

ISO 101 And What Is Happening With ISO/IEC 12207, ISO/IEC 15288 And Other Such Numbers

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National Research Council, Canada
January 18, 2007

Outline of the talk

- What is ISO?
- ISO/IEC JTC1 SC7 demystified
- A brief history and structures of ISO/IEC 12207 and 15288 standards
- How will the harmonized standards look
- Current status of the harmonization work
- What about SMEs?
- How can you help?
- Questions – (there might be Answers too...☺)

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ISO

**Contrary to the popular belief ISO does not stand for
“International Standardization Organization”**

Because "**International Organization for Standardization**" would have different abbreviations in different languages ("IOS" in English, "OIN" in French for *Organisation internationale de normalisation*), it was decided at the outset to use a word derived from the Greek **isos**, meaning "equal". Therefore, whatever the country, whatever the language, the short form of the organization's name is always ISO.

(from www.iso.ch)



ISO/IEC JTC 1 SC7 ICT Standardization (1)

- **International Electromechanical Commission (IEC)**
 - **Founded: 1906**
 - **Today's Mandate: The leading global organization that prepares and publishes international standards for **all electrical, electronic and related technologies.**** (www.iec.ch)
- **International Organization for Standardization (ISO)**
 - **Founded: 1947**
 - **Today's Mandate: The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international **exchange of goods and services,** and to developing cooperation in the spheres of **intellectual, scientific, technological and economic activity.**** (www.iso.ch)

ISO/IEC JTC 1 SC7 ICT Standardization (3)

- **In 1988, ISO and IEC put together a Joint Technical Committee 1 (JTC 1) with the mandate of “Standardization in the field of Information Technology”**

Information Technology includes the specification, design and development of systems and tools dealing with the capture, representation, processing, security, transfer, interchange, presentation, management, organization, storage and retrieval of information.

ISO/IEC JTC 1 SC7 ICT Standardization (4)

Technical Areas	JTC1 Subcommittees
Application Technologies	SC 36 – Learning Technology
Cultural and Linguistic Adaptability and User Interfaces	SC 02 – Coded Character Sets SC 22/WG 20 – Internationalization SC 35 – User Interfaces
Data Capture and Identification Systems	SC 17 – Cards and Personal Identification SC 31 – Automatic Identification and Data Capture Techniques
Data Management Services	SC 32 – Data Management and Interchange
Document Description Languages	SC 34 – Document Description and Processing Languages
Information Interchange Media	SC 11 – Flexible Magnetic Media for Digital Data Interchange SC 23 – Optical Disk Cartridges for Information Interchange
Multimedia and Representation	SC 24 – Computer Graphics and Image Processing SC 29 – Coding of Audio, Picture, and Multimedia and Hypermedia Information
Networking and Interconnects	SC 06 – Telecommunications and Information Exchange Between Systems SC 25 – Interconnection of Information Technology Equipment
Office Equipment	SC 28 – Office Equipment
Programming Languages and Software Interfaces	SC 22 – Programming Languages, their Environments and Systems Software Interfaces
Security	SC 27 – IT Security Techniques SC 37 – Biometrics
Software and Systems Engineering	SC 07 – Software and System Engineering

ISO/IEC JTC 1 SC7 ICT Standardization (5)

- **JTC 1 SC7 MANDATE**

**Standardization
of processes, methods and supporting technologies
for the engineering and **management**
of software and systems throughout their life cycles.**

Resolution 935, SC7 Plenary Meeting, May 2006

- **SC7 Chair and Secretariat are from Canada**
 - There are 30 participating and 20 observing members

SC7 – IEEE Computer Society Alliance

SC7 has a strategic alliance with IEEE Computer Society

- SC7 and JTC1 approved Category A Liaison status for IEEE in September 2000
- Several coordinated projects were initiated and executed
- **Result:**

