The Emerging Consensus on the Software Engineering Body of Knowledge

P. Bourque,

R. Dupuis, Alain Abran J. W. Moore, L. Tripp

Ottawa SPIN

October 18, 2001

SWEBOK

ÉTS

UQÀM

Corporate Support by:

CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
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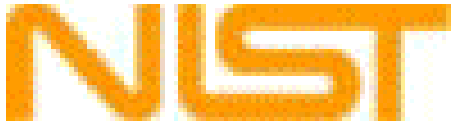

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Project managed by:

Université du Québec
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Presentation Plan

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

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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)."

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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.

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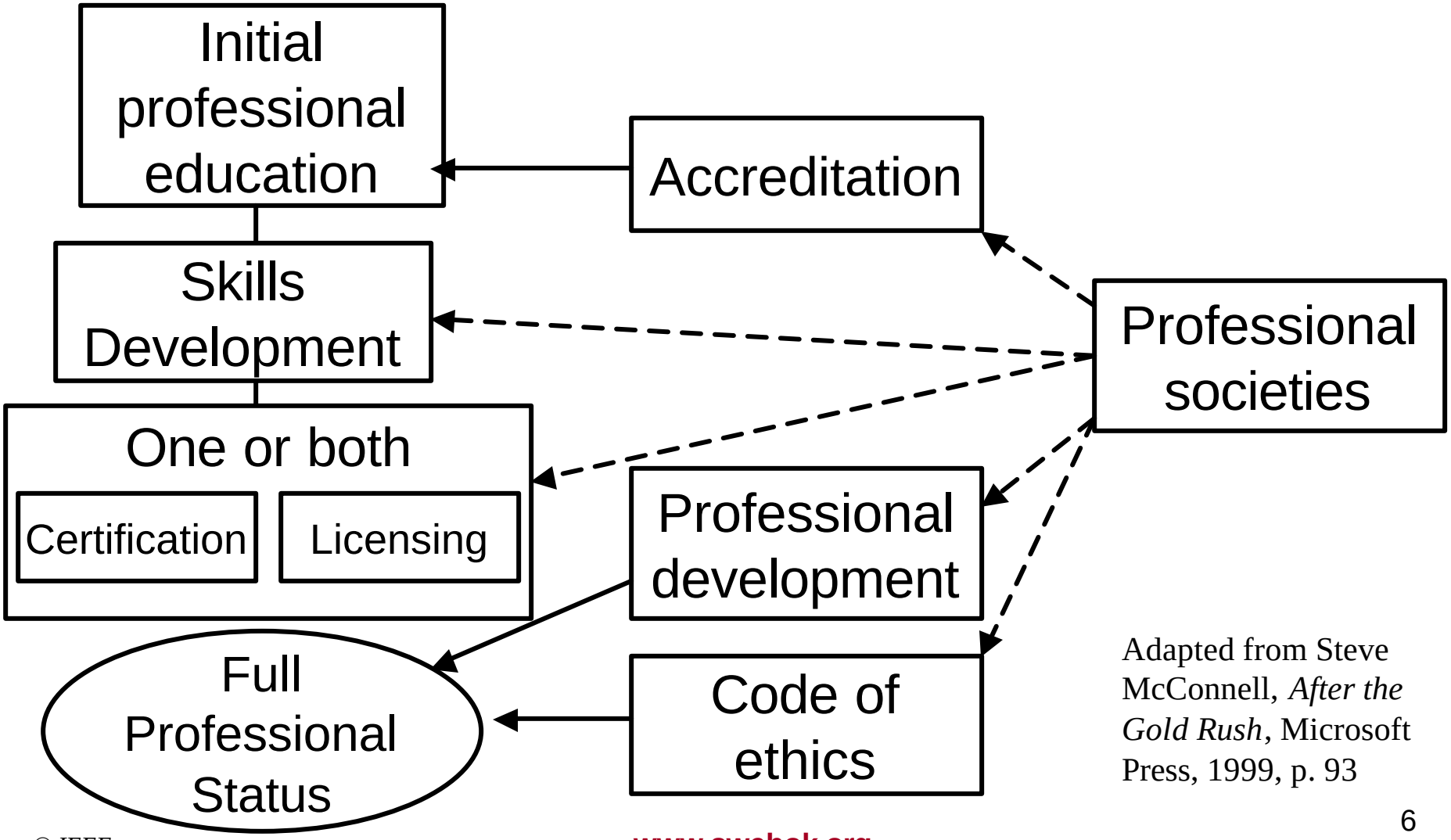
Professional Development



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

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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

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Intended Audience

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

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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

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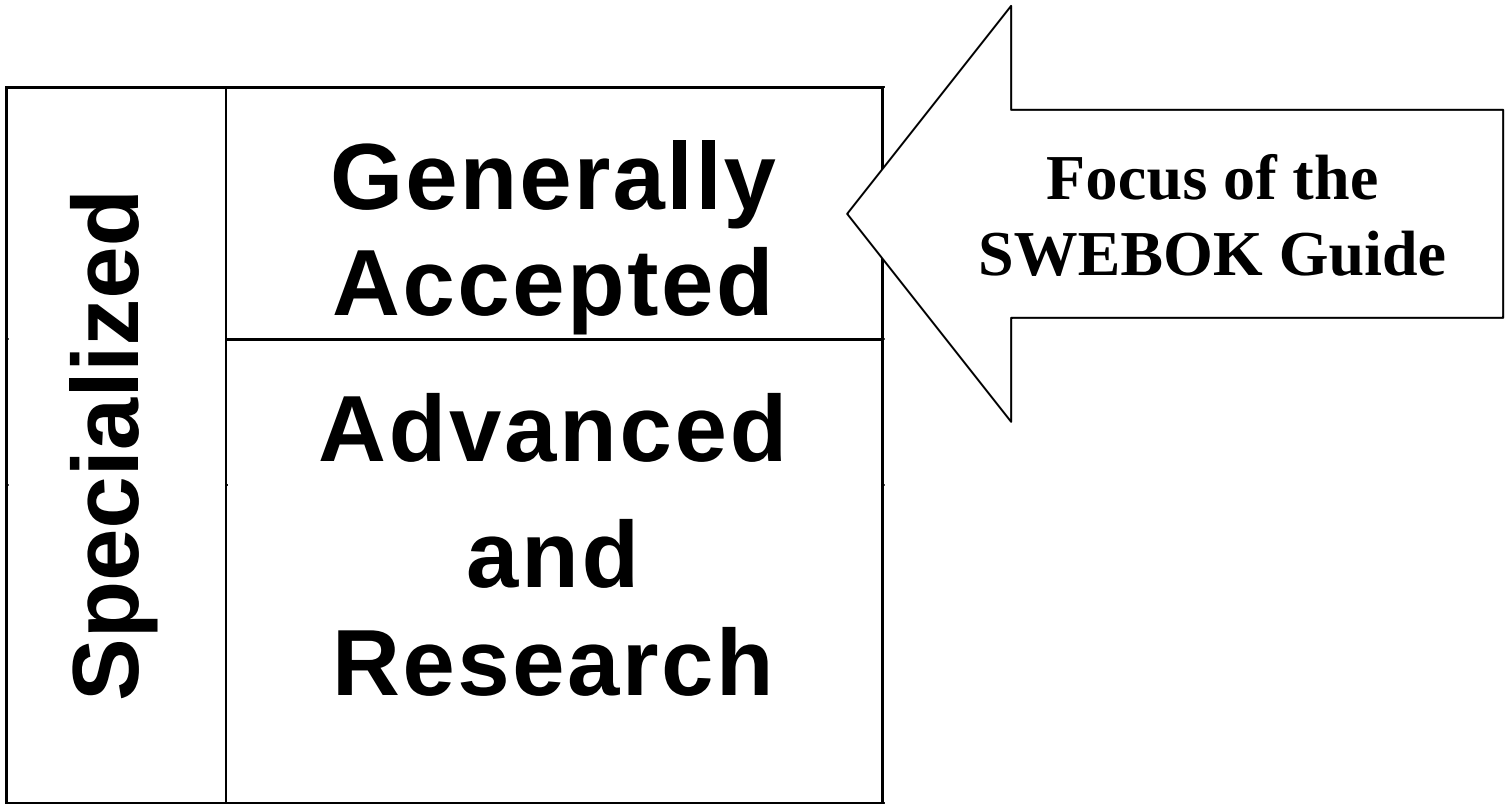
Categories of Knowledge in the SWEBOK



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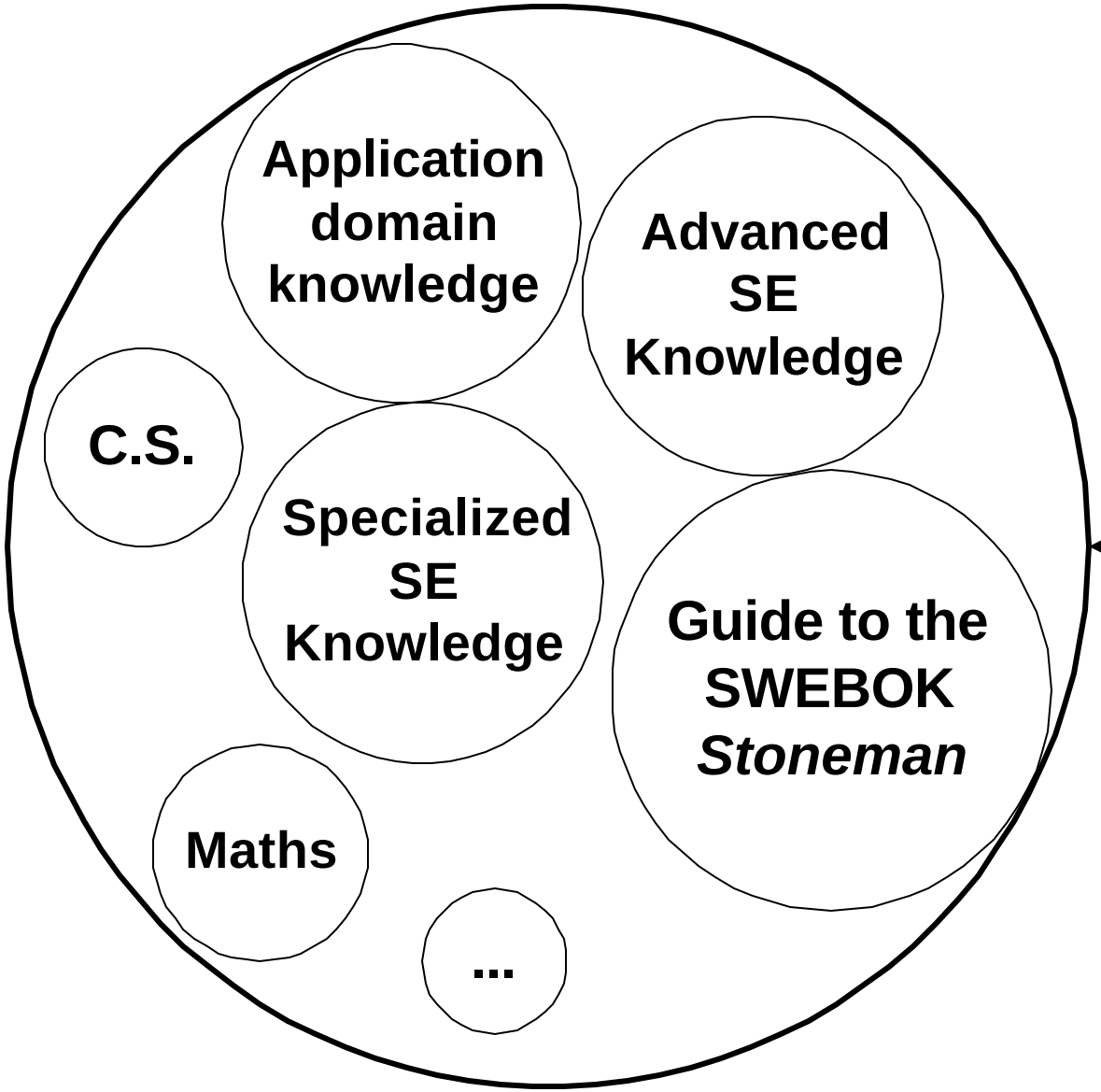

