

The Future of SPICE



Antonio Coletta - DNV IT Global Services

Head of Italian delegation to ISO/IEC JTC1 SC7 email:tony.coletta@virgilio.it

SPICE Days 2009 22 - 24 June 2009 Stuttgart, Germany



Agenda

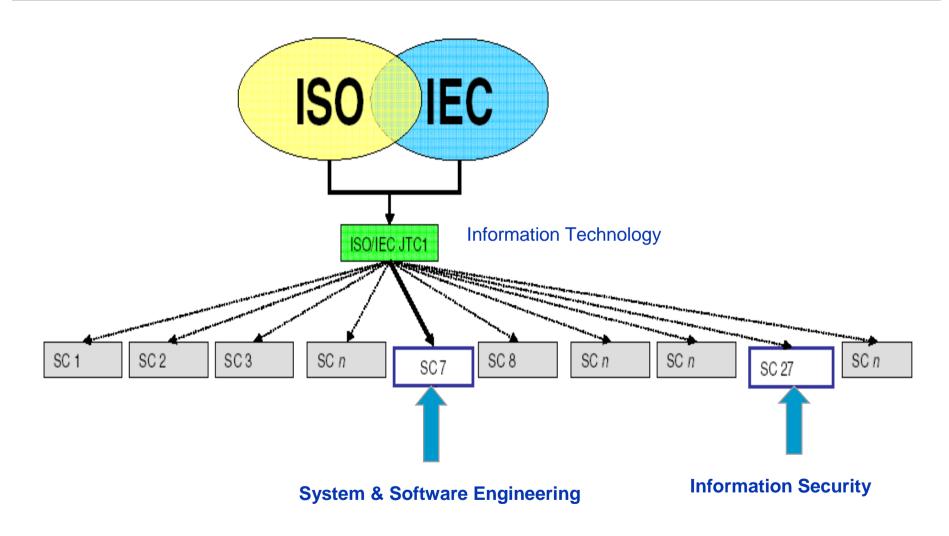


- ISO/IEC 15504 Overview of current baseline
- Short term enhancements and updates
 - Alignment to revised PRM for software and system engineering (Parts 5 and 6)
 - Unexplored new features about process assessments (Part 7)
 - PRM/PAM for IT services (Part 8)
 - Guidance on defining Target Process Profiles (Part 9)
 - Safety Extensions (Part 10)
 - Conformity assessment methodology (ISO/IEC 29169)
- Long term revision The next generation of SPICE (ISO/IEC 3100x)



ISO/IEC JTC1 – Information Technology





ISO/IEC JTC1 SC7 System & Software Engineering Organizational chart

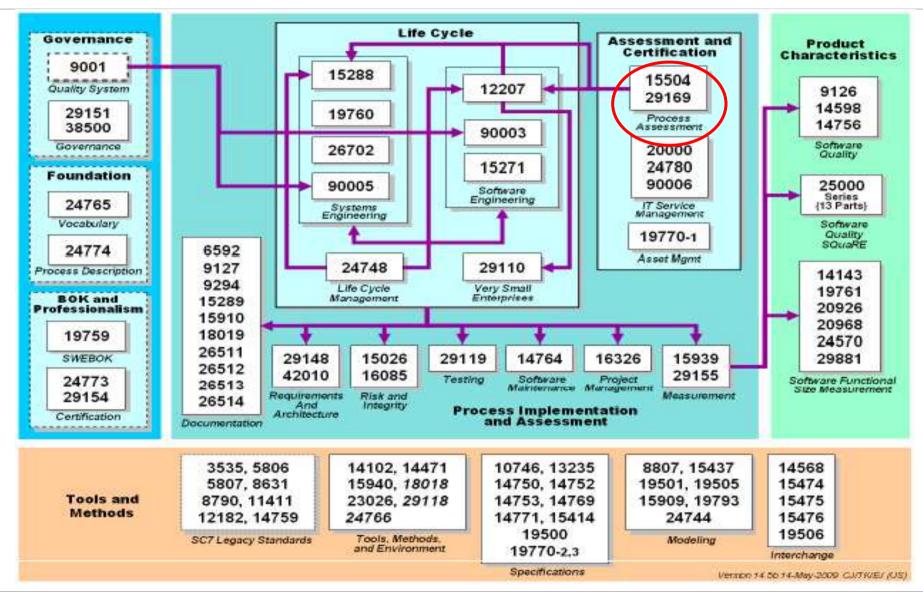


SC7 System & Software Engineering

SWG1 Business Planning Group	SWG 5 Standards Management Group
WG 2 Systems & Software Documentation	WG 4 Tools and Environment
WG 6 Software Product Measurement and Evaluation	WG 7 Life Cycle Management
WG 10 Process Assessment	WG19 Techniques for Specifying IT Systems
WG 20 Software Engineering Body of Knowledge	WG 21 Software Asset Management
WG 22 Vocabulary	WG 23 Systems Quality Management
WG24 SLC Profiles and Guidelines for VSE	WG 25 IT Service management
WG 26 S/W Testing	WG 42 Architecture
WG 1A IT Governance	JWG ISO/TC 54 CIF Usability

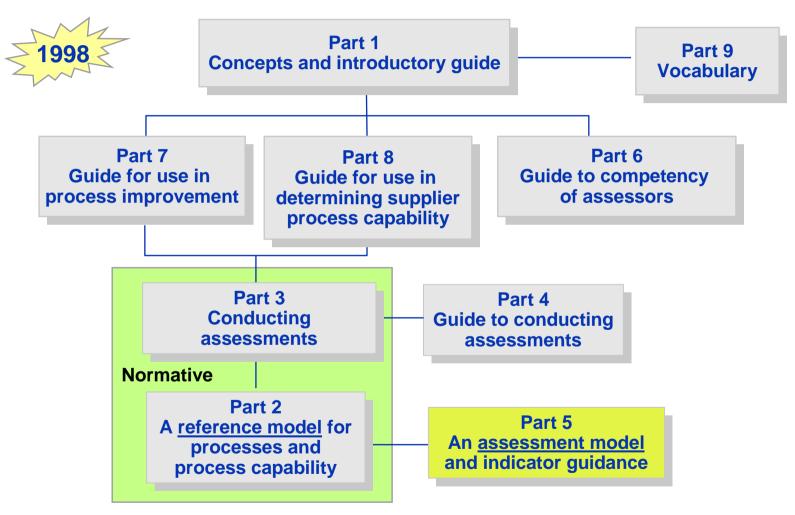
Overview of SC7 standards (2009-05-14)





