IW12
System Security Engineering WG
Jan 23 Workshop
(Mainly Handbook Project)

SSE-WG Charter: Goals and Scope

GOALS

Goal: Establish the responsibility for security within Systems Engineering, with effective system security accepted and practiced as a fundamental goal of system engineering.

Goal: Instigate self-sustaining cross- community involvement between systems engineering, security engineering, and system security standards.

Goal: Establish exemplar profiles of self organizing system-of-system concepts for next generation security.

Customer(s)/Stakeholder(s): Systems engineering educators, systems engineering process and standards developers, DoD systems engineering acquisition requirements developers, systems engineering leaders and managers, customers of systems that require effective security.

SCOPE

This WG will address and foster system design concepts, system engineering processes, enabling support (such as standards), and community understanding and acceptance; all relative specifically to next generation system security characterized principally as self organizing, adaptive, resilient, evolutionary, proactive, and harmonious –in at least equal effectiveness as the system-adversarial communities.

35 Attendees 23Jan2012

1.	Johann Amsenga	Eclipse RDC	amsenga@gmail.com
2.	Kristen Baldwin	DoD OSD DASD/SE	
3.	Rick Dove	Paradigm Shift International	dove@parshift.com
4.	Cheryl Garrison	Northrop grumman	cheryl.garrison@ngc.com
5.	Evelyn Hirt	Battelle at PNNL	evelyn.hirt@pnl.gov
6.	Ken Kepchar	EagleView Associates, Retired FAA	eagleview2@cox.net
7.	Oscar Leon	Lockheed Martin	oscar.j.leon@lmco.com
8.	Ron Lyells	Honeywell	ron.lyells@honeywell.com
9.	Susan MacKeen	TASC	smackeen@earthlink.net
10.	Paul Popick	DoD OSD DASD/SE & Aerospace Corp	paul.popick.ctr@osd.mil
11.	Frank Salvatore	DRC	fsalvatore@drc.com
12.	John Snoderly	Defense Acquisition University	john.snoderly@dau.mil
13.	Bob Swarz	Mitre	rswarz@mitre.org
14.	Stephen Sutton	U. of Maryland, Retired TASC	sjsutton.243@comcast.net
15.	Thomas Tenorio	White Sands Missile Range & NCI/ATA	tenoriot@gmail.com
16.	Leon Turner	Rockwell Collins	dr.leon.turner@gmail.com
17.	Marsha Weiskopf	Aerospace Corp	marsha.v.weiskopf@aero.org
18.	Kent Williams	Booz Allen Hamilton	kenneth.williams@incose.org
19.	Beth Wilson	Raytheon	beth_j_wilson@raytheon.com
20.	Jackson Wynn	Mitre	jwynn@mitre.org

Live Meeting Attendees

21.	Paulo Barroso	Raytheon	paulo.barroso@raytheon.com
22.	Art Hollows	Raytheon	Art_L_Hollows@raytheon.com
23.	Jonathan Goodnight	DoD OSD DASD/SE	jonathan.goodnight.ctr@osd.mil
24.	Neil Greenfield	AEP	ngreenfield@aep.com
25.	Randy Herbert	Raytheon	randy_herbert@raytheon.com
26.	Tom Jones	Raytheon	tom_tj_jones@raytheon.com
27.	Kenneth Lubel	Raytheon	Kenneth_S_Lubel@Raytheon.com
28.	Joseph Merkling	Harris IT	joseph.merkling@gmail.com
29.	Jeanette Moody	Raytheon	Jeanette_Moody@Raytheon.com
30.	John Molloy	Raytheon	john_molloy@raytheon.com
31.	Chris Sargent	Sikorsky	csargent@sikorsky.com
32.	Phillip Smith	Raytheon	phillip_r_smith@raytheon.com
33.	Greg Sweeney	Sikorsky	gsweeney@sikorsky.com
34.	Shirley Tseng	Tseng	shirleytseng@earthlink.net
35.	Ruben Urcuyo	Raytheon	Ruben_Urcuyo@raytheon.com

Security WG – Monday Jan 23 Agenda

08:00 Rick Dove – Introductions and opening general discussions

09:00 Paul Popick – Topic brainstorming

Current Topic Discussions and Concepts

10:00 Beth Wilson, Intro to Topic discussions and general project preparation and work-in-process

11:00 Kristen Baldwin & Paul Popick: Criticality Analysis

12:00 Lunch

13:15 Greg Sweeney: Embedded Systems

13:45 Ken Kepchar: Security Architecture and Security Risk Analysis

14:15 Thoughts on general nature of 2013 INSIGHT essays and IS13 papers for SE/HB compatibility

14:45 Break

Organizational discussion sessions on the nature and structure of the project:

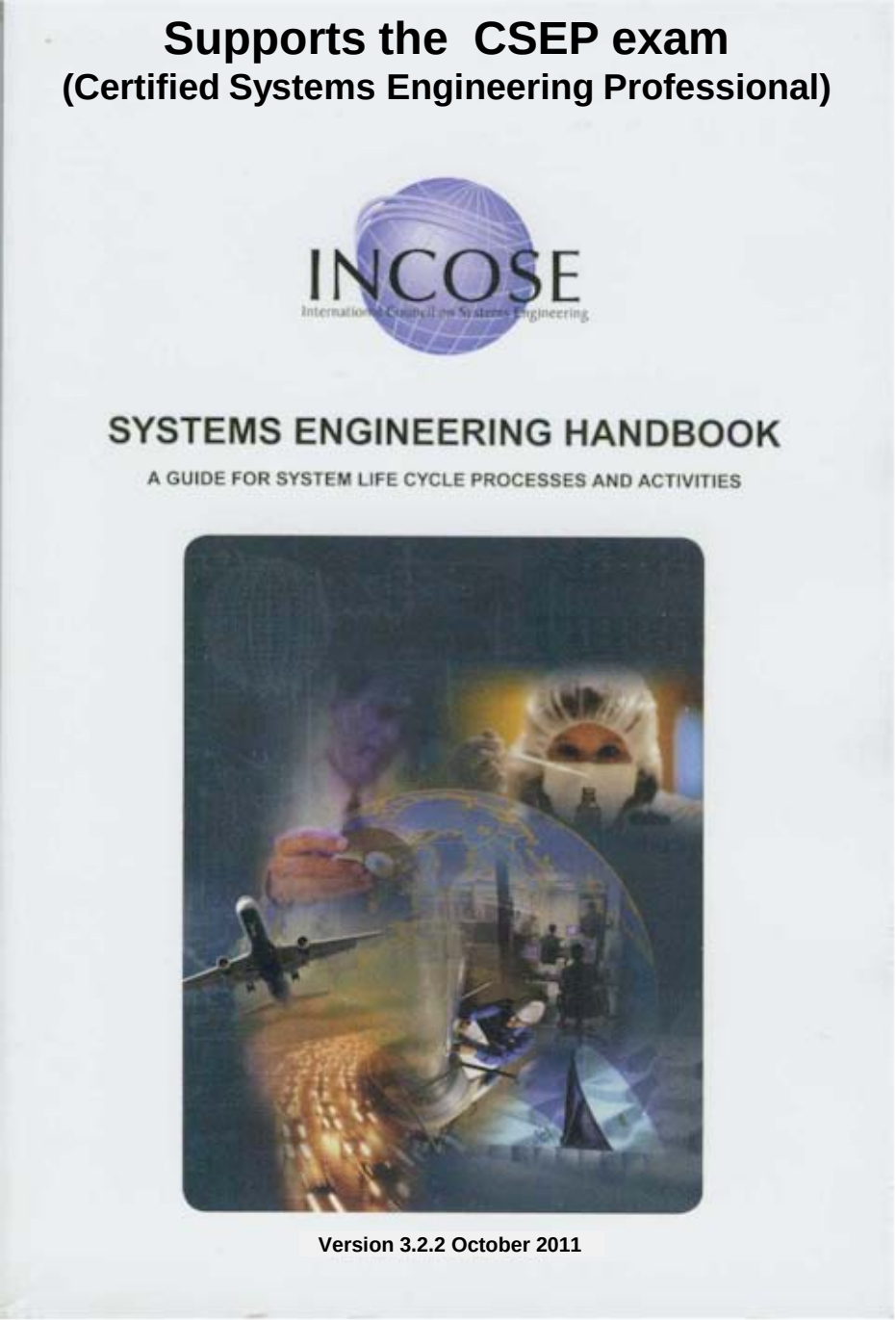
15:00 Kevin Forsberg: INCOSE processes, requirements and guidance for Handbook additions

15:30 Preliminary planning for Handbook 2012 wiki interaction and consideration for INSIGHT Q2 2013 and IS13 papers

16:30 Standards, Johann Amsenga, Chair South African National Committee on Security Standards and Delegate to SC27
- Introduction to ISO and the development of International Standards
- Introduction to SC 27, the ISO committee responsible for Information security standards

17:00 Adjourn

Supports the CSEP exam
(Certified Systems Engineering Professional)



4. Technical Processes

- 4.1 Stakeholder Req. Def. Process
- 4.2 Requirements Analysis Process
- 4.3 Architectural Design Process
- 4.4 Implementation Process
- 4.5 Integration Process
- 4.6 Verification Process
- 4.7 Transition Process
- 4.8 Validation Process
- 4.9 Operation Process
- 4.10 Maintenance Process
- 4.11 Disposal Process
- 4.12 Cross-Cutting Technical Methods

5 Project Processes

- 5.1 Project Planning Process
- 5.2 Project Assessment & Control Process
- 5.3 Decision Management Process
- 5.4 Risk Management Process
- 5.5 Configuration Management Process
- 5.6 Information Management Process
- 5.7 Measurement Process

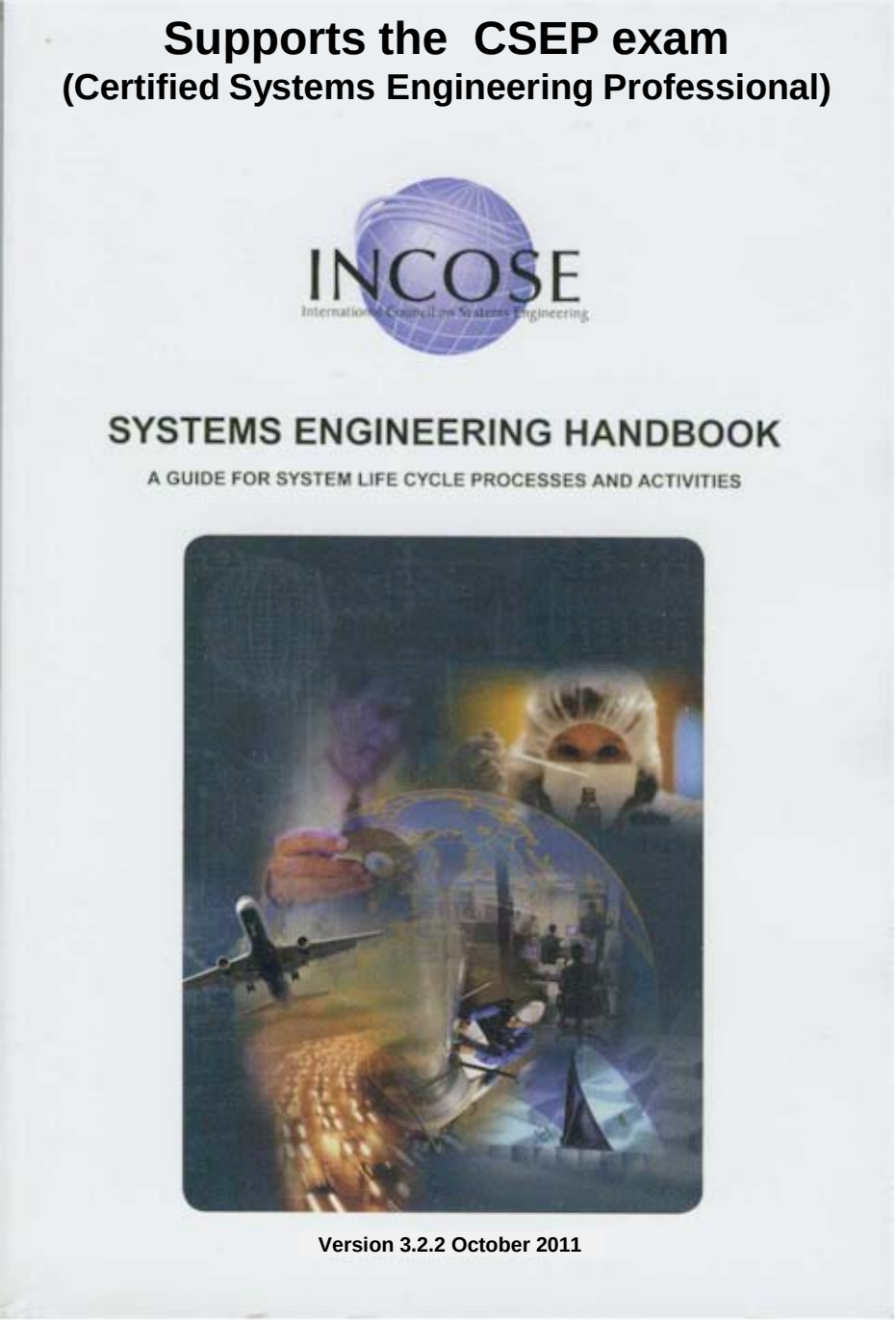
6 Agreement Process

- 6.1 Acquisition Process
- 6.2 Supply Process

7 Organizational Project-Enabling Processes

- 7.1 Life Cycle Model Management Process
- 7.2 Infrastructure Management Process
- 7.3 Project Portfolio Management Process
- 7.4 Human Resource Management Process
- 7.5 Quality Management Process

Supports the CSEP exam
(Certified Systems Engineering Professional)



Security is missing !