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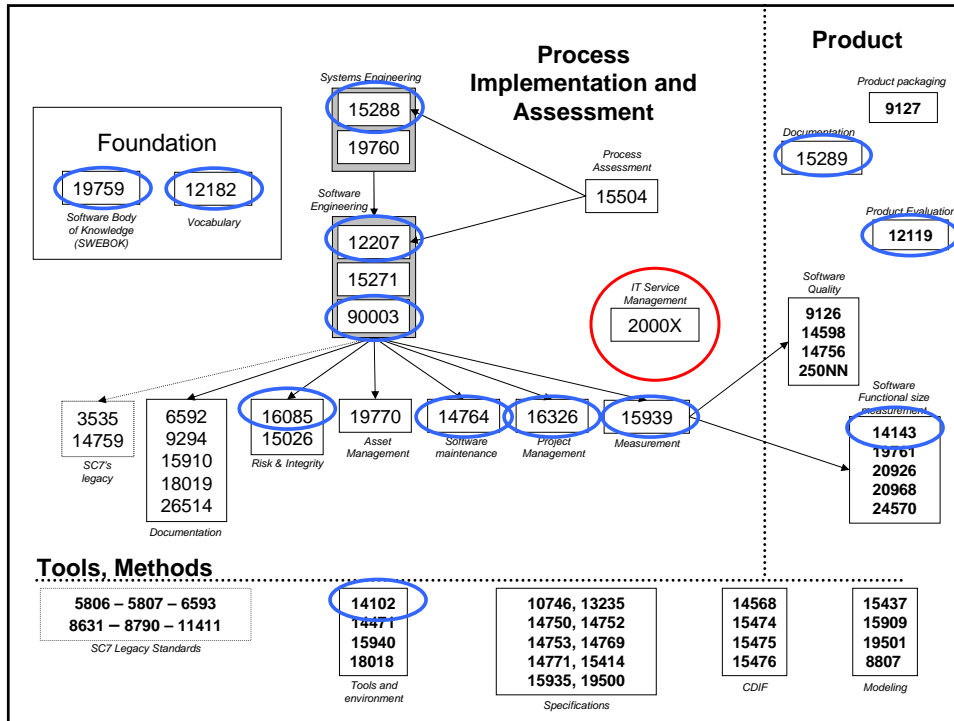
ISO/IEC FCD 12207

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IEEE P12207/CD2

ISO/IEC JTC 1 SC7 ICT Standardization (6)

WG	Program of work
2	Documentation Of Software And Systems
4	Tools And Environment
6	Software Product Measurement And Evaluation System
7	Life Cycle Management
10	Process Assessment
12	Functional Size Measurement
19	Techniques for the Specification of IT Systems
20	Software Engineering Body Of Knowledge And Certification
21	Software Asset Management Process
22	Software And Systems Engineering Consolidated Vocabulary
23	Systems Quality Management
24	Software Life Cycles For Very Small Enterprises
25	IT Service Management
42	Architecture
SWG5	Standards Management Group



NRC-CNRC
Institute for Information Technology

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What is a process?

In the SC7 standards – the process has the following attributes:

- **Title** – conveys the scope of the process as a whole
- **Purpose** – describes the goal of performing the process
- **Outcomes** – express the observable results expected from the successful performance of the process
- **Activities** – are actions that may be used to achieve the outcomes
- **Tasks** – prescribe specific requirements, or recommendations on the execution of a conforming process

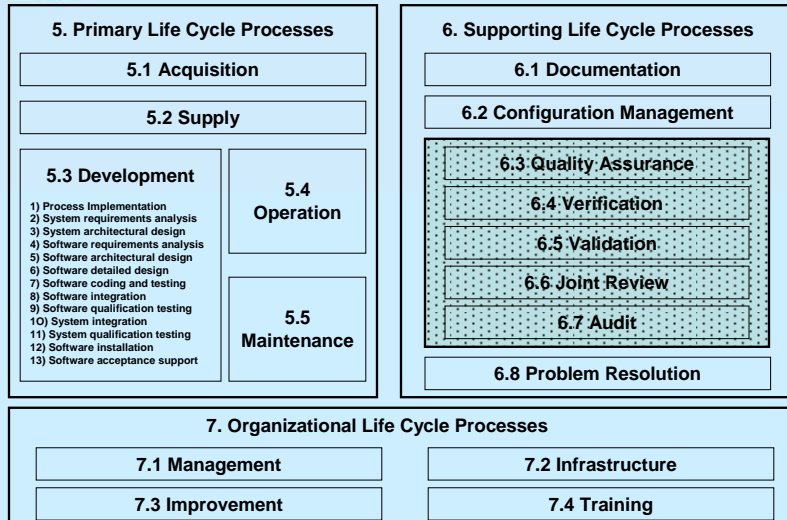
(ISO/IEC TR 24774)

