1962

Something Wicked This Way Comes …

SE Responsibility for System Security

INCOSE Enchantment Chapter

12 September 2012

Rick Dove

1962

Abstract: Something momentous is happening: INCOSE recognition that system security is the responsibility of Systems Engineering is acknowledged – the next version of the Handbook will make this clear in its mid-2013 publication. That is simply a door opened – now the real work begins. What will the Handbook say? How will the responsibility be socialized, accepted, and deployed? How is effective System Engineering and Security Engineering engagement characterized? How will the SEBoK (Systems Engineering Body of Knowledge) support this responsibility? This presentation will review work in planning and process, including the logic and nature of SE responsibility; text to be distributed throughout the Handbook; a new System Security Engineering section 9.16; a call for INSIGHT 2013Q2 essays themed: The Buck Stops Here; a multi-session security track at IS13 call for papers; the NSA/NIST Systems Security Engineering document-in-process; the DoD Program Protection Plan; the IEEE Smart Grid Vision Project cyber-security work-in-process; and a formative-stage INCOSE Agile Systems Engineering working group with implications for systems security. Invitations for involvement are open.

1962

“A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons:

incomplete or contradictory knowledge,

the number of people and opinions involved,

the large economic burden, and

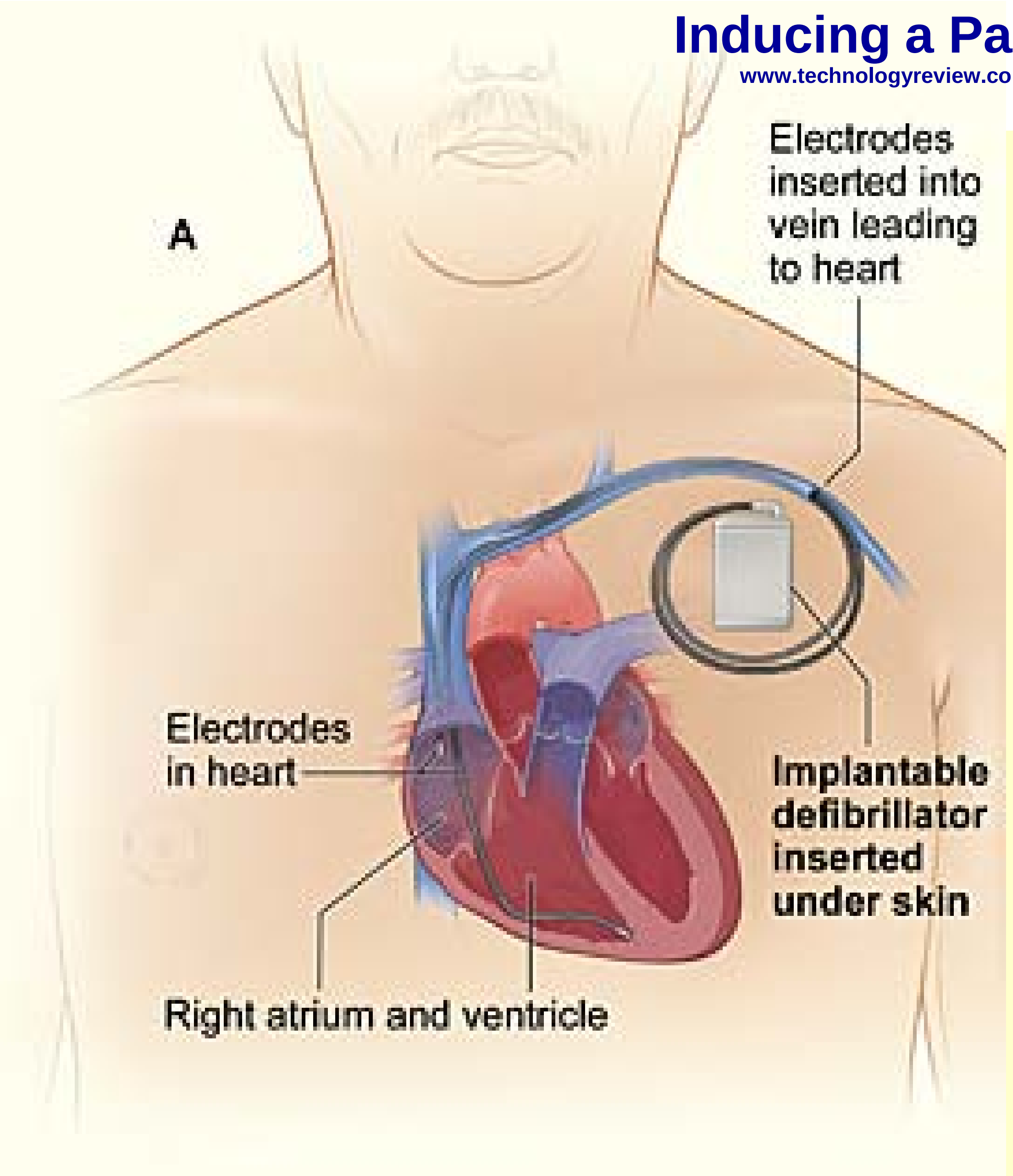
the interconnected nature of these problems with *other* problems.

From: *Wicked Problems: Problems Worth Solving* by Jon Kolko, Austin Center for Design, 2012
www.ssireview.org/articles/entry/wicked_problems_problems_worth_solving

NEVADA
001
Google
self-driving car

Inducing a Pacemaker Heart Attack

www.technologyreview.com/TR35/Profile.aspx?TRID=760&Cand=&pg=1

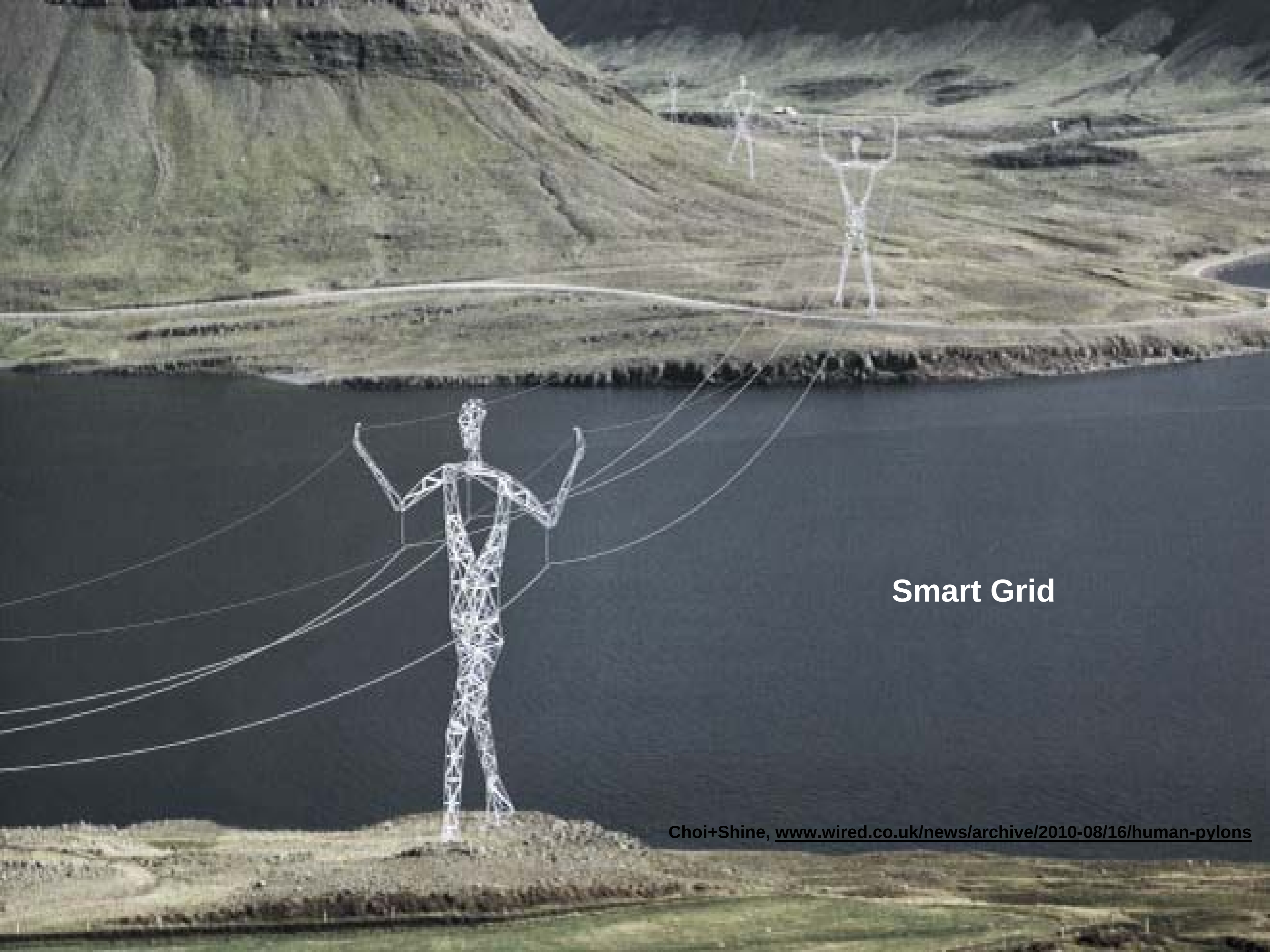

A
Electrodes inserted into vein leading to heart
Electrodes in heart
Implantable defibrillator inserted under skin
Right atrium and ventricle

Fu's software radio was capable of completely reprogramming a patient's ICD in his or her body.

… able to instruct the device not to respond to a cardiac event…

…and tell the defibrillator to initiate its test sequence--delivering 700 volts to the heart …

…whenever they wanted.



Smart Grid

Choi+Shine, www.wired.co.uk/news/archive/2010-08/16/human-pylons

IEEE Spectrum
Counterfeit Chips on Rise
Celia Gorman / June 2012

http://spectrum.ieee.org/computing/hardware/counterfeit-chips-on-the-rise

Making semiconductors is a big business—and so is counterfeiting them.

In 2011, over 1300 counterfeit incidents were reported from around the world. That's more than quadruple the number reported in 2009.

The fear is that these counterfeits—including components falsely labeled as military grade—will fail more quickly than the parts they're standing in for.

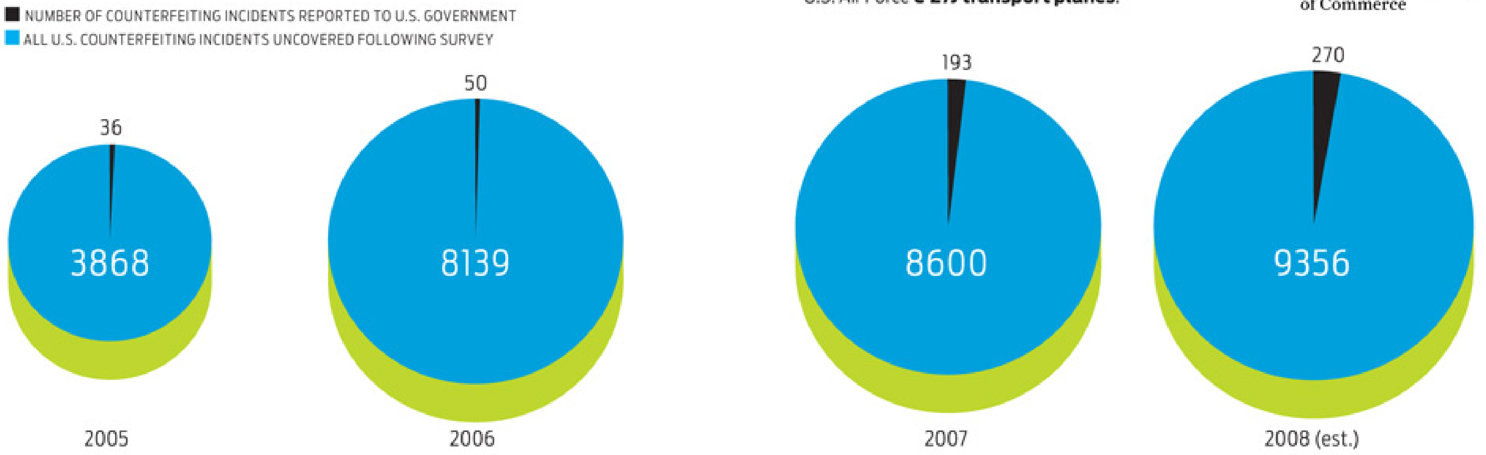
The National Defense Authorization Act for Fiscal Year 2012 [PDF], aims to fight counterfeiting by requiring government contractors to track and report counterfeits and to be held accountable for replacement costs.

A Bigger Problem Than It Seemed

Companies don't usually report counterfeit chips to the U.S. government when they find them. A mandatory survey conducted by the U.S. Commerce Department in 2009 showed that less than 3 percent of incidents were reported in 2008.

As part of the survey, counterfeit chips have been found in the U.S. Navy's **Seahawk helicopters**, Boeing **Poseidon jets**, and U.S. Air Force **C-27J transport planes**.

