



Body of Knowledge and Curriculum to Advance Systems Engineering

**Third Workshop on
Progress toward SEBOK 0.25
and
GRCSE 0.25**

July 7th and 8th, 2010

**Hyatt Regency O'Hare
Chicago, IL, USA**

WORKSHOP REPORT

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1. BKCASE Project

BKCASE is the acronym for the Body of Knowledge and Curriculum to Advance Systems Engineering. The BKCASE project is led by a university partnership between the Stevens Institute of Technology and the Naval Postgraduate School with sponsorship from the U.S. Department of Defense and partnership with INCOSE, the IEEE Computer Society, IEEE Systems Council, ACM, and NDIA Systems Engineering Division. The project scope is to define a Systems Engineering Body of Knowledge (SEBoK) and use the SEBoK to develop an advanced Graduate Reference Curriculum for Systems Engineering (GRCSE).

The ideal outcome is that the SEBoK will be supported worldwide by the Systems Engineering community as the authoritative SEBoK for the SE discipline; and that the GRCSE will receive the same global recognition and serve as the authoritative guidance for graduate degree programs in SE. Systems engineers from across the world have volunteered as authors and reviewers on the project to collaborate over a three year period and to deliver the SEBoK and GRCSE to the public in 2012.

Last December, the BKCASE team held an inaugural workshop in Monterey, CA, at the Naval Postgraduate School to determine the basic rules for the project and develop a common set of objectives. In addition, the team developed an initial strategy to begin work on SEBoK version 0.25, which included using ISO 15288 as the initial structure for the SEBoK. At the second workshop in Daytona Beach, Florida in March, the team expanded the SEBoK contents to include many other areas of systems engineering knowledge in addition to life cycle processes and identified the initial GRCSE team. The author team broke into subteams to begin drafting materials for review at the third Workshop.

2. BKCASE Workshop 3.

The third workshop was held at the Hyatt Regency O'Hare in Chicago, IL, USA on July 7th and 8th, 2010. A list of the workshop attendees is available in Appendix A and the meeting agenda in Appendix B of this report. The workshop's slide sets are available online for download at the BKCASE website located at <http://www.bkcase.org>.

The objectives of the workshop were to:

1. Finalize release criteria for SEBoK 0.25.
2. Review of draft SEBoK 0.25 materials and decide on way ahead to produce 0.25.
3. Standardize and de-conflict terminology for SEBoK 0.25.
4. Finalize SEBoK 0.25 review plan and materials.
5. Review of initial GRCSE materials and decide on way ahead to produce draft 0.25.
6. Review proposed Wiki structure, uses, technology, and protocols.

During Dr. Pyster's introductory comments, he reminded authors that the Author Copyright Release form must be completed and returned to Stevens before publishing both SEBoK and GRCSE v0.25 in

order to participate as a BKCASE author. Dr. Pyster noted that some authors may require approvals from their organizations before signing. If necessary, modifications to the original form will be considered by Stevens Institute of Technology.

3. Workshop Proceedings

3.1 Opening Remarks

Art Pyster opened the meeting by introducing new authors and thanking the authors for their work thus far. He stated that the team appears to be on track for a September 15, 2010 release of SEBoK 0.25 and that the authors had done a tremendous job getting the initial materials together. He did say, however, that the materials submitted for the workshop were uneven in completeness, depth, writing style, number of references, etc. While this was expected and reflects only the diversity of the team, this must be addressed as the team moves forward. To begin this process, the Core team took liberties with the materials submitted for the workshop, reorganizing the layouts, updating the language, etc. One of the primary points of the workshop was to review these changes, discuss any issues caused by them, and develop a way forward to produce SEBoK 0.25.

Dr. Pyster then reviewed the agenda with the author team.

3.2 Finalization of Release Criteria for SEBoK 0.25

At the European Systems Engineering Conference (EuSEC), held on May 23, 2010 in Stockholm, Sweden, a sub-set of the author team met and created a draft set of release criteria for SEBoK 0.25. “Release criteria” are a set of checks which must be passed in order to move forward with the release and review of SEBoK 0.25.

Dave Olwell presented these draft release criteria to the author team. After discussion, the author team edited and finalized the release criteria for SEBoK 0.25. These release criteria are found in Table 1 along with the rationale behind each criterion. At the end of the workshop, these release criteria were revisited and the author team felt comfortable that the release criteria could be met on the schedule provided.

Table 1. SEBoK v.025 Release Criteria

SEBoK 025. Release Criteria	Rationale
1. All authors have signed and returned the author release form.	The content generated for SEBoK 0.25 should be unique and generated by the authors. If the authors have not provided authorization to use their materials, the document cannot be shipped.
2. The BKCASE project has the right to use or the right to use is in process for all figures not developed by the author team.	Protection of Intellectual Property (IP) is critical if the SEBoK is to be comprehensive but accepted within the SE community. Wherever a figure is copied from another source, it will not be included unless permission from the copyright owner has been received or at least requested. The labels “used with permission from [Source]” and “copyright use permission

