Guide to the Software Engineering Body of Knowledge

Robert Dupuis, Pierre Bourque, Alain Abran, UQAM
James W. Moore, The Mitre Corporation
Leonard Tripp, Boeing

ICSSEA’99
Paris
December 8, 1999
Corporate Support by:

Project managed by:

www.swebok.org
Presentation Objectives

- Present the Status of the Guide to the Software Engineering Body of Knowledge project
- Recruit reviewers for the next review cycle
Project Overview

Presentation Plan

- Project background
  - Project scope, objectives and audience
  - Description of current phase
  - Concluding remarks
Software Engineering

- Now 30 years old!
- Millions of pages on the subject!
- Hundreds of conferences and workshops annually!
- Multiple university programs
- Millions of practitioners around the world?

Is the field really mature?
Recognized Profession?

Starr*: 
- Knowledge and competence validated by the community of peers
- Consensually validated knowledge rests on rational, scientific grounds
- Judgment and advice oriented toward a set of substantive values

Window of Opportunity?

- Texas Board of Professional Engineers
- Computer Science Curriculum 2001
- Possible liability issues: Y2K, etc.
- Increased interest in the establishment of a profession
IEEE-CS/ACM Software Engineering Coordinating Committee

- Four task forces
  - Code of ethics
  - Body of knowledge
  - Education
  - Performance norms for software engineers
Key Interrelationships for a Core Body of Knowledge

Development of Software Engineering Curricula

Consensus on a Core Body of Knowledge

Development of Certification / Licensing Criteria and Exams

Development of University Program Accreditation Criteria

Influences
What is Software Engineering?

- IEEE 610.12:
  - “(1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software.
  - (2) The study of approaches as in (1).”
Project Overview
Presentation Plan

- Project background
- **Project scope, objectives and audience**
  - Description of current phase
  - Concluding remarks
Project Objectives

- Characterize the contents of the Software Engineering Body of Knowledge
- Provide a topical access to the Software Engineering Body of Knowledge
- Promote a consistent view of software engineering worldwide
Project Objectives

- Clarify the place of, and set the boundary of, software engineering with respect to other disciplines (computer science, project management, computer engineering, mathematics, etc.)

- Provide a foundation for curriculum development and individual certification and licensing material
Intended Audience

- Public and private organizations
- Practicing software engineers
- Makers of public policy
- Professional societies
- Software engineering students
- Educators and and trainers
What Are we Not Trying to Accomplish?

- Not a curriculum development effort!
- Not an all-inclusive description of the sum of knowledge in the field
- Not all categories of knowledge
## Categories of Knowledge in the SWEBOK

<table>
<thead>
<tr>
<th>Specialized</th>
<th>Generally Accepted</th>
<th>Advanced and Research</th>
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<tbody>
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</table>
Two Underlying Principles of the Project

- **Transparency**: the development process is itself published and fully documented

- **Consensus-building**: the development process is designed to build, over time, consensus in industry, among professional societies and standards-setting bodies and in academia
Project Overview
Presentation Plan

- Project background
- Project scope, objectives and audience

**Description of current phase**

- Concluding remarks
A Three-Phase Approach for Developing the Guide to the SWEBOK

Straw Man Version

Stone Man Version

Iron Man Version

1998 1999 2000 2001
Description of Current Phase

- Project Team
- Stone Man Deliverables
- Development and Review Process
- Results to Date
Participants from a Broad Spectrum of Audiences

- Industry
- Professional societies
- Standards setting bodies
- Academia
- Authors
- International representation
Project Team

- Editorial team
- Industrial Advisory Board
- Panel of Experts
- Knowledge Area Specialists
- Reviewers/Review Captains
- Members of the software engineering community
Editorial Team

- Project “Champion”:
  - Leonard Tripp, 1999 President, IEEE Computer Society
- Executive Editors:
  - Alain Abran, UQAM
  - James W. Moore, The MITRE Corp.
- Editors:
  - Pierre Bourque, UQAM
  - Robert Dupuis, UQAM
Roles of the Industrial Advisory Board

