IEEE/EIA 12207  
Software Life Cycle Processes

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January 1998

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Seminar themes (1 of 3)

- Nature of 12207  
  - A framework of related names and concepts ... not necessarily all of the best practices for software  
  - Processes ... not procedures  
  - Life cycle processes ... not a life cycle model

Seminar themes (2 of 3)

- The best use of IEEE/EIA 12207 is enterprise level adoption.  
  - It is intended for voluntary adoption rather than contractual imposition.  
  - It emphasizes specific one-party claims of compliance rather than two-party tailoring.  
  - It has relationships to contextual standards affecting enterprise goals.  
  - It has relationships to process and data standards that may be used to implement its processes.

Seminar themes (3 of 3)

- IEEE/EIA 12207 is a strategic, integrating standard for the IEEE software engineering collection.  
  - It provides a unifying approach to life cycle process standardization.  
  - It provides a unifying approach to life cycle data standardization.  
  - IEEE is now improving the fit.  
  - IEEE plans to build upon the standard with future strategic efforts.

Part 1 - Software engineering

- Software Engineering  
  - Definition  
  - Model  
  - Relationship to other Disciplines  
  - Software Engineering Standards  
  - Software Engineering Standards Developers

Software engineering: Definition

(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).

-- IEEE Std 610.12

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Software engineering: A model

- Goals
- Constraints
- Control
- Measurement
- Action
- Needs
- Process
- Product
- Resources

Source: [SESC93]

Software engineering: Relationship to other disciplines

- Project Management
- Systems Engineering
- Quality Management
- Computer Science and Technology
- Software Engineering
- Application Domains
- Dependability
- Safety

Part 2 – Software engineering standards

- Software Engineering
- Software Engineering Standards
  - Scope
  - Importance
  - Roles and uses
  - History
  - Software Engineering Standards Developers

Software engineering standards

- Approximately 315 software engineering standards, guides, handbooks, and technical reports are maintained by approximately 46 professional, sector, national, and international standards organizations. – [Magee97]
- In 1981, IEEE had one software engineering standard. By year end 1997, the collection had grown to 44. – [SESC97a]
- Most software engineering standards are practice standards rather than the more familiar product standards.

Software engineering standards: Scope

- Process
  - Acquisition
  - Requirements definition
  - Design
  - Code and Test
  - Integration
  - Maintenance and Operations
  - CM
  - Documentation
  - Project management
  - Quality assurance
  - V & V
- Technique/Tool
  - CASE tools
  - Languages and Notations
  - Metrics
  - Privacy
  - Process improvement
  - Reliability
  - Safety
  - Security
  - Software reuse
  - Vocabulary
- Applicability
  - General
  - Defense
  - Financial
  - Medical
  - Nuclear
  - Process control
  - Scientific
  - Shrink-wrap
  - Transportation

Source: [Magee97]
Software engineering standards:

**Roles**
- Specify techniques to develop software faster, cheaper, better, IEEE 982.1 (Measures for Reliable SW)
- Provide consensus validity for "best practices" that cannot be scientifically validated, IEEE 1008 (Unit Testing)
- Provide a systematic treatment of "ilities", IEEE 730 (SW Quality Assurance)
- Provide uniformity in cases where agreement is more important than small improvements, IEEE P1320.1 (IDEF0)
- Provide a framework for communication between buyer and seller, IEEE/EIA 12207 (SW Life Cycle Processes)
- Give precise names to concepts that are fuzzy, complex, detailed and multidimensional, IEEE 1028 (SW Reviews)

**Uses**
- Terminology
- Best practice adoption
- Organizational badge
- Contractual agreement

Software engineering standards:

**Organizational goals**
- Improve and evaluate software competence
- Framework for two-party agreements
- Evaluation of software products
- Assurance of high integrity levels for software products

**History**
- 1968: Term software engineering coined at NATO conference
- 1976: IEEE creates predecessor of SESC
- 1979: IEEE Std 730, Software Quality Assurance Plans
- 1987: ISO and IEC form JTC1 on Information Technology [Industry]
- 1998(?): JTC1/SC7 gains "horizontal" status

Part 3 – Software engineering standards developers

- Software Engineering
- Software Engineering Standards
- Software Engineering Standards Developers
  - International: SC7 and others
  - US: IEEE and others

SWE standards developers: International

The focal point in international standards is ISO/IEC JTC1/SC7.
Other committees, though, deal with related work.
Members of these committees are "national bodies," i.e. countries, represented by "national delegations."

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SWE standards developers:
- ISO/IEC JTC1/SC7 program
  - WG2: System software documentation
  - WG4: Tools and environment
  - WG6: Evaluation and metrics
  - WG7: Life cycle management
  - WG8: Integral life cycle processes
  - WG9: Classification and mapping
  - WG10: Process assessment
  - WG11: Software engineering data definition and representation
  - WG12: Functional size measurement
  - WG13: Software measurement process

SWE standards developers:
- Current standards of SC7
  - Six “legacy” standards
    - ISO/IEC 9126:1991, Product quality characteristics
    - ISO 9127:1988, User documentation and cover information for consumer software packages
    - ISO/IEC TR 9294:1990, Management of software documentation
    - ISO/IEC 11411:1995, Representation of state transition diagrams
    - ISO/IEC 12119:1994, Software packages: Quality requirements and testing
    - ISO/IEC 14568:1997, Diagram exchange language for tree charts

SWE standards developers:
- US
  - ANSI
  - NCITS
  - AIAA
  - ANS
  - ASTM
  - EIA
  - IEEE
  - PMI
  - INCOS

About 550 organizations in the U.S. make standards. About half of them are accredited by ANSI, allowing them to participate in international standardization activity. The focal point (in the U.S.) is the Software Engineering Standards Committee (SESC) of the IEEE Computer Society.

SWE standards developers:
- IEEE
  - IEEE Board of Directors
  - IEEE Standards Board
  - Other Societies
  - Similar organizations
  - Other “Sponsors”
  - Side Coordinating
    - Committees
  - IEEE Engineering Standards Committee

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