Knowledge of a Software Engineer

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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

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Project Team

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

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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

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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

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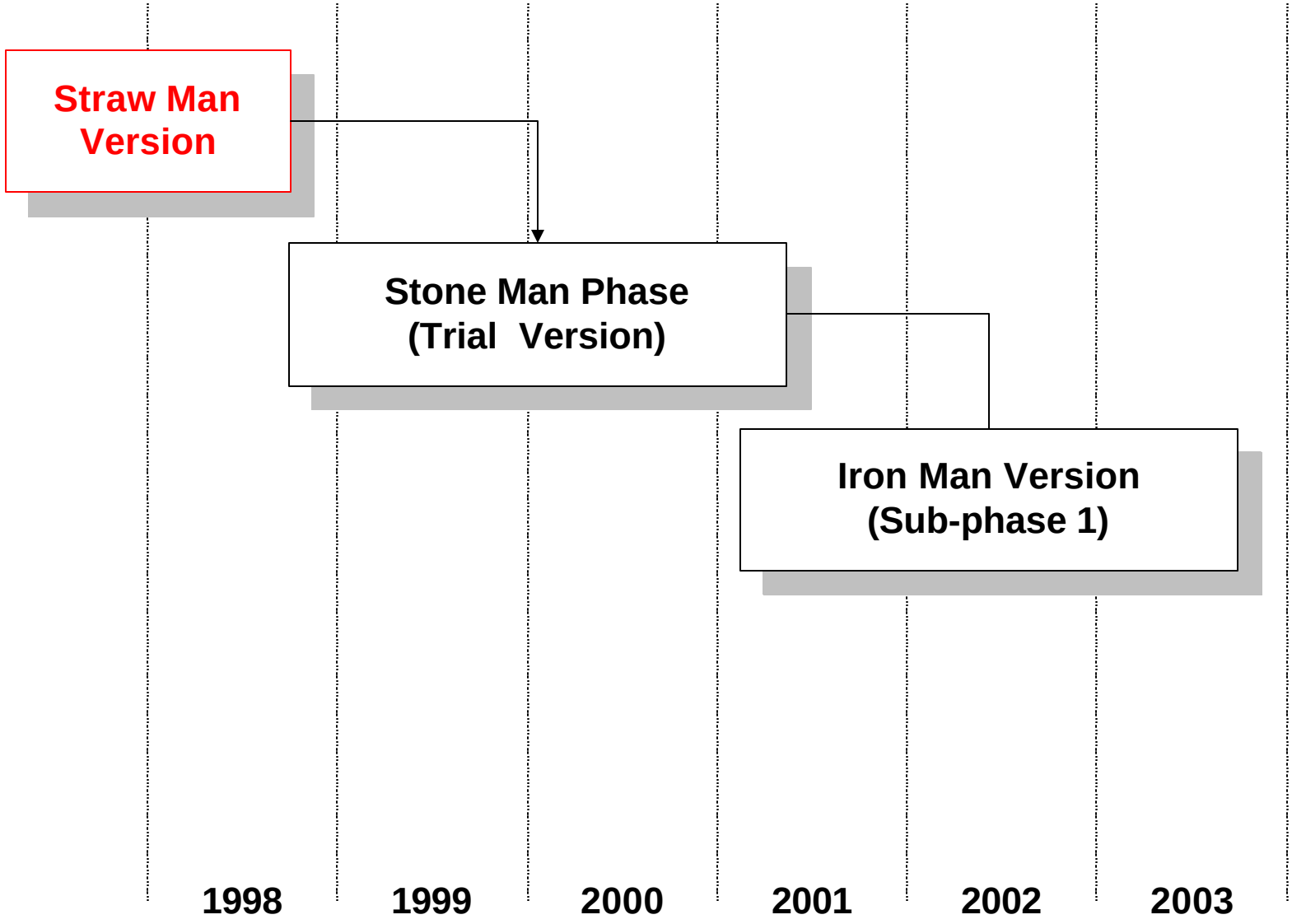
A Three-Phase Approach for Developing the Guide to the SWEBOK



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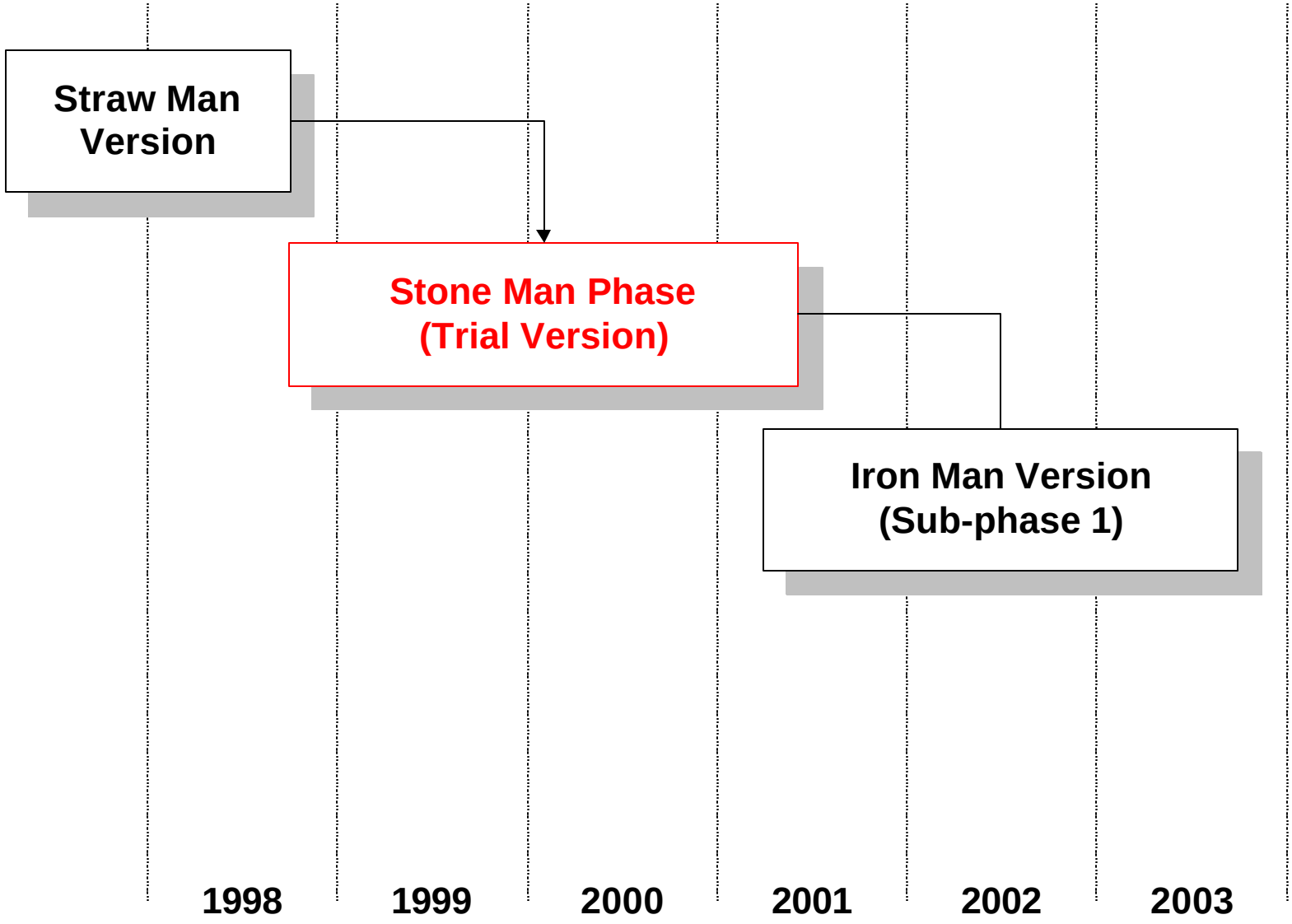
A Three-Phase Approach for Developing the Guide to the SWEBOK



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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