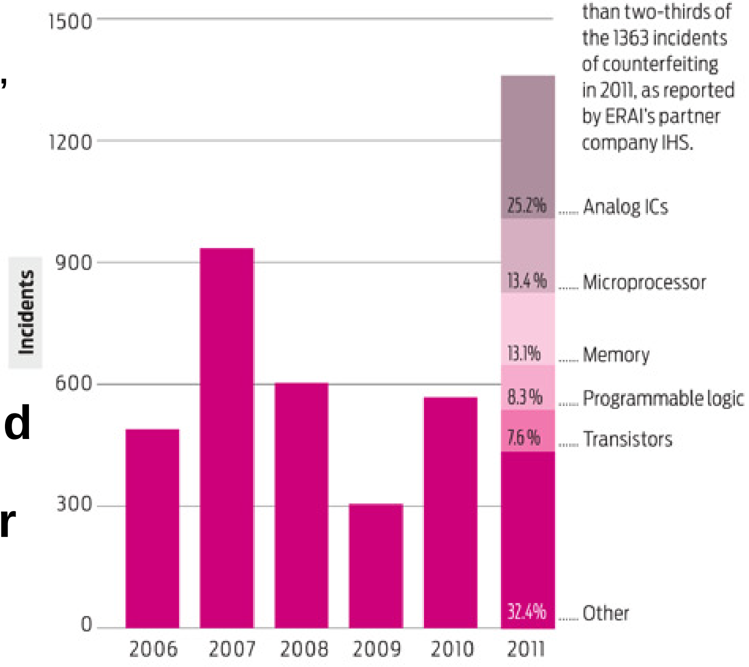
Source: *Defense Industrial Base Assessment: Counterfeit Electronics*, January 2010, U.S. Department of Commerce



Dubious Chips Double

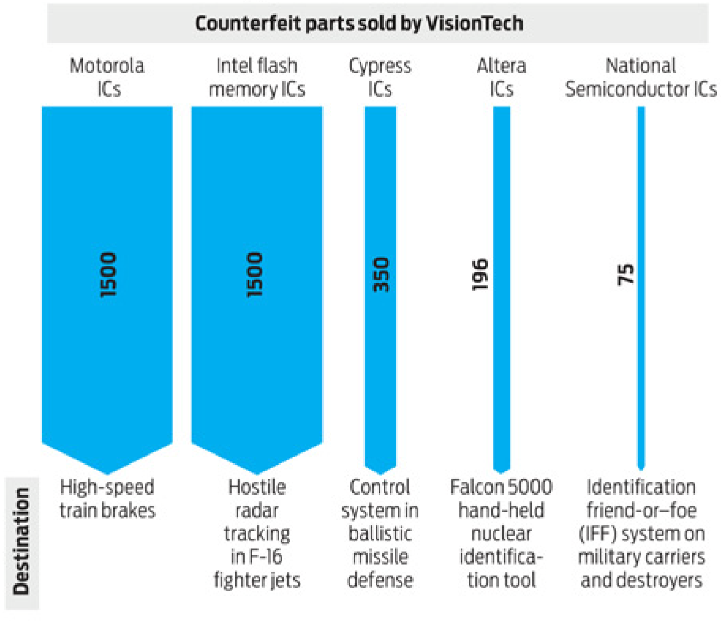
Semiconductor businesses report some fakes to ERAI, a private group that tracks and fights counterfeits.

Five types of semiconductors accounted for more than two-thirds of the 1363 incidents of counterfeiting in 2011, as reported by ERAI's partner company IHS.



A Case Study in Fake Chips

In 2010 the United States prosecuted its first case against a counterfeit-chip broker. The company, VisionTech, sold thousands of fake chips, many of which were destined for military products.



Source: Sentencing memo, *United States of America v. Stephanie A. McCloskey*, filed 7 September 2011

Sustainable System Security – a Critical System Engineering Responsibility

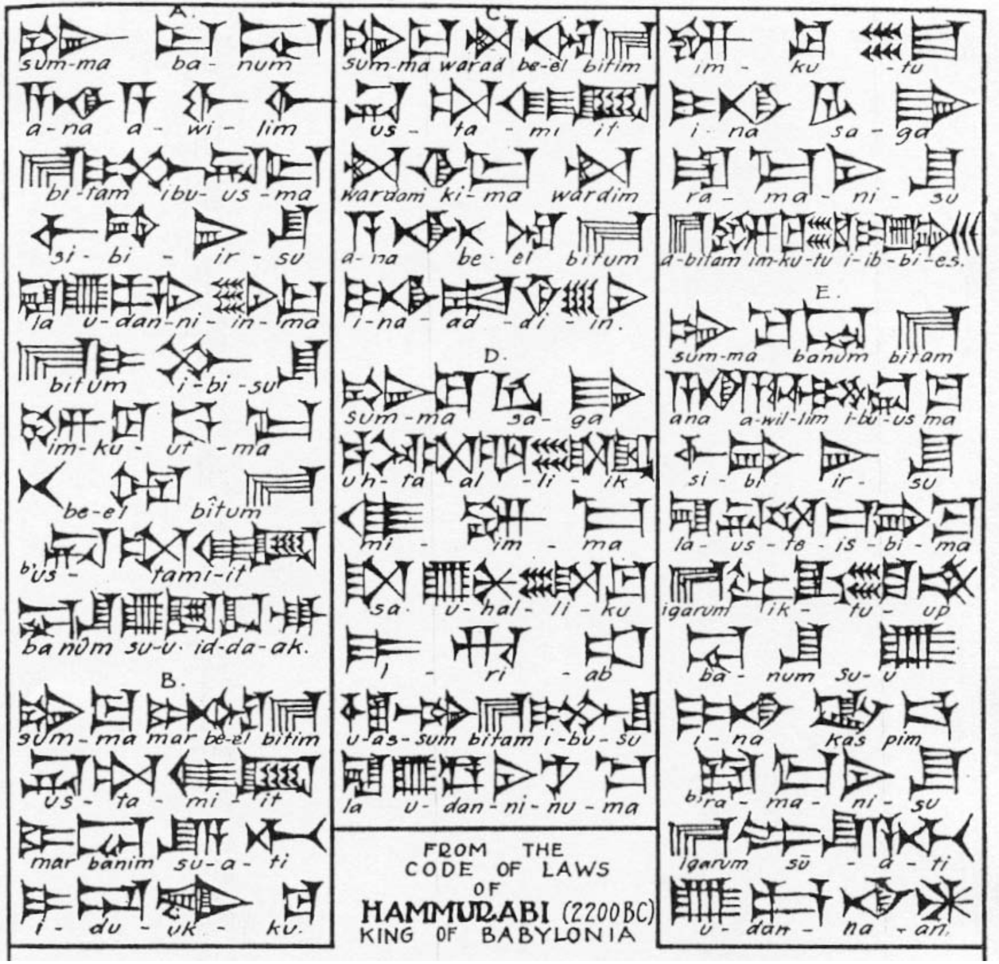
Systems are engineered with expectations: to provide services or carry out missions that justify the development, production, and sustainment investments. This return on investment (ROI) occurs over time. In some cases an ROI might occur with one successful mission; but more often a period of many years is required. Value fails to occur if system life or system ability to carry out its mission during that life is less than required. System life-time, protection of critical system information, and critical assets that may be protected by a system, are under threat by competitive entities, as well as by unanticipated situational events. System security is the property that guards against and counters these threats – a purposefully engineered property that only emerges successfully from thoughtful system engineering.

Emerging technology is a double-edged sword. Modern technology is both the enabler of remarkable system capability and a source of constantly-evolving adversarial attack. Increasing use, knowledge, and complexity of digital data, control systems, and communication networks compel both new system capability and new vectors for system compromise.

Within the systems engineering taxonomy, security is classified as a specialty engineering activity. To be sure, very special knowledge, experience, and practice are necessary in system security engineering; especially when systems of all kinds are targets for intelligent, resourceful adversaries intent on system compromise. Security engineering is engaged to make a system secure, but when allocated to a separate specialty activity, this engagement is constrained by the nature of an already defined and often implemented system, or limited to ensuring that called-for standards and regulations are met. Constrained evolution of existing systems and characterization as a compliance activity both hamstring the ability of security engineering to accept and dispatch system security responsibility.

Fielding sustainably secure systems today is critical to enterprise needs, yet difficult when system security is less than a paramount thoughtful concern of the system engineering processes. Responsibility lies with both acquirer and supplier

Responsibility/Accountability


A.
sum-ma ba- num
a-na a- wi- lim
bi-tam ibu- us -ma
si- bi ir - su
la u-dan-ni- in- ma
bitum i-bi -su
im- ku- ut -ma
be-el bitum
us- tami-it
ba nûm su-u- id-da-ak.
B.
sum-ma mar be-el bitim
us- ta mi -it
mar banim su-a- ti
i- du - uk - ku.
C.
sum-ma warad be-el bitim
us- ta -mi it
wardam ki- ma wardim
a-na be el bitum
i-na ad -di- in.
D.
sum-ma sa- ga
uh- ta al -li - ik
mi - im - ma
sa u- hal- li - ku
i - ri - ab
u-as- sum bitam i-bu- su
la u- dan- ni- nu - ma
FROM THE CODE OF LAWS OF HAMMURABI (2200BC) KING OF BABYLONIA
im - ku -tu
i- na sa - ga
ra- ma- ni - su
a-bitam im-ku-tu i-ib-bi-es.
E.
sum-ma banum bitam
ana a-wil-lim i-bu-us ma
si - bi ir - su
la- us - te - is - bi - ma
igarum ik - tu - up
ba- num su- u
i- na kas pim
ra- ma- ni - su
igarum su - a - ti
u- dan - na - an.

Code of Hammurabi (2200 BC)

King of Babylonia Translated by R.F. Harper

If a builder builds a house for a man and do not make its construction firm and the house which he has built collapse and cause the death of the owner of house – the builder shall be put to death.

If it cause the death of the son of the owner of the house – they shall put to death a son of that builder.

If it destroy property, he shall restore whatever it destroyed, and because he did not make the house which he built firm and it collapsed, he shall rebuild the house which collapsed at his own expense.

Common Law in England (15th Century)

If a carpenter undertakes to build a house and does it ill (not well), an action will lie against him

Napoleonic Code (1804)

If there is a loss in serviceability in a constructed project within 10 years of its completion because of a foundation failure or from poor workmanship, the contractor and architect will be sent to prison

Forensic Engineering, D. Fowler (slide presentation has been removed from the Internet)

SSE-WG Charter: Purpose

PURPOSE

This working group believes that system engineering cannot succeed without accepting core responsibility for enabling and facilitating effective system security – partly in system requirements, partly in system trade space recognition, but mainly in system thinking applied to concepts of operations and systems architecture.

Sustaining system functionality in the face of intelligent determined attack requires self preservation capabilities that adapt and evolve with equal intelligence, determination, and strength of community. This requires full system awareness and adaptability, and system-of-system relationships. Security engineering alone cannot accomplish this.

It is fitting for INCOSE to tackle Next Generation Security, as the issues are leading edge systems engineering issues: architecture, systems of systems, self organizing systems, security tradeoffs with human factors, systems thinking – things that are typically high level integrated-system SE issues.

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.

SSE-WG Charter: Outcomes & Products

OUTCOMES (PRODUCTS/SERVICES)

Outcome: Fundamental responsibility accepted within systems engineering for effective security established in SE processes and standards.

Product: Profiles of actionable next-generation self-organizing system-of-system security structures and strategies. Short term deliverable.

Product: Next generation security process integrated with system engineering processes. Mid term deliverable.

Product: System security standards enabling and encouraging next generation agile security concepts. Long term deliverable.

Security WG Workshop – 23Jan2012 Agenda

08:00Rick 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

11:00Kristen Baldwin & Paul Popick: Criticality Analysis

12:00Lunch

13:15Greg Sweeney: Embedded Systems

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

14:15Rick Dove: Thoughts on 2013 INSIGHT essays and IS13 papers for SE/HB compatibility

14:45 Break

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

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

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

16:30Standards, 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

17:00Adjourn

External links to relevant materials

1. USA FAA Systems Engineering Manual: www.faa.gov/about/office_org/headquarters_offices/ato/service_units/operations/sysengsaf/seman/)
2. USA DoD Defense Acquisition Guidebook (DAG): https://dag.dau.mil/Pages/Default.aspx
3. USA DoD DASD/SE Program Protection Plan (PPP): www.acq.osd.mil/se/docs/PPP-Outline-and-Guidance-v1-July2011.pdf

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
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9.	Susan MacKeen	TASC	smackeen@earthlink.net
10.	Paul Popick	DoD OSD DASD/SE & Aerospace Corp	paul.popick.ctr@osd.mil
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13.	Bob Swarz	Mitre	rswarz@mitre.org
14.	Stephen Sutton	U. of Maryland, Retired TASC	sjsutton.243@comcast.net
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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

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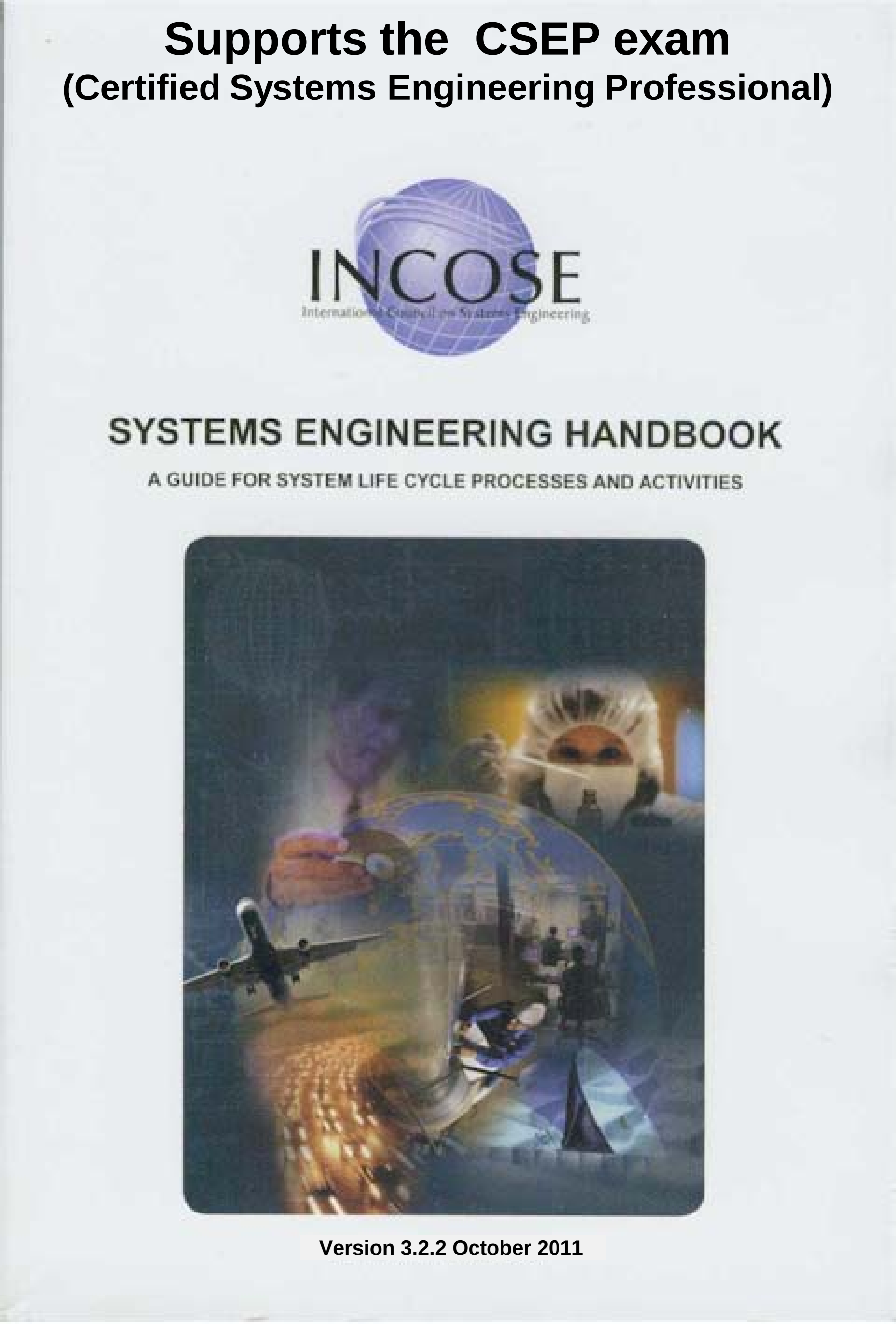
22.	Art Hollows	Raytheon	Art_L_Hollows@raytheon.com
23.	Jonathan Goodnight	DoD OSD DASD/SE	jonathan.goodnight.ctr@osd.mil
24.	Neil Greenfield	AEP	ngreenfield@aep.com
25.	Randy Herbert	Raytheon	randy_herbert@raytheon.com
26.	Tom Jones	Raytheon	tom_tj_jones@raytheon.com
27.	Kenneth Lubel	Raytheon	Kenneth_S_Lubel@Raytheon.com
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

