gain in the courses is designed to be applicable immediately to your job and your career.

More information

New @ Worcester Polytechnic Institute (WPI) – System Optimization Course

"System Optimization is a lot more than linear and non-linear programming. Student projects teach you it's as much art as it is science."

Reflecting WPI's long tradition of theory and practice, this new System Optimization course will provide students not only with fundamentals and techniques but will make sure students understand how to apply system optimization to real world engineering and business problems. This course is not structured around lectures and exams but around student projects.

For example, one project involves optimizing the roster of a New England sports team, given constraints on roster size, salaries, and player availability. Another project involves optimizing the design of a military vehicle, given constraints on size, cost, and range.

More information

Some Systems Engineering-Relevant Websites

http://profs.etsmtl.ca/claporte/English/VSE/VSE.html

Public Site of the ISO/IEC JTC1/SC7[1] Working Group 24 ISO/IEC 29110 - Life Cycle Profiles for Very Small Entities (VSEs)

http://www.nasa.gov/news/reports/NASA_SE_Behavior_Study.html

This study was conducted to identify the characteristics or behaviors frequently observed in highly regarded SEs at NASA.

Standards and Guides

ISO/IEC JTC 1/SC7 Interim Meeting

Registration is now open for the interim meeting at https://www.fbcinc.com/nist_ISOSC7/atreg1.aspx

It is essential that all participants register at least four weeks before the meeting date: The deadline for registration is Monday, October 4, 2010. Advance registration is required for all participants, both US and non-US. Unregistered persons arriving at NIST cannot be admitted.

More information

Some Definitions to Close On

Business Analysis

The set of tasks and techniques used to work as a liaison among stakeholders in order to understand the structure, policies, and operations of an organization, and to recommend solutions that enable the organization to achieve its goals.
Source: International Institute of Business Analysis (IIBA)

Business analysis is the discipline of identifying business needs and determining solutions to business problems. Solutions often include a systems development component, but may also consist of process improvement or organizational change or strategic planning and policy development.
Source: en.wikipedia.org/wiki/Business_analysis

Business Analyst

A person who performs business analysis.
Source: Robert Halligan

An individual who analyzes the operations of a department or functional unit with the purpose of developing a general systems solution to the problem that may or may not require automation.
Source: The Free Dictionary by Farlex

A Business Analyst (BA) analyzes the organization and design of businesses, government departments, and non-profit organizations; BAs also assess business models and their integration with technology.
Source: en.wikipedia.org/wiki/Business_analyst

An internal consultancy role that has responsibility for investigating business systems, identifying options for improving business systems and bridging the needs of the business with the use of IT.
Source: British Computer Society

Project Performance International News

SyEN Editor at RE 2010

SyEN Editor Alwyn Smit will be attending the 18th International Requirements Engineering Conference (RE 2010) In Sydney, Australia, over Sep 27, 2010 to Oct 1, 2010. Alwyn hopes to see you there.

New 1-day Seminar on Cognitive Systems Engineering

The first delivery of a new, one-day introductory short course on cognitive systems engineering will take place in Melbourne, Australia, on Monday 11 October, 2010. The seminar will be repeated in Sydney, Australia on Wednesday, 13 October.

Delivered by world expert and former Chief Scientist of General Dynamics in Dayton, Ohio, Dr. Gavan Lintern, this seminar aims to deliver insight into many of the more puzzling issues that disrupt organizational and system performance, and to introduce the techniques which are effective in addressing these issues. The need for state-of-the-art methods of cognitive analysis and cognitive design in development of safe and effective human-centric engineering solutions is explained, as is, in general outline, the analysis and design strategies that can be used to develop human interfaces and human collaborative systems. The seminar also aims to provide delegates with the insight they will need to judge whether in-depth training in cognitive systems engineering would be of benefit to them or to their colleagues.

Welcome Clive Tudge, CEng MIET

After a honeymoon during which the marriage was planned, Clive Tudge has become a fully accredited member of the PPI family. Clive Tudge has a wealth of project experience across different sectors, with a particular emphasis in his career on project and systems engineering management. Clive will deliver some of PPI's existing courses, and will be the lead presenter

for a range of new courses, in the fields of project management, engineering management, risk management, integrated product teams, technical reviews and audits, and tender/proposal evaluation. Based near Brisbane, Australia, Clive will work both nationally and internationally.