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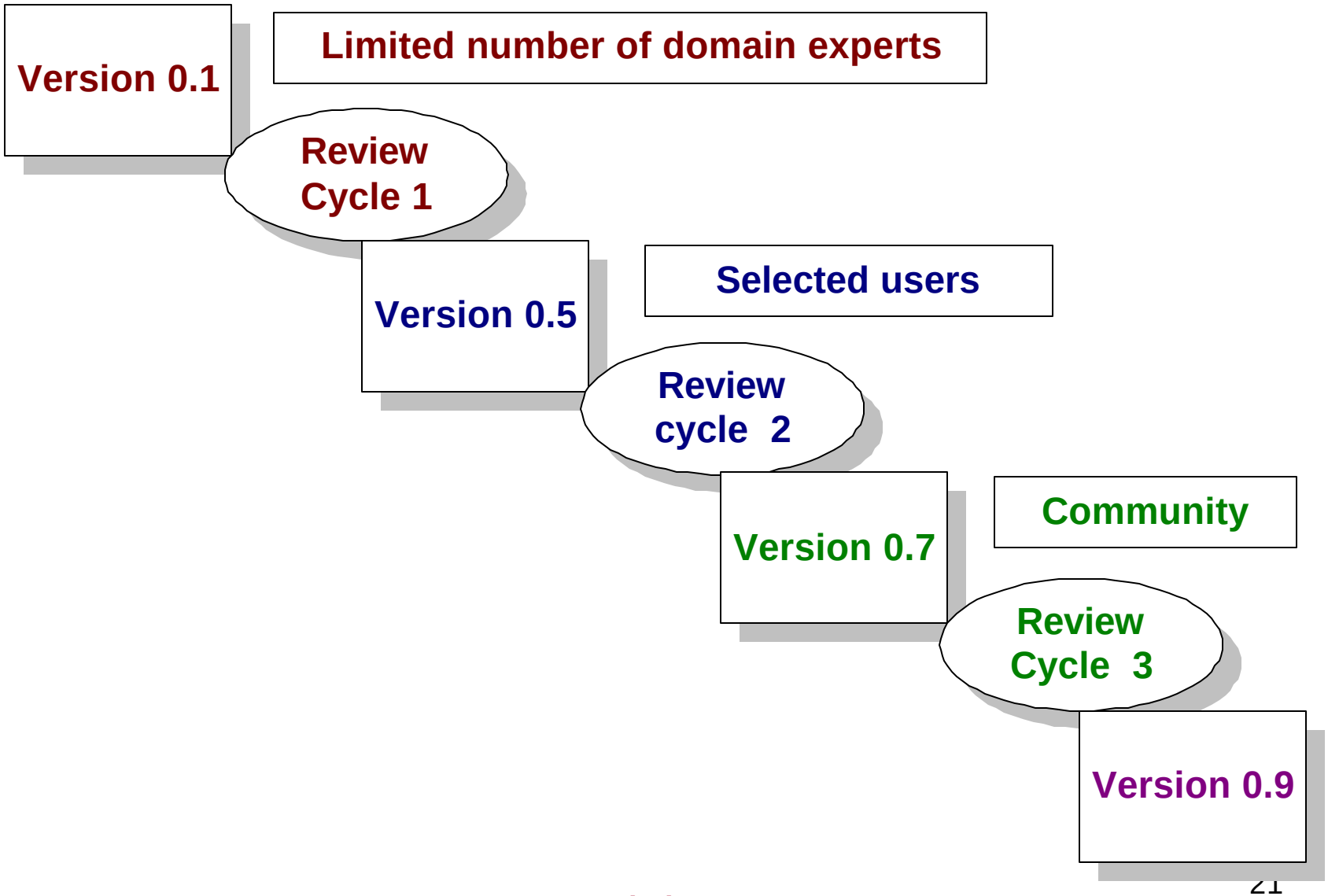
Phase 2: Stone Man Review Process



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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

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Data on reviewers

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

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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

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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

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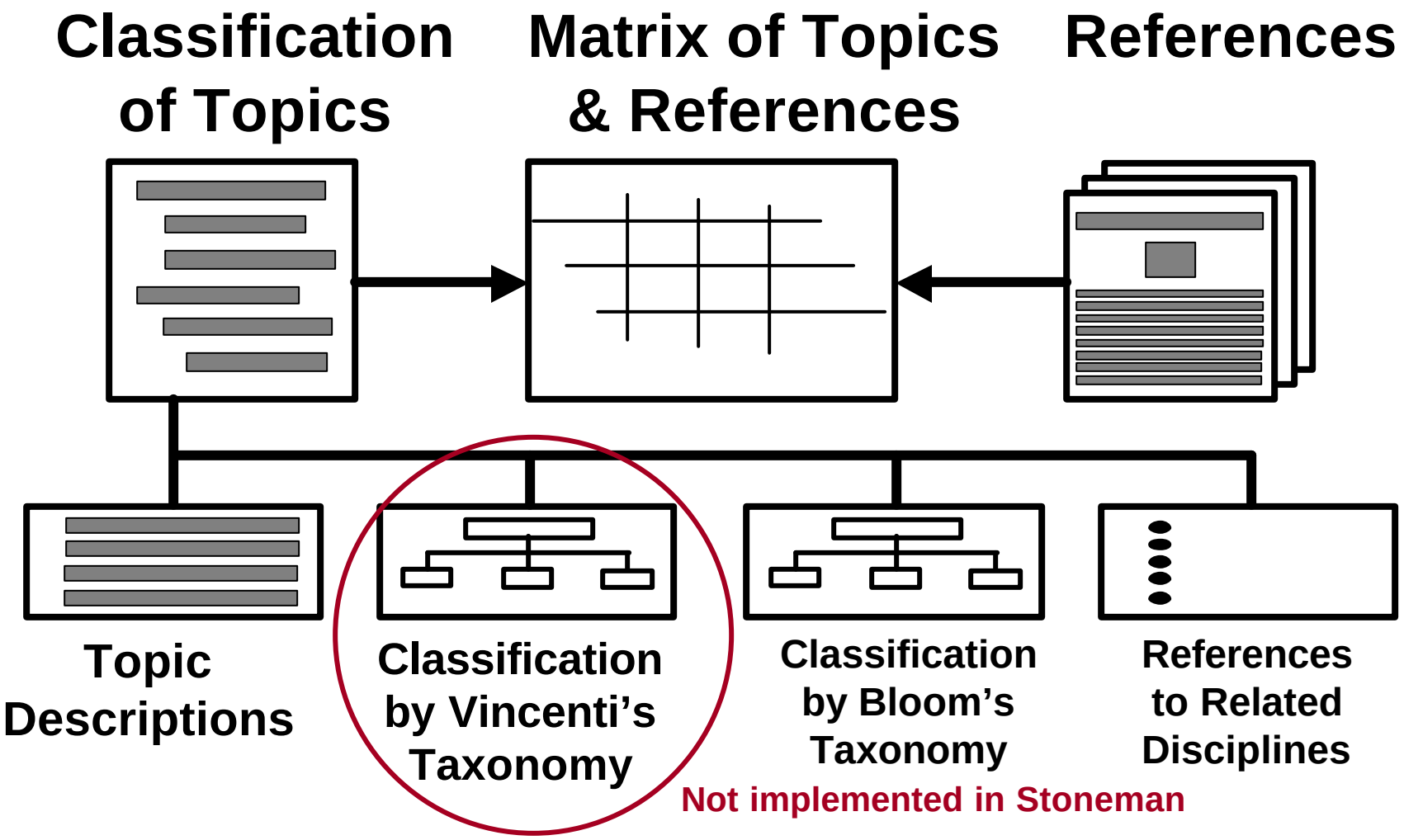
Knowledge Area Description



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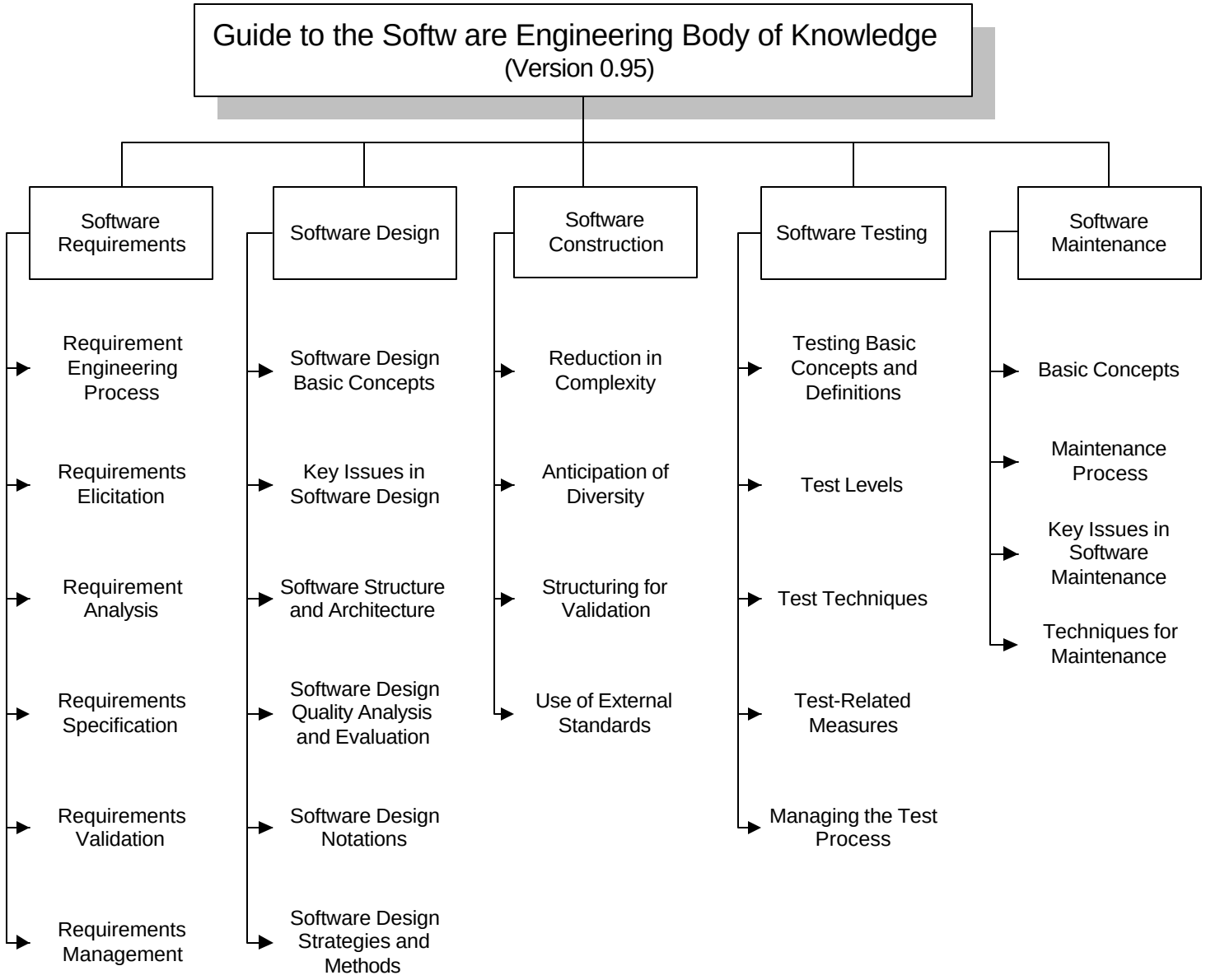
Guide to the Softw are Engineering Body of Knowledge
(Version 0.95)
Software Requirements
Software Design
Software Construction
Software Testing
Software Maintenance
Requirement Engineering Process
Requirements Elicitation
Requirement Analysis
Requirements Specification
Requirements Validation
Requirements 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

