Practical Software and Systems Measurement

A foundation for objective project management

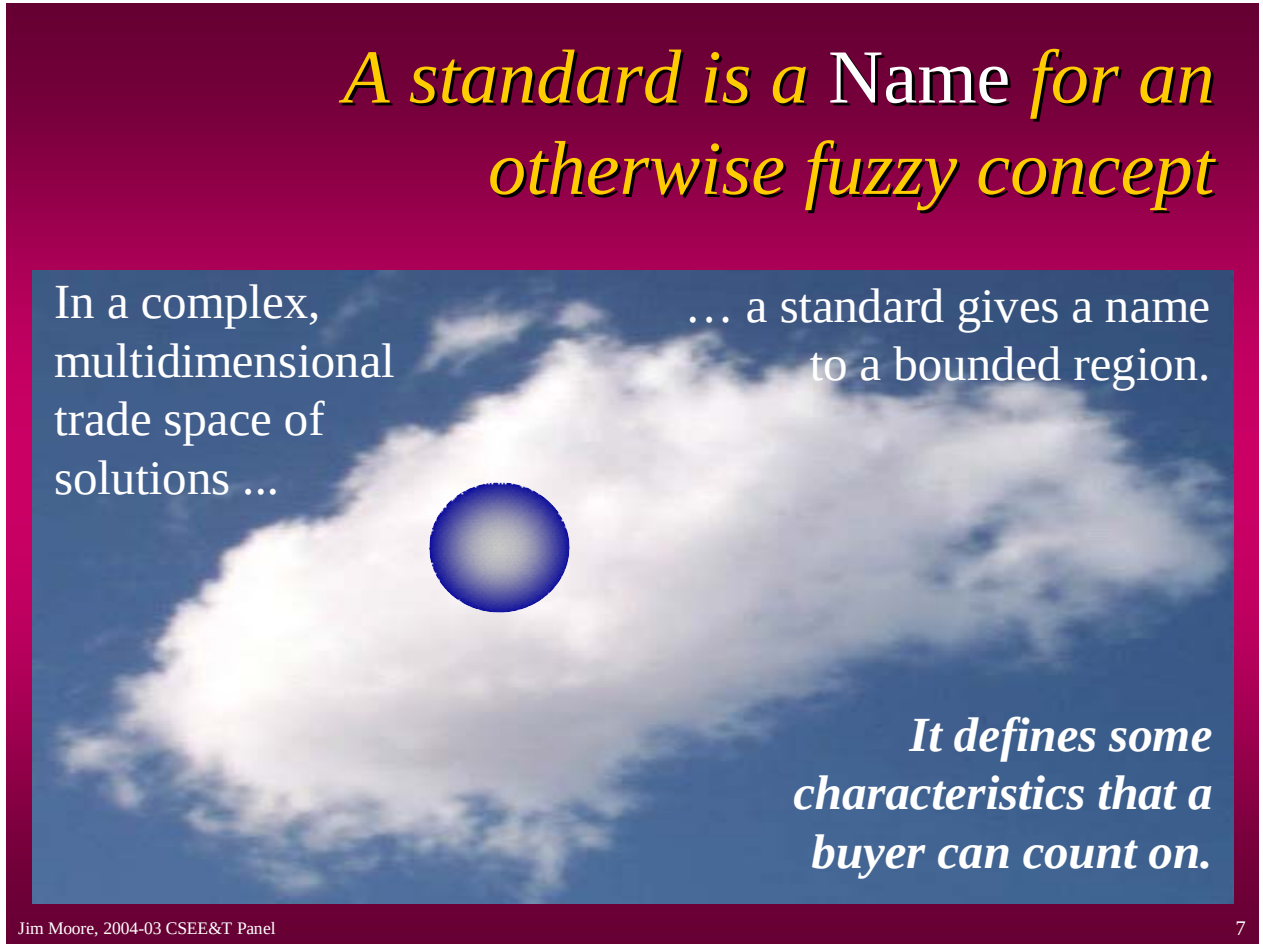
PSM TWG
ISO/IEC and IEEE Standards

March 29, 2006

Current Standard Activities

- ***ISO/IEC 15939, Measurement Process***
- ***ISO/IEC and IEEE 16085, Risk Management***
- ***ISO/IEC 15289,* Content of systems and software life cycle process information products (Documentation)**
- ***ISO/IEC and IEEE 15026, Systems and Software Assurance***
- ***ISO/IEC 12207, Software Development Process and 15288, Systems Engineering Process***

What are Standards Good For?