Program Protection Plan Outline & Guidance

• VERSION 1.0 •

• July 2011 •

Deputy Assistant Secretary of Defense

Systems Engineering

1.0. Introduction – Purpose and Update Plan

- Who will use the PPP?
- What is the plan to align Prime Contractor Program Protection Implementation Plan(s) (PPIP) with this PPP if they are written? What aspects of Program Protection will you ask the contractor to do?
- Summarize how the PPP will be updated and the criteria for doing so to include:
  - Timing of PPP updates (e.g. prior to milestone, prior to export decision, following Systems Engineering Technical Review),
  - Update authority
  - Approval authority for different updates

1.2. Program Protection Responsibilities

- Who is responsible for Program Protection on the program? The chain of responsibility for all aspects of Program Protection should be clear.
- Include contact information for Program Protection leads/resources/SMEs. What aspects are each of these resources responsible for?
- For every countermeasure being implemented, identify who is responsible for execution. Include relevant PEO/SYSCOM contacts as well.

Table 1.2-1: Program Protection Responsibilities (mandated)(sample)

Title/Role	Name	Location	Contact Info
Program Manager			
Lead Systems Engineer			
Program Protection Lead			
Anti-Tamper Lead			
Info. Assurance Lead			
Software Assurance Lead			
SCRM Lead			
…			

Alignment Considerations

Compatibility with SE governing documents must be considered.

What documents relevant to security issues associated with SE processes should be considered?

What nations have documents that should influence what the handbook addresses and how it addresses?

What domains in addition to military acquisition are relevant.

What standards must be considered?

Are we constrained to strict compatibility, or can we deviate with responsible justification?

Content compatibility, when appropriate, with SE-influential and SE-governing documents should be maintained with cognizance.

Form compatibility with the INCOSE handbook, enabling eventual process integration, should be maintained.

Handbook 3.3 Update Schedule

From Kevin Forsberg 27Jan2012

We plan on two iterations of the outline before the July IS in Rome.

The outline we first develop and release at the end of February will be a starting point to create an annotated outline, with inputs solicited from all Working Groups.

What I expect back from the Working Groups in March/April is input to the evolving annotated outline, with a "mature" annotated outline to be distributed in mid-May, so we can have a review by and further input from the WG teams before IS 2012 in July.

I will create a schedule next week covering the February to July time frame.