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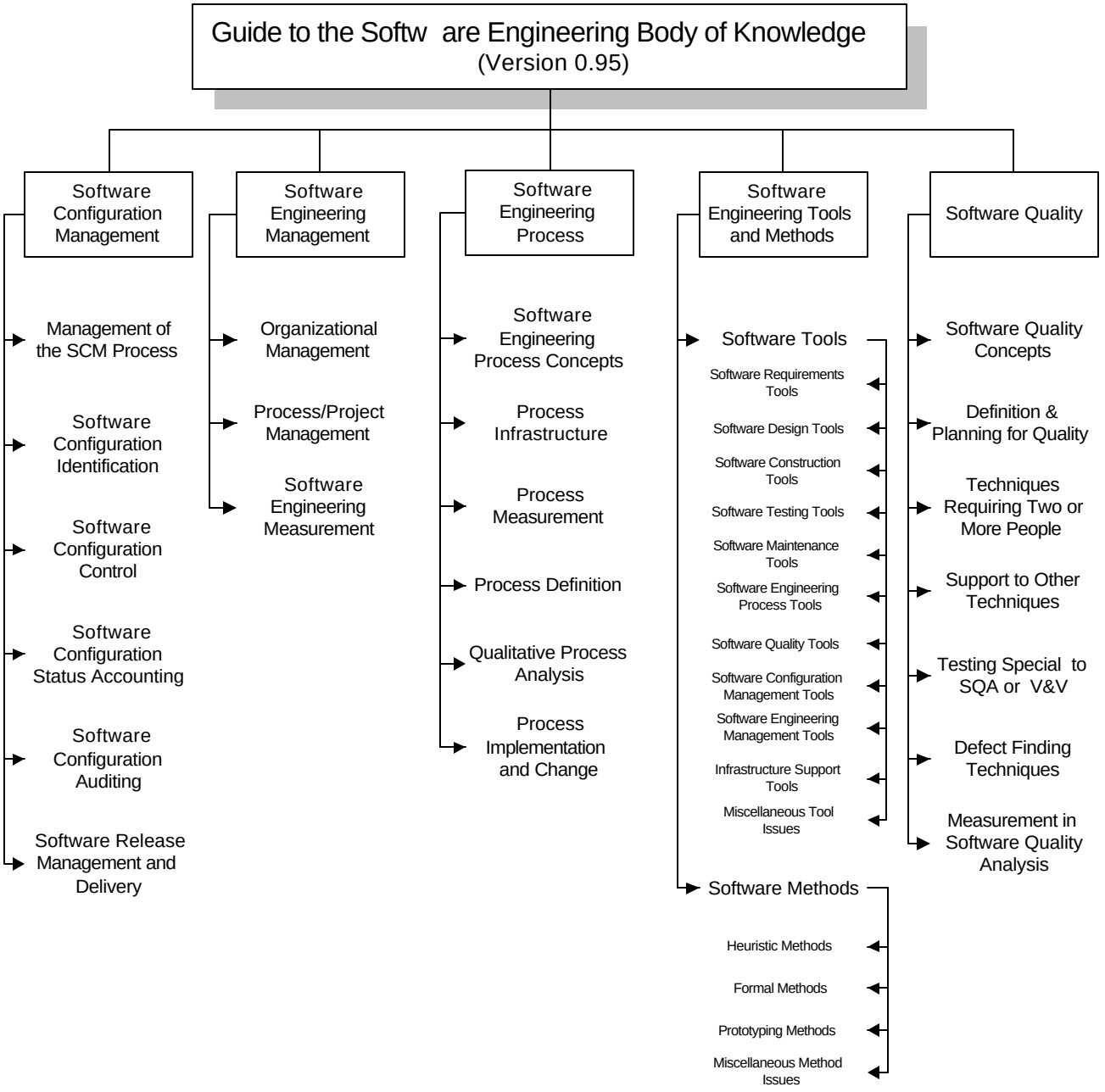
(a) (b) (c) (d) (e)


Guide to the Softw are Engineering Body of Knowledge
(Version 0.95)
Software Configuration Management
Management of the SCM Process
Software Configuration Identification
Software Configuration Control
Software Configuration Status Accounting
Software Configuration Auditing
Software Release Management and Delivery
Software Engineering Management
Organizational Management
Process/Project Management
Software Engineering Measurement
Software Engineering Process
Software Engineering Process Concepts
Process Infrastructure
Process Measurement
Process Definition
Qualitative Process Analysis
Process Implementation and Change
Software Engineering Tools and Methods
Software Tools
Software Requirements Tools
Software Design Tools
Software Construction Tools
Software Testing Tools
Software Maintenance Tools
Software Engineering Process Tools
Software Quality Tools
Software Configuration Management Tools
Software Engineering Management Tools
Infrastructure Support Tools
Miscellaneous Tool Issues
Software Methods
Heuristic Methods
Formal Methods
Prototyping Methods
Miscellaneous Method Issues
Software Quality
Software Quality Concepts
Definition & Planning for Quality
Techniques Requiring Two or More People
Support to Other Techniques
Testing Special to SQA or V&V
Defect Finding Techniques
Measurement in Software Quality Analysis

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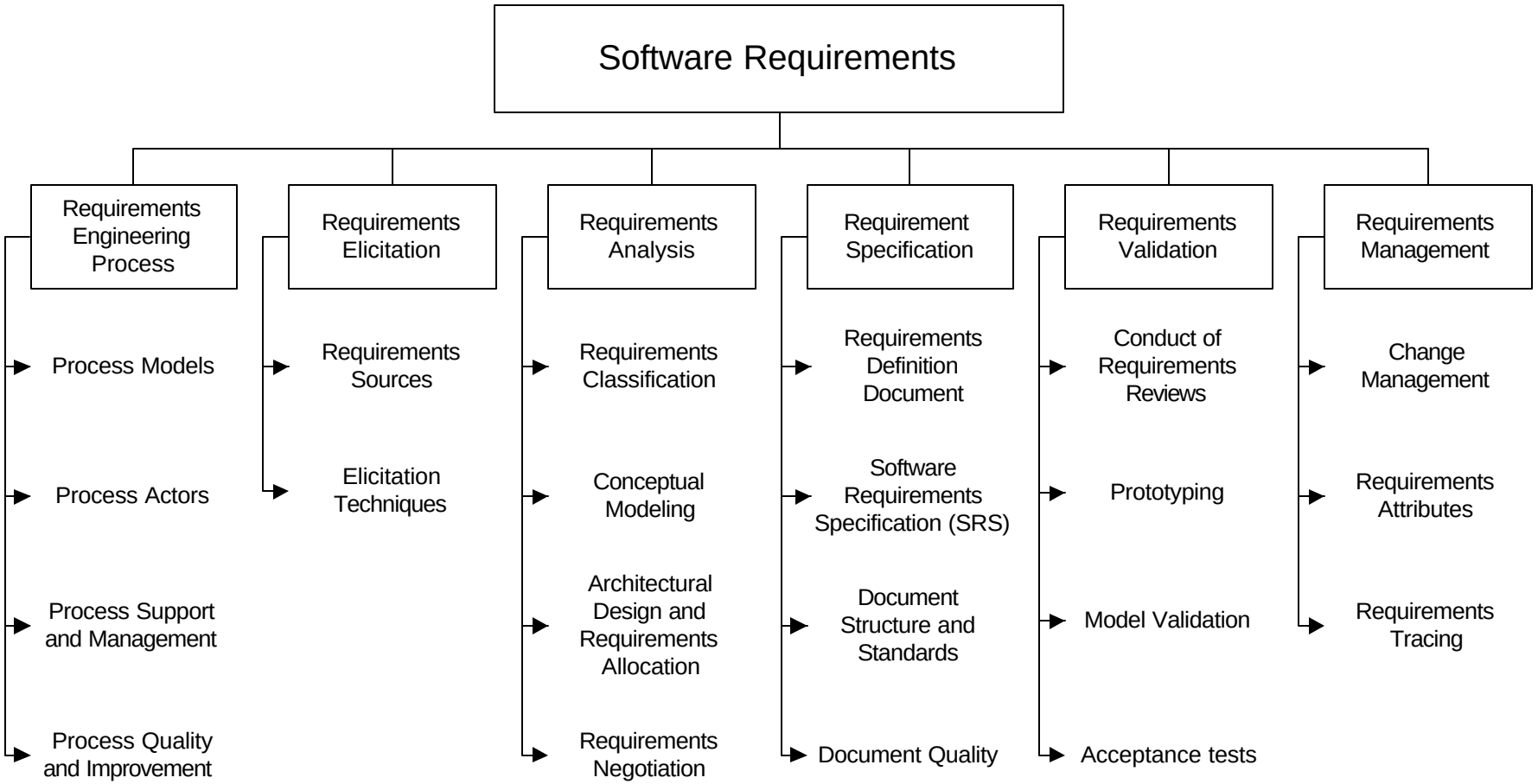
(f) (g) (h) (i) (j)

