

# 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

## – 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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



# Wed 13/10 1:30-3:30pm (Overview)

- 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

# Wed 13/10 1:30-3:30pm (Overview)

- 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 be listed in both places?
    - Alternative: GRCSE contributors listed in table 1 only and other BKCASE in 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?

# Wed 13/10 3:50-6:15pm (Draft)

- 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

# Wed 13/10 3:50-6:15pm (Draft)

- 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

# Wed 13/10 3:50-6:15pm (Draft)

- 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

# Thurs 14/10 9:00-12:30pm (Draft)

- 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

# Thurs 14/10 9:00-12:30pm (Draft)

- 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?

# Thurs 14/10 9:00-12:30pm (Draft)

- 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

# Thurs 14/10 9:00-12:30pm (Draft)

- Appendix B Bloom's (discussion points)
  - Is this section clear to a non-educator?

# Thurs 14/10 9:00-12:30pm (Draft)

- 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