GRCSE materials for BKCASE Workshop IV
Wed 13/10 1:30-3:30pm (Overview)

• Current state
  – The GRCSE document provided on 1 October 2010 is a “substantial draft” working towards version 0.25, due for release 15 December 2010.
  – This document was inspired by GSWE2009 but represents significant new work building towards a different vision for SE education
  – GRCSE in the current form providing a reference curriculum for SE-centric SE programs
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– Compared with GSWE2009 GRCSE has additional types of information:
  • An intended discussion of expected objectives of graduate programs
  • And intended discussion of possible assessment approaches for use in a graduate program
  • Extended discussion of Bloom’s Taxonomy to include the Affective Domain
  • And intended discussion of the relationship of student learning and assessment processes
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• The heading level outline of the GRCSE
  – Preface
  – Acknowledgements
  – Executive summary
  – Section 1 introduction
  – Section 2 guidance instruction of the GRCSE
  – Section 3 expected objectives
  – Section 4 expected outcomes
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– Section 5 expected student background
– Section 6 curriculum architecture
– Section 7 core body of knowledge
– Section 8 assessment
– Section 9 expect the GRCSE evolution
– Appendix A summary of survey
– Appendix B Bloom’s taxonomy
– Appendix C SE competency frameworks
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– Appendix D assessment and learning outcomes
– References
– Glossary
– Index
Wed 13/10 1:30-3:30pm (Overview)

- Driving perspectives (underlying assumptions)
  - There are flavours of SE which are distinguishable as technical systems development, systems management, supplier or contractor site practices, and acquisition side practices
  - All SE practitioners need a fundamental core set of knowledge and extensions depending on which flavour of SE practice they follow
Wed 13/10 1:30-3:30pm (Overview)

• Driving perspectives (underlying assumptions)
  – The reference curriculum must allow significant space for individual University tailoring to suit local contexts
  – The CorBOK will be presented as a list of topics following the same structure as SEBOK. The CorBOK will be annotated with Bloom levels of achievement for student outcomes
Wed 13/10 1:30-3:30pm (Overview)

• Reasoning – discussion intended
  – There are flavours of SE were distinguishable as technical systems development, systems management, supplier or contractor site practices, and acquisition side practices
    • The 4 groups seem to reflect four groups of SE practice
    • The 4 groups seem to focus on different knowledge
    • The 4 groups seem to emphasise different issues
    • The 4 groups each have their own career paths
    • The four groups appear to need different education
Wed 13/10 1:30-3:30pm (Overview)

• Reasoning – discussion intended
  – All SE practitioners need a fundamental core set of knowledge and extensions depending on which flavour of SE practice they follow
    • The core knowledge provides a common overview of SE for all groups of practitioners
    • The extension knowledge provides the specific knowledge required individual’s specific practice
    • Different areas of practice require different levels of attainment in each knowledge area and topic
Wed 13/10 1:30-3:30pm (Overview)

• Reasoning – discussion intended
  – The reference curriculum must allow significant space for individual University tailoring to suit local contexts
    • University programs are constrained by institutional policy and regulatory environment – this impacts permissible degree structures etc
    • It is useful for universities to respond to their local environment – particularly the kinds of industry to which many students will proceed
    • This results in GRCSE being abstract, not directive
Wed 13/10 1:30-3:30pm (Overview)

• Reasoning – discussion intended
  – The CorBOK will be presented as a list of topics following the same structure as SEBOK. The CorBOK will be annotated with Bloom levels of achievement for student outcomes
    • This provides consistency between GRCSE and SEBOK
    • Bloom levels of achievement will be stated as minimum expectations for any degree, individual degrees should produce attainment at a higher level for many items
    • We need to work out how to deal with the complexity introduced by the multiple flavours
Wed 13/10 1:30-3:30pm (Overview)

• State of maturity of GRCSE sections (information)
  – Preface
    • Reasonably mature – a few points are intended for discussion later
  – Acknowledgements
    • Reasonably mature – a few points are intended for discussion later
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– Executive summary
  • Reasonably mature – some items need to be discussed later

