



Body of Knowledge and Curriculum to Advance Systems Engineering

**8th Workshop on
SEBoK 0.5 Release/Way Ahead to
SEBoK 0.75
and
GRCSE 0.5 Way Ahead to Publication**



October 11-13, 2011

University College London

London, UK

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 support from 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 in the development of a 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.

In December 2009, 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 2010, 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. At the third workshop, held in conjunction with the INCOSE International Symposium, July 2010, the author team agreed to publication and review plans for SEBoK 0.25 and discussed the way ahead for development of a draft of GRCSE 0.25. The fourth workshop, held in Toulouse, France, was the first opportunity for authors to discuss the final release version of SEBoK 0.25 and for the authors to focus on preparing the release of GRCSE 0.25. GRCSE 0.25 was released for review on December 17, 2010. The fifth workshop, held in Phoenix, Arizona, focused on the review comments received on SEBoK 0.25 and the publication version of GRCSE 0.25. The sixth workshop, held in Los Angeles, California, focused on determining a way ahead for wiki implementation and examined the reviews of GRCSE 0.25. The seventh workshop, held in Denver, Colorado, focused on determining the publication plan for SEBoK 0.5 and developing the way ahead for GRCSE 0.5.

2. BKCASE Workshop VIII

The eighth workshop was held at the Radisson Grafton Hotel and the University College London in London, UK on October 11th through 13th, 2011. 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 set is available online for download at the BKCASE website located at <http://www.bkcase.org>.

The first two days of the workshop were plenary sessions. The third day opened with plenary sessions, then moved to breakout sessions for the part teams and GRCSE team to work issues independently, and concluded with final outbriefs in plenary.

The objectives of the workshop were:

1. To review and discuss what was released as SEBoK 0.5;
2. To examine author reactions and community comments received to date on SEBoK 0.5;
3. To define the strategy for SEBoK 0.75;
4. To review the draft version of GRCSE 0.5 materials (all but CorBoK, App C, E);
5. To review and refine the draft version of the GRCSE 0.5 CorBoK, with input from non-GRCSE authors;
6. To establish the way ahead for publication of GRCSE 0.5; and
7. To agree to the GRCSE 0.5 release criteria.

The authors believe that they fulfilled the objectives.

During Art Pyster's introductory comments, he congratulated the group on the successful release of SEBoK 0.5 in the wiki environment. He explained that some extensive editing was required during the publication process and that there were still gaps that need an opportunity for review prior to the release of SEBoK version 1.0. Because of this, an interim SEBoK, version 0.75, was proposed and discussed during the workshop (please see below). Finally, Art reminded the authors that this was the last workshop before the release of GRCSE 0.5, making review of key elements of GRCSE a priority.

3. Workshop Proceedings

3.1 SEBoK 0.5 Release – Responses

SEBoK 0.5 was released for public review on September 19, 2011. Since the release, the website has seen a significant amount of traffic. At the time of the workshop, there had been approximately:

- 11,000 views of the main page (www.sebokwiki.org)
- 2,500 view of the SEBoK 0.5 Outline
- 2,000 views of the Part 1 article
- 2,500 views of the Part 2 article
- 2,000 views of the Part 3 Page
- 750 views of the Part 4 Page
- 1,500 views of the Part 5 Page
- 500 views of the Part 6 Page
- 1000 views of the Part 7 Page

The authors also reviewed the list of the most-visited topics.

3.1.2 Author Responses

There were mixed responses from the authors to version 0.5. In general, most authors were reasonably pleased with the overall wiki for the SEBoK. However, prior to the release of SEBoK 0.5, it was necessary to extensively update some articles as part of the Core team edit. Primarily, these edits were intended to make a more cohesive whole, with each article complying to the SEBoK strategy: short (~2000 words or less) articles which describe the general topic, representing the many views available in the body of knowledge, with appropriate pointers to the literature. For some articles, the required editing was somewhat drastic. Authors indicated that, while they understood the reason for the edits, the Core team edited these articles differently than the authors would have edited them. As part of the way ahead, these articles are to be addressed immediately, allowing the authors an opportunity to revise the content while maintaining the agreed-to guidance. (For more information, please see “SEBoK 0.75” below.)

In terms of the architecture, the general sense from the author team is that it is close to final. There are expected to be some changes in terms of adding or subtracting topics, and likely further restructuring in Part 6 as this part was the least mature. However, barring negative community feedback, the authors believe that the part structure will be maintained going forward and most of the KA structure and topic structure will be maintained. For more information, please see SEBoK 0.75 section 3.2 below.

In terms of integration, Sandy Friedenthal and Steve Mitchell developed a concept map of the SEBoK. This map was used in the 0.5 development process to help identify inconsistencies and gaps. An updated version of the concept map based on the release version of 0.5 was presented to the authors during the workshop. Sandy first provided an overview of the development process and the concept map in general. He then pointed out key inconsistencies and issues. Many of these issues are related to the key concepts of the SEBoK, the glossary terms, and how these are used across the SEBoK. The author team agreed that they would (a) continue to use the concept map to improve integration and (b) consider how aspects of the concept map may be presented in the next iteration of the SEBoK. Several authors also have the need to develop standardized definitions and ensure consistent use of terminology across the SEBoK.

Inconsistency in references was another discussion point for the authors. For example, some articles have upwards of 100 references, while others have 10 or fewer. While the SEBoK should reflect the existing BoK, the authors agreed that part of the service to the SE community is to provide some guidance on which sources to review. As such, the authors need to work to strengthen and, in some cases, broaden the references provided for articles.