What is ISO/IEC 12207:1995

- **Software life cycle standard to be used in a two-party arrangements**
- **Proposed to SC7 in June 1988**
- **4 Working Drafts; 2 Committee Drafts; 1 DIS**
- **Over 6 years and 17000 person-hours expended**
- **Published in August 1995**

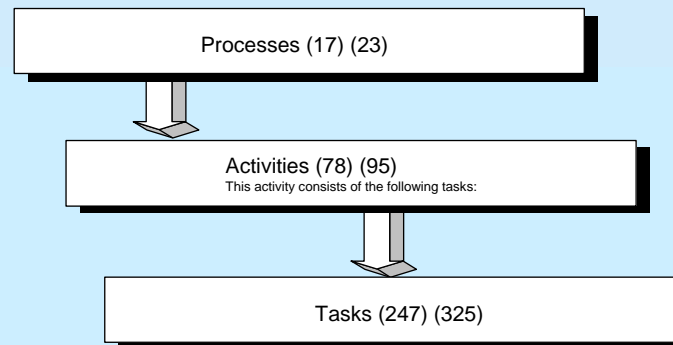
- **Followed by two Amendments in 2002 and 2004 ...**
 - More on those in a minute

Structure of ISO/IEC 12207:1995 (1)



Structure of ISO/IEC 12207:1995 (2)

Processes → Activities → Tasks



Let's improve ...

- **Capability Maturity Model (CMM) was published in 1993**
- **The value of continuous improvement is recognized**
- **Assessment community was growing**
- **... but 12207 was written in non-assessable fashion!**
- **Amendments 1 and 2, and SPICE (aka ISO/IEC TR 15504) to the rescue**
- **TR 15504-2 – Is a Process Reference Model for Software Development LC – but different from 12207!**

Amendments 1 and 2

Amendment 1:

- **Defined purpose and outcomes for all 17 processes in 12207**
- **Defined new Normative processes:**
 - Some were activities from 12207
 - 11 corresponding to activities in Development Process
 - Some new ones – but without activities and tasks
- **Defined “Informative” Processes**
 - Better granularity for assessments
 - “If you do not like Normative Processes try to use those”

Amendment 2:

- **Corrected some errors in Amendment 1**
- **Added one new process (Change Request Management)**

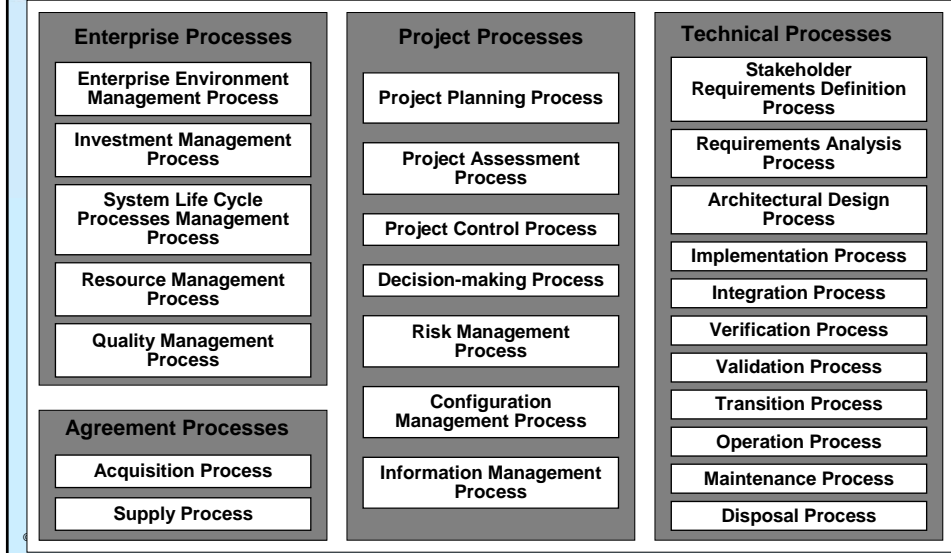
What is ISO/IEC 15288:2002

- **Establishes a common framework for describing the life cycle of systems created by humans and configured with one or more of: the hardware, software, humans, or processes**
- **Defines a set of processes and associated terminology**
 - These processes can be applied at any level in the hierarchy of a system's development