- Provide input to ensure relevance to various audiences
- Review and approve strategy and deliverables
- Oversee development process
- Assist in promoting the Guide to the Software Engineering Body of Knowledge
- Lend credibility to the project
Industrial Advisory Board

- Met in Fall of 1998 and Summer of 1999
- Mario R. Barbacci, Software Engineering Institute, representing the IEEE Computer Society
- Carl Chang, University of Illinois at Chicago, Editor Emeritus, IEEE Software, representing Computing Curricula 2001
Industrial Advisory Board

- François Coallier, Bell Canada, speaking as ISO/IEC JTC 1 / SC7 Chairman
- Morven Gentleman, National Research Council of Canada
- Paula Hawthorn representing the ACM
- Dan Nash, Raytheon Systems Company
- Laure Le Bars, SAP Labs (Canada)
Industrial Advisory Board

- Bryan Pflug, The Boeing Company
- Larry Reeker, National Institute of Standards and Technology
- Dolores Wallace, National Institute of Standards and Technology
Panel of Experts

- Steve McConnell, Construx Software
- Roger Pressman, R.S. Pressman and Associates
- Ian Sommerville, Lancaster University
Project Funding

- Industry
- Professional societies
- UQAM
Stone Man Deliverables:

- **Consensus** on a list of Knowledge Areas
- **Consensus** on a list of topics and relevant reference materials for each Knowledge Area
- **Consensus** on a list of Related Disciplines
- Available free on the web
Stone Man Review Process

Version 0.1

Limited number of domain experts

Review Cycle 1

Version 0.5

Selected users

Review cycle 2

Version 0.7

Community

Review Cycle 3

Version 0.9
Stone Man Review Process

- Transparency and consensus-building
  - All intermediate versions of documents will be published and archived on www.swebok.org
  - All comments will be made public as well as the identity of the reviewers
  - Detailed comment disposition reports will be produced for Review Cycle 2 and 3
Knowledge Area Specialists

- Antonia Bertolino, Italy
- Terry Bollinger, USA
- Dave Carrington, Australia
- Khaled El Emam, Canada
- Stephen MacDonell and Andrew Gray, New-Zealand
- Pete Sawyer and Gerald Kotonya, UK
- John Scott and David Nisse, USA
- Guy Tremblay, Canada
- Tom Pigoski, USA
- Dolores Wallace and Larry Reeker, USA
# Version 0.5 Review Strategy

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<th>Requirement</th>
<th>Educators and Trainers</th>
<th>Small Org.</th>
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<tr>
<td>Req. Analysis</td>
<td>Five to Ten reviewers</td>
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<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Construction</td>
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</table>
Development and Review Process

- Reviewers are responsible for
  - Reading the Knowledge Area Description and consulting the selected reference material
  - Providing comments from one specified viewpoint

- Schedule
  - Review Cycle 2: July, August and September 1999
  - Review Cycle 3: December 1999 and January 2000
Development and Review Process

- Criteria for reviewers are
  - Knowledge in the Area
  - Availability
  - Ability to give articulate, constructive comments
  - Representative of: software engineering practitioners, trainers, educators, standards developers, small industry, students, etc.
Examples of Questions to the Reviewers

- One question for each requirement:
  - As a practitioner, do you find that the breakdowns of topics comply with the requirement of being sound and reasonable?
  - As a practitioner, do you find that the reference material is readily available?
Development and Review Process

- Review Captains:
  - Responsible for compiling comments of a group of 5-10 reviewers for a specific Knowledge Area and Review Viewpoint

- Schedule:
  - September 1999
Stone Man Version 0.5
Review Results

Option 1
Choose one or more from the following lists:

Choose a Knowledge Area
Choose a Review Viewpoint
Choose a Question

See Detailed Questionnaire

Search

Option 2
View all responses for a reviewer:

Choose a Reviewer

Search

Option 3
Enter the Unique Identifier of the Response:
### Guide to the SWEBOK - Stone Man Version 0.5 - Review Results Report - Netscape

**Knowledge Area:** Software design  
**Review Viewpoint:** Researchers

#### Question 1:
Do you find that the breakdowns of topics comply with the requirement of being sound and reasonable?

<table>
<thead>
<tr>
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<th>Response Disposition: No disposition yet</th>
<th>Disposition Rationale:</th>
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<tr>
<td>Reviewer Response:</td>
<td></td>
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<tr>
<td>Yes</td>
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<tr>
<td>Reviewers:</td>
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<tr>
<td>Du, Weichao</td>
<td>Marcos, Esperanza</td>
<td>Rodeiro, Jesus, Javier</td>
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<tr>
<td>Reviewer Response:</td>
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</tr>
<tr>
<td>The distinction between architectural and detailed design is traditional but perhaps becoming unmanageable as the size of a typical program/system grows</td>
<td></td>
<td></td>
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<tr>
<td>Reviewers:</td>
<td></td>
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<tr>
<td>Stolten, Bo</td>
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<td></td>
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<tr>
<td>The inclusion of structure charts under architectural design suggests that we are</td>
<td></td>
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<tr>
<td>Reviewers:</td>
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### Knowledge Area: Software engineering management

**Review Viewpoint: Researchers**

**Question 1:**
Do you find that the breakdowns of topics comply with the requirement of being sound and reasonable?

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<td>Reviewer Response:</td>
<td>Disposition Rationale:</td>
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<tr>
<td>Yes</td>
<td></td>
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</table>

**Question 2:**
(a) Do you find that proposed breakdowns of topics decompose the subset of the Software Engineering Body of Knowledge for this Knowledge Area that is "generally accepted"? (b) Do you believe that there are topics that meet the criteria of being "generally accepted" and are not included in the proposed breakdowns of topics? (c) Are there "non-generally accepted" topics included in the proposed breakdowns of topics?
Knowledge Area: Software testing
Review Viewpoint: Individual practitioners

Question 5:
Do you find that the proposed breakdowns of topics are compatible with the breakdowns generally found in industry and in the software engineering literature and standards?

Review Response:
It would be good to include a mapping of testing strategies against Custom made packages & Generic products. For instance, Beta testing makes more sense for products.

Reviewers:
M. Ramanathan

Response Disposition: No disposition yet
Disposition Rationale:

Printed on Mon Nov 01 17:18:30 Eastern Standard Time 1999
Results to Date

- Approved by the Industrial Advisory Board:
  - Stone Man Development Plan
  - Baseline List of Knowledge Areas
  - Baseline List of Related Disciplines
  - Nomination of Knowledge Area Specialists
  - Knowledge Area Description Specifications

- Version 0.5 of the KA Descriptions

- Hundreds of reviews
Baseline List of Knowledge Areas

- Software Requirements Analysis
- Software Design
- Software Construction
- Software Testing
- Software Evolution and Maintenance
Baseline List of Knowledge Areas

- Software Configuration Management
- Software Quality Analysis
- Software Engineering Infrastructure
- Software Engineering Process
- Software Engineering Management
Baseline List of Related Disciplines

- Computer Science (CC2001)
- Mathematics (CC2001)
- Project Management (PMBOK)
- Computer Engineering
- Cognitive Sciences and Human Factors
- Systems Engineering
- Management and Management Science
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**Concluding remarks**
Institutional Collaboration

- Membership on Industrial Advisory Board
- Participation in review process and uptake of results by national professional societies
- Endorsement of results by national professional societies
Concluding Remarks

- Consensus on the core body of knowledge is key in all disciplines and pivotal for the evolution of SE toward a professional status.
Concluding Remarks

- Involvement of all parties is key for relevancy, credibility and quick uptake:
  - Industry
  - Professional societies
  - Standards setting bodies
  - Academia

- Seeking many collaborators!
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