- **Standards assign names to practices or collections of practices.**
- **This enables communication between**
  - **Buyer and seller**
  - **Government and industry**
  - **Insurer and insured**

SC7: Systems and Software Engineering

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

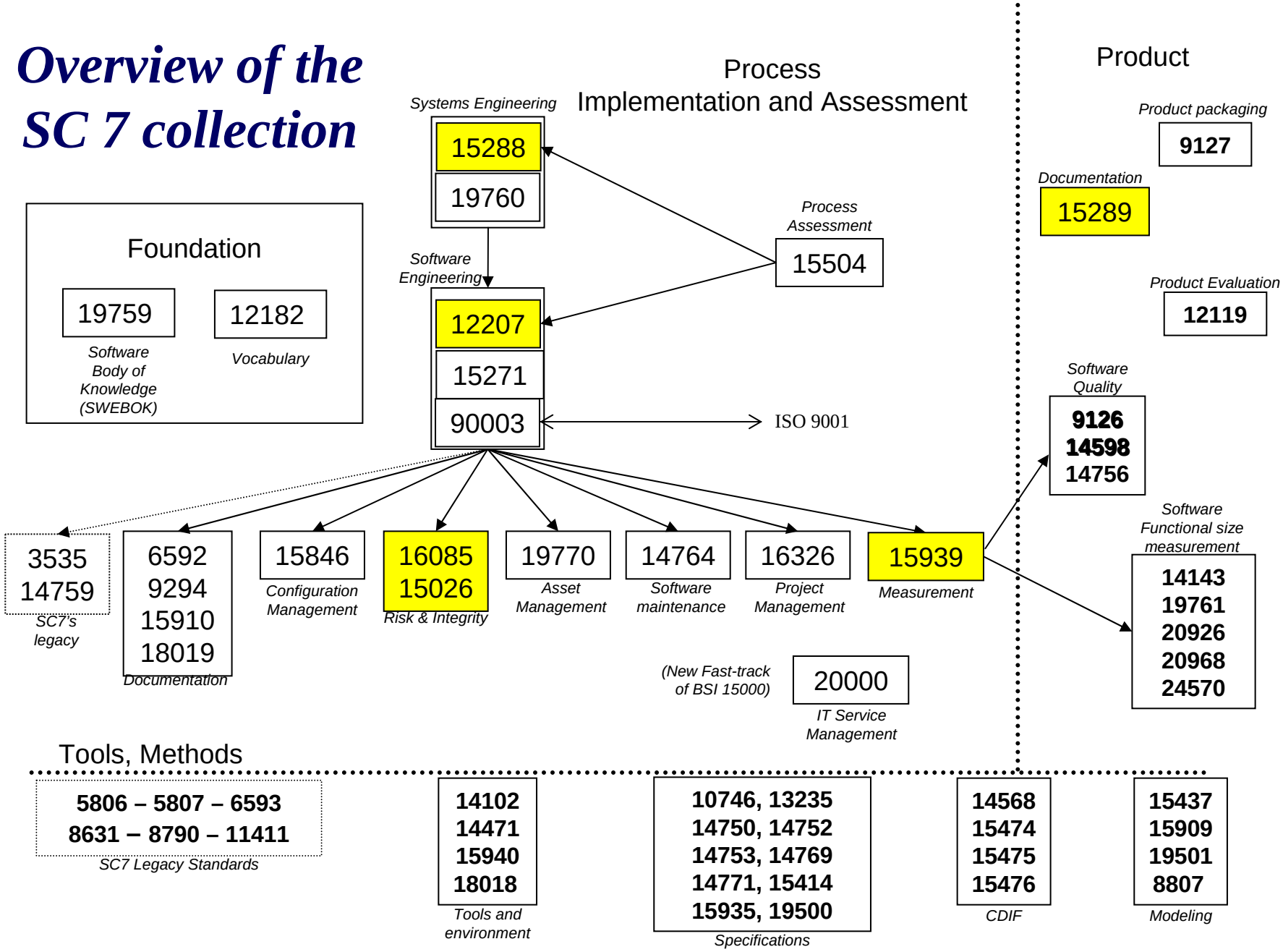
SC7 major strategies 2003-2008

- ***Ensure that its standards are as consistent and coherent as possible***
- ***Become more a systems integrator by focusing its development activities on integration standards and adopting and integrating standards developed by other organizations***
- ***Develop and manage key strategic partnerships with international professional and standardization organizations that operate in its mandated area***