What is ISO/IEC 15288:2002

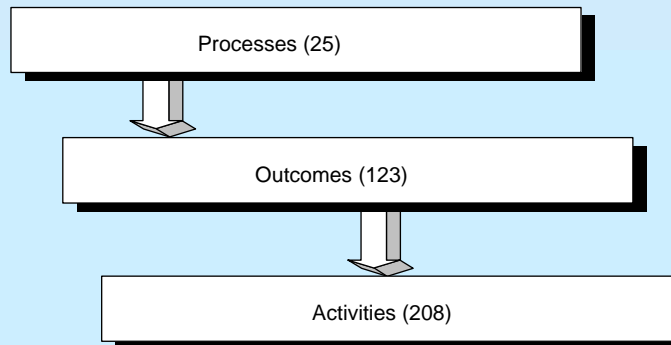
- **Initial planning started in 1994**
- **Published in August 2002**
- **Resolved over 3,800 comments in 10 revisions of the document**
- **Over 40 technical experts from 18 countries participated in the development**
- **Estimated cost of the development - \$8M US**

Structure of ISO/IEC 15288:2002 (1)



Structure of ISO/IEC 15288:2002 (2)

Processes → Outcomes → Activities



What we have is a mess ...

- **12207 – processes without outcomes, but with activities and tasks**
- **12207 Amendments – added purposes and outcomes to existing processes and created new ones with purposes and outcomes only**
- **15288 – processes with purposes, outcomes and activities with a lot of notes**
- **TR 15504-2 – defined its own Process Reference Model (PRM) for Software Development Life Cycle (SDLC)**

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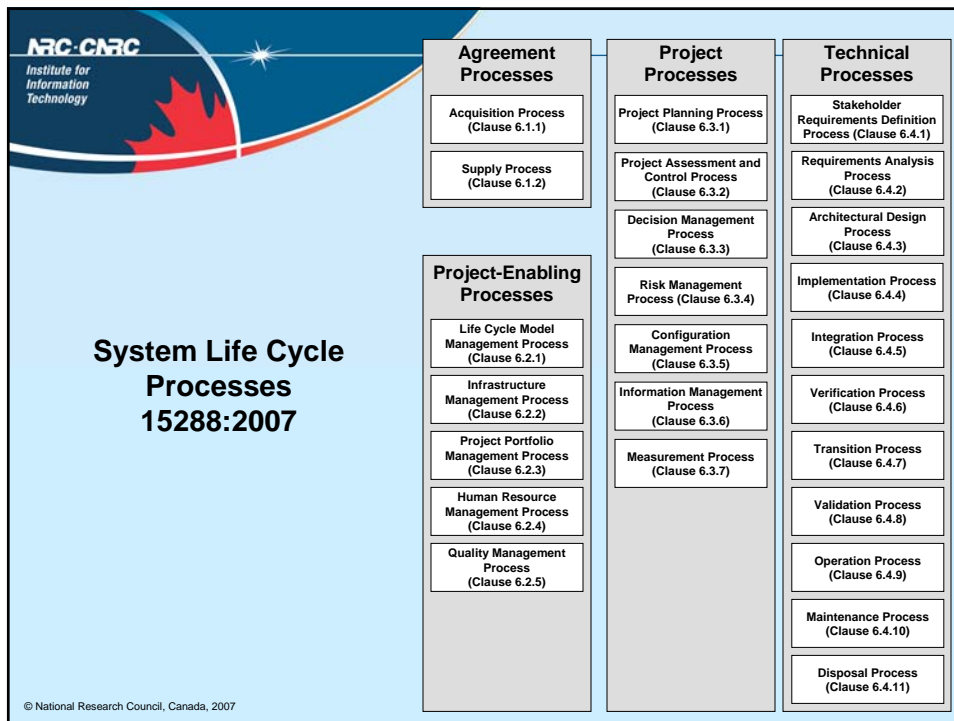
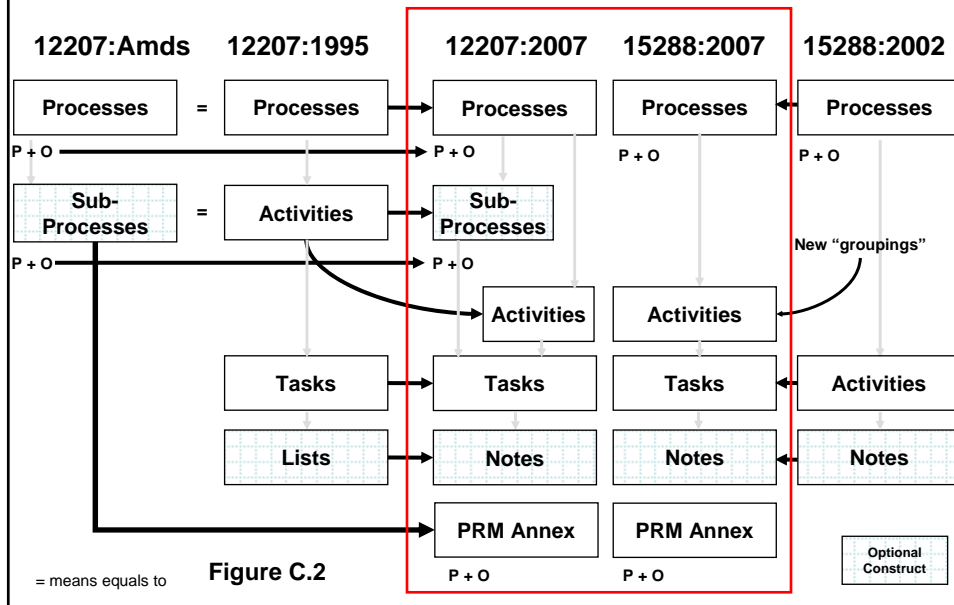
Harmonization Project

