

The Emerging Consensus on the Software Engineering Body of Knowledge

A. Abran,

P. Bourque, R. Dupuis, J. W. Moore, L. Tripp

CUSE

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Corporate Support by:



CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS



National Research
Council Canada

Conseil national
de recherches Canada



Project managed by:



Presentation Plan

⊙ **Project background**

- ⊙ Project objectives, audiences and plan
- ⊙ Content of the Guide
- ⊙ Next steps
- ⊙ Research Issues

Key Issues

- ⊙ Groups and individuals:
 - Different views of software engineering
- ⊙ Universities:
 - Offering undergraduate degrees in *Software Engineering*, outside of traditional Engineering Departments
 - Limited consistency across curriculum
 - Different accreditation groups (Canada:CIPS and CCPE)
- ⊙ Increased interest in the establishment of a profession

Market Trends - Examples

Texas Board of Engineers:

❖ Decision to license software engineers: a strategy with significant impact on:

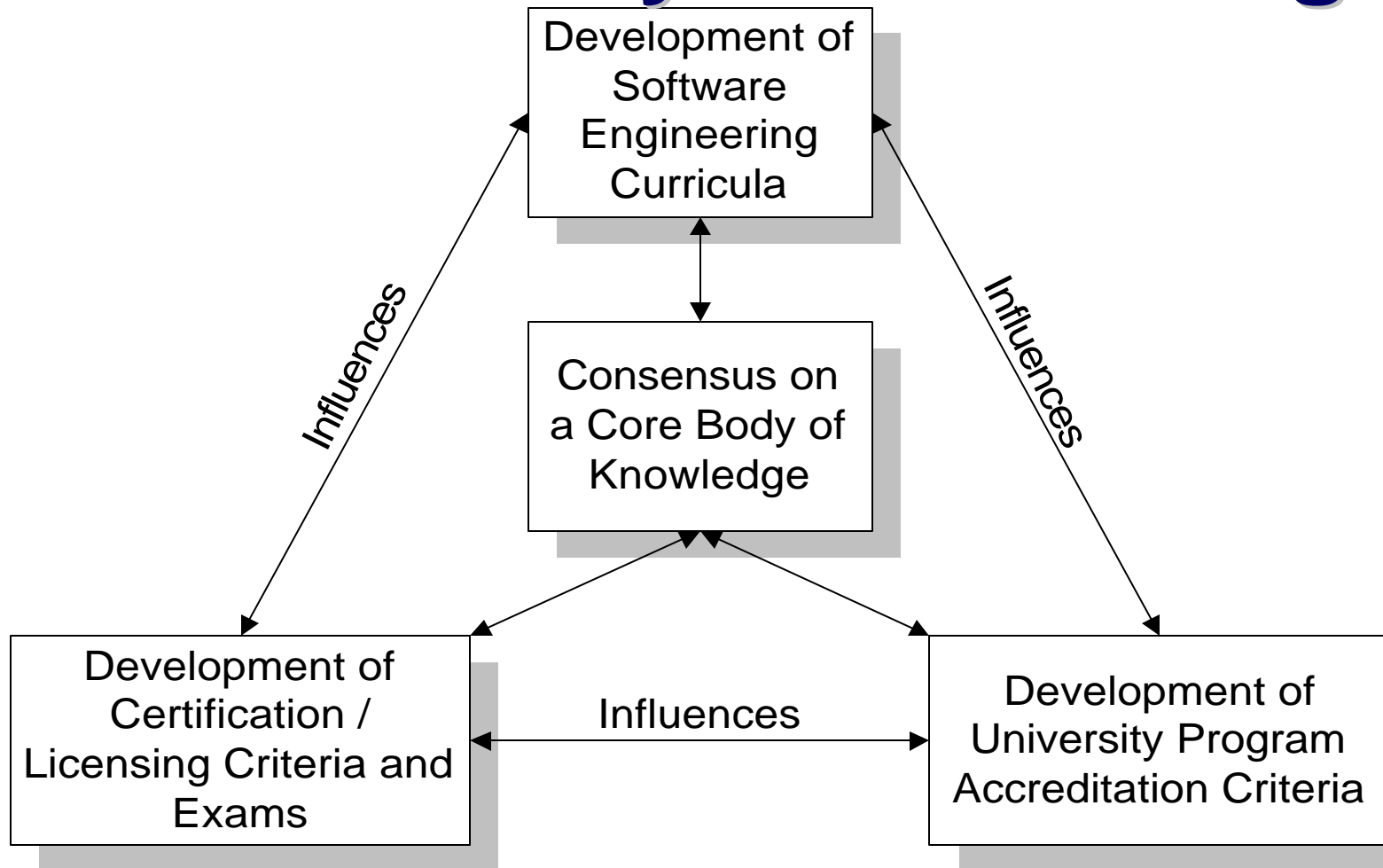
- industry (e.g. mobility of staff & training)
- universities
- policy bodies
- individuals

(+ engineering boards in Canada and universities)

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).”

Key Interrelationships for a Core Body of Knowledge



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Project Objectives

- ⊙ Promote a consistent view of *software engineering* worldwide
- ⊙ Clarify the place of, and set the boundary of, software engineering with respect to other disciplines
- ⊙ Characterize the contents of the Software Engineering Body of Knowledge - SWEBOK
- ⊙ Provide a topical access to the Software Engineering Body of Knowledge
- ⊙ Provide a foundation for curriculum development and individual certification and licensing material

