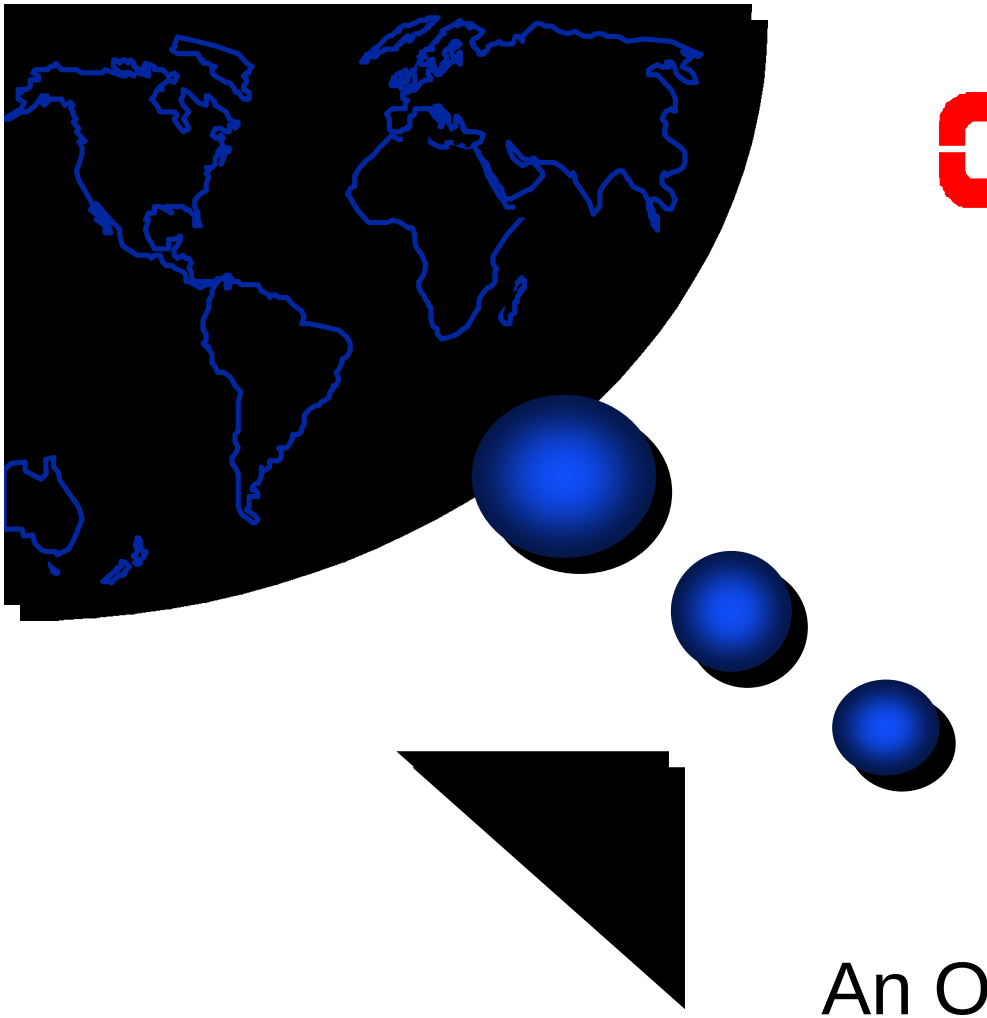

An Overview of IEEE Software Engineering Standards and Knowledge Products

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Objectives

- Provide an introduction to The IEEE Software Engineering Standards Committee (SESC)
- Provide an overview of the current state and future direction of IEEE Software Engineering Standards and knowledge products
  - IEEE Software Engineering Standards Collection
  - Software Engineering Competency Recognition Program
  - Standards-Based Training
- Discuss how you can participate in software engineering standardization efforts

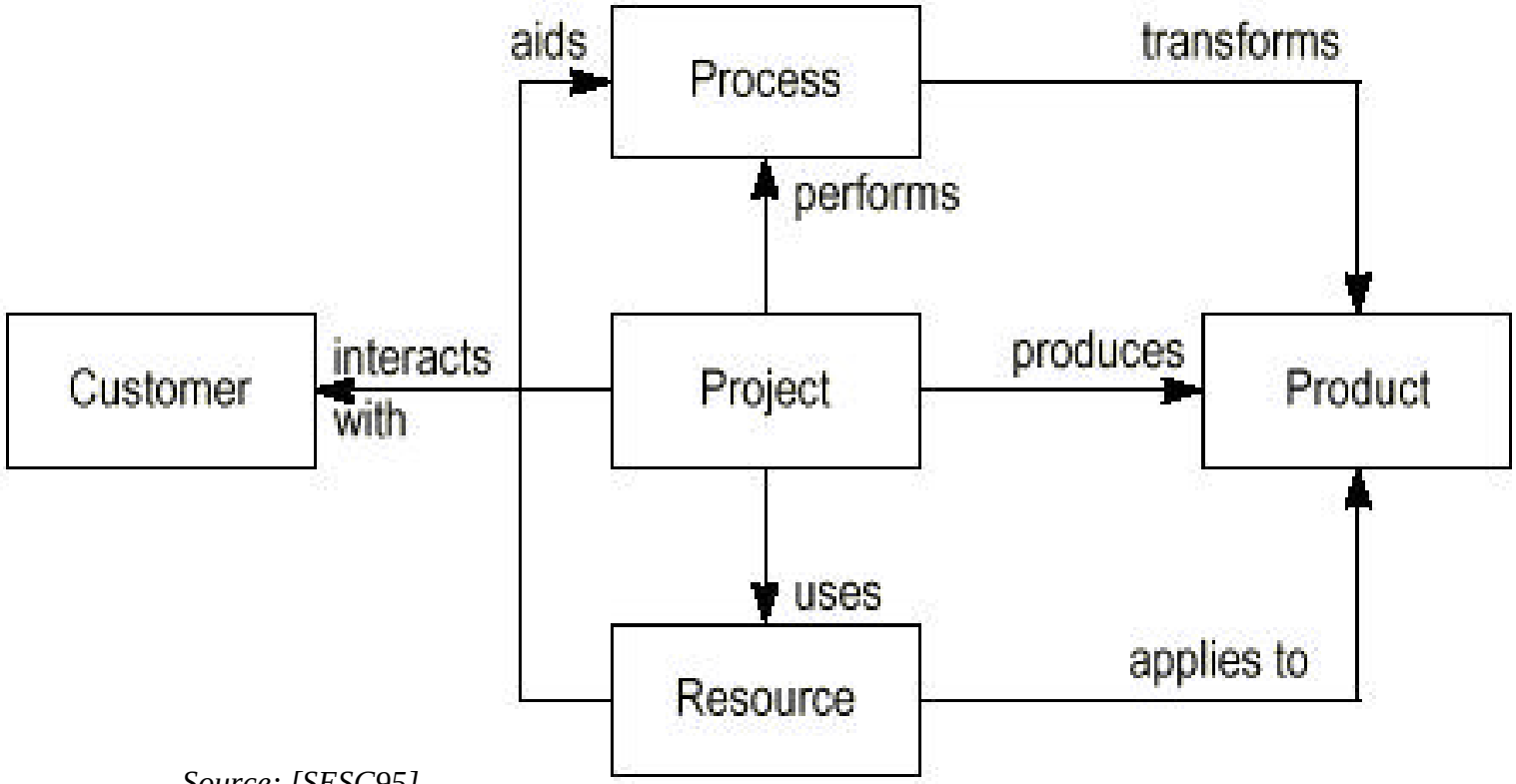
The IEEE Software Engineering Standards Committee (SESC)

