Integrated Software and Systems Engineering curriculum

Graduate Software Engineering Reference Curriculum (GSwERC)

Workshop 6

Curriculum Author Team (CAT)

April 29\textsuperscript{th}, 30\textsuperscript{th}, 2009

Carnegie Mellon University
Pittsburgh, PA, USA

WORKSHOP REPORT
# Table of Contents

1. ISSEc Project .................................................................................................................. 3
2. GSwERC Workshop 6  ..................................................................................................... 4
3. Workshop Proceedings .................................................................................................... 4
3.1 Current Status of iSSEc/GSwERC ................................................................................ 4
3.2 Status of GSwERC Volume 1 ........................................................................................ 5
3.3 Status of GSwERC Volume 2 ....................................................................................... 6
3.4 Status of GSwERC Volume 3 ....................................................................................... 7
3.5 Appendices of Each Volume .......................................................................................... 7
3.6 Endorsement and Sponsorship ..................................................................................... 7
   - Develop proposal for responsibilities/funding way ahead (ACM, IEEE CS, INCOSE, NSF, DOD)........................................................................................................ 8
   - Email to ACM outlining near-term revisions (SWEBOK revision, ISO technical paper) .................................................................................................................. 8
3.7 Project Management Components .................................................................................. 8
3.4 Upcoming Conferences .................................................................................................. 8
3.5 GSwERC 1.0 Publication and Beyond .......................................................................... 9
1. iSSEc Project

Software engineering (SwE) is the acknowledged discipline by which large-scale and complex software is developed. Many universities teach software engineering at the undergraduate level. More than 30 colleges and universities helped create the 2004 model curriculum for undergraduate SwE education that was published by the IEEE and ACM.

Many universities offer a Masters degree in SwE. Yet the only existing reference curriculum for graduate SwE was created in 1991 by the Software Engineering Institute. Since then, technology changes, such as the World Wide Web, have vastly changed how the world communicates, and software being developed today has become enormously more complex. Considering the reliance of the world economy on the quality of SwE professionals, there is a clear need to develop a graduate reference curriculum.

The iSSEc (integrated Software and Systems Engineering curriculum) project is creating a new reference graduate SwE curriculum that reflects new understanding of how to build software, how software engineering depends on systems engineering, and how software engineering education is influenced by individual domains such as telecommunications and defense systems. The proposed reference curriculum will be suitable for university education leading to a Masters Degree in SwE or its equivalent.

As per the initial iSSEc project plan, an Early Start Team (EST) was formed and an organizing workshop was conducted in August 2007 to bring the members together and to jump-start the project activities. Following the workshop, members of the EST began working on an initial version of the reference curriculum. A second workshop was conducted in December 2007 to review the current status and to plan future activities. The EST then prepared and released version 0.25 of the Graduate Software Engineering Reference Curriculum (GSwERC v0.25) in March 2008, which was sent to over 150 reviewers from the world-wide software and systems engineering communities – academia and industry, as suggested by EST members. A third workshop was conducted in April 2008 to discuss the reviews received on GSwERC v0.25. Following this workshop, the EST transitioned into the Curriculum Author Team (CAT), which continued revision of GSwERC v0.25 based, in part, on reviewer comments. The CAT met in July, 2008 in Monterey, California for the fourth workshop to discuss the main outline of GSwERC v0.5 that was released for international review on October 31, 2008. The CAT met in January 2009 in Daytona for the fifth workshop to discuss the review and the way ahead for GSwERC. The international review period closed on March 15, 2009, with 86 reviewers and over 800 comments received.
2. GSwERC Workshop 6

The sixth workshop was held at Carnegie Mellon University in Pittsburgh, PA on April 29th, 30th, 2009. (Please see Appendix A for the list of meeting participants.). The workshop’s briefings can be found on the GSwERC website at http://www.asysti.org/april2009.aspx.