Software Requirements



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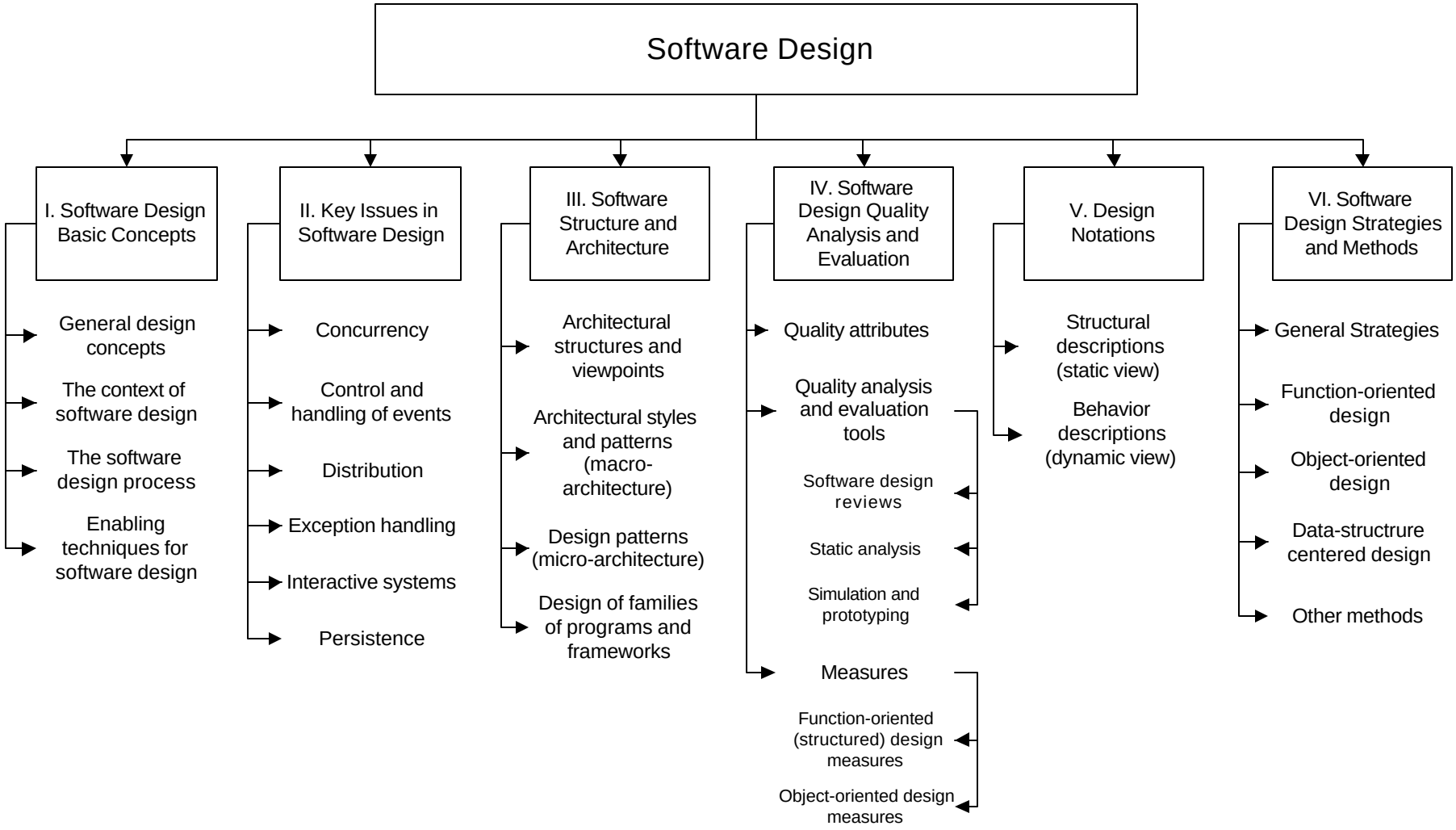
Software Design



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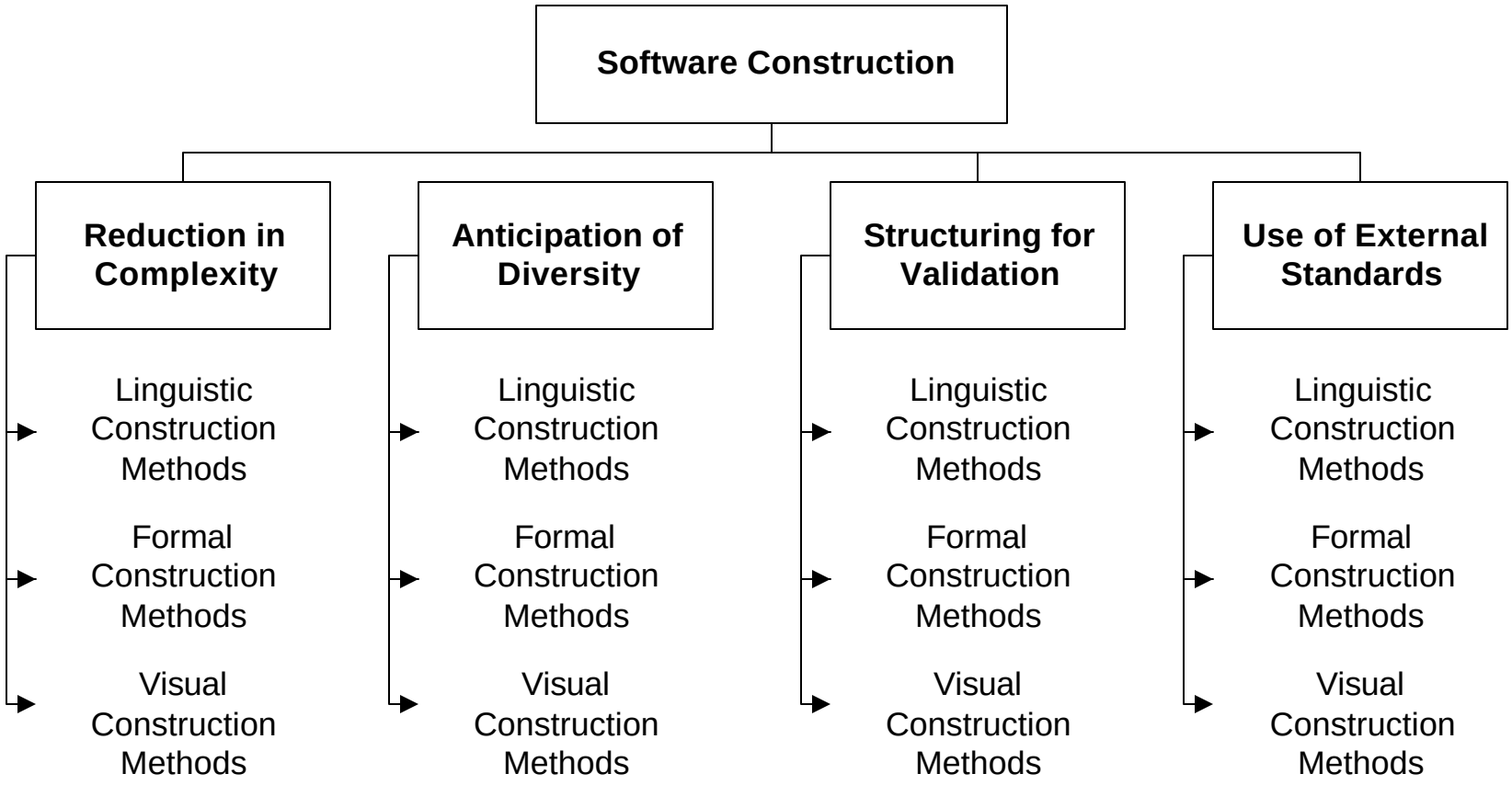
Software Construction



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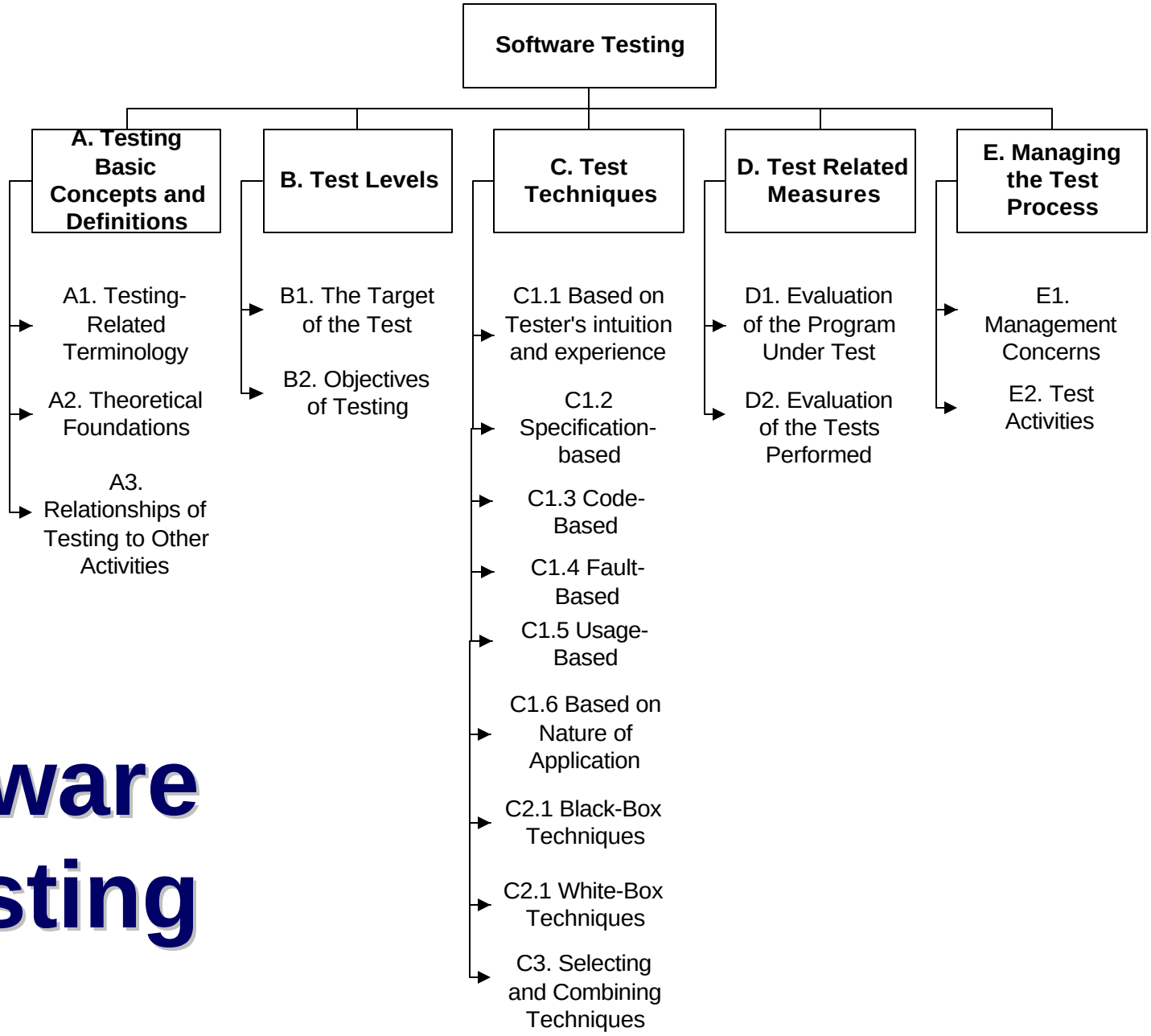
Software Testing



