The Emerging Consensus on the Software Engineering Body of Knowledge

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CASCON 2001

Toronto

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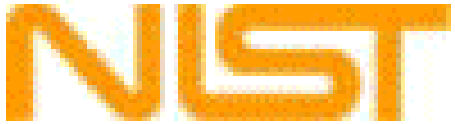
SWEBOK

ÉTS

UQÀM

Corporate Support by:

CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS



National Research Council Canada
Conseil national de recherches Canada

Project managed by:

Université du Québec
École de technologie supérieure

Presentation Plan

- **Project background**
- Project scope, objectives, audience and plan
- Contents of the Guide
- How you can leverage the Guide
- Discussion
- Conclusions

What is Software Engineering?

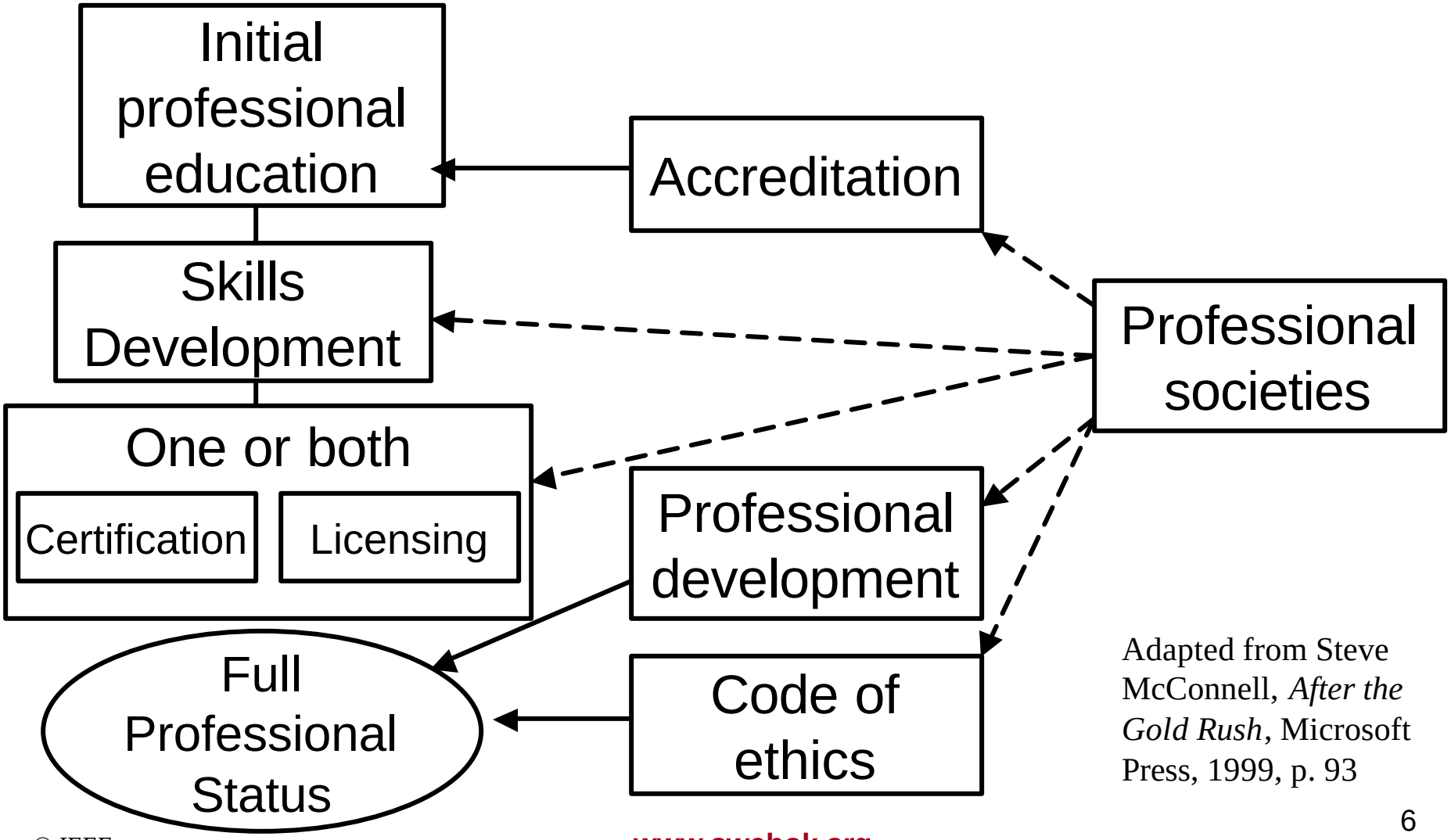
- IEEE 610.12:
  - "(1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software.
  - (2) The study of approaches as in (1)."

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

* P. Starr, *The Social Transformation of American Medicine*: BasicBooks, 1982.

Professional Development



Adapted from Steve McConnell, *After the Gold Rush*, Microsoft Press, 1999, p. 93

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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

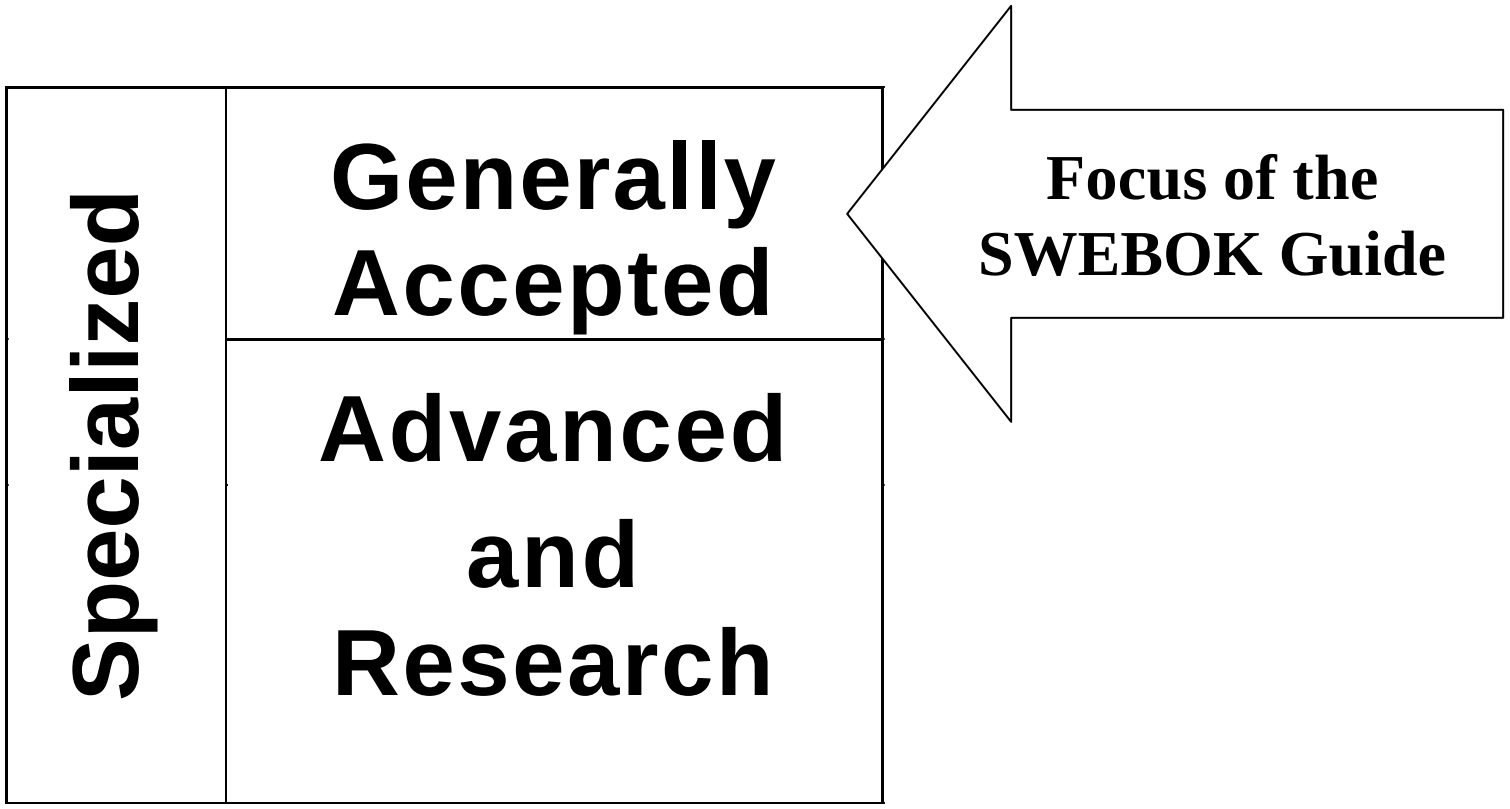
Intended Audience

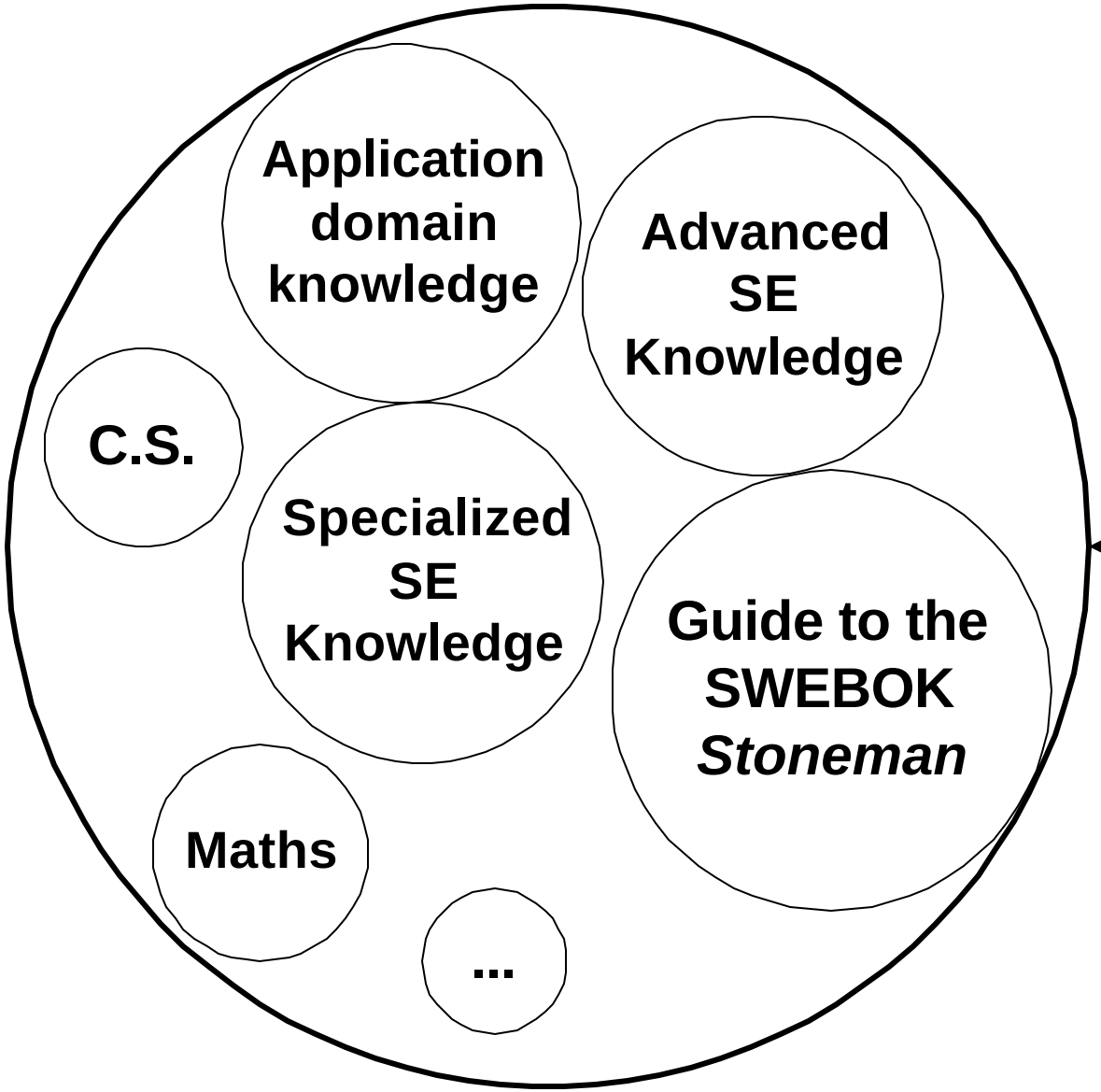
- Public and private organizations
- Practicing software engineers
- Makers of public policy
- Professional societies
- Software engineering students
- Educators and trainers

