Project Performance International

Systems Engineering

Newsletter (SyEN)

SyEN #018 - March 25, 2010

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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.

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

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A Quotation to Open On

"Engineering is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realisation in stone or metal or energy. Then it brings homes to men or women. Then it elevates the standard of living and adds to the comforts of life. This is the engineer's high privilege." - Herbert Clark Hoover, Engineer & President of the US from 1929-1932

Feature Articles

The Role of Values in Identifying Systems Engineering Competencies

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Internationally, there appears to be a shortage of Systems Engineering (SE) skills as predicted by Professor Peter Lindsay of the University of Queensland (Australia)[1]: "The existing international shortage of systems engineers is likely to double in the next few years". This is a problem, specifically in South Africa, where organizations such as the Council for Scientific and Industrial Research[2] (CSIR), have a great demand for these skills. The Defence, Peace, Safety and Security (DPSS) unit of the CSIR provides defence science and technology support to the South African National Defence Force and various international customers. This unit has experienced growth of 30% in some business areas for a number of years leading to significant demand for SE skills.

The business value of screening to identify systems engineering potential lies in the cost currently incurred because of the shortage of SE's and the lead-time in developing SE's. These costs include opportunity costs resulting from not being able to access new projects, and project risks, a consequence of not having the adequate skills on current projects.

For systems engineers, an interview would identify whether the person has the requisite knowledge and skills. The situation is more complicated for candidate SE's, however, as they would not yet have fully developed knowledge and skills. We can only look at candidate potential in terms of psychological attributes. These attributes include personality, cognition, values, interests, and attitudes. While some personality characteristics and cognitive abilities (Marais 2004[11], Toshima 1993[12], Kobori 1991[10], Capretz 2003[3] and Frank 2006[4]) have been understood to be important for identifying systems engineering and related potential, values appear not to have received any attention. However, recent research (Gonçalves and Britz, 2009[6] and Goncalves and Britz, 2010[7]) has identified values as potentially important in identifying systems engineering potential.

Comparing values, interests and attitudes, values are the most stable over time (George and Jones 1997): "work attitudes, as knowledge structures, should exhibit a certain degree of stability, but not as much stability as values because one of the functions of attitudes is to help the individual adjust to changing conditions over time and stay attuned to the social context". In the remainder of this article the focus is on values.

A value system is defined as "…a generalized knowledge structure or framework about what is good or desirable which develops over time through an individual's involvement in the world. A value system guides behaviour by providing criteria that an individual can use to evaluate and define actions and events in the world surrounding him or her. An individual's personal set of values determines which types of actions and events are desirable or undesirable" (George and Jones, 1997[5]).

For the assessment of values, the Value Orientations (VO), from Cognadev International[13], was used. This model is drawn from Graves' Spiral Dynamics Theory (amongst other theories). The VO measures seven broad value systems, which can be combined in a variety of ways to reveal the individual's value orientation (the value systems accepted and rejected) and are represented in terms of different colours, in order to avoid ranking (Beck and Cowan, 2002[8]). Each person may accept or reject different proportions of each of these value systems. The following value systems focus on **individual needs**:

- **RED:** The need to control, to enforce dominance and power. The type of thinking here can be characterised as egocentric.
- **ORANGE:** The need to perform, to achieve and be self-reliant. This value system depicts a strategic type of thinking.
- **YELLOW:** The need to learn, to increase knowledge and experience.

The following value systems are more sacrificial and depict **interdependent values**:

- **PURPLE:** The need to protect and be protected, to belong.
- **BLUE:** The need for order and structure, to conform and be righteous.
- **GREEN:** The need for spiritual growth and harmony, relationships. Feelings are more important than achievement.
- **TURQUOISE:** The need to experience. Everything is interconnected. This value system depicts a holistic type of thinking.

A summary of correlations between the 21 systems engineering competencies on the INCOSE UK Competence Framework (INCOSE UK 2006[9]) and the value systems found in the study (Gonçalves and Britz 2010[7]) is presented below:

Competence	Correlated with
Enterprise and Technology environment	not accepting Turquoise (We experience)
Determining and Managing Requirements	reject Green value system (We relate)
Concept Generation	accept Orange (I perform) but not Turquoise (We experience)
"Design for …"	not accepting Red (I control) while accepting Turquoise
Modelling and Simulation	not rejecting Yellow (I learn), Green (We relate) or Turquoise (We experience) and not accepting Red (I control)
Selecting the Preferred Solution	Yellow (I learn) accept and not rejecting Yellow
Integration and Verification	accepting Red
Enterprise Integration	not Red reject (I control), not Green Accept, not Turquoise accept
Integration of Specialities	Turquoise (We experience) reject
Lifecycle Process Definition	Red accept (I control) and Turquoise reject
Planning, Monitoring and Controlling	not rejecting Red (I control) and not accepting Turquoise

Values, as assessed by the Value Orientations assessment contribute to predicting high competence on at least 11 SE competencies. It appears that values have not been considered in the literature on SE screening. For many of the SE competencies, it is about what value systems are not rejected rather than what is accepted. It is also clear that the values are different for different competencies. From these results it appears that a better strategy to addressing the shortage of systems engineers is not to look for the super-systems engineer, but to form a team of people that will bring various value systems (along with other characteristics) and SE competencies.

1 References

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The Use of Morphological Analysis and Bayesian Networks as Decision Support Methods for Strategic Problem Spaces

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1. Wicked Problems

Strategic decision support often involves the development of scenarios and complex strategy models. Many of the critical factors in the model may be non-quantifiable, since they contain strong socio-political dimensions. Furthermore, the uncertainties inheret in such problem complexes are in principle irreducible and often cannot be described fully. Associating quantitative measures to these uncertainties then becomes a superficial task.

