

Related Disciplines Currently Being Considered by the Guide to the Software Engineering Body of Knowledge Project

Sent in by:

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

The Guide to the SWEBOK project (see www.swebok.org for current status and deliverables) was established with five objectives:

1. Characterize the contents of the software engineering discipline.
2. Provide a topical access to the Software Engineering Body of Knowledge.
3. Promote a consistent view of software engineering worldwide.
4. Clarify the place of, and set the boundary of, software engineering with respect to other disciplines such as computer science, project management, computer engineering, and mathematics.
5. Provide a foundation for curriculum development and individual certification material.

In its current draft, the Stoneman Guide identifies ten Knowledge Areas (in alphabetical order):

- Software Configuration Management
- Software Construction
- Software Design
- Software Engineering Infrastructure
- Software Engineering Management
- Software Engineering Process
- Software Evolution & Maintenance
- Software Quality Analysis
- Software Requirements Analysis
- Software Testing

Each Knowledge Area Description or chapter of the Guide is intended to be ten or so pages in length. Each description contains several important components including:

- A hierarchical organization of topics along with a rationale for the breakdown and a succinct description of each topic:
- A list of reference materials
- A matrix relating the reference materials to the topics
- A selection of relevant knowledge areas from Related Disciplines

The distinction between Knowledge Areas and Related Disciplines is important to the purpose of the Guide. The project will specify Knowledge Areas, topics and point to reference material within these Knowledge Areas that are regarded as core knowledge for software engineers. It is recognized that software engineers must also know material from the Related Disciplines, but the SWEBOK project will not attempt to specify topics and reference materials for these Related Disciplines.

The description of each SWEBOK Knowledge Area will however identify relevant knowledge areas from Related Disciplines. These knowledge areas from Related Disciplines are merely identified without additional description or references. This list of Related Disciplines and Knowledge Areas within these Related Disciplines are seen as an aid to curriculum developers.

A document entitled A "Baseline for a List of Related Disciplines for the Stone Man Version of the Guide to the Software Engineering Body of Knowledge" was therefore prepared by the project's editorial team, approved by the

project's Industrial Advisory Board in March 1999 and submitted to the Knowledge Area Specialists. This document can be downloaded from www.swebok.org. The Knowledge Area Specialists are responsible for writing the Knowledge Area Descriptions or chapters of the Guide.

The objectives of this document are essentially two fold:

- establish a candidate list of Related Disciplines for the Knowledge Area Specialists
- identify from an authoritative source as possible a list of Knowledge Areas for each of these candidate Related Disciplines.

The details of how this candidate list of Related Disciplines was established and their lists of Knowledge Areas can be found in the document and are too long to be included here.

The Related Disciplines currently being considered as well as the source(s) that was used to identify a list of Knowledge Areas for these Related Disciplines are:

Computer Science

The reference for this Related Discipline will be obtained through the "Year 2001 Model Curricula for Computing: CC-2001". To ensure proper coordination with this initiative, Carl Chang, Joint Task Force Co-Chair is a member of the Guide to the SWEBOK Industrial Advisory Board.

Mathematics

The Computing Curricula 2001 initiative will be the "conduit" to mathematics. So far, we have not received such a list of Knowledge Areas (Knowledge Units in the CC-2001 vocabulary), for Mathematics but it is expected that CC-2001 will provide it.

Project Management

The reference for this Related Discipline is "A Guide to the Project Management Body of Knowledge" published by the Project Management Institute. This document has been adopted as an IEEE software engineering standard. The document is available without any charge from www.pmi.org.

Computer Engineering

A list of Knowledge Areas for Computer Engineering was compiled from the integration of:

- The syllabus for the British licensing exam for the field of Computer Systems Engineering.
- The Principles and Practice of Engineering Examination – Guide for Writers and Reviewers in Electrical Engineering of the National Council of Examiners for Engineering and Surveying (USA). An appendix listed Computer Engineering Knowledge Areas for which questions should be put to the candidates.
- The Computer Engineering undergraduate program at the Milwaukee School of Engineering. This program is considered to be a typical example of an American accredited program by the director of the Computer Engineering and Computer Science Department at MSOE.

Systems Engineering

The list of Knowledge Areas for Systems Engineering was compiled from:

- The EIA 632 and IEEE 1220 (Trial-Use) standards;
- The following paper: Stephen J. Andriole and Peter A. Freeman, Software systems engineering: the case for a new discipline, System Engineering Journal, Vol. 8, No. 3, May 1993, pp. 165-179;
- The material available on the INCOSE (International Council on Systems Engineering) website: www.incose.org;
- A curriculum for a graduate degree in Systems Engineering at the University of Maryland: <http://www.isr.umd.edu/ISR/education/msse/>;
- Three experts in the field were also consulted:
 - John Harauz, from Ontario Power Generation

- John Kellogg from Lockheed Martin
- Claude Laporte, consultant, previously with the Armed Forces of Canada and Oerlikon Aerospace.
- We intend to continue improving it notably as the INCOSE results are made available.

Management and Management Science

No definitive source has been identified so far for a list of Management and Management Science Knowledge Areas relevant to software engineering. A list was therefore compiled from:

- The Technology Management Handbook which contains many relevant chapters;
- The Engineering Handbook which contains a section on Engineering Economics and Management covering many of the relevant topics.
- The following article: Henri Barki and Suzanne Rivard, "A Keyword Classification Scheme for IS Research Literature: An Update", MIS Quarterly, June 1993, pp. 209-226.

Cognitive Sciences and Human Factors

The list of proposed Knowledge Areas for Cognitive Sciences and Human Factors was compiled from the list of courses offered at the John Hopkins University Department of Cognitive Sciences and from the ACM SIGCHI Curricula for Human-Computer Interaction. The list was then refined by three experts in the field: two from UQAM, MM. Lefebvre and Bouchard and W. W. McMillan, from Eastern Michigan University. They were asked to indicate which of these topics should be known by a software engineer. The topics that were rejected by two of the three respondents were removed from the original list.