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





Knowledge of a Software Engineer

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
- Available ***free*** on the web

Project Team

- Editorial team
- Industrial Advisory Board
- Knowledge Area Specialists
- Reviewers

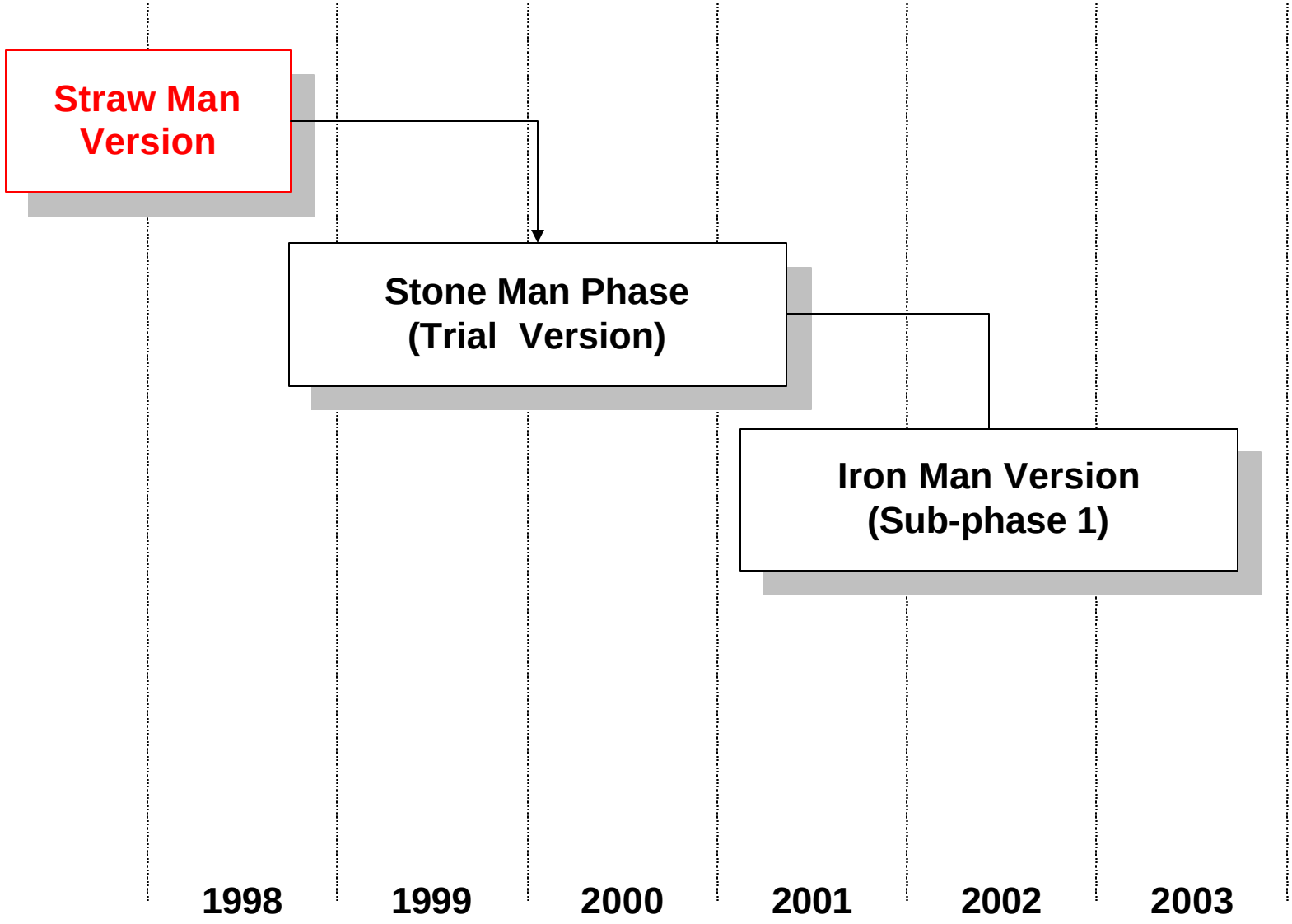
Editorial Team

- Project “Champion”:
  - Leonard Tripp, 1999 President, IEEE Computer Society
  - President, Professional Practices Committee
- Executive Editors:
  - Alain Abran, ETS
  - James W. Moore, The MITRE Corp.
- Editors:
  - Pierre Bourque, ETS
  - 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

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



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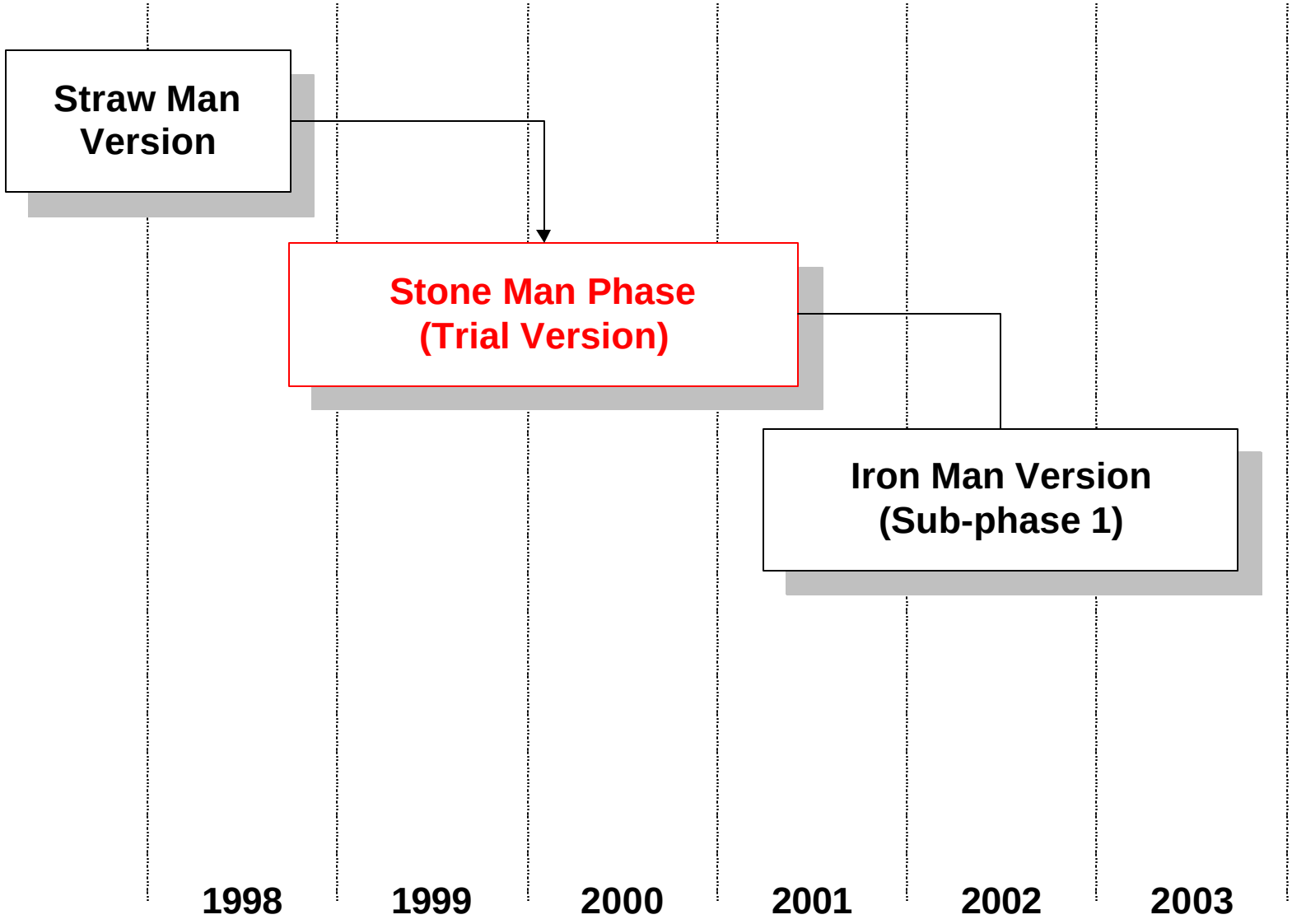
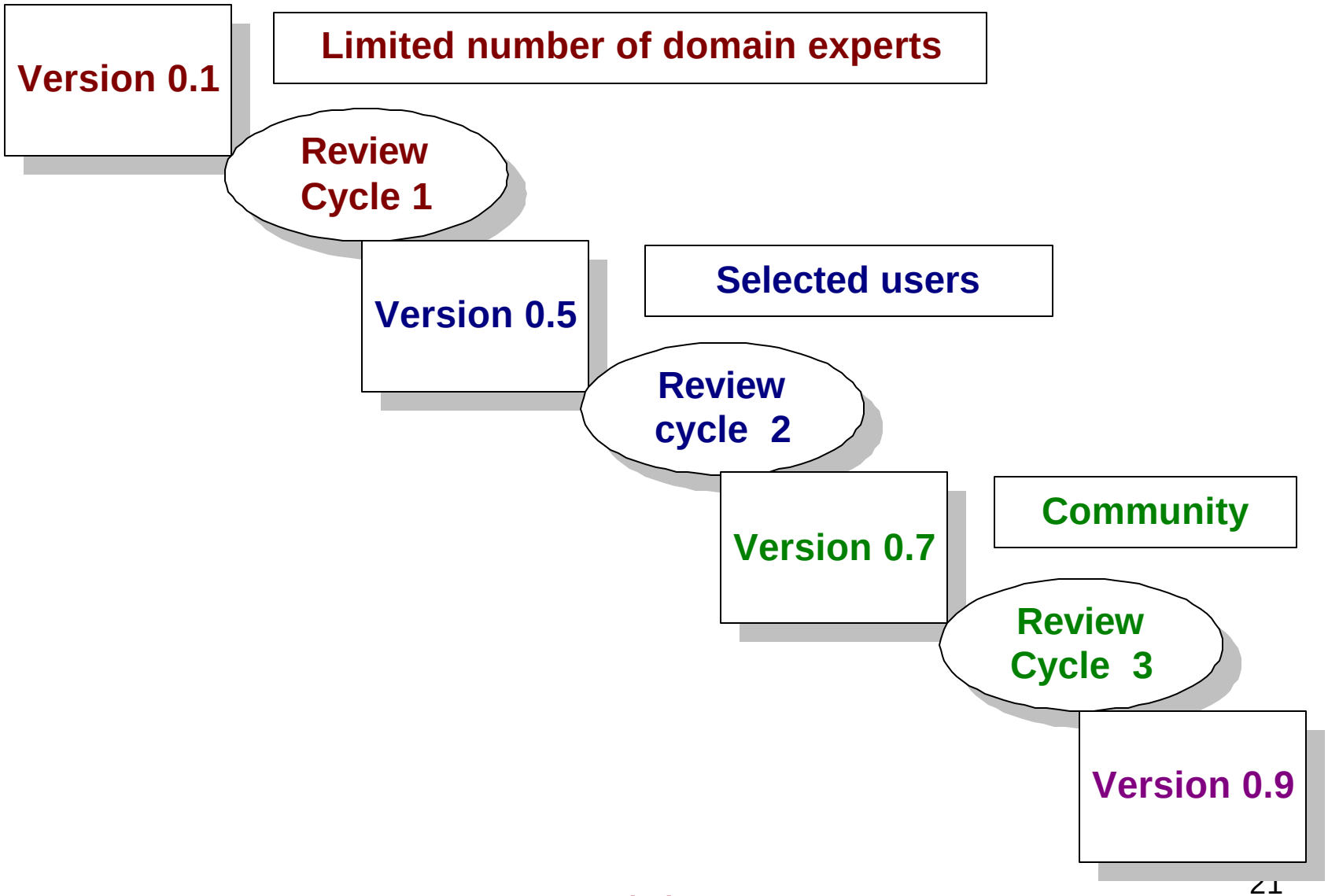


