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International Software & Systems Engineering Standards

Jim Moore

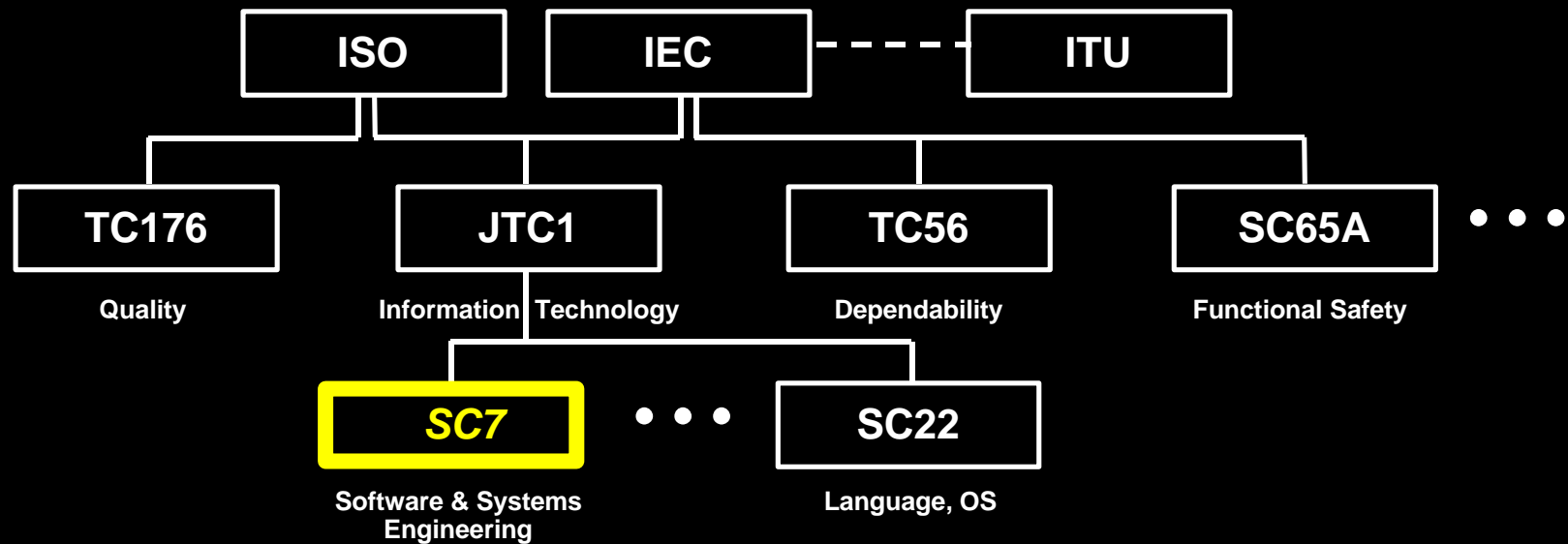
The MITRE Corporation

Chair, US TAG to ISO/IEC JTC1/SC7

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Developers of International Standards related to SWE