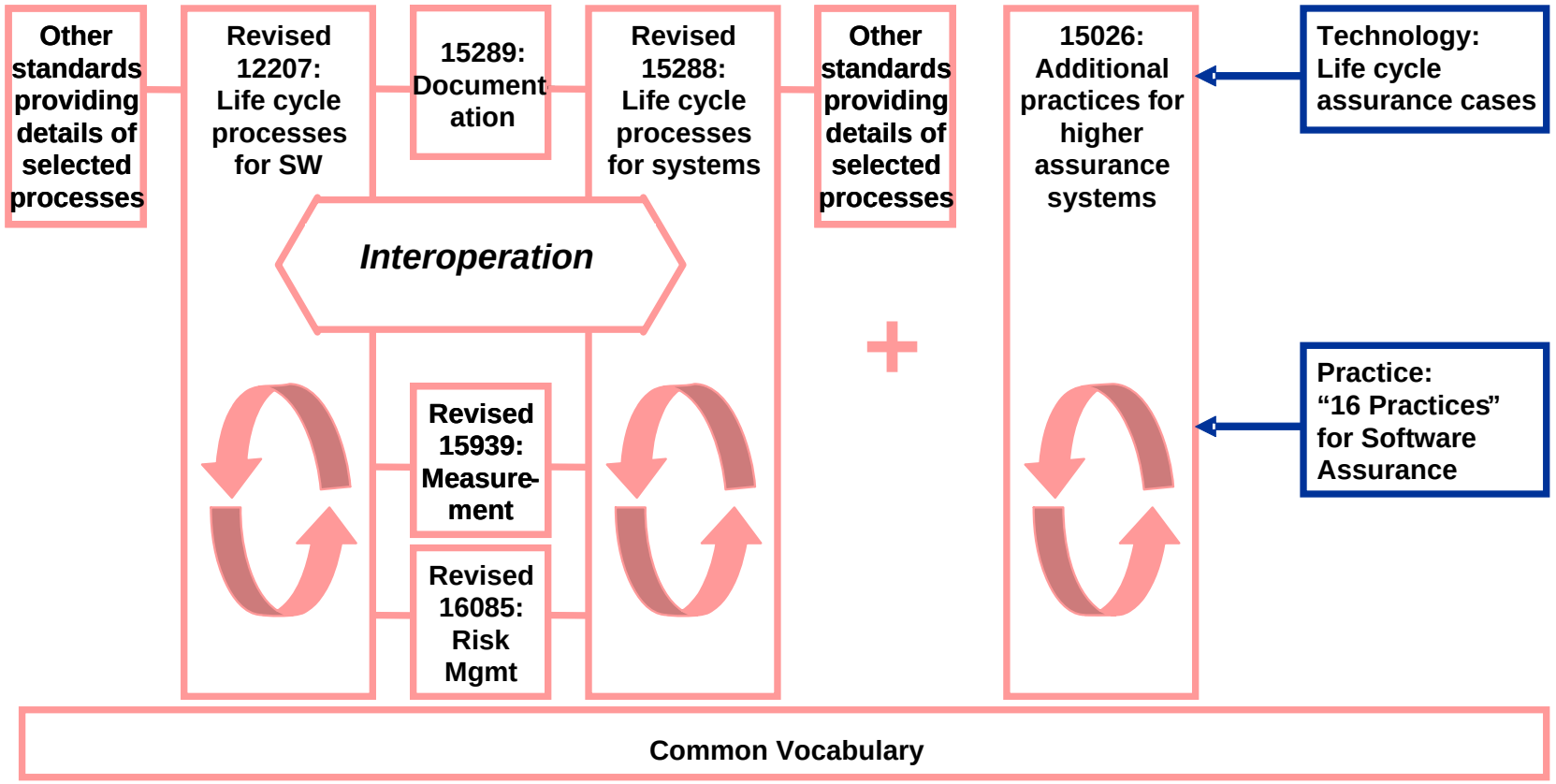
SC7 major strategies 2003-2008

- ***Communicate efficiently** to its intended customers about its program of work and market its accomplishments*
- *Proactively **assess the relevance** of its standards to the state of software and systems engineering technology and markets, and initiate maintenance or new development activities if required*
- ***Increase market share** in the area of systems engineering*

