

12207 - Unit 1 - JWM - 9801

Unit 1



IEEE/EIA 12207 Software Life Cycle Processes

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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

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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.

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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*.

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Part 1 - Software engineering

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

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Software engineering: Definition

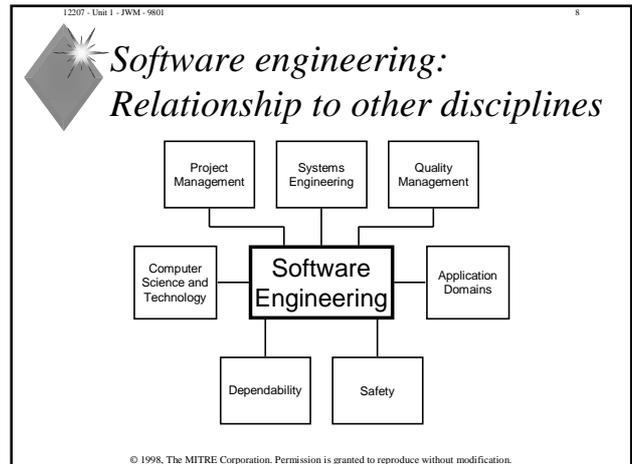
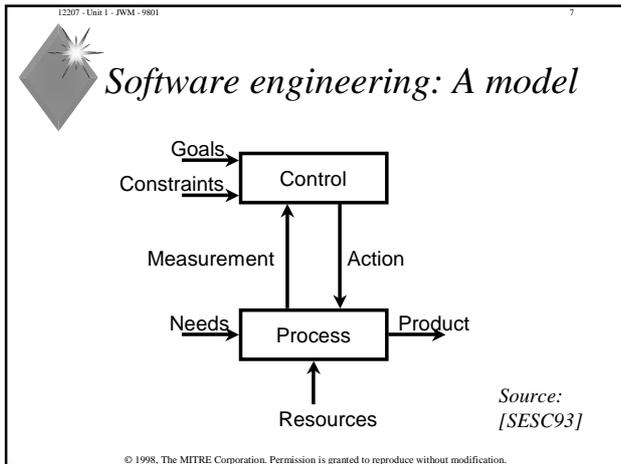
(1) *The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software, that is, the application of engineering to software.*

(2) *The study of approaches as in (1).*

-- IEEE Std 610.12

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- Part 2 – Software engineering standards**
- ◆ Software Engineering
 - ◆ Software Engineering Standards
 - ◆ Scope
 - ◆ Importance
 - ◆ Roles and uses
 - ◆ History
 - ◆ Software Engineering Standards Developers
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- 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]
 - ◆ The 1994 edition of IEEE Standards Collection: Software Engineering is 1300 pages long. The 1998 edition will be in four volumes totaling 2400 pages.
 - ◆ Most software engineering standards are *practice* standards rather than the more familiar *product* standards.
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Software engineering standards: Scope

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

Source: [Magee97]

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- Software engineering standards: Importance**
- ◆ They consolidate existing technology into a firm basis for introducing newer technology
 - ◆ They increase professional discipline
 - ◆ They protect the business
 - ◆ They protect the buyer
 - ◆ They improve the product
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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)

More exciting ↑
↓ More effective

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Software engineering standards: Uses

- ◆ Terminology
- ◆ Best practice adoption
- ◆ Organizational badge
- ◆ Contractual agreement

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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

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Software engineering standards: History

- ◆ 1968: Term *software engineering* coined at NATO conference
- ◆ 1973: US National Bureau of Standards writes *Guidelines for Documentation of Computer Programs and Automated Systems*
- ◆ 1974: US Navy initiates Mil-Std-1679, *Weapons System Development*, including guidelines for embedded computing resources.
- ◆ 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

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Part 3 – Software engineering standards developers

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

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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

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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 12207:1995, Software life cycle processes**
- ◆ ISO/IEC 14102:1995, Evaluation and selection of CASE tools
- ◆ ISO/IEC 14143-1:1997, Functional size measurement
- ◆ ISO/IEC 14568:1997, Diagram exchange language for tree charts

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SWE standards developers: US

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graph TD
    ANSI[ANSI] --- NCITS[NCITS]
    ANSI --- AIAA[AIAA]
    ANSI --- ANS[ANS]
    ANSI --- ASTM[ASTM]
    ANSI --- EIA[EIA]
    ANSI --- Dots1[.....]
    ANSI --- IEEE[IEEE]
    IEEE --- SESC[SESC]
    PMI[PMI]
    INCOSE[INCOSE]
    
```

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

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SWE standards developers: IEEE

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graph TD
    Board[IEEE Board of Directors] --- OS[Other Societies]
    Board --- CS[Computer Society]
    Board --- ISB[IEEE Standards Board]
    OS --- SO[Similar organizations]
    CS --- SAB[Standards Activity Board]
    ISB -.- CS
    SAB --- OSponsors[Other "Sponsors"]
    SAB --- SCC[Stds Coordinating Committees]
    SAB --- SWESC[SW Engineering Standards Committee]
    
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