http://computer.org/standard/sesc/

The SESC Vision

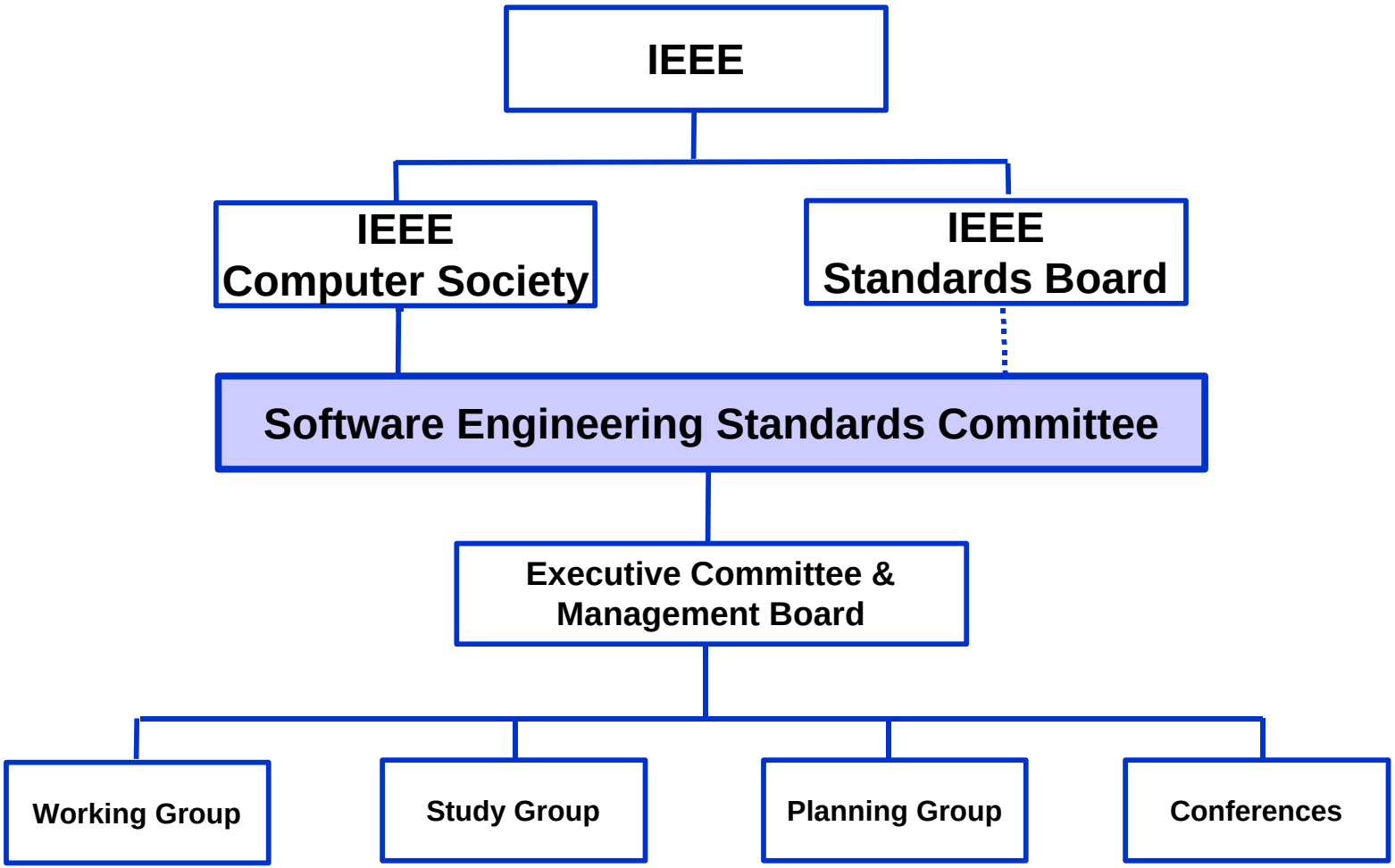
- The leading supplier and promoter of a family of software engineering standards and related products and services.

Software Engineering: An Object View

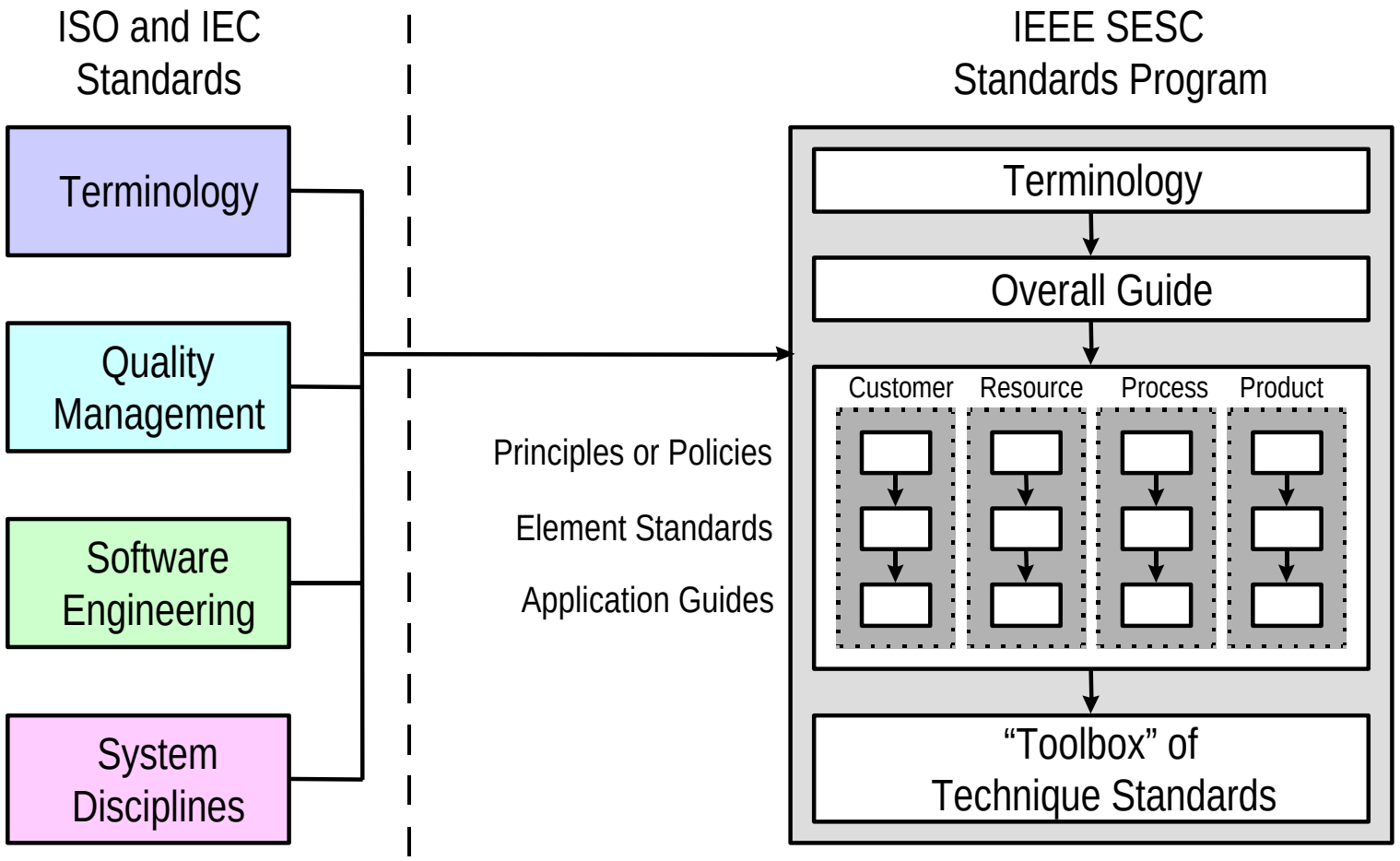


Source: [SESC95]