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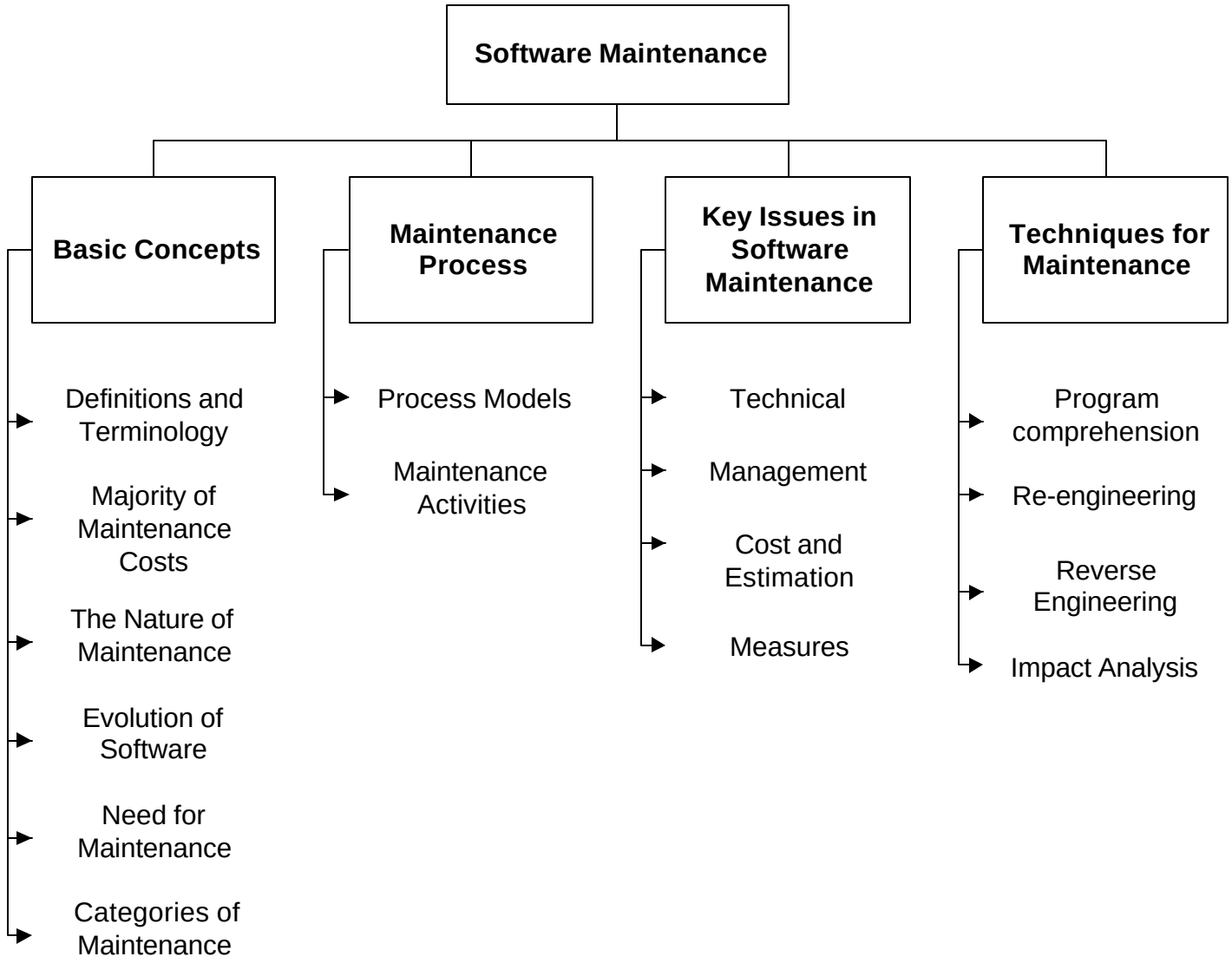
Software Maintenance



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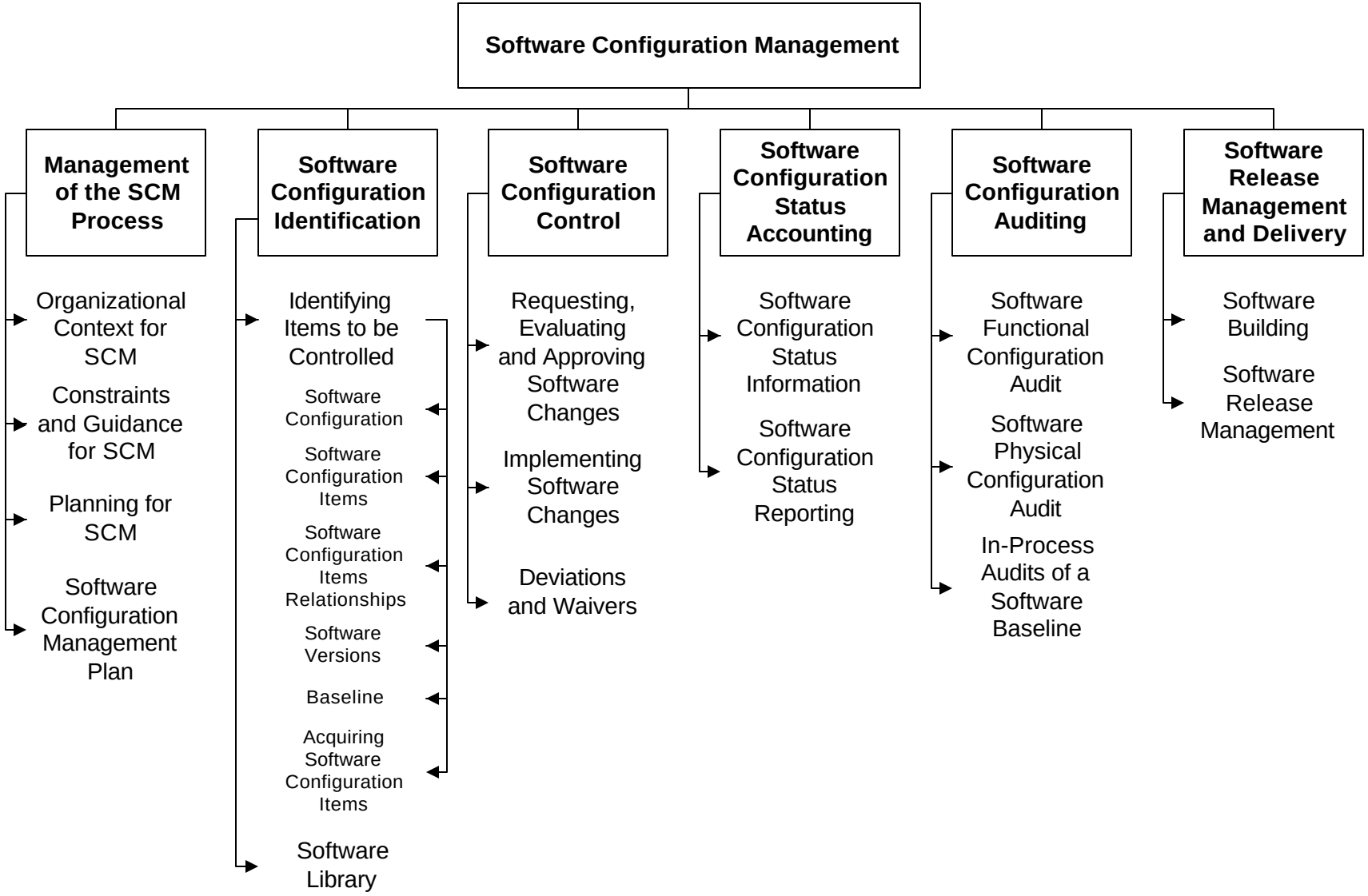
Software Configuration Management



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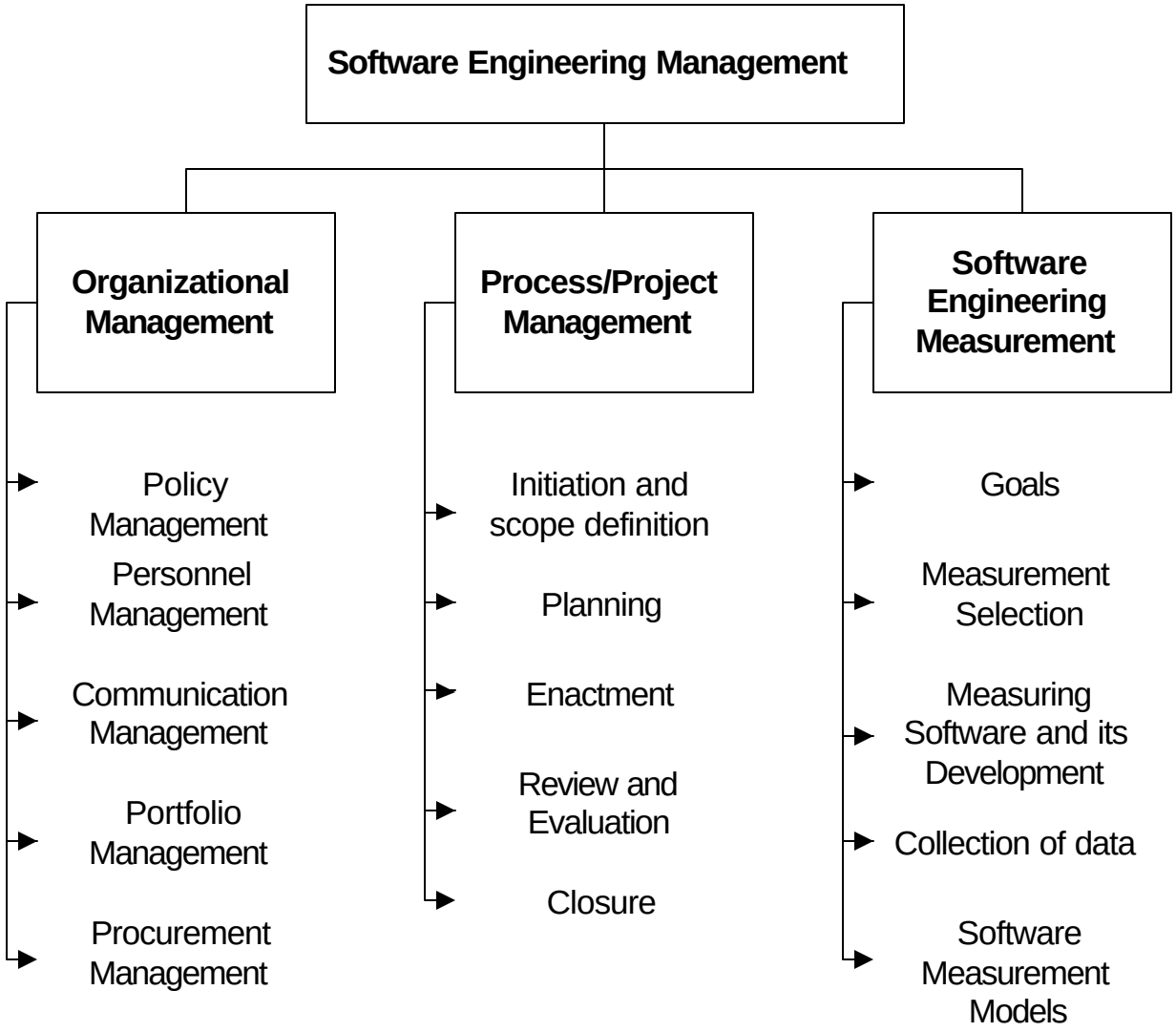
Software Engineering Management