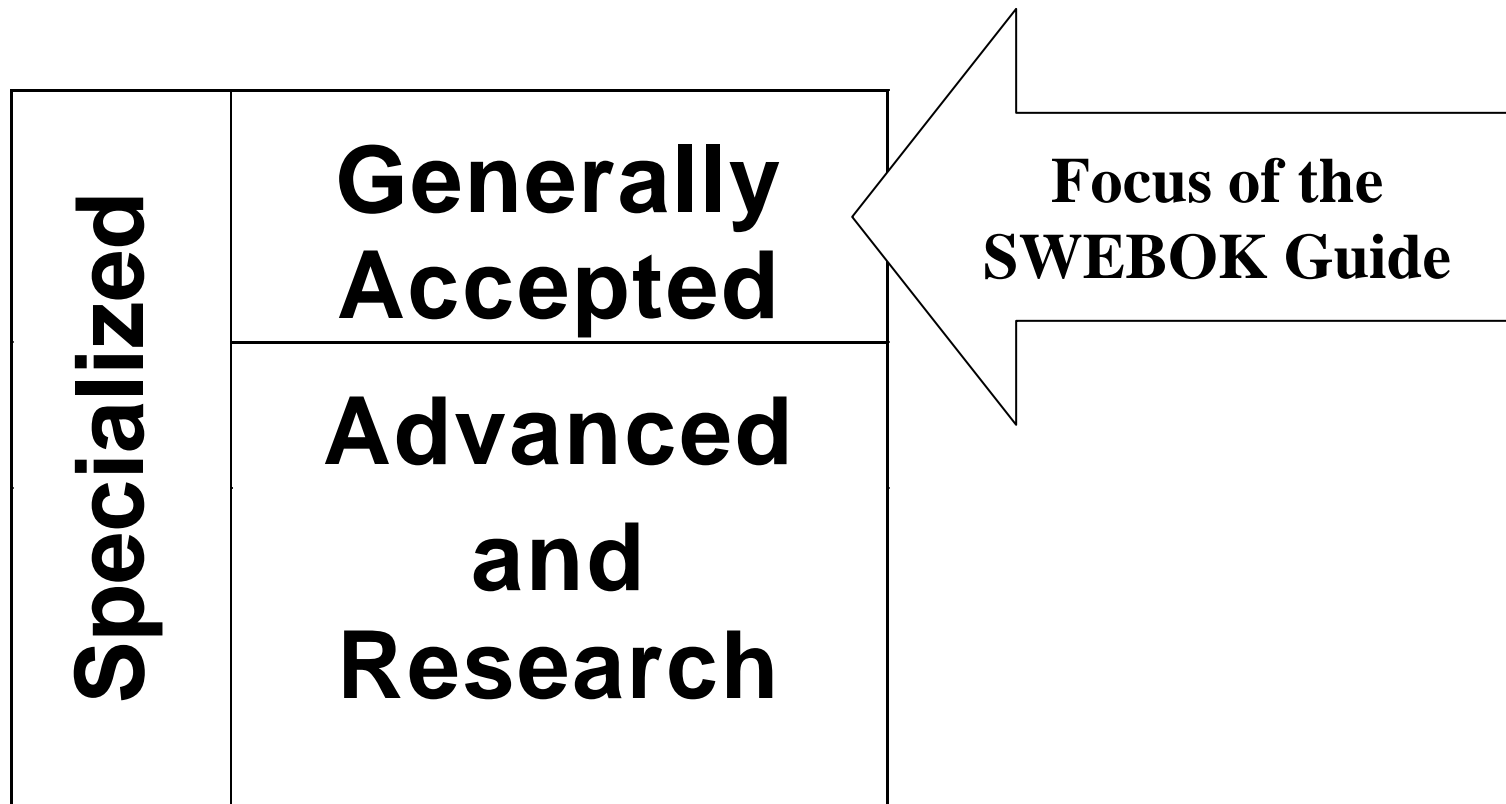
Intended Audiences

- ⦿ Public and private organizations
- ⦿ Practicing software engineers
- ⦿ Makers of public policy
- ⦿ Professional societies
- ⦿ Software engineering students
- ⦿ Educators and trainers

What Are we Not Trying to Accomplish?

- ⦿ Not an all-inclusive description of the sum of knowledge in the field
- ⦿ Not all categories of knowledge
- ⦿ Not a curriculum development effort

Categories of Knowledge in the SWEBOK



Generally Accepted

- ⊙ «Applies to most projects, most of the time, and widespread consensus validates its value and effectiveness»
 - Project Management Institute
- ⊙ Bachelor + 4 years of experience

IEEE and ACM strategies

⊙ IEEE-CS:

- initial focus on generally accepted
- strategy with intermediate deliverables
- contributions to the maturation and consensus building

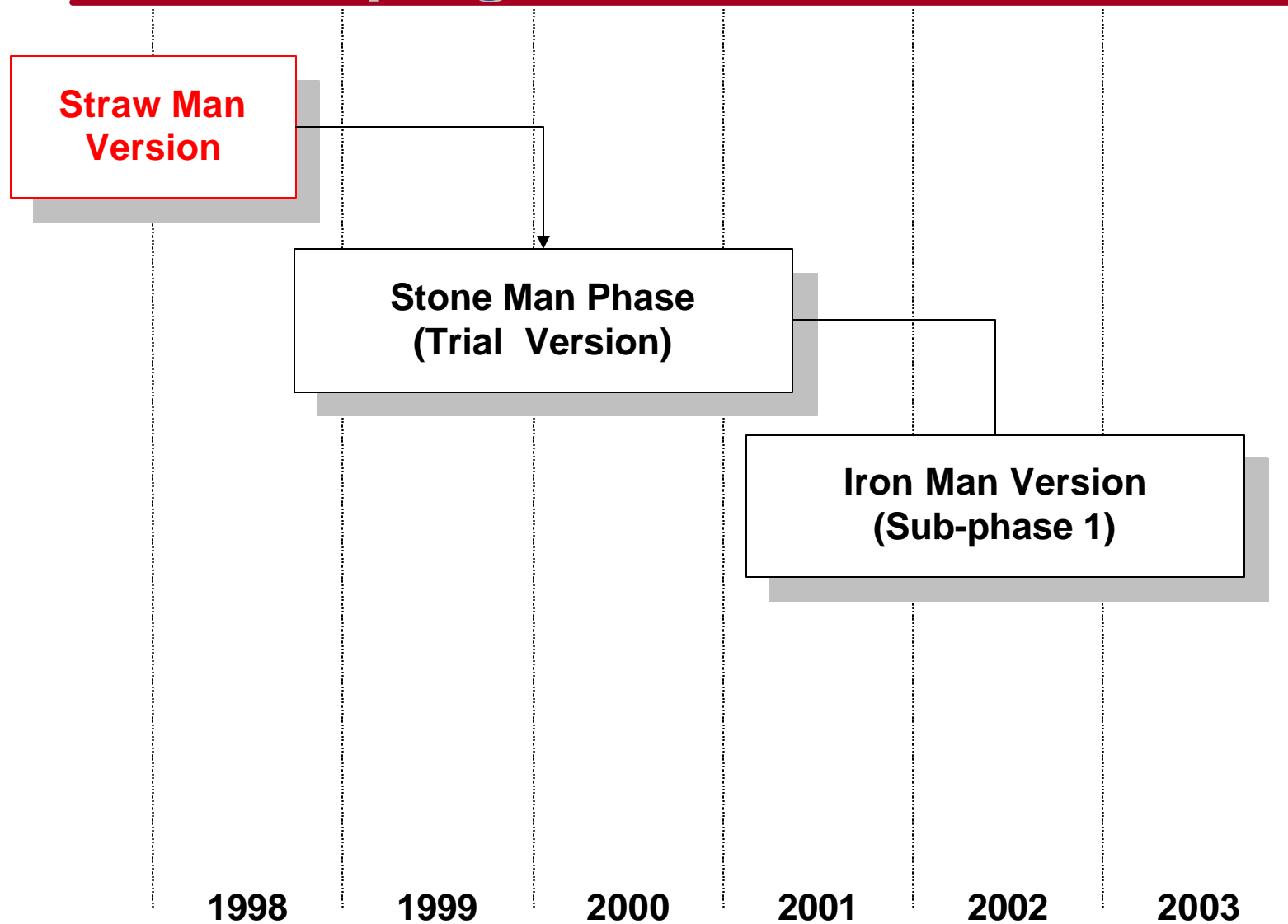
⊙ ACM:

- opposition to licensing
 - withdrawal from joint efforts with IEEE-CS
 - concerns: limited to specialized knowledge

Three 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
 - Consensus does not equal Unanimity!
- ⊙ Available **free** on the web