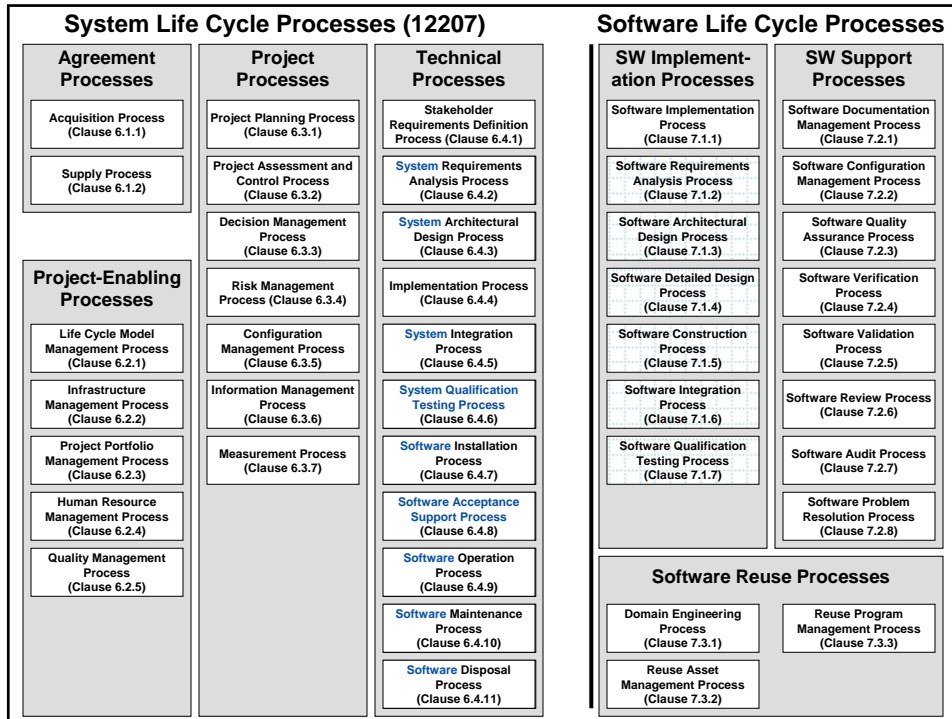
- **Work started before 15288 was published (2002)**
- **Goal – “The unified standard of systems (and software) development”**
- **We were to:**
 - Tailor 15288 for standards development
 - Get users’ feedback
 - Create use cases
 - Create requirements
 - ...
- **We got a number from ISO – 24748**