The detailed meeting agenda can be found in Appendix B. The objectives of the workshop were to:

1. Refine the course to create GSwERC version 1.0 with Volumes 1, 2, & 3
2. Understand the review of GSwERC 0.5 and agree how to respond to certain critical comments
3. Discuss first steps of GSwERC adoption with ACM, IEEE, and INCOSE
4. Plan GSwERC-related publications and participation in conferences and workshops
5. Begin discussion of SE Body of Knowledge and reference curriculum project

After discussions, the CAT agreed to a strategy to implement GSwERC version 1.0 by improving the contents of the three volumes (1, 2, and 3); gain more international participation in the development of GSwERC comparisons and implementation considerations; and initiate the agreed endorsement process with ACM, IEEE, and INCOSE.

3. Workshop Proceedings

3.1 Current Status of iSSEc/GSwERC

Dr. Art Pyster, principal investigator of the iSSEc Project, opened the meeting with a discussion of the status of GSwERC to date.

Progress to date. As of April 2009, 86 reviews to GSwERC Version 0.5 have been received, half of which are from outside the U.S. The GSwERC Vol. 1, 2, and 3 teams have been meeting regularly to work on the contents of each volume. The team leaders presented the progress of each volume and received feedback from the author team and the CMU professors invited to the workshop.

Schedule. The release of GSwERC Version 1.0 is scheduled for September 2009. GSwERC’s 7th Workshop is scheduled for the beginning of August to finalize GSwERC Version 1.0.

Endorsements. As of the time of the workshop, Andrew McGettrick, the head of the Association for Computing Machinery (ACM) Educational Activities Board (EAB) accepted the request for ACM to fully participate in the GSwERC project and to seek
sponsorship by the ACM when GSwERC 1.0 is published; Dr. Lillian (Boots) Cassel, ACM representative on the CAT, gave a talk on the first day of the workshop to narrate the process of endorsement. The Institute of Electrical and Electronics Engineers Computer Society (IEEE CS) Educational Activities Board Chairman, Alan Clements, appointed Greg Hislop as the Computer Society participant on the Author Team. The International Council on Systems Engineering (INCOSE) Board of Directors is considering a request to become a steward of GSwERC after version 1.0 is released. INCOSE is represented on the by Dr. Ricardo Valerdi and Dr. Rick Adcock.

Publicity. More publicity is still desired. Greater awareness will increase early adoption and increase the submission of additional comparisons and hypothetical implementations. The CAT agreed to present talks, write more articles, and post information on websites to increase visibility and interest.

3.2 Status of GSwERC Volume 1

GSwERC Volume 1 is the primary recommendations document including: guidance, outcomes, entrance requirements, architecture, and Core Body of Knowledge (CBOK). As a result of several virtual meetings, many updates had been incorporated in Volume 1 prior to the workshop in response to the reviews received.

3.2.1 Outcomes and Entrance requirements

Art Pyster presented the main updates that were incorporated into the outcomes and entrance requirements sections. As a result of discussion with the CAT, the following suggestions were made:

- Diagram showing alignment/differential between SwE undergrad/grad programs
- Comments on Blooms levels for Outcomes
- Add more clarity to Outcomes 1, 2, 6, 9, & 10
- Write-up of comments on Outcomes 1 & 2 Entrance Expectations refinement—craft language clarifying experience requirements to enrich academic experience and consequences without this experience
- Ensure language is clear to indicate that students should have learned how to perform functions upon graduation

3.2.2 Architecture

Jim McDonald presented the few changes made to the architecture section to respond to the review comments. The main updates included more clarity on the architecture figures, length of the program that could vary from 18 months to 24 months, and the feasibility of the capstone project within industry.
3.2.4 CBOK

Thomas Hilburn presented the updates added to the CBOK section as a response to the review comments. The CBOK discussion generated the following action items:

- Develop an alternative to percentages (weight categorization) for importance of KAs, emphasizing that CBOK is no more than 50% of the total curriculum
- Improve language to ensure the reader understands the need to use SWEBOK as a companion document
- Refine discussion of cross-cutting issues; include more clarity on presenting security and human factors
- Develop discussion of potential SWEBOK updates, and add some excerpts of the SWEBOK content to the Cross-Cutting Issues section
- Revise the CBOK to better coordinate with the SWEBOK organization; currently, there are some CBOK elements presented differently, or moved up or down in the hierarchy of the CBOK

