



MANAGING RISK

# The Future of SPICE

Antonio Coletta – DNV IT Global Services

Head of Italian delegation to ISO/IEC JTC1 SC7  
email: [tony.coletta@virgilio.it](mailto:tony.coletta@virgilio.it)

SPICE Days 2009  
22 - 24 June 2009  
Stuttgart, Germany

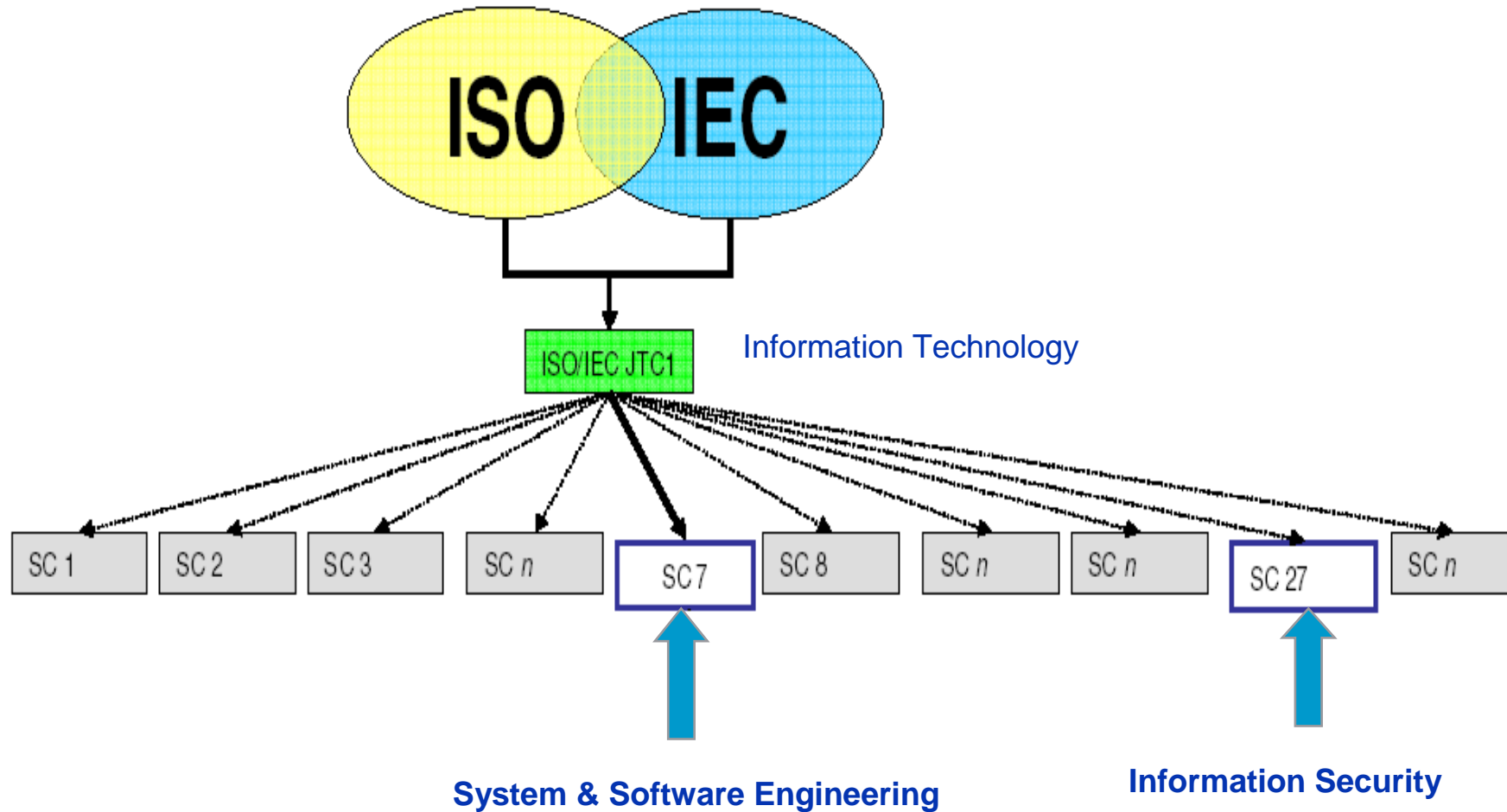


# Agenda

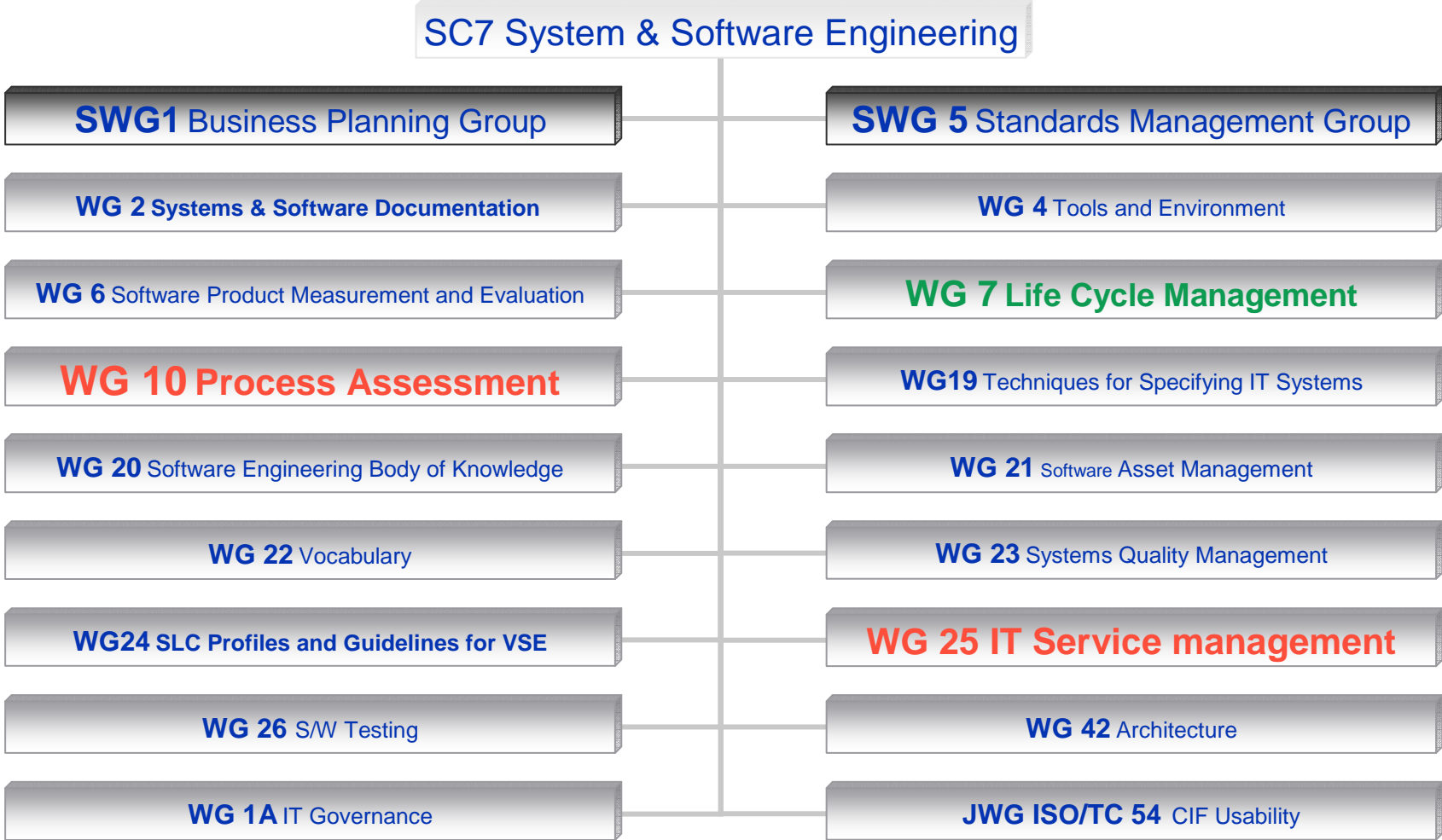
- ISO/IEC 15504 - Overview of current baseline
- Short term enhancements and updates
  - Alignment to revised PRM for software and system engineering (Parts 5 and 6)
  - Unexplored new features about process assessments (Part 7)
  - PRM/PAM for IT services (Part 8)
  - Guidance on defining Target Process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