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SEBoK 025. Release Criteria	Rationale
	requested from [Source]" will be used to mark all figures not generated by the author team.
<p>3. The following sections are reasonably mature: Introduction (Chapter 1), Systems Concepts and Thinking (Chapter 2), and Systems Engineering Overview (Chapter 3).</p>	<p>Because they provide the foundations for all other knowledge areas, it is critical that these chapters be as mature as possible.</p>
<p>4. All other Chapters are reasonably mature, meaning each Chapter has an appropriate organizational structure with fairly complete topic and sub-topic lists, "obvious" material is included, scope is appropriate, glossary terms are identified, primary references are identified, and there is a statement of maturity (stable, evolving, immature).</p>	<p>For version 0.25, it is unrealistic that all materials will be as mature as Chapters 1-3. However, it is appropriate that each chapter contains enough information for reviewers to provide substantive and useful feedback. Without the minimum requirements stated, it would be difficult to receive meaningful feedback during the review process.</p>
<p>5. No more than 2 Chapters are blank.</p>	<p>For version 0.25, it is considered acceptable for 2 chapters to be blank (exempt from the criteria mentioned in Release Criterion #4). This provides some flexibility for the author team to prioritize required areas. As there are 16 chapters, however, only a small portion of the overall document would be blank. The authors agreed this was acceptable, provided an explanation that the chapters would be drafted for version 0.5 was included.</p>
<p>6. The Core Team has approved the document with regards to technical editing and readability.</p>	<p>With over 40 individuals contributing content, it is critical that the document be edited for grammatical correctness, technical consistency, and unification of voice. This will improve the overall product and reduce the number of review comments focused on these issues instead of content.</p>
<p>7. Critical overlaps in material are corrected while non-critical overlaps which are not yet corrected are identified.</p>	<p>Many teams of individuals will develop version 0.25 and, therefore, overlaps in material are expected. To improve internal consistency, the Core team will help to identify and correct major overlaps. It may not be necessary to correct all non-critical overlaps for version 0.25 and, therefore, it is acceptable to leave these in the document, provided they are identified.</p>
<p>8. Critical inconsistencies are corrected while major inconsistencies which are not yet corrected are identified.</p>	<p>Many teams of individuals will develop version 0.25 and, therefore, inconsistency in material is expected. To improve internal consistency, the Core team will help to identify and correct major inconsistencies. It may not be necessary to correct all non-critical inconsistencies for version 0.25 and, therefore, it is acceptable to leave these in the document, provided they are identified.</p>
<p>9. Critical gaps are noted and characterized.</p>	<p>Many teams of individuals will develop version 0.25 and, therefore, gaps in material expected. To improve internal consistency, the Core team will help to identify and correct major gaps. Because there will be two additional versions of</p>

SEBoK 025. Release Criteria	Rationale
	the document, it is acceptable to leave information gaps provided they follow the guidance set forth in Release Criteria 2-5.
<p>10. The author team is reasonably comfortable with the draft presented at Workshop III.</p>	<p>Based on the workshop discussions, the author team agreed that they are comfortable with the materials presented at WS III as a basis for the additional writing and editing expected prior to release of version 0.25.</p>

3.3 Discussion of SEBoK 0.25 Draft Materials

Art Pyster led a walk-through of the draft of SEBoK 0.25 which was sent out by the Core team prior to the workshop. Each chapter was discussed at a high level and decisions were made on a chapter-by-chapter basis as appropriate. Some overall points on the state of SEBoK 0.25 included:

- **The draft materials submitted are sometimes too prescriptive.** Philosophically, a body of knowledge should point to a variety of knowledge on a given topic. Therefore, it is not appropriate to dictate a single approach or method for any given knowledge area. Instead, authors should strive to cover the breadth of available information for a given area. Where there are divergent opinions, such as in emerging areas, these should be discussed and references for each opinion should be provided. This will support the purpose of SEBoK providing guidance on how to access the many types of information in the systems engineering knowledge base.
- **In general, the draft materials are too oriented towards government contracting and the government acquisition/supplier model.** Given the make-up of the team and the high number of resources based on these types of models, this is not surprising. However, for the SEBoK to be truly comprehensive, authors must focus on finding commercial sources outside of this arena.
- **Overall, the SEBoK is lacking the desired level of reference materials.** The materials contained a mixture in the number of references provided for a given topic. However, on the whole the author team should focus on finding additional references for each section. As stated above, these should include resources outside of the typical government contracting and acquisition models. In addition, many of the references provided were incomplete. The Core team will provide further guidance on the best way to both cite references in the text and provide bibliographic information. The references will be divided into two categories:
 - **Primary references** are those that are considered “canon”. These would be the top references that authors consider essential for understanding on a subject. The assumption is that if a reference falls into this category, it should be referenced in the text.

- **Additional references and readings** are those that provide additional understanding on a subject, new or emerging perspectives, current research, information on a topic specific to a particular domain, etc. This includes these types of resources regardless of whether or not they are referenced in the text.
- **Overall, there was too much copying from other sources.** Even if properly cited and with permission of the author, the purpose of the SEBoK is to provide a guide to systems engineering knowledge, not to compile all SE knowledge into a single place. Authors should strive to create a concise overview and roadmap to appropriate sources on a specific topic. Copying directly from source material, though in small amounts appropriate, should not be the primary mode of building SEBoK content.
- **Writing is generally too focused on product SE without adequate coverage of service SE and enterprise SE.** This is, in part, a result of the government-centric nature of the current materials. The author team discussed several possible ways to address this. The Systems Concepts and Thinking and the Systems Engineering Concepts chapters will both include references to service and enterprises and how they are engineered. This will help to set up two new chapters: Service SE and Enterprise SE. When appropriate in the technical content, considerations for differences in application to products, services, and enterprises will be discussed. In future versions of the SEBoK (not for 0.25), the Applications and Case Studies chapter will also include examples of service and enterprise systems.
- **Glossary terms often not filled in and many terms are not defined even in the text.** As authors move forward with their draft materials, it is critical to identify any terms which are specific to systems engineering (i.e. terms not commonly understood by the public). Where a term has a specific meaning in systems engineering which differs from commonly-accepted definitions, this should also be defined. All terms should be accompanied by some form of reference from which the definition was pulled.