The type of problems associated in the field of strategic decision support can often be described as wicked problems. The term 'wicked problem' was introduced by Rittel and Weber (1973) to describe complex problems that are mutlidimensional and nonquantifiable. The multidimensional aspect makes it difficult to solve one part of the problem without affecting another part of the problem. The nonquantitative aspect makes it difficult to solve with traditional quantitative methods (Plauché, 2010). Rittel and Weber defined wicked problems with the following characteristics (p. 161):

a. There is no definitive formulation of a wicked problem.
b. Wicked problems have no stopping rule, because the solution to a wicked problem is not unique.
c. Solutions to wicked problems are not true or false, but better or worse.
d. There is no immediate or ultimate test of a solution to a wicked problem.
e. Wicked problems provide little opportunity for trial and error because of their uniqueness, and therefore every attempt counts significantly.
f. Every wicked problem can be considered to be a symptom of another problem.

2. Modelling methods

Nonquantified problem structuring methods addresses the shortcomings of traditional quantitative methods: Complex problem spaces such as wicked problems are approached by facilitating group interaction and providing a transparent framework for finding consensus on the problem definition.

Morphological Analysis (MA) is a problem structuring method that allows small groups of subject specialists to define, link and internally evaluate the parameters of complex problem spaces easily. This way, a solution space for the research question is created, as well as a flexible inference model.

A Bayesian network (BN) is not a nonquantified problem structuring method, but rather a probabilistic causal model. Therefore it allows for causal and hierarchical relationships between variables in the research question.

In De Waal & Ritchey (2007) we suggest the combination of these methods as two phases of a modelling process and thereby gaining the benefits of both methods when addressing wicked problems. A systems view of the problem is then obtained on two different levels:

a. The MA provides a typological or morphological view, structuring the problem space according to logical relationships.
b. The BN provides a causal or hierarchical view, structuring the problem space according to causal relationships.

We briefly discuss both methods and present a simple case study involving the use of both methods in sequence.

2.1. Morphological Analysis

In a logical approach, as is the case with MA, the coexistence or consistency between each factor needs to be described. MA begins by identifying and defining the variables of the problem complex to be investigated. Then, each variable is assigned a range of possible values. For example, the variable 'colour' may have the values 'red', 'green', 'blue', etc. As a logical approach, the possibility of coexistence of all values between variables is investigated. It makes sense that a field with 8-10 variables, each having 4 or more values, have millions of possible configurations. The number of configurations is reduced by only

allowing consistent configurations (see (De Waal & Ritchey, 2007) for a more detailed description).

The MA process goes through cycles of analysis and synthesis. These steps are (Ritchey and Stenström, 2002):

Analysis phase: Define the problem complex in terms of variables and variable values.

a. Identify the dimensions or variables that best define the problem complex or scenario. Each variable is represented in a column of the morphological field.
b. For each variable, define the range of relevant possible values. The values are represented in the rows of the morphological field. This step also concludes the analysis phase.

Synthesis phase: Link variables and synthesize an outcome space.

a. Use a cross-consistency matrix to assess the internal consistency by considering only pairs of variable values that are internally consistent. (Internal consistency evaluates the logical, rather than causal relationship between two variables.)
b. Synthesize an internally consistent outcome space. (MA software assists here by automatically “reducing” the solution space to contain only those solutions whose outcomes do not contain internal contradictions.)

At any stage in the process, revisit particular steps to adjust variables, values, and consistency measures.

The focus of MA lies in its focus on problem formulation, parameterisation and the establishment of an internal structure. This is achieved in a systematic, traceable manner.

2.2. Bayesian networks:

BNs are causal networks that establish causal relationships between variables. A causal network consists of nodes (variables) and arcs (directed links) between them. Each variable may have a range of (mutually exclusive) values. The strengths of the links between variables are defined by probabilities. The major modelling tasks can be captured by the following 3 questions:

a. What are the variables and variable values?
b. What does the graphical (causal) structure look like – i.e. between which variables are there dependencies and what are their causal directions?
c. What are the strengths of these dependencies?

2.3. Inferencing:

Both MA and BNs allow the user to ask what-if questions. In practise this means that if a value of a variable is given as an input, the output (answer) of the model is the values of other variables that can be associated with the input. The difference between the two modelling methods is that MA answers the question with possibilities and BN answer the question with probabilities. This will become clear in the following case study.

3. Case Study

The example that we present is a small model that involve the development of a decision support model for assessing the environmental impact of different fire-fighting methods under different conditions (see De Waal & Ritchey, 2007 for more detail). The objective of the model is to provide decision makers with the best fire-fighting method under different circumstances. The primary intension of the model is for planning, education and training.

3.1. Morphological Analysis

The following figure illustrates the MA model for this problem complex. The columns represent the variables, with each cell depicting a possible value for the variable. This specific example can be interpreted as follows:

If the fire-fighting method 'water, no control' is used under the circumstances specified in the first four columns, it is consistent with the outcomes 'long and short term' environmental consequences.

Type of substance	Type of event	Geological situation	Type of threatened recipient	Method (of fire fighting)	Likelihood of substance spreading	Environmental consequences
Electrical waste	Container	Clay and rock	Surface water	Dry method	High	Irreversible
Rubber	Industrial	Stony pine seed ground	Ground water	Foam or water which can be controlled	Moderate	Long-term
Plastic	Recycling depot	Gravel	"Natura 2000" (Protected areas)	Water, no control	Low	Short-term
Petroleum	Residential	Frozen ground	Sewerage plant	Foam, no control		No significant consequences
Radioactive substances	Transport/road	Storm water	Forest	Do nothing		
Other environmentally dangerous	Bush	Slag water (populated area)	Farmland			
Other diverse products	Large building	Open waterway	Sea			
		Air	Urban area			

Figure 1: Morphological model of case study

3.2. Bayesian network

The next step is to develop a causal structure of the variables defined in the MA field. The BN graphical structure for this is illustrated in the following figure.