Knowledge Area Specialists

- 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

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%

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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

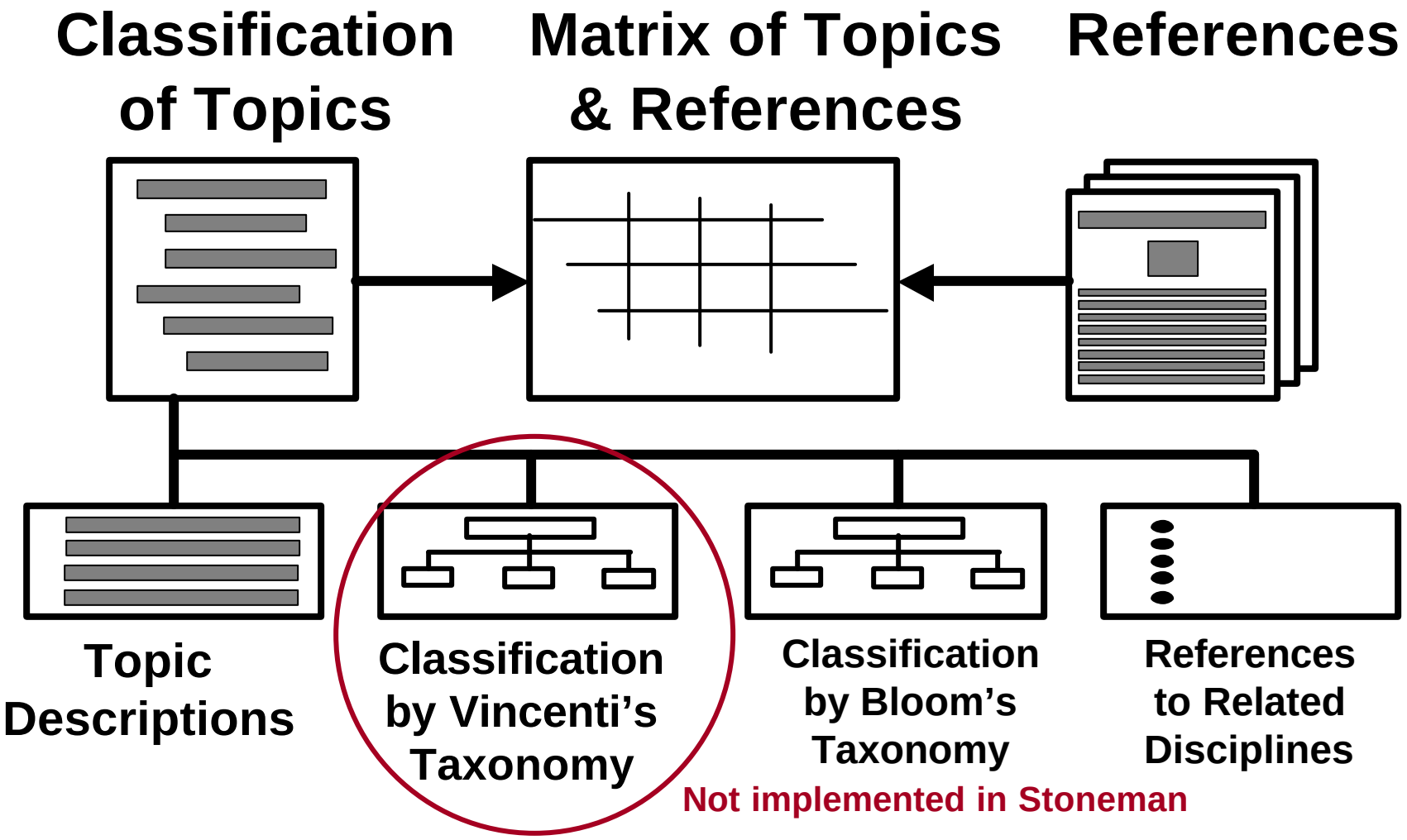
List of Knowledge Areas

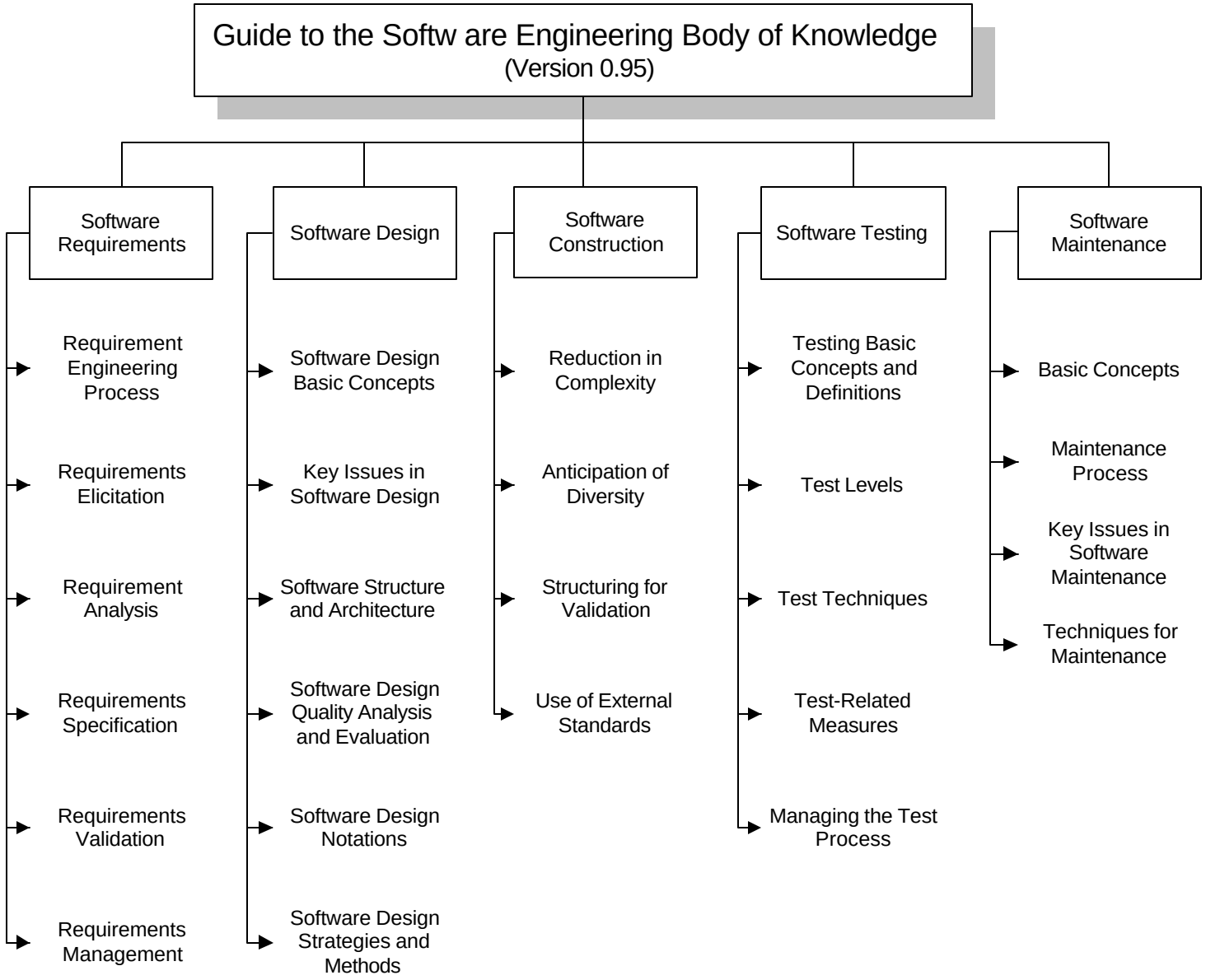
- Software Requirements
- Software Design
- Software Construction
- Software Testing
- Software Maintenance
- Software Configuration Management
- Software Eng. Management
- Software Eng. Tools & Methods
- Software Engineering Process
- Software Quality