The ISO/IEC 15504 Technical Report





ISO/IEC TR 15504: 1998 – **Software** Process Assessment

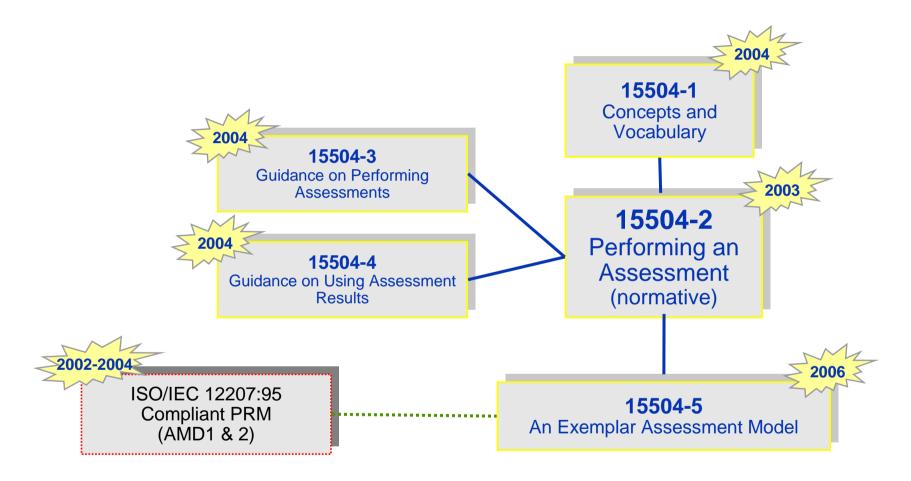
2003-2006 - From TR to IS



- From Technical Report (TR) to International Standard (IS)
- Restructuring from 9 parts to 5 parts
- Name change from "Software Process Assessment" to "Process Assessment"
- Introduction of concept of external Process Reference Models (PRM) and Process Assessment Models (PAM)
- Alignment of Capability Dimension with ISO 9001:2000

Structure of ISO/IEC 15504 (IS)



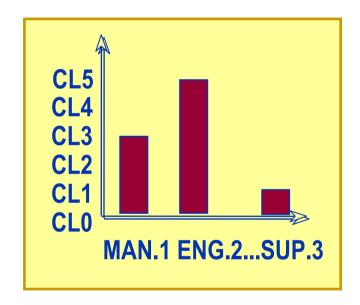


The Assessment framework



Two-dimensional model for processes and process capability

- Process Dimension
 - Process Categories
 - Processes (P1, ..., Pn)
- Capability Dimension
 - Capability Levels (CL1, ..., CL5)
 - Process Attributes (PA1.1, PA2.2 .. PA5.5)



Each process receives a capability level rating

Capability Levels and Attributes



Optimizing

The process is continuously improved to meet relevant current and projected business goals

Predictable

The process is enacted consistently within defined limits

Established

A defined process is used based on a standard process.



Level 5 **Optimizing**

Process Innovation PA.5.1

PA.5.2 **Process Optimization**



Level 4 Predictable

PA.4.1 **Process Measurement**

PA.4.2 **Process Control**



Level 3 **Established**

PA.3.1 **Process Definition**

PA.3.2 **Process Deployment**



Level 2 Managed

> PA.2.1 **Performance Management**

PA.2.2 **Work Product Management**

Managed

The process is managed and work products are established, controlled and maintained.



Performed Level 1

PA.1.1 Process Performance

Performed

The process is implemented and achieves its process purpose

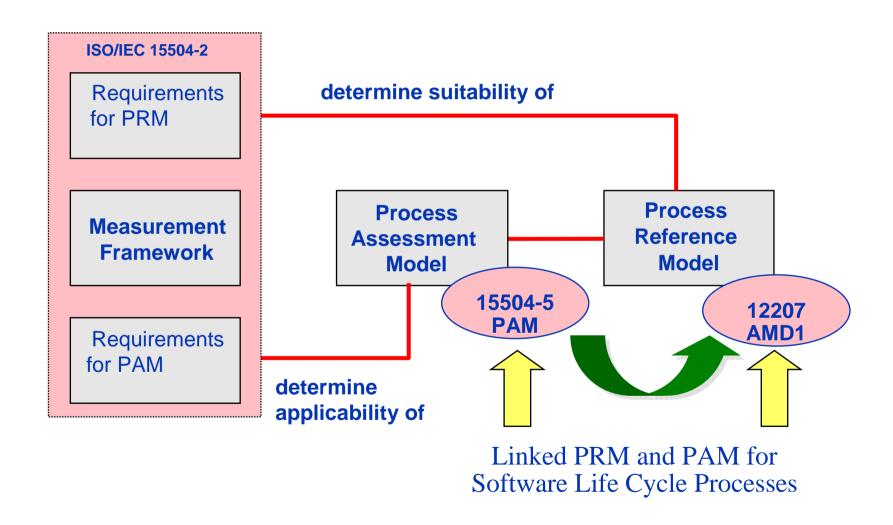
Incomplete Level 0

Incomplete

The process is not implemented or fails to achieve its purpose

ISO/IEC 15504 International Standard





Process Reference Model – 12207 AMD1





PRIMARY PROCESSES

Acquisition

Acquisition Preparation Supplier selection Supplier monitoring Customer acceptance

Supply

Operation

Operational Use Customer support

Maintenance

Development

Requirements elicitation System Requirements Analysis

System Architecture Design

Software Requirements

Analysis

Software Design

Software Construction

(Code and Unit Test)

Software Integration

Software Testing

System Integration

System Testing

Software Installation

SUPPORTING PROCESSES

Documentation

Configuration Manag.