Figure 2: Bayesian network of case study

Once the strength of the links between variables is established, the following 'what-if' questions can be asked: The first and most natural mode is synthetic and “predictive”, i.e. given a set of circumstances and a selected fire-fighting method, what is the likelihood of substances spreading, leading to negative consequence for the environment.

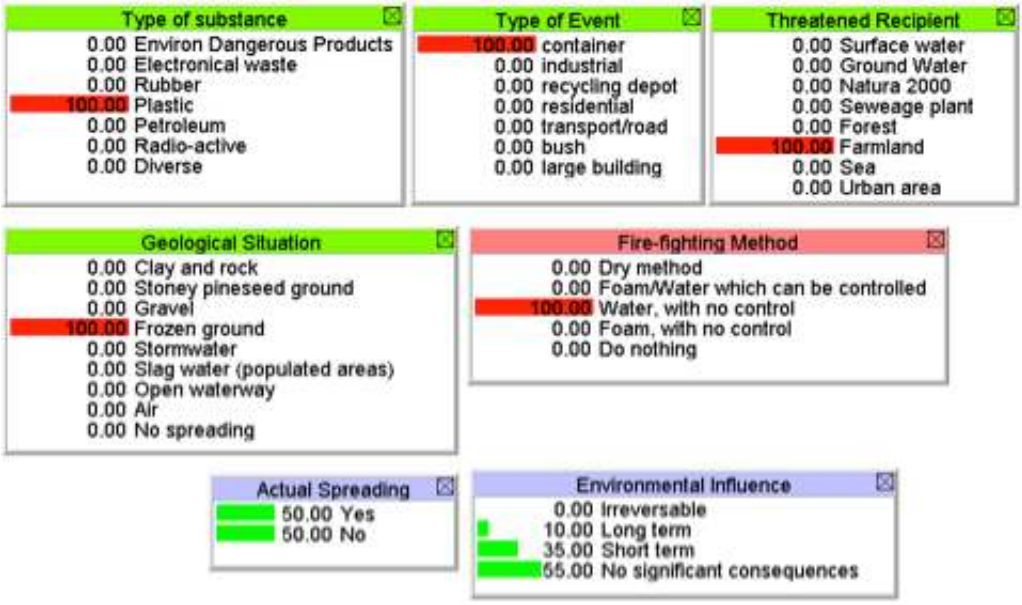

Figure 3: Example of Predictive mode. What if we use 'Water with no control' on a particular instance?

Another mode is analytic and 'diagnostic', i.e. given a degree of environmental impact, what are the circumstances and fire-fighting methods that can lead to this?

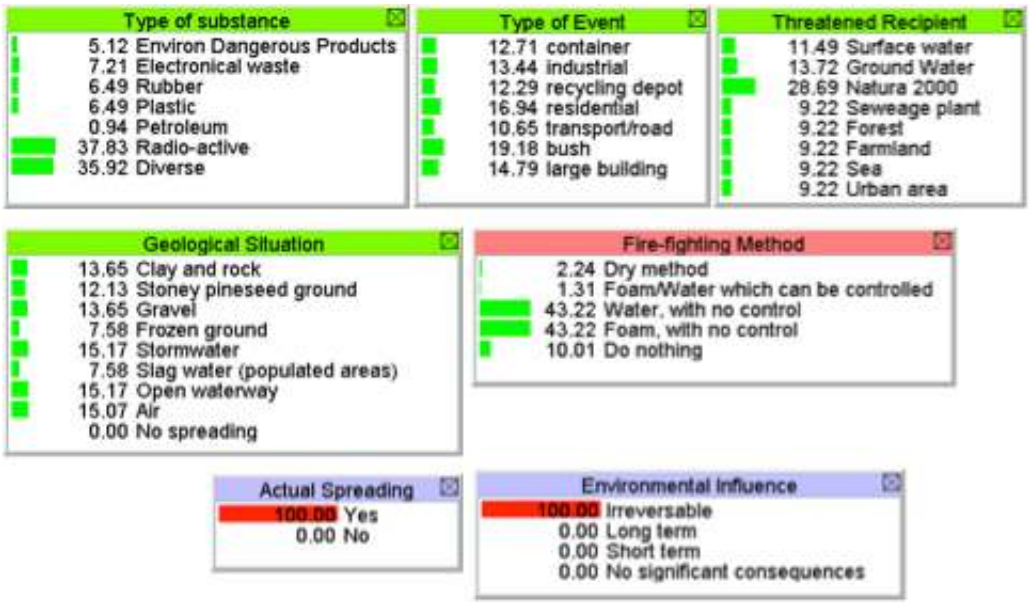

Figure 4: Example of Diagnostic mode: Under what circumstances can irreversible environmental damage be done?

4. Conclusions

Morphological analysis and Bayesian networks were presented as two modelling methods in a two-phased modelling process. Both methods depict a problem complex in a systematic view. MA focuses on the logical relationships between variables and BNs depicts the causal relationships between variables.

Both methods enable the user to systematically evaluate decisions under different circumstances by asking what-if questions. Although the models cannot truly predict outcomes under circumstances, they aid the understanding of relationships between variables and how variables influence each other. These methods prove to be very valuable in decision support of wicked problems.