SESC in the IEEE Structure



SESC Strategic Program Model



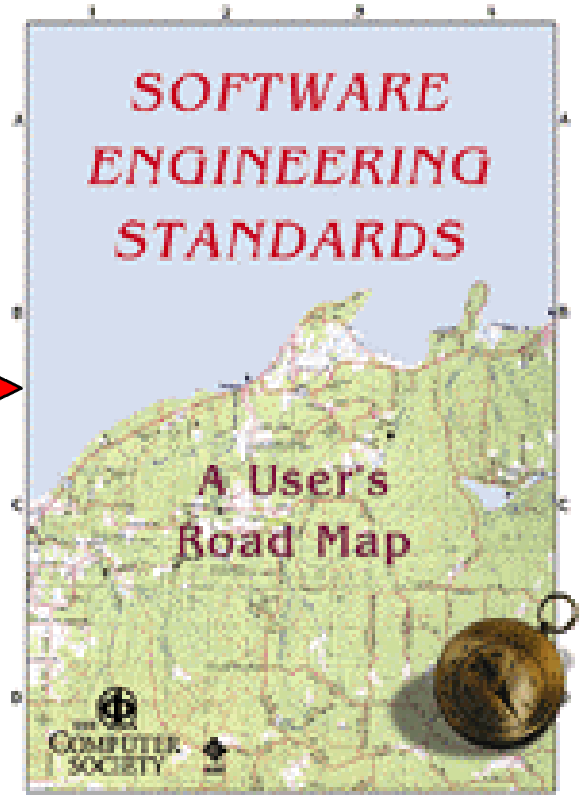
Source: [SESC95]

The IEEE Software Engineering Standards Collection

http://standards.ieee.org/catalog/softwareset.html

The 2000 Software Engineering Standards Collection

- Forty-six Standards
  - Customer & Terminology
  - Process
  - Product
  - Resource & Technique
- Overall guide
  - Several “views”
    - Context
    - Object
    - Normative intent
    - Provider and subject
  - Relationships among standards

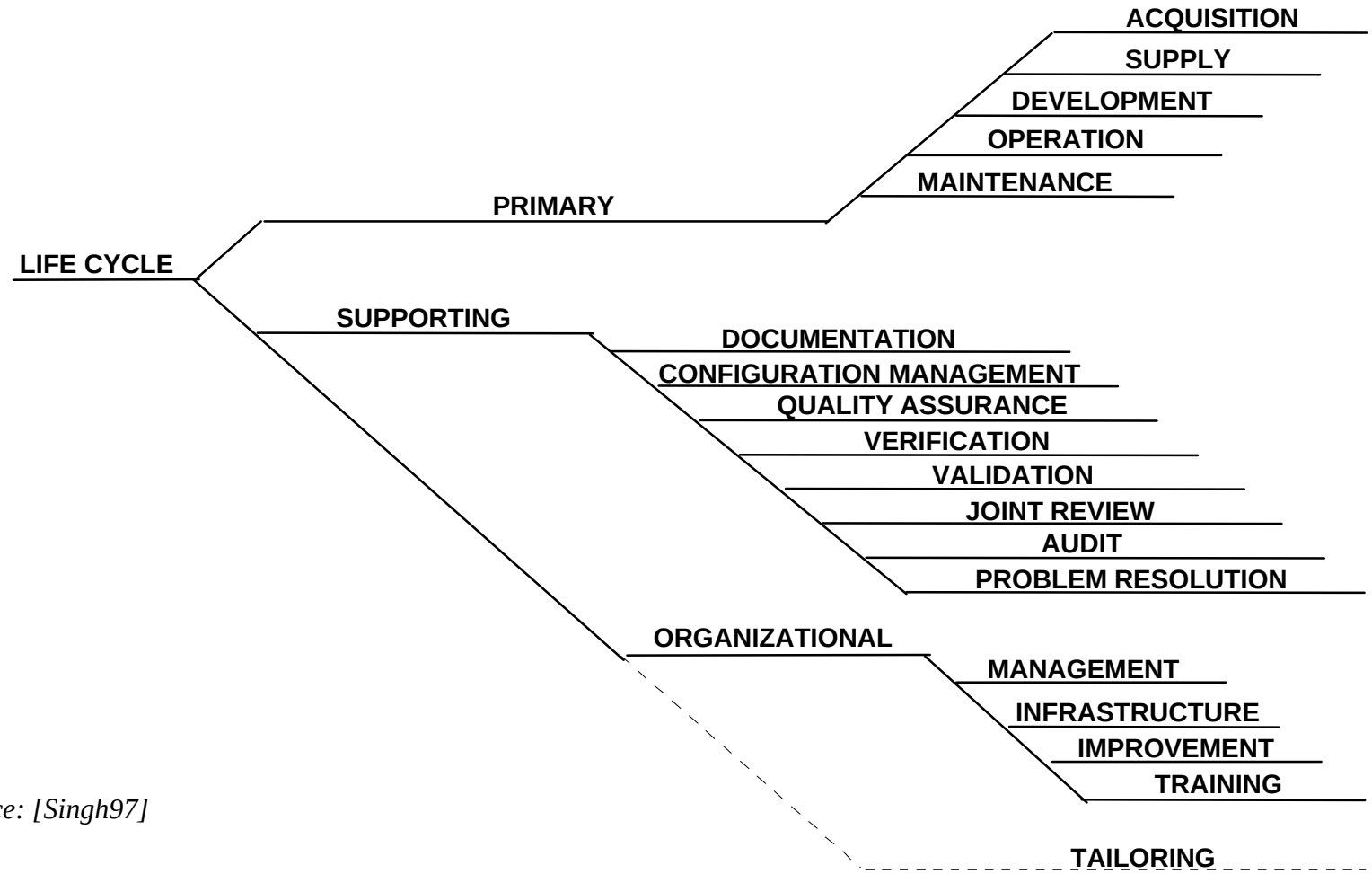


Source: [Moore97]