Supports the CSEP exam
(Certified Systems Engineering Professional)



INCOSE

International Council on Systems Engineering

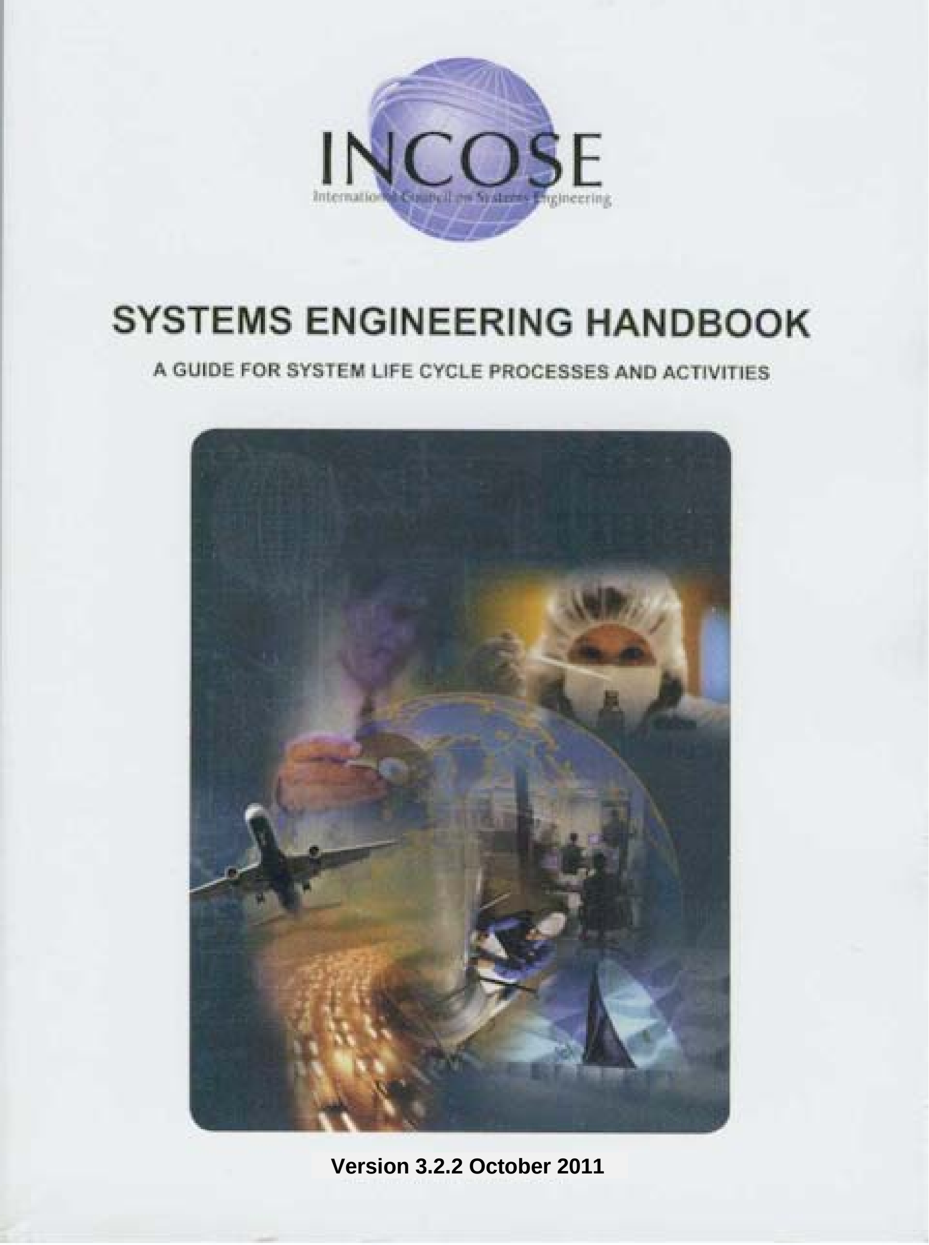
SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES

Version 3.2.2 October 2011

Table of Contents

Supports the CSEP exam
(Certified Systems Engineering Professional)


INCOSE

International Council on Systems Engineering

SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES

Version 3.2.2 October 2011

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

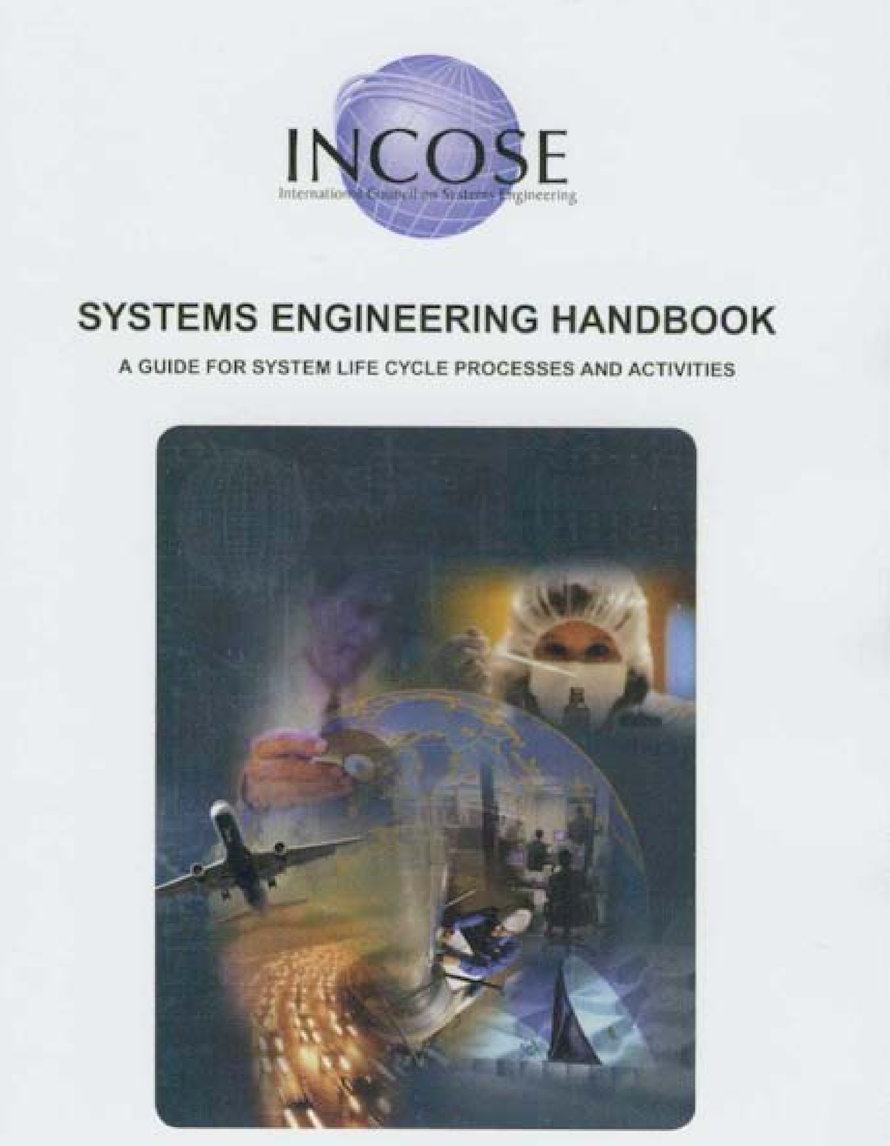
6 Agreement Process

- 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)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SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES

Version 3.2.2 October 2011

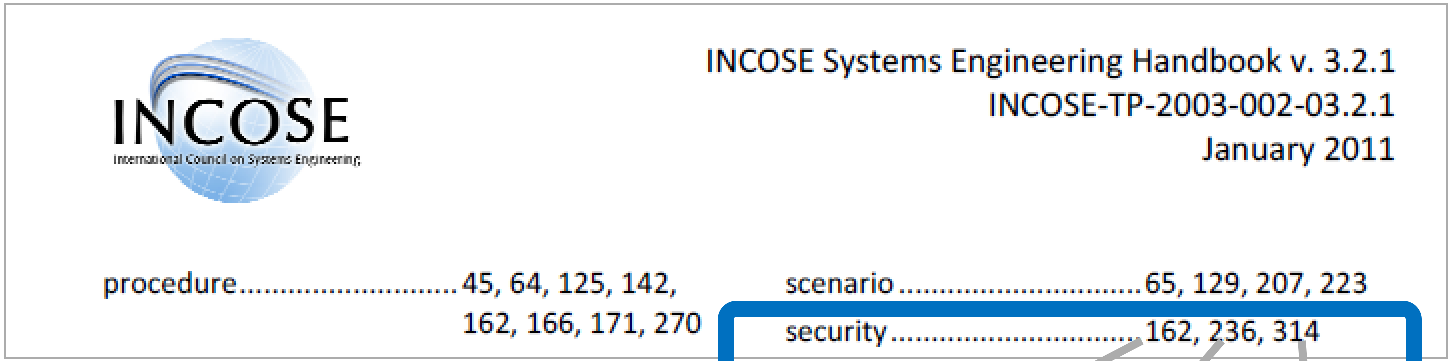
8 Tailoring Processes
- 8.1 Tailoring Process

9 Specialty Engineering Activities
- 9.1 Design for Acquisition Logistics – Integrated Logistics Support
- 9.2 Cost-Effectiveness Analysis
- 9.3 Electromagnetic Compatibility Analysis
- 9.4 Environmental Impact Analysis
- 9.5 Interoperability Analysis
- 9.6 Life-Cycle Cost Analysis
- 9.7 Manufacturing and Producibility Analysis
- 9.8 Mass Properties Engineering Analysi
- 9.9 Safety & Health Hazard Analysis
- 9.10 Sustainment Engineering Analysis
- 9.11 Training Needs Analysis
- 9.12 Usability Analysis/Human Systems Integration
- 9.13 Value Engineering

Appendix
- A: System Life-Cycle Process N2 Chart
- B: System Life-Cycle Process Mappings
- C: Acronym List
- D: Terms and Definitions
- E: Acknowledgement
- F: Comment Form

Security is missing !

INCOSE SE Handbook
Minimal Content on Systems Security



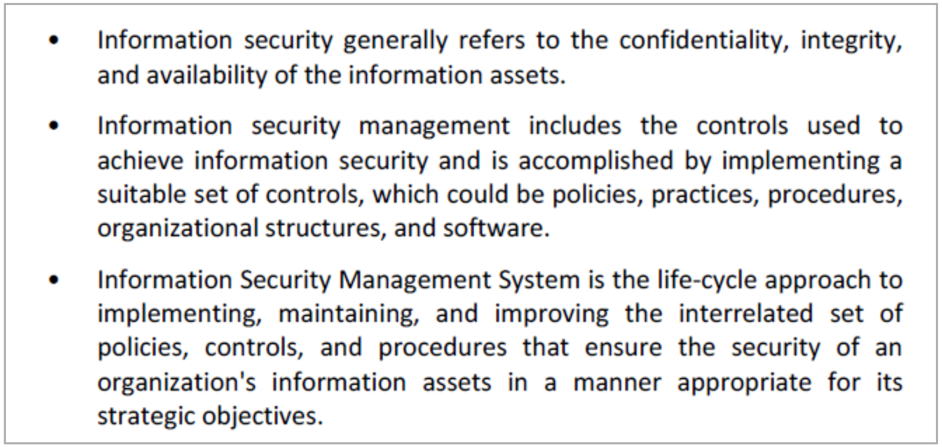
INCOSE
International Council on Systems Engineering

INCOSE Systems Engineering Handbook v. 3.2.1
INCOSE-TP-2003-002-03.2.1
January 2011

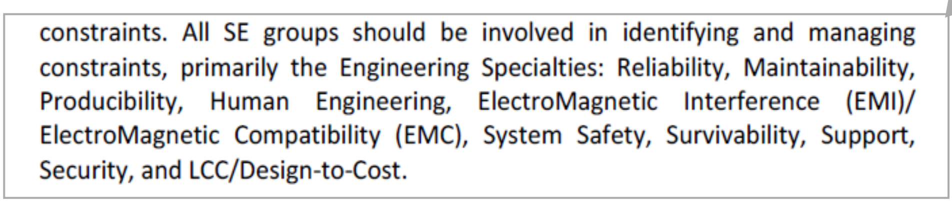
procedure.........................45, 64, 125, 142, 162, 166, 171, 270

scenario 65, 129, 207, 223

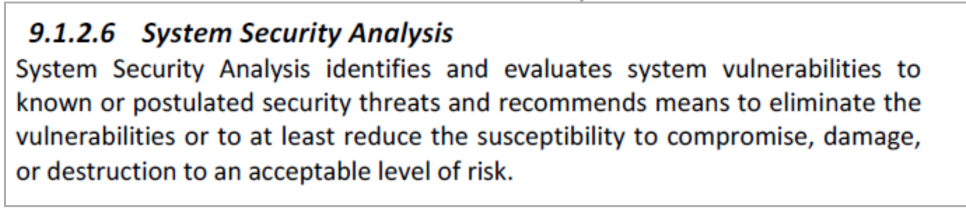
security 162, 236, 314



- Information security generally refers to the confidentiality, integrity, and availability of the information assets.
- Information security management includes the controls used to achieve information security and is accomplished by implementing a suitable set of controls, which could be policies, practices, procedures, organizational structures, and software.
- Information Security Management System is the life-cycle approach to implementing, maintaining, and improving the interrelated set of policies, controls, and procedures that ensure the security of an organization's information assets in a manner appropriate for its strategic objectives.



constraints. All SE groups should be involved in identifying and managing constraints, primarily the Engineering Specialties: Reliability, Maintainability, Producibility, Human Engineering, ElectroMagnetic Interference (EMI)/ ElectroMagnetic Compatibility (EMC), System Safety, Survivability, Support, Security, and LCC/Design-to-Cost.