3.2.5 Outcomes/CBOK mapping

As a response of one of the review comments, Kahina Lasfer presented to the CAT an outcomes/CBOK table that includes how well the CBOK supports the outcomes. The main purpose of the mapping is to clarify where CBOK falls short of achieving the outcomes, and to help explain the importance of the remaining 50% of the curriculum not covered by the CBOK. The draft table, as presented at the workshop, may be found in Appendix D.

A degree of support of the outcome from CBOK is rated using high, low, medium, and none. "High" would mean that the CBOK - with its designated Bloom’s levels - fully supports the outcome; “medium”, “low”, and “none” describe decreasing levels of support of the outcome within CBOK. The CAT suggested adding a column to the draft table to show the mapping against the entire GSwERC curriculum. Future versions should include additional commentary on how to demonstrate and bridge the gaps between the level of outcome satisfaction gained through the CBOK versus through the entire curriculum (e.g. utilization of university-specific content, capstone projects, etc).

3.3 Status of GSwERC Volume 2

GSwERC Volume 2 includes recommendations at the individual program level, and comparisons of several universities, including non-U.S. institutions, to GSwERC. A strategy for acquiring additional program information was developed, primarily involving outreach by individual CAT members.

Dennis Frailey presented the general status of GSwERC Volume 2 progress. The main issue discussed was identification of the main focus and objectives of Volume 2 document. The structure of the volume should be developed in a way that makes it a useful resource for individuals wishing to implement GSwERC in their universities.
Mary Jane Willshire and Massood Towhidnejad presented a rubric that contains the main questions and rating that will be used to develop a comparison template. The CAT proposed the following elements to be considered for Volume 2:

- Remove school names from the comparisons; instead characterize each school according to demographics, focus, etc.
- Develop a list of participating schools (with permissions to appear on the list)
  - For version 1.0, the following mix is desirable: 3 US, 1 European, 1 Asian, 1 Australian, and 2 wildcard universities
  - WebEx available for facilitation
- Refine rubric/guide for assisting comparisons
- Outreach to foreign schools for comparisons

### 3.4 Status of GSwERC Volume 3

This includes the implementation considerations currently in Section 8 of GSwERC v0.5. Additional implementation considerations will be added as they come to light. The volume will be organized according to the types of issues being addressed. The following observations were noted during the discussion:

- Terminology – which should be clarified for all volumes
  - Eliminate or explain US-centric terms (“track”, tenure, faculty, etc)
  - Develop alternative terms
  - Define used terms
- Appendix: History of SwE education, incorporating information in the current appendix on the Wang program
- Follow-up with CAT re: implementation of GSwERC
- Recommendation on teaming with industry for classroom and/or capstone projects, where projects address industry needs.
- The CAT should utilize their networks to get more international inputs in implementation considerations.
- Include more international inputs on combined BS/MS degree programs.
- Include journal papers and additional references and use an Internet-based collaborative technology to share resources and documents.
- A request to the CAT to get more inputs to improve Volume 3.

### 3.5 Appendices of each Volume

Each volume’s team will propose appendices, references, etc. for each Volume. There was an agreement to include an executive summary in each volume to summarize the GSwERC recommendations of Volume 1.

### 3.6 Endorsement and sponsorship

Boots Cassel emphasized the importance of following the right process on how to seek endorsement or sponsorship of GSwERC. For after version 1.0 is published, she
proposed using a stable web application which includes interactive components to capture observations and comments. The other recommendation is to create a small committee to supervise and monitor the evolution of GSwERC. The EAB of ACM is scheduled to meet at the end of December, which is after the publication date for GSwERC. Therefore, it is an appropriate time to present version 1 to the ACM EAB. A few action items were suggested for the CAT:

- Develop proposal for responsibilities/funding way ahead (ACM EAB, IEEE CS, INCOSE, NSF, DOD)
- Email to ACM outlining near-term revisions (SWEBOK revision, ISO technical paper)

3.7 Project management components

Dick Thayer presented his thoughts on how to include more project management topics in the CBOK such as staffing, directing, and controlling. The related discussion among the CAT focused on what knowledge the graduates need to capture and touched on some topics of project management such as risk management, team organization, and project organization. Tom Hilburn took an action to compare the list that was proposed by Dick Thayer and compare it to the CBOK and make a recommendation on how to update the CBOK appropriately without changing the fundamental organization of the CBOK.