IEEE/EIA 12207: The Life Cycle Process Framework

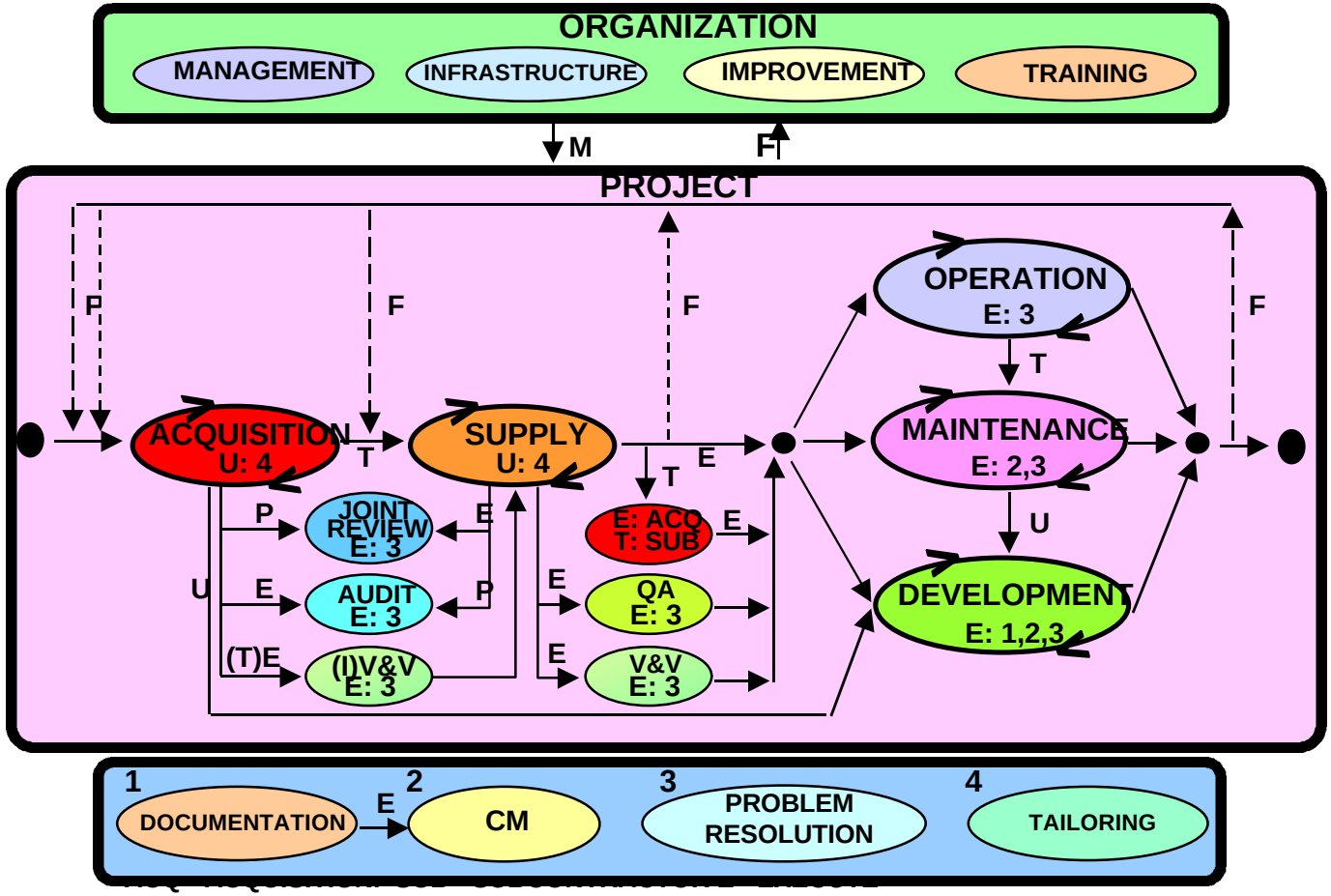
- IEEE/EIA 12207, Standard for Information Technology – Software Life Cycle Processes
  - Addresses the complete software engineering life cycle, from acquisition and supply, through development, to operations and maintenance
  - Provides a process framework upon which an organization can build its enterprise-level life cycle processes
  - These enterprise-level processes are then tailored into projects, in order to meet specific project-level requirements.

IEEE/EIA 12207 Process Tree



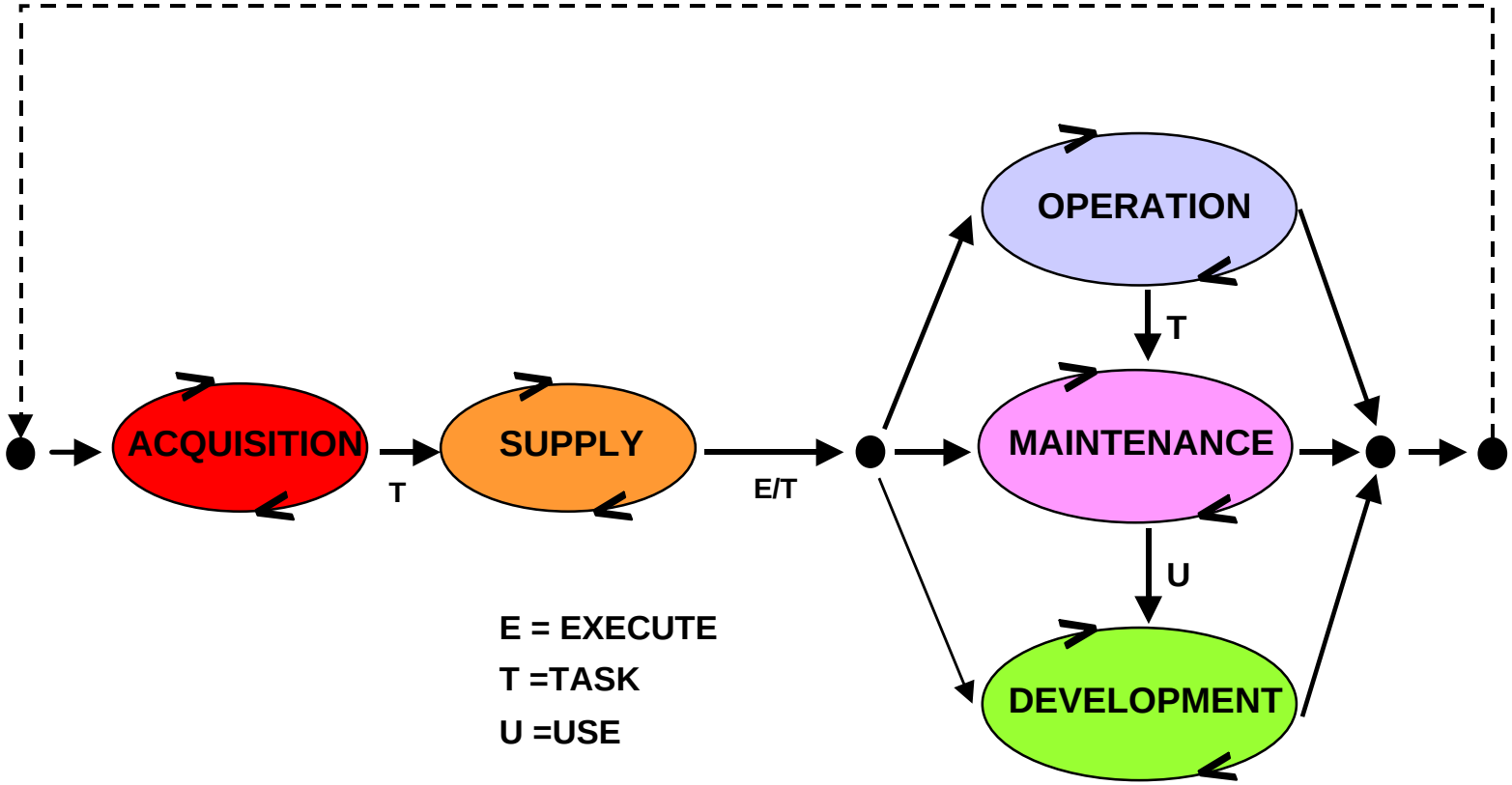
Source: [Singh97]

12207 Process Flow



Source: [Singh97]