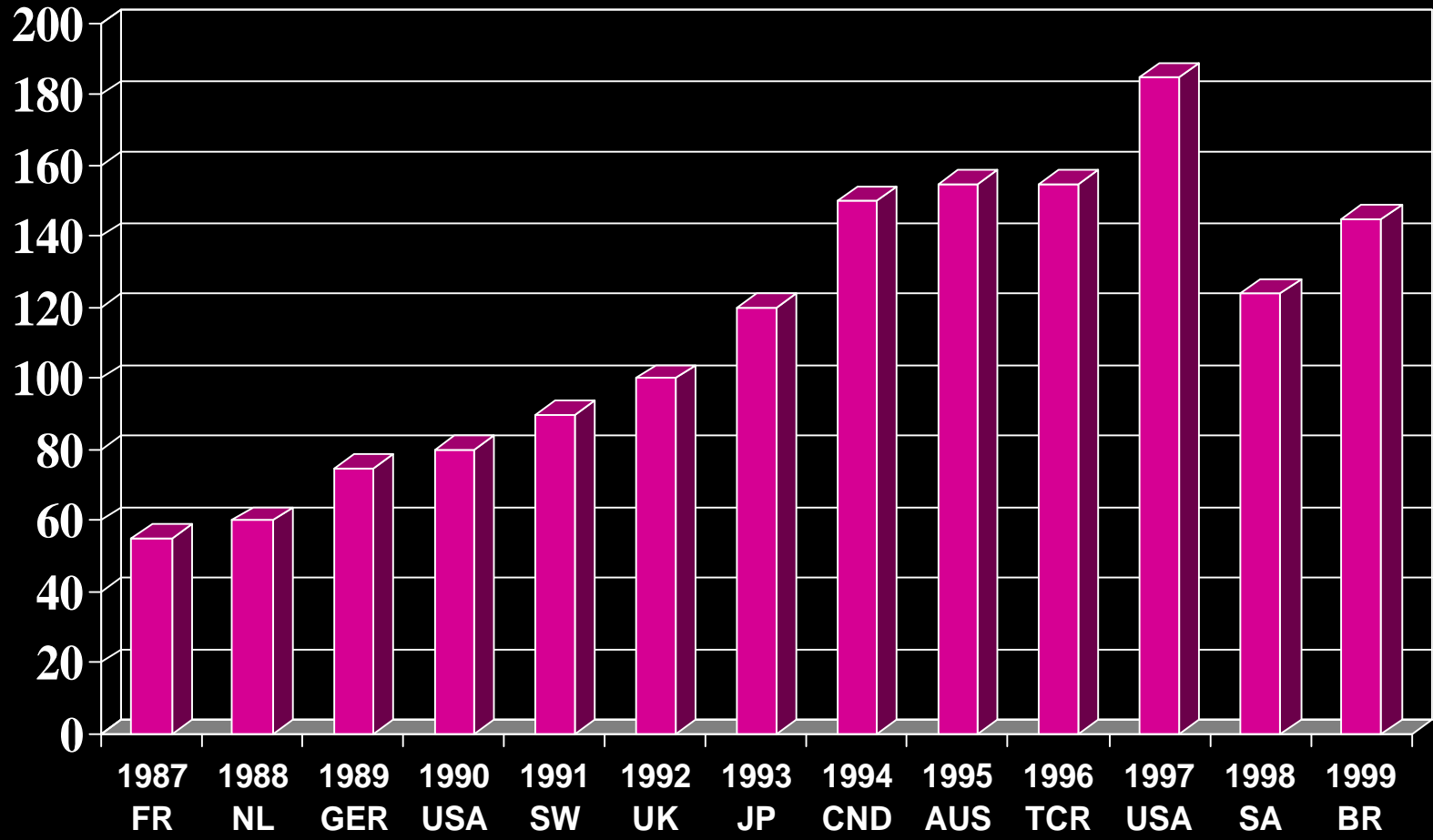
The focal point in international standards is ISO/IEC JTC1/SC7.

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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SC7 Plenary Attendance