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



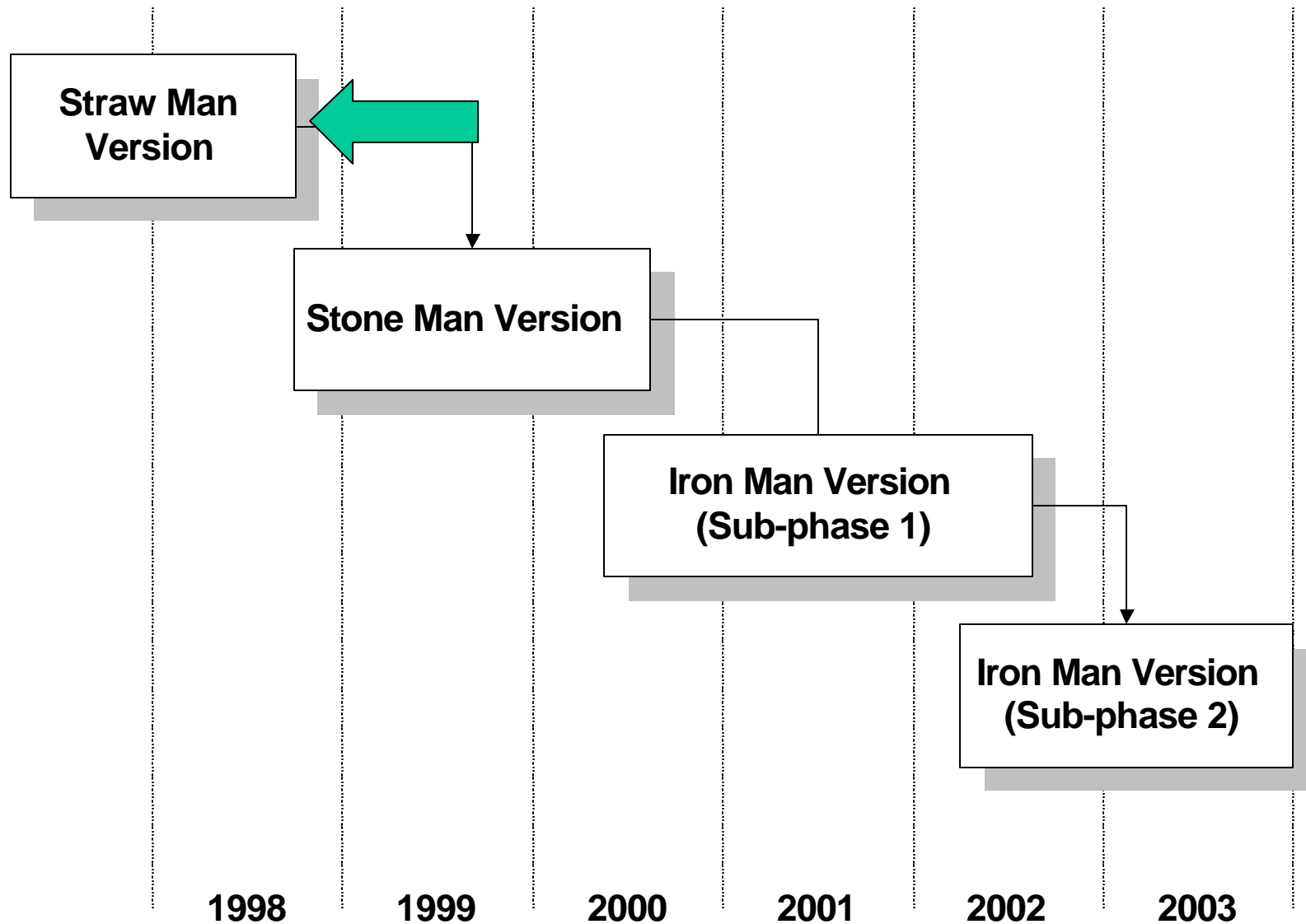
Project Team

- ⊙ Editorial team
- ⊙ Industrial Advisory Board
- ⊙ Knowledge Area Specialists
- ⊙ A very large international group of **Reviewers**

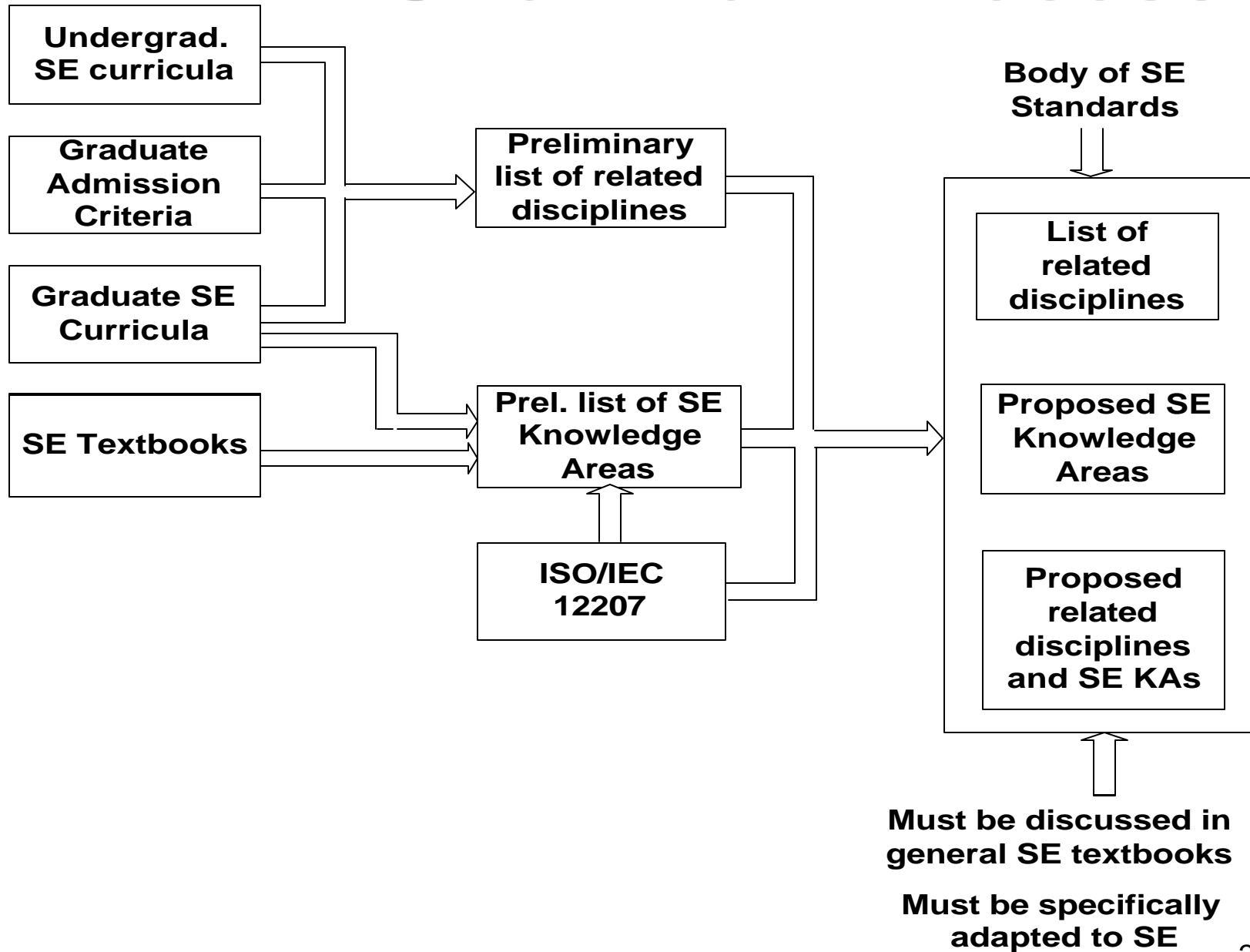
Editorial Team

- ⊙ 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

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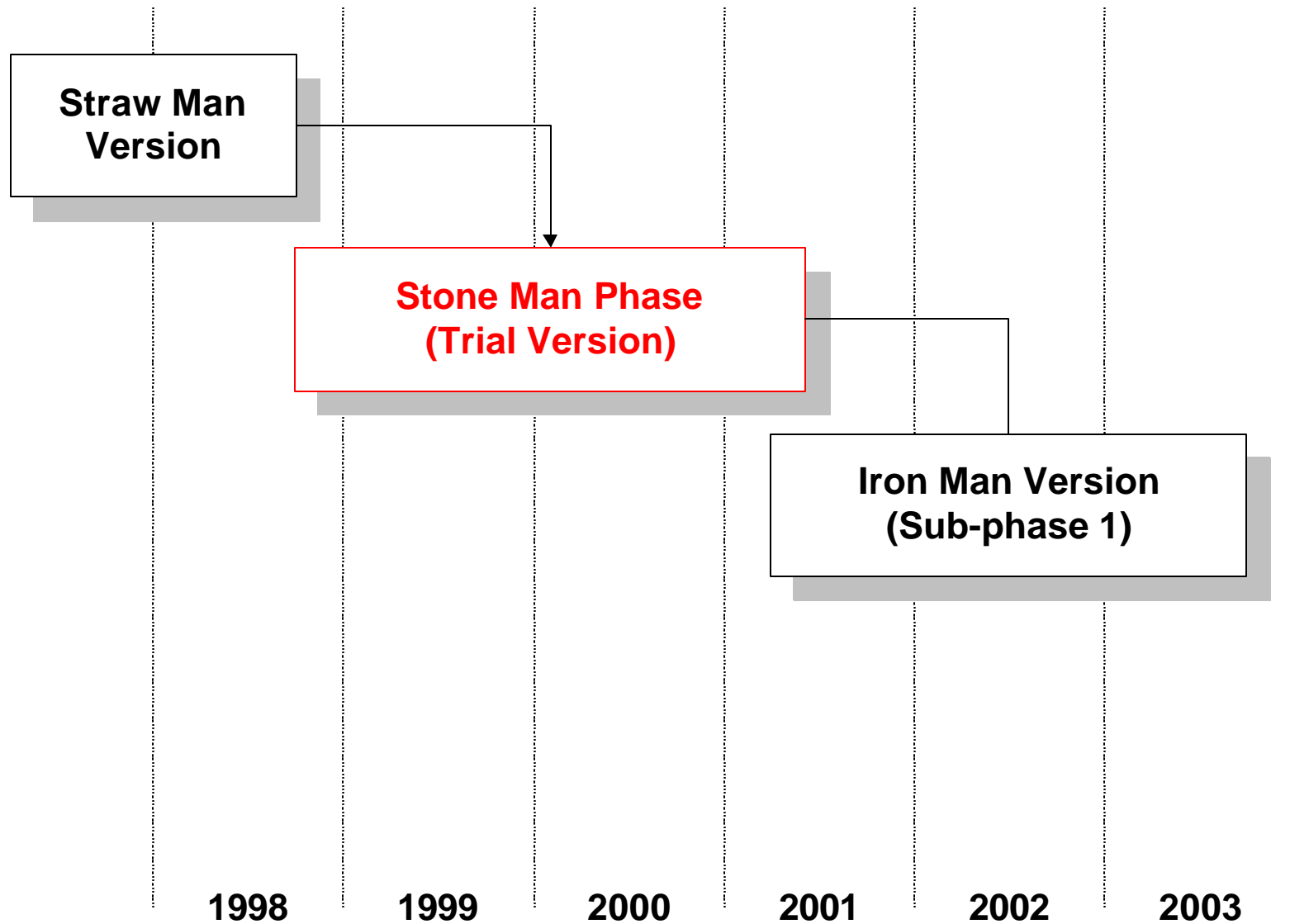
Strawman: Process