Overview of the SC 7 collection



Intended Relationships of Some Key SC7 Standards

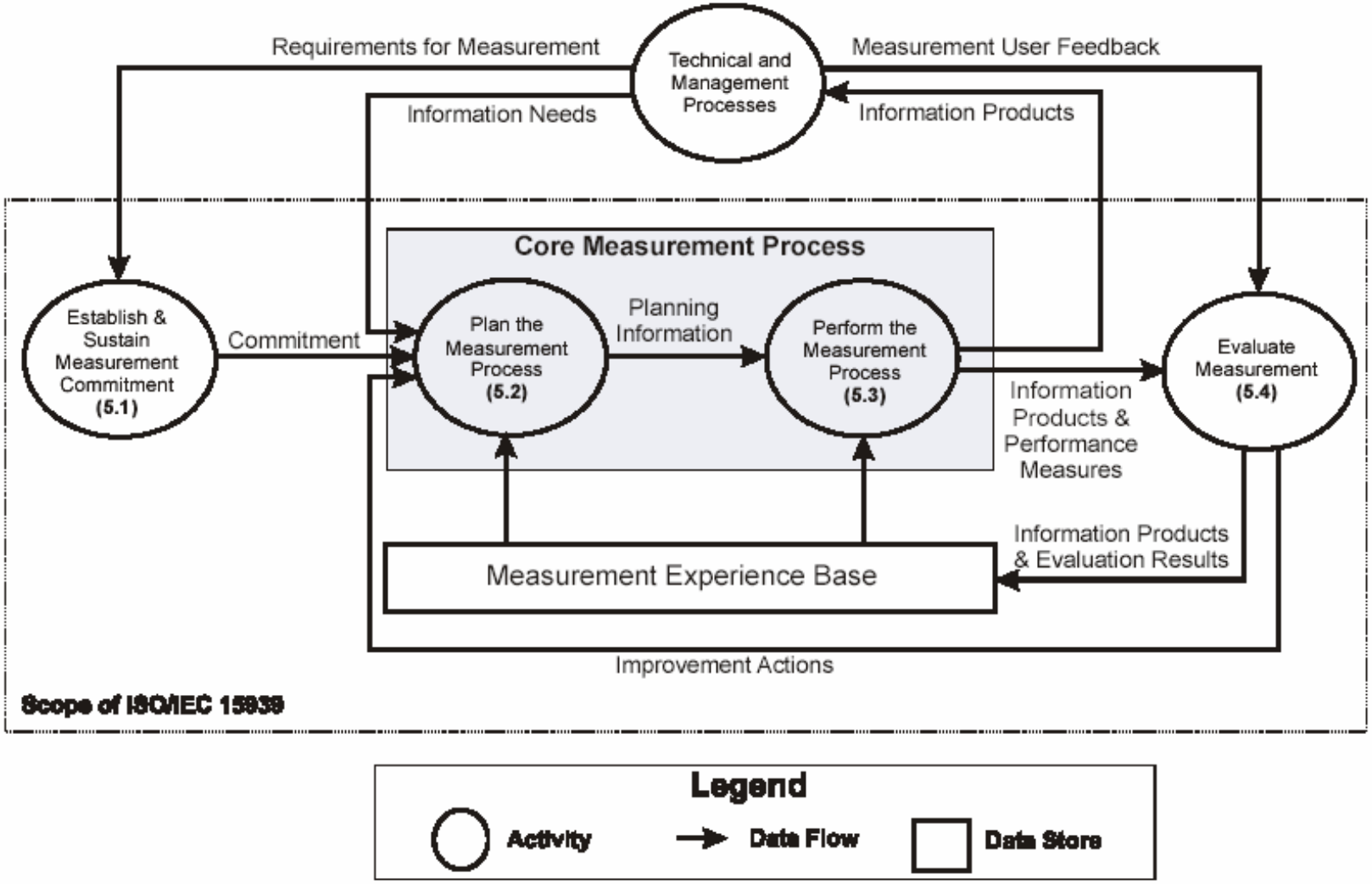


Adapted from Slide by Jim Moore

Measurement process

- ISO/IEC JTC1/SC7 has a single standard for measurement: ISO/IEC 15939, Software Measurement Process
- It is based on the PSM measurement process and information model
- It is currently being updated to the systems level with only minor changes
- It adds detailed requirements and helpful guidance to the measurement provisions of ISO/IEC 15288 and ISO/IEC 12207