Issues still open

- Permissions to reproduce/ adapt / derive figures and tables
 - Consolidate the permission list and the core team will send out one letter to each source. Multiple requests may go out to any one organization who owns the copyright.
 - “Fair use” still ill-defined; legal advice pending

The authors reviewed the Core team’s assessment of the state of materials. The assessments were based on the amount of time believed to be required to create a draft suitable for the final version 0.25, with “low” requiring less than 10 hours of work, “medium” requiring 10-25 hours of work, and “high” requiring more than 25 hours of work. Though the final structure of the document was changed (See Appendix E), the overall assessment from the submitted materials held true. Roughly half the chapters

require low additional work, a third requires a high amount of work, and the remainder requires a moderate amount of work. The author team agreed that this is satisfactory to meet the September 15, 2010 publication deadline.

3.4 SEBoK 0.25 Draft Review Plan

The Core team developed a draft review plan; Nicole Hutchison presented this plan at the workshop. The plan follows the basic format shown in Figure 1: The Core team will develop guidance and a template that will be provided to all reviewers. The author team will provide the Core team with specific recommendations for the content of this guidance (e.g. authors of specific material will state where additional information is needed for that material). As reviews are received, the Core team will catalogue and categorize them. These organized comments will be provided to the appropriate authors for specific sections. The author team will then adjudicate the comments, record the adjudication and any follow-on actions, and provide this to the Core team. The Core team will be responsible for publishing the review comments and adjudication to the wider SE community via the BKCASE website. Figure 1 below is a Systemigram™ outlining the proposed review process.

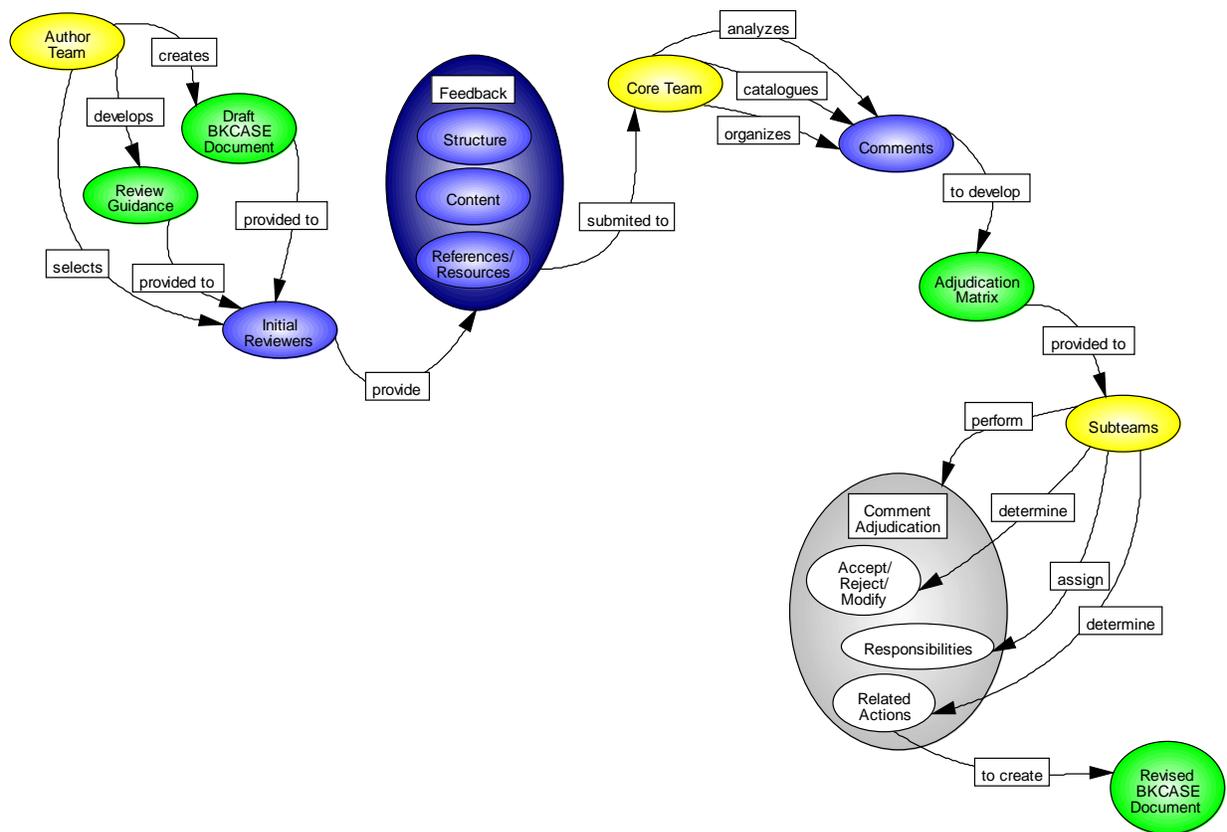


Figure 1. Proposed Review Process for BKCASE

The author team agreed with this general approach. Nicole Hutchison will provide a draft of guidance documents and review forms to the team after the July 30 mid-point check.

3.5 Review of GRCSE Materials to Date

Tim Ferris is the author lead for GRCSE and he provided a review of the current state of GRCSE. The group has formed; it consists of a very diverse set of individuals. The team has met and has held 5 conference calls to date.