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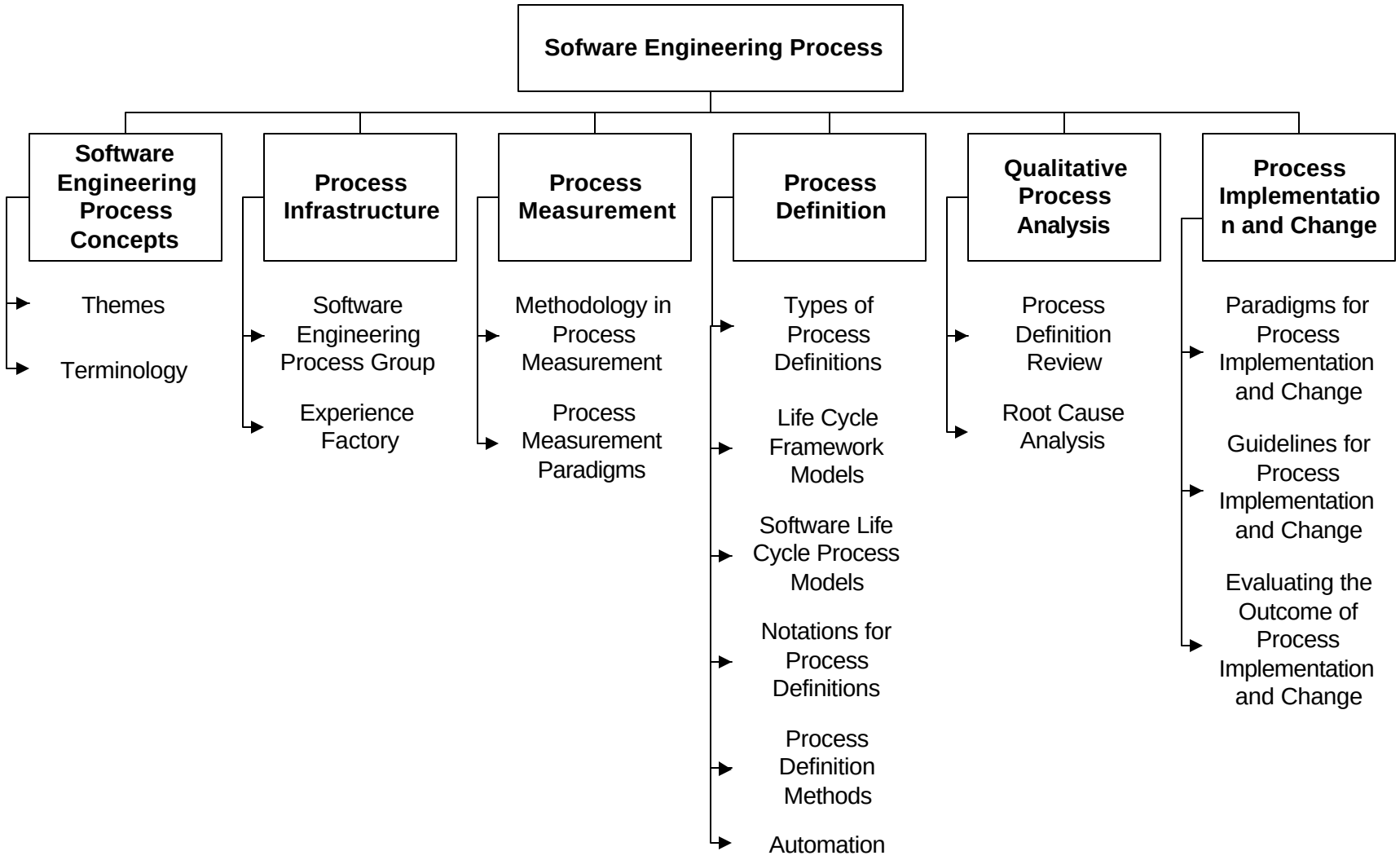
Software Engineering Process



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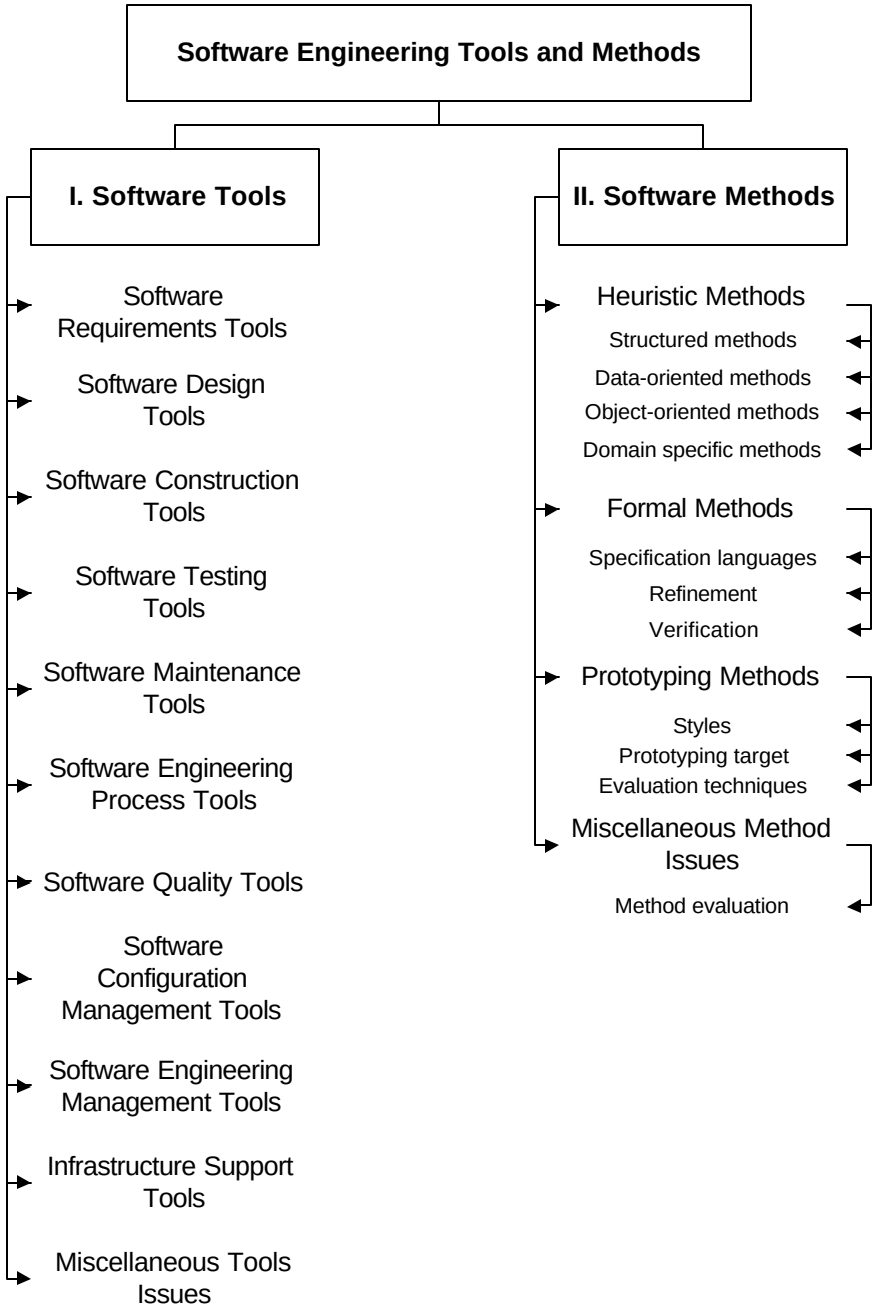
Software Engineering Tools and Methods