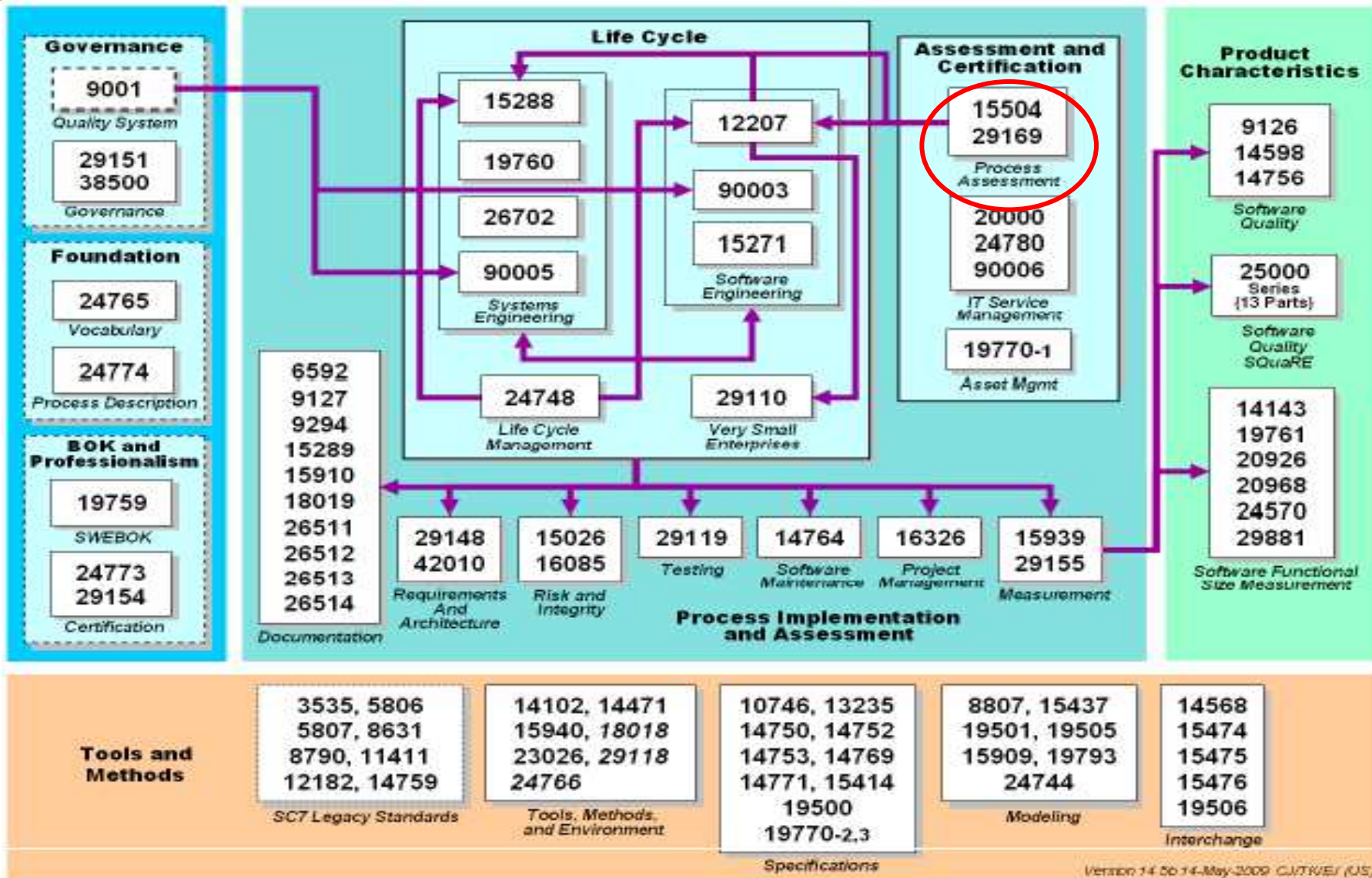
# ISO/IEC JTC1 – Information Technology