Alignment Project

- **Proposed in May 2005**
- **Alignment project goals are:**
 - doing “just enough” harmonization to ensure compatibility and consistency, yet provide a more acceptable evolution path for users
 - to be executed quickly
 - to meet the following constraints:
 - Be substantially compatible with 12207:1995
 - Be substantially compatible with 15288:2002
 - Support process assessment as well as it is currently supported by 12207 Amendments
 - Establish consistent terminology and concepts
 - Provide consistent guidelines for both Standards – **ISO/IEC TR 24748**
 - Be accepted at the same time by IEEE CS
- **First drafts of the aligned standards were available in October 2005**

Relations of Process Constructs among ISO/IEC 12207:1995 and its Amendments, 15288:2002, 15288:2007 and **this IS**






12207 Processes – at 15,240 m (1)*

Clause 6 – Provides a system context for dealing with standalone software product or services

- **6.1 – Agreement Processes**
 - Two “dialoging” processes – Acquisition and Supply
- **6.2 – Project-Enabling Processes**
 - Provide resources and infrastructure needed for project execution – human resources, quality management and others

*** 50,000 ft.**

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12207 Processes – at 50,000 ft. (2)

- **6.3 – Project Processes**
- **Two groups:**
 - One to manage:
 - Establishing and evolving project plans
 - Assessing progress of the project
 - Controlling execution until fulfillment
 - One to support:
 - Decision and Risk Management Processes
 - Information Management Process
 - Configuration Management Process

12207 Processes – at 50,000 ft. (3)

- **Technical Processes – Clause 6.4**
 - This clause defines general approach to:
 - Definition of the requirements for the system
 - Transformation of the requirements into a product
 - Consistent reproduction of the product where necessary
 - Use of the product to provide required services
 - Disposal of product when it is retired from service
 - Those processes support and align with ISO/IEC 15288

12207 Processes – at 50,000 ft. (4)

- **Software Life Cycle Processes – Clause 7.1 through 7.3**
 - Provide an elaboration on implementing software products
 - Are used to produce a specified system element that satisfies the requirements derived from the system requirements
- **7.1 – Software Implementation Processes**
 - Software Requirements Analysis
 - Software Architectural Design
 - Software Detailed Design
 - Construction and Integration
 - Qualification Testing
- **7.2 – Software Support Processes**
- **7.3 – Software Reuse Processes**

12207 process – at a ground level (1)

- **7.1.3 – Software Architectural Design**
- **Purpose**
 - To provide a design for software that implements and can be verified against the requirements
- **Outcomes**
 - Software architecture is developed and baselined
 - Internal and external interfaces are defined
 - Consistency and traceability to requirements are established
- **One activity with seven tasks**

12207 process – at a ground level (2)

- The implementer shall transform the requirements for the software item into an architecture that describes its top-level structure and identifies the software components. It shall be ensured that all the requirements for the software item are allocated to its software components and further refined to facilitate detailed design. The architecture of the software item shall be documented
- The implementer shall develop and document a top-level design for the interfaces external to the software item and between the software components of the software item
- The implementer shall develop and document a top-level design for the database
- The implementer should develop and document preliminary versions of user documentation
- The implementer shall define and document preliminary test requirements and the schedule for Software Integration
- The implementer shall evaluate the architecture of the software item and the interface and database designs considering the criteria listed below. The results of the evaluations shall be documented
- The implementer shall conduct review(s) in accordance with clause 7.2.6

Relations between 12007 and 15288

- **12207:2007 establishes the link between system and its software -**
 - Software is always treated as part of the system – a fundamental premise of the standard
 - Software is implemented by extracting software requirements from system and then produced and integrated back into the system
 - When “software content” is small – use 15288
 - When “system content” is small – use 12207
 - When both are large – use 15288 for system and 12207 for software.

Relations ... (2)

- ***is-part-of***
 - SW Detailed Design ***is-part-of*** SW Implementation
 - (This is the relationship between processes and sub-processes processes.)
 - Activity ***is-part-of*** Process
- ***is-specialization-of***
 - SW Implementation ***is-specialization-of*** Implementation Process
- ***contributes-to***
 - SW Installation ***contributes-to*** Transition Process
 - Activity ***contributes-to*** Process

Annex D of 12207 lists process relations in those terms

Relations ... (3)

- **Software Product and Software Service**
 - In general 12207 applies to both
 - Provisions of processes state their applicability
 - Acquisition and Supply, Requirements Definitions, Operation Process
- **Life Cycle Models and Stages in 12207**
 - Informative text adapted from 15288
 - Temporal relations