July 2013 | Volume 16 Issues 2

INCOSE International Council on Systems Engineering

INSIGHT

A PUBLICATION OF THE INTERNATIONAL COUNCIL ON SYSTEMS ENGINEERING

What's Inside

11 or so ~2,000 word essays written by WG members and associates

SPECIAL FEATURE

The Buck Stops Here: *Systems Engineering's Responsibility for System Security*

Workshop Discussion

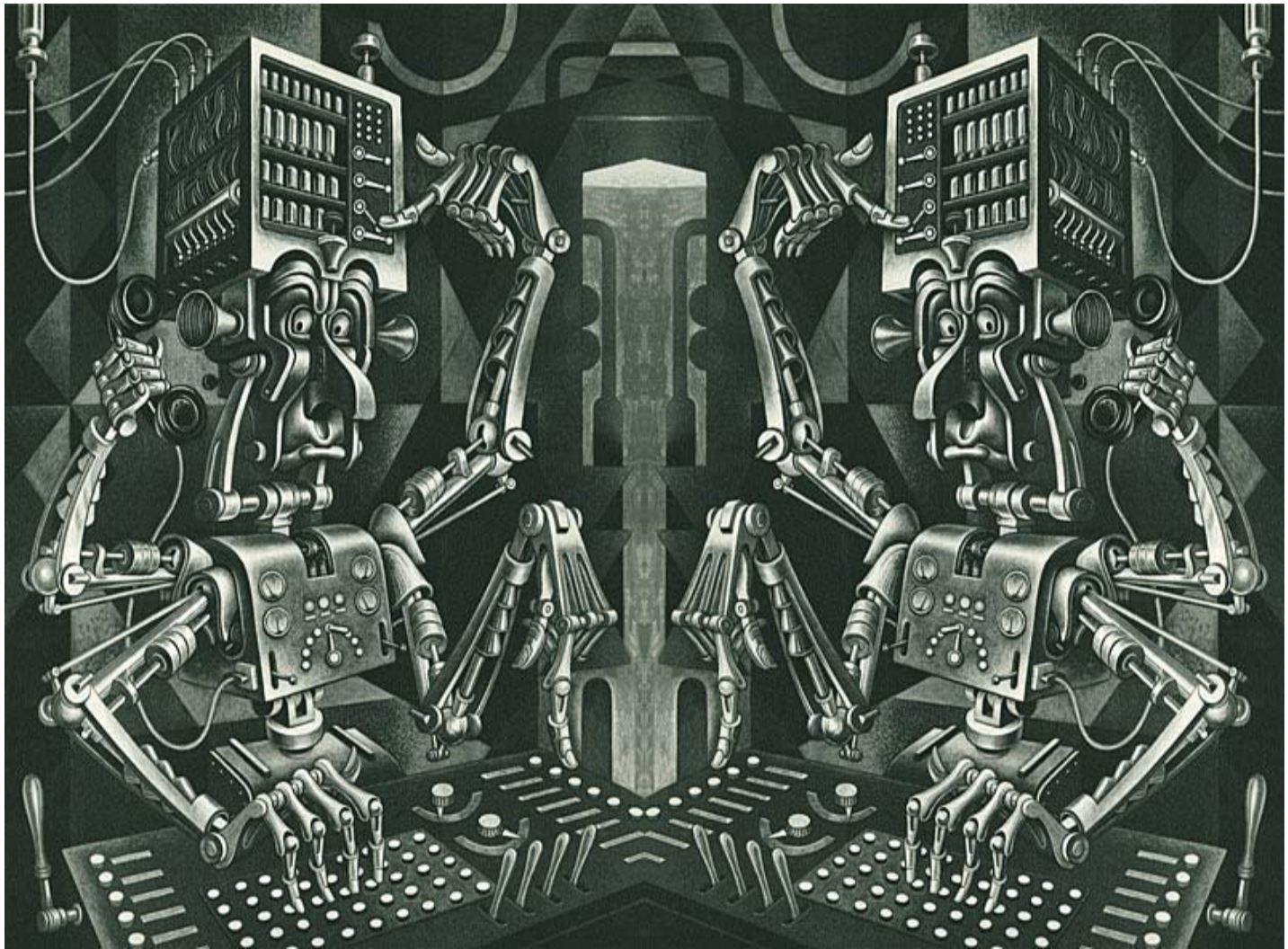
Work Products and Approach

- Immediate Handbook 3.3 Interaction
  - Investigate INCOSE Wiki capability: Joseph Merkling & Oscar Leon by Feb 1
  - Set up an appropriate wiki and populate it with Kevin Forsberg March-release outline
  - Publish wiki 3.3 outline engagement strategy: Steering committee Rick Dove, Paul Popick, Beth Wilson
  - Two iterations on 3.3 outline wiki and consolidation by IS13
  - HB section authoring on approved outline activities icompleted by year end 2012

- INSIGHT 2013Q2: “The Buck Stops Here: SE Responsibility for System Security”
  - 2,000 words x 10 essays plus overview essay aligned with theme
  - Respond to call for authors (with IS2013 call for papers) and provide abstract
  - Provide first draft before IW2013
  - Review essays at January IW2013 meeting
  - February notice with comments and acceptance
  - Final draft due from authors April 15, 2013
  - Final draft of overview paper May 15, 2013

- IS2013 (Philadelphia, PA)
  - 15 pages maximum, 6 papers/track (can do a double track)
  - IS2012 decide theme for call (same as INSIGHT theme?)
  - Papers due early November

ASTE-WG at IW12
(Autonomous Systems Test & Evaluation)
Systems of the Third kind
Essay Reviews – Jan 22, 2012



Call for Essays
INCOSE INSIGHT, July 2012, Theme:

Systems of the Third Kind: Distinctions, Principles and Examples

We choose to categorize systems of the first kind as deterministic, of the second kind as probabilistic, and of the third kind as non-deterministic. Systems of the third kind include variations of currently popular labels such as chaotic, complex-adaptive, autonomous, resilient, sustainable, agile, and human activity. They move among us already: cars that drive themselves in urban environments, helicopters that land autonomously, lethal weapons that decide when and where to shoot, unmanned aircraft in the national airspace. Some work alone, others are being taught to work in packs and swarms. Emergent behavior is expected, with consequences, and with virtually no current system engineering guidance.

REVIEW ORIENTATION

Theme – Systems of the Third Kind: Distinctions, Principles and Examples

We are on a mission!

Purpose: These essays are intended to spur interest and urgency within the systems engineering community for exposing and addressing the largely unaddressed system engineering issues of non-deterministic systems. The intent is to launch a foundation of thought for guiding the incorporation of non-deterministic system engineering in the system engineering body of knowledge.

General guidance

INCOSE is a Systems Engineering association. Essays must speak effectively and meaningfully to systems engineers, and not be directed exclusively to software engineers with specialty vocabulary and knowledge.

These essays are expected to appeal to a broad system engineering audience, ranging across any and all aspects of non-deterministic systems engineering.

Evaluation Criteria:

1. Fit to the theme, and meaningful to SEs and SE issues.
2. Addresses the purpose (above).
3. Publishability: writing quality, consistency, comprehensible, about 2,000 words.

Submissions: These are essays, not journal articles. Approximately 2000 words is appropriate, independent of graphics (encouraged). The style guide councils against abstracts, and introductions and conclusions that are redundant with essay text, suggesting that you will be speaking to fellow INCOSE members in essay style – so be direct, and use the first person.

Reviewers: Useful comments and suggestions will keep the purpose in mind, and note how well the essay supports that purpose and/or might achieve that purpose better.

Essay Submission Status as of Jan 22

Drafts received

1. **Jack K. Horner, A Test-of-Design Rubric for Autonomous Systems**
2. **John Clymer, Simulation-Based Engineering of Context-Sensitive Systems**
3. **Steve Krane, System Development Progress Disambiguation**
4. **Doug McDavid, Determinism and Determination in Socio-Technological Systems**
5. **Jack Ring, Systems of the Third Kind Field of Discourse**
6. **Jack Ring, T&E of S(3)**
7. **Jack Ring & Tom Tenorio, SE of T&E of S(3)**
8. **David Ulman, Decisions of the Third Kind**
9. **Gabriele Harrer, The Biocybernetic Approach as a Basis for Planning and Governance**

Drafts in Progress

1. **Rick Dove, Conscience & Righteousness Embedded Behavior Monitors**
2. **Bill Hock and Donya He, Improving Defense System Reliability**
3. **Various potential authors among 16 SO-SoS students**

New Essays Being Pursued

1. **Georgia Tech**
2. **MIT**
3. **Steve van Horn – Use Case**

12 Attendees 22Jan2012

On-Site Meeting Attendees

1.	Rick Dove	Paradigm Shift International	dove@parshift.com
2.	Jack Horner	Retired SAIC	jhorner@cybermesa.com
3.	Bob Kenley	MIT & INCOSE INSIGHT	bob.kenley@kenley.org
4.	Ron Lyells	Honeywell	ron.lyells@honeywell.com
5.	Dimitri Mavris	Georgia Tech	dimitri.mavris@ae.gatech.edu
6.	Thomas Tenorio	White Sands Missile Range, NCI/ATA	tenoriot@gmail.com
7.	Stephen van Horn	Honeywell	stephan.vanhorn@honeywell.com

Live Meeting Attendees

8.	Bill Hock	DRS C3&A	william.hock@drs-c3a.com
9.	Steve Krane	Parker	skrane@parker.com
10.	Doug McDavid	DougMcDavid Enterprises	dougmcdavid@gmail.com
11.	Jack Ring	Kennen Technologies	jring7@gmail.com
12.	David Ullman	Robust Decisions	ullman@robustdecisions.com

Sunday Jan 22 – Room 4145
Q2 2012 INSIGHT Essay-Draft Reviews

AGENDA

Times are approximate.