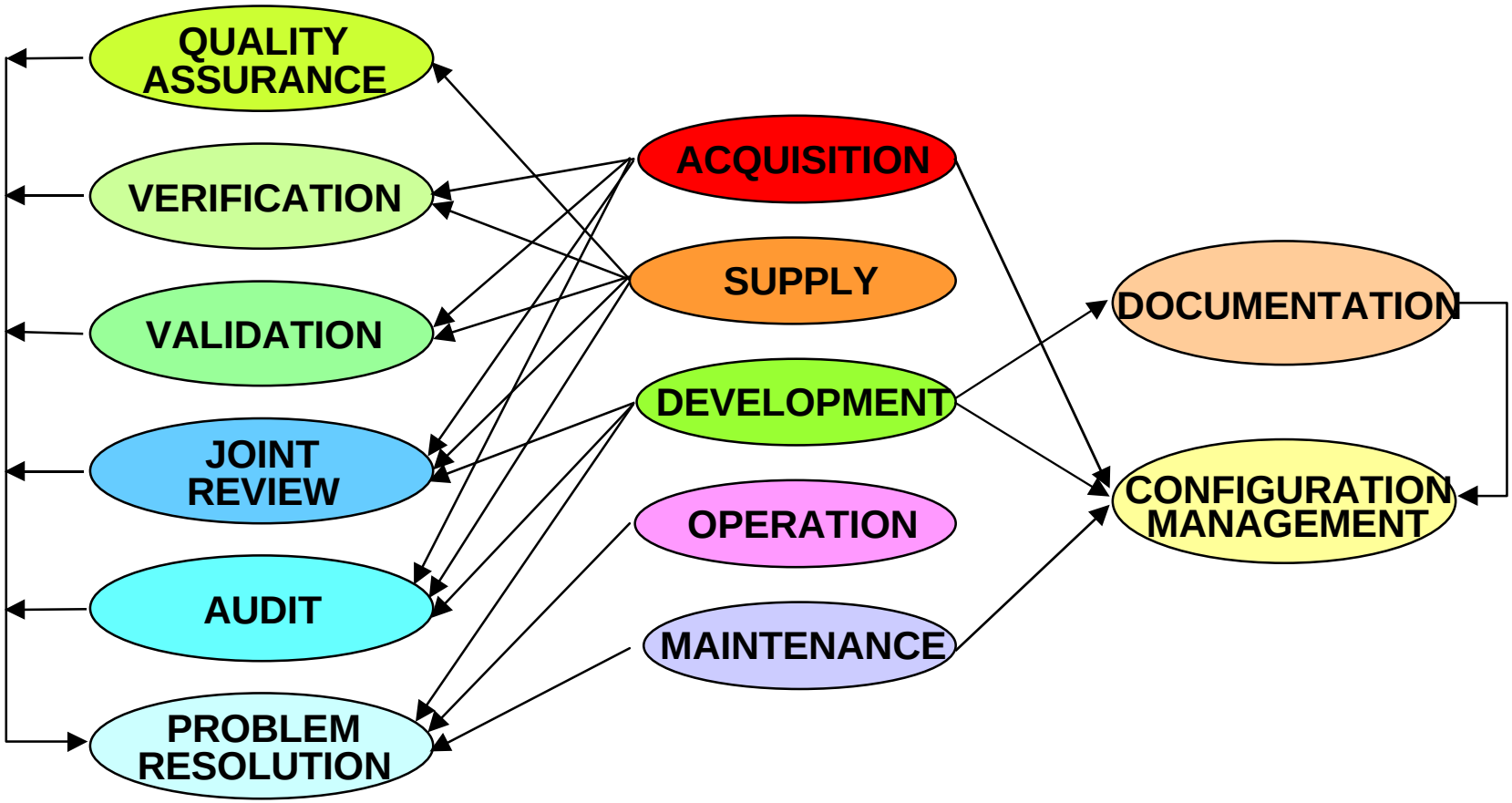
Primary Process Flow



Source: [Singh97]