Prior to arriving in Australia, Clive held many senior Project Director positions in the aviation industry in Europe, on projects such as the Tornado, Jaguar and Hawk aircraft. In Germany, he was the Senior Project Manager on a unique Fly-By-Wire Flight Control System for the Typhoon Eurofighter Aircraft Project and Project Manager on various systems for the European Tiger Helicopter.

In addition to English, Clive speaks fluent German and French (not yet Portuguese or Spanish, but we aim to fix that!).

Robert Halligan Passes 100

No, not years of age! But countries and autonomous regions from which Robert has wine.

The interest of PPI founder and Managing Director Robert Halligan in wine has extended geographically over the last decade, facilitated by the worldwide expansion of PPI's support to projects. Robert, always interested in wine as a science as well as a sensory experience, has increased the countries and autonomous regions represented in his wine collection past 100, with the addition of the island of La Réunion in the Indian Ocean, and Madagascar. Visit Robert's Wines of the World page at http://www.ppi-int.com/biographies/wines-of-the-world.php for a full list.

Project Performance International Events

Systems Engineering 5-Day Course

Upcoming locations include:

- Melbourne, Australia
- Las Vegas, USA
- São José dos Campos, Brazil
- Rio de Janeiro, Brazil
- Stellenbosch, South Africa
- London, UK

View 2010/2011 Systems Engineering Course Schedule

Requirements Analysis and Specification Writing 5-Day Course

Upcoming locations include:

- Las Vegas, USA
- Amsterdam, The Netherlands
- Stellenbosch, South Africa
- Adelaide, Australia

View 2010/2011 RA&SW Course Schedule

OCD & CONOPS in Capability Development 5-Day Course

Upcoming locations include:

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

View 2010/2011 OCD/CONOPS Course Schedule

Software Development Principles & Processes 5-Day Course

Upcoming locations include:

- Sydney, Australia

View 2011 Software Development Principles & Processes Course Schedule

Cognitive Systems Engineering 5-Day Course

Upcoming locations include:

- Adelaide, Australia

View 2010/2011 Cognitive Systems Engineering Course Schedule

Requirements Engineering 4-Day Course

Upcoming locations include:

- São José dos Campos, Brazil

View 2011 Requirements Engineering Course Schedule

IT Project Management Principles & Processes 3-Day Course

Upcoming locations include:

- Melbourne, Australia

View 2010 IT Project Management Principles & Processes Course Schedule

Introduction to Software Development Principles & Processes 2-Day Seminar

Upcoming locations include:

- Melbourne, Australia
- Sydney, Australia

View 2011 Introduction to Software Development Principles & Processes Seminar Schedule

Introduction to Requirements Analysis 1-Day Seminar

Upcoming locations include:

- Brisbane, Australia
- Melbourne, Australia
- Sydney, Australia
- Wellington, New Zealand

View 2011 Introduction to Requirements Analysis Seminar Schedule

Preparing Great Requirements Specifications 1-Day Seminar

Upcoming locations include:

- Brisbane, Australia

- Melbourne, Australia
- Sydney, Australia
- Wellington, New Zealand

View 2011 Preparing Great Requirements Specifications Seminar Schedule

---

PPI Upcoming Participation in Professional Conferences

- September 23-24, 2010 - **RuSEC 2010** - Moscow, Russia (Exhibiting)
- September 28 - October 1, 2010 - **XI SIGE** - São José dos Campos, Brazil (Sponsor/Exhibiting)
- October 4 - 6, 2010 - **APCOSE 2010** - Keelung, Taiwan (Exhibiting)
- October 25 - 28, 2010 - **NDIA SE Conference** - San Diego, CA, USA (Exhibiting)

Kind regards from the SyEN team:
Robert Halligan, Managing Editor, email: rhalligan@ppi-int.com
Alwyn Smit, Editor, email: asmit@ppi-int.com
Luke Simpson, Production, email: lsimpson@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

Tell us what you think of SyEN: email to contact@ppi-int.com

If you do not wish to receive a copy monthly of SyEN in future, please reply to this e-mail with "Remove" in the subject line. All removals are acknowledged; you may wish to contact us if acknowledgement is not received within 7 days.