Related Disciplines

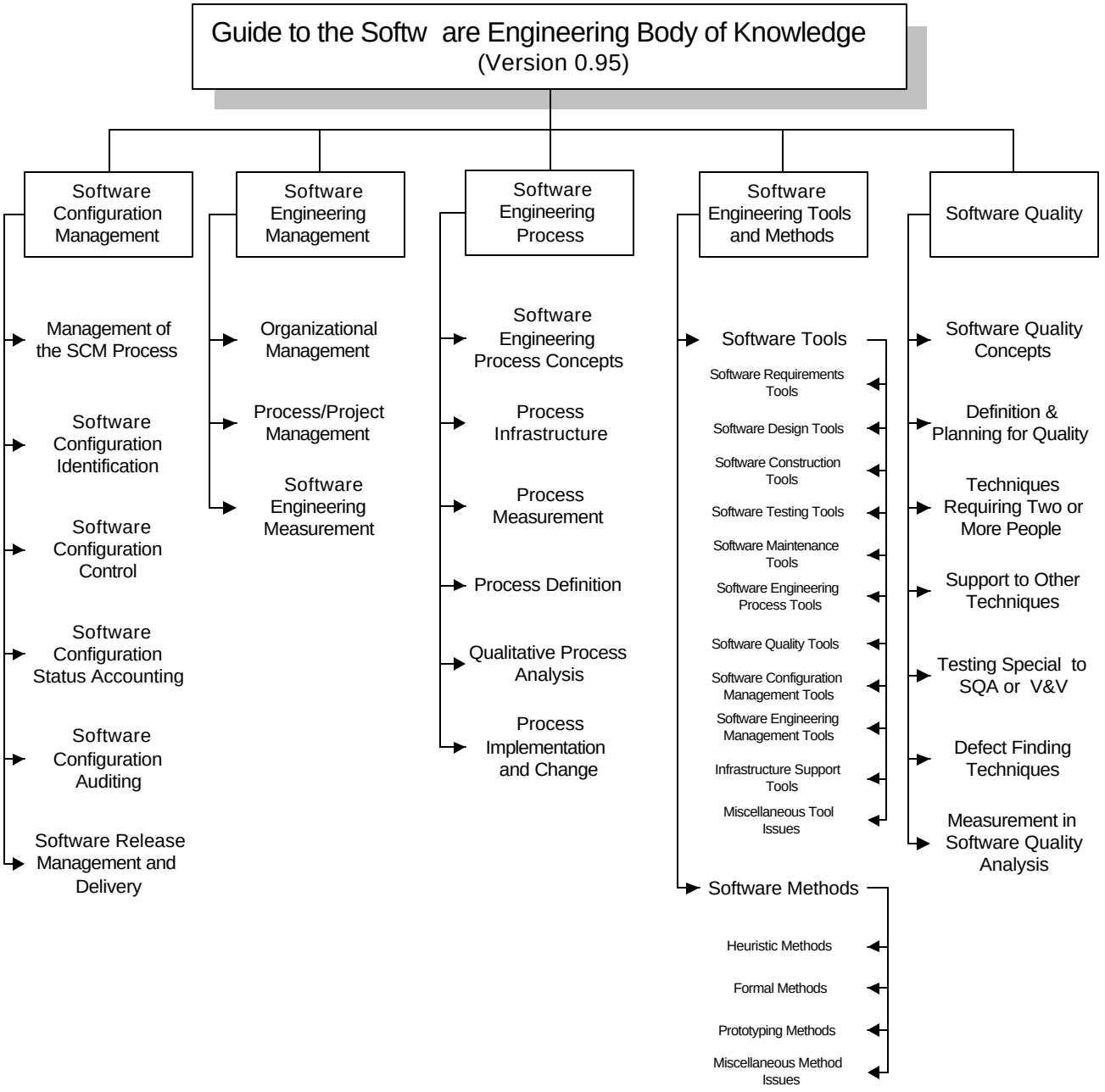
- Computer Science (CC2001)
- Mathematics (CC2001)
- Project Management (PMBOK)
- Computer Engineering
- Cognitive Sciences and Human Factors
- Systems Engineering
- Management and Management Science

Knowledge Area Description



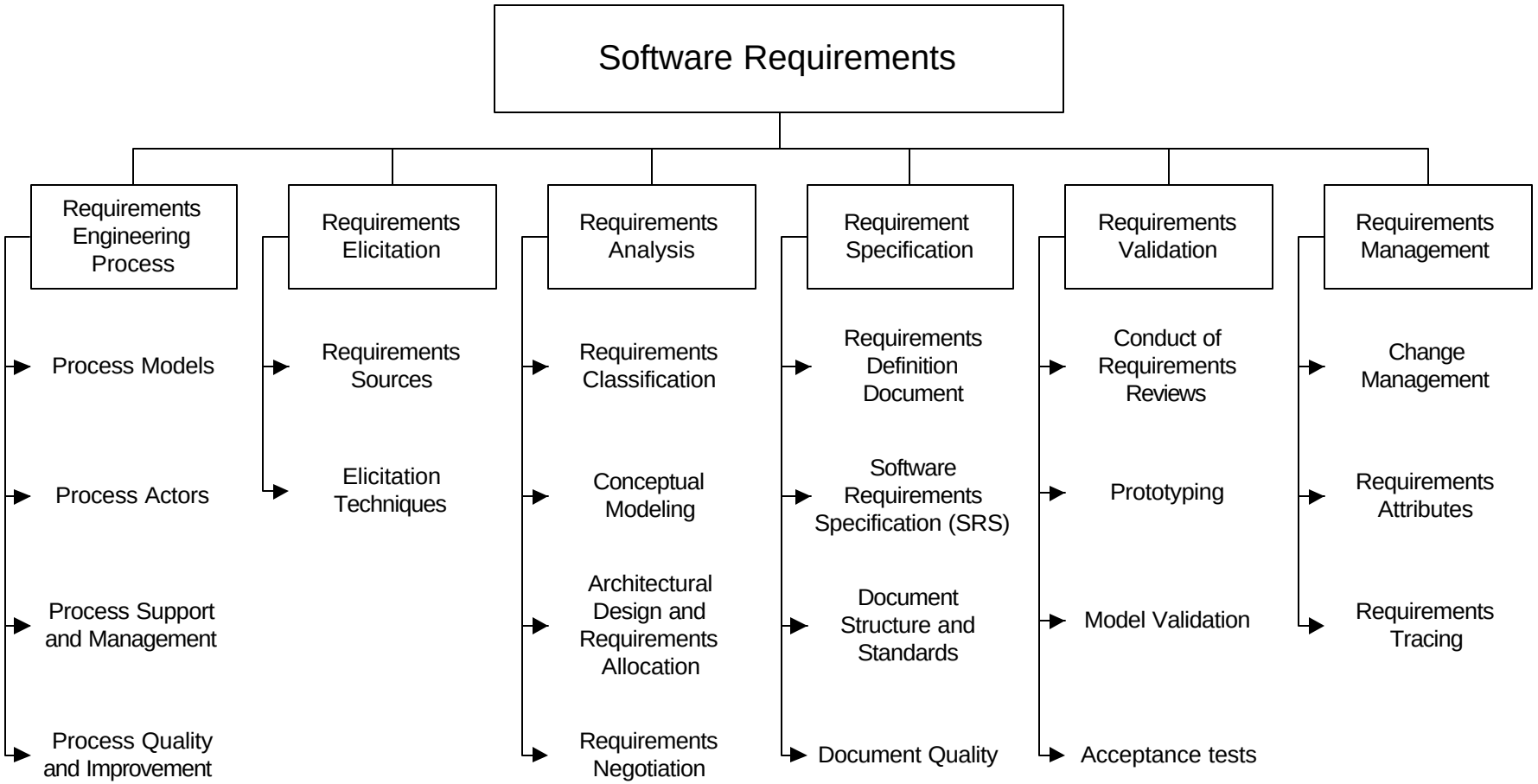

Guide to the Softw are Engineering Body of Knowledge
(Version 0.95)
Software Requirements
Software Design
Software Construction
Software Testing
Software Maintenance
Requirement Engineering Process
Requirements Elicitation
Requirement Analysis
Requirements Specification
Requirements Validation
Requirements Management
Software Design Basic Concepts
Key Issues in Software Design
Software Structure and Architecture
Software Design Quality Analysis and Evaluation
Software Design Notations
Software Design Strategies and Methods
Reduction in Complexity
Anticipation of Diversity
Structuring for Validation
Use of External Standards
Testing Basic Concepts and Definitions
Test Levels
Test Techniques
Test-Related Measures
Managing the Test Process
Basic Concepts
Maintenance Process
Key Issues in Software Maintenance
Techniques for Maintenance

(a) (b) (c) (d) (e)

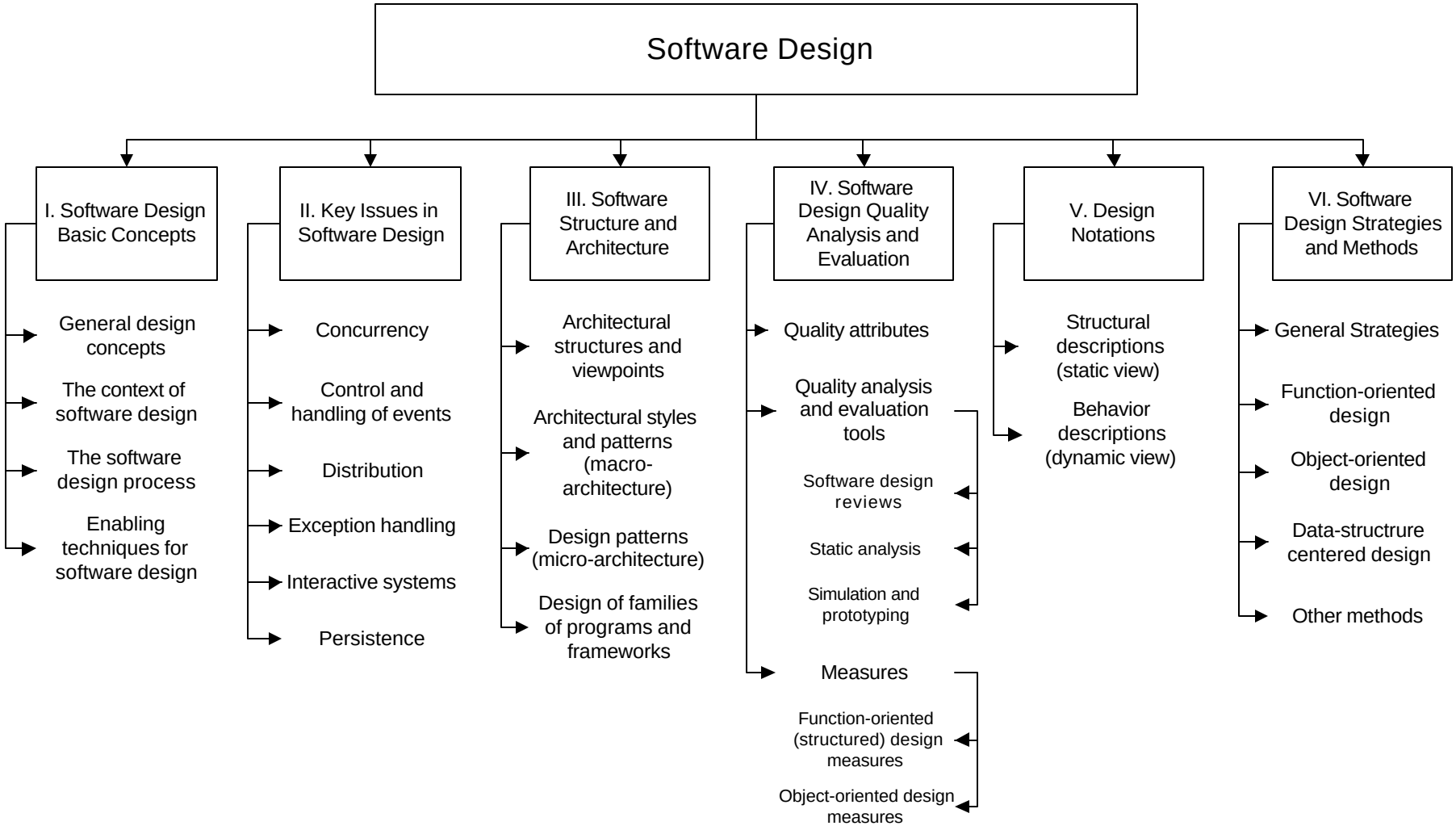


(f) (g) ww (h) .org (i) (j)