Based on a chart by François Coallier, SC7 Chair

ISO/IEC JTC1/SC7

Working Groups

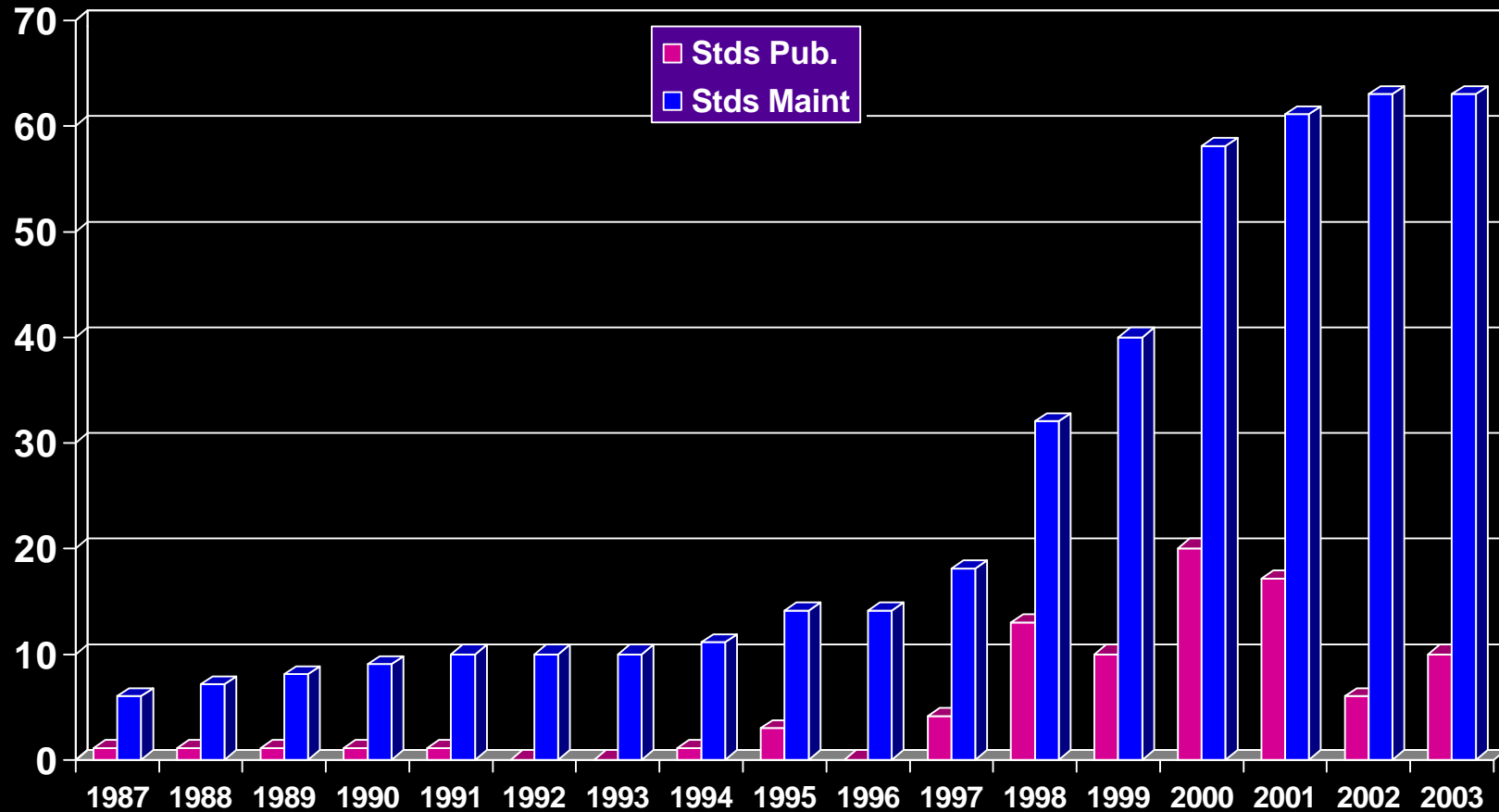


- ◆ WG2: System software documentation
 - ◆ WG4: Tools and environment
 - ◆ WG6: Evaluation & metrics
 - ◆ WG7: Life cycle management
 - ◆ WG9: System & SW integrity
 - ◆ WG10: Process assessment
 - ◆ WG11: Software data definition and representation
 - ◆ WG12: Functional size measurement
 - ◆ WG13: 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
- ◆ ISO/IEC TR 12182:1998, Categorization of software
- ◆ *ISO/IEC 12207:1995, Software life cycle processes*
- ◆ ISO/IEC 14102:1995, Evaluation and selection of CASE tools
- ◆ ISO/IEC 14143-1:1998, Functional size measurement