9.1.2.6 System Security Analysis

System Security Analysis identifies and evaluates system vulnerabilities to known or postulated security threats and recommends means to eliminate the vulnerabilities or to at least reduce the susceptibility to compromise, damage, or destruction to an acceptable level of risk.

Slide content source: Dr. Beth Wilson, Raytheon

INCOSE Systems Security WG
June 2011 Discussion

Discussion: Barriers to Effective Systems Security

- Systems Engineers (SEs) don’t know when to ask for system security engineering (SSE)
- SSE focused on checklist
- System security not part of trade space (CONOPS, architecture, strategies)
- Security not considered part of SE by some (SE Journal rejected article as irrelevant to SEs)

Result: Handbook Project

- Focus: “What is the essential knowledge that a SE must have in order to intelligently engage their system security expert?”
- Goal: Make system security an attribute of a well-designed system

Slide content source: Dr. Beth Wilson, Raytheon

Surprise: Handbook Revision 3.3 Kicked Off at IW12

Process for Handbook Additions (Kevin Forsberg)

- Handbook effort is part of Knowledge Management working group
- Looking at next generation of the SE Handbook (3.3), current version is 3.2.2
  - Review draft outline end of February/early March
  - Provide annotated outline in June
  - Discuss outline at IS2012 for version 3.3
  - Need authors in fall 2012
  - Draft material to review at IW2013 (June/July)
  - Expect 3 year cycle before 3.4
  - Can provide common content to both SE Handbook and SEBoK, update SEBoK during time between SE Handbook version 3.3 and 3.4.
- Certification exam questions must tie to SE Handbook content
- SEBoK will be a moderated wiki
  - Future may have SEBoK be the SE Handbook (3.3 will be separate)
  - SEBoK governance will be joint INCOSE and IEEE
  - SE Handbook governance related to certification
- Systems Security can be integrated into existing and/or separate section
- Can provide common content to both SE Handbook and SEBoK, update SEBoK during time between SE Handbook version 3.3 and 3.4.

Work Products and Approach

- Immediate Handbook 3.3 Interaction
  - Steering committee: Rick Dove, Paul Popick, Beth Wilson
  - Investigate INCOSE Wiki capability
  - Publish wiki 3.3 outline engagement strategy:
  - Two iterations on 3.3 outline wiki and consolidation by IS12 (July 2012)
  - HB section authoring on approved outline activities completed by year end 2012

Handbook Project Positioning Info

The Handbook revision is a project of the Knowledge Management WG.

Leads on the project are Gary Roedler and Kevin Forrester

Current version is 3.2, new 3.3 version is scheduled for Mid 2013 release – likely planned for availability at IS-2013.

> **"The [3.3] changes are driven by user feedback, planned changes for ISO/IEC/IEEE 15288, feedback from the SE Body of Knowledge (SEBoK) team, and input from the Knowledge Management Working Group (KMWG) during IW 2012." [Garry Roedler]**

SE Handbook http://www.incose.org/ProductsPubs/products/sehandbook.aspx

"Version 3 of the INCOSE Systems Engineering Handbook represents a shift in paradigm toward global industry application consistent with the Systems Engineering Vision. Developed for the new systems engineer, the engineer in another discipline who needs to perform systems engineering or the experienced systems engineer who needs a convenient reference, the handbook provides an updated description of the key process activities performed by systems engineers.

"The descriptions in this handbook show what each systems engineering process activity entails, in the context of designing for affordability and performance. On some projects, a given activity may be performed very informally (e.g., on the back of an envelope, or in an engineer's notebook); on other projects, very formally, with interim products under formal configuration control. This document is not intended to advocate any level of formality as necessary or appropriate in all situations.

Handbook Revision Planning

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…

System Security Engineering WG

International Workshop
21 – 24 Jan 2012
Jacksonville, FL USA

Charter:

- ❑ to identify effective system security principles consistent with new reality
- ❑ to integrate responsibility for system security into the system engineering community

Chair/Co-Chair:

Rick Dove rick.dove@parshift.com
Jennifer Bayuk jennifer@bayuk.com

INCOSE Connect address:
https://connect.incose.org/tb/specialty/systemsecurity

INCOSE Web page:
http://www.incose.org/practice/techactivities/wg/template

Number of Members: ~50 on list

Published Products

- 2008 April INSIGHT Declaration of Responsibility
- 2009Q2 INSIGHT 11 Theme Essays: *The Interplay of Architecture, Security, & Systems Engineering*
- 2011Q2 INSIGHT 11 Theme Essays: *Systems of Systems and Self-Organizing Security*

Work in Process & Planned

- SEBoK Review
- Next Gen Agile-SysSec Patterns
- 2013Q2 INSIGHT 11 Theme Essays: *The Buck Stops Here: SE's Responsibility for System Security*
- Security responsibility integrated with Handbook processes/activities
- Security responsibility in CSEP

Five Contributors Reviewed the Handbook, consolidated suggestions were submitted to KM-WG in June 2012

2.5 Systems of Systems

“The following challenges all influence the development of systems of systems.

(1-7 as is, add number 8): System security is especially complex, as system component interface relationships are rearranged and augmented asynchronously, and often involve COTS-components from a wide variety of sources. Security vulnerabilities may arise as emergent phenomenon from the total system-of-systems configuration even when individual system components are felt to be sufficiently secure in isolation.

2.6 Use of Systems Engineering

Suggestion to follow the paragraph pg 15 that starts “Another factor driving the need for SE is that the time..”:

A recent factor of growing consequence, driving the need for SE, is system security. Systems of all kinds have become targets of opportunity and value for human-directed malicious attacks - running the full range from highly sophisticated nation states to attack-tool enabled psychopaths and malcontents. The ubiquity of digital control systems and value in digital data systems provides a common base of digital-technology vulnerability. Security engineering as an afterthought or as standards compliance has proven to be critically inadequate. From relatively simple systems like medical-device pace-makers, through complex systems like health-care medical records, to systems-of-systems with asynchronous integration and COTS-device multiple-supplier employment - only the systems engineering holistic view can adequately assess and direct the necessary attention to system security.

3.6 Introduction to three case studies

Recommend changing Title to “Introduction to Selected Case Studies.” The SSE-WG would like to develop another case study related to system security.

[NEW 4.1] Mission or Business Analysis

In section 4.2.1.5 p76 in the entry that begins with “design considerations” add supply chain risk management to the e.g. after security requirements.

4.1 Stakeholder needs & requirements

Suggestion section 4.1.1.5 p 60 there is an entry that begins with “establish MOEs” – security should be added to the e.g. list just as safety, reliability, are on the list.

Suggestion section 4.1.1.5 p 60, to include in the list of “Common approaches and tips”: Develop a description of system security threats and the malicious threat community to provide common understanding across the effort and to validate the appropriateness of scenarios. A threat community description may cover the demographic group(s) to which a product will be vulnerable or the specific categories such as insiders and supply chain elements that will be included as purchased items

4.2 Requirements engineering (definition) process

Suggestion 4.2.14 p 74 to explicitly call out system security as a functional requirement in the "System Functions" bullet item: *System Functions* – Defines the functions the system must perform, including sustainment of system functional capability and protection of system assets; and defines the functional boundaries for the system to be developed.

Suggestion 4.2.15 p 75: *System Functions* – Define the functions that the system is to perform. These functions should be kept implementation independent. For more information on approaches for defining and refining system functions see Section 4.12.2.

Suggestion 4.2.1.5 p76 in the entry that begins with "design considerations" add supply chain risk management to the e.g. after security requirements

Suggestion 4.2.2.1 p 77: Figure 4.5, External Environment might include a third bullet recognizing the system adversarial/malicious attack community.

Suggestion 4.2.2.4 p 83: 2nd paragraph might recognize security as an ongoing life-cycle requirement in addition to support, with an insertion in the paragraph as "Defining, deriving, and refining functional/performance requirements applies to the total system over its life cycle, including its security and support requirements.

4.8 Validation Process

Suggestion: describe approaches to testing non functional requirements here including security testing approaches such as penetration testing and misuse or abuse scenarios for validation of security requirements.

Suggestion 4.8.1.2 Description p 135, add the word “security” after safety as shown: […] Validation criteria are selected based on the perceived risks, safety, security, and criticality.

4.10 Maintenance Process

Suggestion 4.10.1.4 Outputs p 144 Maintenance Strategy bullet, add current security effectiveness per: “Accounts for the system’s technical availability, current effectiveness of system security functionality, replacements for system elements and logistical support, maintenance personnel training and staff requirements.

Suggestion 4.10.1.5 p 145 Common approaches and tips, add a fourth bullet: The evolution of the system security attack community and its methods changes rapidly, and must therefore by constantly reevaluated for effectiveness and maintenance.

4.11 Disposal Process

Suggestion 4.11.1.5 Process Activities p 148 Plan Disposal, first bullet add protected assets element, per: “Review the Concept of Disposal, including protected assets that should be removed/destroyed, any hazardous materials and other environmental impacts to be encountered during disposal.

Suggestion 4.11.1.5 Process Activities p 148 Common approaches and tips, add removal/destruction element per: “Disposal analyses include consideration of costs, disposal sites, environmental impacts, health and safety issues, removal/destruction of protected assets, responsible agencies, handling and shipping, supporting items, and applicable federal, state, local, and host-nation regulations.

[NEW 4.16] Design for X

Suggest a reference to Information System Security (9.16) since info security considerations in design are cross-cutting.

5.4 Risk & Opportunity Management Process

Suggest section 5.4.1.5 on page 220 where FMECA is mentioned also include vulnerability analysis to that sentence.

Suggest inserting a reference to Information System Security here since the info security process essentially stems from risk.

6 Agreement Process

Suggest highlighting that security considerations must be extended to the processes used to develop and supply the system to prevent compromise of the system through malicious insertion or counterfeit parts.

9 Specialty Engineering Activities

Suggest reconsidering the word “Activities” in the title Specialty Engineering Activities. Perhaps this would be better left as Specialty Engineering without the word Activities.

[NEW 9.16] System Security Engineering Process

Recommend changing section title to Systems Security Engineering.

Recommended sub-sections (SSE-WG will provide content):
9.16.1 SSE Role in SE
9.16.2 SSE Activities for the Technical Processes
9.16.2.1 Stakeholder Requirements Definition and Analysis SSE Activities
9.16.2.2 Architecture Design SSE Activities
9.16.2.3 Verification / Validation SSE Activities
9.16.2.4 Maintenance and Disposal SSE Activities
9.16.3 SSE Activities for the Project Processes
9.16.3.1 Risk Management Process SSE Activities
9.16.3.2 Configuration Management Process SSE Activities
9.16.4 SSE Activities for the Agreement Processes
9.16.4.1 Acquisition and Supply Processes
9.16.5 References

System Security Engineering WG
IS12 Workshop Agenda
Tuesday July 10, 2012 – 14:00-18:00

14:00 Introductions and WG & workshop positioning, Rick Dove

14:45 Project: Handbook Security Revision – Status and next steps, Beth Wilson

15:00 Handbook Section 9.16 status and discussion, Paul Popick

15:45 Project: INSIGHT 2013Q2 Essays – Status and discussion, Rick Dove

16:15 Project: IS13 Security Track – status and discussion, Beth Wilson

16:45 Project: SEBoK needs Security Document References – discussion, Paul Popick

17:00 International involvement – let's get some! what does it take? Mike Wilkinson

17:30 Closing wrap-up and other news, Rick Dove

18:00 Adjourn

Mailing Lists: opt in to rick.dove@parshift.com
(includes non-INCOSE members)

1) **General Announcements (96 people)**
2) **Handbook Project Ongoing Status (44 people)**

WG Projects

Project 01: WG Mission – Manifesto Style

Project 02: INSIGHT Essays Q2 2009: Interplay of Architecture, Security, & SE

Project 03: Patterns of Agile Self-Organizing Security (Open)

Project 04: INSIGHT Essays Q2 2011: Sys-of-Sys & Self Organizing Security

Project 05: ITNG Conference Track March 2011: Six SE & Security Authors

Project 06: Handbook inclusion of SE Security Responsibility (Open)

Project 07: INSIGHT Essays Q2 2013: The Buck Stops Here (Open)

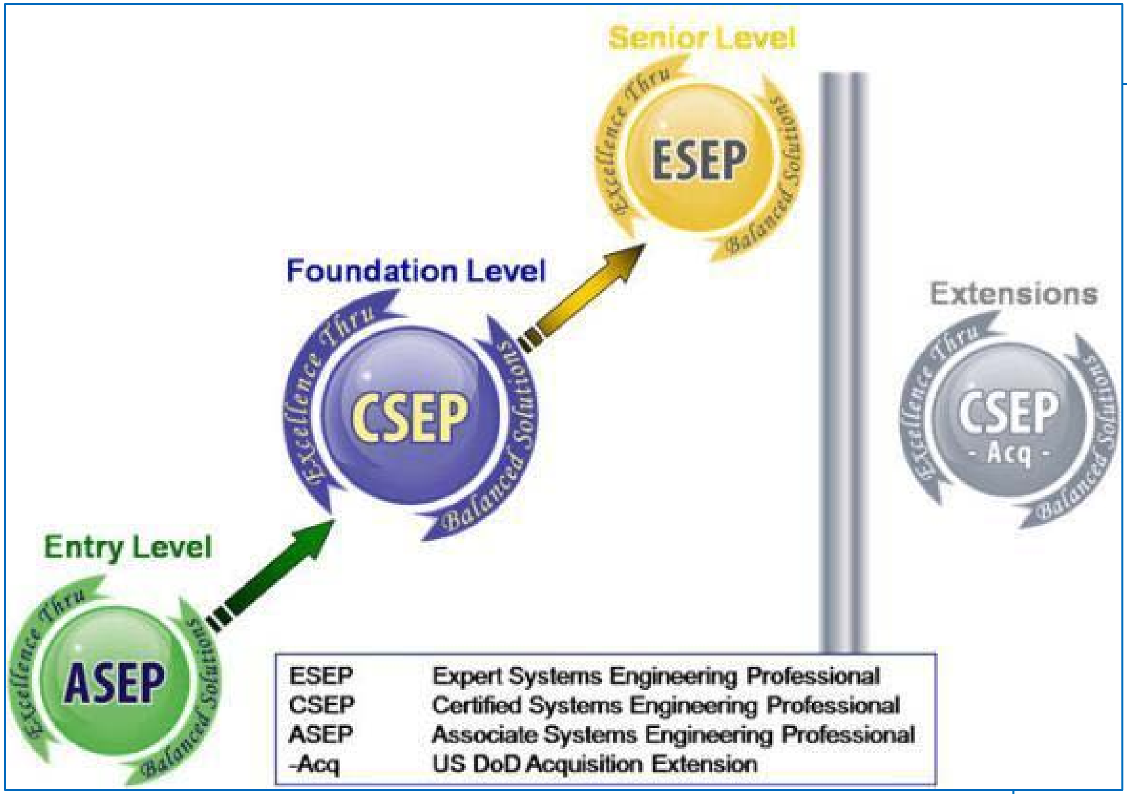
Project 08: IS13 Paper Track: SE & Security Engineering (Open)