3.4 Upcoming Conferences

The CAT discussed the following conferences at which it may be appropriate to distribute information on GSwERC and make presentations to enhance its exposure and attract more reviewers. The conferences discussed, and potential CAT representatives, included:

- ICSE 2009 (May 16-24, Vancouver, lunch session) – accepted – Barrie Thompson, Richard Turner, Guilherm Travassos
- INCOSE (July 20-23, Singapore) Rick Adcock, Art Pyster, and Ricardo Valerdi
- IFIPS WCCE 09 (July 27-31, Brazil) – accepted for publicity session – Barrie Thompson & Guilherm Travassos (presentation) – possibly larger events
- ITSMF 09 (September 17-18, Dallas) – adding presentations for GSwERC – Bill Hefly & Dick Fairley
- NDIA 09 (Oct 26-29, San Diego) - Art Pyster, Ken Nidiffer, Rich Turner
- FIE 09 (Oct 18-21, San Antonio) – IEEE Academic Forum (Dennis Frailey, Tom Hilburn, and Mark Ardis)
- APSEC 09 (Dec 9-12, Malaysia)
- SIGCSE 10 (March 10-13, Milwaukee)
- AFCEA for a presentation – Ken Nidiffer (identify the right events)
The CAT agreed to look for other conferences in other application domains such as finance, medical, etc. The purpose is to target multiple audiences, including faculty (implementers), industry (demand), and potentially students. Some of the CAT members proposed finding places in industry journals to publicize papers and give GSwERC more exposure in the industrial sector.

3.5 GSwERC 1.0 Publication and Beyond

After Version 1.0 is published, the CAT wishes to transfer stewardship from itself to professional societies. It is proposed that the IEEE CS and the ACM become stewards of GSwERC Volume 1, with an advisory role for INCOSE. The three professional societies will most likely become stewards of Volume I only, as they do not typically endorse utilizing examples of particular programs. Volumes II and III, which contain information about specific implementation experiences and advice, are companion documents which are not typically associated with a curriculum when it is first published. A different governance model for Volumes II and III may be necessary. Art Pyster, Boots Cassel, Greg Hislop, Bruce Amato (or Scott Lucero), Rick Adcock, Ricardo Valerdi, and Joe Urban will evolve the strategy for post-version 1.0 governance. The specific actions regarding these items and the individual(s) responsible for the actions can be found in more detail in Appendix C. Key publications on GSwERC will be sought in major journals of the IEEE CS, ACM, and INCOSE. Funding from the National Science Foundation (NSF) will be sought for summer faculty workshops in 2010. Joe Urban will explore whether it is possible for the Office of Naval Research (ONR) to provide funding for adoption workshops outside the U.S.

4. Way Ahead

In the near-term, the owner of each volume will continue to lead the sub-team updates of each volume. The CAT will work on having more additional comparisons and implementations. A draft update will be completed by July 28, 2009 for discussion at the next CAT workshop, which will be held the first week of August 2009 at a TBD location. The workshop focus will be to discuss the updated version of each volume of GSwERC and any final changes and plans required to publish version 1.0 and to review progress on post-version 1.0 governance.
Appendix A: Workshop Participants