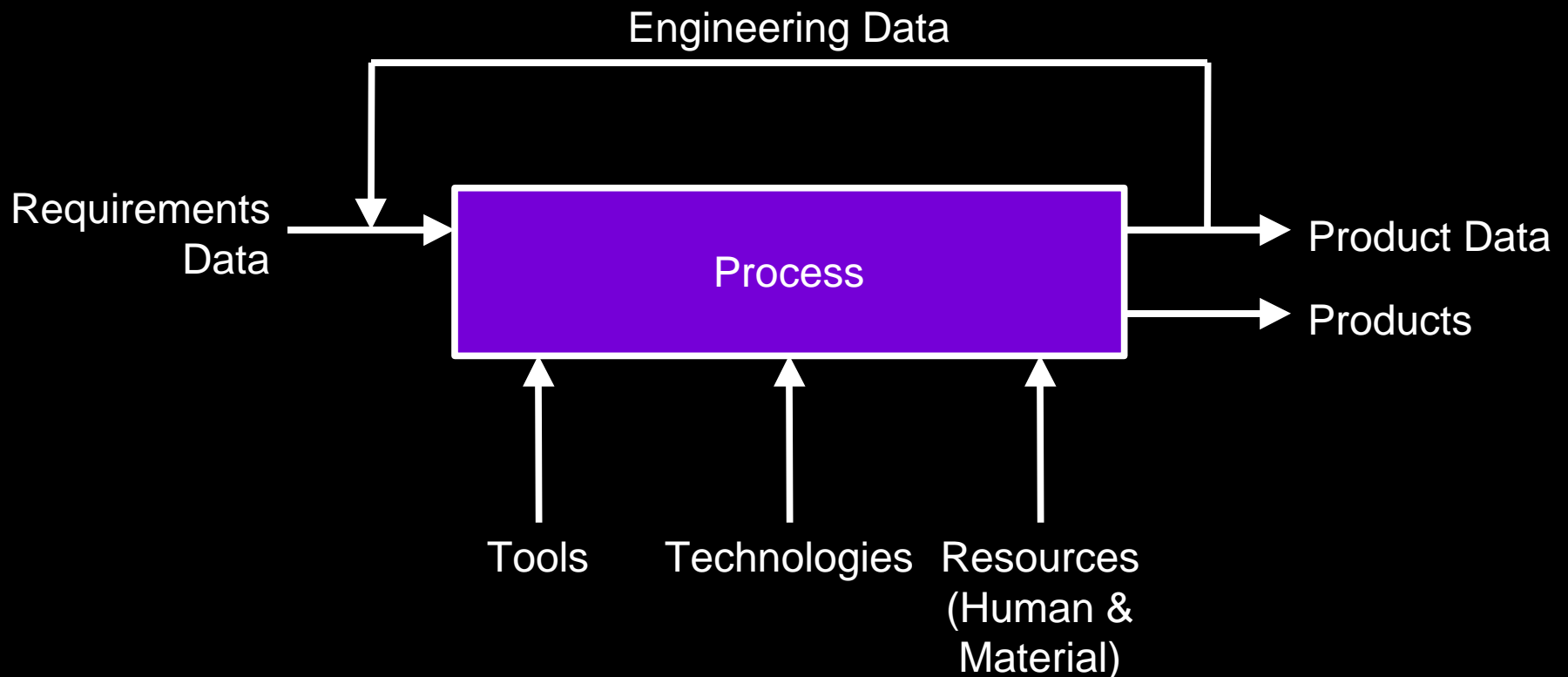
★ *Current Standards of SC7* *(2 of 2)*

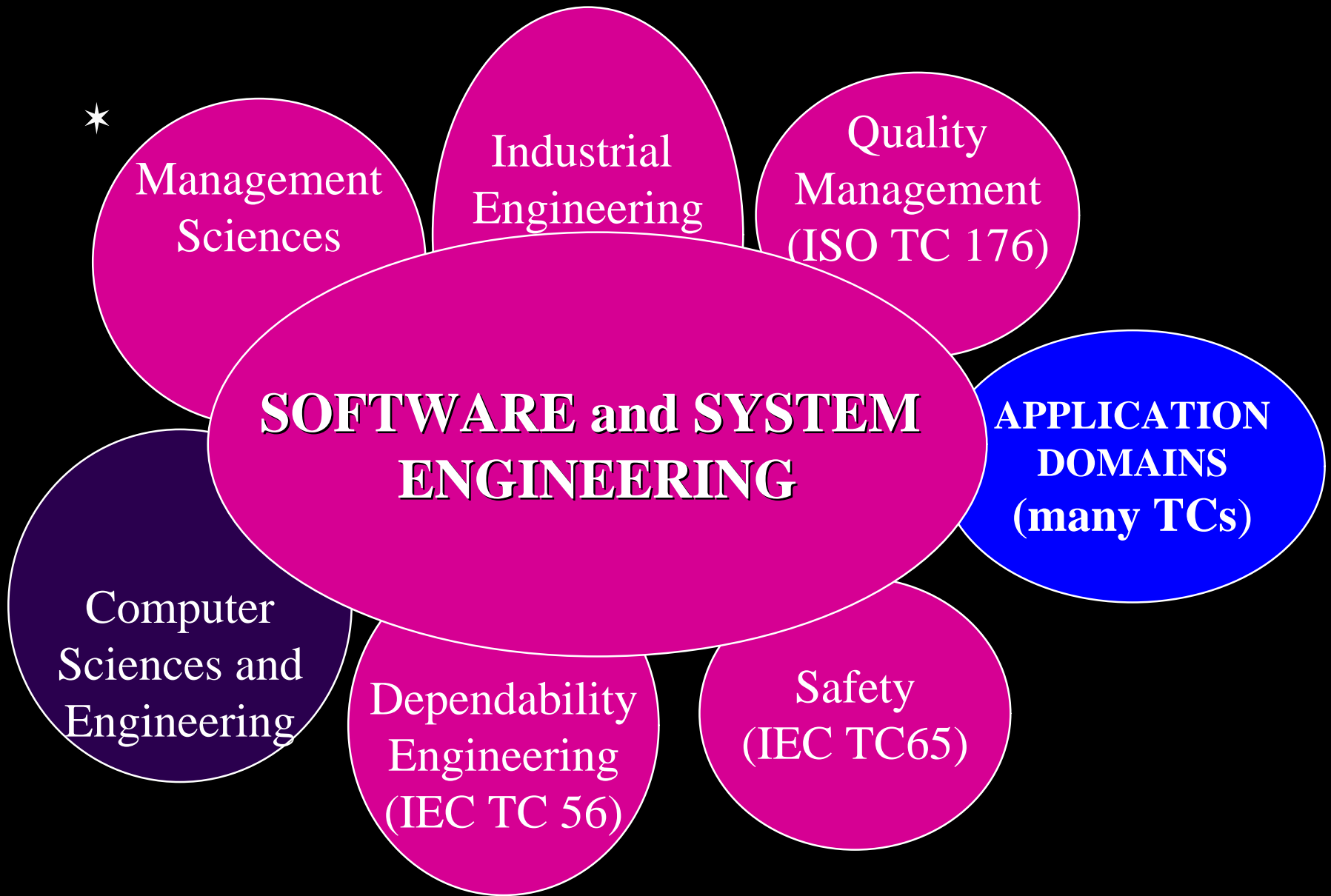
- ◆ ISO/IEC TR 14471:1999 Information technology -- Software engineering -- Guidelines for the adoption of CASE tools
- ◆ ISO/IEC 14568:1997, Diagram exchange language for tree charts
- ◆ ISO/IEC 14598:2000, Software product evaluation (6 parts)
- ◆ ISO/IEC 14756:1999, Measurement and rating of performance
- ◆ 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 15271:1998, Guide for ISO/IEC 12207
- ◆ *ISO/IEC TR 15504:1998, Software process assessment (9 parts)*
- ◆ ISO/IEC TR 15846:1998, SWLC processes - Configuration management
- ◆ ISO/IEC 15910:1999, Software user documentation process
- ◆ ISO/IEC TR 16326:1999, Software project management

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Scope of ISO/IEC JTC1/SC7

“Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems.”