Project 09: SEBoK Security Engineering Document References (Open)

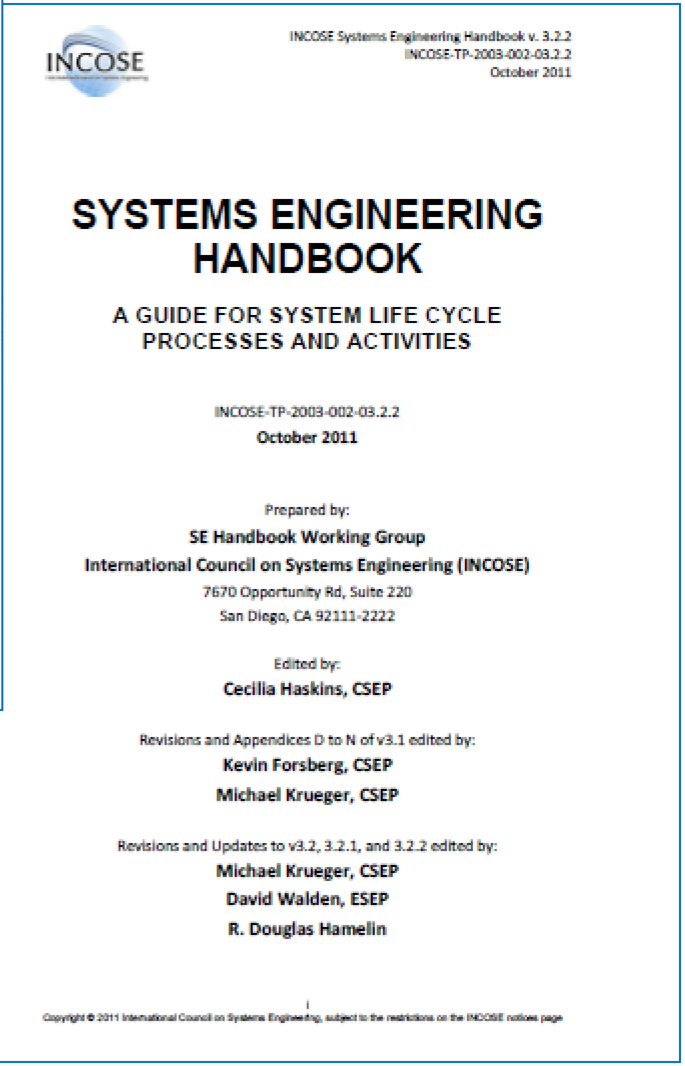
Future Candidates? (will discuss in final session today – think about it):

- **CSEP EXAM Questions – based on Handbook security responsibility entries.**
- **INCOSE Library Product: System Security Engineering for the SE.**
- **INCOSE Library Product: Agile Self-Organizing Security Patterns.**
- **Standards Involvement.**
- **Smart Grid SE security.**
- **Collaborative project with new Agile Systems Engineering WG.**
- **Collaborative project with Autonomous Systems Test & Evaluation WG.**
- **What else should be considered?**

INCOSE Systems Engineering Certification Based on SE Handbook



ESEP	Expert Systems Engineering Professional
CSEP	Certified Systems Engineering Professional
ASEP	Associate Systems Engineering Professional
-Acq	US DoD Acquisition Extension



INCOSE Systems Engineering Handbook v. 3.2.2
INCOSE-TP-2003-002-03.2.2
October 2011

INCOSE

SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES

INCOSE-TP-2003-002-03.2.2
October 2011

Prepared by:
SE Handbook Working Group
International Council on Systems Engineering (INCOSE)
7670 Opportunity Rd, Suite 220
San Diego, CA 92111-2222

Edited by:
Cecilia Haskins, CSEP

Revisions and Appendices D to N of v3.1 edited by:
Kevin Forsberg, CSEP
Michael Krueger, CSEP

Revisions and Updates to v3.2, 3.2.1, and 3.2.2 edited by:
Michael Krueger, CSEP
David Walden, ESEP
R. Douglas Hamelin

i

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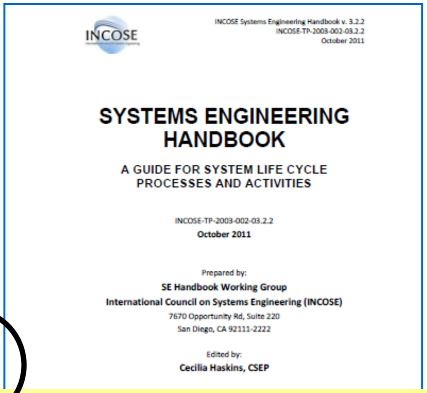
Open Author Needs and Opportunities: 4 Projects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October 2011

SYSTEMS ENGINEERING
HANDBOOK

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Edited by:
Cecilia Haskins, CSEP

1

SE Handbook
Insert security content
(1-2 sentences)
New SSE Section 9.16
(2-3? Handbook pages)
Expect call for inputs Fall 2012

2

INCOSE Symposium 2013
Philadelphia, June 24-27, 2013
Security Track
15 page max papers
Papers due early Nov 2012

3

SEBoK
Need References
for Review at IW12

4

INSIGHT Issue 2013
2,000 word essays
Sep 2012 Authors selected
Nov 2012 Draft essays
Jan 2013 Review essays at IW13
July 2013 Issue

Section 9.16
Preliminary Outline
Discussion

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

Background

- Request from SE Handbook WG to add a SSE specialty section to Section 9 of the SE Handbook
- Current size of specialty sections range from a paragraph to 3 and a half pages
- SE Handbook is aligned with ISO 15288 processes

Approach

- Target SSE Section at about 4-6 pages (Ken Kepchar's guess on allowance)
- Align with 15288 Processes
- Identify Technical, Project and Agreement Processes that are most significant to SSE implementation
- Submitted Draft Outline to SE Handbook Working Group by Mid December

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

SSE Section 9.16 Outline Draft

9.16 System Security Engineering (SSE)

- **9.16.1 Systems Engineer and Systems Security Engineer Roles and Responsibilities for SSE**
- **9.16.2 SSE Activities for the Technical Processes**
  - *9.16.2.1 Stakeholder Requirements Definition and Requirements Analysis SSE Activities (reference 4.1-4.2)*
  - *9.16.2.2 Architecture Design SSE Activities (4.3)*
  - *9.16.2.3 Verification / Validation SSE Activities (4.6 & 4.8)*
  - *9.16.2.4 Maintenance and Disposal SSE Activities (4.10-4.11)*
- **9.16.3 SSE Activities for the Project Processes**
  - *9.16.3.1 Risk Management Process SSE Activities (5.4)*
  - *9.16.3.2 Configuration Management Process SSE Activities (5.5)*
- **9.16.4 SSE Activities for the Agreement Processes**
  - *9.16.4.1 Acquisition and Supply Processes (6.1-6.2)*
- **9.16.5 References**

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

SSE Section 9.16 Way Forward

- **Word count per section**
  - **a** 3 page target breaks down to about 1000 words (35 lines per page and 11 words per line)

    Workshop Note: a 4-6 page limit will change these numbers
  - 11 sections (including the intro sections) means approximately 100 words per subsection and 50 words per intro section that has subsection
- **Plan**
  - Sections 16.2.1/2.2/2.3 will be drafted in August to establish tone and content scope
  - Remaining Sections need to be drafted by end of September
  - An October-live wiki with limited access will likely be employed after initial drafts
  - Next iteration by first week of November
  - Completion targeted by December 15th
- **Authors of Initial Drafts**
  - Section 16.1 – Ken Kepchar (volunteered during workshop)
  - Section 16.2.1 – Paul Popick
  - Section 16.2.2 – Beth Wilson
  - Section 16.2.3 – Rick Dove
- **Need authors for other sections (16.2.4, 16.3.1, 16.3.2, 16.4.1)**

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

SSE Section 9.16 Way Forward

Workshop Note: a 4-6 page limit will change these numbers

A 100 word budget per section may be difficult to accomplish

- Each section should not go into any practice-detail, but rather stick to general process engagement responsibility
- While recognizing deference between different types of system-projects (large/small; defense/commercial; long-life/short-life; Cyber/physical/human/SoS, etc).

First step into the SE Handbook-Process world for Security –

- each Handbook revision hereafter will have an opportunity to improve the initial V-3.2 door-opener**.**

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

Draft Annotated Outline (1 of 5)

9.16 System Security Engineering (SSE)

- **9.16.1 Systems Engineer and Systems Security Engineer Roles and Responsibilities for SSE**
  - The role and responsibilities of the Systems Engineer in SSE
  - Role and responsibilities of the Systems Security Engineer
    - Establishing the top level security requirements and the plan for the use of the SSE
    - Establishing and tailoring the systems engineering technical reviews (SRR, PDR, …) criteria for SSE
  - List of SSE sub-specialties
- **9.16.2 SSE Activities for the Technical Processes**
    - key activities for selected technical processes overview

Workshop suggestion: add role of SysSecEng in system lifecycle to 9.16.1

Systems Security Engineering (SSE) Working Group SE Handbook update for SSE

Draft Annotated Outline (2 of 5)

- *9.16.2.1 Stakeholder Requirements Definition and Requirements Analysis SSE Activities (reference 4.1-4.2)*
  - Identification of stakeholders classes that have a security perspective
  - Identification of security mitigation and or/ compliance requirements (Secure design, anti-tamper, FIPS 140-2 compliance, HIPAA, SOX, Supply Chain Risk Management, SOX)
  - abuse and misuse scenarios to describe the operational environment
  - measures of effectiveness for system security
  - Mission criticality analysis
  - Threat and Vulnerability analysis
  - Secure and defensive design requirements
  - abuse and misuse scenarios elaboration
  - risk-cost-benefit trade to determine security requirement

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

Draft Annotated Outline (3 of 5)

- *9.16.2.2 Architecture Design SSE Activities (4.3)*
  - Secure design pattern to analyze security requirements (reference SEI TR)
  - Allocate security requirements to system elements
  - Updated vulnerability analysis as design is elaborated
  - Design for security
    - Isolation and separation of the most critical functions and data from less critical functions and data; separation mechanism include separation kernels, virtualization, and encryption.
    - Detection and monitoring of
      - inputs and outputs to valid values, ranges and formats
      - Faults
      - Intrusions
      - Anomalous behavior
    - Collection of data for forensics
    - Deception (e.g. honey pots)
    - Anti-tamper
    - Fault and attack recovery
    - Real-time adaptation of monitoring, detection and defensive functions
    - Establish programs secure design and coding standards based examination of common vulnerabilities form SEI, CWE.CVE, CAPEC and other sources

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

Draft Annotated Outline 4 of 5)

- *9.16.2.3 Verification / Validation SSE Activities (4.6 & 4.8)*
  - Develop test scenarios and test cases over a range of misuse scenarios and abuse cases (red team, penetration testing, …).
  - Ensure that the most prevalent vulnerabilities noted in CVE or SEI websites are prevented
- *9.16.2.4 Maintenance and Disposal SSE Activities (4.10-4.11)*
  - Periodic and event (enhancements, tech refresh, …) driven reassessment of threats and vulnerabilities
  - Rapid deployment of security enhancements to address exploited vulnerabilities
  - Risk-cost based trade-off deployment of security enhancements
  - Protection of intellectual property, security features and environment during disposal to prevent reverse engineering and exploitation

Systems Security Engineering (SSE) Working Group
SE Handbook update for SSE

Draft Annotated Outline (5 of 5)

- **9.16.3 SSE Activities for the Project Processes**
  - *9.16.3.1 Risk Management Process SSE Activities (5.4)*
    - Mission criticality analysis to inform the consequence portion of the risk analysis
    - Vulnerability analysis to inform the likelihood portion of risk process
    - Describe a cost benefit risk trade-off model to determine the appropriateness of the security features included in the design
  - *9.16.3.2 Configuration Management Process SSE Activities (5.5)*
    - Limiting access to system and specific modules to minimize risk of malicious insertion
    - Keeping records for forensics analysis of configuration changes
    - Applying vendor updates and patches to reduce vulnerabilities
- **9.16.4 SSE Activities for the Agreement Processes**
  - *9.16.4.1 Acquisition and Supply Processes (6.1-6.2)*
    - System security engineering security extends to protecting development environment
    - Knowing the origins of the products that make up the
      - System being developed
      - development environment
    - Assessing the threats and vulnerabilities to the supply chain
    - Protecting the supply chain
    - Trade-offs between supply vulnerabilities and design requirements
- **16.5 References**