– Section 1 introduction
  • Reasonably mature – one section will need to be rewritten to transition effectively from SW to SE

– Section 2 guidance instruction of the GRCSE
  • Quite mature – the GRCSE team believe that this is a version 0.25 text. This section and there is the majority of the underlying assumptions of the GRCSE work.
  • The assumptions change the text will need to change
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– Section 3 expected objectives
  • We have no substantive text
  • We have some discussion points for later in this meeting

– Section 4 expected outcomes
  • This section is fairly mature. Limitations concern cross linkages with other sections. (The most important of these concern the later discussion of the CorBOK and curriculum architecture.)
  • We also have some discussion planned
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– Section 5 expected student background
  • This section is fairly mature – we have some discussion points planned

– Section 6 curriculum architecture
  • Low maturity – we have something which expresses our current ideas. This expresses our idea of core and extension material.
  • We have discussion points planned

– Section 7 core body of knowledge
  • Very immature – plan significant discussion
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- Section 8 assessment
  - Very immature – all we have is a paragraph expressing our intended purpose
  - We plan discussion

- Section 9 expect the GRCSE evolution
  - Reasonably mature – this is acceptable text or version 0.25 subject to our understanding of the intentions the correct

- Appendix A summary of survey
  - Fairly mature – we have discussion points planned
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– Appendix B Bloom’s taxonomy
  • Reasonably mature – we have discussion points planned

– Appendix C SE competency frameworks
  • Reasonably mature – we have discussion points planned

– Appendix D assessment and learning outcomes
  • No text written – we have a brief outline the intended content
  • We plan discussion
Wed 13/10 1:30-3:30pm (Overview)

– References
  • Is automatically generated. No discussion required

– Glossary
  • We have identified a number of terms and acronyms used to date.
  • If you have been completed, much further work is required
  • We have discussion points planned

– Index
  • This will be automatically generated
Wed 13/10 3:50-6:15pm (Draft)

• Preface (discussion points)
  – Table 1 lists the GRCSE team, table 2 lists the BKCASE team
  – Some people have contributed to both. Should people who have contributed to both the listed in both places?
    • Alternative: GRCSE contributors listed in table 1 only and other BKCASE is the table 2 only
    • All BKCASE authors are listed because of the dependence of GRCSE on the SEBOK of BKCASE
Wed 13/10 3:50-6:15pm (Draft)

• Preface (discussion points)
  – Subject to the conclusion of the previous discussion point:
    • There are two comments in the bullet point section. Is the text in those bullet points clear in conveying the intent indicated in those comments?
    • Is the preface content correct in fact?
    • Is the preface content, order and style appropriate?
• Acknowledgements (discussion points)
  – We have noted comments about points which must be maintained going forward.
  – Is the content of this section appropriate?
Wed 13/10 3:50-6:15pm (Draft)

• Executive Summary (discussion points)
  – The executive summary is quite long by the standards of executive summaries
  – Does the first page appear consistent with the rest of the document?
  – Is it appropriate to bring forward all the numbered item key points from the later chapters which address specific subject areas?
Wed 13/10 3:50-6:15pm (Draft)

• Executive Summary (discussion points)
  – Do we need a section at the end of the executive summary with the heading “discussion”?
  – What content should appear under “discussion”?
Wed 13/10 3:50-6:15pm (Draft)

• Introduction (discussion points)
  – On the second page of this section there is a large section which has been commented upon. This section needs to be modified to reflect SE rather than SW. The current text has been carried over from GSWE2009.
  – Action: GRCSE team to modify to reflect SE
  – Is the content of the introduction appropriate?
Wed 13/10 3:50-6:15pm (Draft)

• Guidance (discussion points)
  – The GRCSE team believe this section text is mature
  – The numbered items embed the GRCSE team assumptions and foundational perspectives
    • Reasoning is provided in Section 2
Wed 13/10 3:50-6:15pm (Draft)