Essay authors provided an overview of their essays.

Attendees provided comment and suggestion for final drafts.

Essay handouts at workshop, and/or download from: www.parshift.com/s/IW12-ASTE-WgDrafts.zip

10:00 Opening and Positioning – Rick Dove
10:30 Jack K. Horner, A Test-of-Design Rubric for Autonomous Systems
11:00 Jack Ring, Systems of the Third Kind Field of Discourse
Jack Ring, T&E of Systems of the Third Kind
Jack Ring & Tom Tenorio, SE of T&E of Systems of the Third Kind
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15:00 Break
15:15 Steve Krane, System Development Progress Disambiguation
15:45 John Clymer, Simulation-Based Engineering of Context-Sensitive Systems
16:15 Rick Dove, Conscience & Righteousness Embedded Autonomous Behavior Monitors
16:45 Wrap Up with Next Steps
17:00 Adjourn

Next Steps – Toward May 15 INSIGHT Submission

Authors:

1. **All authors will receive written consolidated comments by Feb 28, sooner if possible.**
2. **All authors will receive INCOSE INSIGHT style manual and citation guide by Feb 28 for final draft submission, due March 31.**

Review Committee (Ring, Tenorio, Horner, Dove):

1. **Review Gabriele Harrer's essay**
2. **Send all review comments to Rick by Monday Feb 13**
3. **Rick: Consolidate written feedback and provide with style manual to authors by Feb 28**

Open suggestions made at workshop

1. **Glossary development would be a good project to start**

INCOSE IW 2012 Working Group Summaries

Sharissa Young, CSEP
Enchantment Chapter Meeting
February 8, 2012

INCOSE Working Groups

- 39 working groups
- Divided into 4 Domains
  - Knowledge

- **Attendees to IW12 : 331** (334 at IW11, 303 at IW10)
- **Attendees to MBSE Workshop : 170**
- **Countries represented : 15**
- **Nb of groups** (30 WG + committees / boards) **: 58**
- **Nb of meetings : 109**

Knowledge Domain

- Architecture - *C. Dickerson / M. Wilkinson / D. Mavris* (32)
- Competency - *Eileen Arnold / Rashmi Jain* (40)
- Complex Systems - *Sarah Sheard* (65)
- *Decision Analysis - *Franck Salvatore* (16)
- Intelligent Entreprises - *Steve Else*
- Knowledge Management - *Kevin Forsberg* (22)
- *Process Improvement - *John Clark* (2)
- Resilient Systems - *Scott Jackson*
- *Systems Engineering Effectiveness - *Joe Elm* (2?)
- *Systems Science - *James Martin* (100+)
- System of Systems – *Alan Harding* (new, N/A)
- *Training - *John Clark* (3)

Highlights of Knowledge Domain

- Decision Analysis was fairly new and not very active yet, so high ability to impact the WG
- Process Improvement WG was focused on partnering with related professional societies (IEEE, SSTC, etc.)
- SE Effectiveness – with Eric Honour as co-chair, they will launch a survey to collect data on SE impacts to develop business case for SE
- System Science is very active and engaged
- Training is developing CSEP & SE tutorials

Process Domain

- Affordability - *Joe Bobinis* (42)
- Cost Engineering - *Ed Casey*
- Human Systems Integration - *Jennifer Narkevicius* (90)
- In-Service Systems – *Marcel van de Ven* (24)
- *Lean Enabler for Program Management – *Josef Oehmen* (105)
- Lean Systems Engineering - *Bo Oppenheim / Deb Secor* (206)
- Life Cycle Management- *Jan de Liefde*
- Measurement - *Paul Frenz* (48)
- Object-Oriented SE Method - *Howard Lykins* (16)
- Reliability Engineering - *Albertyn Barnard* (30)
- Requirements - *Kathy Baksa* (N\A)
- Risk Management - *Jack Stein / Bob Parro* (73)
- System Safety Integration - *Katri Hakola* (17)
- Systems Security Engineering - *Rick Dove* (50)
- *Verification & Validation - *Ben Mancuso* (TBD)

Highlights of Process Domain

- Lean SE has imitated a successful teaming effort with PM groups
- Verification and Validation is reorganizing to include Test and Evaluation

Industry Domain

- *Biomedical – *Melissa Masters / Meaghan O'Neil* (139)
- *Infrastructure – *Alain Kouassi* (46)
- Net-centric Operations – *John Hsu* (97)
- SE in VSME – *Joe Marvin* (105)

Highlights of Industry Domain

- Biomedical is a fast-growing INCOSE group
- Infrastructure recently published a Guide to apply SE to Construction Projects

Technology Domain

- Autonomous System Test & Validation – *Jack Ring* (47)
- *Tools Database – *Randy Bullard* (5)
- Tools Integration & Interoperability – *John Nallon* (28)

- **Highlights of Technology Domain**
  - Tool Database
    - >1600 entries
    - http://www.incose.org/practice/techactivities/wg/tools
    - **Requirements Management (33 tools with vendor responses)**
    - **Systems Architecture (server currently down)**
    - **Measurement (3 tools)**
    - **General (searchable database with 1425 tools entered)**

Government Domain

- Anti-terrorism International – *Bill Mackey* (20)
- Defense Systems – *Karl Geist*
- Global Earth Observation System of Systems – *Larry McGovern* (4)
- Power and Energy Systems – *Ray Beach* (42)
- Space Systems – *Bjorn Cole* (200)
- Transportation – *Anne O'Neil / Duncan Kemp* (130)

- **Highlights of Transportation Domain**
  - **Transportation WG is very active, mostly rails represented, but some new auto participation from active WG outreach efforts**

Academia Domain

- *Motor Sport – *Jack Ring / Bill Mackey* (30)

- **Highlights of Academia Domain**
  - Motor Sport WG Charter:

    to accelerate learning regarding systemics and systems engineering principles, practices and methodologies.