Relations ... (4)

- **Organizations and Parties**
 - An organization is a body of persons with identified responsibilities and authorities
 - When organization enters into a contract – it is a party
 - Organization or a party derives its name from a process it executes
- **Parties can be from the same organization**
- **Under the same application of the Standard a party should not perform the Acquisition and Supply processes**
 - But, it can execute all other processes

Conformance

- Derived from 15288:2002**
- **Major change from 12207:1995**
 - Full conformance
 - Tailored conformance
 - Tailoring is limited to deletion of outcomes, activities and tasks
 - **Tailoring process allows (in Notes)**
 - To achieve additional outcomes or implement additional activities
 - “Modification should be avoided because it may have unanticipated consequences on other processes, outcomes, activities or tasks. If necessary, modification is performed by deleting the provision (making the appropriate claim of tailored conformance) and, with careful consideration of consequences, implementing a process that achieves additional outcomes or performs additional activities and tasks beyond those of the tailored standard.”

Process Views - 15288

- **15288 (or 12207) – Did not provide distinct processes to handle “ilities”**
 - Human factors, Security, Reliability ...
- **We had a number of requests to develop Domain Engineering standards**
- **15288 defines an informative “bolting on” mechanism for those domains**
- **Provided a generalized example for illustrative purposes which covers a broad set of functional and non-functional characteristics.**
 - For actual usage, the process view should be adapted for the specific specialty engineering concern.

We did not provide a similar example in 12207

Current status and plans

- **Working Drafts reviewed in Seoul in October 2006**
 - ~ 1200 comments dispositioned
 - Editors incorporated changes
- **Final Committee Drafts (FCD) published December 17, 2006**
 - Canadian review and balloting ends April 27, 2007
 - ISO balloting ends May 6, 2007
- **Editorial team will meet in early May (?)**
- **Final disposition of comments in Moscow, May 20-25, 2007**
- **FDIS ready for voting early July 2007**
- **Standards ready in November 2007**

You too can review and influence these Standards ...

- There is still time ...
- I can provide documents and your comments would be channeled through me

OR

- For a sustained contributions one must be accredited by **Standards Council Canada (SCC)**
 - SCC parallels ISO structure(s)
 - Canadian Advisory Committee (CAC) to SC7
- All done electronically through **SCC website**
- All you need is some time and a resume ...
- Contact Jean Bérubé at jean.berube@idegenic.com

Future Work

- **Five years correction cycle**
 - “Editorial issues”
 - Stronger integration of system and software engineering
 - Levels of detail in 12207 and 15288
 - Definitions
- **Elaboration on specific life cycle management processes**
 - Requirements Engineering Standard(s)
 - Configuration Management Standard(s)
 - Testing Standard(s)
 - Services
- **Another attempt on “The unified standard of systems development?”**
- **My position**
 - Let the dust settle ...
 - We must have a substantial feedback from users of the standards

Supporting Standards (1)

- **ISO/IEC TR 24748 – Systems and software engineering — Life cycle management — Guide for life cycle management**
 - Lags 12207 and 15288 by one review cycle
 - Request was made to ISO to be available free
- **Expands on concepts of life cycle stages**
- **Develops an exemplar LC for system and software**
- **Provides guidance on tailoring**

The future of the existing Guides (TR 15271, TR 19760) is not clear at the moment

Supporting Standards (2)

- **15939:2007 – ~~Systems and~~ software engineering — ~~Software~~ Measurement process**
- **16085:2006 – Systems and Software engineering – Risk management**
- **16326:1999 – “~~Systems and~~ Software engineering – Guide for the application of ISO/IEC 12207 to project management” is being rewritten**
- **14764:2006 – Software Life Cycle Processes – Maintenance**
- **15289:2006 – Systems and software engineering – Content of systems and software life cycle process information products (Documentation)**

- **Software and Systems Engineering Vocabulary**
 - IEEE and SC7 cooperation
 - Available (soon) on line

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ISO 29110 – 12207 for the masses