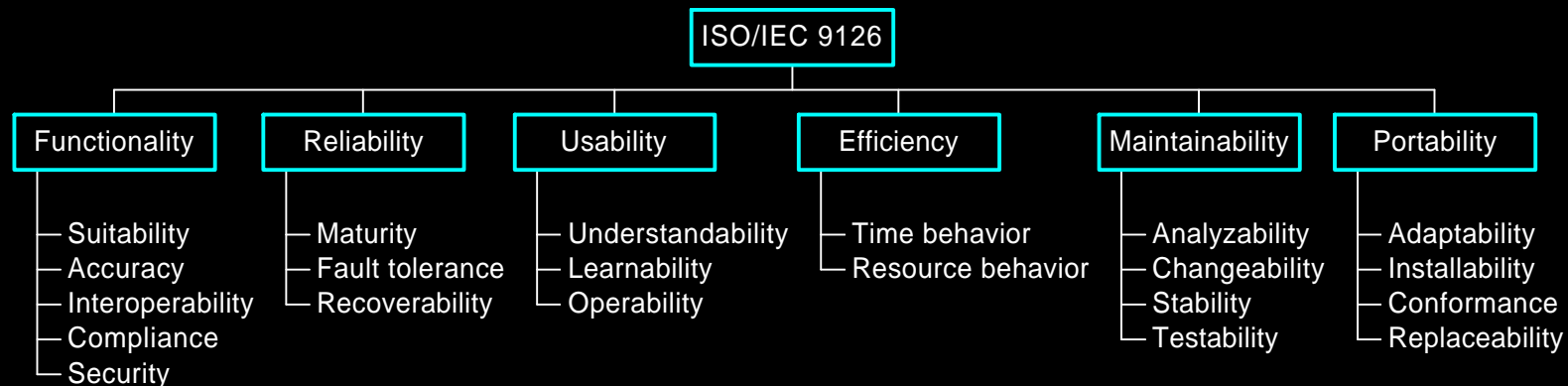
Based on a chart by François Coallier, SC7 Chair