Quality Assurance

Verification

Validation

Joint Review

Audit

Problem Resolution

Usability

Product Evaluation

ORGANISATIONAL PROCESSES

Management

Organizational Alignment
Organization Management
Project Management
Quality Management
Risk Management
Measurement

Infrastructure

Asset Management

Improvement

Process establishment Process assessment Process improvement Human Resource Human Resource

Management

Training

Knowledge Management

Reuse

Domain Engineering

Automotive SPICE - Process Reference Model



PRIMARY

Acquisition

Contract agreement

Supplier monitoring

Technical Requirements

Legal and Administrative Req.s

Project Requirements

Request for proposals

Supplier Qualification

Supply

Supplier tendering

Product release

Management

Project management

Risk management

Measurement

Engineering

Requirements elicitation

System requirements analysis

System architectural design

Software requirements analysis

Software design

Software construction

Software integration test

Software testing

System integration test

System testing

ORGANISATIONAL

Process Improvement

Process improvement

SUPPORTING

Support

Quality assurance

Verification

Joint review

Documentation Management

Configuration Management

Problem Resolution management

Change Request management



Reuse

Reuse program management

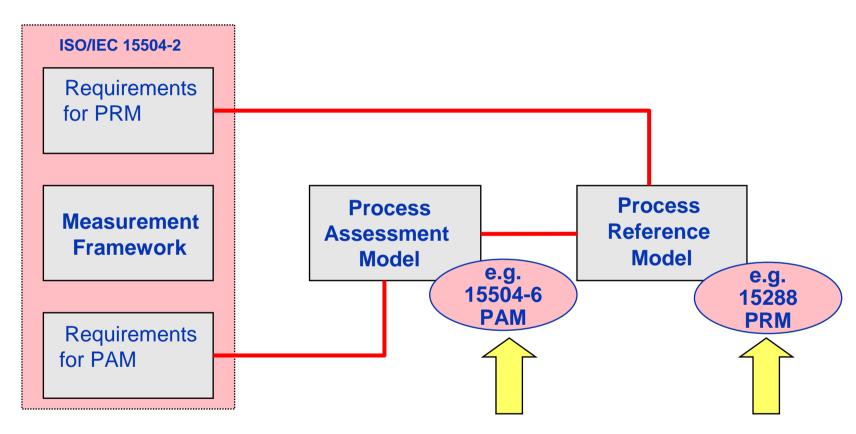
Downloadable from http://www.automotivespice.com/web/download.html