• Guidance (discussion points)
  – Do the guidelines pitch GRCSE at the right level in the spectrum of prescription/abstraction and flexibility?
  – Is there any significant change recommended/suggested?
    • Please provide recommended text changes or questions about wording in writing to Tim Ferris
Objectives 3-5 years out (discussion points)

- This section is intended to discuss the career direction of graduates
  - Achievement of the objectives is not solely dependent on an education program
  - Achievement of objectives is related to development of competencies which are desired by employers
  - Education programs must be designed to create the foundations from which an individual can (with experience and additional training) grow into an advancing career
Wed 13/10 3:50-6:15pm (Draft)

• Objectives 3-5 years out (discussion points)
  – This section is intended to provide:
    • Perspective for program developers concerning the post-graduation career growth which the program should enable
    • Establish the concept that graduate programs in SE are the beginning of a career
  – Views of the BKCASE author team are sought
• Outcomes (discussion points)
  – This section is fairly mature
  – The description is general and cross references later discussions, particularly CorBOK and the curriculum architecture
  • Is the discussion at the right level of abstraction to be useful to program developers in the context of the GRCSE document?
Wed 13/10 3:50-6:15pm (Draft)

- Expected Background (discussion points)
  - This section is fairly mature
    - Have we provided a reasonable set of entrants expectations?
    - Is our expectation of background bachelor level study appropriate?
    - Is numbered points 2 a reasonable expectation or does it unnecessarily exclude appropriate applicants?
    - Should the paragraph after numbered point 3, concerning University policy issues, be a plain paragraph or be upgraded as a numbered point?
Thurs 14/10 9:00-12:30pm (Draft)

• Curriculum Architecture (discussion points)
  – The text here captures our principal ideas but is not presented as mature text
  – Our reasoning follows that some SE knowledge fundamental and every systems engineer to know it
    • This knowledge is classified as “core foundation topics”
  – We build on our assumption of the validity of “flavours” of SE
    • Flavours are supported by “core extension topics”
Thurs 14/10 9:00-12:30pm (Draft)

• Curriculum Architecture (discussion points)
  – We provide “the main/program specific specialty/elective topics” as our placeholder for university specificity
  – We believe that some kind of “capstone experience” should be included in a program
    • We describe various ideas of what could constitute a suitable capstone experience. These ideas provide a diversity of capstone experiences which would result in potentially different capabilities being developed
Thurs 14/10 9:00-12:30pm (Draft)

• Curriculum Architecture (discussion points)
  – Figure 1 describes the overall curriculum architecture
    • We want to reduce to a single figure, either 1a or 1B, which form of the curriculum architecture figure is clearer in expressing our concept
      – 1A seems to suggest a hierarchical increase of level through the program
      – 1B seems to suggest a floundered expansionary growth of the student through a program
    • Figure 2 shows the relation of courses and architecture
      – We want to use the same figure form for both 1 and 2
Thurs 14/10 9:00-12:30pm (Draft)

• Curriculum Architecture (discussion points)
  – Figures 3, 4 and 5 show three flavour type use of SE: a product view, an enterprise view and a service view
  • A question has arisen as to whether these three use our best presented here, in the middle of the curriculum architecture, or someone else
    – We seek views on this question
Thurs 14/10 9:00-12:30pm (Draft)

• Curriculum Architecture (discussion points)
  – Figure 6 attempts to show a time and depth of learning relationship which would be experienced by a student during the program
    • Should this figure then modified in order to make the message clearer? (We have had some uncertainty in relation to this)
Thurs 14/10 9:00-12:30pm (Draft)

• CorBOK (discussion points)
  – This section is very immature. We have expressed our current ideas
  – We intend to structure the CorBOK according to the structure of SEBOK
    • This consistency will assist readers with cross referencing issues
Thurs 14/10 9:00-12:30pm (Draft)