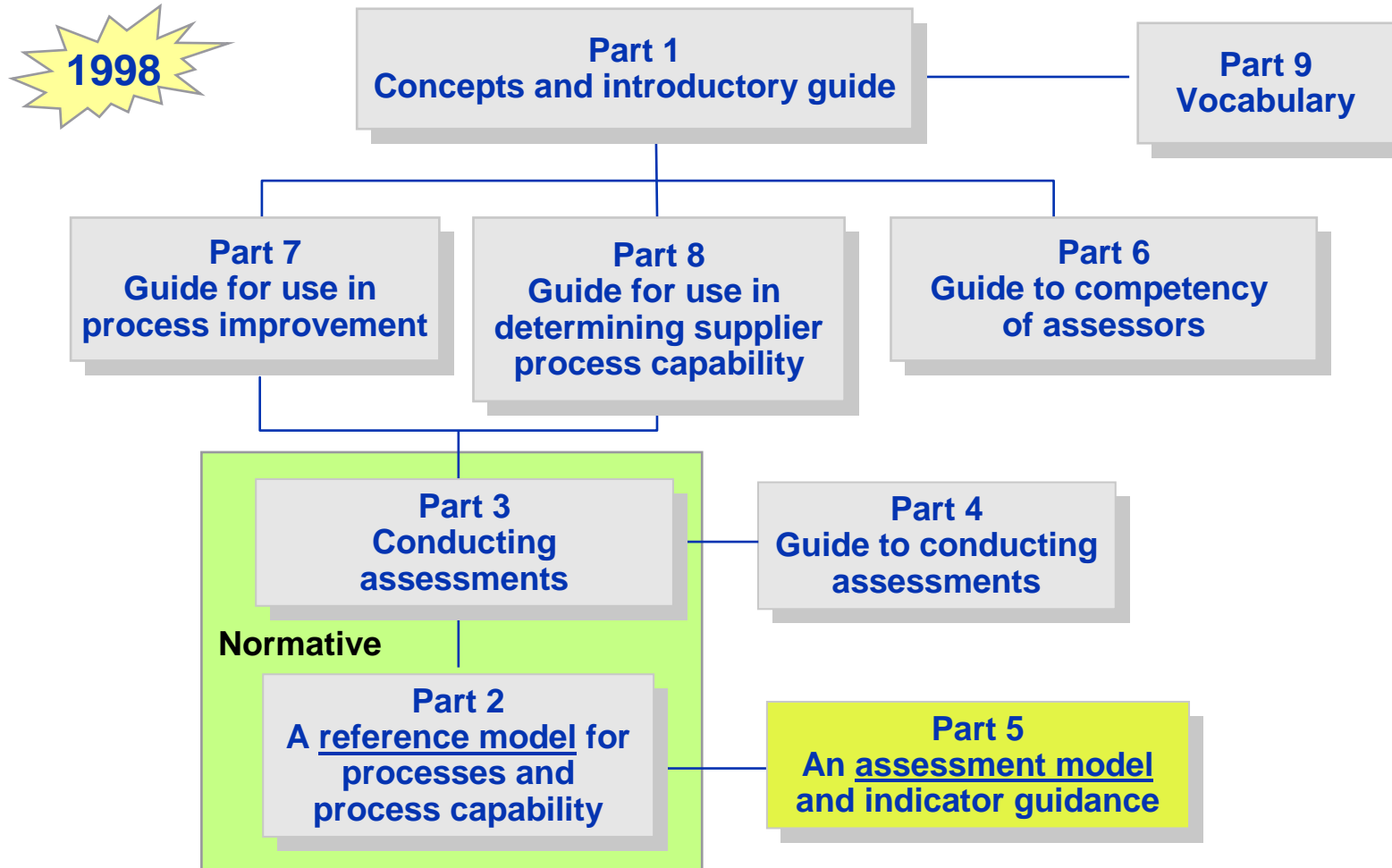
# ISO/IEC JTC1 SC7 System & Software Engineering Organizational chart