INSIGHT 2013Q2 Essay Project Status and Discussion

A PUBLICATION OF THE INTERNATIONAL COUNCIL ON SYSTEMS ENGINEERING

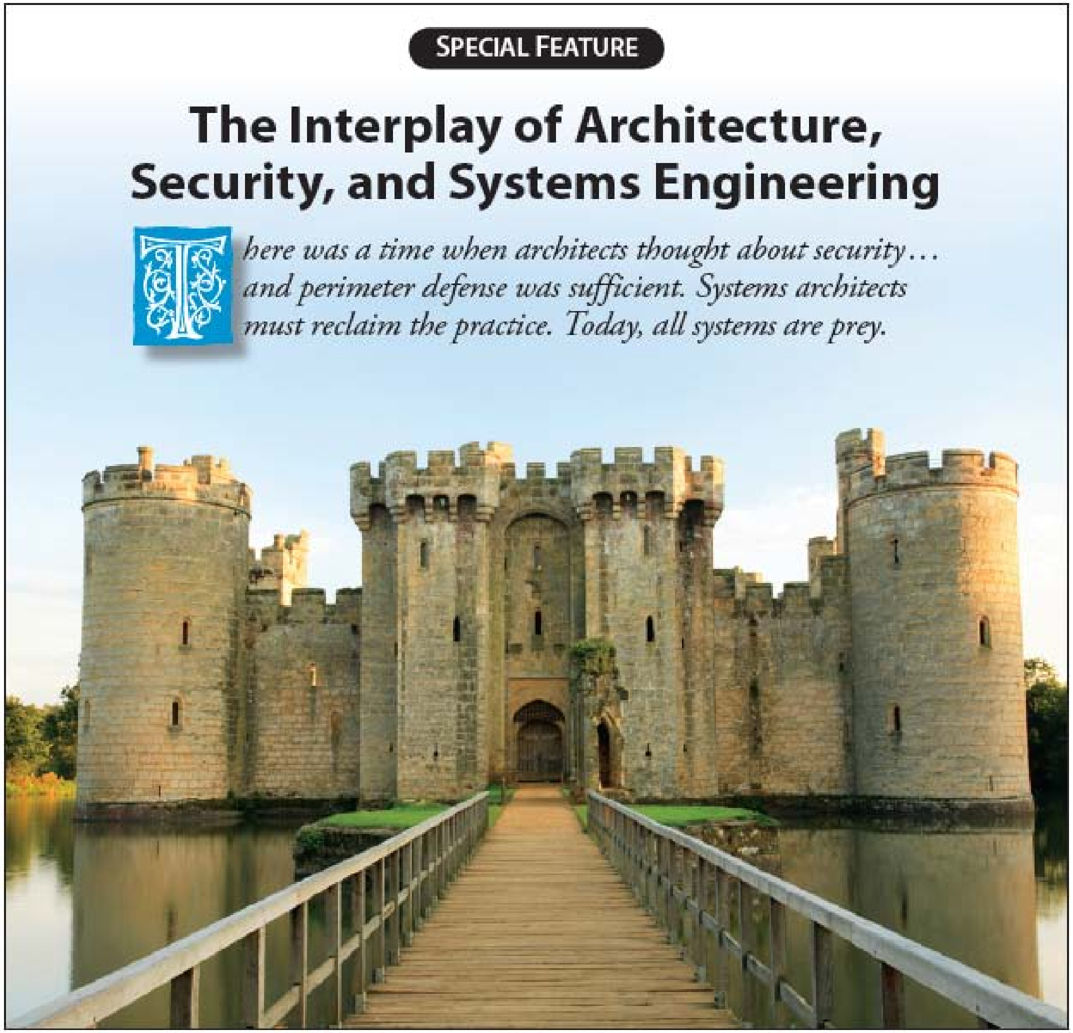
INSIGHT

INCOSE

International Council on Systems Engineering

July 2009

Vol 12 Issue 2



SPECIAL FEATURE

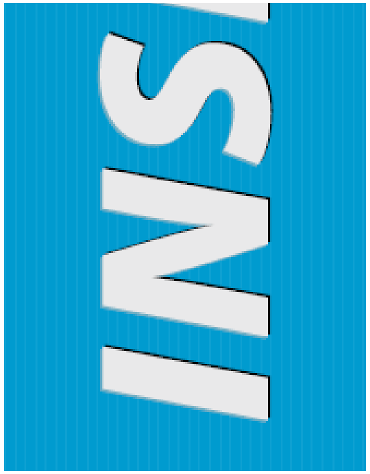
The Interplay of Architecture, Security, and Systems Engineering

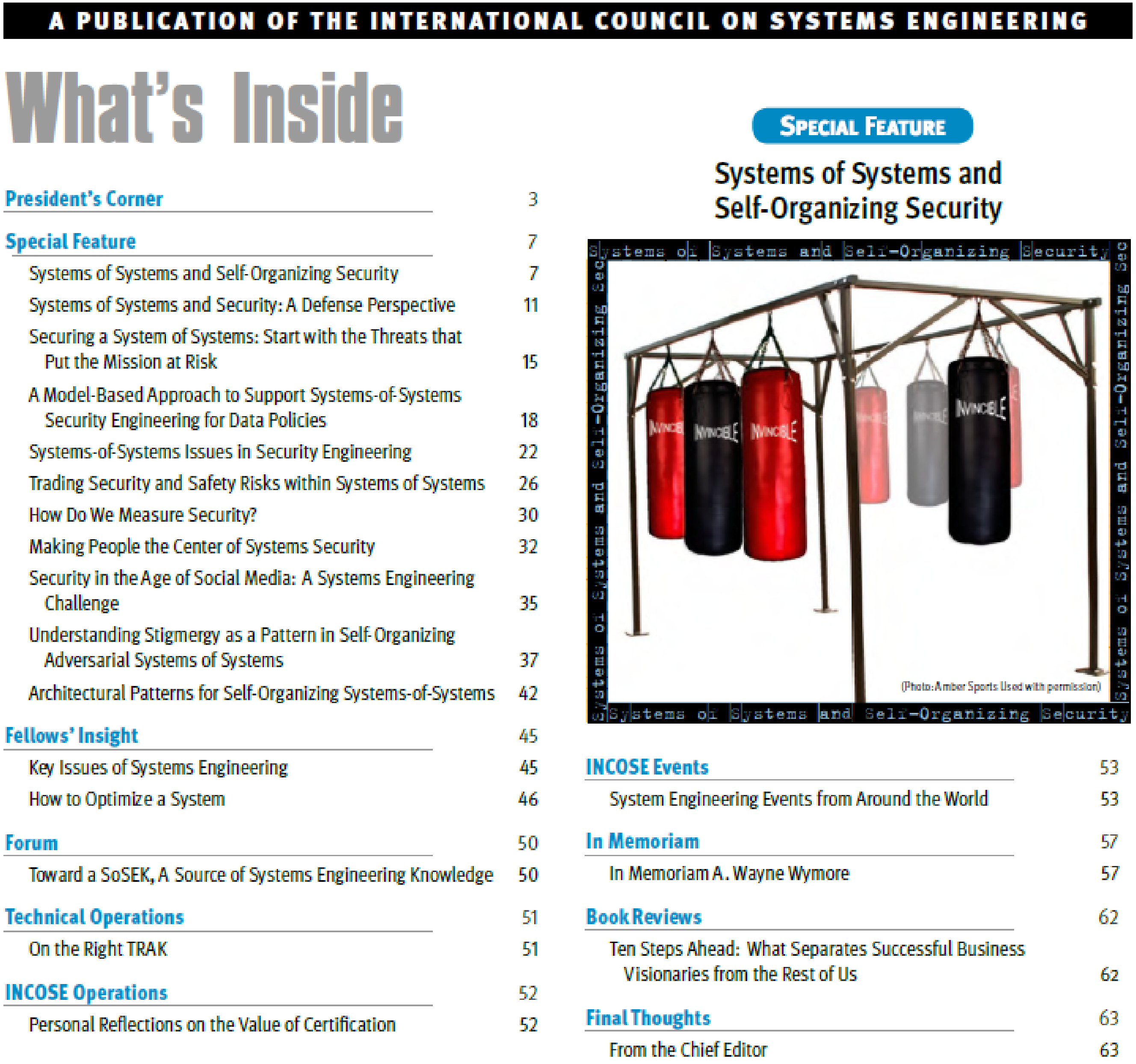
There was a time when architects thought about security… and perimeter defense was sufficient. Systems architects must reclaim the practice. Today, all systems are prey.

- **The Interplay of Architecture, Security, and Systems Engineering** – Rick Dove
- **System Security Engineering: A Critical Discipline of Systems Engineering** – Kristen Baldwin
- **Embedding Agile Security in System Architecture** – Rick Dove
- **Toward a Dynamic System Architecture for Enhanced Security** – Mark De Spain
- **Resilient Control Systems: A Basis for Next-Generation Secure Architectures** – Craig Rieger
- **Secure Architecture and Design of Component-Based Systems** – Karen Mercedes Goertzel
- **Using the U.S. Department of Defense Architecture Framework to Build Security into the Lifecycle** – William P. Mulokey
- **An Architecture of Information Assurance Processes** – Jackson Wynn
- **Standardized Practices for Embedding Security from Concept Through Development** – Susan Albert and Jacqueline Nemeth
- **Balancing Security and Other Concerns within a Systems Architectural Approach** – Mike Wilkinson and Paul King
- **Developing a System Architecture for Managing the Nuclear Weapons Enterprise in the Context of a Comprehensive Policy Portfolio** – Dennis Engi
- **Establishing Security Strategy Using Systems Thinking** – John Wirsbinski and John Boardman

July 2011 | Volume 14 Issue 2
INCOSE
International Council on Systems Engineering

- Rick Dove and Jennifer Bayuk
- Kristen Baldwin, Judith Dahmann, and Jonathan Goodnight
- Steve Sutton
- Daniele Gianni, Niklas Lindman, Joachim Fuchs, Robert Suzic, and Daniel Fischer
- Jennifer Bayuk
- Warren Axelrod
- Fred Cohen
- Jennifer McGovern Narkevicius
- John Ackley
- Jena Lugosky and Rick Dove
- Craig Nicholson and Rick Dove





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What's Inside

SPECIAL FEATURE

Systems of Systems and Self-Organizing Security

(Photo: Amber Sports Used with permission)

July 2013 | Volume 16 Issues 2

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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

2013Q2 INSIGHT Essays – The Buck Stops Here: Systems Engineering is Responsible for System Security

Mission: These essays are intended to lower the barriers (toward removal) of effective systems and security engineer mutual engagement. The barriers are those perceived by systems engineers, security engineers, project managers, and program managers.

On-or-Before Schedule

10 Jul 2012: Call for essays issued.

15 Aug 2012: Authors declare intent, topic, and brief abstract to rick.dove@parshift.com.

01 Sep 2012: Authors selected and a coach from the Editorial Committee is assigned.

30 Nov 2012: First (complete) draft essay submission.

29 Jan 2013: Symposium – Presentation/discussion at IW13 (LiveMeeting enabled).

28 Feb 2013: Notification of acceptance – comments for improvement as appropriate.

31 Mar 2013: Final draft submission, with author-company release if necessary.

15 May 2013: Collection sent to INSIGHT editors.

xx Jul 2013: INCOSE INSIGHT publication.

General guidance

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

Essays should relate real life experience of effective/attempted mutual engagement, with lessons learned as appropriate.

The mission is important, so a coach from the Editorial Committee will be assigned to each author.

12 Essay Author Commitments Currently

Requirements, Requirements Analysis, and Concept of Operations Processes:
SysE: Paul Popick -- SecE: Mark Snell and Ruth Duggan

Architectural Design Process:
SysE: Ken Kepchar -- SecE: Kevin Stoffell

Implementation Process:
SysE: TBD -- SecE: Stephan Thompson

Integration Process:
SysE: Robert Marchant (also V&V) -- SecE: Carol Woody (SEI)

Verification and Validation and Test and Evaluation:
SysE: Robert Marchant (also integration) -- SecE: Bruce Hunter

Three large view essays:

– Beth Wilson (SysE): Management's Processes for Systems and Security Engineering Integration

– Janet Oren (SecE): A General Process-Basis for Integrating Systems and Security Engineering

– Don Gelosh, Worchester PolyTech (Education): Univ. curricula integrating security with systems engineering.

Other Commitments:
- John Miller on Supply Chain

UPDATED CALL

Visit www.parshift.com/s/CallForEssays-INSIGHT2013Q2.pdf for continuing updates to this Call for Essays.

INCOSE Symposium 2013
SSE Track

INCOSE Symposium June 24-27, 2013
Philadelphia, PA

Food for Thought:

What does the System Engineer need to know about Security Engineering and Systems Security?

What kinds of questions should the Systems Engineer ask of the Security Engineer?

How can Security Engineers engage with Systems Engineers and Systems Engineering Processes effectively?

15 pages maximum
6 papers/track (can do a double track)

July IS2012 finalize theme for call
Systems Engineering Responsibility for System Security

Papers due November 8, 2012

Systems Security Engineering (SSE) Working Group (Obligated to Develop References for the)

SE Body of Knowledge (SEBoK) Project

Systems Security Engineering (SSE) Working Group SE Body of Knowledge (SE BoK)

Background

- INCOSE has given SSE WG responsibility to “contribute” our Systems-and-Security knowledge to the security section of SEBoK
- SEBoK will eventually be an accessible wiki
- Upcoming monthly Webinar will discuss INCOSE and SEBoK
- Objective of SE BoK
  - Create a SE Body of Knowledge (SEBoK) that defines and organizes the SE Discipline and is globally recognized by the SE community as the authoritative BoK for the SE discipline

SSE Objectives

- To have a collection of candidate Primary References for SSE WG circulation prior to, and discussion at, IS13 –
- Select a subset of reference based upon the IW13 discussion to offer to the SEBoK WG
- Identify someone to the lead the SSE contribution to the SEBoK Working Group
  - To lead the SSE effort to collect and discuss the SEBoK references at IS13