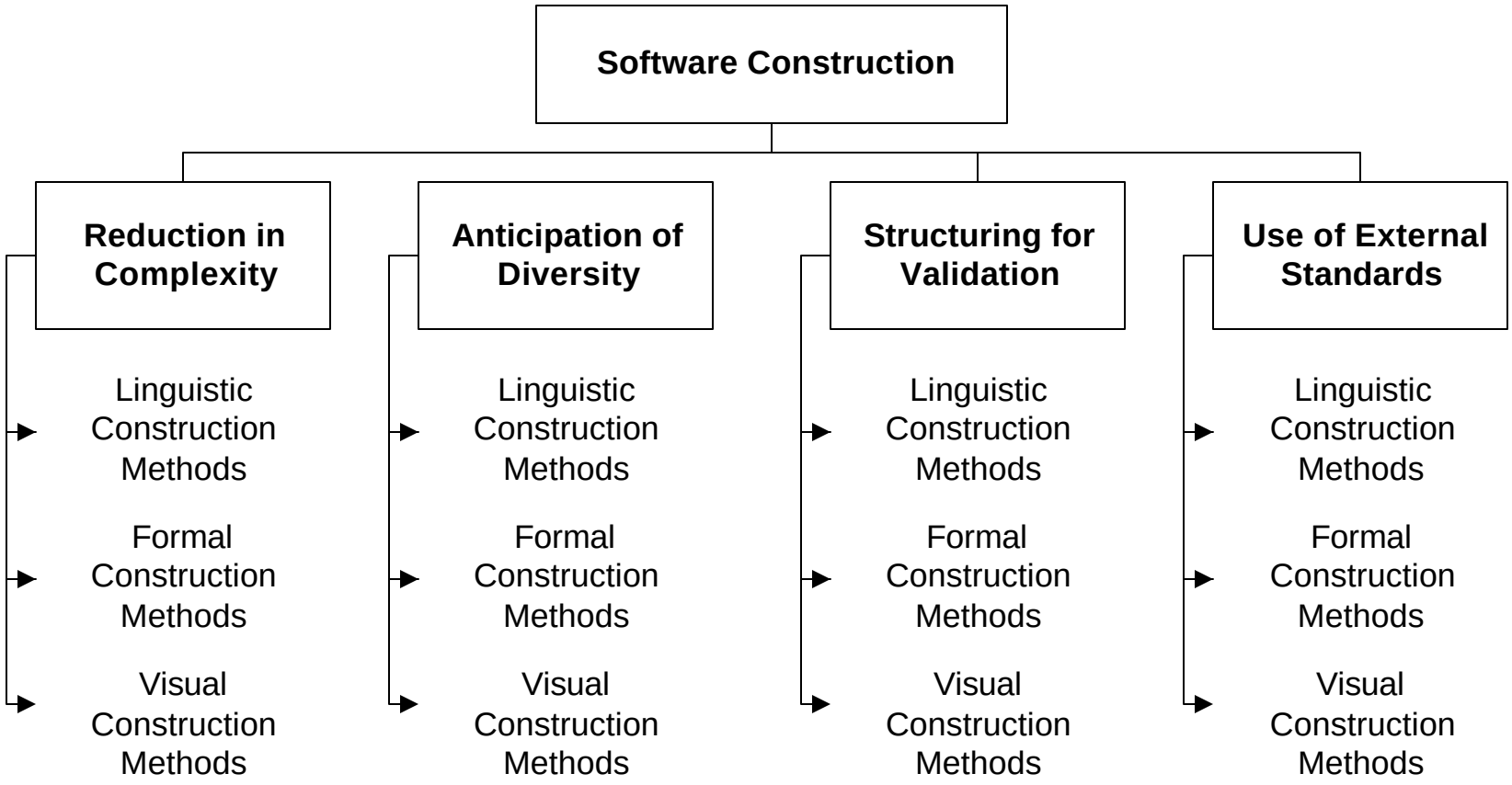
Software Requirements



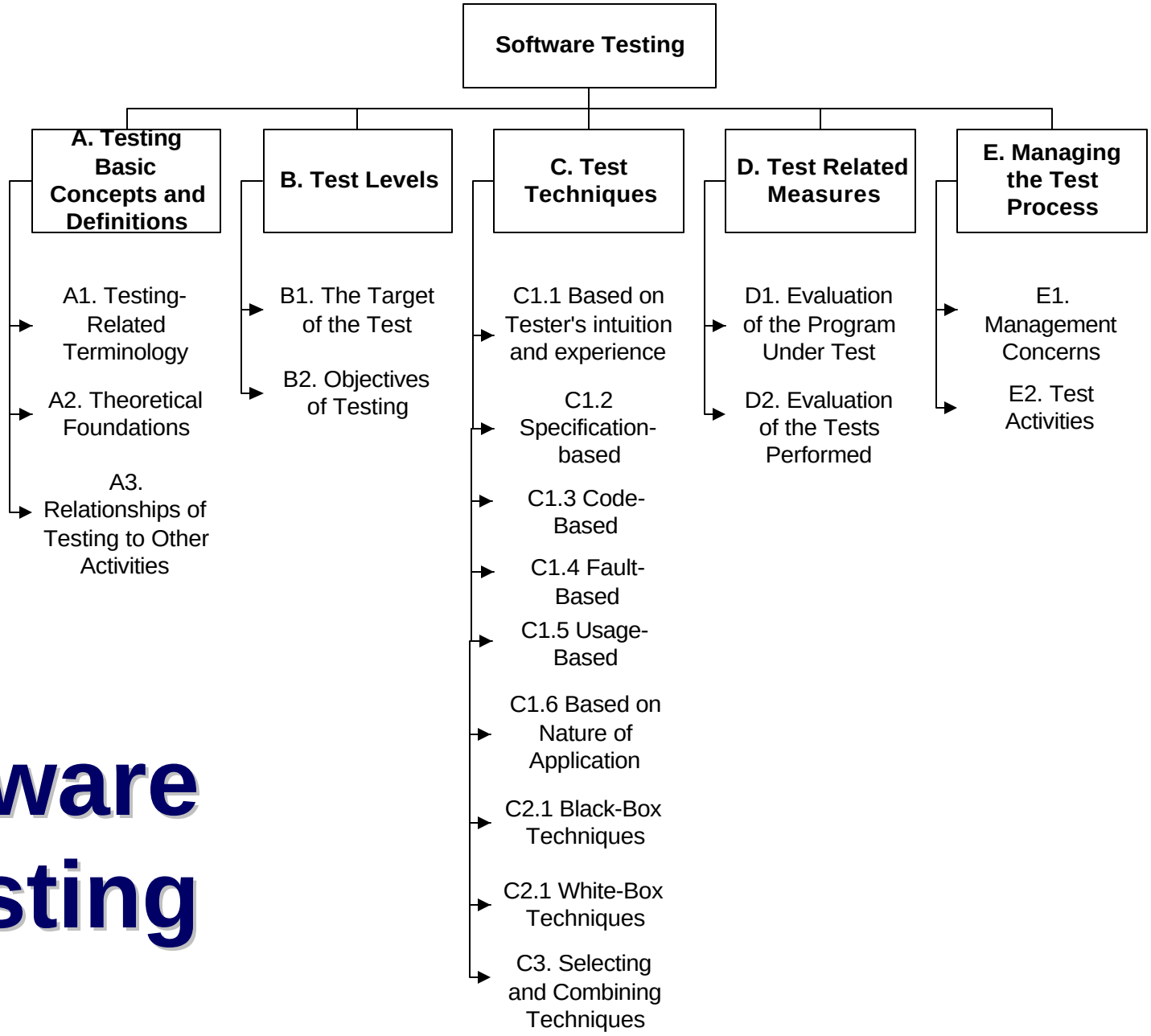
Software Design



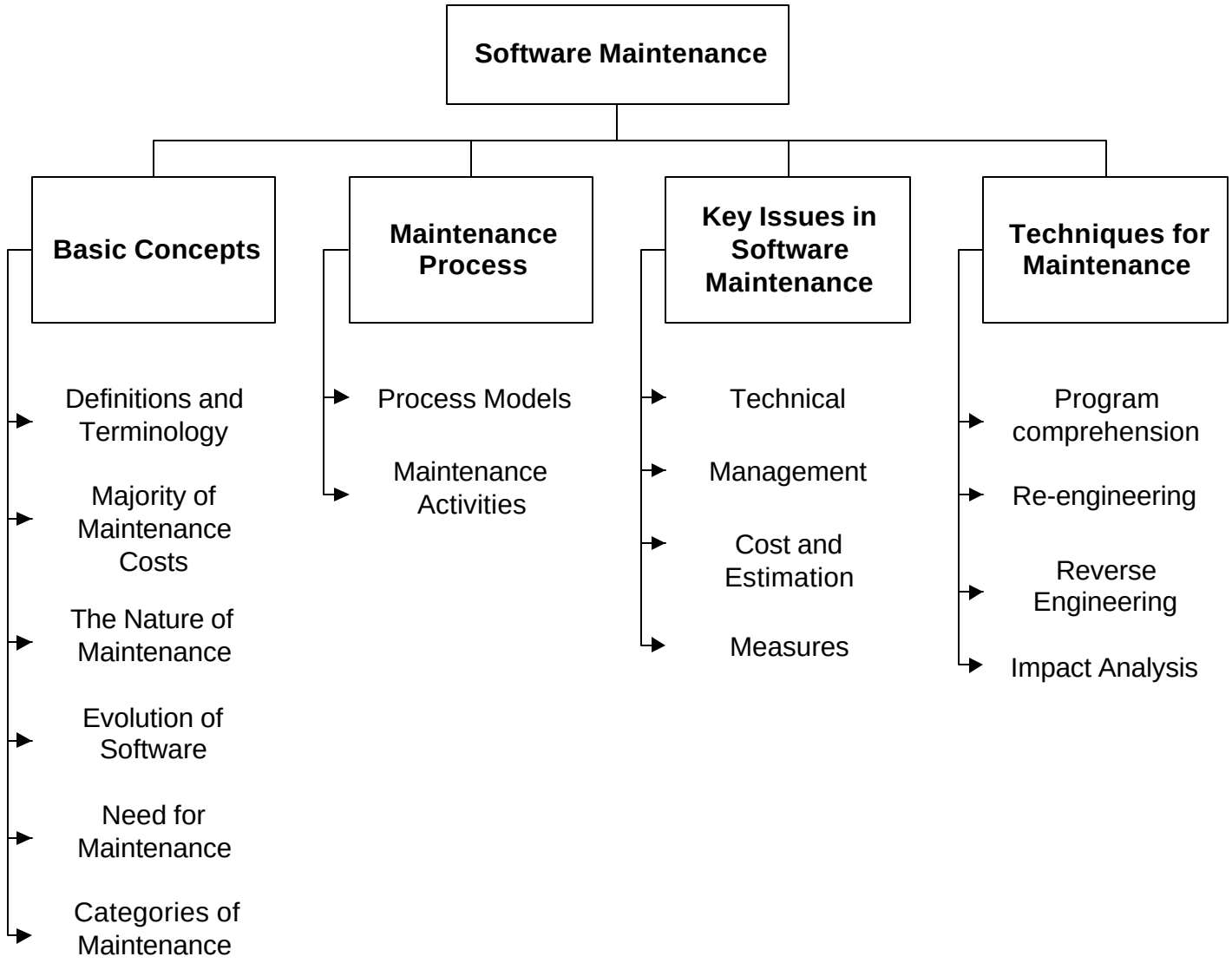
Software Construction



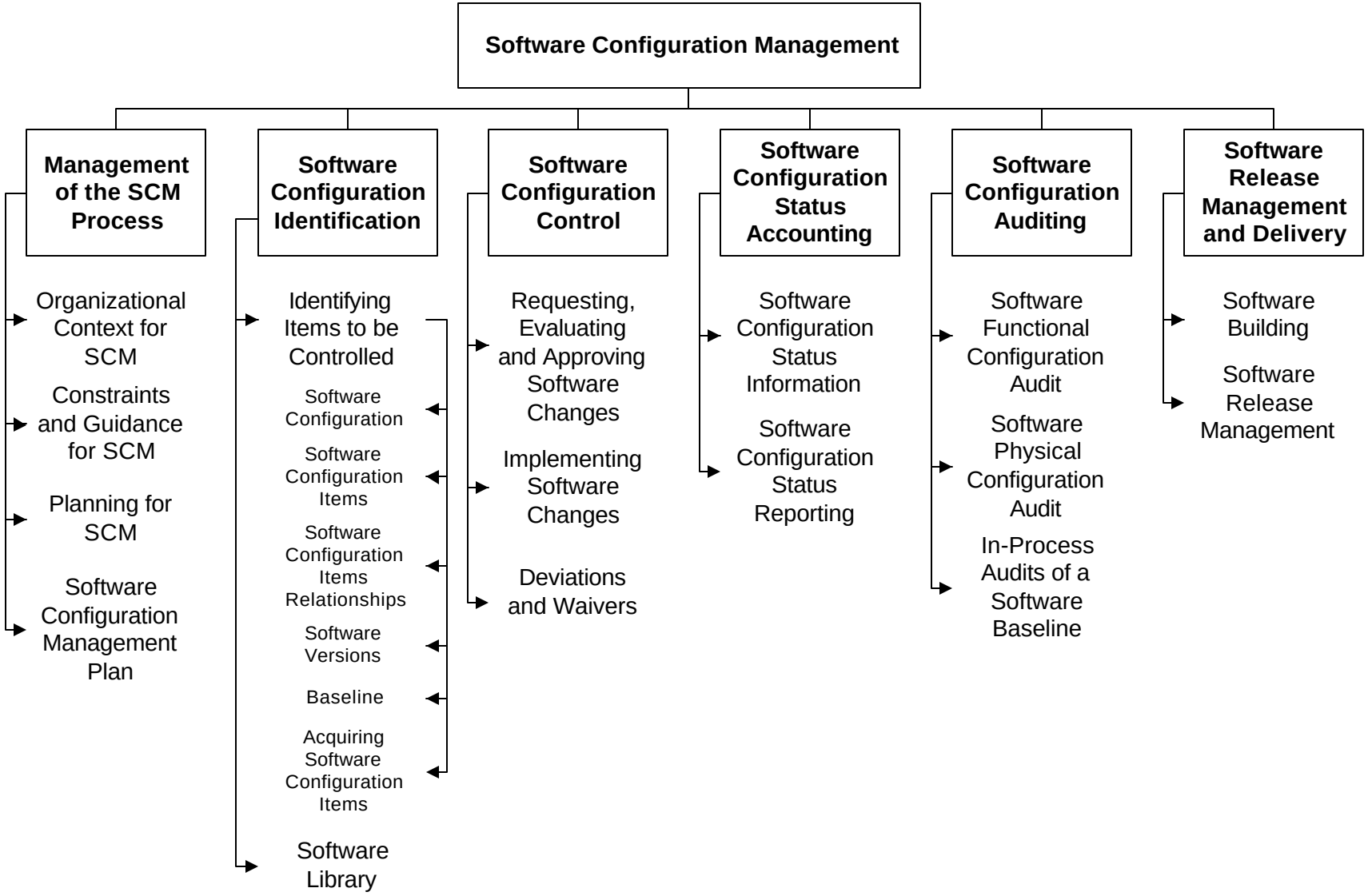