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Systems Engineering News

IIBA Business Analysis Competency Model Now available

IIBA® announced the release of the new Business Analysis Competency Model, a tool for assessing the ability of business analysts to work in the role. It includes 53 competencies and indicators/behaviors of the competency, and describes the qualities that can make a Senior BA successful in performing the activities outlined in the *BABOK® Guide*.

The Competency Model is beneficial to organizations and business analysis professionals for a wide range of uses such as assessing performance, identifying areas for professional development, conducting job reviews, assessing training programs, and more. To learn about the Competency Model and Licenses, visit the IIBA website.

More information

INCOSE eNote: News and Notes from the INCOSE Network

Vol 7 Issue 3, March 2010

INCOSE Working Group Award for Collaboration

The INCOSE Working Group Award for Collaboration was presented to the Model Driven System Design WG (MDSD WG) Co-Chairs: Phil Spiby from Eurostep and Roger Burkhart from John Deere.

"For their professional contributions, personal efforts and over a decade of effort to bring ISO10303-AP233 to fruition as the enabler for information exchange in an integrated Model Based Systems Engineering environment."

More information

Getting Close - A Systems-Oriented Architecture Framework to be released as Open Source

Over the last year London Underground Ltd has been working on an architecture framework, TRAK. The original idea was very much centred on the rail domain. It is based on MODAF and in the process of distilling the bare bones we've ended up with something that is

a. domain free
b. centred on the 'System' stereotype
c. captures physical, organisation membership, responsibility extent (for solution parts) and human competence as well as the inevitable computer-computer interfaces
d. based around ISO 42010 / IEEE 1471 wrt specification of views, consistency rules etc.

More information

Call for Participation INCOSE Systems Engineering and Architecting Doctoral Student Network (SEANET) 2010 Workshop

March 16, 2010

INCOSE seeks to foster and accelerate doctoral research in the field of systems engineering, and one means to do this is by connecting graduate student researchers through a network. The purpose of SEANET is to advance systems engineering research by providing a collegial support network, research resources, and industry contacts that will enable the completion of doctoral dissertations related to systems engineering. The INCOSE SEANET invites current and soon-to-begin doctoral students to participate in a 1-day workshop at Stevens Institute of Technology in Hoboken, NJ. This event will precede the CSER 2010.

More information

INCOSE Version 3.2 of the Systems Engineering Handbook Available on Connect

A new version of the INCOSE Systems Engineering Handbook is now available for download on INCOSE Connect in the Products Area. The primary purpose of the Version 3.2 update was to:

- Bring the handbook into alignment with the latest 2008 version of ISO/IEC 15288 international standard
- Resolve inconsistencies in Version 3.1, primarily in the areas of terminology, figure-to-figure & figure-to-text consistency

- Consolidate related process information throughout the text to remove the multiple treatment of topics
- Minimize impact to the INCOSE CSEP/ASEP certification exam

Version 3.1 of the INCOSE Systems Engineering Handbook remains the sole basis for the INCOSE CSEP/ASEP exam until further notice. An announcement will be made when Version 3.2 can also be used. For planning purposes, an exam update is currently scheduled for late April 2010, after which time both Version 3.1 and 3.2 may be used.

More information

Featured Societies - International Test and Evaluation Association (ITEA)

About ITEA

The International Test and Evaluation Association (ITEA), is a not-for-profit educational organization founded in 1980 to further the exchange of technical information in the field of test and evaluation. Its members include professionals from industry, government, and academia, who are involved in the development and application of policy and techniques used to assess the effectiveness, reliability, and safety of new and existing systems and products.

Vision

To be recognized as the premier professional association for the international Test and Evaluation community

Mission

To advance the field of Test and Evaluation worldwide in government, industry and academia

Contact

Email: membership@itea.org
Tel: 703-631-6220
Fax: 703-631-6221

More information: www.itea.org/

INCOSE Technical Operations

Process Improvement Working Group

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

Charter

The PIWG Charter is to:

- Facilitate improvement of SE Process thru expansion of current practices to include new issues
- Coordinate improvement mechanisms throughout INCOSE to expand current practices
- Provide to INCOSE Membership

Vision

The vision of the Process Improvement WG is to be the acknowledged leader in advancing the overall continual improvement of the Systems Engineering Processes throughout the systems engineering community.

Mission

The mission of the Process Improvement WG is to take stakeholders needs, real world constraints, and capture the direction for potential continual improvement for the systems engineering processes for the future. This captured direction should provide value added to systems engineering practitioners in the future.

Objectives

The objectives of the Process Improvement WG are to:

- Capture the purpose, output and description of systems engineering processes as identified in ISO 15288 and INCOSE SE Handbook
- Identify, develop and coordinate any proposed improvements for the future systems engineering process.
- Recommend standardized approaches for systems engineering process definition.
- Enhance the working group members' knowledge of process improvement methods.
- Develop an integrated approach for corporate level strategy for process improvement that would encompass the concept and application of continual improvement for systems engineering tailored to the organization.
- Provide support for INCOSE Quick Review Process for applications such as maturity models.
- Provide INCOSE representation in CMMI administration activities to provide consistent Systems Engineering Process application.

Presentations

2008 International Workshop SE Process Improvement Summary Presentation Size: 200K

Leadership

Co-Chair: Karen Bausman, Air Force Center for Systems Engineering
Chair: Karen Richter

Contact SE Process Improvement and Capability Evaluation Working Group for additional information or to join this group.

Accomplishments and Products

Members of the Process Improvement WG meet twice yearly at the International Workshop and the International Symposium. They also hold teleconferences as needed and if an INCOSE Quick Review is required may interact through e-mail. There are several ways to participate including:

- Working Member: Participates in most meetings and teleconferences as well as any Quick Reviews.
- Reviewing Member: Participates in all Quick Reviews.
- Informational Member: Receives information via e-mail and participates in as many meeting, teleconferences and reviews as possible.