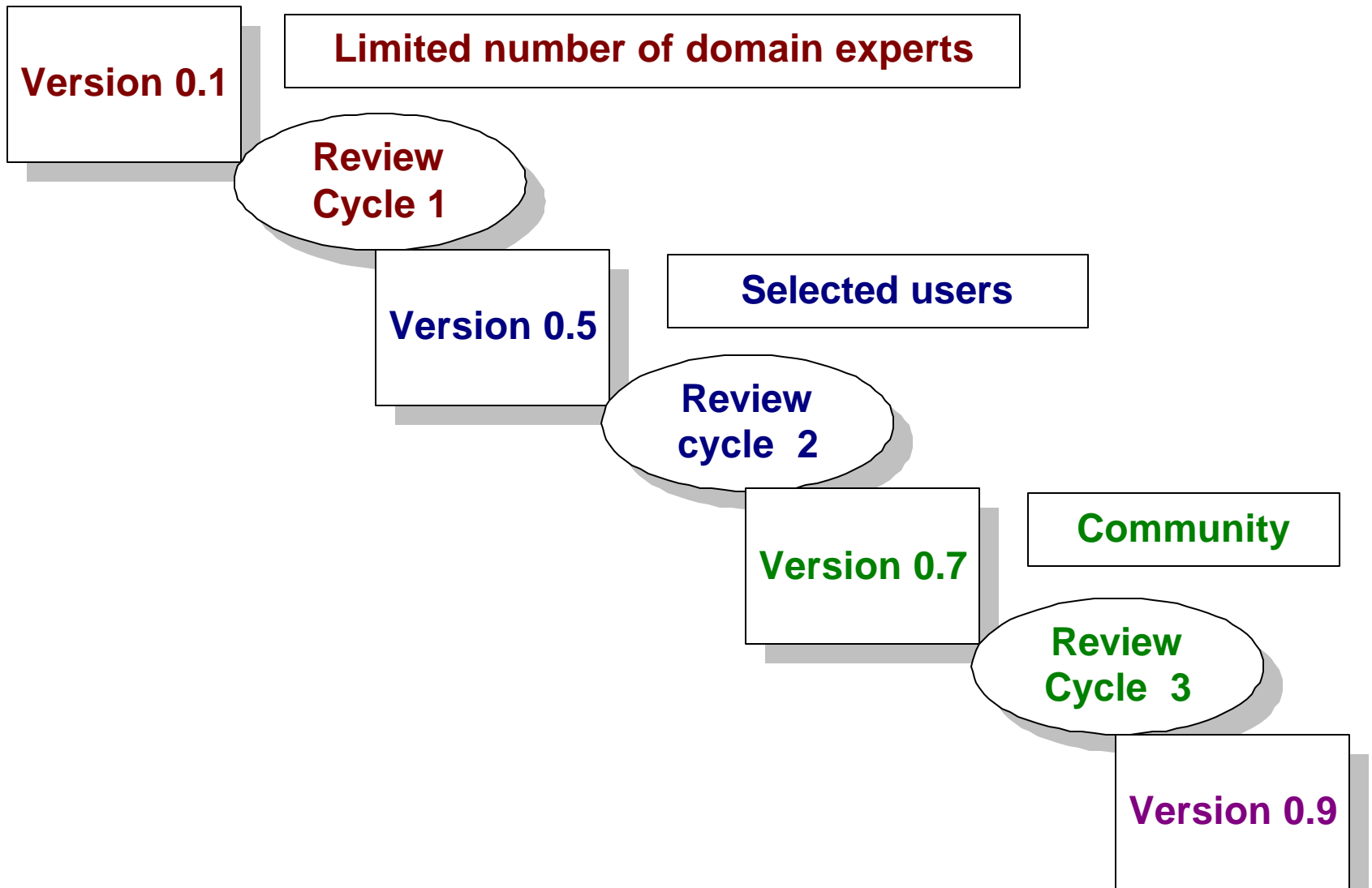
Knowledge Area Specialists

- ◉ Bertolino, Istituto Elaborazione Informazione, CNR, Italy
- ◉ Bollinger, MITRE, USA, Martin & Gabrini, UQAM
- ◉ Carrington, Queensland University, Australia
- ◉ El Emam, National Research Council, Canada
- ◉ MacDonell, University of Otago, New-Zealand
- ◉ Sawyer & Kotonya, Lancaster University, UK
- ◉ Scott, Lawrence Livermore National Lab., USA
- ◉ Tremblay, UQAM, Canada
- ◉ Pigoski, USA
- ◉ Wallace & Reeker, NIST, USA

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



Phase 2: Stone Man Review Process



Stone Man Review Process

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

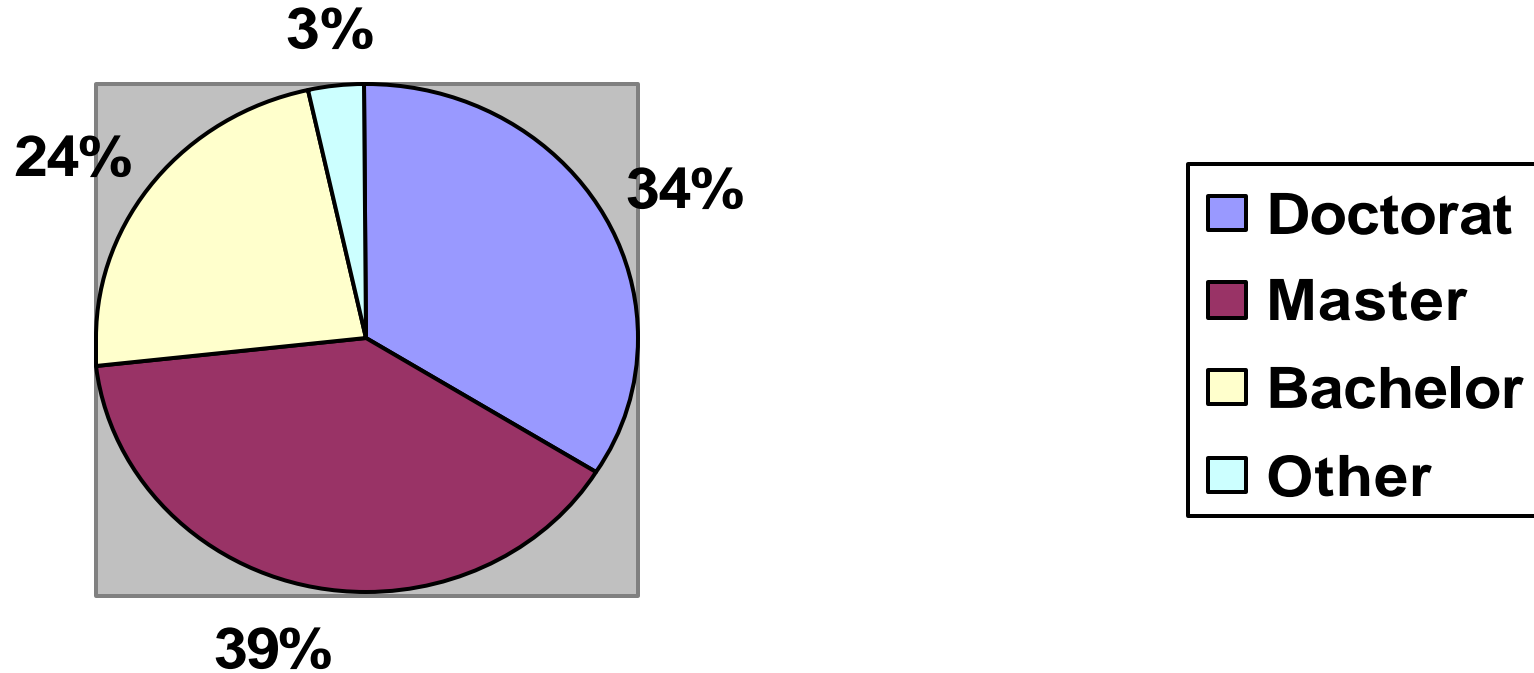
Data on reviewers

- ⦿ Version 0,1: 33
- ⦿ Version 0,5: 195
- ⦿ Version 0,7: 378
 - ❖ + ISO reviews from 5 countries