Several authors also mentioned that they, or others they had spoken with, would like to have a downloadable copy of the SEBoK. They indicated there was frustration that it could only be used when internet access was available. The Core team has taken the action to develop a PDF version that can be posted to the wiki for download.

3.1.3 Reviewer Responses

There is a high level of Wiki traffic, but limited use of the response tools in place to provide reviewer feedback. The authors discussed the review process – a structured response to each wiki thread and any forms received – but did not discuss specifics of the few review comments that were topic focused.

In order to increase the reviewer response, the BKCASE wiki team will hold open WebEx sessions in November to provide an overview of the wiki and demonstrate the review process. These Webex sessions will be advertised through the professional societies, the author team and their affiliations, appropriate conferences and conference distributions and by other means as feasible.

3.1.3. Integration

As stated above, a consistent concern during the workshop was the ability of the author team to ensure appropriate consistency within and between the Parts going forward. The concept map for the SEBoK will be updated and used to provide a common reference for improving integration. Each Part Team Lead (PTL) will be responsible for ensuring integration within his/her part and will also raise any areas of potential concern to the integration team for their awareness.

Integration Team	
Co-Leads	Art Pyster & Dave Olwell
Concept Map Developers	Sandy Friedenthal, Steven Mitchell
Members	Rick Adcock, Jim Anthony, Barry Boehm, Heidi Davidz, Nicole Hutchison, Bud Lawson, Steve Mitchell, Ken NiDiffer, Garry Roedler, Alice Squires, Mary VanLeer

SEBoK Action Items:

1. Develop an updated version of the SEBoK concept map, which will be used for integration. *Sandy Friedenthal* and *Steve Mitchell* to develop; the *Part Team Leads* to review and correct any noted inconsistencies/gaps.
2. Determine whether and how to incorporate some aspect of the concept map into the next iteration of the SEBoK. *Sandy Friedenthal* to lead.
3. Develop a PDF version of the SEBoK that can be posted to the wiki and downloaded.

3.2 SEBoK 0.75 – Concept and Way Ahead

Based on the published version of 0.5, the Core team believes that there are still enough immature or blank articles to require a limited round of reviews (after 0.5) before the publication of the final version of the SEBoK (1.0) for BKCASE.

The Core team proposed the development of SEBoK 0.75 – an interim version which would reflect updates of selected articles. The new release would develop content for currently blank articles, improve immature articles, and provide authors an opportunity to update articles that were heavily edited in preparation for SEBoK 0.5.

3.2.1 Articles to be Updated

During the workshop, the authors reviewed the final outline for SEBoK 0.5 (www.sebokwiki.org/SEBoK_0.5_Outline). Based on the authors' review of 0.5, they developed a short list of articles to be edited for SEBoK 0.75. This included minor modifications to the architecture – primarily splitting of some topics with considerable content, the addition of a few new topics, and restructuring of Part 6. The articles to be revised can be seen in Appendix C, along with the basic staffing.

The primary focus is on Part 3, which has a substantial amount of material, Part 6, which was the last part to be developed, and Part 4, which had one blank knowledge area in version 0.5. There are also minor updates in Parts 1, 2, and 5. It is estimated that 52 articles will be revised for version 0.75 (this is an estimate as some content is still TBD). Glossary and primary reference pages will be updated *only* for those pages related to the articles up for revision. It was agreed that Part 7 will not be edited for v0.75. These decisions will be revisited at Workshop IX.

3.2.2 Staffing

Because approximately 2/3 of the SEBoK will not be revised for version 0.75, the team reviewed staffing for SEBoK 0.75, allowing authors whose 0.5 articles are not being revised the opportunity to work on additional articles. The full staffing list can be found in Appendix D. Authors who did not attend the workshop are encouraged to review the list and contact the appropriate part team lead or core team members to volunteer for articles.

PTLs should provide updates to the staffing of their articles to the Core team as needed.

3.2.3 SEBoK 0.75 Way Ahead/Timeline

The general approach for SEBoK 0.75 is outlined below.

- Part Teams will begin drafting articles immediately after Workshop VIII
 - Initial work will be offline. A developmental version of the 0.75 wiki will be available as soon as possible. (This will be separate from the public version of 0.5 open now for review.)
 - Authors should be examining the comments for SEBoK 0.5 (www.sebokwiki.org) as they refine materials for SEBoK 0.75.

- **January 17-19, 2012 – Workshop IX.** At Workshop IX the SEBoK 0.75 approach will be reviewed and revised as appropriate. Part Teams will continue working on selected articles after Workshop IX through February 5, 2012.
 - Integration work using the concept map will be conducted, but the precise dates for this are TBD.
- **February 6-12, 2012 – Internal Review.** Authors will finish drafts of SEBoK 0.75 articles on February 5. February 6-12, the wiki will be reviewed by the entire author team. (Specific assignments TBD).
- **February 13-19 – Final Author Editing.** Authors will have one week to examine the internal review comments and update their article(s) to reflect any final changes.
 - Final integration efforts will be conducted during this time. Exact process TBD.
- **February 20-March 14, 2012 – Preparation for Publication.** This phase includes Core team edit, technical editing, wiki technical review, and IP/copyright review, and testing of all wiki functionality.
 - At this time, the list of selected reviewers for version 0.75 will also be developed.
- **March 15, 2012 – Release.** SEBoK 0.75 should be released no later than March 15 for a 30-day limited review.