Curriculum Author Team

**Present**
Rick Adcock, Cranfield University & INCOSE Representative
Bruce Amato, Department of Defense
Mark Ardis, Rochester Institute of Technology
John Brackett, Boston University
Lillian (Boots) Cassel, Villanova and ACM Representative
Dick Fairley, Colorado Technical University
Dennis Frailey, Southern Methodist University & Raytheon
Thomas Hilburn, Embry-Riddle Aeronautical University
Ken Nidiffer, Software Engineering Institute
Art Pyster, Stevens Institute of Technology
Mary Shaw, Carnegie Mellon University
Dick Thayer, California State University at Sacramento
Barrie Thompson, University of Sunderland
Massood Towhidnejad, Embry-Riddle Aeronautical University
Richard Turner, Stevens Institute of Technology
Joe Urban, Texas Technical University
Mary Jane Willshire, Colorado Technical University
Nicole Hutchison, Stevens Institute of Technology
Kahina Lasfer, Stevens Institute of Technology

**Joining via WebEx**
Larry Bernstein, Stevens Institute of Technology
Barry Boehm, University of Southern California
Pierre Bourque, École de technologie supérieure
Dave Klappholz, Stevens Institute of Technology
Phillip Laplante, Penn State University
Bret Michael, Naval Postgraduate School
Jim McDonald, Monmouth University
Guilherme Travassos, Brazilian Computer Society

**CMU invited faculty members**
Bill Hefley, hefley@cmu.edu
Todd Sedano, todd.sedano@sv.smu.edu
David Garlan, garlan@cs.cmu.edu
Mel Rosso-Llopart, rossol@cs.cmu.edu
John Grasso, john.grasso@cmu.edu
Gil Taran, gtaran@icarnegie.com
Appendix B: Workshop Agenda

Day 1: April 29th, 2009

8:00a  Continental breakfast
8:30a  Introductions and current status of iSSEc project & GSwERC - Art Pyster
9:00a  Review of GSwERC 1.0 Volume 1 document: GSwERC Outcomes, - Art Pyster
10:15a  Break
10:30a  Review of GSwERC v1.0 Volume 1 document: Architecture and CBOK – review comments, and updates - Jim McDonald and Tom Hilburn
12:00p  Lunch
1:00p  Review GSwERC v1.0 Volume 2: Comparison of Current Programs to GSwERC – Dennis Fairley
2:30p  ACM involvement – Boots Cassel
2:45p  GSwERC Version 1.0 governance – Art Pyster
3:10p  Break
3:25p  Review GSwERC v1.0 Volume 3: Hypothetical GSwERC Implementation – Bret Michael
4:30p  Maturing GSwERC v1.0 Volume 3: improving content; obtaining additional implementations, especially for diversity – Bret Michael
5:00p  Adjourn for the day

Day 2: April 30th, 2009

7:30a  Continental breakfast
8:00a  Recap of previous day’s discussions
8:30a  Discussions on other sections and appendices of GSwERC 1.0 – Art Pyster
9:30a  GSwERC conference, publication plan – Art Pyster
10:00a  GSwERC adoption workshops in 2010 and 2011 – Art Pyster
10:30a  Break
10:45a  SE body of knowledge and reference curriculum project – Art Pyster
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00</td>
<td>Plan to complete GSwERC 1.0</td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00p</td>
<td>Workshop summary and next steps -- what remains to be done to create version 1.0 – Art Pyster</td>
</tr>
<tr>
<td>2:00p</td>
<td>Adjourn</td>
</tr>
</tbody>
</table>
## Appendix C: Follow-On Action Items