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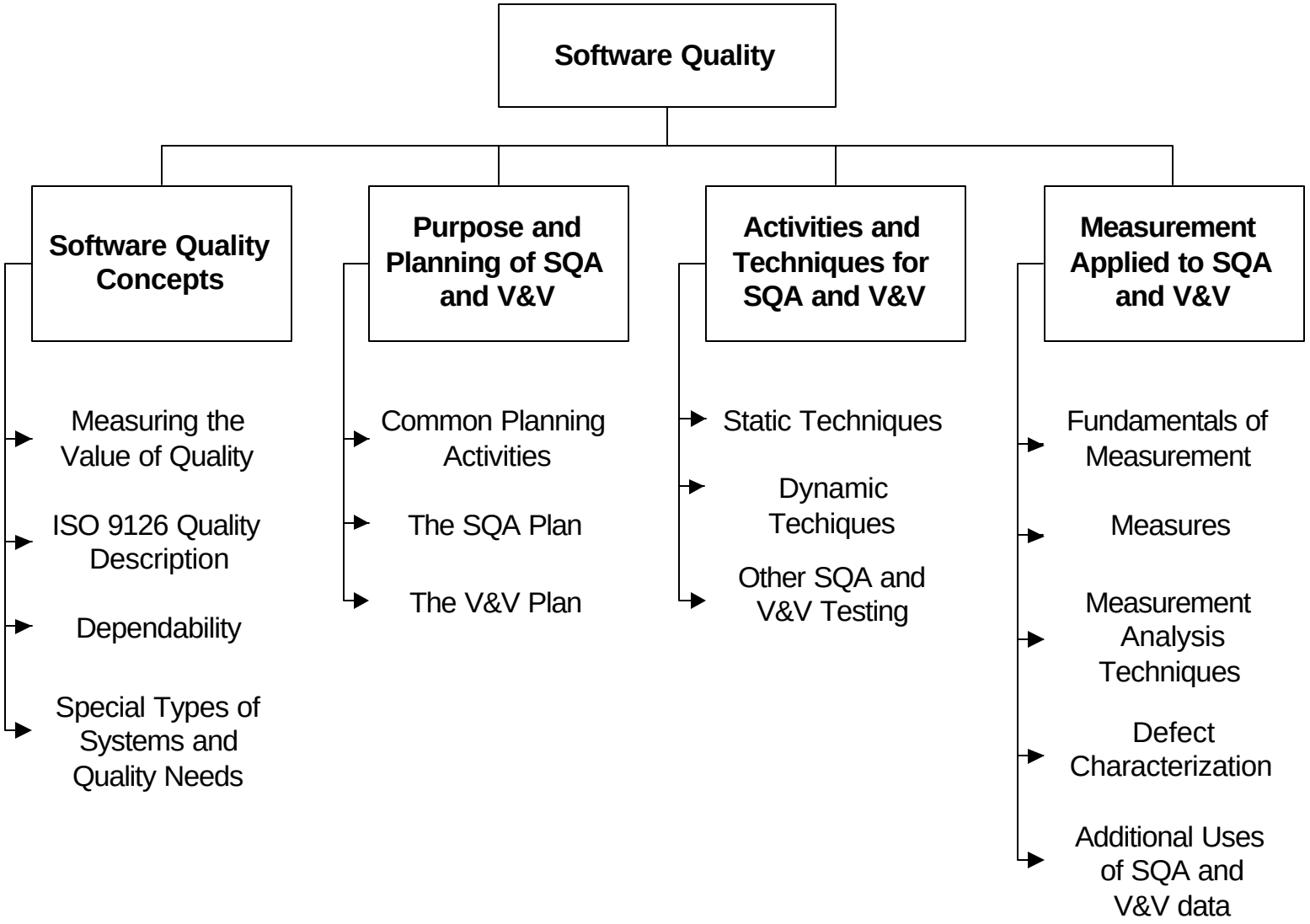
Software Quality



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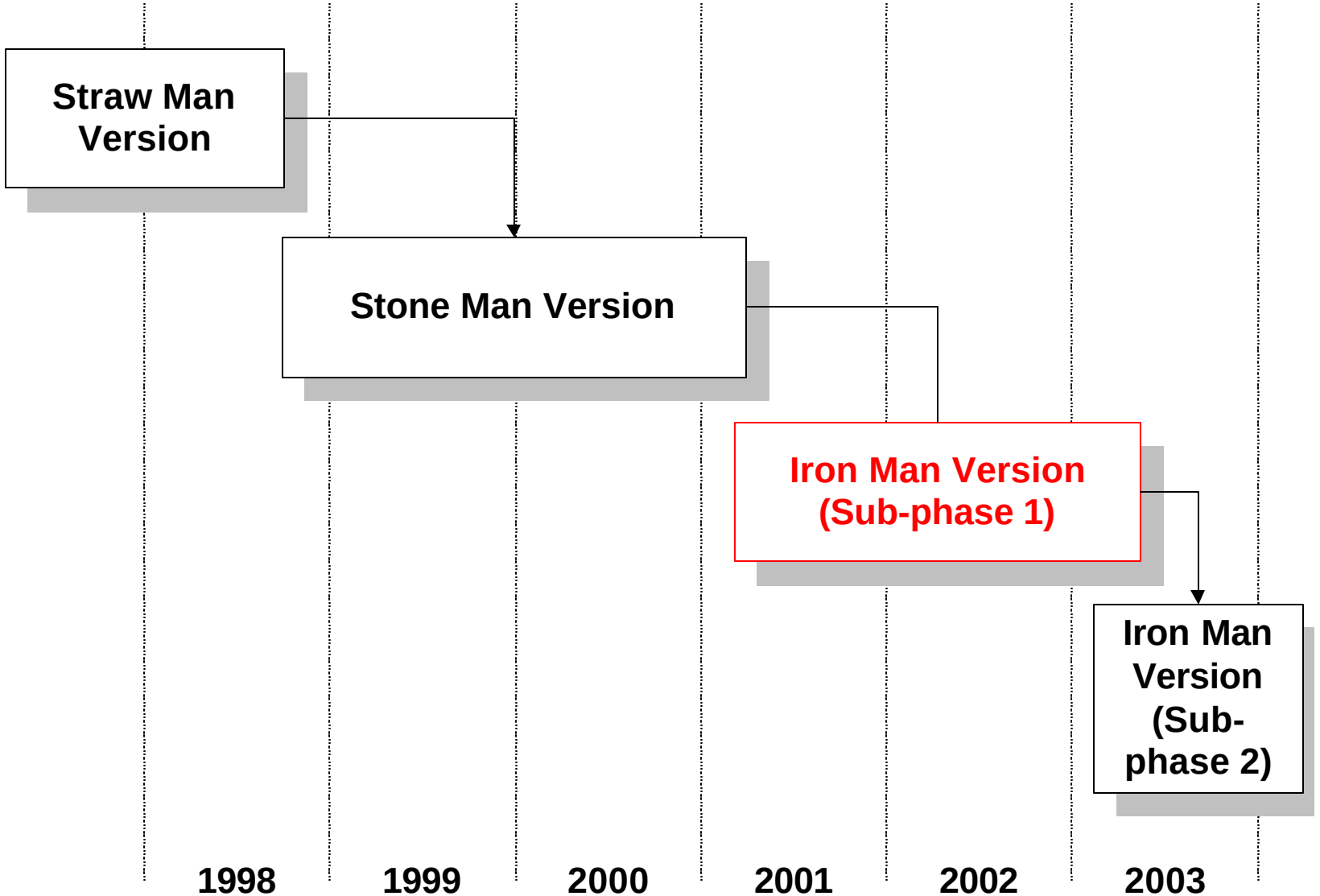

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Applications of the Guide

- Industry & Government
  - job description
  - hiring
  - staffing of projects
  - career planning
  - contracting

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Applications of the Guide

- Professional development
  - internal training, corporate universities
  - course design
  - self-assessment
  - individual training

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Applications of the Guide

- Licensing & Certification
  - licensing exam questions
  - study material
  - in software engineering and other IT fields
  - could be on subsets of Knowledge Areas

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Applications of the Guide

- Education:
  - Curriculum design/evaluation
  - Program accreditation:
  - Course design/evaluation

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Identifying Opportunities in Your Organization

- How could the Guide be used in your organization ?
- What other applications do you see in your organization ?

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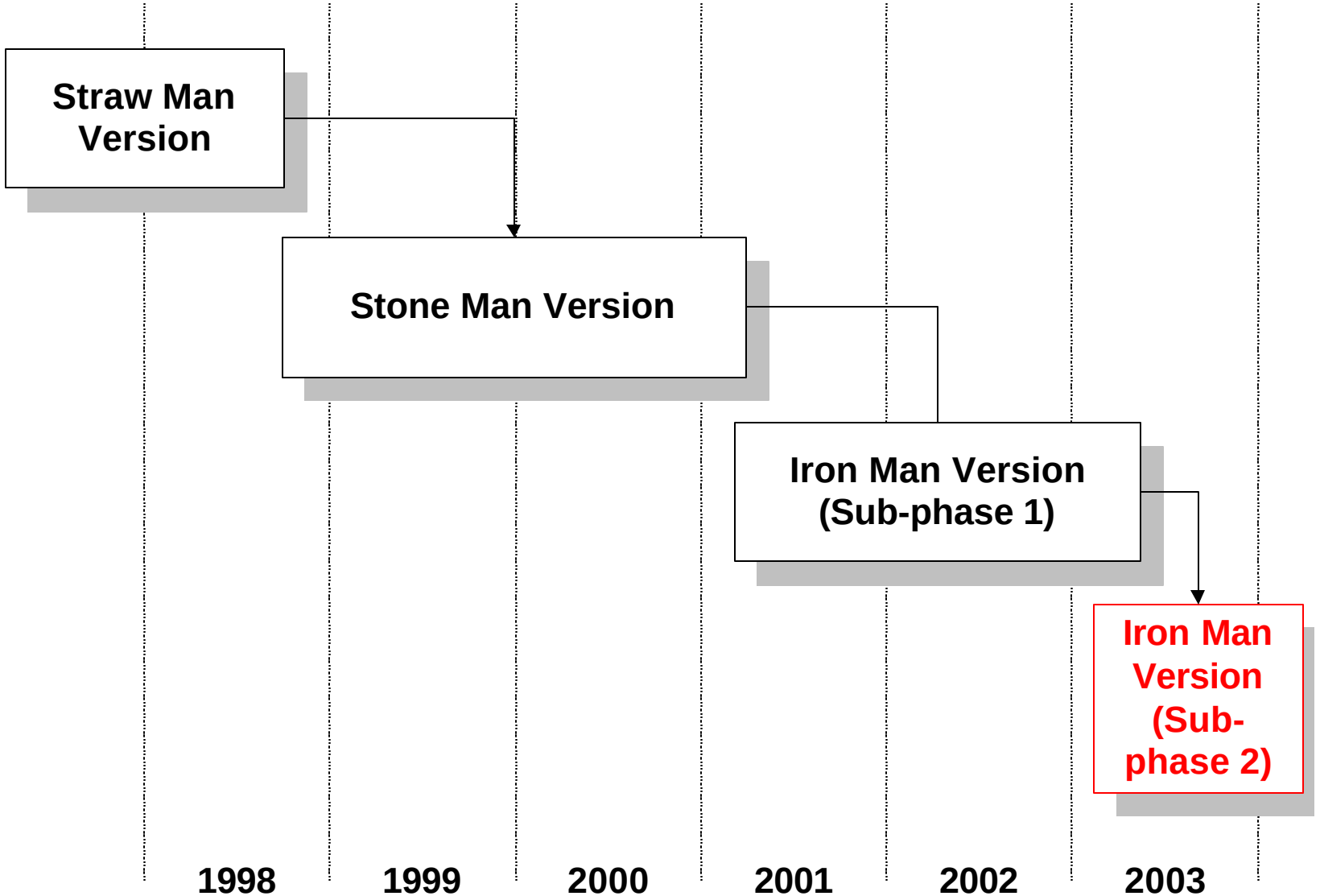

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Concluding Remarks

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

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