3.3 GRCSE 0.5 Pre-Release

Tim Ferris, the lead GRCSE author, provided an overview of the current status of GRCSE 0.5. After this, the leads for each chapter provided a more detailed assessment of their GRCSE elements. A major issue still up for discussion was the coverage of two different educational models in GRCSE: (a) undergraduate followed immediately by graduate studies or (b) undergraduate studies followed by work experience and then graduate education. The consensus by the end of the workshop was the GRCSE is focused primarily on the second model (undergraduate education, experience, then graduate education). The reason for this is that most systems that generally use the first model (undergraduate education then graduate education), do not, in fact, follow it for SE master's programs. The bachelor's degree would normally be an engineering degree in something other than SE; e.g., electrical or mechanical engineering. The student would then enter the workforce and later return to pursue a master's in SE. Therefore, the SE master's program still follows the model incorporating experience. The authors agreed that it is important to explain this clearly up front, so that systems with different educational models will know the difference.

3.3.1 Status of Non-CorBoK GRCSE Elements

In general, the non-CorBoK elements of GRCSE are in near-final draft status. The front matter is believed to be in near-final status.

The Outcomes and Objectives have been extensively revised based on review comments. There are now only four (4) recommended general objectives and several examples of objectives from real programs have been provided. The outcomes have also been updated. One major change was to update the language related to required software engineering skills to reflect what systems engineers need to understand about software engineering; the previous version included “mastery” of software engineering.

The architecture is generally unchanged; however, the graphical representation of the architecture is undergoing revision based on the many helpful comments received by the author team.

The entrance expectations are primarily unchanged. However, the discussion about how entrance expectations relate to outcomes – and how different entrance characteristics might limit a student’s ability to reach those objectives – has been expanded.

The assessment materials (chapter 8 and appendix D) seem to be reasonably mature and discuss possible assessment techniques for certain levels of attainment. It was noted that assessment here refers to how well students achieve the given outcomes; it does not address assessment of the curriculum design. This is something that may be considered for the final version of GRCSE.

The appendices appear to be in reasonable shape with the exception of Appendix C which will be developed as the CorBoK becomes more mature. Appendix E is going through a re-write as well.

3.3.2 CorBoK Discussion

The Core Body of Knowledge (CorBoK) of GRCSE is based primarily on the SEBoK, with the understanding that it is possible for knowledge from other disciplines to be included. Prior to the workshop, the GRCSE team developed a draft of the CorBoK – primarily a listing of the key knowledge areas and most of the topics from the SEBoK that are believed to be important for all students. A subset of the GRCSE team with input from several SEBoK authors (to provide industry input) also provided recommendations on the attainment level (Bloom’s level) to which a student should know each element of the CorBoK. The input was based on members from around the world. This information was used as input to the plenary.

The time spent in the workshop plenary session was focused on getting recommendations from the authors on the appropriate Bloom’s level for each topic – both for the Foundation (the topics all master’s students must cover) as well as for the Concentrations (the topics that are specific to a particular role). Much discussion was spent on the meaning of the specific Bloom’s levels; the authors decided that a critical task for the GRCSE team was to develop clean/concise definitions for the Bloom’s levels that would allow them to achieve repeatable results. In addition, the authors recommended that the GRCSE team simplify the Bloom’s levels being used for the first pass. Instead of 1-6 (knowledge through evaluation), they recommended three groupings: 1 and 2 (combination of knowledge and comprehension), 3 and 4 (combination of application and analysis), and 5 and 6 (combination of synthesis and evaluation). The rationale for reducing to 3 levels is that the GRCSE team could likely reach more consistent results using this method and then focus on any required differentiation in a second pass.

Based on this guidance, the GRCSE team met during the working sessions on Day 3 and completed a more detailed review of the CorBoK. The team believes that they have an appropriate way ahead to finalize the CorBoK for GRCSE 0.5.

3.3.4 GRCSE 0.5 Release Criteria

The author team reviewed draft release criteria for GRCSE 0.5; these following criteria were agreed to. The Core team will use these criteria to ensure that GRCSE 0.5 is ready for release in December 2011.

1. All main body chapters (except CorBoK) are at about 70% maturity
2. CorBoK sufficiently mature for external review (including draft time allocation), anticipating significant change may be required before version 1.0
3. No blank appendices
4. Chapter leads agree their respective chapters are ready for release
5. GRCSE has gone through tech editing
6. Each image has a copyright release in hand or there is placeholder for image with pointer to another source if one exists
7. Integration threads between aspects of GRCSE (e.g. Entrance Expectations, Outcomes, CorBoK, etc.) are explained
8. General guidance on use of SEBoK in GRCSE context is explicitly included
9. Core Team believes GRCSE will be usable by *early adopters* – a “gestalt” perspective
10. Core Team agrees GRCSE is ready for release
11. Gang of 6 from BKCASE/INCOSE/IEEE agree there is nothing that would prohibit INCOSE/IEEE from becoming stewards after version 1.0 is released

3.3.4 GRCSE Staffing

The GRCSE team will determine the best way to address and provide recommendations at Workshop IX.