Some Important SC7 Standards

★ *ISO/IEC 9126:1991, Software Product Quality Characteristics*

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



New Generation of 9126 Family



ISO/IEC 9126 Quality Model and Metrics

ISO/IEC 14598 Product Evaluation

ISO/IEC 12119 Quality Requirement and Testing

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

- 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

Adapted from a chart by Motoei Azuma

ISO/IEC 12207:1995,

★ Software Life Cycle Processes

- ◆ 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

An Enterprise

Supply



Management
Infrastructure
Training
Improvement

Documentation

Quality Assurance

Verification

Validation

Configuration Mgmt

Joint Review

Audit

Problem Resolution

ISO/IEC TR 15504, Software Process Assessment

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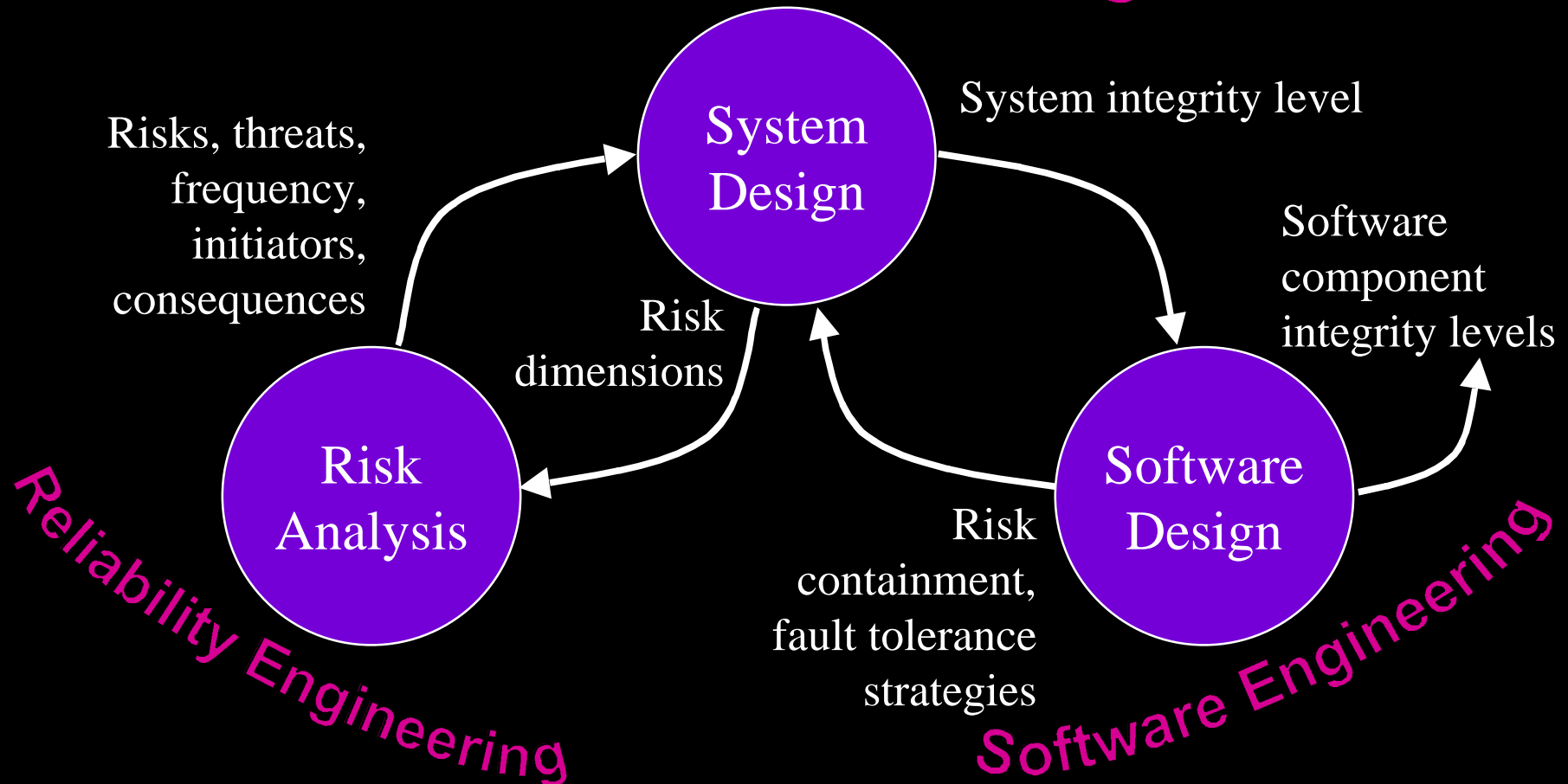
- ◆ A nine-part *Technical Report* -- not a standard
- ◆ Currently under revision to become a five-part Standard
 - ◆ Will have a “process dimension” provided by an externally supplied process reference model*
 - ◆ Will have a 6 point “capability dimension”: Incomplete through Optimizing
- ◆ What conforms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

**Processes other than software may be supplied.*

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ISO/IEC 15026, System and Software Integrity Levels