ISO/IEC 15939: Measurement Process

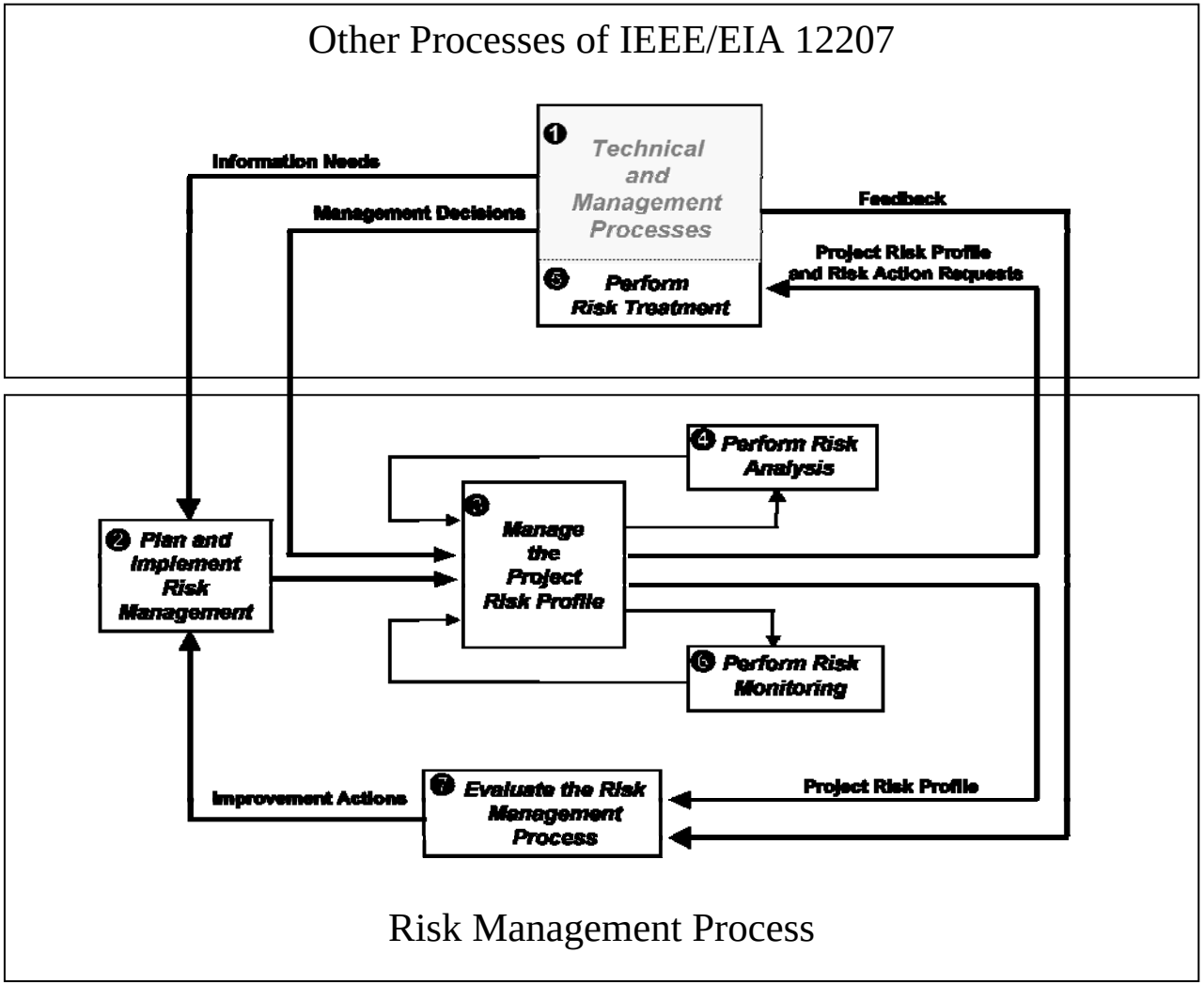


From ISO/IEC 15939

Risk Management Process

- ISO/IEC JTC 1/SC 7 has a single standard for risk management: ISO/IEC 16085, Software Risk Management
- It is has been updated to the systems level
- It adds detailed requirements and helpful guidance to the risk management provisions of ISO/IEC 15288 and ISO/IEC 12207
- It provides a process framework for managing risk - programmatic, technical and operational - throughout the life cycle of software and systems

ISO/IEC 16085: Risk Management Process



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Information Products (Documentation)

- ISO/IEC 15289, Content of systems and software life cycle process information products (Documentation)
  - Intended to support life cycle processes defined in ISO/IEC 12207 (SW) and ISO/IEC 15288 (System)
    - Assist users to manage information items as products of the system or software life cycle processes
    - The information items aid in planning, producing, and evaluating the results of the life-cycle processes
    - Provide a common reference for description of typical information products identified or implied by 12207 and 15288
  - Incorporates information from IEEE/EIA 12207.1:1996
  - FDIS issued 9/21/2005 and approved by ISO/IEC