The first main action of the GRCSE team has been to develop and conduct a survey of schools that have systems engineering masters programs. As of the workshop, over 30 schools had responded. The results show a great diversity in the way that systems engineering is approached and the topics covered within programs. The results of this survey provide an understanding of the current baseline of systems engineering programs worldwide. Full results will be reported as an appendix to the GRCSE chapter.

Tim explained that the approach to GRCSE was to first focus on systems-centric programs (as opposed to domain-centric programs) but will include a discussion of the different types of programs. The team hopes that future versions of GRCSE may be able to appropriately address domain-specific programs.

The team has started drafting materials for GRCSE 0.25 using the GSWE2009 document as a model. Tim provided a breakdown of the expected content for version 0.25 and how much of the material was drafted as of the workshop. This is summarized in Table 2.

Table 2. Proposed Structure of GRCSE 0.25

Title	Completion
Preface	80%
Acknowledgements	5%
Executive summary	25%
1. Introduction	0%
2. Guidance for the construction of GRCSE	90%
3. Expected objectives when a graduate has 3-5 years' experience	0%
4. Expected outcomes when a student graduates	0%
5. Expected student background when entering the master's program	0%
6. Curriculum architecture	0%
7. Core Body of Knowledge (CorBoK)	0%
8. Assessment	0%
9. Anticipated GRCSE Evolution	0%
Appendix A. Summary of Graduate SE-centric SE programs in 2010	10%
Appendix B. Bloom's taxonomy of educational objectives	90%
Appendix C. Systems engineering competency frameworks	90%
Appendix D. Untitled – probably Assessment and curriculum	0%
Appendix E. GRCSE outcomes CorBOK mapping	0%
Glossary	0%
Index	0%

One final issue discussed was the relationship between competency models and education. The author team agreed that it is inappropriate for GRCSE to duplicate information found in the SEBoK chapter on competencies. However, the GRCSE team agreed that looking at the overlaps in different competency models at the appropriate level and determining how those might affect the outcomes and objectives for graduates of an SE masters program is appropriate.

3.6 Strategy for Developing GRCSE 0.25

The GRCSE team will continue to draft material based on the template of GSwE2009 (the software engineering reference curriculum). They will also complete the analysis of the school surveys and begin looking at how competency models might inform the outcomes of the product.

The GRCSE team held a meeting to further define the GRCSE way ahead immediately following the workshop. Meeting highlights found in Appendix C. The team agreed to provide draft materials on August 1 and to submit draft materials of GRCSE 0.25 to the Core team by September 15, 2010 in preparation for the fourth author team workshop.

3.7 Review & Discussion of Proposed Wiki Structure

Sandy Friedenthal led the discussion on a proposed wiki structure for use in developing BKCASE materials. He discussed motivation for using a wiki structure, specifically in allowing SEBoK to evolve as appropriate and enable cross-linkages of related information. Users will need effective navigation and search mechanisms to provide functionality that is not possible for traditional documents.

Currently, Wiki efforts focus on determining what the options are for a BKCASE Wiki. The Wiki team recommends using a semantic MediaWiki, with technology similar to what is used in Wikipedia. This will allow people to search, organize, tag, browse, evaluate, and share Wiki content.

The team has drafted some Wiki content based on the early drafts of the SEBoK documents. The URL is http://sesandbox.referata.com/wiki/BKCASE_SE_BoK_Prototype_Wiki.

Sandy Friedenthal also provided draft use cases for the Wiki. These included those for updating, reviewing, approving, querying, and administering BKCASE Wiki content. The team will continue to work on processes and use cases. They will also explore methods for importing document text directly into the Wiki structure to ease the transition from 0.25 to 0.5.

3.8 BKCASE Publications/Papers/Presentations

Alice Squires led a discussion of the process which authors should use to publish information regarding the BKCASE project. Authors are encouraged to write papers and present information on BKCASE. However, it is important to maintain consistency of message as well as for the Core team to have visibility into the arenas in which SEBoK information is being presented.

The author team agreed to the following principles:

- For all formal publications (journal or conference papers or presentations), authors must obtain approval from the co-PIs, Art Pyster and Dave Olwell. This is not intended to hinder anyone publishing on BKCASE but instead to ensure consistency of message to the broader SE community.
- For all publications, including informal talks or local or in-company events, the author must notify Core team. This is not intended to be a 'permission' process, but simply to ensure that the Core team can track all of the events where BKCASE is being discussed or promoted. Authors should inform Steph Enck and Nicole Hutchison.
- As a good practice, an author should notify corresponding members of the author team about any articles, papers, presentations, etc. that they are generating. This will give the relevant members of the author team an opportunity to comment and, when appropriate, contribute.
- In general, authors should allow for a review cycle. When possible, authors should allow time for the Core team and the wider author team to review materials being presented, even if materials are going to be presented informally.
- Authors must use proper reference and citing of BKCASE team publications. The appropriate method for referencing will be developed by the Core team and posted on Sakai.
- Authors are welcome to leverage the generic BKCASE slide deck, which is available on Sakai. Authors should forward their paper(s) and/or briefing material(s) to the Core team for archiving on Sakai. If authors found any information in the generic slide deck lacking, they are asked to please forward this information to the Core team so that the generic slide deck can be continually improved.

All publications should align with the BKCASE vision, objectives, and the intent of the author team. If an author has a question regarding any form of publication on BKCASE, they should discuss it with the co-PI's, Art Pyster and Dave Olwell.