SEBoK and "Primary References"

www.sebokwiki.org/075/index.php/How_to_Read_the_SEBoK#Primary_Reference_Article

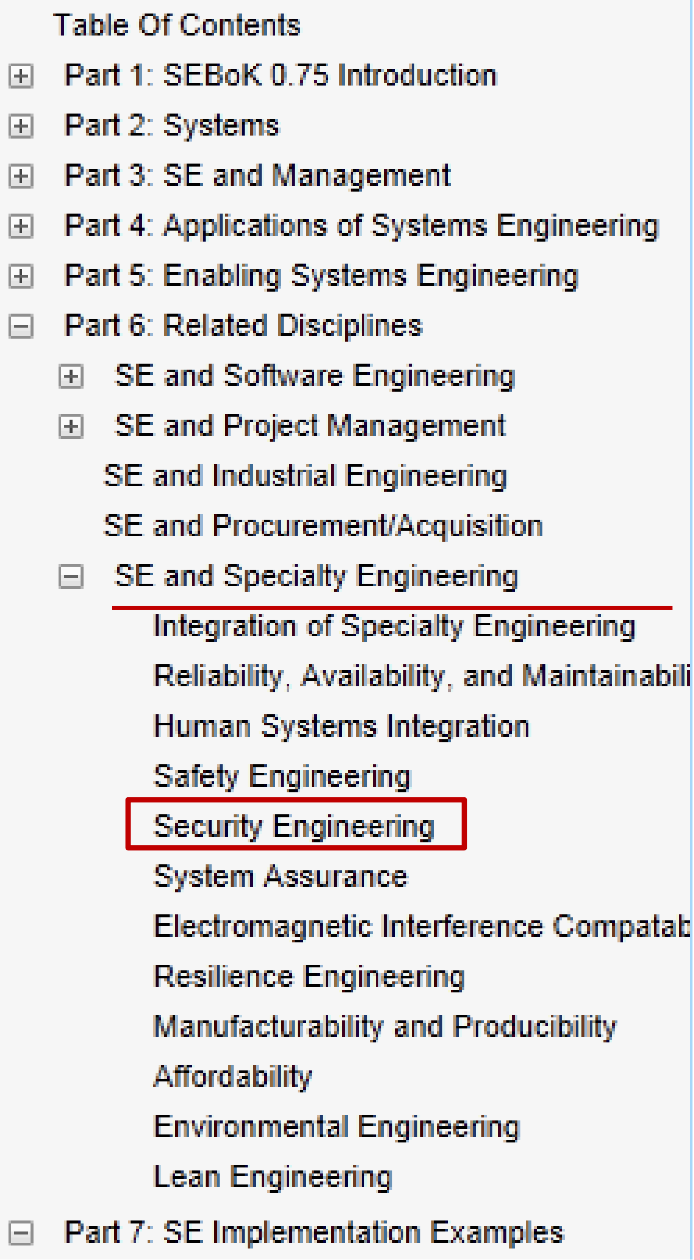


Table Of Contents

- ⊞ Part 1: SEBoK 0.75 Introduction
- ⊞ Part 2: Systems
- ⊞ Part 3: SE and Management
- ⊞ Part 4: Applications of Systems Engineering
- ⊞ Part 5: Enabling Systems Engineering
- ⊟ Part 6: Related Disciplines
  - ⊞ SE and Software Engineering
  - ⊞ SE and Project Management
  - SE and Industrial Engineering
  - SE and Procurement/Acquisition
  - ⊟ SE and Specialty Engineering
    - Integration of Specialty Engineering
    - Reliability, Availability, and Maintainabili
    - Human Systems Integration
    - Safety Engineering
    - Security Engineering
    - System Assurance
    - Electromagnetic Interference Compatab
    - Resilience Engineering
    - Manufacturability and Producibility
    - Affordability
    - Environmental Engineering
    - Lean Engineering
- ⊟ Part 7: SE Implementation Examples

First topic under SE and Specialty Engineering is *Integration of Specialty Engineering* at

www.sebokwiki.org/075/index.php/Integration_of_Specialty_Engineering - with a US Air Force "Primary Reference" that displays the figure below.

Security is notably absent – indicating our work of obtaining "primary references" is not limited to the Security Engineering section.

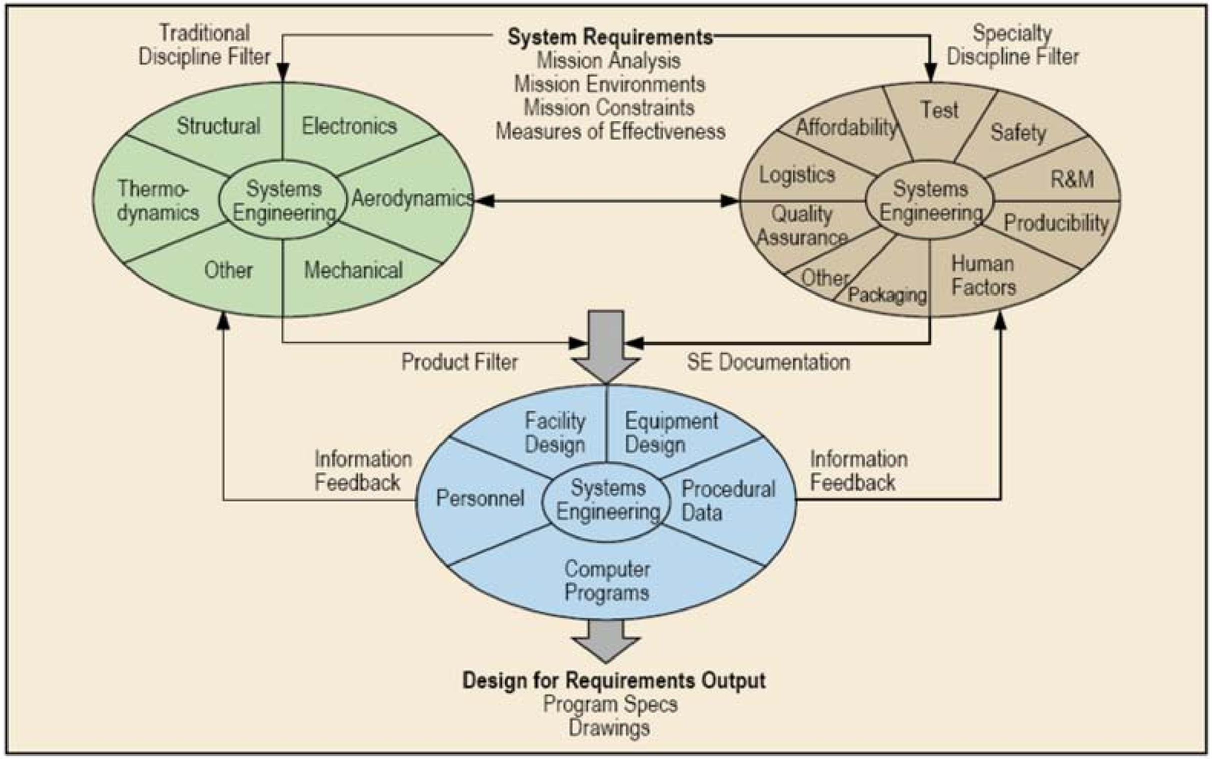
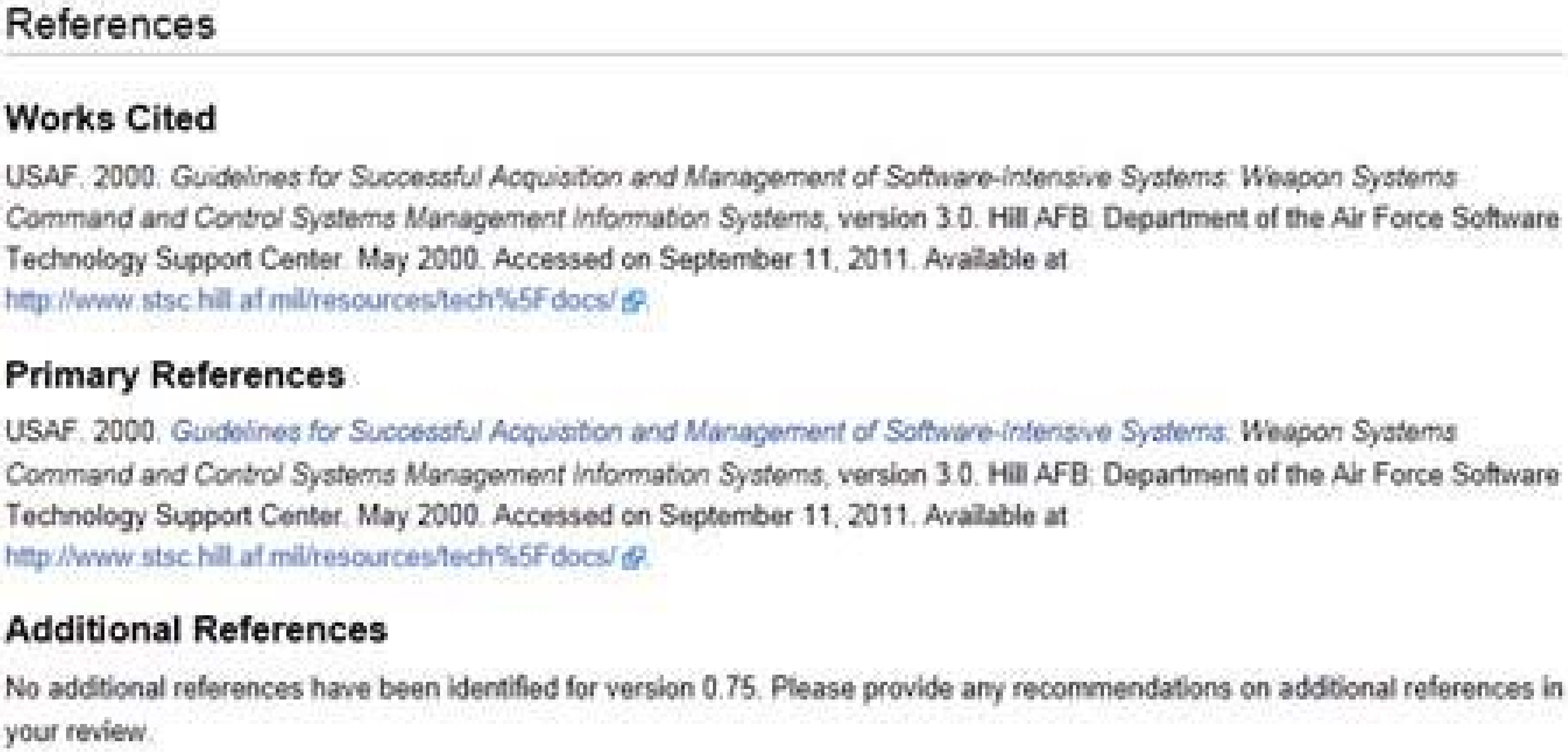


Fig. 1 Integration Process for Specialty Engineering

More Than *Primary* References Needed



References

Works Cited

USAF. 2000. *Guidelines for Successful Acquisition and Management of Software-Intensive Systems: Weapon Systems Command and Control Systems Management Information Systems*, version 3.0. Hill AFB: Department of the Air Force Software Technology Support Center. May 2000. Accessed on September 11, 2011. Available at http://www.stsc.hill.af.mil/resources/tech%5Fdocs/

Primary References

USAF. 2000. *Guidelines for Successful Acquisition and Management of Software-Intensive Systems: Weapon Systems Command and Control Systems Management Information Systems*, version 3.0. Hill AFB: Department of the Air Force Software Technology Support Center. May 2000. Accessed on September 11, 2011. Available at http://www.stsc.hill.af.mil/resources/tech%5Fdocs/

Additional References

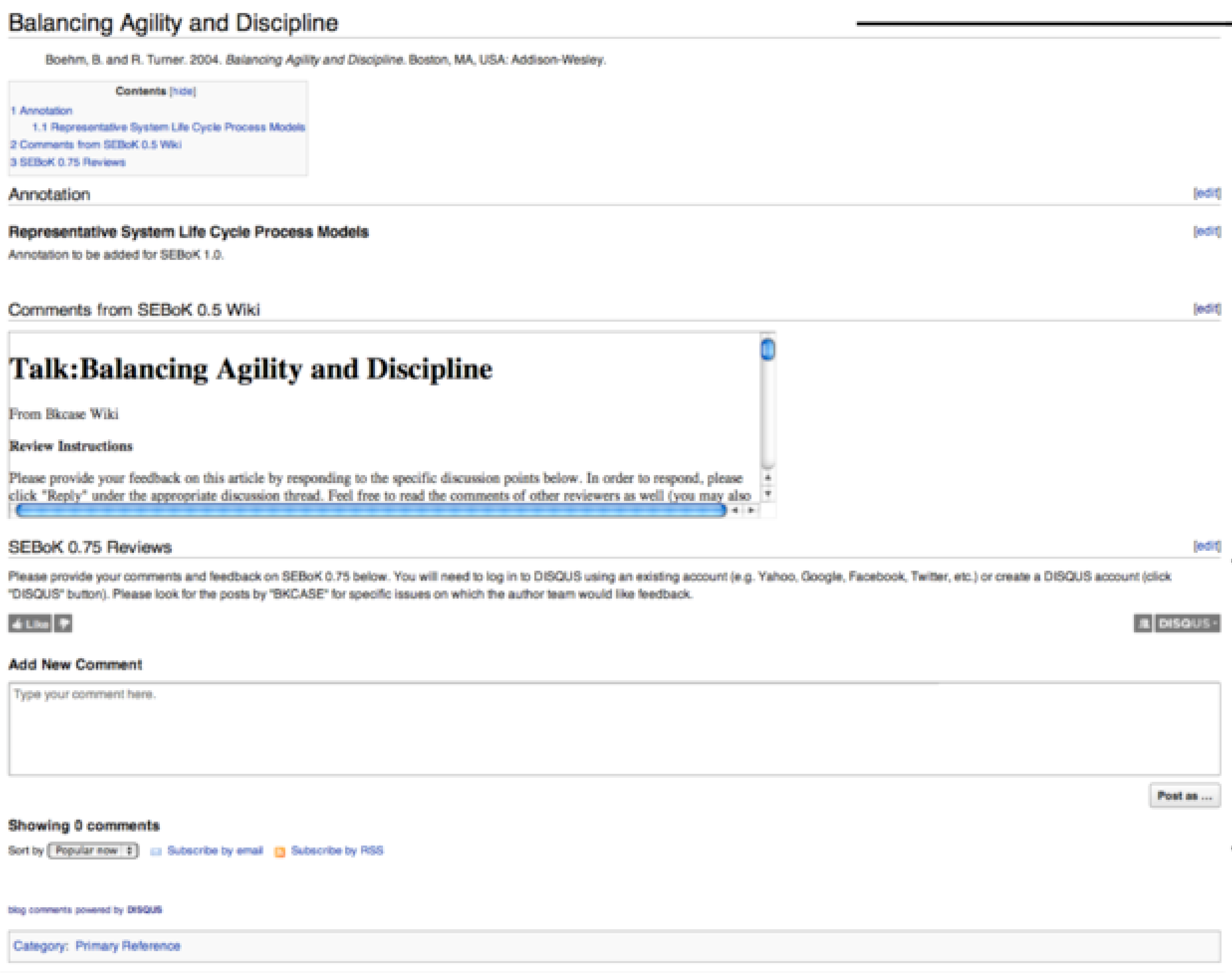
No additional references have been identified for version 0.75. Please provide any recommendations on additional references in your review.

Primary Reference
Format is explained – but qualifications are not found

www.sebokwiki.org/075/index.php/How_to_Read_the_SEBoK#Primary_Reference_Article

Primary Reference Article

The following is an example of a primary reference article, showing the different types of information contained in each article.



Balancing Agility and Discipline

Boehm, B. and R. Turner. 2004. *Balancing Agility and Discipline.* Boston, MA, USA: Addison-Wesley.

Contents [hide]

Annotation [edit]

Representative System Life Cycle Process Models [edit]

Annotation to be added for SEBoK 1.0.