<table>
<thead>
<tr>
<th>Task</th>
<th>Action Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Diagram showing alignment/differential between SwE undergrad/grad programs.</td>
<td>Art Pyster and Dennis Frailey</td>
</tr>
<tr>
<td>Adding more clarity to Outcomes 1, 2, 6, 9, &amp; 10.</td>
<td>Art Pyster</td>
</tr>
<tr>
<td>Write-up of comments on Outcomes 1 &amp; 2 (assessment versus application—Rick Adcock)</td>
<td>Rick Adcock</td>
</tr>
<tr>
<td>Entrance Expectations refinement—craft language clarifying experience requirements to enrich academic experience and consequences without this experience</td>
<td>Art Pyster</td>
</tr>
<tr>
<td>Ensure language is clear to indicate that students should have learned how to perform functions upon graduation</td>
<td>Art Pyster</td>
</tr>
<tr>
<td><strong>CBOK</strong></td>
<td></td>
</tr>
<tr>
<td>Develop alternative to percentages (weight categorization) for importance of KAs, emphasizing that CBOK is only 50% of a curriculum</td>
<td>Thomas Hilburn</td>
</tr>
<tr>
<td>Improve language to ensure reader understands need to use SWEBOK as a companion document (Tom)</td>
<td>Thomas Hilburn</td>
</tr>
<tr>
<td>Refine discussion of cross-cutting issues; include more clarity on presenting security and human factors.</td>
<td>Thomas Hilburn</td>
</tr>
<tr>
<td>Develop discussion of potential SWEBOK updates, and add some of the SWEBOK sections as an appendix.</td>
<td>Thomas Hilburn, Pierre Bourque</td>
</tr>
<tr>
<td>Compare the list that was proposed by Dick Thayer and compare it to the CBOK and make a recommendation on the right topics.</td>
<td>Thomas Hilburn</td>
</tr>
<tr>
<td>Mapping with Outcomes—add column to draft table to show mapping against overall GSwERC; include additional commentary on how to address gaps between CBOK and outcomes</td>
<td>Kahina Lasfer</td>
</tr>
<tr>
<td>Remove school names from the document and develop a list of participating schools with permission</td>
<td>Dennis Fraley, Mary Jane Willshire</td>
</tr>
<tr>
<td>Include a mix of 3 US, 1 European, 1 Asian, 1 Australian, 2 wildcard.</td>
<td>Volume 2 team</td>
</tr>
<tr>
<td>Refine rubric/guide for assisting comparisons</td>
<td>Mary Jane Willshire</td>
</tr>
<tr>
<td>Outreach to non-U.S. schools for comparisons</td>
<td>CAT</td>
</tr>
<tr>
<td><strong>GSwERC Volume 3</strong></td>
<td></td>
</tr>
<tr>
<td>Enhance the terminology used through the document specifically:</td>
<td></td>
</tr>
<tr>
<td>- ID US-centric terms (“track”, tenure, faculty, etc)</td>
<td>Bret Michael take lead and coordinate with other volume owners</td>
</tr>
<tr>
<td>- Develop alternative terms</td>
<td></td>
</tr>
<tr>
<td>- Define used term</td>
<td></td>
</tr>
<tr>
<td>Include an Appendix related to the history of SwE education, incorporating information in the current appendix on the Wang program History of SwE education, incorporating information in the current</td>
<td>Dick Fairley, Mark Ardis</td>
</tr>
</tbody>
</table>
### Task

<table>
<thead>
<tr>
<th>Task</th>
<th>Action Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>appendix on the Wang program</td>
<td></td>
</tr>
<tr>
<td>Follow-up with École de technologie supérieure EST on their implementation of elements of GSwERC</td>
<td>Bret Michael, Pierre Bourque</td>
</tr>
<tr>
<td>Include more recommendations on teaming with industry for classroom and/or capstone projects, where projects address industry needs.</td>
<td>Bret Michael</td>
</tr>
<tr>
<td>Include journal papers and additional references</td>
<td>Bret Michael</td>
</tr>
<tr>
<td>Include more international inputs on combined BS/MS degree programs.</td>
<td>CAT</td>
</tr>
<tr>
<td>Include more international inputs in implementation considerations</td>
<td>CAT</td>
</tr>
<tr>
<td>Develop proposal for responsibilities/funding way ahead (ACM, IEEE CS, INCOSE, NSF, DOD)</td>
<td>Art Pyster</td>
</tr>
<tr>
<td>Support ACM role in governance</td>
<td>Boots Cassel</td>
</tr>
<tr>
<td>Support INCOSE in governance</td>
<td>Ricardo Valerdi/Rick Adcock</td>
</tr>
<tr>
<td>Support IEEE role in governance</td>
<td>Greg Hislop</td>
</tr>
</tbody>
</table>