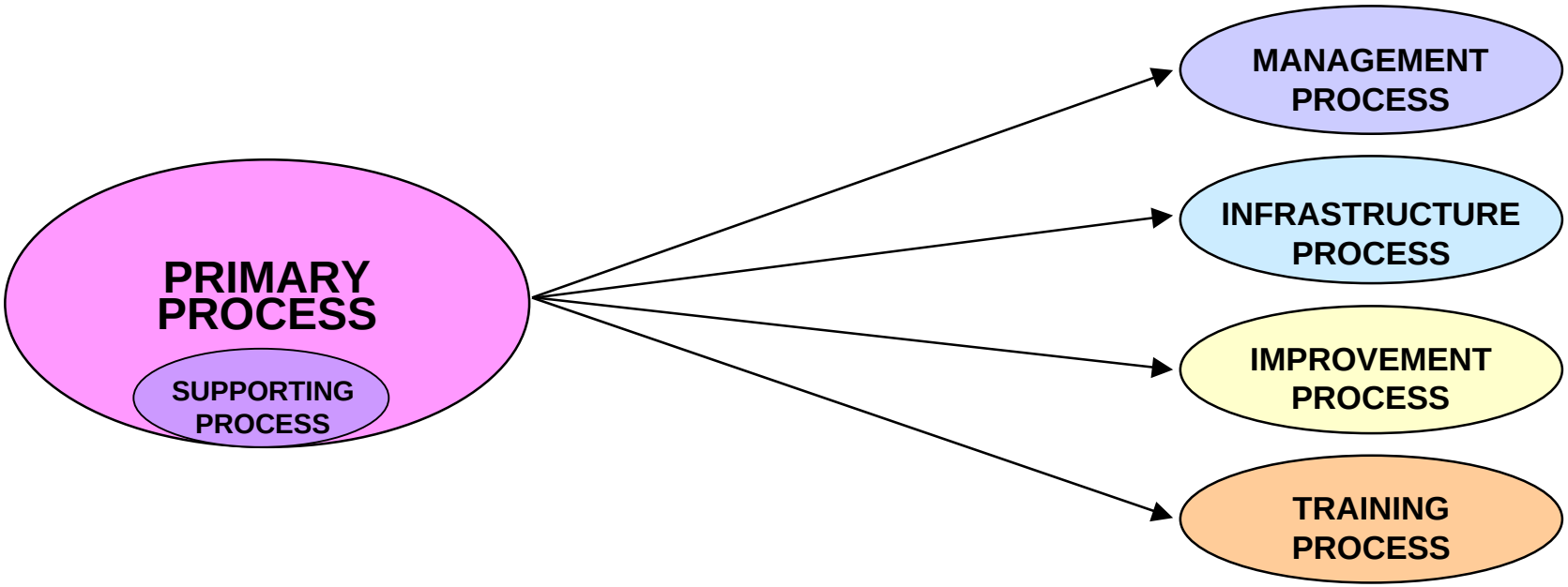
PLAN, DO, CHECK & ACT

Supporting Process Flow



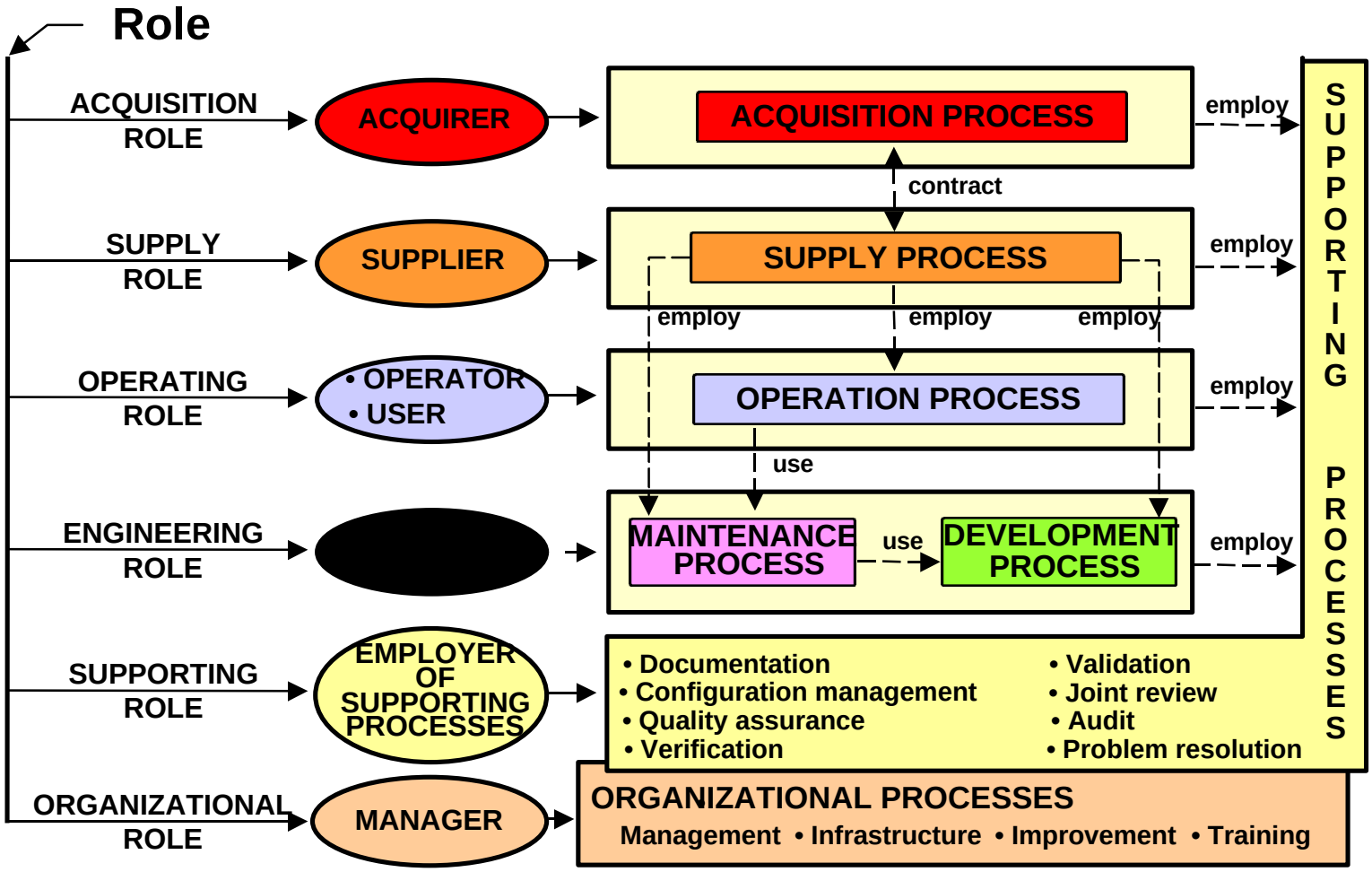
Source: [Singh97]

Organizational Process Flow



Source: [Singh97]

12207 Process Roles



Source: [Singh97]

Role Definitions

- Acquirer:
  - an organization that acquires or procures a system, software product or software service from a supplier
- Supplier:
  - an organization that enters into a contract with the acquirer for the supply of a system, software product or software service under the terms of the contract
- Operator:
  - an organization that operates the system

Role Definitions - 2

- Developer:
  - an organization that performs development activities (including requirements analysis, design, testing through acceptance) during the software life cycle process
- Maintainer:
  - an organization that performs maintenance activities
- Supporting Process Performer and Manager are undefined

IEEE/EIA 12207 Document Structure

- IEEE/EIA 12207.0-1996, Software Life Cycle Processes
  - Industry adoption of ISO/IEC 12207-1995
- IEEE/EIA 12207.1-1997, Life Cycle Data
  - Industry guide to life cycle data
- IEEE/EIA 12207.2-1997, Implementation Considerations
  - Industry guide to implementation of the life cycle processes contained in 12207.0

IEEE/EIA 12207.0 Document Structure

- Foreword to IEEE/EIA 12207.0-1996
- ISO/IEC 12207-1995
  - Introduction
  - Foreword
  - Clause 1 - Scope
  - Clause 2 - Normative references
  - Clause 3 - Definitions
  - Clause 4 - Application of this International Standard
  - Clause 5 - Primary life cycle processes
  - Clause 6 - Supporting processes
  - Clause 7 - Organizational life cycle processes

IEEE/EIA 12207.0 Annexes

- ISO/IEC 12207-1995 Annexes
  - A - Tailoring process
  - B - Guidance on tailoring
  - C - Guidance on processes and organizations
  - D - Bibliography
- Additional IEEE/EIA 12207.0 Annexes
  - E - Basic concepts of ISO/IEC 12207
  - F - Compliance
  - G - Life cycle processes objectives
  - H - Life cycle data objectives
  - I - Relationships
  - J - Errata

IEEE/EIA 12207.1 Document Structure

- Introduction
- Clause 1 - Scope
- Clause 2 - Normative references
- Clause 3 - Definitions
- Clause 4 - Life cycle data
  - Clause 4.1 Overview
  - Clause 4.2 Life cycle data objectives
  - Clause 4.3 Information item matrix
  - Clause 4.4 Compliance
- Clause 5 - Generic information item content guidelines
- Clause 6 - Specific information item content guidelines
- Annex A - References

IEEE/EIA 12207.2 Document Structure

- Foreword
- Introduction
- Clause 1 - Scope
- Clause 2 - Normative references
- Clause 3 - Definitions
- Clause 4 - Application
- Clause 5 - Primary life cycle processes
- Clause 6 - Supporting processes
- Clause 7 - Organizational life cycle processes

IEEE/EIA 12207.2 Annexes

- IEEE/EIA 12207 Annexes
  - A - IEEE/EIA 12207.0 Annex A - Tailoring process
  - B - IEEE/EIA 12207.0 Annex F - Compliance
  - C - IEEE/EIA 12207.0 Annex G - Life cycle processes objectives
  - D - IEEE/EIA 12207.0 Annex H - Life cycle data objectives
  - E - IEEE/EIA 12207.0 Annex J - Errata

IEEE/EIA 12207.2 Annexes - 2

- Additional IEEE/EIA 12207.2 Annexes
  - F - Use of reusable software products
  - G - Candidate joint management reviews
  - H - Software measurement categories
  - I - Guidance on development strategies and build planning
  - J - Category and priority classifications for problem reporting
  - K - Software product evaluations
  - L - Risk management
  - M - Life cycle processes references

Supporting Standards for High Integrity Software

- IEEE/EIA 12207 relies upon other standards to fill in the details regarding the activities supporting life cycle processes.
- In the case of high integrity software, several additional software engineering standards are of interest.