Comments from SEBoK 0.5 Wiki [edit]

Talk:Balancing Agility and Discipline

From Bkcase Wiki

Review Instructions

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Annotation (topics for which this is a primary reference and explanation of why this is important)

SEBoK 0.5 (shows comments submitted in SEBoK 0.5 wiki, if any. Note: this does not include comments submitted outside the wiki)

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Security Engineering Page - From .75 SEBoK 9Jul2012

www.sebokwiki.org/075/index.php/Security_Engineering

Security engineering is concerned with building systems that remain secure despite malice or error. Security engineering focuses on the tools, processes, and methods needed to design and implement complete systems that proactively and reactively mitigate vulnerabilities. Security engineering is a primary discipline used to achieve system assurance.

Multidisciplinary Reach

Security engineering incorporates a number of cross-disciplinary skills, including cryptography, computer security, tamper-resistant hardware, applied psychology, supply chain management, and law. Security requirements differ greatly from one system to the next. System security often has many layers built on user authentication, transaction accountability, message secrecy, and fault tolerance. The challenges are protecting the right items rather than the wrong items and protecting the right items but not in the wrong way.

Robust Security Design

Robust security design explicitly rather than implicitly defines the protection goals. The Certified Information Systems Security Professional (CISSP) Common Body of Knowledge (CBK) partitions robust security into ten domains (Tipton 2006):

- Information security governance and risk management addresses the framework, principles, policies, and standards that establish the criteria and then assess the effectiveness of information protection. Security risk management contains governance issues, organizational behavior, ethics, and security awareness training.
- Access control is the procedures and mechanisms that enable system administrators to allow or restrict operation and content of a system. Access control policies determine what processes, resources, and operations users can invoke.
- Cryptography can be defined as the principles and methods of disguising information to ensure its integrity, confidentiality, and authenticity during communications and while in storage. Type I devices are certified by NSA for classified information processing. Type 2 devices are certified by NSA for proprietary information processing. Type 3 devices are certified by NSA for general information processing. Type 4 devices are produced by industry or other nations without any formal certification.
- Physical (environmental) security addresses the actual environment configuration, security procedures, countermeasures, and recovery strategies to protect the equipment and its location. These measures include separate processing facilities, restricted access into those facilities, and sweeps to detect eavesdropping devices.
- Security architecture and design contains the concepts, processes, principles, and standards used to define, design, and implement secure applications, operating systems, networks, and equipment. The security architecture must integrate various levels of confidentiality, integrity, and availability to ensure effective operations and adherence to governance.
- Business continuity and disaster recovery planning are the preparations and practices which ensure business survival given events, natural or man-made, which cause a major disruption in normal business operations. Processes and specific action plans must be selected to prudently protect business processes and to ensure timely restoration.
- Telecommunications and network security are the transmission methods and security measures used to provide integrity, availability, and confidentiality of data during transfer over private and public communication networks.
- Application development security involves the controls applied to application software in a centralized or distributed environment. Application software includes tools, operating systems, data warehouses, and knowledge systems.
- Operations security is focused on providing system availability for end users while protecting data processing resources both in centralized data processing centers and in distributed client / server environments.
- Legal, regulations, investigations, and compliance issues include the investigative measures to determine if an incident has occurred and the processes for responding to such incidents.

Given the variety of security needs and various domains that contribute to system security, a commonly applied architecture and design approach is known as "defense in depth." This approach implements multiple layers of defense and countermeasures, making maximum use of certified equipment in each layer to facilitate system accreditation.

References

Works Cited

- Tipton, H.F. (ed.). 2006. *Official (ISC)2 guide to the CISSP CBK,* 1st ed. Boston, MA, USA: Auerbach Publications.

Primary References

- **No primary references have been identified for version 0.75. Please provide any recommendations on additional references in your review.**

Additional References

- Anderson, Ross J. 2008. *Security Engineering: A Guide to Building Dependable Distributed Systems.* 2nd Ed. New York, NY, USA: John Wiley & Sons.
- ISO. 2007. *Information technology -- Security techniques -- Systems Security Engineering -- Capability Maturity Model® (SSE-CMM®)*ISO/IEC 21827. Geneva, SW: ISO.

SEBoK Security Engineering: Wiki Comments as of 9Jul2012

Thread title	Replies	Last modified
References	4	19:44, 8 December 2011
Integration	2	05:17, 21 November 2011
Multiple Perspectives	1	20:30, 18 September 2011
Terminology	1	20:30, 18 September 2011
General Content	1	20:29, 18 September 2011
Open Discussion	1	20:29, 18 September 2011

From Bkcase Wiki – The SEBoK is designed to provide pointers to a variety of relevant works within the systems engineering community for a given topic.The author team acknowledges that more diversity of references is still needed. Please provide your feedback on references here, specifically what additional references should be considered for future incorporation.

References

Bkcase, 18 September 2011 – The SEBoK is designed to provide pointers to a variety of relevant works within the systems engineering community for a given topic. For version 0.5, the author team acknowledges that more diversity of references is still needed. Please provide your feedback on references here, specifically what additional references should be considered for future incorporation.

Stn, 7 November 2011 – The MITRE System Engineering Guide has articles on various aspects of security engineering. These could be included as additional references: Mission Assurance and Certification and Accreditation

Harold Baker, 21 November 2011 – Good reminder that certification and accreditation (C&A) is a vital companion process to Systems Security Engineering

Harold Baker, 21 November 2011 – Security Engineering specific references should include: "Security Engineering: A Guide to Building Dependable Distributed Systems", Second Edition by Ross J. Anderson, John Wiley & Sons © 2008; ISO/IEC 21827:2008 specifies the Systems Security Engineering - Capability Maturity Model® (SSE-CMM®); Information Assurance Technical Framework (IATF); and NIST Special Publications (SP) in the 800 series.

Thesis: Establishing a Framework for an Information Systems Security Engineering Process 5/25/2012

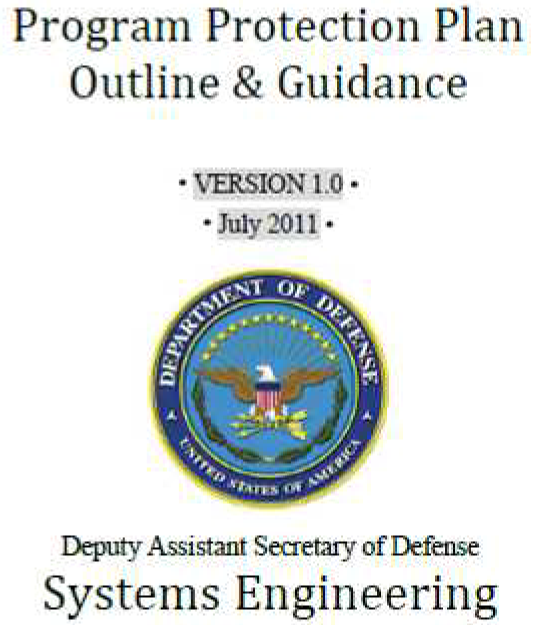
Doctoral Candidate - Janet Carrier Oren

ABSTRACT: The need for system safety was recognized during the 1940s. Information systems security engineering is now recognized as essential to many contemporary system developments. It has been observed that safety and security requirements often overlap within software-based systems. Both the safety and security disciplines have an objective of operating and failing in a safe and secure manner that is realized through analysis, testing, and/or inspection. Such common objectives and methodologies raise the question of whether cost savings could be realized if the safety and security tasks were executed simultaneously. To study potential cost savings, it is necessary to compare tasks in a similar manner. While safety engineering descriptions are task based and focused on artifacts, information systems security engineering process descriptions are unstructured. The purpose of this research was to establish a comparable process description for systems security engineering. Business process modelling based upon existing process descriptions is, as a starting point, applied to define a framework rendering the process understandable to a broad audience and to allow for focused research and improvement. This research presents the process for creation of an innovative model and completion of the model and supporting documentation. Evidence is provided of early adoption of the model. Reviews from application of the process model have recognized its value in establishing consistency in application of the systems security engineering process and in guiding further research on task execution. The model is also being adopted as the foundation for development of a new government publication addressing systems security engineering.

From page 18 "The National Security Agency is working with the National Institute of Standards and Technology to revise and expand the 2002 [NSA] publication. The model produced by this current research has been provided to the National Security Agency to guide the content of the new publication." The 2002 NSA publication is titled "Information Assurance Technical Framework" with a focus on "Information Systems Security Engineering Process".

Page 35 of thesis: "After a July 2010 draft of the described Special Publication was deemed unacceptable by the management of the Agency, the Information Systems Security Engineering process model defined in Appendix B was offered as a framework for the Special Publication. The model was used as the initial outline for the new Special Publication, and many of the defined tasks and output were incorporated into the current draft. While the process model is clearly evident within the new document, it does not reflect all 94 tasks because that level of detail is not the intent for the publication.

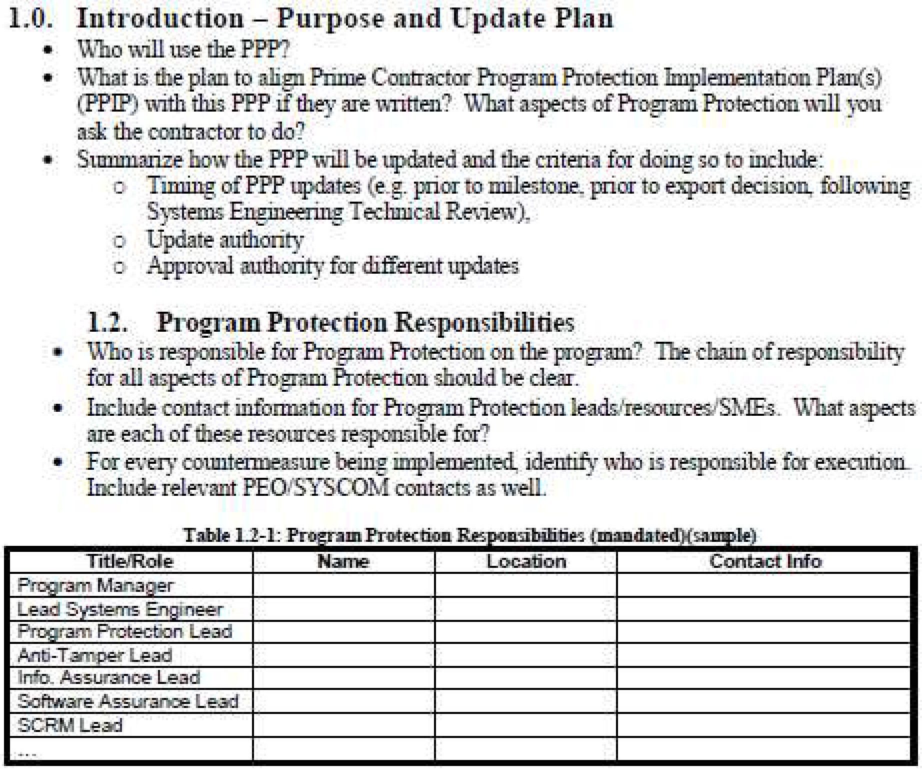
Alignment Considerations



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			
…			

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.

Collaboration with New Agile Systems Engineering WG?

Purpose—The purpose of this working group is to identify and develop a body of knowledge that will inform systems engineering and related processes which require agile system capability. Agile systems of interest to this working group include both systems engineering processes and systems-engineered systems.

This working group views agility as a sustainable system capability, enabled and constrained fundamentally by system architecture. This architecture delivers agile capability as reconfiguration, augmentation, and evolution of system functionality, after deployment; enabling the system to respond to new and immediate situational requirements effectively. Effectiveness of response is measured in response time, response cost, response quality, and response scope sufficient to sustain the system's functional intent.

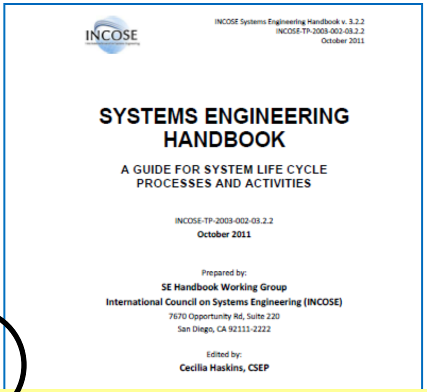
Need—The need to understand sustainably agile system design and project management concepts exists on multiple fronts:

- **Agile Systems-Engineering development processes have become of interest to the CAB companies, and they are asking that INCOSE develop appropriate guidance.**
- **Defense organizations have an interest in how agile system concepts might inform agile acquisition processes.**
- **Quick Reaction Capability (QRC) has been a defense acquisition need for some time and would benefit from an agile response capability by suppliers, yet generally QRC is achieved today by the employment of costly and error-prone overtime work and the increased risk of relaxing formal Systems Engineering processes.**
- **Both commercial and governmental organizations are finding that the pace of technology and growing user expectations are reducing the effective life time of deployed systems.**

Next steps—Under the assumption that the working group will be approved during IS12, organizational activity will occur during the remainder of this year, in preparation for an IW13 kick-off workshop. This will include the creation and population of a SharePoint site, recruitment of WG members from both INCOSE membership and external sources, development of an opt-in announcements mailing list, and an agenda for the IW13 Jacksonville, FL January 26-29 kick-off workshop.

To get on the announcements mailing list indicate that desire to rick.dove@parshift.com, and include any thoughts you may have.

Open Author Needs and Opportunities: 4 Projects



INCOSE Systems Engineering Handbook v. 3.2.2
INCOSE-TP-2003-002-03.2.2
October 2011

INCOSE

SYSTEMS ENGINEERING HANDBOOK

A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES

INCOSE-TP-2003-002-03.2.2
October 2011

Prepared by:
SE Handbook Working Group
International Council on Systems Engineering (INCOSE)
7670 Opportunity Rd, Suite 220
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Edited by:
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1

SE Handbook
Insert security content
(1-2 sentences)
New SSE Section 9.16
(2-3? Handbook pages)
Expect call for inputs Fall 2012

BKCASE SEBoK

3

SEBoK
Need References
for Review at IW12

INCOSE
International Council on Systems Engineering

INSIGHT

IS13 Philadelphia

INCOSE International Symposium

2

INCOSE Symposium 2013
Philadelphia, June 24-27, 2013
Security Track
15 page max papers
Papers due early Nov 2012

4

INSIGHT Issue 2013
2,000 word essays
Sep 2012 Authors selected
Nov 2012 Draft essays
Jan 2013 Review essays at IW13
July 2013 Issue

1962

“A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons:

incomplete or contradictory knowledge,

the number of people and opinions involved,

the large economic burden, and

the interconnected nature of these problems with *other* problems.

From: *Wicked Problems: Problems Worth Solving* by Jon Kolko, Austin Center for Design, 2012
www.ssireview.org/articles/entry/wicked_problems_problems_worth_solving