#### GSwERC v1.0 Development

- **Vol 1** — Stevens (structure); CAT teams (content update); Guidance/Outcomes, architecture, and CBOK - troika to be stewards
  - Volume Owner: Art Pyster
  - Content Leads: Art Pyster, Tom Hilburn, Jim McDonald
- **Vol 2** -- Comparisons and sample implementations; including organization specific to a single program
  - Volume Owner: Dennis Frailey
- **Vol 3** — capture “lessons learned” and “best practices” for specific implementation issues
  - Volume Owner: Bret Michaels
- Summary Volume — Executive Summary of Vols I-III to be included in each volume.
- Formatting, Glossary, Index, etc. for all volumes
  - Richard Turner
  - Kahina Lasfer: Vol I & III
  - Nicole Hutchison: Vol II
  - Nicole Hutchison, & Kahina Lasfer

### Publication plan

- Publications via ACM and IEEE and INCOSE
- ID appropriate venues/topics
- Paper development/submittal
  - Art Pyster & Rich Turner (CAT members to author)

### Conferences outreach

- ICSE 2009 (May 16-24, Vancouver, lunch session) – accepted –
  - Barrie Thompson, Richard Turner, Guilherm Travassos.
- INCOSE (July 20-23, Singapore)
  - Rick Adcock, Art Pyster, and Ricardo Valerdi
- IFIPS WCCE 09 (July 27-31, Brazil) – accepted for publicity session – (presentation) – possibly larger events
  - Barrie Thompson & Guilherm Travassos
- iSMART 09 (September 17-18, Dallas) – adding presentations for GSwERC — accepted.
  - Bill Hefly & Dennis Frailey

### GSwERC v1.0 Publication and Outreach

- Update GSwERC website, and rename/update the domain name for a better visibility and access to the information.

### Endorsement/Stewardship

- Support ACM role in governance
  - Boots Cassel
- Support INCOSE in governance
  - Ricardo Valerdi/Rick Adcock
- Support IEEE role in governance
  - Greg Hislop
<table>
<thead>
<tr>
<th>Task</th>
<th>Action Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>• NDIA 09 (Oct 26-29, San Diego)</td>
<td>Art Pyster, Ken Nidiffer, Scotts Lucero, Rich Turner</td>
</tr>
<tr>
<td>• FIE 09 (Oct 18-21, San Antonio) – IEEE academic forum.</td>
<td>Dennis Frailey, Tom Hilburn, and Mark Ardis</td>
</tr>
</tbody>
</table>
| • APSEC 09 (Dec 9-12, Malaysia)  
• SIGCSE 10 (March 10-13, Milwaukee)  
• AFCEA for a presentation – Ken Nidiffer (identify the right events)  
• CSEET 10 (March, Pittsburgh)  
• ICSE 10 (May 1-8, Cape Town)  
• ITICSE 10 (Jun 28-30, Ankara)  
• INCOSE IS 10 (July 12-15, Chicago) | |
| Write a white paper proposal to NFS | Joe Urban |
| Identify speaking opportunities  
Local computer/ professional societies | Each CAT member |
## Appendix D: Outcomes/CBOK mapping