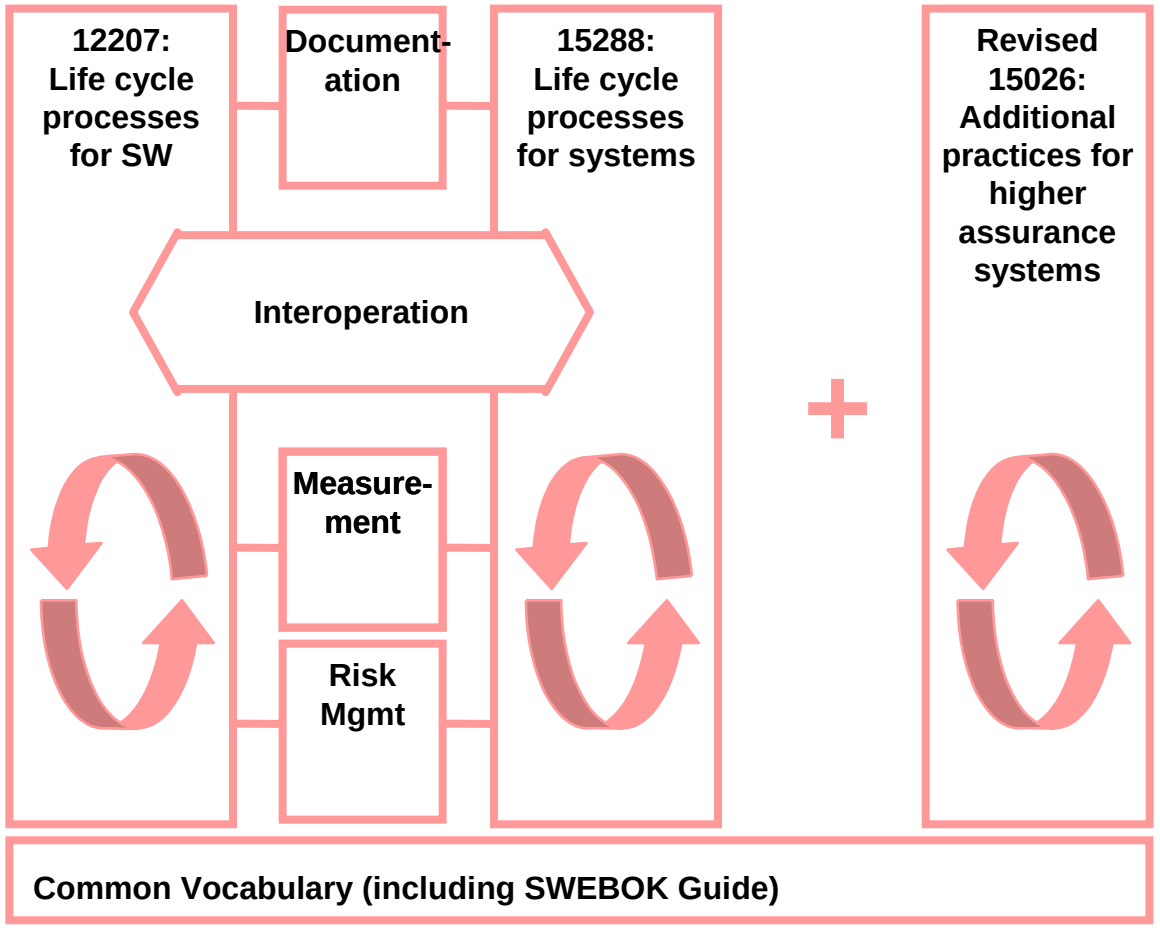
Assurance Activities

- ISO/IEC JTC 1/SC 7 plans a single standard for a generic software assurance activities: ISO/IEC 15026:200x, Systems and Software Assurance
- The planned standard is a major revision of the current standard describing “integrity levels”
- Using a baseline of the life cycle processes of ISO/IEC 15288 and ISO/IEC 12207, it will provide additional activities used to assure the existence of critical properties such as safety and security
- SC 7 hopes to harmonize the standard with IEC TC 56 (dependability), IEC TC 65 (safety), and SC 27 (security)