BKCASE Authors	GRCSE (Chapters)
Adcock, Rick	Author
Brackett, John	Author - Lead 6
Ekstrom, Joseph J.	Author - Lead App C
Ferris, Tim	GRCSE lead; Lead Preface/Chapter 1, 2, 9, App B
Hilburn, Tom	Author - Lead 5, App A, App E
Hutchison, Nicole	Author
Mitchell, Steve	Author
Olwell, Dave	Author -Lead 3
Prun, Daniel	Author - Lead 8, App D
Squires, Alice	Author - Lead 7

BKCASE Authors	GRCSE (Chapters)
Towhidnejad, Massood	Author -Lead 4, App F
VanLeer, Mary	Author

3.3.5 GRCSE Way Ahead/Timeline

The general timeline for release of GRCSE 0.5 is as follows:

- GRCSE authors draft materials through November 20, 2011.
- **November 21-29, 2011 – Core Team/Tech Edit.** First round of Core team review and technical editing.
- **November 30 – December 4, 2011 – GRCSE Team Review/Update.** The GRCSE team will have an opportunity to review the work done by the Core team.
- **December 5-12, 2011 – Core Team/Tech Edit.** Final preparations for publication.
- **December 15, 2011 – Release of GRCSE 0.5.** Release of GRCSE 0.5 for open review for 90 days.

4. Way Ahead

4.1 Future Workshops

It should be noted that the author team agreed Workshops IX, X, and XI should be 3-day sessions, with 2 days for traditional workshop and 1 day for break-out work sessions.

- **Workshop IX: January 17-19, 2012.** Daytona Beach, FL, USA, hosted by Embry-Riddle University. Scheduled immediately prior to the INCOSE International Workshop.
- **Workshop X: April 24-26, 2012.** Monterey, CA, USA, hosted by the Naval Postgraduate School. (Please refrain from booking travel until further notice. Location is subject to change and pending availability.)
- **Workshop XI: July 3-5, 2012.** Rome, Italy, in conjunction with the INCOSE International Symposium and the European Conference on Systems Engineering (EUSEC). (Details TBD)
- **Workshop XII: October, 2012.** Hoboken, NJ, USA, hosted by the Stevens Institute of Technology. This will be the final workshop of the BKCASE project.

4.2 BKCASE Publications and Outreach

Alice Squires provided an overview of the BKCASE outreach activities (including journal and conference papers, conference presentations, etc.) conducted since the last workshop, the remaining activities for

2011, and upcoming deadlines for events in 2012. She encouraged all authors to consider participating in or taking ownership of at least one outreach opportunity.

2011 remaining outreach opportunities include:

1. APCOSE: Oct 19-21, Seoul, South Korea –Tim Ferris and Jean-Claude Roussel to present papers
2. NDIA: Oct 24-27, San Diego, CA – Submissions for a 3-presentation session on SEBoK and a GRCSE panel were made by the Core Team, Tim Ferris, and other BKCASE authors; waiting for response from NDIA.

All authors who submit papers or presentations on BKCASE should notify the Core Team at bkcase@stevens.edu and provide a copy of the final paper and/or presentation. For areas where the author team would simply like to provide a briefing on BKCASE to a specific audience, or would like to take ownership of an outreach activity, the author team is encouraged to:

1. Notify the core team (bkcase@stevens.edu) of any outreach opportunity that you choose to pursue (presentation, conference proceeding, journal article) in support of BKCASE. Please provide the conference or publication medium and the title of the presentation or article.
2. Once the event is complete, lead author should please provide a copy of your briefing or publication to the Core Team (bkcase@stevens.edu) that can be posted on Sakai or possibly used in future updates of the generic slide deck.
3. Utilize the generic slide deck, which is found on Sakai and which is periodically updated by the Core Team.

Appendix A: Meeting Participants

In Attendance

Rick Adcock, *Cranfield University/INCOSE* (UK)
James Anthony, *OSD, AT&L Contract Support* (USA)
Barry Boehm, *University of Southern California* (USA)
Cihan Dagli, *Missouri University of Science and Technology* (USA)
J.J. Ekstrom, *Brigham Young University* (USA)
Stephanie Enck, *Naval Postgraduate School* (Support Staff) (USA)
Alain Faisandier, *Association Francaise d'Ingenierie Systeme, MAP Systeme/French INCOSE Chapter* (France)
Tim Ferris, *INCOSE/University of South Australia* (Australia)
Kevin Forsberg, *INCOSE* (USA)
Sandy Friedenthal, *SAF Consulting* (USA)
Tom Hilburn, *Embry Riddle Aeronautical University* (USA)
Nicole Hutchison, *Stevens Institute of Technology* (USA)
Bud Lawson, *Lawson Konsult AB* (Sweden)
Ray Madachy, *Naval Postgraduate School* (USA)
Steven Mitchell, *Lockheed Martin* (USA)
David Olwell, *Naval Postgraduate School* (USA)
Ricardo Pineda, *University of Texas at El Paso* (USA)
Daniel Prun, *Ecole Nationale de l'Aviation Civile (ENAC)* (France)
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* (UK)
Alice Squires, *Stevens Institute of Technology* (USA)
Massood Towhidnejad, *Embry-Riddle Aeronautical University (ERAU)*
Brian Wells, *Raytheon* (USA)

Joining via WebEx

None

Appendix B: Meeting Agenda

Tuesday, October 11, 2011:

- 8:30 am – Opening Remarks/Agenda Review – Art Pyster
- 9:00 am – Overview of SEBoK 0.5 – Art Pyster
- 9:30 am – Review of SEBoK 0.5 Concept Map – Sandy Friedenthal
- 10:45 am – Discussion of SEBoK 0.5 Reviews Received to Date – Nicole Hutchison
- 11:20 am – Discussion of Known SEBoK 0.5 Successes, Shortfalls, and Gaps
 - 11:20 am – Part 1 – Barry Boehm
 - 11:50 am – Part 2 – Rick Adcock
 - 12:20 pm – Part 3 – Garry Roedler
 - 12:40 pm – Part 4 – Bud Lawson
 - 1:00 pm – Part 5 – Art Pyster
 - 1:20 pm – Part 6 – Dave Olwell
 - 1:40 pm – Part 7 – Alice Squires
 - 2:00 pm – Wiki – Nicole Hutchison
- 2:20pm – Overall Successes, Shortfalls, Gaps – Art Pyster
- 2:45 pm – Discussion of Adjudication Approach for SEBoK 0.5 – led by Nicole Hutchison
- 3:30 pm – Identify Way Ahead for SEBoK 0.75 (to Workshop IX) – Art Pyster
- 4:30 pm – Initial CorBoK Assessment – Tim Ferris
- 5:00 pm – Adjourn

Wednesday, October 12, 2011

- 9:00 am – Review of Day 1 – Dave Olwell
- 9:20 am – Resolution of Outstanding Day 1 Issues – led by Art Pyster
- 9:30 am – Review and Discussion of GRCSE 0.5 Draft Materials (non-CorBoK)
 - 9:30 am – Overview and Front Matter – Tim Ferris
 - 10:00 am – Objectives – Dave Olwell
 - 10:30 am – Outcomes/Use Cases – Massood Towhidnejad
 - 11:15 am – Entrance Expectations/Appendix E – Tom Hilburn
 - 11:45 am – Architecture – Alice Squires
 - 12:15 pm – Assessment – Daniel Prun
 - 12:45 pm – Other Appendix Overviews – Tim Ferris
- 1:00 pm – Review of Draft CorBoK and CorBoK Working Session – Tim Ferris
- 4:30 pm – Way Ahead for GRCSE 0.5 (to Publication) – led by Tim Ferris
- 5:00 pm – Adjourn

Thursday, October 13, 2011

Plenary

- 9:00 am – Review of Day 2 – Dave Olwell
- 9:30 am – Communication and Outreach – Alice Squires

BKCASE Workshop 8 Report

9:45 am – Overview of Workshop IX Logistics – Steph Enck

Breakout Sessions - Working Sessions (CorBoK, SEBoK, and others TBA)

10:00 am – Begin Working Sessions

2:45 pm – Break for Final Plenary

Plenary

3:00 pm – Review of Working Session Progress

3:00 pm – CorBoK Update – Tim Ferris

3:30 pm – Update on other GRCSE Sections – Tim Ferris

3:45 pm – Closing Remarks – Art Pyster

4:00 pm – Adjourn

Appendix C: Outline of SEBoK 0.75 (end of Workshop VIII)

Below is the proposed work plan for SEBoK 0.75. Included are the staff against the articles to be updated, including any gaps.

Key

Grey = No Change

Blue = Topic to be Revised for 0.75

Red = New Topic for 0.75

SEBoK 0.75 Article	Staffing
Part 1: SEBoK 0.5 Introduction	
Scope of the SEBoK	
Structure of the SEBoK	Barry, Art, Sandy
Economic Value of Systems Engineering	Barry, Alice, Ray
Systems Engineering: Historic and Future Challenges	
Systems Engineering and Other Disciplines	
SEBoK Users and Uses	
Use Case 1: Practicing Systems Engineers	
Use Case 2: Other Engineers	
Use Case 3: Customers of Systems Engineering	
Use Case 4: Faculty Members	
Use Case 5: General Managers	
Use Case 6: TBD	Barry, JJ, TBD
Use Case 7: TBD	Barry, TBD
Use Case 8: TBD	Barry, TBD
Use Case 9: TBD	Barry, TBD
SEBoK Evolution	
Acknowledgements	
Part 2: Systems	
<i>Knowledge Area: Systems Overview</i>	
Topic: What is a System?	
Topic: System Context	
Topic: Overview of System Science	
Topic: Systems Thinking	
<i>Knowledge Area: System Concepts</i>	
Topic: Overview of System Concepts	
Topic: Complexity	
Topic: Emergence	
<i>Knowledge Area: Types of Systems</i>	
Topic: Classifications of Systems	
Topic: Groupings of Systems	
Topic: The Product View of Engineered Systems	
Topic: The Service View of Engineered Systems	
Topic: The Enterprise View of Engineered Systems	

Knowledge Area: Representing Systems with Models

Topic: What is a Model?

Topic: Why Model?

Topic: Types of Models

Topic: System Modeling Concepts

Topic: Modeling Standards

Knowledge Area: Systems Approach

Topic: Overview of the Systems Approach

Topic: Exploring a Problem or Opportunity

Topic: Systems Analysis Approach

Topic: Synthesis of a System

Topic: Proving a System

Topic: Owning and Making Use of a System

Topic: Applying the Systems Approach

Knowledge Area: Systems Challenges

Topic: Complex System Challenges

Topic: Dynamically Changing Systems

Topic: Humans in Systems (to be finalized)

Part 3: Systems Engineering and Management

Knowledge Area: Life Cycle Models

Topic: Life Cycle Characteristics

Topic: System Life Cycle Process Drivers and Choices

Topic: System Life Cycle Process Models: Vee

Topic: System Life Cycle Process Models: Iterative

Topic: Integration of Process and Product Models

Knowledge Area: System Definition

Topic: Fundamentals of System Definition

Topic: Mission Analysis and Stakeholders Requirements

Topic: Stakeholder Needs and Requirements

Topic: System Requirements

Topic: Architectural Design: Logical

Topic: Architectural Design: Physical

Topic: System Analysis

Knowledge Area: System Realization

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Scott, Bud (P4), Hillary (P5), Alain (P3), P6?