Automotive SPICE™ Process Assessment Model (PAM) RELEASE v2.4 - 2008-08-01

Automotive SPICE™ Process Reference Model (PRM) RELEASE v4.4 - 2008-08-01

ISO/IEC 15504 applied on 15288

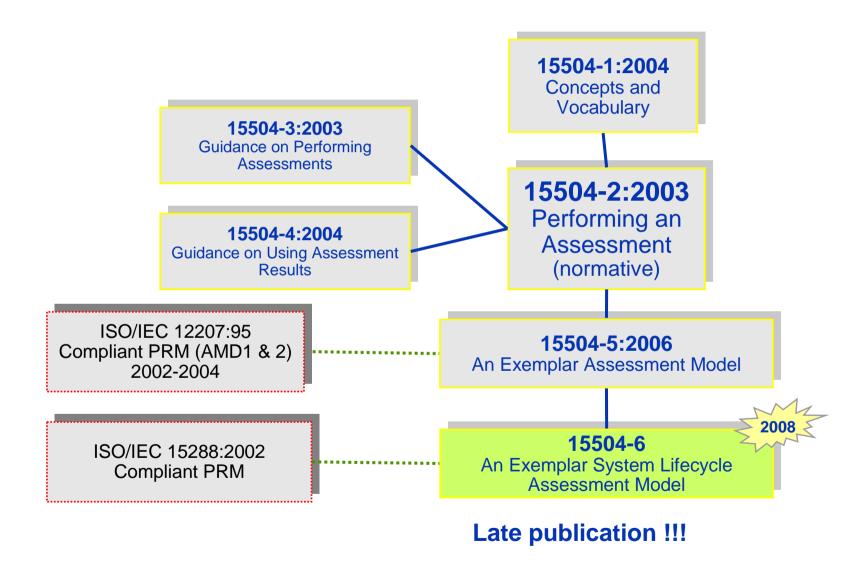




Linked PRM and PAM for **System** Life Cycle Processes

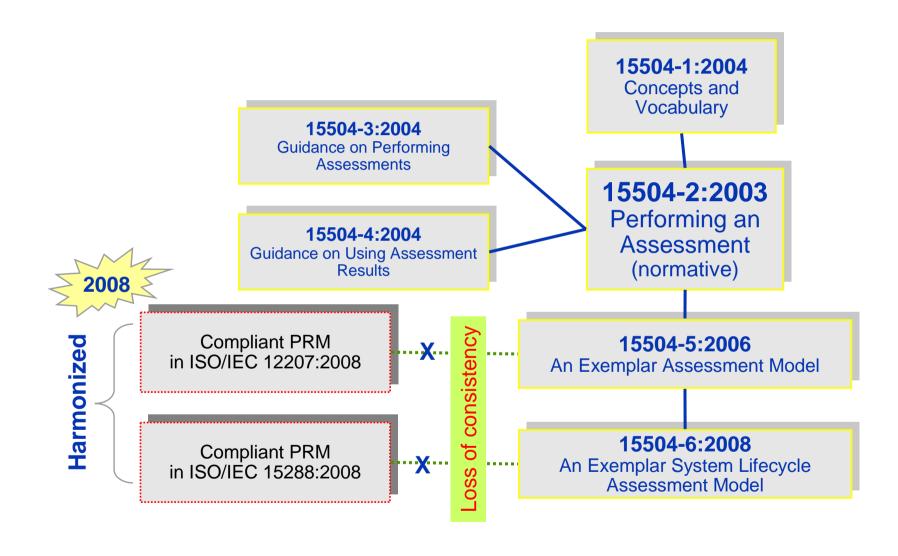
Assessment Model for System Lifecycle





2008 – Publication of revised 12207 and 15288







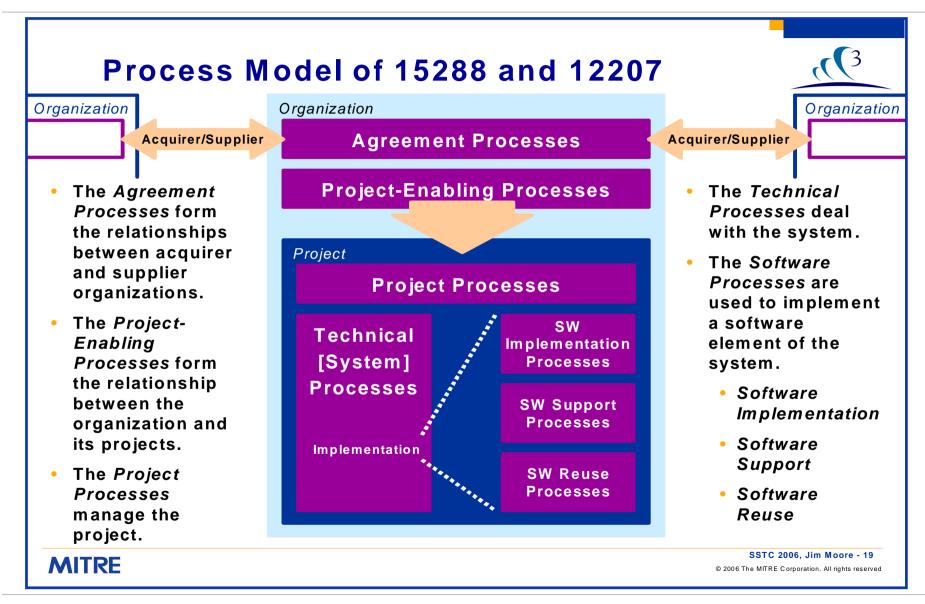
Alignment to software and system lifecycle standards



Restore consistency with revised ISO/IEC 12207 & 15288

Harmonized 15288 and 12207









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Agreement Processes

Acquisition Process (Clause 6.1.1)

Supply Process (Clause 6.1.2)

Organizational Project-Enabling Processes

Life Cycle Model Management Process (Clause 6.2.1)

Infrastructure Management Process (Clause 6.2.2)

Project Portfolio Management Process (Clause 6.2.3)

Human Resource Management Process (Clause 6.2.4)

Quality Management Process (Clause 6.2.5)

Project Processes

Project Planning Process (Clause 6.3.1)

Project Assessment and Control Process (Clause 6.3.2)

Decision Management Process (Clause 6.3.3)

Risk Management Process (Clause 6.3.4)

Configuration Management Process (Clause 6.3.5)

Information Management Process (Clause 6.3.6)

Measurement Process (Clause 6.3.7)

Technical Processes

Stakeholder Requirements Definition Process (Clause 6.4.1)

Requirements Analysis Process (Clause 6.4.2)

Architectural Design Process (Clause 6.4.3)

Implementation Process (Clause 6.4.4)

Integration Process (Clause 6.4.5)

Verification Process (Clause 6.4.6)

Transition Process (Clause 6.4.7)

Validation Process (Clause 6.4.8)

Operation Process (Clause 6.4.9)

Maintenance Process (Clause 6.4.10)

Disposal Process (Clause 6.4.11)

ISO/IEC 12207:2008 PRM – Software lifecycle





System Context Processes

Agreement Processes

Acquisition Process (Clause 6.1.1)

Supply Process (Clause 6.1.2)

Organizational Project-Enabling Processes

Life Cycle Model Management Process (Clause 6.2.1)

Infrastructure Management Process (Clause 6.2.2)

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Configuration Management Process (Clause 6.3.5)

Information Management Process (Clause 6.3.6)

Measurement Process (Clause 6.3.7)

Technical Processes

Stakeholder Requirements Definition Process (Clause 6.4.1)

System Requirements Analysis Process (Clause 6.4.2)

System Architectural Design Process (Clause 6.4.3)

Implementation Process (Clause 6.4.4)

System Integration Process (Clause 6.4.5)

System Qualification Testing Process (Clause 6.4.6)

Software Installation Process (Clause 6.4.7)

Software Acceptance Support Process (Clause 6.4.8)

Software Operation Process (Clause 6.4.9)

Software Maintenance Process (Clause 6.4.10)

Software Disposal Process (Clause 6.4.11)

SW Implementation Processes

Software Specific Processes

Software Implementation Process (Clause 7.1.1)

Software Requirements Analysis Process (Clause 7.1.2)

Software Architectural Design Process (Clause 7.1.3)

Software Detailed Design Process (Clause 7.1.4)

Software Construction Process (Clause 7.1.5)

Software Integration Process (Clause 7.1.6)

Software Qualification Testing Process (Clause 7.1.7)

SW Support Processes

Software Documentation Management Process (Clause 7.2.1)

Software Configuration Management Process (Clause 7.2.2)

Software Quality Assurance Process (Clause 7.2.3)

Software Verification Process (Clause 7.2.4)

Software Validation Process (Clause 7.2.5)

Software Review Process (Clause 7.2.6)

Software Audit Process (Clause 7.2.7)

Software Problem Resolution Process (Clause 7.2.8)

Software Reuse Processes

Domain Engineering Process (Clause 7.3.1)