Customer and Terminology

- 610.12, Standard Glossary of Software Engineering Terminology
- **1062, Recommended Practice for Software Acquisition**
- **1220, Standard for Application and Management of the Systems Engineering Process**
- **1228, Standard for Software Safety Plans**
- **1233, Guide for Developing System Requirements Specifications**
- **1362, Guide for Concept of Operations Document**
- **12207, Software Life Cycle Processes**
- **12207.1, Guide to Software Life Cycle Processes—Life Cycle Data**
- **12207.2, Guide to Software Life Cycle Processes—Implementation Considerations**

■ = High Integrity Systems Related

Process

- 730, Standard for Software Quality Assurance Plans
- 730.1, Guide for Software Quality Assurance Planning
- 828, Standard for Software Configuration Management Plans
- **1008, Standard for Software Unit Testing**
- **1012, Standard for Software Verification and Validation**
- **1012a, Software Verification and Validation Content Map to IEEE/EIA 12207.1**
- 1028, Standard for Software Reviews
- 1042, Guide to Software Configuration Management
- 1045, Standard for Software Productivity Metrics
- 1058, Standard for Software Project Management Plans
- 1059, Guide for Software Verification and Validation Plans
- 1074, Standard for Developing Software Life Cycle Processes
- 1219, Standard for Software Maintenance
- 1490, A Guide to the Program Management Body of Knowledge

■ = High Integrity Systems Related

Process - 2

- J-STD-016-1995, (EIA/IEEE) Interim Standard for Information Technology - Software Life Cycle Processes - Software Development - Acquirer-Supplier Agreement
- 1517-1999, Standard for Information Technology - Software Life Cycle Processes - Reuse Processes
- **P1540, D7.0, Draft Standard for Software Life Cycle Processes - Risk Management**

■ = High Integrity Systems Related

Product

- **982.1, Standard Dictionary of Measures to Produce Reliable Software**
- **982.2, Guide for the Use of Standard Dictionary of Measures to Produce Reliable Software**
- 1061, Standard for a Software Quality Metrics Methodology
- 1063, Standard for Software User Documentation
- 1465, IEEE Standard Adoption of ISO/IEC 12119: 1994 (E) International Standard--Information Technology - Software Packages - Quality Requirements and Testing
- 14143.1, Approved Draft - Standard Adoption of ISO/IEC 1443-1:1998 - Information Technology - Software Measurement - Functional Size Measurement - Part 1: Definition of Concepts

■ = High Integrity Systems Related

Resource and Technique

- **829, Standard for Software Test Documentation**
- **830, Recommended Practice for Software Requirements Specifications**
- **1016, Recommended Practice for Software Design Descriptions**
- 1044, Standard Classification for Software Anomalies
- 1044.1, Guide to Classification for Software Anomalies
- 1320.1, Syntax and Semantics for IDEF0
- 1320.2, Syntax and Semantics for IDEF1X97 (IDEFObject)
- 1348, Recommended Practice for the Adoption of CASE Tool
- 1420.1, Software Reuse—Data Model for Reuse Library Interoperability: Basic Interoperability Data Model
- 1420.1a, Software Reuse—Data Model for Reuse Library Interoperability: Asset Certification Framework
- 1420.1b-1999, Trial Use Supplement - Software Reuse—Data Model for Reuse Library Interoperability: Data Model for Reuse Library Interoperability: Intellectual Property Rights Framework