• CorBOK (discussion points)
  – We intend to provide Bloom level of achievement indications for each sub topic that we include in the cognitive domain
  – We intend to provide gloom levels of achievement indications for the affective domain for either the top-level knowledge areas or for selected topics or subtopics

• The effective practice of SE depends on the individual valuing and being characterised by their valuation of certain knowledge areas
Thurs 14/10 9:00-12:30pm (Draft)

• CorBOK (discussion points)
  – We will do this for the core knowledge required of all systems engineers
  – We will also do this for be extended for knowledge required for the particular “flavours” that we pursue

  – Are we going the right way?
Thurs 14/10 9:00-12:30pm (Draft)

• Assessment (discussion points)
  – This section is intended to provide some indications of potential means of assessing students
  – The purpose of this section is to provide suggestions which can be considered by program developers for their appropriateness in the specific circumstances of their program
  – We expect that this will be a fairly short section (2 or 3 pages)
Thurs 14/10 9:00-12:30pm (Draft)

• Assessment (discussion points)
  – This section would be based on a general discussion of the relationship of student learning and modes of assessment provided in appendix D
  – Does the author Tim see that you in providing this kind of information?
Thurs 14/10 9:00-12:30pm (Draft)

• Evolution of GRCSE (discussion points)
  – We see the text of this section as mature subject to the arrangements for ongoing support of GRCSE through INCOSE and IEEE
• Appendix A survey (discussion points)
  – This appendix describes the survey of existing Masters programs which we conducted at the beginning of the GRCSE project
  – The current form includes our findings related to:
    • Program attributes
    • Program focus
    • Admission requirements
    • Language requirements
    • Work experience
Appendix A survey (discussion points)

• The findings are summarised in a set of numbered points

• We intend to write a section concerning comparison of institutions based on purpose

• We intend to write a section concerning a gap analysis between GRCSE and the current programs
Thurs 14/10 9:00-12:30pm (Draft)

• Appendix A survey (discussion points)
  – Is the information provided in the findings useful to our audience?
  – Should we maintain our table in which we name fusions who have responded?
  – Is this index clear?
• Appendix B Bloom’s taxonomy (discussion points)
  – This appendix describes Bloom’s taxonomy of educational outcomes. We include:
    • Cognitive domain – obvious application
    • Affective domain – we believe there is a need for systems engineers to value and be characterised by the evaluation of systemic approaches to engineering
    • Psycho motor domain – this is included for completeness but is unlikely to be used. A un-used we will delete
• Appendix B Bloom’s (discussion points)
  – Is this section clear to a non-educator?
Appendix C competencies (discussion points)
- This section describes a number of SE competency frameworks
- The intention is that these competency frameworks will inform the selection of knowledge areas and topics for CorBOK
- Does this content belong here? (We note that there is a chapter of SEBOK which addresses the same topic area)
Thurs 14/10 9:00-12:30pm (Draft)

• Appendix D assessment (discussion points)
  – This has not been written yet
  – Our intention is to describe the relationship of assessment and student learning in general
    • It is commonly observed that students learn according to the assessment rather than according to the stated course objectives
  – The purpose of this appendix is to provide background referencing the education literature to support section 8
Thurs 14/10 9:00-12:30pm (Draft)

• Glossary and terms (discussion points)
  – We have collected a number of glossary and terms items
  – Some are standard SE vocabulary which will be included in SEBOK
    • We propose to copy SEBOK definitions where available
  – Some are specific to GRCSE
    • We propose to find or create definition text
Thurs 14/10 1:30-2:30pm (Way ahead)

• GRCSE ver 0.25 review release is scheduled 15 December 2010
• Ready the final editing version 0.25 scheduled 15 November 2010
Thurs 14/10 1:30-2:30pm (Way ahead)

• GRCSE team must:
  – Complete copyright release forms
  – Respond to BKCASE author team review comments
  – Write objective section
  – Improve expression of the curriculum architecture
  – Produce a first version of a populated CorBOK
  – Write assessment section
  – Write appendix D