Reuse Asset Management Process (Clause 7.3.2) Reuse Program Management Process (Clause 7.3.3)





- "Action should be taken in the <u>short term</u> to re-establish consistency between Parts 5 and 6 and the source standards, ISO/IEC 12207 and ISO/IEC 15288." (From Study Group on Revision of ISO/IEC 15504)
- Resolutions approved last May for maintenance projects to revise:
 - ISO/IEC 15504-5 to align to ISO/IEC 12207:2008
 - ISO/IEC 15504-6 to align to ISO/IEC 15288:2008



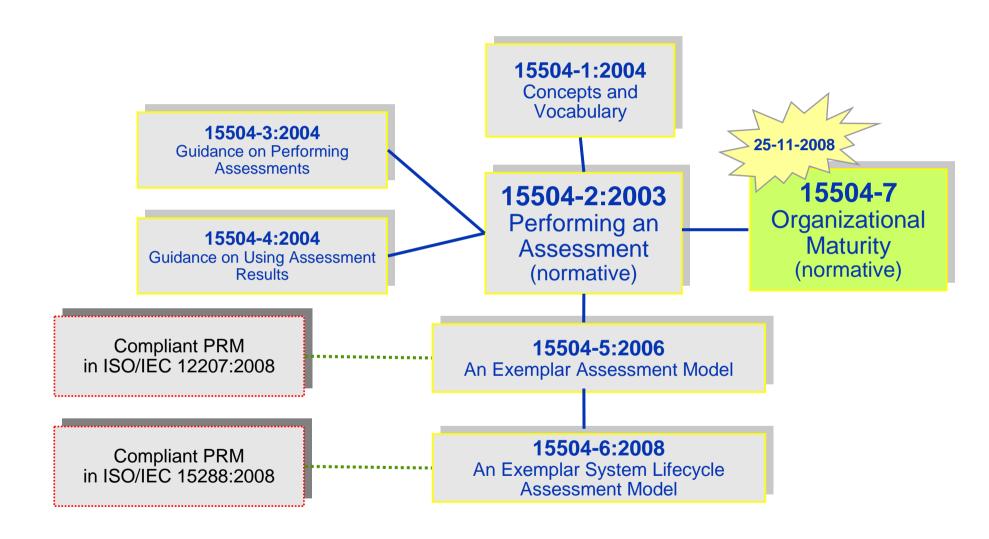
Unexplored features of part 7



Making assessments more robust andresults more reliable

Introducing Organizational Maturity





"Unexplored" features in Part 7



- New features not sufficiently known/applied
- Additional requirements to enhance confidence and reliability of assessment results
- Assessment <u>classes</u> different levels of rigor and confidence in the assessment results
- Assessment <u>types</u> different levels of independence of the body and the assessment team performing the assessment

Assessment classes (SCAMPI-like)



Class 1

- well suited for comparisons across different organizations;
- reliable conclusions on strengths and weaknesses;
- for process improvement, external benchmarking and capability determination.

Class 2

- indicates the overall level of performance of the key processes;
- suitable for comparisons across an organizational or product line scope;
- Indications on levels of risk and opportunities for improvement;
- for initial assessment at the commencement of an improvement program.

Class 3

- provides general indication of organizational maturity
- indicate key areas of risk and critical opportunities for improvement;
- suitable for monitoring ongoing progress of improvement program, or to identify key issues for later Class 1 or Class 2 assessment.

Assessment Classes



Class	Class 1	Class 2	Class 3
Requirements			
Min. number of process instances	4	2	No constraint
Min number of assessor (including	2 Competent assessor must be	2	1
competent assessor)	independent		
Evidence type	Work products + Testimony	Work products + Testimony	No constraint
	Outcomes for each instance (F,L,P,N)		
Rating	Attribute for each instance (F,L,P,N)		
	Overall Attributes (F,L,P,N)	Overall Attributes (F,L,P,N)	Overall Attributes (F,L,P,N)
	Capability Level	Capability Level	Capability Level
Document & Reporting weakness/gaps	YES	YES	Not required

Requirements for data collection (Class 1 & 2)



Process Attribute	Process Instance 1	Process Instance 2	Process Instance 3	Process Instance 4	
PA 1.1	Work product	Testimony	Work product	Testimony	
PA 2.1	Testimony	Work product & Testimony	Work product	Testimony	For each process attribute
PA 2.2	Work product	Testimony	Testimony	Testimony	there shall be both work product evaluation and
PA 3.1	Work product	Work product	Testimony	Testimony	testimony (5.2.3.2.a).
PA 3.2	Work product	Work product	Work product & Testimony	Work product	
	Each process instance shall include both work product evaluation and testimony (5.2.3.2 b)				

Assessment Type



	Type A	Туре В	Type C	Type D
Body performing the assessment	The body performing the assessment is independent of the organization being assessed		The body performing the assessment is part of the organization being assessed	The body performing assessment may or may NOT be independent of the organization being assessed
Assessors (other than competent assessor)	Independent of the organization being assessed	Independent of the organization being assessed May be from the organization being assessed provided clear separation of the responsibilities of the assessors from personnel in other functions	Adequate separation of responsibilities from personnel in other functions	Need NOT be independent of the organization being assessed