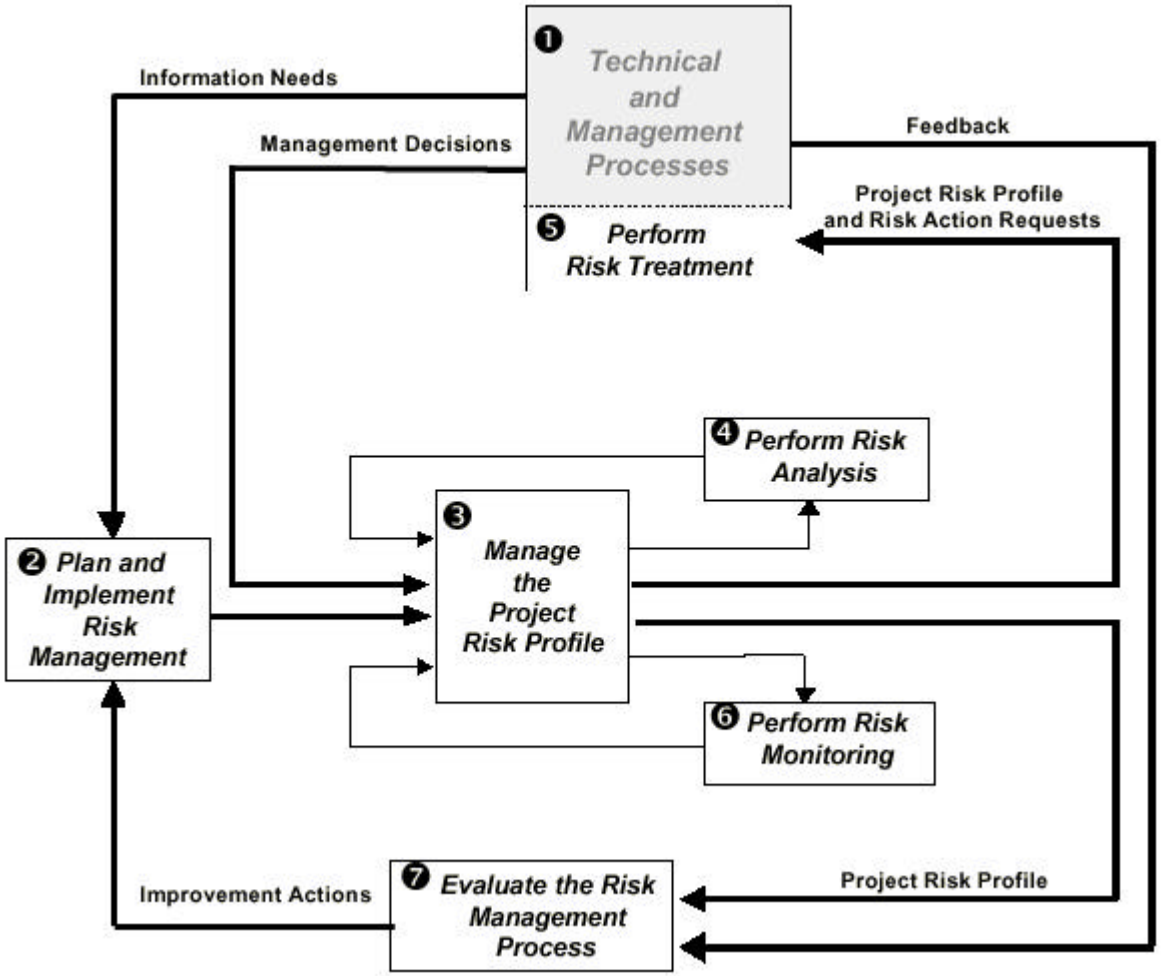
■ = High Integrity Systems Related

Resource and Technique - 2

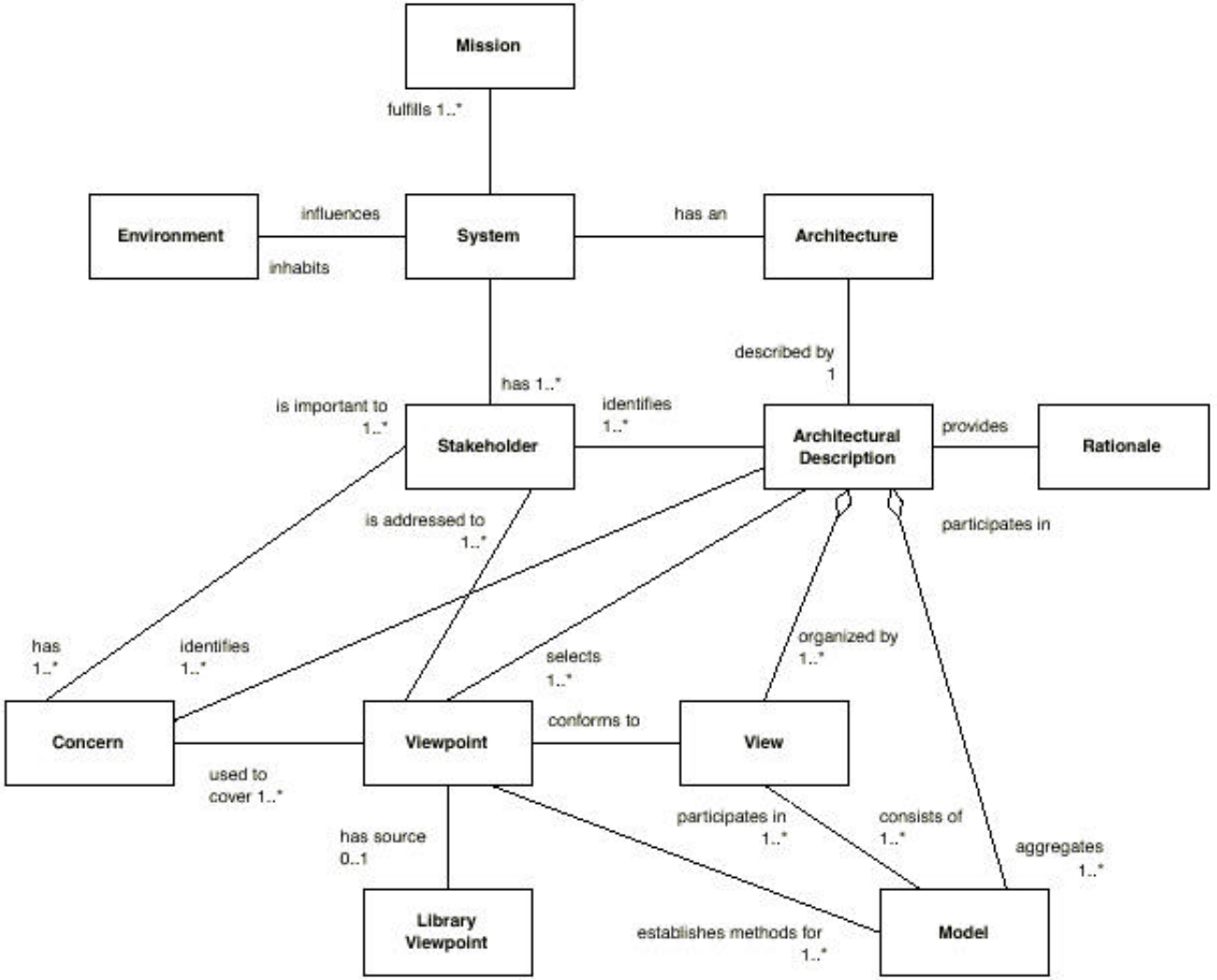
- 1430, Guide for Software Reuse - Concept of Operations for Interoperating Reuse Libraries
- 1462, Guide for the Evaluation and Selection of CASE Tools
- **P1471, Recommended Practice For Architectural Description of Software Intensive Systems**

■ = High Integrity Systems Related

IEEE 1540: Software Risk Management - Process Model



IEEE 1471: Recommended Practice for Architectural Description of Software-Intensive Systems - Conceptual Model



Software Engineering Competency: Professionalizing Software Engineering

The Three Components of Engineering Competency

- A defined Body of Knowledge
- A Code of Practice
- Competency recognition

Guide to the Software Engineering Body of Knowledge

- Objectives
  - Better characterize the discipline of Software Engineering
  - Provide a consistent view Software Engineering as an engineering discipline

http://www.swebok.org

IEEE Software Engineering Competency Recognition Program

- Goals
  - Identify qualified professionals
  - Ensure recognition of expertise
  - Assist in professional development
  - Establish professional practice standards
  - Protect public
  - Enable professionals to stay current

Source: [IEEE99]

IEEE Software Engineering Competency Recognition Program - 2

- Roles
  - software engineering practitioner
  - software project manager
  - software systems architect
  - supporter (e.g. CM, QA, etc.)

Standards-Based Training

- Skills training in the “Code of Practice”
  - tailorable course outlines
  - completion certificates
- Pilot training program
  - State of California
  - New York City Transit Authority
  - Delta Airlines
- Twenty-three courses were delivered last year to 500 attendees
- Five universities contracted to teach courses

IEEE Software Engineering Standards Committee

Our Future and Yours

SESC objectives for the New Millenium

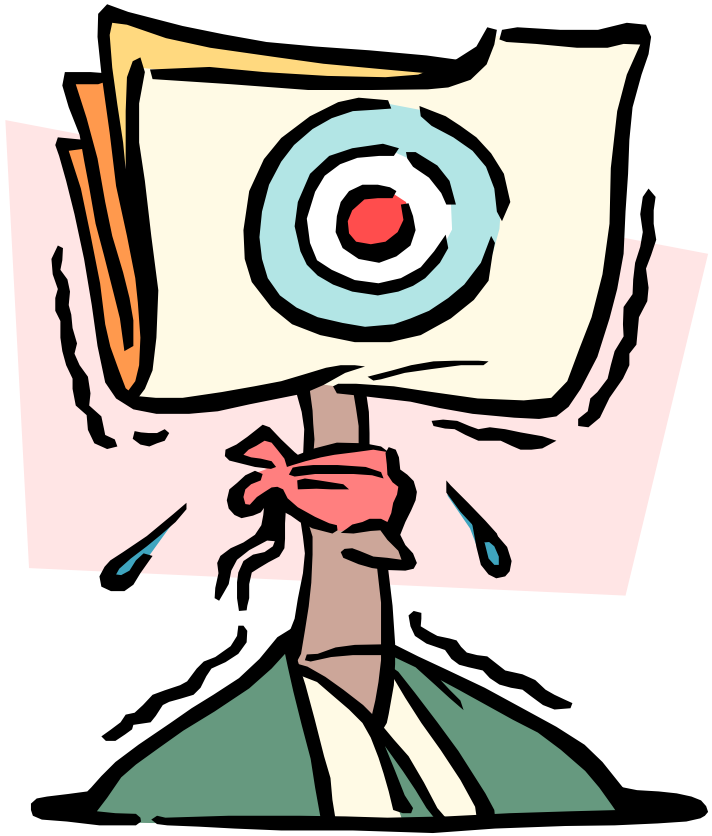
- A consistent collection of Software Engineering Standards to support process definition and product development, that improve the quality of delivered software and software-intensive systems
- Development and delivery of Standards-based training to improve skills
- Feedback mechanisms to capture experience in standards usage
- A conformance program for the organizational implementation of SESC standards

How You Can Participate

- Join the IEEE Computer Society

  (at **http://www.computer.org**)
- Join the IEEE Software Engineering Standards Committee (at **http://www.tcse.org**)
  - Lead or participate in Working Groups developing or revising Standards
  - Lead or participate in Study Groups investigating new areas for standardization
  - Participate in SESC special projects
  - Become part of the SESC balloting pool (IEEE Standards Association membership required)

Questions



For more information . . .

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[IEEE99] IEEE Computer Society, “Business Plan for the Software Engineering Competency Recognition Program”, May1999

[Moore97] James W. Moore, *Software Engineering Standards: A User's Road Map*, IEEE Computer Society Press, Los Alamitos, CA, 1997.

[SESC95] SESC Business Planning Group, “Vision 2000 Strategy Statement (Final Draft),” v0.9, SESC/BPG-002, August 20, 1995.

[Singh97] Raghu Singh, *An Introduction to International Standards ISO/IEC 12207, Software Life Cycle Processes*, 1997.