Relationship of 15026 to life cycle process standards

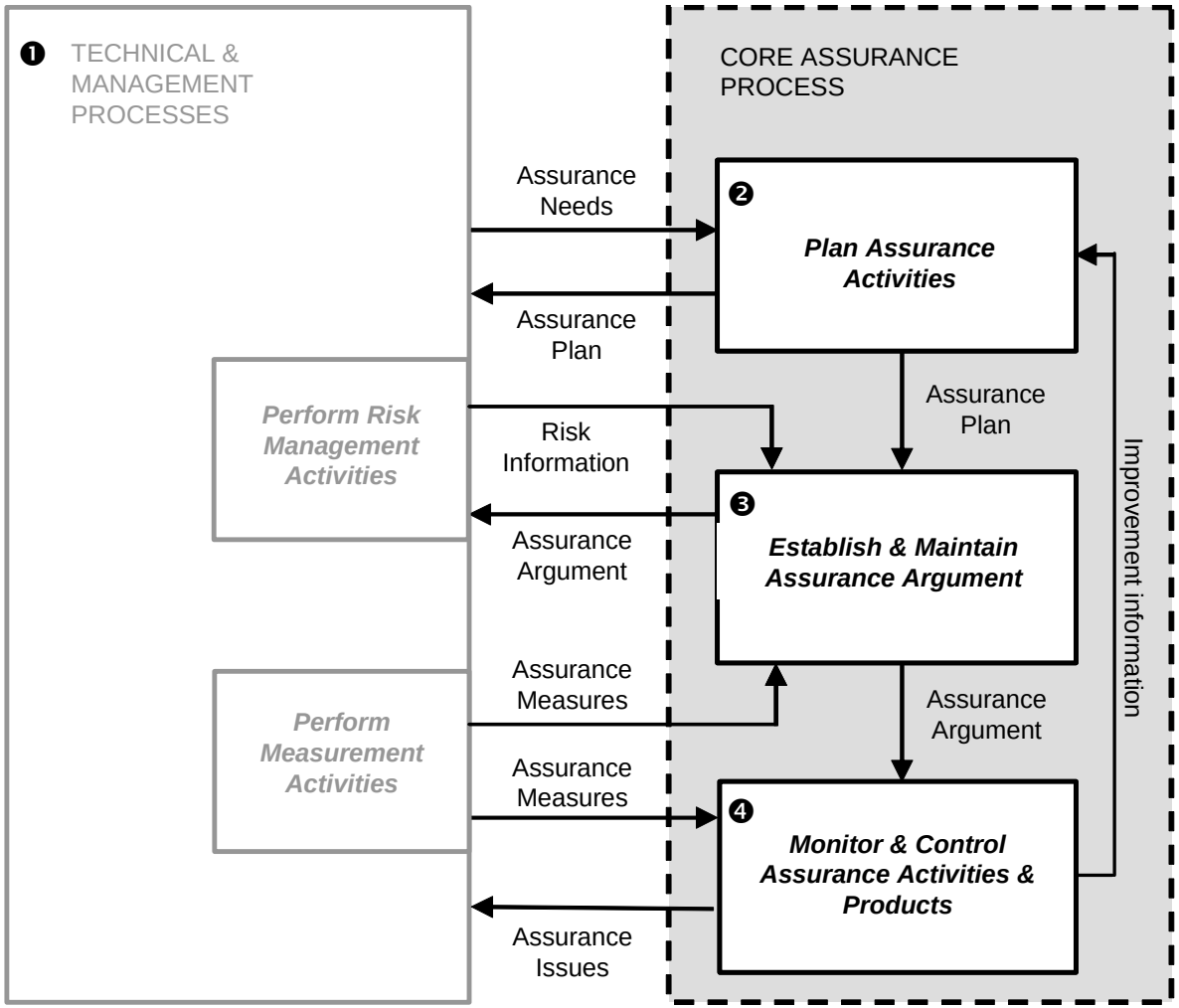
The revision of ISO/IEC 15026 will incorporate the concept of an "assurance case" (a generalization of safety case) as a life-cycle artifact justifying confidence that a system has a desired critical property.

Because the case is a life-cycle artifact, it would be maintained and revised during maintenance and operation of the system.



Adapted from Slide by Jim Moore

ISO/IEC 15026: Systems and Software Assurance



Harmonization of 15288 and 12207

- The standards were difficult to use together because of some differing concepts and process structure
- Furthermore, a set of amendments to 12207 (for the process assessment community) compounded the difficulty by adding some additional differing concepts
- A project is underway to “harmonize” the standards

Key Standards for Software and System Processes

- ISO/IEC 15288, System Life Cycle Processes
  - 25 processes spanning the life cycle of a system
  - The standard is primarily descriptive
- ISO/IEC 12207:1995, Software Life Cycle Processes
  - 17 processes spanning the life cycle of a software product or service
  - The standard is somewhat prescriptive in defining a minimum level of responsible practice
  - Describes processes meeting the needs of organizational process definition
- ISO/IEC 12207:Amd 1
  - Re-describes processes to meet the needs of process assessment and improvement

Overview of approach for Harmonization

Agreed and technically correct ISO/IEC 12207 and guide - can be used with confidence

Small change

ISO/IEC 12207:2007 aligned and using a common nomenclature and structure with ISO/IEC 15288

Larger change

ISO/IEC 24748 General life cycle process set for systems and software

Agreed and technically correct ISO/IEC 15288 and guide - can be used with confidence