Rick, Brian Wells, Barry (review)

Rick, Brian Wells, Barry (review)

Rick, Brian Wells, Barry (review)

Rick, Brian Wells, Barry (review)

Garry, Alain

Garry, Kevin, Bud, Barry, Jim

Garry, Kevin, Bud, Barry, Jim

Garry, Alain, Jim, Jean-Claude

Garry, Alain, Jim, Jean-Claude

Garry, Alain, Jim, Jean-Claude

Garry, Alain, Jim, Jean-Claude

Garry, Alain, Jim, Jean-Claude

Garry, Alain, Jim, Jean-Claude

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Topic: System Implementation

Topic: System Integration

Topic: System Verification and Validation

Topic: System Validation

Knowledge Area: System Deployment and Use

Topic: System Deployment

Topic: Operation of the System

Garry, Alain, Jim, Jean-Claude
Garry, Alain, Jim, Jean-Claude

Garry, Jim, Mark Cecere
(Garry to contact), Bill Stiffler

Topic: System Maintenance

Garry, Jim, Mark Cecere
(Garry to contact), Bill Stiffler

Topic: Logistics

Garry, Jim, Mark Cecere
(Garry to contact), Bill Stiffler

Knowledge Area: Systems Engineering Management

Topic: Planning

Topic: Assessment and Control

Topic: Risk Management

Topic: Measurement

Topic: Decision Management

Topic: Configuration Management

Topic: Information Management

Topic: Quality Management

Knowledge Area: Product and Service Life Management

Topic: Service Life Extension

Topic: Capability Updates, Upgrades, and
Modernization

Topic: Disposal and Retirement

Knowledge Area: Systems Engineering Standards

Topic: Relevant Standards

Topic: Alignment and Comparison of the Standards

Topic: Application of Systems Engineering Standards

Garry, Barry, Ray

Part 4: Applications of Systems Engineering

Knowledge Area: Product Systems Engineering

Topic: TBD

Topic: TBD

Topic: TBD

Topic: TBD

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Topic: TBD

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Topic: TBD

Bud, Ricardo, Brian Wells,
James Martin, Hillary Sillitto

Knowledge Area: Service Systems Engineering

Topic: Service Systems Background

Topic: Fundamentals of Services

Topic: Properties of Services

Topic: Scope of Service Systems Engineering

Topic: Value of Service Systems Engineering

Topic: Service Systems Engineering Stages

Knowledge Area: Enterprise Systems Engineering

Topic: Enterprise Systems Engineering Background

Topic: The Enterprise as a System

Topic: Related Business Activities

Topic: Enterprise Systems Engineering Key Concepts

Topic: Enterprise Systems Engineering Process
Activities

Topic: Enterprise Capability Management

Knowledge Area: Systems of Systems (SoS)

Topic: Architecting Approaches for Systems of Systems

Topic: Socio-Technical Features of Systems of Systems

Topic: Capability Engineering

Part 5: Enabling Systems Engineering

*Knowledge Area: Systems Engineering Organizational
Strategy*

Topic: Organizational Purpose

Topic: Value Proposition for Systems Engineering

Topic: Systems Engineering Governance

Art, Heidi, Hillary

*Knowledge Area: Enabling Businesses and Enterprises to
Perform Systems Engineering*

Topic: Deciding on Desired Systems Engineering
Capabilities within Businesses and Enterprises

Topic: Organizing Business and Enterprises to Perform
Systems Engineering

Art, Heidi, Hillary

Topic: Assessing Systems Engineering Performance of
Business and Enterprises

Topic: Developing Systems Engineering Capabilities
within Businesses and Enterprises

Topic: Culture

*Knowledge Area: Enabling Teams to Perform Systems
Engineering*

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Topic: Determining Needed Systems Engineering Capabilities in Teams

Topic: Organizing Teams to Perform Systems Engineering

Topic: Assessing Systems Engineering Performance of Teams

Topic: Developing Systems Engineering Capabilities within Teams

Topic: Team Dynamics

Knowledge Area: Enabling Individuals to Perform Systems Engineering

Topic: Roles and Competencies

Topic: Assessing Individuals

Topic: Developing Individuals

Topic: Ethical Behavior

Part 6: Related Disciplines (New Title TBD)

Dave, Ricardo, Sandy, Barry

Knowledge Area: Systems Engineering and Software Engineering

Dick, Dave, Art, Ken Nidiffer, Tom (reviewer)

Topic: The Nature of Software

Topic: An Overview of the SWEBOK Guide

Topic: Software Engineering and Systems Engineering: Similarities and Differences

Knowledge Area: Systems Engineering and Project Management

Dick, Alice, Karl Best (possible), Brian G., Ken Nidiffer

Topic: An Overview of Project Management

Dick, Alice, Karl Best (possible), Brian G., Ken Nidiffer

Topic: Systems Engineering and Project Management: Similarities and Differences

Dick, Alice, Karl Best (possible), Brian G., Ken Nidiffer

~~*Knowledge Area: Systems Engineering and Procurement/Acquisition*~~

~~*Knowledge Area: Systems Engineering and Marketing/Sales*~~

Knowledge Area: Systems Engineering and Specialty Engineering

Topic: Integration of Specialty Engineering

Topic: Reliability, Availability, and Maintainability

Topic: Human Systems Integration

Topic: Safety Engineering

Topic: Security Engineering

Cihan (support)

Topic: System Assurance

Dave, Ricardo, Sandy, Barry

Topic: Manufacturability

Brian Wells, Ricardo P.