Systems Engineering

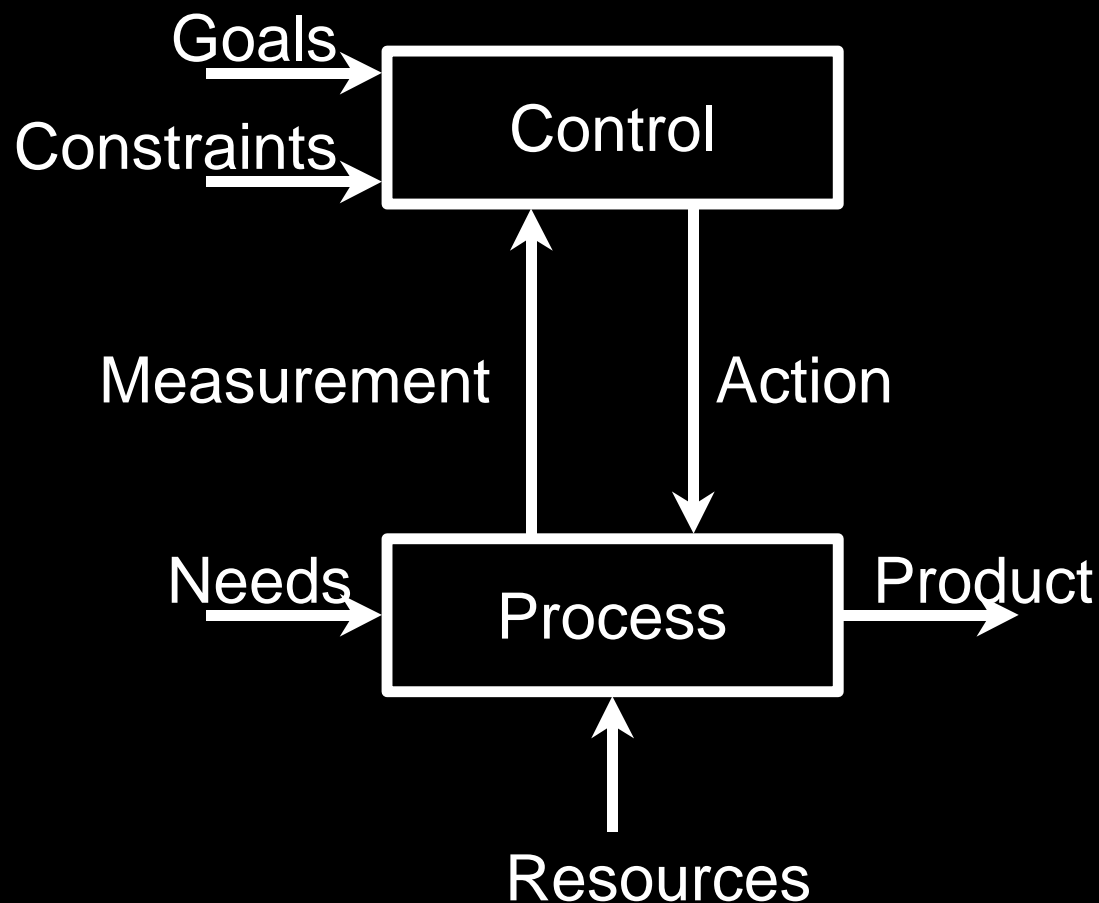


★ *Draft ISO/IEC 15939, Software
Measurement Process*

- ◆ 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.

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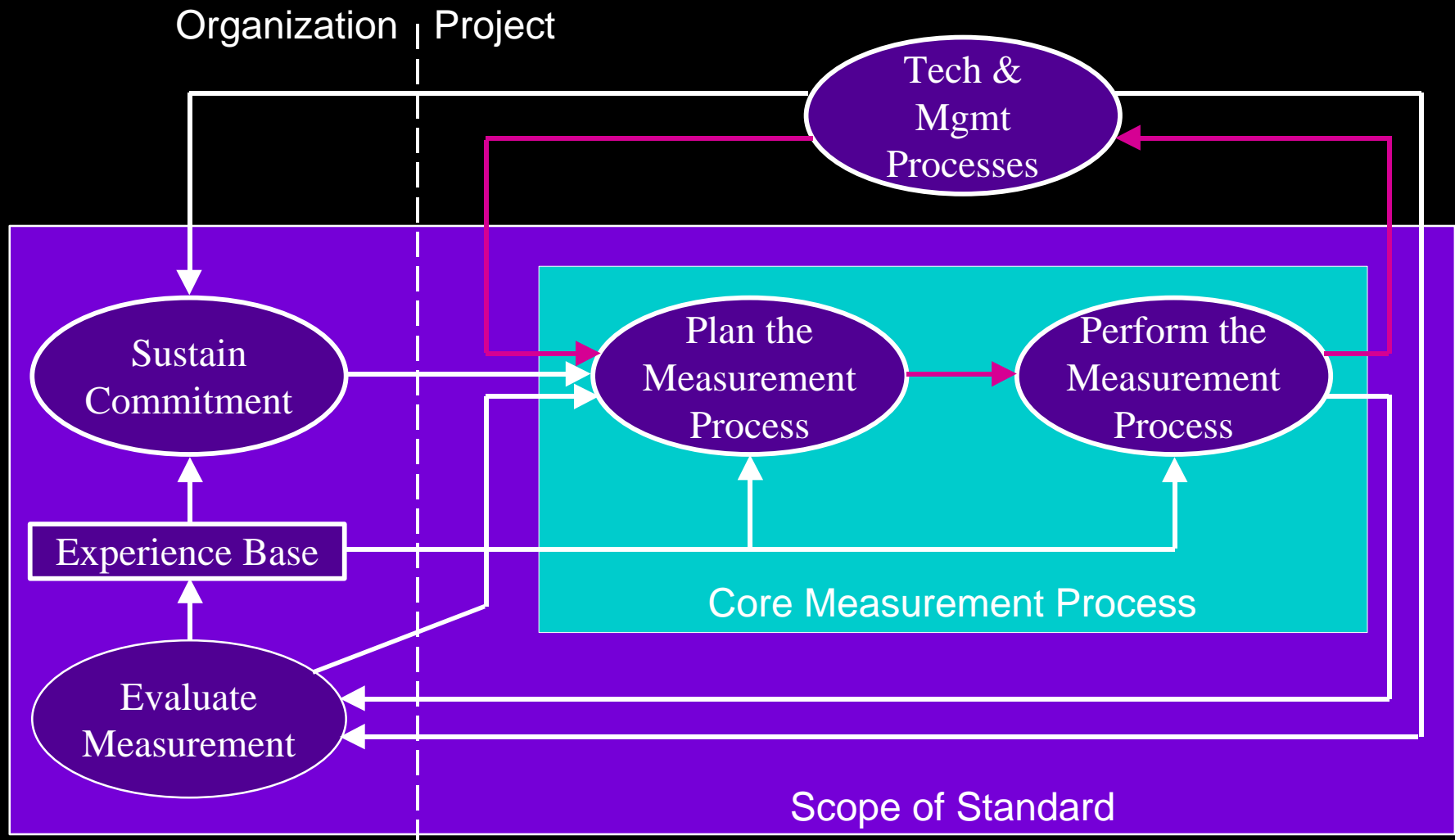
How to Characterize Measurement as a Process?