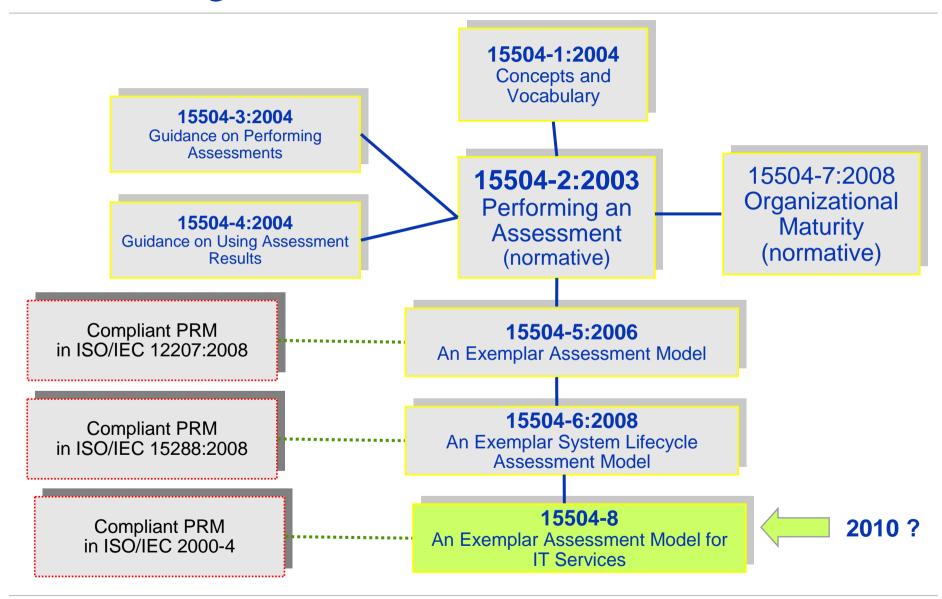


SPICE for IT Services



Introducing SPICE for IT Services





ISO/IEC 20000-1 – Structure & Content



Management	System
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Management Responsibility
Documentation Requirements
Competences, awareness & training

Continual Improvement

Plan, Implement, Monitor, Improve (Plan, Do, Check, Act)

Transition new/changed services

Planning and Implementing new or changed services

Security Management

Availability & Continuity Management

Release Processes

Release Management

Service Delivery Processes

Service Level Management Service Reporting

Control Processes

Configuration Management
Change Management

Resolution Processes

Incident management
Problem Management

Capacity Management

Budgeting & Accounting for IT Services

Relationship Processes

Business Relationship Management

Supplier Management

Process reference model (ISO/IEC 20000) MANAGING RISK



PRIMARY (CORE) PROCESSES

- Service level management
- Service reporting
- **Service continuity** and availability management
- Capacity management

- Information security management
- Configuration management
- Change management
- Release management
- Incident management
- Problem management

ORGANISATIONAL PROCESSES

- Corporate governance
- **SMS** Establishment
- **Management review**

- Measurement
- Audit
- **Improvement**
- **Human resource** management

SUPPORTING PROCESSES

- **Business relationship** management
- **Supplier management**
- New and changed services
 - Identification
 - **Planning**
 - Design
 - **Transition**
 - **Monitoring**
- Information item management for TSM
- Risk management
- **Budgeting and** accounting for IT services