4. Way Ahead

4.1 Overview

SEBoK 0.25 draft iterations will be submitted to the Core team **July 30, 2010** as a mid-process check. **Final SEBoK 0.25 materials will be submitted to the Core team no later than August 18, 2010.**

4.2 Future Workshops

- **Workshop IV: October 13-14, 2010.** Toulouse, France. Expected feedback on SEBoK 0.25 and finalization of GRCSE 0.25.

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- **Workshop V: January 26-27, 2011.** Mesa, AZ, USA in conjunction with the INCOSE International Workshop (IW). Expected feedback from GRCSE 0.25 and progress on SEBoK 0.5.
- **Workshop VI: April 12- 13, 2011.** Los Angeles, CA, USA, hosted by USC, prior to the Conference on Systems Engineering Research (CSER).
- **Workshop VII: June 2011 (tentatively June 15-16).** Denver, CO, USA, in conjunction with the INCOSE International Symposium.
- **Workshop VIII: October 2011.** Tentatively to be held in the United Kingdom, hosted by Cranfield University.

Appendix A: Meeting Participants

In Attendance

Rick Adcock, *Cranfield University/INCOSE* (UK)
Jim Anthony, *Office of the Director of Defense Research & Engineering* (USA)
John Brackett, *Boston University* (USA)
Ed Conrow, *Management and Technology Associates* (USA)
Cihan Dagli, *Missouri University of Science and Technology* (USA)
Heidi Davidz, *UTC Pratt & Whitney* (USA)
J.J. Ekstrom, *Brigham Young University* (USA)
Stephanie Enck, *Naval Postgraduate School* (Support Staff) (USA)
Marcia Enos, *Lockheed Martin* (USA)
Dick Fairley, *IEEE* (USA)
Tim Ferris, *INCOSE/University of South Australia* (Australia)
Alain Faisandier, *Association Francaise d'Ingenierie Systeme/French INCOSE Chapter* (France)
Kevin Forsberg, *Center for Systems Management and INCOSE* (USA)
G. Richard Freeman, *Air Force Institute of Technology* (USA)
Sandy Friedenthal, *Lockheed Martin* (USA)
Brian Gallagher, *Northrup Grumman* (USA)
Don Gelosh, *Office of the Director of Defense Research & Engineering* (USA)
Tom Hilburn, *Embry Riddle Aeronautical University* (USA)
Nicole Hutchison, *Stevens Institute of Technology* (Support Staff) (USA)
Bud Lawson, *Lawson Konsult AB* (Sweden)
Alex Lee, *Defence Science and Technology Agency* (Singapore)
Nao Kohtake, *Keio University* (Japan)
Mike Krueger, *ASE Consulting* (USA)
Ray Madachy, *Naval Postgraduate School* (USA)
Ken Nidiffer, *Software Engineering Institute (SEI)* (USA)
David Olwell, *Naval Postgraduate School* (USA)
Art Pyster, *Stevens Institute of Technology* (USA)
Jean-Claude Roussel, *European Aeronautical Defence and Space Company* (France)
Garry Roedler, *Lockheed Martin* (USA)
Hillary Sillitto, *Thales Group and INCOSE* (UK)
John Snoderly, *Defense Acquisition University (DAU)* (USA)
Alice Squires, *Stevens Institute of Technology* (USA)
Mary VanLeer, *Arkansas Education Lottery* (USA)
Brian Wells, *Raytheon* (USA)

Joining via WebEx

Scott Jackson, *University of Southern California* (USA)

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Paul Croll, CSC (USA)

Massood Towhidnejad, *Embry-Riddle Aeronautical University* (USA)

Guests

Keith Chamberlain, PMI

Karl Best, PMI

Seiko Shiraska, INCOSE Japan Chapter

Dick Fairley, IEEE in USA

Appendix B: Meeting Agenda

Wednesday, July 7, 2010

- 8:00-9:00 am Agenda Overview, Opening remarks, New Author Introduction—*Art Pyster*
- 9:00 am-10:00 am Finalize Release Criteria for SEBoK 0.25 (draft developed at EuSEC)—*Dave Olwell*
- 10:00-10:30 am Discussion of SEBoK 0.25 Materials and Issues—*Art Pyster*
- 10:45-12:00 pm Discussion of SEBoK 0.25 (cont.)—*Art Pyster*
- 12:00-1:00 pm Lunch (*Garry Roedler, ISO/IEC Update 15 minutes*)
- 1:00-3:00 pm Discussion of SEBoK 0.25 (cont.)—*Art Pyster*
- 3:15-4:00 pm Discussion of SEBOK 0.25 (cont.)—*Art Pyster*
- 4:00-5:00 pm SEBoK 0.25 Review Plan—*Steph Enck and Nicole Hutchison*

Thursday, July 8, 2010

- 8:00-8:30 am Review of Day –Production and Release SEBoK 0.25—*Dave Olwell*
- 8:30-10:00 Review of GRCSE materials to date—*Tim Ferris*
- 10:15-11:30 pm Strategy for Developing GRCSE 0.25—led by *Art Pyster*
- 11:30-12:30 pm Lunch (*Don Gelosh, NDIA SE Conference Update 15 minutes*)
- 12:30-1:30 pm Review and Discussion of Proposed Wiki Structure—*Hans-Peter de Koning*
- 1:30-1:40 pm Brief on Workshop IV in Toulouse, France –*Jean Claude Roussel*
- 1:40-2:00 pm BKCASE Publications/Papers/Presentations by Authors –*Alice Squires*
- 2:00-3:00 pm Meeting Review and Wrap Up —*Art Pyster*