Initiatives

- MBSE
  - MBSE Chair & SE Vision – *Sandy Friedenthal*
  - Communications – *Ray Jorgensen*
- Standards
  - Standards Initiative – *Ken Zemrowski*

- **Initiatives Highlights**
  - 2-day MBSE tutorial/workshop had 170 participants
  - http://www.omgwiki.org/MBSE/doku.php
  - MBSE survey: http://www.surveymonkey.com/s/mbse_survey
  - All presentations at: http://www.omgwiki.org/MBSE/doku.php?id=mbse:incose_mbse_is_2012

INCOSE IW 2012 MBSE Workshop Summary

Sharissa Young, CSEP

Enchantment Chapter Meeting

February 8, 2012

IW2012 MBSE Workshop Summary

- MBSE Chair & SE Vision – Sandy Friedenthal
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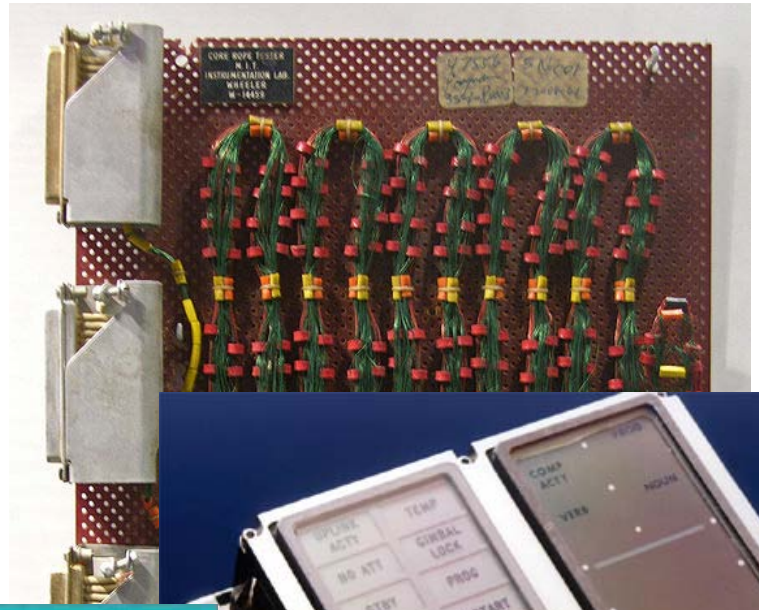
Apollo Moon rockets vs. Gift Cards

Accelerating complexity…

- Apollo Guidance Computer (1966)
  - 1st IC-based computer
  - 2k core, 36k ‘rope’ memory
  - 11.72 micro-second cycle
  - 55 Watts
  - 70 lbs
  - 24” x 12.5” x 6.5”
  - $$$$$$$$
- Hallmark Card (today)
  - 256mb+ memory
  - ~2 ghz
  - 1900 mAh (2 yrs)
  - .085 oz
  - 1” x 1” x .25”
  - .$ <$1



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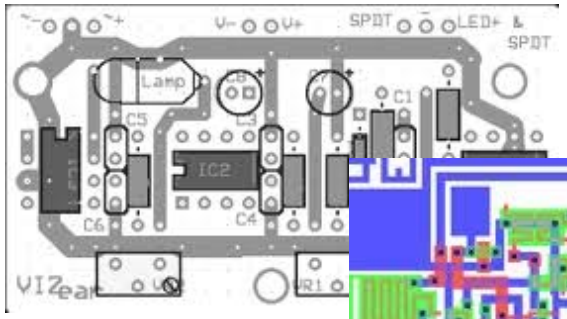
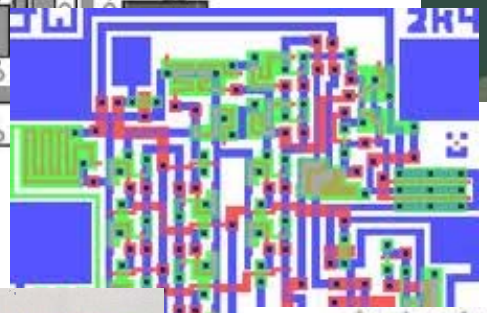
Documents





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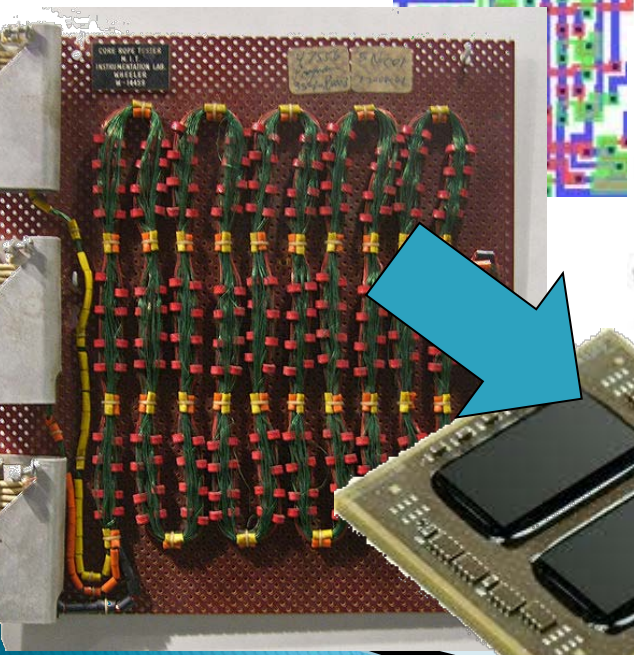
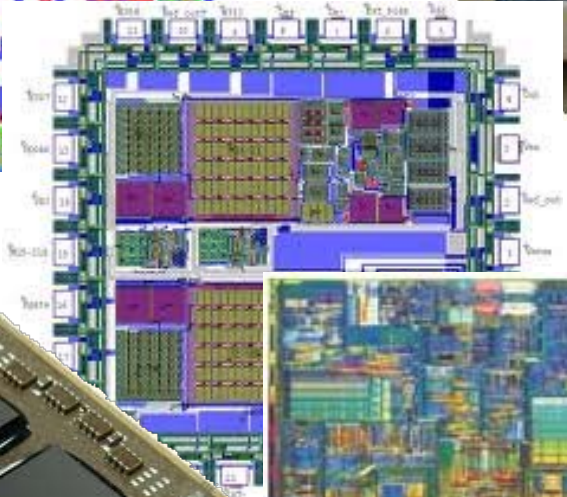
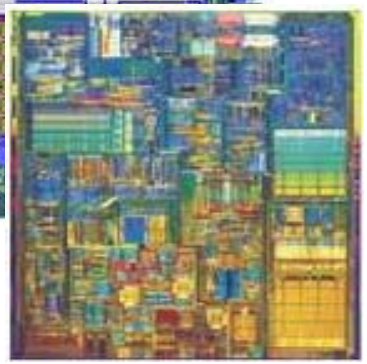
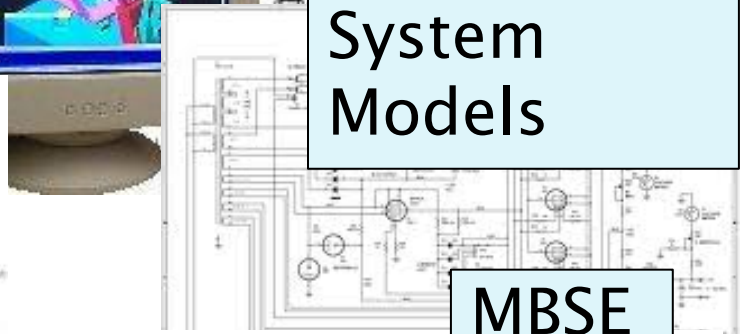
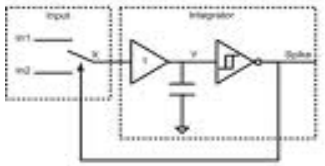