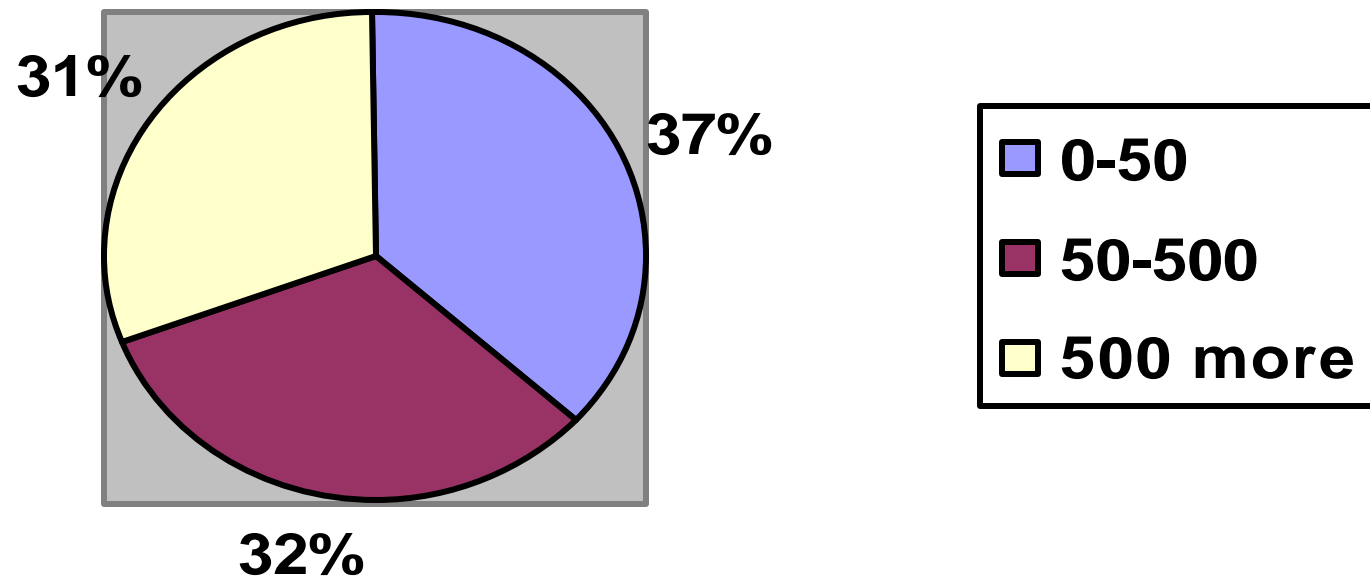
Geographic Distribution of Reviewers

- ⊙ USA: 55%
- ⊙ Europe: 18%
 - ❖ 90 reviewers from 25 countries
- ⊙ Canada: 10%
- ⊙ Australia: 5%
- ⊙ Asia: 5%
- ⊙ Latin America: 4%

Education of Reviewers



Organizations of Reviewers (no. of employees)



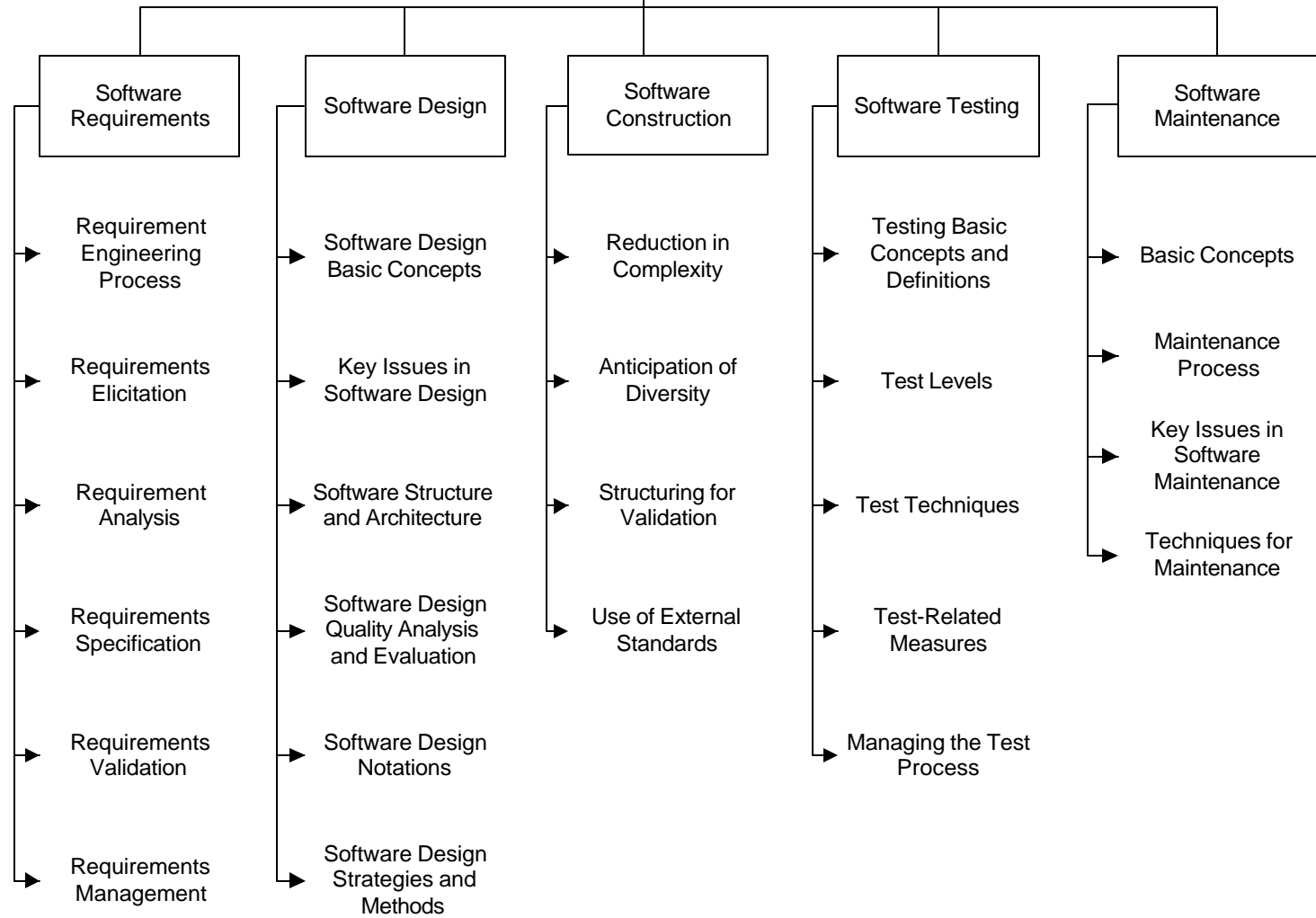
Project Overview Presentation Plan

- ⦿ Project background
- ⦿ Project scope, objectives, audience and plan
- ⦿ **Contents of the Guide**
- ⦿ How you can leverage the Guide within your organization
- ⦿ Conclusion