Current Projects

- Review draft of ISO 29110 Life Cycle for Very Small Enterprise.
- Investigate background for Technology Insertion, Front End SE and Reverse Engineering plus others
- Set up communication chain through email and Bi-monthly telecons.

Systems Engineering Software Tools News

3SL® Inc. Releases Cradle®-6.2 Requirements Management and Systems Engineering Software

3SL announced the release of Cradle-6.2. Cradle-6.2 implements the first of many planned steps to ensure interoperability, supporting both current and up and coming data formats. The newly added support for XML and RIF 1.1a highlights this commitment. XML allows for consistent and predictable mapping of data between Cradle and other data sources, while RIF 1.1a builds on the XML functionality, extending Cradle data schema to match the Requirements Interchange Format heavily used in European auto manufacturing.

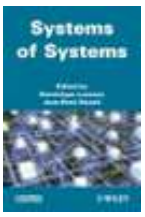
More information

Cradle® March 2010 Newsletter

http://www.threesl.com/pages/webletter-March10/index.php

Systems Engineering Books, Reports, Articles and Papers

Systems of Systems



By Dominique Luzeaux and Jean-René Ruault
Publisher: Wiley, Publication Date: January 2010
ISBN-13: 9781848211643

Summary:
In recent decades, the systems designed in the fields of banking, health, transportation, space, aeronautics, defense, etc. have been becoming increasingly larger. With the growing maturity of information and communication technologies, systems have been interconnected within growing networks, yielding new services through the combination of the system functionalities. This has led to an increasing complexity that has to be managed in order to take advantage of these system integrations.

Part 1 “Systems of systems: concepts and practical illustrations” is a multidisciplinary work on the concept of the "systems of systems" that is discussed extensively in current literature. After a critical comparison of the different definitions and a range of various practical illustrations, it provides key answers as to what a system of systems is and how its complexity can be mastered.

Part 2 “Systems of systems engineering: methods and tools”’ focuses on both engineering and modeling, and standardization issues which are critical in order to deal with the key steps of systems-of-systems engineering: elicitation of stakeholders’ needs, architecture optimization, integration of constituent systems, qualification and utilization.

More information

Systems Research Forum (SRF)

Volume: 3, Issue: 2 (December 2009)

PAPERS:

1. The Art and Science of Systems Engineering by Michael Ryschkewitsch, Dawn Schaible and Wiley Larson
2. Smart Systems Architecting: Computational Intelligence Applied To Trade Space Exploration And System Design by Cihan H. Dagli, Atmika Singh, Jason P. Dauby And Renzhong Wang
3. Model-Based Technical Planning: An Evaluation Of Description Techniques by Jonas Andersson And Tomas Huldt

CASE STUDY:

1. System and Context Modeling — The Role of Time-Boxing and Multi-View Iteration by Gerrit Muller

More information

Systems Engineering Leading Indicators Guide Version 2.0 Now Available

The Systems Engineering Leading Indicators Guide editorial team is pleased to announce the release of Version 2.0. Version 2.0 supersedes Version 1.0, which was released in July 2007 and was the result of a project initiated by the Lean Advancement Initiative (LAI) at MIT in cooperation with:

- the International Council on Systems Engineering (INCOSE),
- Practical Software and Systems Measurement (PSM), and
- the Systems Engineering Advancement Research Initiative (SEAri) at MIT.

Systems Engineering Leading Indicators Guide Version 2.0

More information

Conferences and Meetings

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

NDIA Systems Engineering "Top Systems Engineering Issues" Workshop

March 17-18, 2010, National Defense Industrial Association, 2111 Wilson Blvd, Suite 400, Arlington, VA 22201, USA
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, USA
More information

Systems Research Showcase, INCOSE UK, Bristol Local Group

24th March 2010, University of Bristol, exact location MVB/KES, UK
More Information

2010 IEEE International Systems Conference

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

10th Annual Cornell University Systems Engineering Forum 2010

April 7-8, 2010, Statler Hotel Amphitheater, USA
More information

Introduction to Dynamic Modeling with STELLA and iThink

April 7-9, 2010, Buena Vista Palace Hotel & Spa, Orlando, FL, USA
More information

INCOSE-COA 2010 Spring Mini-Conference

Saturday, April 10, 2010 from 8:30 AM - 4:00 PM
West Lafayette, IN, USA
More information

Quality of Model-Based Testing (QuoMBaT 2010)

April 10, 2010. Paris, France
More information

CHI 2010 Workshop: Context-Adaptive Interaction for Collaborative Work

April 10, 2010, Atlanta, GA, USA
More information

INCOSE-Crossroads of America 2010 Spring Mini-Conference 

April 10, 2010 from 8:30 AM - 4:00 PM (ET), West Lafayette, IN, USA
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

First Workshop on Green and Smart Embedded System Technology: Infrastructures, Methods and Tools - GREEMBED 2010

In conjunction with CPSWEEK 2010
April 12th, 2010, Stockholm, Sweden
More information

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

The Ergonomics Society Annual Conference 2010 NEW

April 13-15, 2010, Keele University, Staffordshire, UK
More information

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

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

More information

Overcoming Complexity Seminar 1 NEW

April 21, 2010, NDIA, Arlington, VA, USA
More information

Lean Software & Systems Conference 2010

April 21-23, 2010, Atlanta , USA
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, USA
More information

The Second International Conference on Complexity, Systems Thinking, and Social Entrepreneurship

April 30 – May 2, 2010, Adelphi University, Garden City, New York, USA
More information

Fifth Workshop on SHAring and Reusing architectural Knowledge - SHARK 2010 NEW

32nd Int. Conf. on Software Engineering (ICSE 2010)
May 2-8, 2010, Cape Town, South Africa
More information

Systems Engineering and Test Evaluation (SETE) 2010

3 - 6 May, 2010, Stamford Grand, Adelaide, Australia
More information

Model-Based Engineering of Real-time and Embedded Systems (MoBE-RTES 2010)

(organized in conjunction with ISORC 2010)
May 4th, 2010, Carmona (close to Sevilla), Spain
More information

ISORC 2010 Symposium - 13th IEEE Computer Society symposium dealing with the rapidly expanding field of object/component/service-oriented real-time distributed computing (ORC) technology.