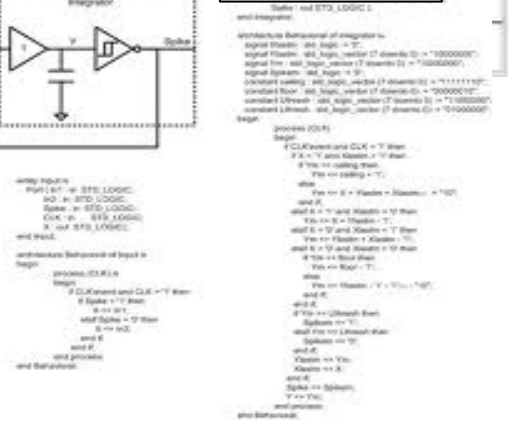






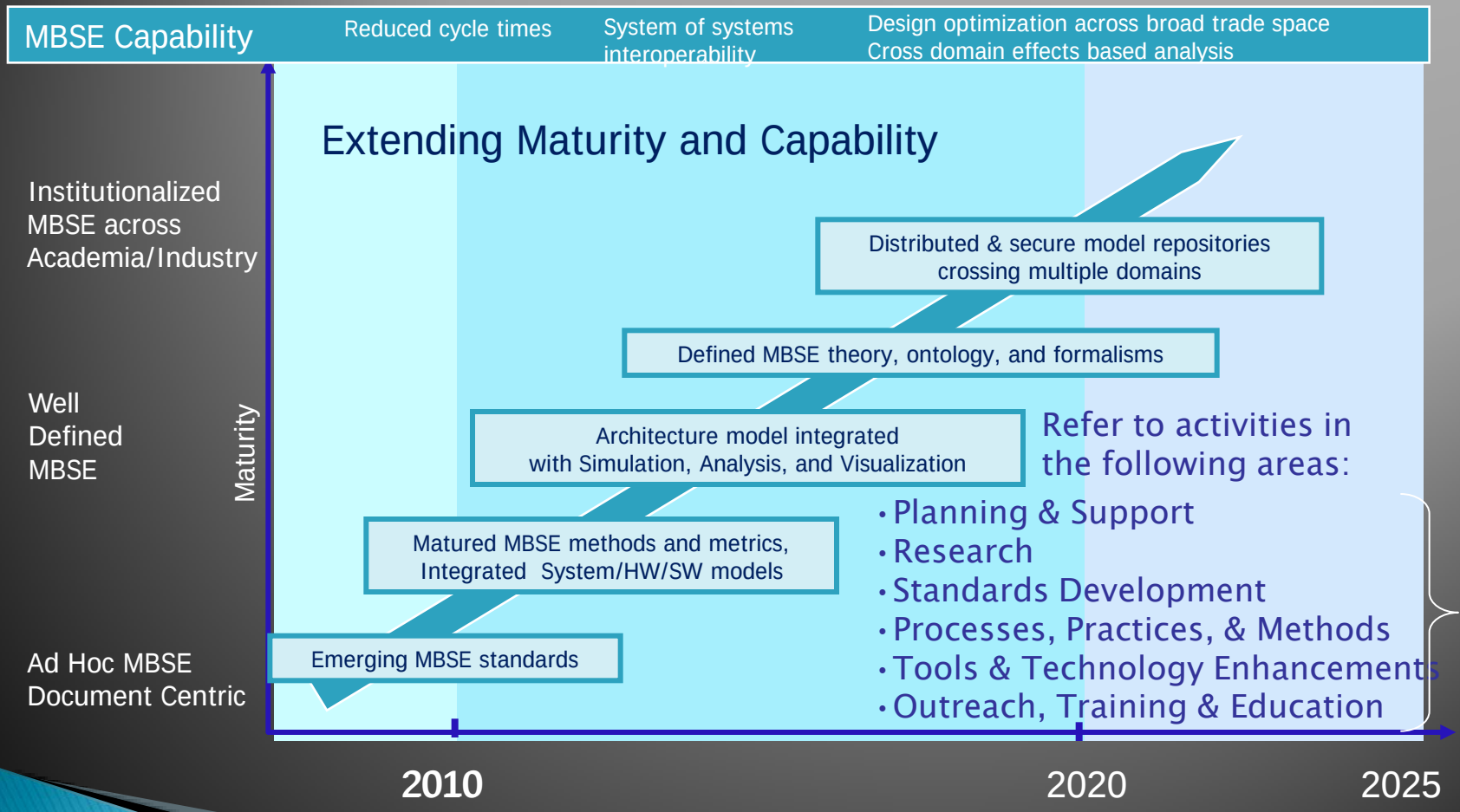
Disconnected System Models





MBSE

INCOSE MBSE Roadmap



MBSE Initiative Forums

- MBSE Webinars
  - 10 webinars in 2011
  - Average session attendance = 27
- MBSE Wiki
  - http://www.omgwiki.org/MBSE/doku.php
  - Populated by MBSE Activity and Challenge Teams
  - Provides open forum to foster industry collaboration
- MBSE Track at IS 2011
  - Papers, Tutorials, Panel
- MBSE Workshop at IW

MBSE Leadership Team

Management

- Chair Mark Sampson
- Co-Chair Sandy Friedenthal
- Webinars and Communications - Ray Jorgensen

Challenge Teams

- Biomedical Modeling Steve Corns
- Modeling and Simulation Interoperability Russell Peak
- Space Systems Modeling Chris Delp
- Telescope Modeling Robert Karban

Activity Teams

- MBSE Usability Scott Workinger
- Methodology and Metrics John Watson
- Model-Based Testing – Frank Alvidrez (NEW)
- Model Management Joe Bedocs
- Modeling Standards Roger Burkhart
- Ontology Henson Graves
- System of Systems/Enterprise Modeling Ron Williamson