Appendix C: Lunchtime Sessions

Garry Roedler, ISO/IEC/JTC1/SC7 Resolution

Resolution 1288 of the ISO/IEC Joint Technical Committee 1/Sub-Committee 7 was passed in May 2010. This resolution states that the BKCASE technical material is of interest for ISO/IEC and relates well to Work Group 7 (WG7) efforts. They will do what is necessary to submit SEBoK for fast-track approval upon completion and they are willing to be reviewers of the SEBoK. Fast-track approval would allow SEBoK to be published as an ISO technical report. It would still be freely available and ISO would not have IP ownership. But it would provide exposure to a wider community and support from the ISO is a positive thing. Fast track applications would have to be submitted through the U.S. Technical Advisory Group (TAG). A member of the U.S. TAG has expressed interest in sponsoring BKCASE for Fast Track submittal.

This is currently an opportunity which the author team will continue to examine as the BKCASE project moves forward. There is currently no commitment to submit the SEBoK as a technical report.

Don Gelosh, BKCASE Track at NDIA SE Conference

In June, Robert Rassa had agreed to support a full track on BKCASE at the NDIA 2010 conference. The authors submitted paper and panel abstracts. After review, the NDIA is now offering to combine the BKCASE and Workforce Development tracks. This would give the equivalent of 12 paper slots to BKCASE and 9 paper slots for Workforce Development. The author team should plan for having 4 BKCASE sessions (including panels and papers) for the October 2010 conference. Don Gelosh and Art Pyster will attempt to negotiate an increase in the number of slots with Robert Rassa, but this depends on facility availability.

Appendix E: BKCASE Document Structures & Staffing

SEBoK

Section/Knowledge Area	Responsible/Team Members
SEBoK Version 0.25	Art Pyster/Dave Olwell
Introduction	Art Pyster (lead); Dave Olwell (support)
System Concepts & Thinking	Bud Lawson (lead); Alice Squires, Erik Aslasken, Scott Jackson (support)
SE Overview	Rick Adcock (lead); Scott Jackson, BarryBoehm (support)
Life Cycle	Kevin Forsberg (lead); Bud Lawson, Mike Krueger, Alain Faisandier (support)
<i>Service SE</i>	<i>blank</i>
Enterprise SE	James Martin (lead); Richard Freeman
Enabling SE (formerly “SE Organization”)	Hillary Sillitto (lead); James Martin, Richard Beasley
Management	Ray Madachy (lead); Barry Boehm, Garry Roedler, Ed Conrow, Ken Nidiffer
System Definition (Mission Analysis, Stakeholder Requirements, System Requirements, Architectural Design, Systems Analysis)	Alain Faisandier (lead); Richard Freeman, Garry Roedler, Jean-Claude Roussel
System Realization (Implementation, System Integration, System V&V)	John Snoderly (lead); Nicole Hutchison, Paul Croll, Jean-Claude Roussel (support)
System Deployment and Use (Transfer for Use or Deployment, Operation, Maintenance, Logistical Support)	Brian Gallagher (lead); Alex Lee (support)
System Life Management (Service Life Extension, Update/Upgrade, Disposal or Retirement)	Brian Wells (lead); Massood Towhidnejad, Alex Lee (support)
Agreement	Dave Olwell (lead); Brian Gallagher (support)
Cross-Cutting	Cihan Dagli (lead); Paul Croll, (Bail and Mayhew) (support)
Competencies	Brian Wells (lead); Heidi Davidz, Tom Hilburn, Ken Nidiffer (support)
Case Studies	Sandy Friedenthal (lead); Alex Lee, Alice Squires, Richard Freeman, Tom Hilburn (support)

GRCSE

GRCSE	Responsible
Introduction/Front Matter	<p style="text-align: center;">Tim Ferris (Lead) <i>Support Team:</i> <i>Alice Squires, J.J. Ekstrom, Mary van Leer, Dave Olwell, Tom Hilburn, Massood Towhidnejad, Guilherme Travassos, Rick Adcock, Scott Jackson, Daniel Prun, Nao Kohtake, Seiko Shirasaka, Richard Freeman, Alex Lee, Ken Nidiffer, Marcia Enos, John Brackett, Nicole Hutchison</i></p>
Objectives	
Outcomes	
Entrance Expectations	
Curriculum Architecture	
CBOK	
Assessment	
Maintenance/Refresh	
Closing Metter	
Appendices	