May 5-6, 2010, Carmona (close to Sevilla), Spain
More information

International Workshop on Advances and Applications of Problem Orientation (IWAAPO-2010) at

ICSE

May 8th, 2010, Cape Town, South Africa
More information

The First International Workshop on Dependable Services and Systems (IWODSS 2010) NEW

May 17-18, 2010, Montreal, Quebec, Canada
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, USA
May 24 – Thursday May 27, 2010
More information

XP2010 Workshop: Dealing With Usability in an Agile Domain NEW

June 1, 2010,Trondheim, Norway
More information

3rd International Conference - From Research to Teaching Formal Methods: The B Method (TFM-B'10)

June 7, 2010, Nantes, France
More information

Exploring Modelling Methods for Systems Analysis and Design (EMMSAD 2010)

In conjunction with CAiSE 2010
June 7-8, 2010, Hammamet, Tunisia
More information

11th Workshop on Business Process Modeling, Development, and Support (BPMDS'10)

In conjunction with CAiSE 2010
June 7-8, 2010, Hammamet, Tunisia
More information

Fourth International i* Workshop - istar 2010

In conjunction with CAiSE 2010
June 7-8, 2010, Hammamet, Tunisia
More information

6th International Workshop on Enterprise & Organizational Modeling and Simulation (EOMAS 2010)

In conjunction with CAiSE 2010
June 7-8, 2010, Hammamet, Tunisia
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)

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)

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

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

June 9-11, 2010, Singapore
More information

Model-Based Verification & Validation from Research to Practice

2nd Workshop in conjunction with SSIRI 2010

June 9-11, 2010, Singapore
More information

3rd Workshop on Model-based Testing in Practice

15/16 June 2010, Paris, France, in conjunction with ECMFA 2010
More information

6th European Conference on Modelling Foundations and Applications (ECMFA 2010)

June 15-18, 2010, Paris, France
More information

2nd International Workshop on Abstractions for Petri Nets and Other Models of Concurrency

a satellite event of Petri Nets 2010
June 21, 2010, Braga, Portugal
More information

International Workshop on Formalization of Modeling Languages 

Colocated with ECOOP 2010
June 21 or 22, 2010 – Maribor, Slovenia
More information

PETRI NETS 2010

21-25 June, 2010, Braga, Portugal
More information

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

Collocated with Petri Nets 2010

June 21-25, 2010, Braga, Portugal
More information

IEEE International Conference on Systems of Systems Engineering

22 June 2010 to 24 June 2010, Henry Ford College, Loughborough University, UK
More information

ISARCS 2010 - 1st International Symposium on Architecting Critical Systems Federated with CompArch 2010

June 23-25 2010 Prague, Czech Republic
More information

1st International Workshop on Collaborative Modeling & Simulation - CoMetS'10

June 28 - 30, 2010, TEI of Larissa (Greece)
More information

2nd International Workshop on Model Transformation with ATL 

In conjunction with Tools 2010 Federated Conferences.
June 30, 2010 - Malaga, Spain
More information

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

30 June – 2 July, 2010, Essen, Germany
More information

IV Brazilian e-Science Workshop NEW

(in conjunction with CSBC 2010)
July 2010, Belo Horizonte, MG, Brazil
More information

Transformation Tool Contest 2010

Satellite workshop to TOOLS 2010, 1 - 2 July, 2010, Malaga.
More information

2010 International Conference on System Science and Engineering (ICSSE2010)

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

10th International Conference on Web Engineering NEW

July 5 - 9, 2010 in Vienna, Austria
More information

Summer Computer Simulation Conference (SCSC 2010)

July 11–14, 2010, Ottawa, Canada
More information

4th ACM International Conference on Distributed Event-Based Systems (DEBS 2010)

July 12-15, 2010, Cambridge, United Kingdom
More information

20th Annual INCOSE International Symposium (IS10)

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

4th IEEE International Workshop on Requirements Engineering For Services (REFS'10)

In conjunction with COMPSAC 2010
Seoul, Korea, July 19 - 23, 2010
More information

1st International Workshop on Complexity and Real World Applications Using the Tools and Concepts from the Complexity Sciences to Support Real World Decision-making Activities

July 21-23, 2010, Southampton, England, UK
http://iscepublishing.com/Forum/default.aspx?g=posts&m=227
More information

System Dynamics Society 2010 Conference

July 25 – 29, 2010, Seoul, Korea

More information

The 2nd International Workshop on Enterprise Architecture Challenges and Responses

To be held in conjunction with ICIS 2010
August 18 – 20, 2010, Yamagata University, Yonezawa, Japan
More information

The Second International Conference on Advances in System Testing and Validation Lifecycle (VALID 2010)

August 22-27, 2010 - Nice, France
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

1st International Workshop on Reuse in Business Process Management (rBPM 2010)