ISO/IEC 15288:2007 using a common nomenclature and structure with ISO/IEC 12207

Guides and specific life cycle management process standards

Now

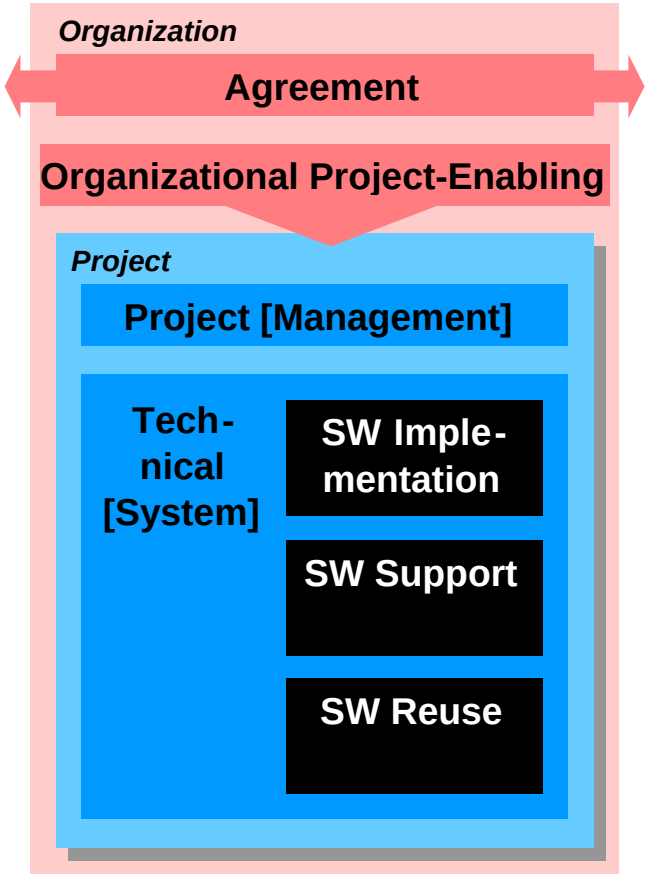
18-24 months

Future

Harmonization Summary

- The harmonization project will be conducted in 2 phases:
  - Alignment phase
    - ISO/IEC 12207 (amended) and ISO/IEC 15288 are being aligned now to have more consistent terminology and presentation
      - Structural refactoring, emphasizing backward compatibility
      - Revise SW and Systems LC standards for better fit, providing a baseline of processes for use by other standards
      - Focus on interoperability of the standards
    - This is part of the normal five year revision of these technically correct standards
  - Integration phase
    - Further guidance and advice on the use of the standards is planned
    - Full integration of processes
      - An integrated model is being worked on but it will take some time and may not be delivered as a conventional standard

Overview of system and software life cycle processes



- Currently, SC7 is revising both 15288 and 12207 to improve the fit between the two - this figure anticipates the result
- The chart shows the *categories* of life cycle processes - there will be about 44 (or 55, depending on how you count specializations) processes
- Each process is defined with:
  - A statement of purpose
  - A list of outcomes
  - A set of activities and tasks to achieve the outcomes
- For a particular project, selected processes are assembled into life cycle "stages"

Examples of processes likely to result from the revision of 12207 and 15288

- Agreement
  - Acquisition, Supply
- Organizational Project Enabling
  - Life Cycle Model and Process Mgt, Infrastructure Mgt, Quality Mgt, Human Resource Mgt, System Portfolio Mgt
- Project
  - Planning, Execution, Assessment and Control
  - Information Mgt, Risk Mgt, Measurement, Decision Mgt, Configuration Mgt
- [System] Technical
  - Stakeholder Requirements Definition, Requirements Analysis, Architectural Design, Implementation, Integration, Verification, Transition, Validation
  - Operation, Maintenance, Disposal
- Software Implementation
  - SW Requirements Analysis, SW Coding & Testing, SW Integration
- Software Support
  - SW Configuration Management, SW Review, SW Quality Assurance
- Software Reuse
  - Domain Analysis

Status of Revisions

- Phase 1 is underway
  - Jan 2006: Working Drafts out for review
  - June 2006: Formal balloting begins
  - Dec 2007: Publication

Other Relevant Standards In Process

- Fast Track and follow-up revision of IEEE 1220, Application and Management of the Systems Engineering Process
  - Revised by IEEE team align better with ISO/IEC 15288 (Phase A)
  - Fast Track into ISO/IEC by June 2006
  - Revision to fully align with Revised 15288
- ISO/IEC 16326, SW Project Management
  - Revision of an existing TR
  - Merger of TR with IEEE Std 1058
  - Investigating broadening scope to include systems
  - Need to clarify the role of the document with respect to other SC7 standards