*Source:
[SESC93]*



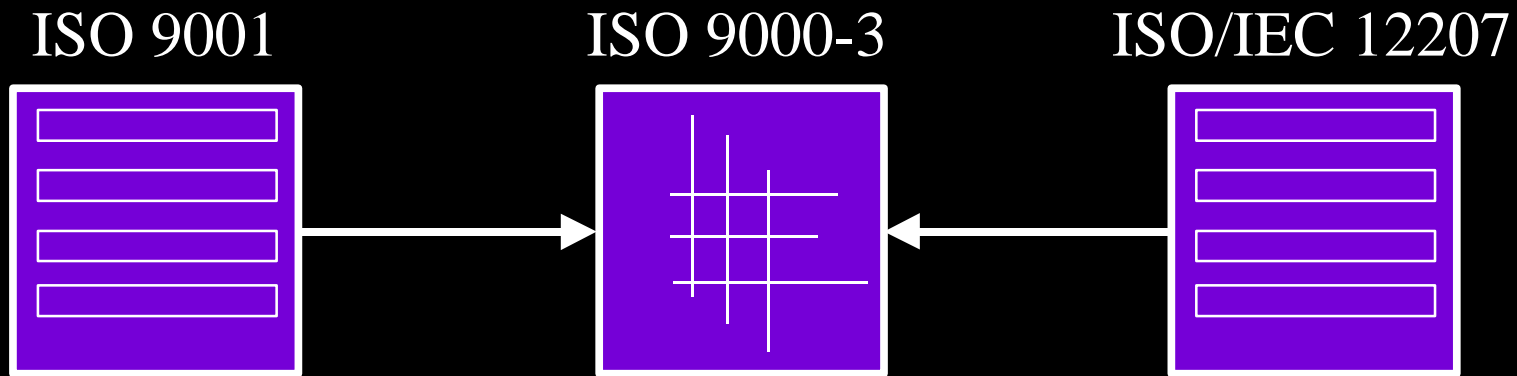
Draft ISO/IEC 15939





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*

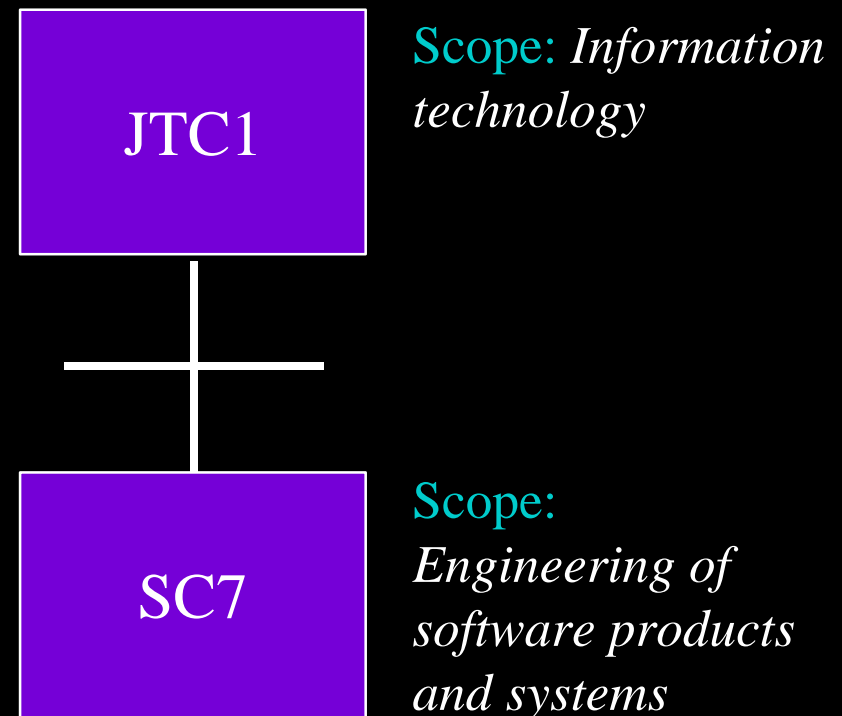


Systems Engineering in SC7

Scope of SC7 was Changed in 1997

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



Rationale

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- ◆ 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



- ◆ *WG2: System software documentation*
 - ◆ WG4: Tools and environment
 - ◆ *WG6: Evaluation & metrics*
 - ◆ *WG7: Life cycle management*
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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.

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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