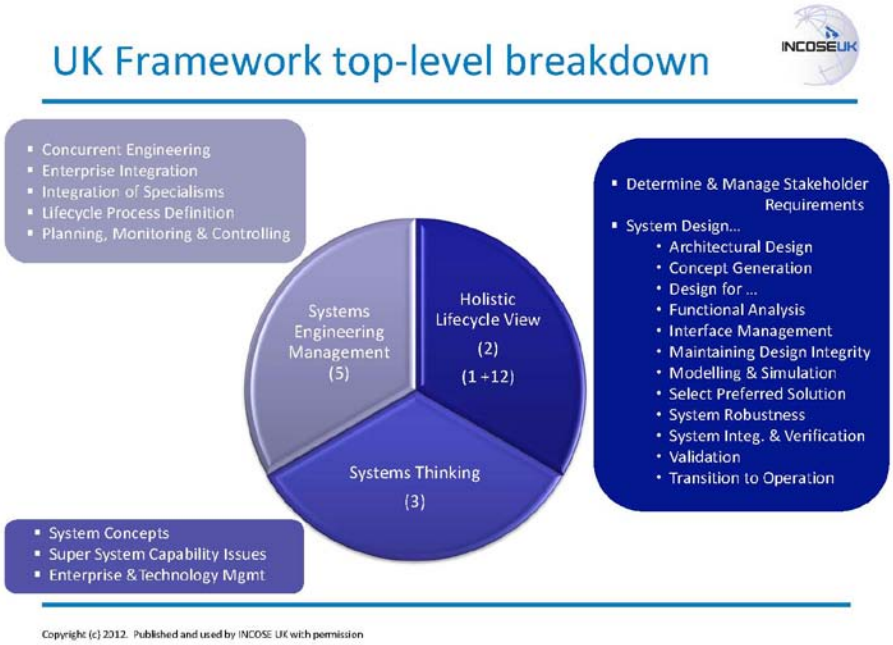
Heidi Hahn reporting

The Competency Working Group (CWG) met for two half-day sessions on January 23-24 at the IW. My report starts with a disclaimer: I wasn't there! The combination of the time difference and technical issues with LiveMeeting experienced by the folks on the ground in Jacksonville made my participation spotty. This report is cobbled together from information that I was able to glean during my remote phone-only participation as well as from a later review of materials provided by the presenters. Any inaccuracies are purely mine, and I apologize for them in advance!

Eileen Arnold, chair of the CWG, kicked the session off with an introductory presentation that reviewed the charter and planned work for the group, as well as some of the aspects of competency assessment that the group has been considering. She reported that there was consensus within the Corporate Advisory Board (CAB) that the development of a SE competency framework was a good idea, and passed along some guidance from the CAB. Among the most notable was that the competency framework must be simple, objective and credible, and based on a defined Body of Knowledge (BoK). Eileen also discussed CWG interface priorities, noting that ongoing engagement with the CAB, the G2SEBoK/BKCASE initiative, and the PMI-INCOSE Alliance Team (because of the CWG's interest in SE-PM interface competencies) were the highest priorities. In support of the latter, Eileen was invited to join the Alliance Team. John Thomas, representing the Certification Advisory Group (CAG), then discussed areas for focus for the CWG. These are: (1) the system engineer; (2) the system engineering enterprises that employ system engineers; and (3) the system thinking population who do not recognize they are doing system engineering and the enterprises that employ them.

The remainder of the meeting was devoted to presentations on various competency frameworks, distinctions between individual competencies and organizational competencies, and detailed discussions about specific competencies, including systems thinking and social capabilities, persuasion and influence, and intuitiveness. Ian Presland gave an overview of the INCOSE UK Systems Engineering Competencies Framework. One of Ian's slides, which shows three top-level competency areas supported by 10 underlying competencies, is provided below (used with permission). The UK Framework also posits four increasing levels of competence: awareness, supervised practitioner, practitioner, and expert. Ian noted that the UK SE Framework is just a common starting point that organizations can adapt to their own terminology and ways of working.

Joe Kasser described some of his recent efforts at benchmarking competency models. He looked at nine SE-related competency models, including the INCOSE Certified Systems Engineering Professional (CSEP) examination and the INCOSE UK SE Competencies Framework. All of the competency models address the SE knowledge domain as well as cognitive characteristics (systems thinking, critical thinking) and individual traits (leadership, communications, ethics, etc.), and some (notably NASA, JPL, and MITRE) also address the problem, solution, and implementation domains.



My presentation explored the notion that SE process competency is the bridge between the individual practitioner and the enterprise. My assertion, based on a review of the literature and our experiences here at LANL in implementing SE within the enterprise, is that there must be congruence between the competence of the individual SE and of the SE enterprise if either is to succeed. That congruence comes in the ability of the organization to instantiate SE processes as the way of doing engineering work and in the ability of the individual SE to execute and manage the processes (among other traits) – both the enterprise and the individual must have process competency!

Wiljeana Glover, Donna Rhodes, and Heidi Davitz (a lot of Heidis in this WG!) noted that social characteristics such as trust, confidence, and voice, and systems thinking are often considered to be less important than technical capabilities. Academic and practitioner resources from various fields, however, have found that systems thinking and social capabilities have a significant impact on performance in work systems. The presenters asserted that, as technical experts (e.g., systems engineers) increasingly work in complex team-oriented and cross-functional settings, individual and team interpersonal traits and individual and collaborative systems thinking become more critical. MIT is sponsoring a knowledge exchange event on this topic on April 10. Information can be obtained by emailing sjbenson@mit.edu.

The role of persuasion and influence in enterprise SE was the subject of Duncan Kemp's talk. He stated that the quality of the SE effort is just one factor in project success. Good influencing skills are also critical if SEs are to be effective. Duncan asserted that successful SEs spend more time persuading people of the right approach to take as they do "doing engineering." He gave two key tips to influencing: (1) focus on what matters to key people and (2) build rapport with people by treating them *as they would like to be treated* [emphasis his].

Finally, Rashmi Jain discussed intuitiveness and its impact on SE performance. The majority of the presentation focused on defining intuition, comparing experiential vs. rational information processing systems and noting that intuition is how we make trade-offs between accuracy and speed in decision making, and providing the results of intuition results in various domains showing that intuitive information processing increases organizational performance. The bad news is that Nuclear and Aeronautical Engineers are more intuitive than Industrial and Systems Engineers (huh?). The good news is that judgmental competencies can be developed and strengthened through focused, repetitive practice with domain-relevant schemas – so get busy, folks!

Information about the CWG can be obtained by contacting Eileen Arnold at eparnold5@aol.com or me at Hahn@lanl.gov.