Source: Alastair Walker



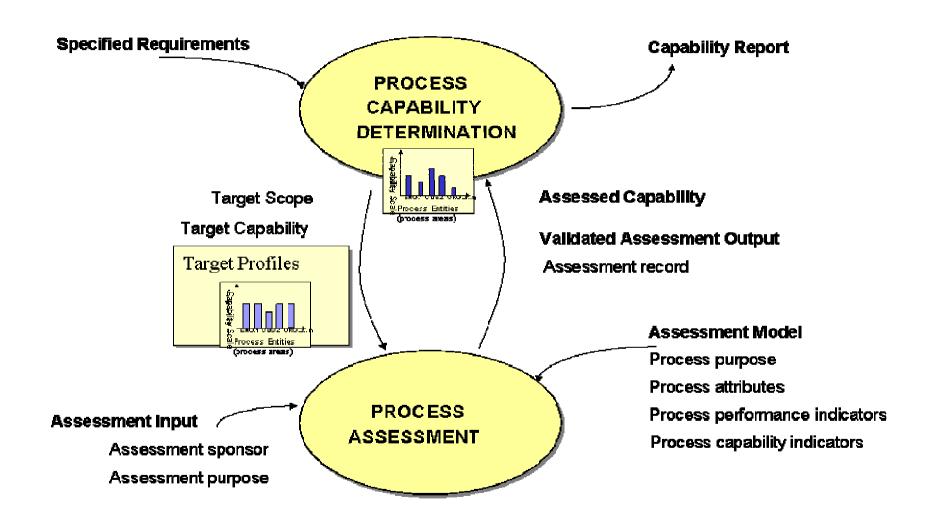
Target Process Profiles



ISO/IEC15504-9 – Enhancing Capability Determination

Target Profiles in capability determination





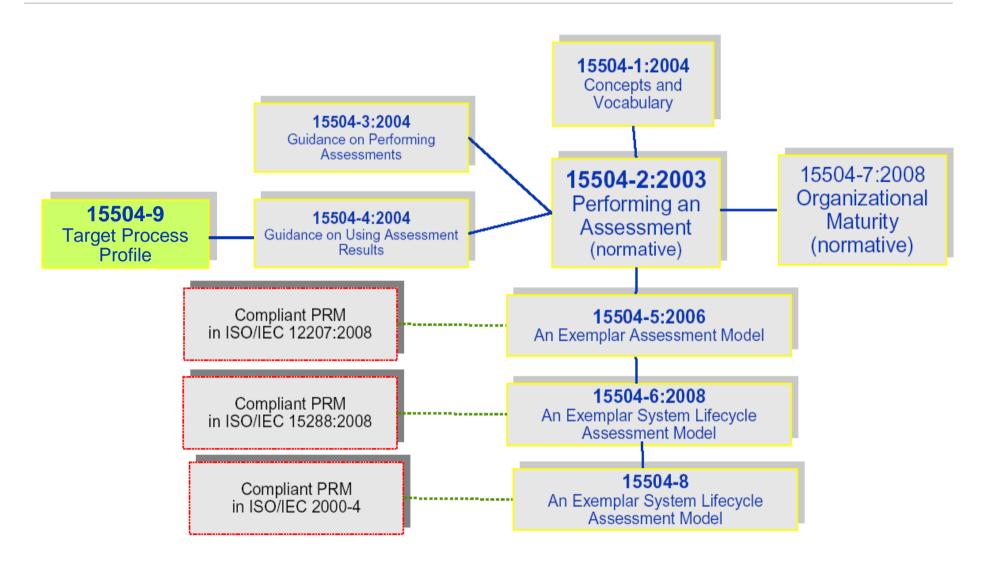
ISO/IEC 15504-9 Target process profiles



- Guidelines for creating and using a target process profile.
- Guidance on defining:
 - a) purpose of the target process profile (process improvement/capability determination);
 - b) community of use (e.g., automotive, aerospace);
 - c) business requirement;
 - d) domain of application, (systems, software, IT services);
 - e) categorization scheme for the domain of application, (e.g. safety critical systems);
 - f) applicable processes or process reference models;
 - g) data and information to be collected to ensure the profile is relevant to the community of use, business requirements, domain of application and categorization scheme;
 - h) expression of results

ISO/IEC 15504-9 Target Process Profile







SPICE Safety Extensions



ISO/IEC 15504-10

ISO/IEC 15504-10 - Safety Extensions



- Current PRMs/PAMs do not cover safety issues adequately
- Need additional <u>processes and guidance</u> to support <u>safety related</u> <u>developments</u>
- Will extend the exemplar PAMs for systems and software (ISO/IEC 15504 Parts 5 and 6)
- Independent of domain and of any specific safety standards that define safety principles, methods, techniques and work products
- Input Standards currently considered:
 - IEC 61508 Functional safety of electrical/electronic/programmable electronic safety-related systems Parts 1 to 7
 - ISO/IEC 15026 Systems and Software Assurance
 - +SAFE V1.2 A Safety Extension to CMMI-DEV.V1.2 March 2007
 - Relevant domain specific safety standards e.g. ISO 26262, IEC 62061, IEC 60880, DO 178B, Def-Stan 00-56, MIL-STD-882C, IEEE 1012

ISO/IEC 15504-10 - Safety Extensions



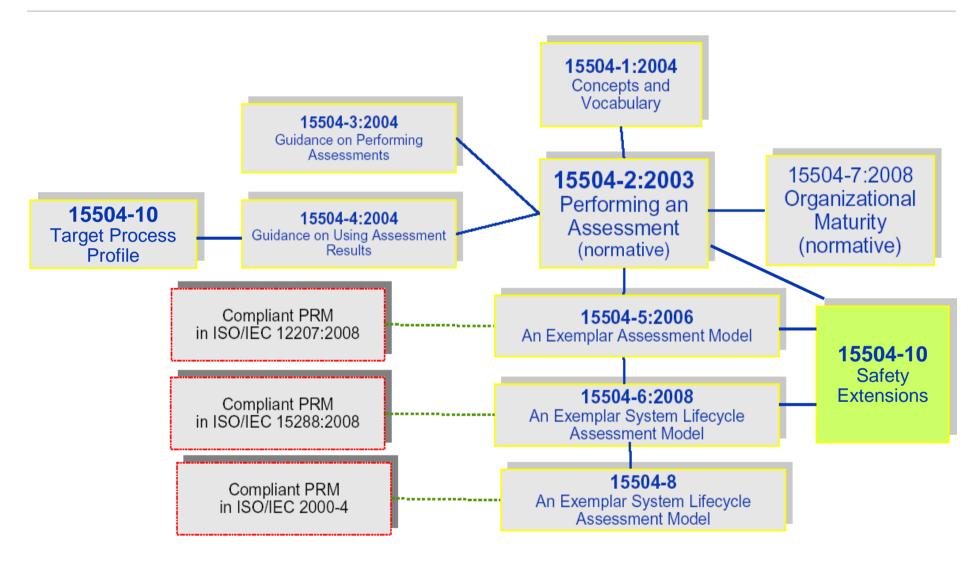
Initial list of expected processes needed for the Safety Extension:

- Safety Management to ensure that safety activities are planned and performed
- Safety Engineering to ensure safety is adequately addressed throughout all stages of the engineering lifecycle
- Selection and qualification of software tools and libraries to ensure confidence in the software tools and libraries to be used to support safety critical systems development.

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ISO/IEC 15504-10 Safety Extension





The near future of the standard ISO/IEC 15504



- Part 1 Concepts and Vocabulary
- Part 2 Performing an Assessment
- Part 3 Guidance on performing an assessment
- Part 4 Guidance on use for process improvement and process capability determination
- Part 5 An exemplar Process Assessment Model (for sw life cycle) to revise
- Part 6 An exemplar System Life Cycle Process Assessment Model to revise
- Part 7 Assessment of Organizational Maturity
- Part 8 An Exemplar Assessment Model for IT Service Magement (WD3)
 Part 9 Target process profile (PDTP)
- Part 9 Target process profile (PDTR)
- Part 10 Safety extension (NWIP)
- ISO/IEC 29169 "The application of conformity assessment methodology to process capability and organizational maturity" (NWIP)

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and Classes



Conformity assessment



ISO/IEC 29169 - The application of conformity assessment methodology to process capability and organizational maturity

ISO/IEC 29169 – Conformity Assessment



- Conformity assessment approaches and procedures well established within ISO/IEC but....
-no guidance on their application to the field of process capability and organizational maturity assessments.
- Need to close this gap and promote worldwide recognition of conformity assessment for process capability and organizational maturity
- Will follow the principles defined in **ISO/IEC 17020:1998** General criteria for the operating of various types of bodies performing inspection.
- Expect to use the concepts of assessment types and classes form part 7
- Some early work has been done in the PATHFINDER scheme for the "certification" of assessment results (http://pathfinderalliance.ning.com/)
- The publication will be a Technical Report Type 2.