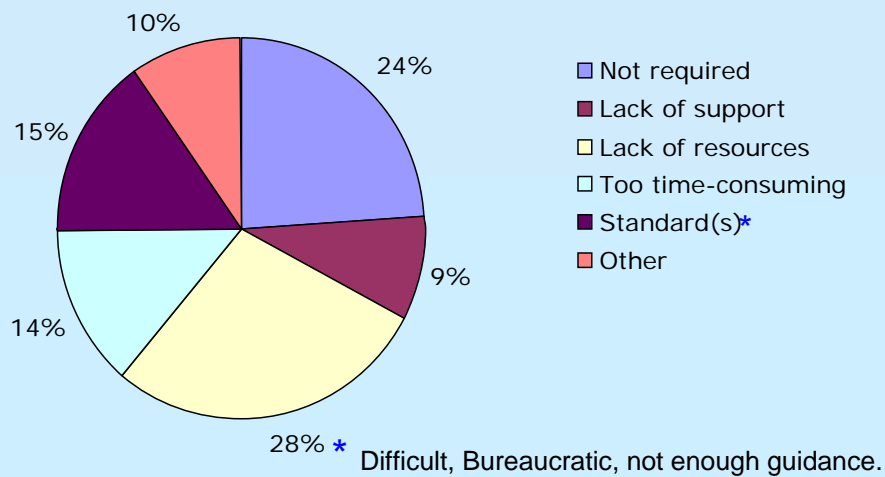
- **A proposal for subsetting of 12207 “socialized” before Plenary Meeting in May 2004**
 - Gained support from Canadian CAC
 - Gained support from SC7 Chair
- **NWIP done in the fall 2004**
 - Thailand’s proposal - two workshops held in Bangkok in 2005
- **WG24 established after May 2005 meeting**
- **Defined Very Small Enterprise as < 25 IT people**
- **General objective – a graduated path to conformance to full standards**

Survey of VSEs

www.sc7-wg24.net
Username: isosurvey
Password: vse

- **Objectives**
 - Ask VSEs about their use of ISO/SC7 standards
 - Identify problems and potential solutions to help VSEs apply standards and become more competitive.
- **Method**
 - Web questionnaire translated into nine languages
 - Invitation to respond broadcasted through:
 - WG 24 Network
 - Centers and initiatives focused on SMEs/VSEs,
 - SIPA (Thailand), CETIC (Belgium), Parquesoft (Colombia).
 - SPINs
- **Results**
 - Over 430 responses from 32 countries
 - Colombia 109, Thailand 59, Brazil 72
 - **Canada 10, USA 3**

Why don't VSEs use Standards?



12207 for the masses

- **WG24 accepted input from Thailand and Mexico as the basis for Profile 1**
- **The contributed Mexican standard is divided into four parts:**
 - Definition of Concepts and Products;
 - Process Requirements (MoProSoft);
 - Guidelines for Process Implementation; and
 - Guidelines for Process Assessment (EvalProSoft)
- **Clear two aspects – packaging of standard for specific domain; the other provide guideline material**
- **Your contributions and participation is more than welcome ...**

ISO 20000

- **ISO/IEC 20000 – Information technology – Service management**
 - Based on BS15000 – fast-tracked into ISO
 - enables organizations to benchmark their capability in delivering managed services, measuring service levels and assessing performance
- **Part 1: *Specification***
 - provides requirements for IT service management
 - is relevant to those responsible for initiating, implementing or maintaining IT service management in their organizations
- **Part 2: *Code of practice***
 - industry consensus on guidance to auditors and assistance to service providers planning service improvements or to be audited against ISO/IEC 20000-1

Useful links

- www.scc.ca
- www.iso.ch
- www.jtc1-sc7.org
- www.12207.com
- www.15288.com
- <http://profs.logti.etsmtl.ca/claporte/English/VSE/index.html>
- www.sc7-wg24.net
Username: isosurvey
Password: vse

Acknowledgments

- **Some text derived from presentation by François Coallier on May 1, 2006 (private communication)**
- **Some text derived from “15288 Marketing Presentation” prepared by WG7 Members (07N0643)**
- **Some text derived from NWIPs for Harmonization Project (07N0861, 07N0862)**
- **Some text derived from Claude Laporte’s presentation on work of WG24 (to be presented at SEPG 2007, Austin, TX)**
- **Massive amount of work of the Alignment Editorial Team**
- **Work of the members of the ISO/IEC JTC1 SC7/WG7**

If you want to contribute, have questions

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