Appendix F: GRCSE Meeting Agenda and Action Items

Agenda

1. Survey – University of Pretoria
 - Who will send it?
 - Rick Adcock (try to find at IS10 and email Tom Hilburn)
2. Issues Identified – Bloom’s Taxonomy
 - Use all three domains as a source for educational outcomes planning.
 - Therefore – all three domains will have some impact on the expected outcomes – levels of achievement in each domain on topics of knowledge
 - KN: Kilpatrick’s taxonomy.
 - TH: GSWE Bloom’s – more widely recognised and understood.
 - AS: Bloom about proficiency level, Kilpatrick – more about assessment of the education. Kilpatrick may be used for effectiveness of education and so addresses the issue of ROI.
 - KN: Need a response.
3. Issues Identified – Competency Frameworks
 - Question: How should Competency Frameworks be addressed in GRCSE (given that there is also a chapter related to Competency Frameworks in BKCASE SEBoK)?
 - Competency frameworks can be used to develop statements of outcomes and objectives.
 - Competency framework to be used to develop the career growth model
 - RA: Do a mapping of outcomes to competency framework.
 - DO: Show how competency model works in the education part of work.
 - Use as support – especially commonalities of models.
 - AS: systems thinking (not in all), other three area shared, management, technical leadership – do not use the word. UK focused on skills to be a good team member. Management – leadership qualities; Technical – team member.
 - MV: curriculum should support what is SEBOK.
 - JE: CorBOK what is necessary to enter a career. BOK deals with the long experience knowledge.
 - TH: SWEBOK – knowledge for 5 years out – and used Bloom’s levels to reduce it a bit.
 - JE: may structure as knowledge areas, topics, units. For each level outcomes which describe what someone can do if they understand – i.e. evidence of understanding in the intended manner. Hard to develop the required level of detail in the CorBOK.
 - AS: SE architecture more complex than the SW architecture. Not expect higher levels in all areas. Possibly a small core + a middle and broader area. Either young or fairly old.
 - TH: entry requirements – an important part of the program description.
 - NH: entry requirements relate to minimum requirements – some may have much more experience.
 - RA: October – provide GSWE approach and apply to SE and put to review.
 - TH: GSWE outcomes easy to modify for SE.
 - RA: objectives and outcomes – discuss – can add dimension of both in relation to purpose of program.
4. Issues Identified – Range of Flavors of SE Programs

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- Construct a single set of knowledge areas with different levels of attainment, depending on the perspective of the program. This is likely to:
 - Highlight the essential unity across the field,
 - Accommodate more international perspectives, and
 - The fact that the differences are in emphasis (not irreconcilable)
 - Users would be challenged to target their program, and develop education which leads to the appropriate levels of attainment
 - Provide minimum levels in the CorBOK areas
 - Emphasis requires higher attainment in some coherent set of things
- 5. 'Complete' the survey
 - Collate and write up the findings with respect to content areas and program outcomes
 - TH: report on analysis of survey.
- 6. Develop a statement of the CorBOK (Core Body of Knowledge)
 - Informed by BKCASE-SEBOK 0.25
 - Using the survey to check for items other educators have chosen to include which may not be in SEBOK. (If items are found, GRCSE will feedback to BKCASE-SEBOK)
 - AS: also the competency roadmap. Time relation of SE over time – so depends on entrance requirements and the career trajectory.
 - TH: can look at current SEBOK to determine beginning of CorBOK. In 0.25 we can get a starting outline of CorBOK.
 - RA: write plan for maturing of 0.25 to 1.0 so review does not criticise the wrong things. Starting point, CorBOK is whole SEBOK with low levels of attainment for most.
 - DO: if use only SEBOK, no system dynamics, so therefore differential equations is not needed – would SD be in CorBOK. Statistics is probably essential – reliability, .
 - Does entry need engineering degree, or other sciences?
- 7. Develop levels of attainment of CorBOK elements and potential evidences of such attainment to be expected by graduates
- 8. Author processes required for:
 - Evolution of GRCSE
 - TF: author evolution plan, 1 August
 - Objectives (3-5 years out)
 - DO, AS: essay on objectives, tie competency model to outcomes. , 1 August
 - Outcomes (at graduation)
 - RA, NH, MT, ME: develop outcomes. , 1 August
 - Entry requirements
 - TH, JB, ME: write description of entry requirements. , 1 August
 - Curriculum architecture
 - AS, RF, JB, SS, NK: describe an architecture, such as what graphics that might help. , 1 August
 - CorBOK
 - JE: Explanation of the layered CorBOK, 1 August
 - Assessment
 - Leave for time being. , 1 August
 - Appendix – relationship of assessment and curriculum
 - TF + JE: Drafting a text. , 1 August

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- Appendix – Analysis of survey
 - Action: ML, NH, TH: report on survey findings. , 1 August
- GRCSE outcomes and CorBOK mapping
 - Hold for time, 1 August
- Linkage of outcomes to competencies
 - Hold for time, 1 August

9. Future meetings – telecons

Next meeting: 5pm New York time, 29/July.

Sunday 19 September is the target date for submission of materials for Toulouse release version.

Action List

1. RA to send survey to University of Pretoria.
2. All: Read outcomes in GSWE and comment in relation to SE by 25 July.
3. All: Read outcomes as stated by survey respondents. 25 July
4. TF: circulate the NDIA abstract version of outcomes and objectives. AS has done.
5. DO: to find the ABET definitions of objectives and outcomes. Complete.
6. Write an appendix reporting on the survey – which would become a journal paper. Probably MV to author.
7. TF: author evolution plan, 1 August
8. DO, AS: essay on objectives, tie competency model to outcomes. , 1 August
9. RA,NH, MT, ME: develop outcomes. , 1 August
10. TH, JB, ME: write description of entry requirements. , 1 August
11. AS, RF, JB, SS, NK: describe an architecture, such as what graphics that might help. , 1 August
12. JE: Explanation of the layered CorBOK, 1 August
13. TF + JE: Appendix – relationship of assessment and curriculum, Drafting a text. , 1 August
14. ML, NH, TH: Appendix – Analysis of survey, report on survey findings. , 1 August