Software Testing



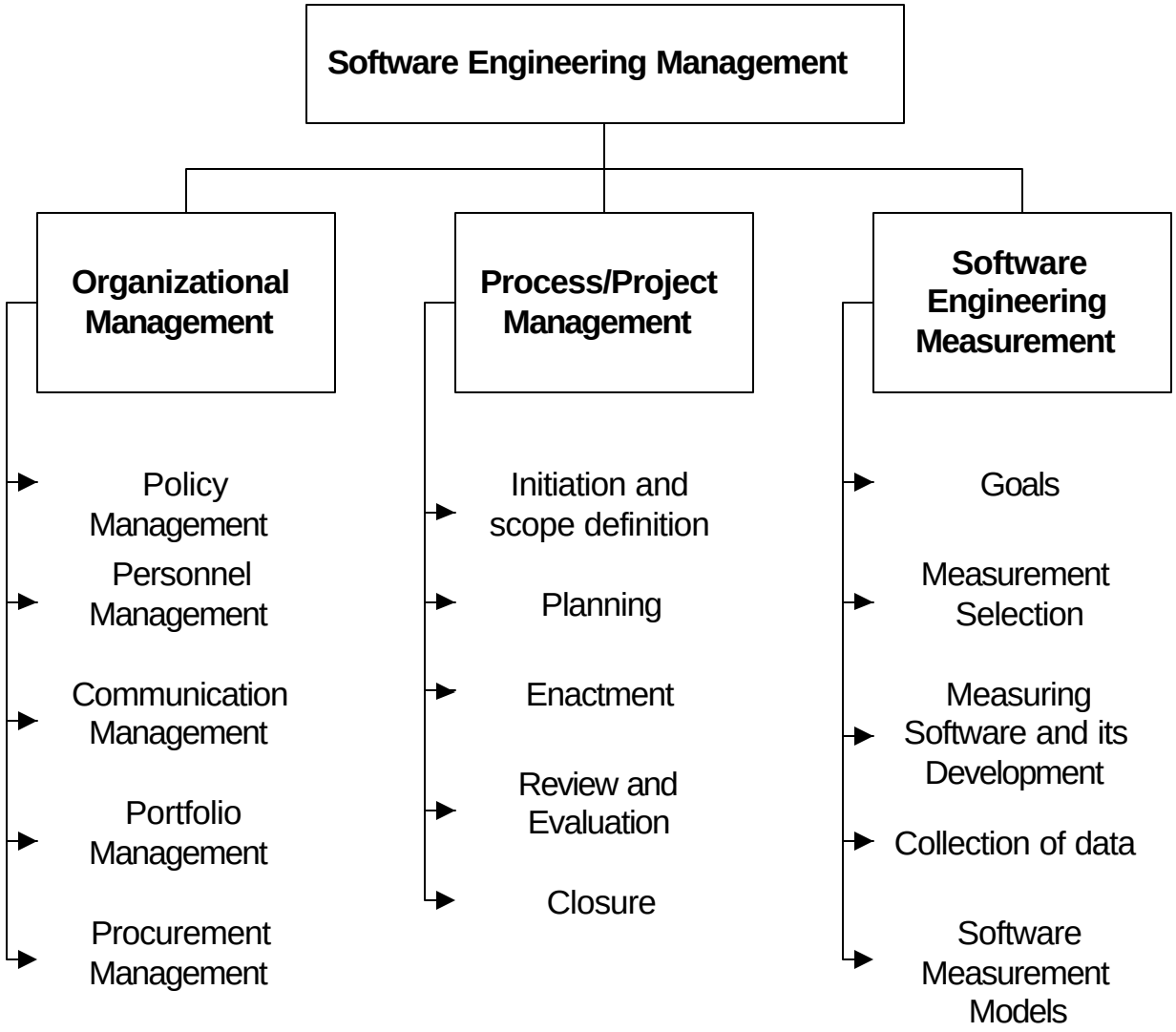
Software Maintenance



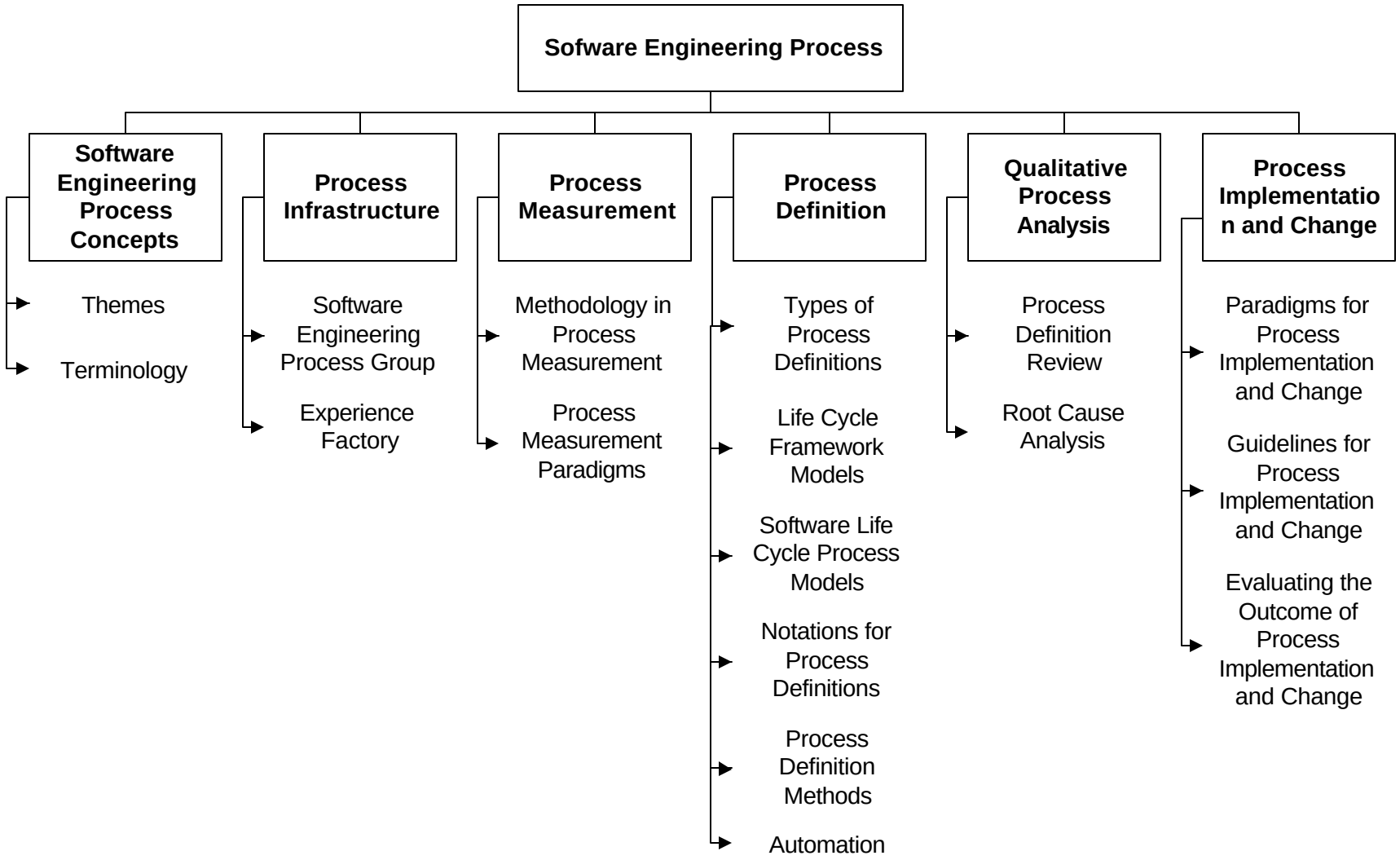
Software Configuration Management



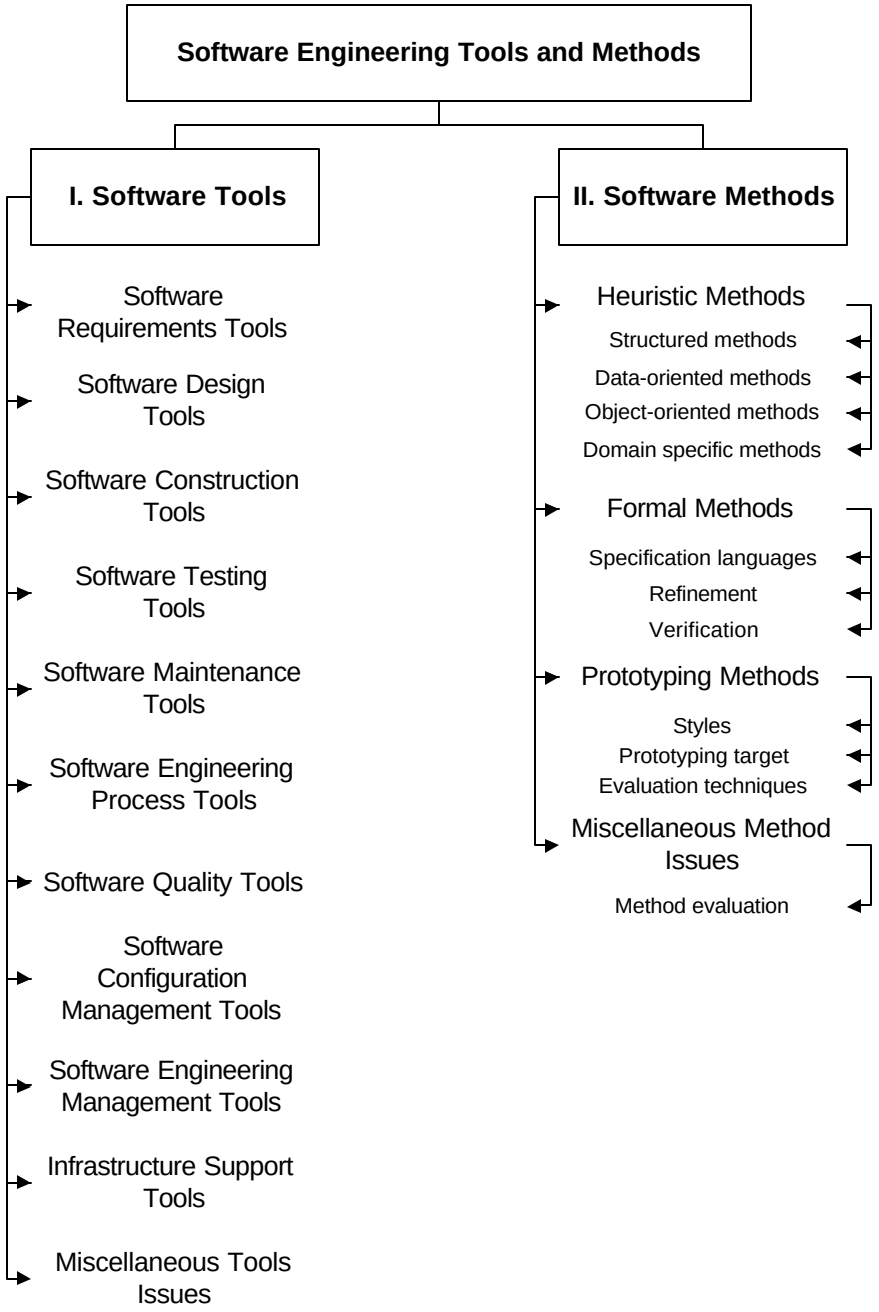