September 13, 2010, Hoboken, New Jersey – USA
More information

Modeling Business Information Systems (MoBIS 2010) NEW

September 15-17, 2010, Dresden, Germany
More information

7th International Conference on Quantitative Evaluation of SysTems (QEST) 2010

September 15 - 18, 2010, Williamsburg, Virginia, USA at the College of William & Mary, Computer Science Department,
More information

First International Workshop on Evolution Support for Model-Based Development and Testing (EMDT2010) NEW

Co-located with the International Scientific Colloquium (IWK2010)
September 16, 2010, Ilmenau, Germany
More information

15th International Workshop on Formal Methods for Industrial Critical Systems (FMICS 2010) NEW

September 20-21, 2010, Antwerp, Belgium
More information

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

21-24 September 2010, Singapore
More information

EPEW 2010: 7th European Performance Engineering Workshop

University Residential Center of Bertinoro, Italy
23-24 September 2010
More information

ACM International Conference on Design of Communication (SIGDOC'10) NEW

September 26-29, 2010, São Carlos - São Paulo - Brazil
More information

54th Annual Meeting of the Human Factors and Ergonomics Society

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

Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2010) NEW

September 27-October 1, 2010, Budapest, Hungary
More information

Model-based Testing and Test Automation - From Research into Practice (MoTes2010) NEW

September 27 – October 2, Leipzig, Germany
More information

Fifth International Conference on Graph Transformation

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

PDMC 2010
9th International Workshop on Parallel and Distributed Methods in verifiCation

Joint with 2nd International Workshop on High Performance Computational Systems Biology (HiBi 2010)
September 30 - October 1, 2010, Twente, The Netherlands

Co-locating with
5th International Conference on Graph Transformation (ICGT 2010) , 29 September - 1 October, 2010
17th Annual workshop on Software Model Checking (SPIN 2010), 27 September - 29 September, 2010
More information

ACM/IEEE 13th International Conference on Model Driven Engineering Languages and Systems NEW

October 3-8, 2010, Oslo, Norway
More information

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

4 - 6 October, 2010. Keelung, Taiwan.
More information

2010 isee User Conference NEW

October 4-6, 2010, The Westin Providence, Providence, Rhode Island, USA
More information

IFM 2010: Integrated Formal Methods 8th International Conference NEW

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

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

October 16 – 20, Reykjavik Iceland
More information

FMCAD 2010 - Formal Methods in Computer Aided Design

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

NDIA 13th Annual Systems Engineering Conference NEW

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

Requirements Days 2010 NEW

October 26 – 28, 2010, München, Germany
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

MIT Systems Engineering Advancement Research Initiative

The Systems Engineering Advancement Research Initiative (SEAri) at the Massachusetts Institute of Technology conducts collaborative research to advance the theories, methods, and effective practice of systems engineering applied to complex socio-technical systems. The group actively shares its research with the systems community through events and publications, and maintains a web-based repository with information, presentations, downloadable publications, and upcoming courses to provide timely access to ongoing and recently completed research. Current research sponsors include US government agencies, Singapore DSTA/DSO, MIT-Portugal Program, AF Human Systems Integration Office, and selected corporations.

The group's research portfolio includes socio-technical decision making, designing for value robustness, systems engineering economics, and systems engineering in the enterprises. Targeted domains include defense, transportation, critical infrastructure, and energy. Research outcomes are prescriptive approaches developed through a combination of practice-based research and theory-based research. Highly collaborative efforts with project sponsors are designed to ensure research has impact on the real-world engineering organizations. The outcomes of research are also shared with the engineering community though an annual research summit, and through MIT's Professional Short Course summer program. Evidence of the value of the work as perceived by the systems community is seen in recent recognitions including the 2009 Outstanding INCOSE Journal Paper, IEEE Systems Conference Best Paper Awards in 2008 and 2009, and the two INCOSE Best Paper Awards of 2008.

SEAri research is disseminated through various written forms, including publications, theses, presentations, and working papers.

Visit the SEAri website at http://seari.mit.edu or contact the leadership team at seari@mit.edu

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Adjunct Faculty Position - Systems Engineering

Institution: University of Maryland, Baltimore County
Location: Baltimore, MD
Category: Faculty - Engineering - Other Engineering
Posted: 02/19/2010
Application Due: Open Until Filled
Type: Part-Time/Adjunct

UMBC is currently recruiting for part-time, adjunct faculty as they are expanding their professional master's, graduate certificate, special session and non-credit training programs.

Core areas of need include:

- Systems Engineering
- Legal Issues in Engineering

More information

Arizona Western College (AWC) Builds Up Engineering Program

AWC and University of Arizona announced a partnership aimed to smooth the path to a bachelor of science in systems engineering that will be available starting in the fall of 2010.

More information

Some Systems Engineering-Relevant Websites

Systems Engineering Advancement Research Initiative (SEAri) Community

Massachusetts Institute of Technology

MIT Engineering Systems Division

ESD has a mission to transform engineering education, research, and practice through the emerging field of engineering systems; and prepare engineers to think systemically, lead strategically, and address the complex challenges of today's world, for the benefit of humankind.

MIT Department of Aeronautics and Astronautics

MIT AeroAstro prepares engineers for success and leadership in the conception, design, implementation, and operation of aerospace and related engineering systems. We achieve this through our commitment to: educational excellence; creation, development, and application of technologies critical to aerospace vehicle and information engineering; and to the architecture and engineering of complex high-performance systems.

MIT Lean Advancement Initiative

LAI is an evolving learning and research community that brings together key aerospace stakeholders from industry, government, and academia.

System Design and Management Program

Created in 1996 in response to industry's need to develop the next generation of leaders, SDM is at the forefront of graduate education at MIT. Not an MBA, SDM combines cutting-edge courses from the MIT Sloan School of Management and MIT's School of Engineering, enriching the experience with innovative distance learning, flexible matriculation options and an interdisciplinary perspective.