Appendix G: Workshop Decisions

1. Release Criteria agreed to at EuSEC were approved by the author team, with one minor revision (with the exception that the consideration for “scope” was added to the criteria for topics/suptopics).
2. At the end of day 1, author team agreed that SEBoK was in reasonably good shape to meet the release criteria prior to the 15 Sept deadline.
3. There will be one definition for “system” and “system engineering” in the introduction; the elaboration of definitions based on different perspectives will be explained in chapters 2 and 3.
4. The definition of SE in Chapter 3 needs to be expanded to include the concepts of Enterprise and Service systems.
5. Enterprise and Service engineering will be addressed primarily in their own chapters, with pointers in other material where appropriate. James Martin will lead the Enterprise Engineering chapter.
6. Additional case studies should be added which address enterprise and service engineering; however, these are not required for version 0.25.
7. The concept of capability (how it is achieved, what “system level” it resides at, etc.) must be defined in chapters 2 and 3, and the concepts addressed in later chapters. It is not likely that this will be fully resolved in 0.25.
8. Many possible title for the “Systems Engineering organization” chapter were discussed. The final version (I think) was “Systems Engineering In the Organization”
9. Former technical knowledge materials will be divided into 4 chapters: Definition (mission analysis, stakeholder requirements, system requirements, architectural design, system analysis), Production (Implementation, Integration, Validation, Verification), Utilization (Transfer for Use/Deployment, Operation, Maintenance/Logistics), End-of-Life (service Life Extension, Update/Upgrade, Disposal, Retirement).
10. Overarching structure and requirements for v0.25 review were set. This includes an overview of comments from authors, comments received from reviewers, and statistics on the reviewer population in Oct with final discussion at WS 5 in January.

Appendix H: Action Items

The following are the action items and deadlines for the BKCASE authors and core team members:

Item	Individual (s) Responsible
Introduction chapter will be revised to reflect updated SEBoK structure and strengthen the explanation of how to use the BOK.	Art P. and Dave O.
Author teams must review their references for completeness, and appropriate allocation (either to primary or additional).	All Authors
Author teams must provide working definitions of all major terms utilized within their respective chapters.	All Authors
Each author must send Nicole & Steph their "Top 5" references by 30 July or 18 August. The core team will compile the list and send to the author team; this list may provide useful insights into existing knowledge areas.	All Authors
Art & Rick will explore the possibility of moving some very basic SE content from the Overview chapter to the Introduction (3.1.2).	Art P. and Rick A.
Send the copyright release letter (to gain permission to copy material from published sources for BKCASE) to all authors once it is approved by the Stevens legal department.	Core team
All authors are responsible for providing chapter-specific suggestions to the chapter lead.	All Authors
Scott Jackson will write an introduction on modification during the system life cycle. This is slated for the life cycle chapter, but may be moved.	Scott J.
Systems Concepts & Thinking chapter should provide an introduction for the term "system"; Alain Faisandier to support.	Bud L. (leader) plus Chp. 2 Team and Alain F.
James Martin, Art Pyster, and Bud Lawson will meet during the INCOSE IS to discuss the possibility of bringing in an author for the Enterprise SE chapter.	James M., Art P., and Bud L.
The discussion of what need drives SE should be included in the Enabling SE Chapter, Chapter 7 (formerly SE Organization. Specifically, the team should include a discussion of how a cost, time, quality, dependability, etc. focus will drive the way in which an enterprise organizes to perform SE and in what "market" each may likely occur.	Hillary S. and Chp. 7 Team
Affordability, cost estimation, and ethics (as it applies to individuals) should be considered for inclusion in the cross-cutting knowledge areas by the chapter team.	Cihan D. and Chp. 14 Team
Ethics (as it applies to organizations or groups) should be addressed in the Competency Chapter.	Brian W. and Chp. 15 Team
Cultural aspects belong in the Systems Engineering in the Organization chapter.	Hillary Sillitto and Chp. 7 Team
The cross-cutting issues chapter should consider ways to demonstrate which specific KAs are cut across by each topic. (A matrix was recommended)	Cihan D. and Chp. 14 Team
Rick Adcock will send Brian Wells a paper by Joe Kasser which compares a number of competency frameworks for consideration in the competency chapter.	Rick A.

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All authors should consider whether they can provide case study data for the SEBoK and discuss with Sandy Friedenthal.	All Authors and Sandy F.
The Case Study/Application chapter should consider developing a list of relevant standards outside the traditional SE standards (but not to the exclusion of case studies).	Sandy F. and Chp. 16 Team
Core team will provide guidance on how to utilize the current document/template to complete work for 0.25.\	Stephanie E
Nicole & Steph will draft review process materials for distribution to core team.	Nicole H. and Stephanie E.
All authors send the core team their current content, all copyright permission needs identified, and a list of 5 nominated reviewers (with contact info, organization, brief background) on July 30.	All Authors
All final materials for SEBoK v0.25 are due August 18 in the format preferred by the core team	All Authors
Publish SEBoK v0.25 for Reviewers	Core Team
All Reviewer Comments Returned to Core Team on or before November 15	Core Team
All Reviewer Comments Distributed to Author Teams by December 15	Core Team
All Authors will have reviewed the reviewer comments, prepared to discuss the reviewer comments, flag major issues, and decide on the response strategy to reviewers at Workshop V (tentatively located in Phoenix, AZ) January 26-27	All Authors and Core Team
All Authors adjudicate the reviewer comments and return to core team by February 16	All Authors
Adjudication matrix released for v0.25. Strategy for v0.50 finalized by April Workshop (Los Angeles, CA (University of Southern CA)) April 12-13, 2011	Core Team and All Authors
GRCSE v0.25 Draft Materials Due to Core Team September 15	GRCSE Authors