Software Engineering Management



Software Engineering Process



Software Engineering Tools and Methods



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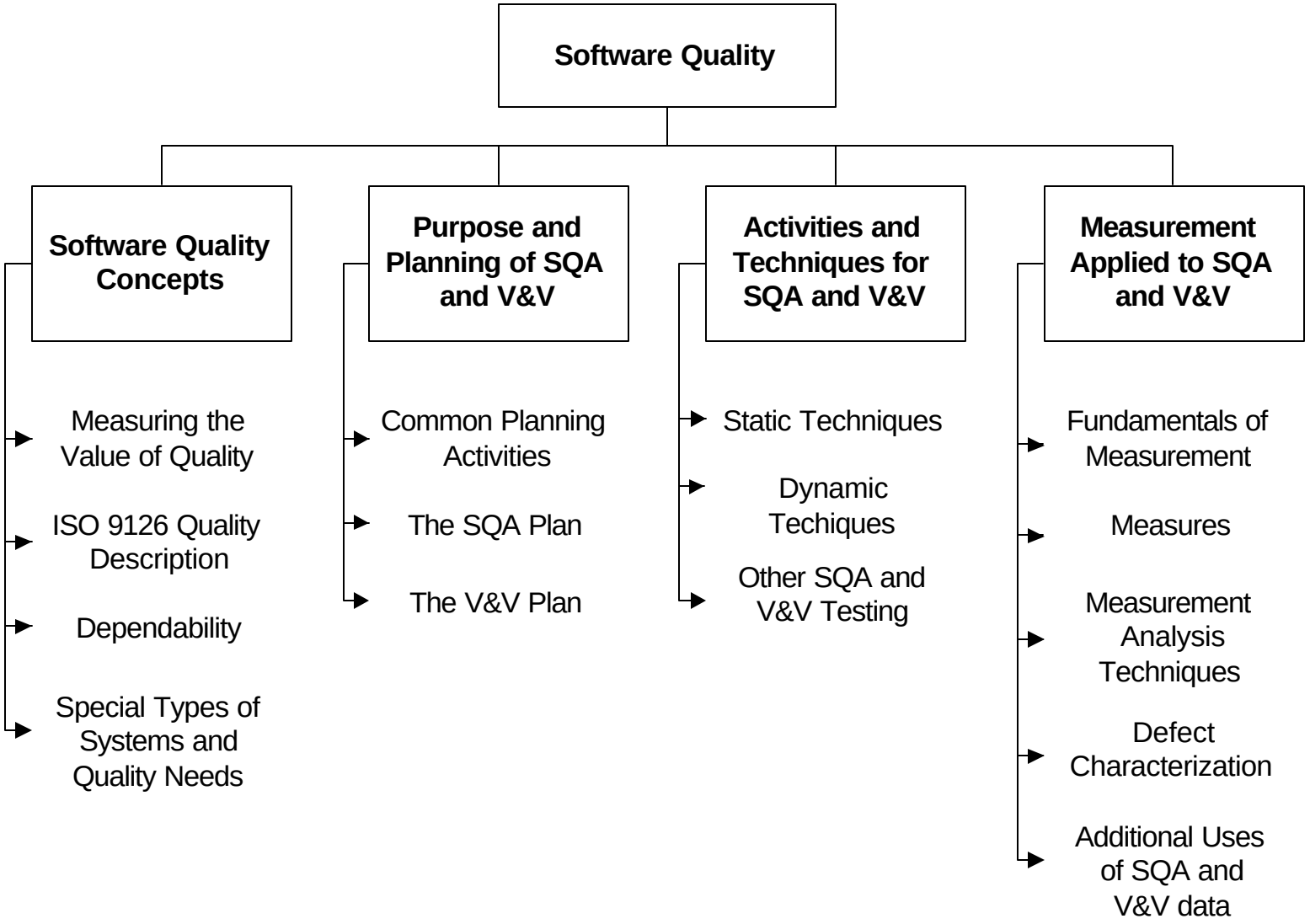
Software Quality