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~~Topic: Quality Engineering~~

Topic: Electromagnetic Interference/Electromagnetic
Compatibility

Topic: Resilience Engineering

Topic: Manufacturability and Producibility

Topic: **Affordability**

Barry, Brian Wells, Ray, Garry

Topic: **Environmental (title to be finalized)**

TBD

~~Topic: Workplace Engineering~~

Part 7: Systems Engineering Implementation

Examples

Matrix of Implementation Examples

Case Studies

Hubble Space Telescope Case Study

Global Positioning System Case Study

Medical Radiation Case Study

FBI Virtual Case File System Case Study

MSTI Case Study

Next Generation Medical Infusion Pump Case Study

Vignettes

Denver Airport Baggage Handling System Vignette

Virginia Class Submarine Vignette

UK West Coast Route Modernization Project Vignette

Singapore Water Management Vignette

FAA Advanced Automation System (AAS) Vignette

Standard Korean Light Transit System Vignette

Appendix D: Staffing Matrix

Please note: The staffing matrix reflects the outcome at the end of Workshop VII (June 14, 2011).

	SEBoK 0.75			GRCSE		Integration Team
	Role	Part	Article(s)	Role	Chapter	Role
Adcock, Rick	Part 2 Lead	2	Systems Approach (KA), Overview of the Systems Approach, Exploring a Problem or Opportunity, Systems Analysis Approach, Synthesis of a System, Proving a System, Owning and Making Use of a System, Applying the Systems Approach; Systems Challenges (KA), Complex System Challenges, Humans in Systems	Author	Preface/1, App B	Member
Anthony, Jim	Part 3 Core Team Rep	3,5	System Life Cycle Process Models: Vee, System Life Cycle Process Models: Iterative; System Definition (KA), Mission Analysis and Stakeholders Requirements, Architectural Design, System Verification, System Validation; Operaiton of the System, System Maintenance, Logistics			Member
Aslaksen, Erik	author					
Beasley, Richard	author					
Bendz, Johan	author					
Best, Karl	Observer - Possible support to SE & PM KA			Observer		

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Boehm, Barry	Part 1 Lead	1, 2, 3, 6	Systems Challenges (KA), Complex System Challenges, Hymans in Systems (REVIEWER); System Life Cycle Process Models: Vee, System Life Cycle Process Models: Iterative; Structure of the SEBoK, Economic Value of Systems Engineering, Use Cases (6-9); Planning; Related Disciplines (Part 6), System Assurance, Affordability			Member
Booth, Stuart	author					
Brackett, John	author			Author - Lead 6	6, 8 (review), App D	
Calvano, Chuck	author					
Chia, Aaron Eng Seng	author					
Choe, Kyung-il	author					
Conrow, Edmund	author					
Croll, Paul	author					
Dagli, Cihan	author	6	Security Engineering			
Dahmann, Judith	author					
Davidz, Heidi	Part 7 Lead	5	Systems Engineering Governance, Organizing Business and Enterprises to Perform Systems Engineering			Member
Dick, Jeremy	author					
Dickerson, Charles	author					

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Dori, Dov	author				
Ekstrom, Joseph J.				Author - Lead App C	7, App C, App F (review)
Fairley, Dick	author	6	Systems Engineering and Software Engineering (KA)		Member
Faisandier, Alain	author	2, 3	Systems Approach (KA), Overview of the Systems Approach, Exploring a Problem or Opportunity, Systems Analysis Approach, Synthesis of a System, Proving a System, Owning and Making Use of a System, Applying the Systems Approach; System Definition (KA), Mission Analysis and Stakeholders Requirements, Architectural Design, System Verification, System Validation;		
Ferris, Tim				GRCSE lead; Lead Preface/Chapter 1, 2, 9, App B	Preface, 1, 2, 5 (review), 7, 9, App B
Forsberg, Kevin	author	3	System Life Cycle Process Models: Vee, System Life Cycle Process Models: Iterative;		
Freeman, G. Richard	author				Member
Friedenthal, Sanford	author	1, 2	Structure of the SEBoK; System Assurance; Related Disciplines (Part 6)		Concept Map Developer

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Gallagher, Brian	author	6	Systems Engineering and Project Management (KA), An Overview of Project Management, Systems Engineering and Project Management: Similarities and Differences			
Henshaw, Michael	author					
Hilburn, Tom	author	6	Systems Engineering and Software Engineering (KA) (REVIEWER)	Author - Lead 5, App A, App E	2 (review), 5, App A, App B (review), App E	
Hutchison, Nicole	Part 2 Core Team Rep			Author	Preface/1, 2, 4, 7 (review all)	Member
Jackson, Peter						
Jackson, Scott	author	2	Systems Approach (KA), Overview of the Systems Approach, Exploring a Problem or Opportunity, Systems Analysis Approach, Synthesis of a System, Proving a System, Owning and Making Use of a System, Applying the Systems Approach			
Jamshidi, Mo	author					
Jones, Cheryl	author					
Kim, Chul Whan	author					
Kohtake, Naohiko						