MIT Strategic Engineering

Strategic Engineering is the process of architecting and designing complex systems and products in a way that deliberately accounts for future uncertainty and context in order to minimize the effects of lock-in while maximizing lifecycle value.

Humans and Automation Laboratory

Research in the Humans and Automation Lab (HAL) focuses on the multifaceted interactions of human and computer decision-making in complex sociotechnical systems.

Education & Research Networks

Council of Engineering Systems Universities

CESUN was established in 2004 by universities offering educational and research programs in engineering systems. Membership includes over 30 universities in North America, Europe, Asia, and Australia. The Council provides a mechanism for the member universities to work together developing engineering systems as a new field of study

SEANET Doctoral Student Research Network

SEANET is an INCOSE sponsored network of doctoral student researchers working in the field of systems engineering and architecting.

Professional Societies

International Council on Systems Engineering

INCOSE is a not-for-profit membership organization founded in 1990 with a mission is to advance the state of the art and practice of systems engineering in industry, academia, and government by promoting interdisciplinary, scaleable approaches to produce technologically appropriate solutions that meet societal needs.

IEEE Systems Council

The IEEE Systems Council integrates activities of the Institute of Electrical and Electronics Engineers regarding aspects of multiple disciplines and specialty areas associated with the engineering of systems.

American Institute of Aeronautics and Astronautics

AIAA is the principal voice and technical society devoted to global leadership in the aerospace community.

University Collaboration Partners

USC Center for Systems and Software Engineering

CSSE is a research center at the University of Southern California aimed at evolving and unifying theories and practices of systems and software engineering.

Standards and Guides

ISO/IEC JTC1/SC7 Plenary meeting

23–28, May 2010, Niigata, Japan

Host

Information Processing Society of Japan /Information Technology Standards Commission of Japan(IPSJ /ITSCJ)

Organizer

IPSJ /ITSCJ
Organizer contact: Jacky Takahashi at: ing-sc7niigata@itscj.ipsj.or.jp

Meeting Location

Toki Messe Niigata Convention Center
Address: 6-1, Bandai-jima, Niigata-city, 950-0078, Japan

Web: http://www.tokimesse.com/english/

More Information

IEEE Reaffirms Five Software and Systems Engineering Standards

The IEEE announced that it has reaffirmed five standards related to software and systems engineering.

They are:

- IEEE 830™, "IEEE Recommended Practice for Software Requirements Specification"
- IEEE 1008™, "IEEE Standard for Software Unit Testing"
- IEEE 1061™, "IEEE Standard for a Software Quality Metrics Methodology"
- IEEE 2001™, "IEEE Recommended Practice for the Internet - Web Site Engineering, Web Site Management, and Web Site Life Cycle"
- IEEE 1233™, "IEEE Guide for Developing System Requirements Specifications"

The standards are all sponsored by the Systems & Software Engineering Committee of the IEEE Computer Society.

More information

Some Definitions to Close On

Earned Value Management (EVM) - Related Definitions

Earned value management (EVM) is a project management technique which aims to measuring project progress in an objective manner. EVM combines measurements of project scope accomplishment, schedule, and cost within a single, integrated measurement and reporting system. EVM can provide an early warning of project problems.

EVM can be implemented very efficiently for small projects by using a spread sheet. For larger projects, software support, typically provided by project management software packages, will be more appropriate.

Basic EVM measures:

- Budgeted Cost of Work Scheduled = BCWS = Planned Value = PV
- Budgeted Cost of Work Performed = BCWP = Earned Value = EV
- Actual Cost of Work Performed = ACWP = Actual Cost = AC
- Budget at Completion = BAC
- Estimate at Completion = EAC
- Estimate to Complete = ETC
- Variance at Completion = VAC

Derived EVM measures: Actual:

- Variance = Plan - Actual
- Cost Variance CV = BCWP - ACWP = EV - AC
- Schedule Variance SV = BCWP - BCWS = EV - PV
- Cost Performance Index CPI = BCWP / ACWP = EV / AC
- Schedule Performance Index SPI = BCWP / BCWS = EV / PV

Derived EVM Measures: Forecast

- Estimate at Completion EAC = BAC / CPI
- Estimate to Completion ETC = EAC - ACWP
- Variance at Completion VAC = BAC - EAC

Note: these “at completion” derived measures used to forecast “at completion” outcomes are subject to a variety of issues.

Project Performance International News

Software Engineering Course Name Change

PPI's Software Engineering - A Systems Approach 5-Day course has undergone a name change and is now named "Software Development Principles and Processes". The course outline and course content is unchanged the name change is to highlight the courses application.

More information on this course can be seen here: http://www.ppi-int.com/training/software-development-course.php

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Project Performance International Events

Systems Engineering 5-Day Courses

Upcoming locations include:

- São José dos Campos, Brazil
- Las Vegas, USA
- London, UK
- Pretoria, South Africa
- Adelaide, Australia
- Wellington, New Zealand
- Melbourne, Australia

View 2010/2011 Systems Engineering Course Schedule

Requirements Analysis and Specification Writing 5-Day Courses

Upcoming locations include:

- Melbourne, Australia
- Las Vegas, USA
- Stellenbosch, South Africa
- Adelaide, Australia

View 2010/2011 RA&SW Course Schedule

OCD/CONOPS 5-Day Courses

Upcoming locations include:

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

View 2010/2011 OCD/CONOPS Course Schedule

Software Engineering 5-Day Courses

Upcoming locations include:

- 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

- April 26 - 29, 2010 - **SSTC 2010** - Slat Lake City, UT, USA (Exhibiting)

- 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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