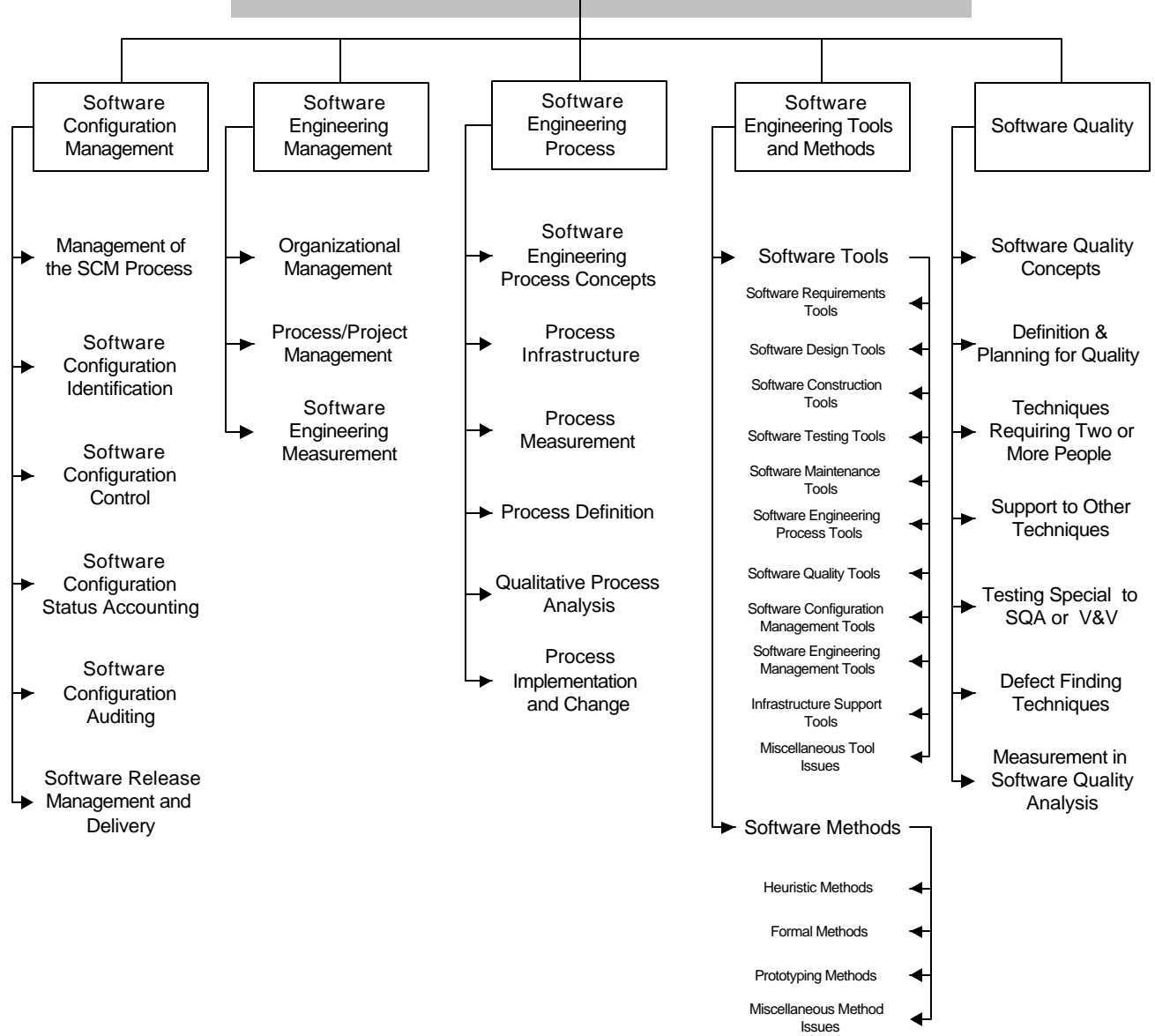
Stone Man Deliverables:

- ⊙ **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

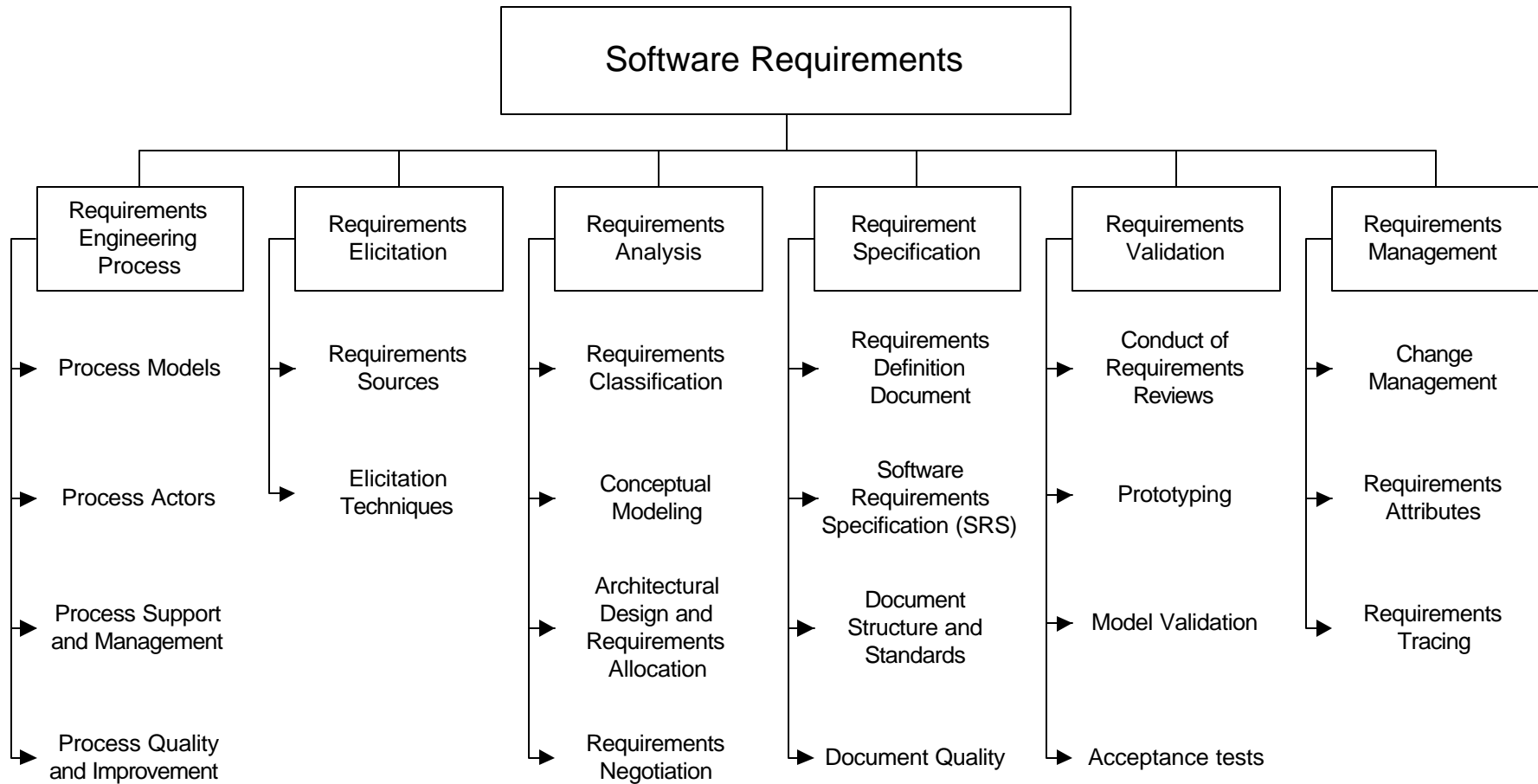
Guide to the Software Engineering Body of Knowledge
(Version 0.95)