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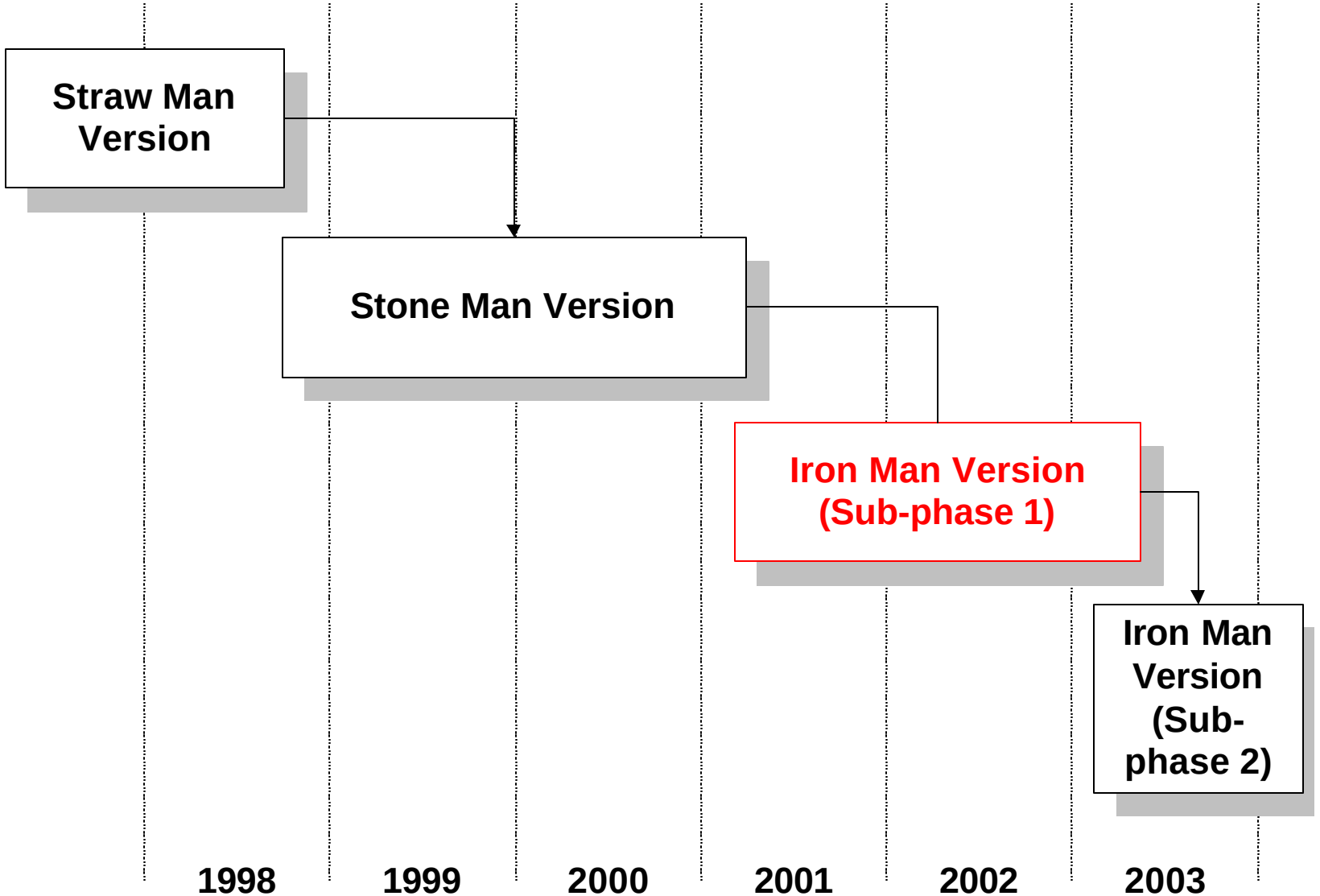


Applications of the Guide

- Industry and Government
- Education
- Research
- Licensing and Certification ?

Applications of the Guide

- Industry & Government
  - HR: job description, hiring, staffing of projects, career planning, contracting:
    - Lockheed-Martin
    - Large Brazilian bio-medical software company
  - Process models, policy: Construx, Brazilian company
  - Makers of public policy:Turkish Society for Quality

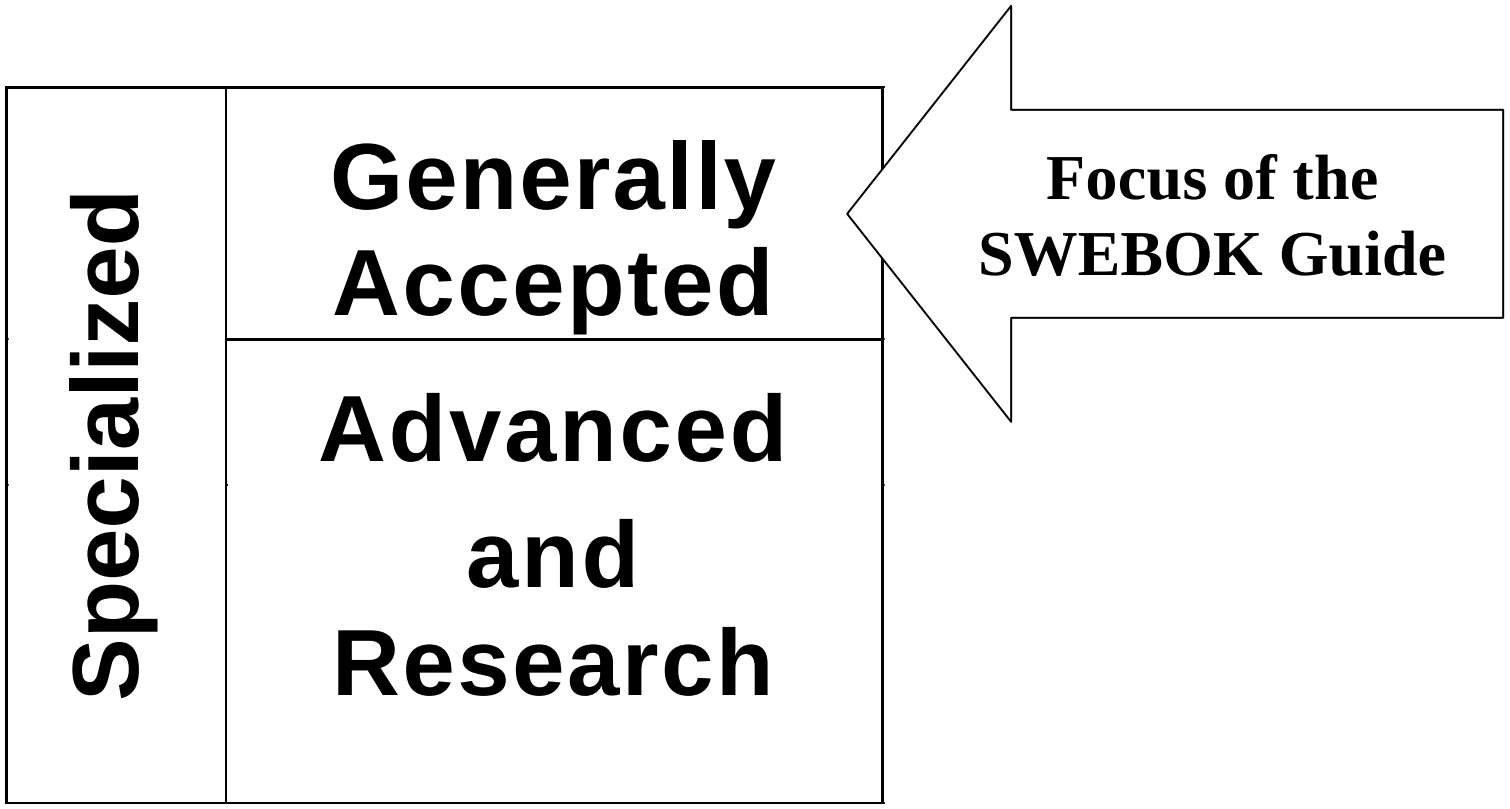
Applications of the Guide

- Professional development
  - internal training, corporate universities
  - self-assessment
  - individual training
  - Examples: Construx, Financial Software Company

Applications of the Guide

- Education:
  - Course design/evaluation: Arizona St.
  - Curriculum design/evaluation: NTU, U. of Iceland, SMU, Stevens Institute of Technology (NJ), Musahi U. Japan, etc.
  - Program accreditation: Japan is evaluating...

Categories of Knowledge in the SWEBOK



Research: Advanced and Research Topics

- What topics should be monitored as the most likely to become *generally accepted* in the near future ?
- What mecanisms should be used to monitor these and other topics ?

Research: Specialized Domains

- What are the most important domains for which the knowledge should be included in extended versions of the Guide ?
- What characteristics make each of these domains different from the core of Software Engineering ?
- Do we need additional criteria for recognizing the *generally accepted* knowledge in each of these domains ?

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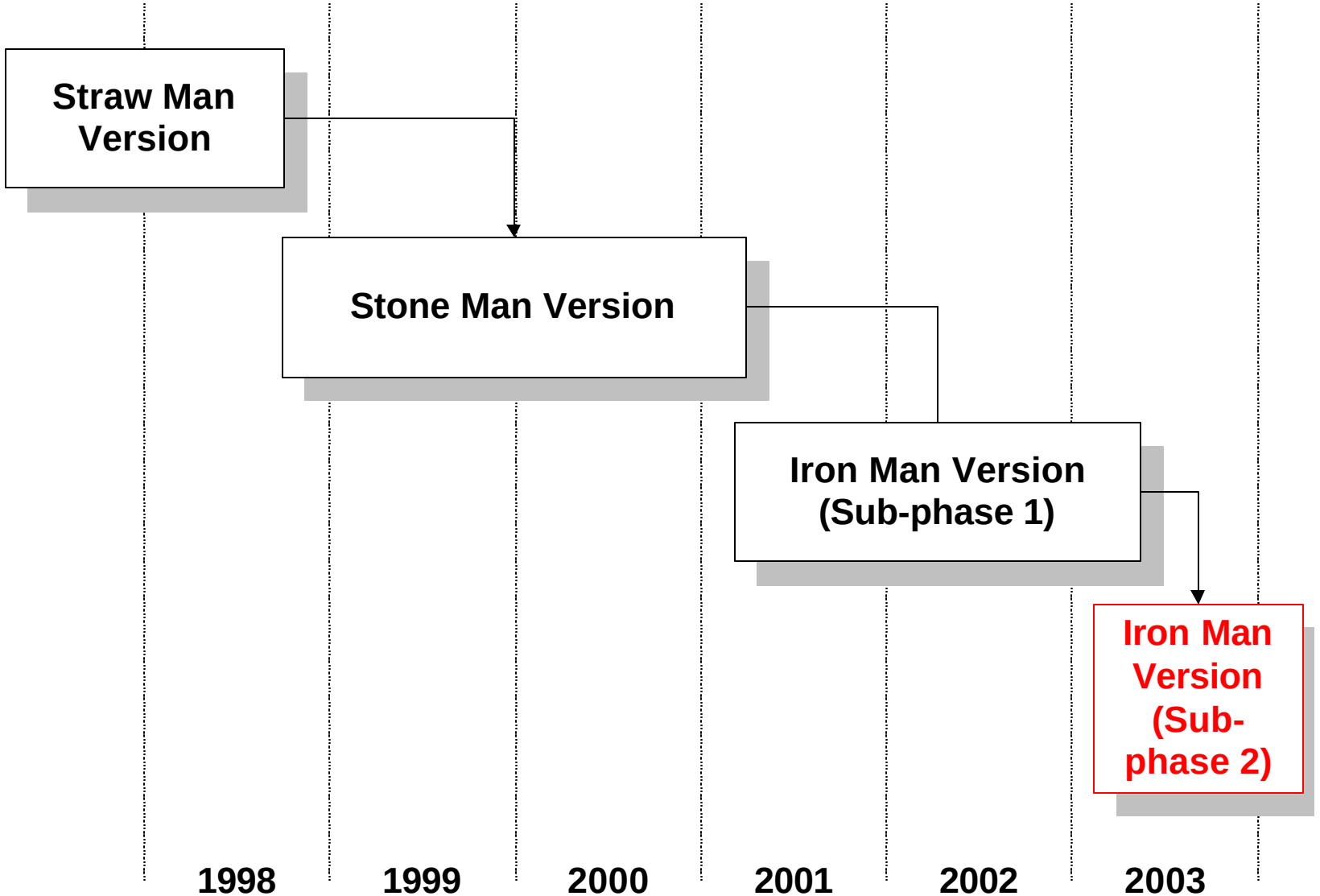

Concluding Remarks

- Consensus on the core body of knowledge is key in all disciplines
- Participation of all communities is important

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