The next generation of SPICE 2009-2014



From ISO/IEC 15504 to ISO/IEC 3100x series

ISO/IEC15504 Revision Study Group Terms of Reference



- 5 year review/revision mandated by ISO rules (part 2 expired in 2008)
- Define the requirements for the revision of ISO/IEC 15504
- Address the optimal restructuring required to encompass the existing and developing parts of the Standard in a coherent framework
- Develop recommendations for the development and recognition of PRMs, PAMs, OMMs based on ISO/IEC 15504.
- Address the actions required to ensure harmonization of ISO/IEC 15504 with other relevant SC7 Standards, and related standardization efforts in other Committees.

ISO/IEC15504 – The next generation of SPICE



- Draft study report circulated through SC7 and approved recently (May 2009 – Hyderabad, India)
- Plan to move from a single, 15504 multi-part Standard to an organized series of standards
- Reserved number series 31001 31099
- PAS (Publicly Available Specification) submissions for:
 - Process Reference Models
 - Process Assessment Models
 - Organisational Maturity Models
 - Measurement Frameworks
 - Documented assessment processes (Methods)
- SC7 resolution at last meeting for New Work Item proposals to be balloted

Revision of Measurement Framework



- Address other characteristics of processes in addition to process capability.
- Define requirements for the construction of measurement frameworks to address identified characteristics in a generic way,
- Measurement Framework for Process Capability (current Part 2) will be a specific instance of a framework
- More explicit linkage to the effectiveness of process implementation.
- Recognized need for revision of higher levels capability/maturity
 - Process Attributes for higher levels of process capability (CL4 and CL5) and
 - Process profiles associated with high levels of organizational maturity.

Process Models –issues to be risolved



- The relationship between PRM and other process models
- The extent to which a common set of indicators of capability and performance should be employed in Process Assessment Models developed within the ISO/IEC 15504 Framework.
- Relationship with elements in implementation standards (e.g. activities and tasks in 12207 and 15288; shall statements in 20000-1)
- The extent to which process reference models adequately represent the range of methodologies within the domain (e.g. Agile development)
- The relationship between Organizational Maturity Models and Process Assessment Models, and the extent to which an OMM can be constructed using elements from different independent PAMs.

Level and content of guidance



- More detailed guidance on the achievement of model-based process improvement driven by the results of assessment
- More detailed guidance on the skills and competencies required for performing assessment
- Overall guide to the performance of process assessment adaptable to all circumstances (process capability and organizational maturity).
- Additional guidance on the construction of process models PRM, PAM and OMM.

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ISO/IEC 3100x series



Core Elements

- 31001 Concepts & Terminology
- 31002 Requirements for Performing Process Assessment
- 31003 Requirements for Process Measurement Frameworks
- 31004 Requirements for Process Models

Guidance

- 31010 Guide on performing assessments
- 31011 Guide on defining a documented assessment process for assessment
- 31012 Guide for process improvement
- 31013 Guide for process capability determination
- 31014 Guide for constructing process reference models, process assessment models and organizational maturity models for assessments
- 31016 Process Assessment Body of Knowledge
- 31017 Process Improvement Body of Knowledge

ISO/IEC 3100x series



Measurement Frameworks

31020 Measurement Framework for assessment of process capability and organizational maturity

Documented Assessment Processes

■ 31030 Exemplar documented assessment process

Process Reference Models

- 31040 Safety Extension
- 31041 High Maturity Extension

Process Assessment Models

- 31060 Process Assessment Model for Software Life Cycle Processes
- 31061 Process Assessment Model for System Life Cycle Processes
- 31062 Process Assessment Model for IT Service Management Processes
- 31064 Safety Extension
- 31065 High Maturity Extension Organizational Maturity Models
- 31080 OMM for Software Engineering
- 31081 An Integrated Organizational Maturity Model for Software and Systems Engineering

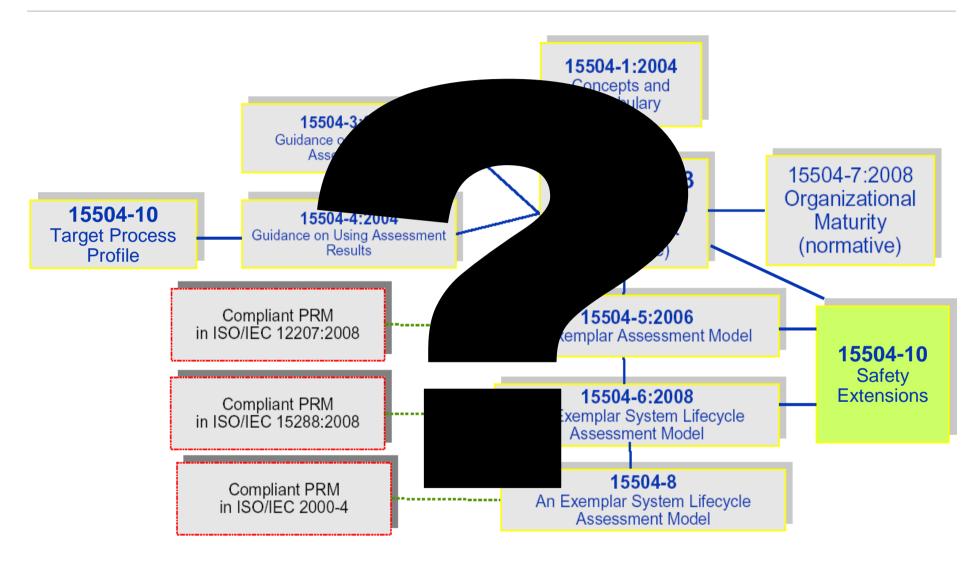
Initial set to be developed (NWIP)



- 31001 Concepts & Terminology
- 31002 Requirements for Performing Process Assessment
- 31003 Requirements for Process Measurement Frameworks
- 31004 Requirements for Process Models
- **...**
- **31013** Guide for process improvement
-
- 31021 Measurement Framework for assessment of process capability and organizational maturity

Need a new architecture diagram !!!!





These guys are going to be busy for the next 5 years !!!!



Source: Alec Dorling's photo archive