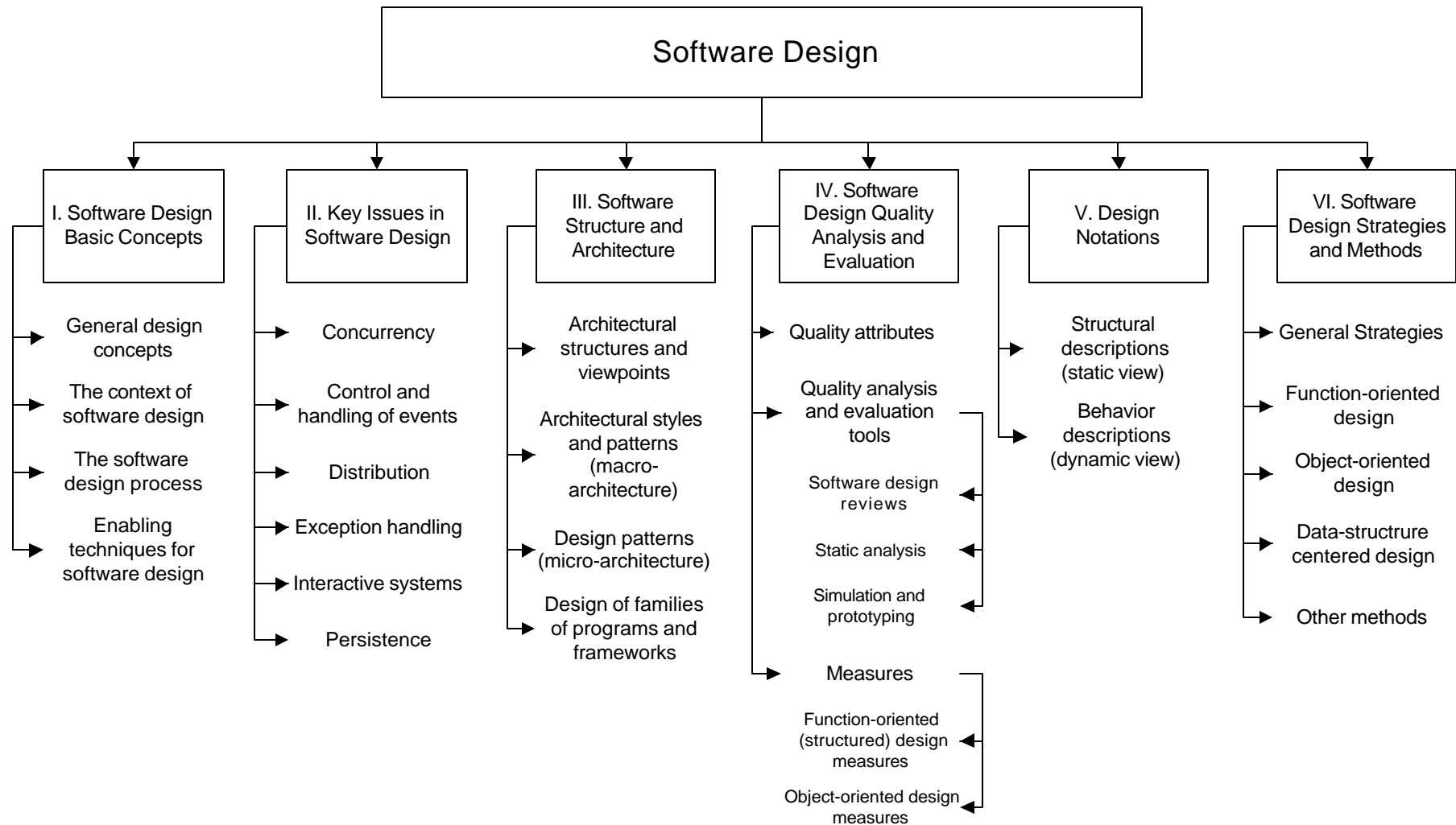
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Software Requirements



Software Design

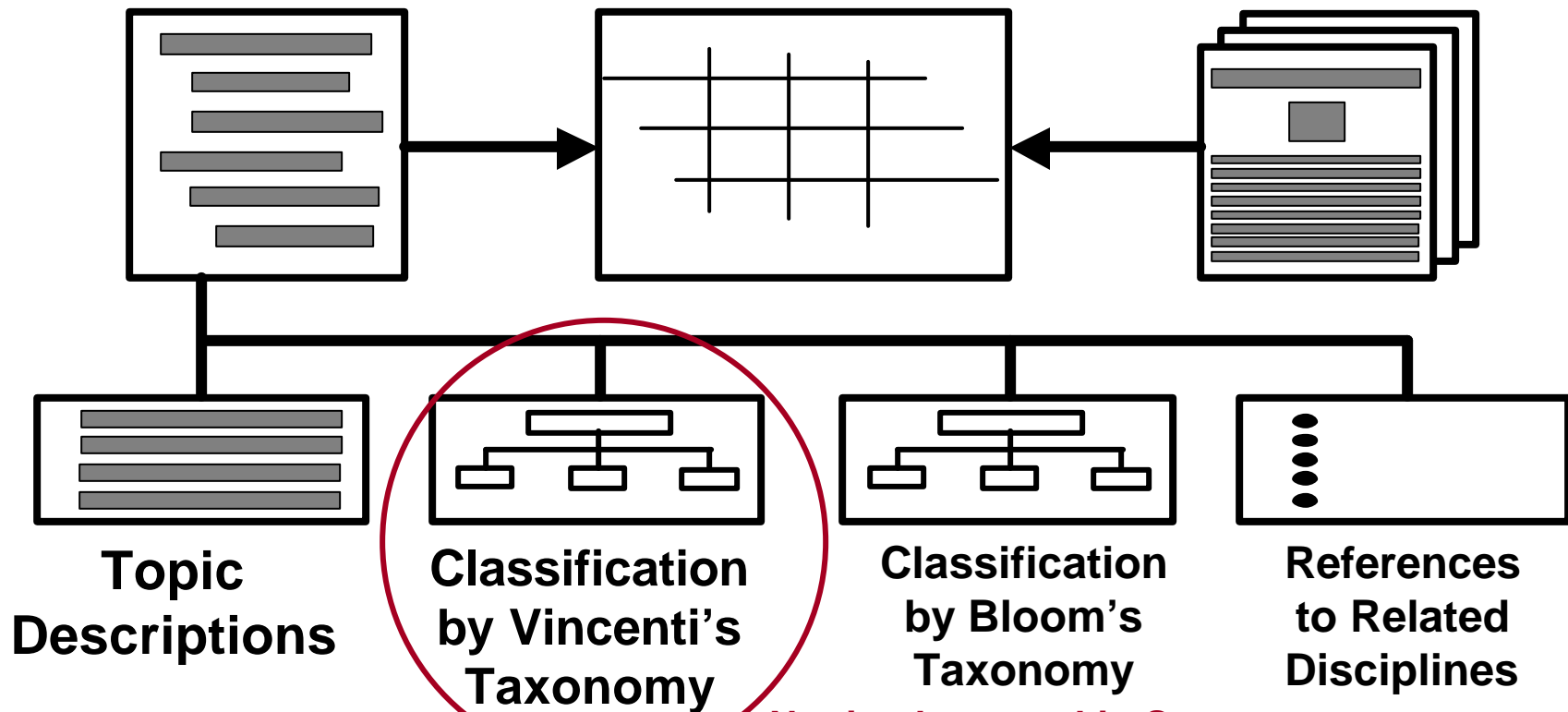


Knowledge Area Description

Classification of Topics

Matrix of Topics & References

References



Not implemented in Stoneman

Related Disciplines

- ◉ Software Requirements
- ◉ Software Design
- ◉ Software Construction
- ◉ Software Testing
- ◉ Software Maintenance
- ◉ Software Configuration Management
- ◉ Software Eng. Management
- ◉ Software Eng. Tools & Methods
- ◉ Software Engineering Process
- ◉ Software Quality