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Knowledge Areas that Support the Outcome</th>
<th>Topics within KAs that Support the Outcome</th>
<th>Degree of Support for the Outcome</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mastered the Core Body of Knowledge (CBOK).</td>
<td>All</td>
<td>All</td>
<td>High</td>
<td>By definition, the CBOK supports this outcome.</td>
</tr>
<tr>
<td>2. Be able to apply software engineering in one application domain, such as finance, medical, transportation, or telecommunications, and in one application type, such as real-time, embedded, safety-critical, or highly distributed systems.</td>
<td>All</td>
<td>All</td>
<td>None</td>
<td>There is no requirement in the CBOK for application of knowledge to any domain in depth.</td>
</tr>
<tr>
<td>3. Have mastered at least one knowledge area or sub-area from the CBOK to at least the Bloom Synthesis level.</td>
<td>Any</td>
<td>All</td>
<td>Low</td>
<td>The CBOK does not require Bloom’s Synthesis level.</td>
</tr>
<tr>
<td>4. Be able to make ethical professional decisions and practice ethical professional behavior</td>
<td>A. Ethics and Professional Conduct</td>
<td>All</td>
<td>High</td>
<td>All the KA in the CBOK require ethical and professional conduct.</td>
</tr>
<tr>
<td>5. Understand the relationship between software engineering and systems engineering and be able to apply systems engineering principles and practices in the engineering of software.</td>
<td>A. Ethics and Professional Conduct</td>
<td>A.1. Social, legal, and historical issues</td>
<td>Medium</td>
<td>No topics related to “be able to apply systems engineering principles and practices in the engineering of software.”</td>
</tr>
<tr>
<td></td>
<td>B. System Engineering</td>
<td>A.2. Codes of ethics and professional conduct</td>
<td></td>
<td>Table 2 has a column that lists systems engineering areas/units.</td>
</tr>
<tr>
<td></td>
<td>C. Requirements Engineering</td>
<td>B. (all)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F. Testing</td>
<td>C. (all)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H. Configuration Management</td>
<td>H. (all)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I. Software Management</td>
<td></td>
<td></td>
<td>No topics related to: “including teams that may be multinational and geographically distributed, to effectively communicate both orally and in writing, and to lead in one area of project development, such as project development.”</td>
</tr>
<tr>
<td>6. Be able to work effectively as part of a team, including teams that may be multinational and geographically distributed, to effectively communicate both orally and in writing, and to lead in one area of</td>
<td>A. Ethics and Professional Conduct</td>
<td>A.1. Social, legal, and historical issues</td>
<td>Low</td>
<td>No topics related to: “including teams that may be multinational and geographically distributed, to effectively communicate both orally and in writing, and to lead in one area of project development, such as project development.”</td>
</tr>
<tr>
<td></td>
<td>I. Software Management</td>
<td>I.4. Software Project Organization and Enactment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Project development, such as project management, requirements analysis, architecture, construction, or quality assurance | C. Requirements Engineering  
I. Software Engineering Management | C.3. Initiation and Scope Definition  
I.1. Software Project Planning  
I.2. Risk Management  
I.3. Software Project Organization and Enactment  
I.7. Engineering Economics | management, requirements analysis, architecture, construction, or quality assurance”  
Topics related to multicultural communication are missing.  
No KA or topic related to: “reconcile conflicting project objectives, finding acceptable compromises within limitations of cost, time, knowledge, risk, existing systems, and organizations.”  
Topics related conflict resolutions, is missing.  
No KA or topic related to: “feasibility analysis, negotiation, effective work habits, leadership, and good communication with stakeholders”.  
No topics on: leadership, communication and negotiation skills, feasibility analysis.  
No KA or topic related to this outcome.  
Refer to capstone or comparisons.  
No KA or topic related to this outcome.  
Refer to capstone or comparisons. |
|---|---|---|---|
| **7. Be able to reconcile conflicting project objectives, finding acceptable compromises within limitations of cost, time, knowledge, risk, existing systems, and organizations.** | C. Requirements Engineering  
I. Software Engineering Management | C.3. Initiation and Scope Definition  
I.1. Software Project Planning  
I.2. Risk Management  
I.3. Software Project Organization and Enactment  
I.7. Engineering Economics | Low |
| **8. Understand and appreciate the importance of feasibility analysis, negotiation, effective work habits, leadership, and good communication with stakeholders in a typical software development environment** | C. Requirements Engineering  
I. Software Engineering Management | C.3. Initiation and Scope Definition  
C.4. Requirements Elicitation  
I.3. Software Project Organization and Enactment | Low |
| **9. Be able to learn new models, techniques, and technologies as they emerge, and appreciate the necessity of such continuing professional development** | All | Low |
| **10. Be able to analyze a current significant software technology, articulate its strengths and weaknesses, compare it to alternative technologies, and specify and promote improvements or extensions to that technology** | Some | Low |