This presentation represents the opinion of the author and does not present positions of The MITRE Corporation or of the U.S. Department of Defense.

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International Software & Systems Engineering Standards
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.”
SC7 Plenary Attendance

Based on a chart by François Coallier, SC7 Chair
ISO/IEC JTC1/SC7
Working Groups

- WG2: System software documentation
- WG4: Tools and environment
- WG6: Evaluation & metrics
- WG7: Life cycle management
- WG9: System & SW integrity
- WG10: Process assessment
- WG11: Software data definition and representation
- WG12: Functional size measurement
- WG13: Software measurement process
- SWG1: Planning
- SWG2: Vocabulary
- SWG3: Process Architecture
- Ad Hoc: Quality Mgmt
- Study Group: SE Practices

Plus four other WGs inherited from SC33 dealing with ODP and LOTOS
**SC7 Production (est.)**

(No new NWI assumed - exclude dependability)

Based on a chart by François Coallier, SC7 Chair
Current Standards of SC7

(1 of 2)

- Several “legacy” standards
- ISO/IEC 6592:2000, Guidelines for the documentation of computer-based application systems
- 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
Current Standards of SC7
(2 of 2)

- ISO/IEC TR 14471:1999 Information technology -- Software engineering -- Guidelines for the adoption of CASE tools
- ISO/IEC 14568:1997, Diagram exchange language for tree charts
- ISO/IEC 14598:2000, Software product evaluation (6 parts)
- ISO/IEC TR 14759:1999, Mockup and prototype
- ISO/IEC 14764:1999, Software maintenance
- ISO/IEC 15026:1998, System and software integrity levels
- ISO/IEC TR 15504:1998, Software process assessment (9 parts)
- ISO/IEC 15910:1999, Software user documentation process
- ISO/IEC TR 16326:1999, Software project management
“Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems.”
SOFTWARE and SYSTEM ENGINEERING

APPLICATION DOMAINS
(many TCs)

Quality Management
(ISO TC 176)

Safety
(IEC TC65)

Dependability
Engineering
(IEC TC 56)

Industrial
Engineering

Computer
Sciences and
Engineering

Management
Sciences

Based on a chart by François Coallier, SC7 Chair
Some Important SC7 Standards

- 9126 defines the characteristics and subcharacteristics intended to cover all aspects of software quality resulting from the ISO definition of quality.

ISO/IEC 9126

- Functionality
  - Suitability
  - Accuracy
  - Interoperability
  - Compliance
  - Security
- Reliability
  - Maturity
  - Fault tolerance
  - Recoverability
- Usability
  - Understandability
  - Learnability
  - Operability
- Efficiency
  - Time behavior
  - Resource behavior
- Maintainability
  - Analyzability
  - Changeability
  - Stability
  - Testability
- Portability
  - Adaptability
  - Installability
  - Conformance
  - Replaceability
New Generation of 9126 Family

ISO/IEC 9126 Quality Model and Metrics
- 9126-1 Quality Model
- 9126-2 External Char. and Metrics
- 9126-3 Internal Char. and Metrics
- 9126-4 Quality in Use Char. and Metrics

ISO/IEC 14598 Product Evaluation
- 14598-1: General Overview
- 14598-2: Planning and Management
- 14598-3: Developers Process
- 14598-4: Acquirers Process
- 14598-5: Evaluators Process
- 14598-6: Documentation of Evaluation Module

ISO/IEC 12119 Quality Requirement and Testing

Adapted from a chart by Motoei Azuma

- To establish a common framework for the life cycle of software
  - Broad scope: Acquire, supply, develop, operate, and maintain software
  - Recognizes that software is part of a system and that a project is part of an enterprise
- To establish a basis for world trade in software
  - Amendment underway to describes processes at level of purpose and outcome
Example Use of 12207 Processes

An Enterprise

Acquisition

Supply

Development

Operation

Maintenance

An Enterprise

Management
Infrastructure
Training
Improvement

Documentation
Quality Assurance
Verification
Validation
Configuration Mgmt
Joint Review
Audit
Problem Resolution
ISO/IEC TR 15504,
Software Process Assessment

- A nine-part *Technical Report* -- not a standard
- Currently under revision to become a five-part Standard
  - Will have a “process dimension” provided by an externally supplied process reference model*
  - Will have a 6 point “capability dimension”: Incomplete through Optimizing
- What conforms to 15504? -- the *assessment*. 

*Processes other than software may be supplied.*
ISO/IEC 15026, System and Software Integrity Levels

System Design
- Risk dimensions
- System integrity level
- Software component integrity levels
- Risk containment, fault tolerance strategies

Risk Analysis
- Risks, threats, frequency, initiators, consequences

Software Design

Risk Management in Systems Engineering
Draft ISO/IEC 15939, Software Measurement Process

* Activities and tasks necessary to identify, define, select, apply and improve software measurement with a project or organization.

* Based on principles of Practical Software Measurement (PSM)

* Designed to fit with ISO/IEC 12207, ISO/IEC 15504, and ISO 9000 series.
How to Characterize Measurement as a Process?

Source: [SESC93]
Experience Base

Sustain Commitment

Evaluate Measurement

Project

Tech & Mgmt Processes

Plan the Measurement Process

Perform the Measurement Process

Core Measurement Process

Scope of Standard

Organization

Draft ISO/IEC 15939
**Relationship to Quality Management Standards**

**Current Situation**

- Current relationship will be made obsolete by the circa 2000 revision of the ISO 9000 series.
- SC7 will take responsibility for the replacement of ISO 9000-3 *and other documents on SW QM*.
Systems Engineering in SC7
Scope of SC7 was Changed in 1997

- Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems

Scope: Information technology

Scope: Engineering of software products and systems
Software generally is part of a system or product
Tight integration of software and other component in many software based systems. Examples:
- Telecommunication products (Hardware, Silicon, Software)
- Fly-by-wire aircraft

Based on a chart by François Coallier, SC7 Chair
Working Groups with System Scope

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How Can You Participate?

* US delegates to meetings of ISO/IEC SC7 and its working groups are selected from representatives to the US Technical Advisory Group.
* US positions are developed by the TAG.
* Any US-domiciled organization can join the TAG -- $300 per year.
* The TAG meets three times a year.
Help Wanted!

* SW *product* quality models and metrics
* Systems processes and systems engineering practices
* Extension of process assessment to systems and business processes
* System/software dependability issues
* Non-traditional functional size measurement
* Comprehensive SW quality management
* Also... Documentation, CASE, electronic data interchange