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Lawson, Harold "Bud"	Part 4 Lead	2, 3, 4	Systems Approach (KA), Overview of the Systems Approach, Exploring a Problem or Opportunity, Systems Analysis Approach, Synthesis of a System, Proving a System, Owning and Making Use of a System, Applying the Systems Approach; System Life Cycle Process: Vee, System Life Cycle Process: Iterative; Product Systems Engineering (KA) and TBD topics			Member
Lee, Yeaw lip "Alex"	author					
Madachy, Ray	author	1, 3, 6	Economic Value of Systems Engineering; Plannign; Affordability			
Martin, James	author	4	Product Systems Engineering (KA) and TBD Topics			
McGettrick, Andrew			Observer	Observer		
Miller, William "Bill"			Observer	Observer		
Mitchell, Steve	author	1	Structure of the SEBoK	Author	6 (review)	Concept Map Developer
NiDiffer, Ken	author	6	Systems Engineering and Project Management (KA), An Overview of Project Management, Systems Engineering and Project Management: Similarities and Differences			Member
Olwell, Dave	Part 6 Lead; Part 4 Core Team Rep	6	Related Disciplines (Part); Systems Engineering and Software Engineering (KA); System Assurance	Author -Lead 3	3, App C (Review)	Lead

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Pickard, Andy	author				
Pineda, Ricardo	author	4, 6	Product Systems Engineering (KA) and TBD Topics; Manufacturability		
Prun, Daniel				Author - Lead 8, App D	4 (review), 8, App D, App E (review)
Pyster, Art	Part 5 Lead; Part 1 Core Team Rep; Part 6 Core Team Rep	1,5	Systems Engineering Governance, Organizing Business and Enterprises to Perform Systems Engineering; Related Disciplines (Part); Systems Engineering and Software Engineering (KA); System Assurance; Product Systems Engineering (KA) and TBD topics		Lead
Roedler, Garry	Part 3 Lead	3	System Life Cycle Process Models: Vee, System Life Cycle Process Models: Iterative; System Definition (KA), Mission Analysis and Stakeholders Requirements, Architectural Design, System Verification, System Validation; Operation of the System, System Maintenance, Logistics; Planning; Affordability		Member
Roussel, Jean-Claude	author	3	System Definition (KA), Mission Analysis and Stakeholders Requirements, Architectural Design, System Verification, System Validation;		
Shirasaka, Seiko					
Shishko, Bob	author				

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Sillitto, Hillary	author	2, 4	Systems Approach (KA), Overview of the Systems Approach, Exploring a Problem or Opportunity, Systems Analysis Approach, Synthesis of a System, Proving a System, Owning and Making Use of a System, Applying the Systems Approach; Systems Engineering Governance, Organizing Business and Enterprises to Perform Systems Engineering; Part 4 Product Systems Engineering			
Snoderly, John	author					
Squires, Alice	Part 5 Core Team Rep; Part 7 Core Team Rep		Economic Value of Systems Engineering; Systems Engineering and Project Management (KA), An Overview of Project Management; Systems Engineering and Project Management: Similarities and Differences	Author - Lead 7	7, App C, , App E	Member
Stiffler, Bill	author	3	Operation of the System, System Maintenance, Logistics			
Towhidnejad, Massood	author			Author -Lead 4, App F	3, 4, App C, App F	
Travassos, Guilherme Horta						
Valerdi, Ricardo	author					
VanLeer, Mary				Author	7, App A, , App E	Member
Wang, Qing	author					

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Wells, Brian	author	2	Systems Challenges (KA), Complex System Challenges, Hymans in Systems; Product Systems Engineering (KA) and topics TBD; Manufacturability, Affordability		
Willshire, Mary Jane	author				
White, Brian	author				
Zemrowski, Ken	author				
Cecere, Mark (to be confirmed)	author (unconfirmed)	3	Operation of the System, System Maintenance, Logistics		

Appendix E: Action Items & Milestones

The following are major milestones for the BKCASE author team through Workshop VIII

- **SEBoK 0.75:** Part Teams will begin drafting articles immediately after Workshop VIII
 - Initial work will be offline. A developmental version of the 0.75 wiki will be available as soon as possible. (This will be separate from the public version of 0.5 open for review.)
 - Authors should be examining the comments for SEBoK 0.5 (www.sebokwiki.org) as they refine materials for SEBoK 0.75.

Below is a list of specific action items, as outlined in this report.

1. **All authors should ensure that they have at least one assignment for SEBoK 0.75 or GRCSE 0.5.**
2. Develop an updated version of the SEBoK concept map, which will be used for integration. *Sandy Friedenthal* and *Steve Mitchell* to develop; the *Part Team Leads* to review and correct any noted inconsistencies/gaps.
3. Determine whether and how to incorporate some aspect of the concept map into the next iteration of the SEBoK. *Sandy Friedenthal* to lead.
4. Develop a PDF version of the SEBoK that can be posted to the wiki and downloaded. *Core Team*
5. Provide staffing updates as all authors identify their assignments. *Part Team Leads*
6. Group should think of the general Wiki related comments or problems you come across as you review the Wiki and provide the core team with discoveries post review or at the next workshop. *All Authors*