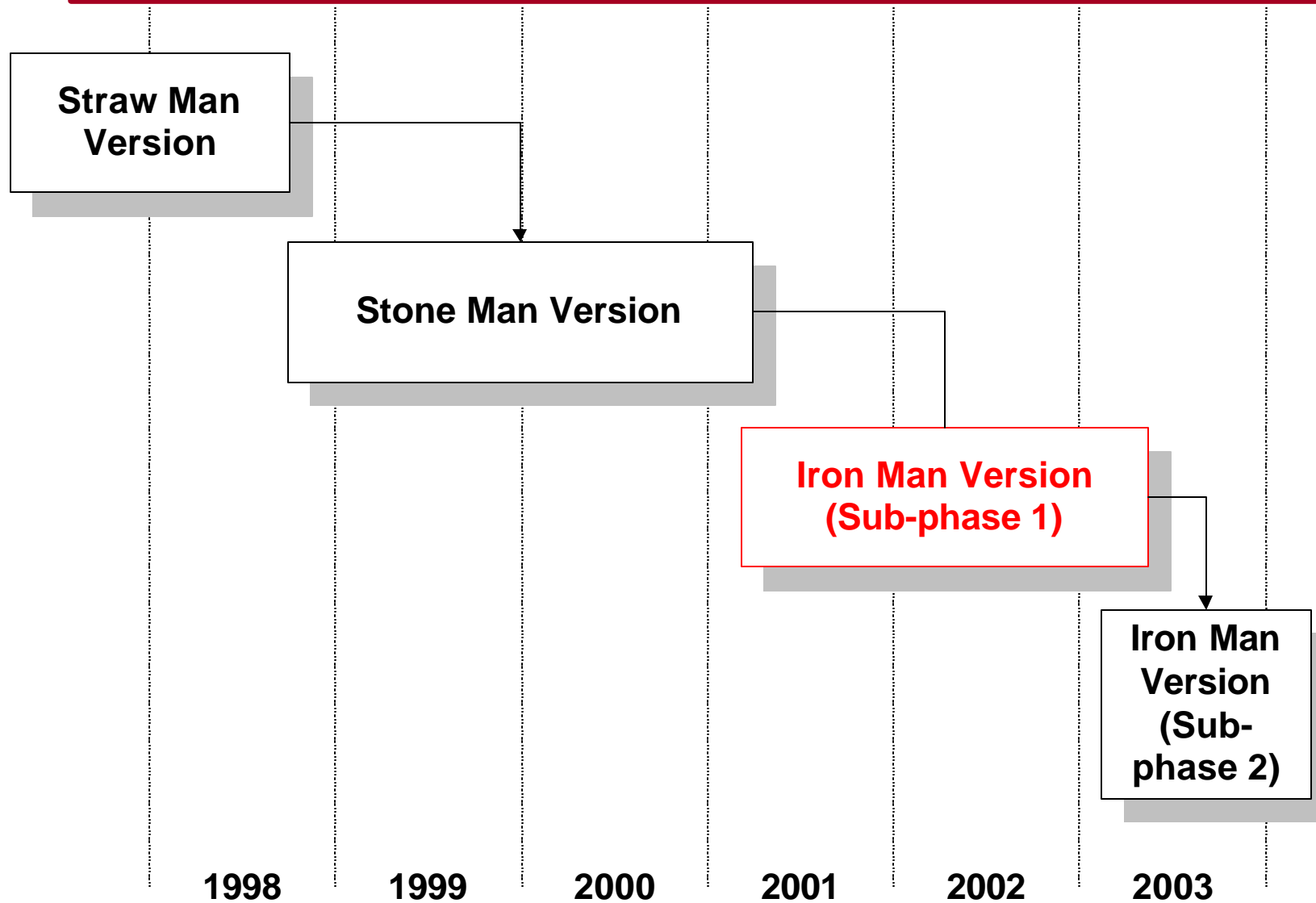
Related Disciplines

- **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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Collection of feedback from:

- ⊙ Education:
 - ❖ Curriculum design/evaluation
 - ❖ Program accreditation
 - ❖ Course design/evaluation
 - ❖ Internal training, corporate universities

Collection of feedback from:

⊙ Industry & Government

- ❖ job description
- ❖ hiring
- ❖ staffing of projects
- ❖ career planning
- ❖ contracting

Collection of feedback from:

- ⊙ Policy organisations

- ❖ Licensing & Certification

- licensing exam questions

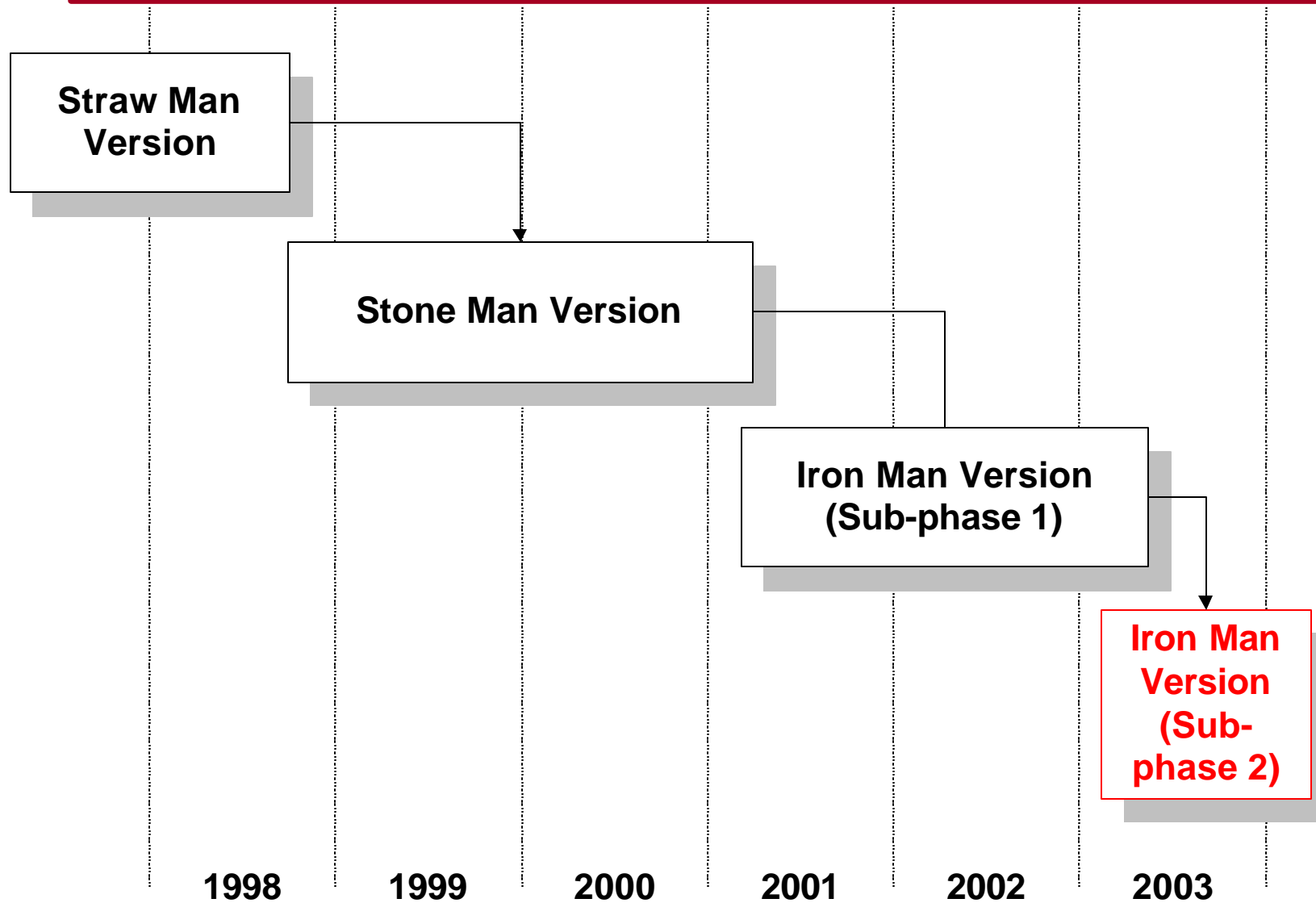
- study material

- in software engineering and other IT fields

- could be on subsets of Knowledge Areas

- ❖ R & D agencies: strategies for increasing engineering maturity of the domain

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- ⦿ **Research Areas**

SWEBOK & Research Issues

- ⦿ The **Engineering** of:
 - ❖ Software Requirements
 - ❖ Software Design
 - ❖ Software Construction
 - ❖ Software Testing
 - ❖ Software Maintenance
 - ❖ Software Quality
 - ❖ Software Eng. Management
 - ❖ Software Eng. Tools & Methods
 - ❖ Software Engineering Process
 - ❖ Software Configuration Management

Concluding Remarks

- **Software Engineering:** The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software
 - IEEE 610.12
- ❖ **Strengthening the Engineering Knowledge** within this new discipline is required for a rapid maturation, and significant contribution to the Canadian software industry

www.swebok.org