# Overview of SC7 standards (2009-05-14)



# The ISO/IEC 15504 Technical Report

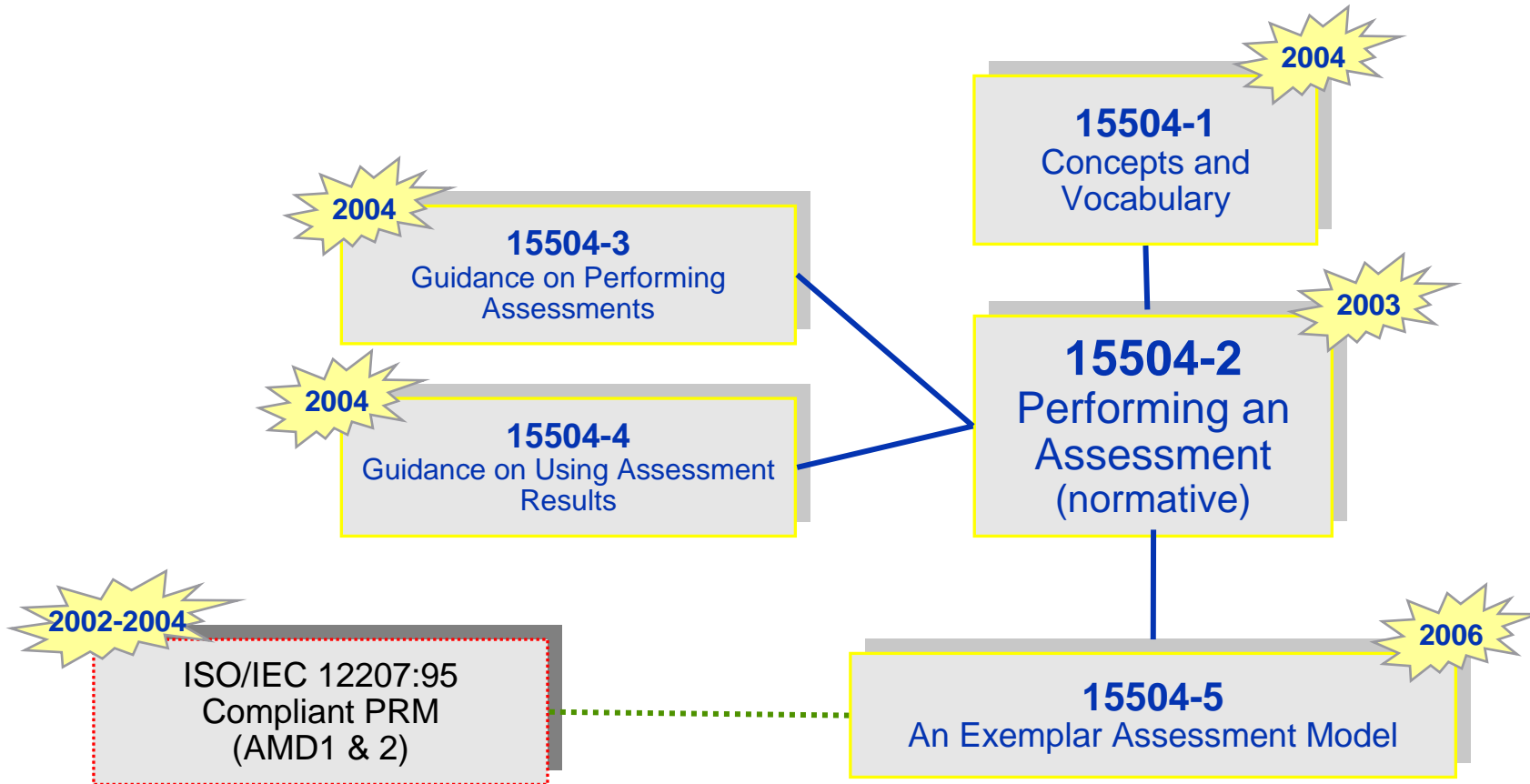


## ISO/IEC TR 15504: 1998 – Software Process Assessment

## 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)

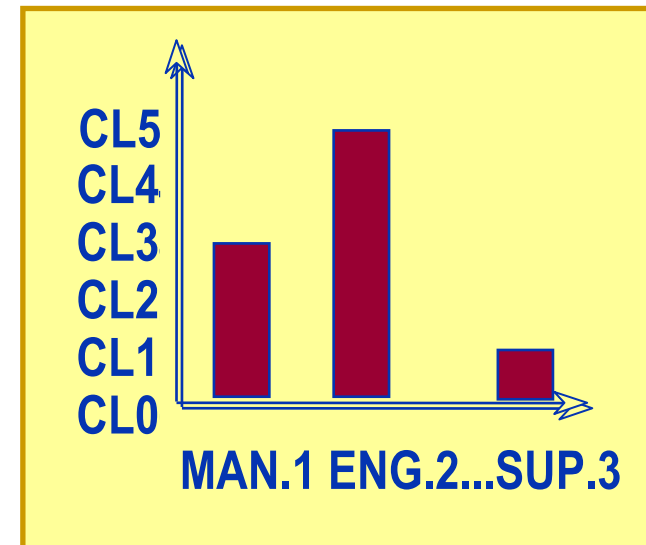




# The Assessment framework

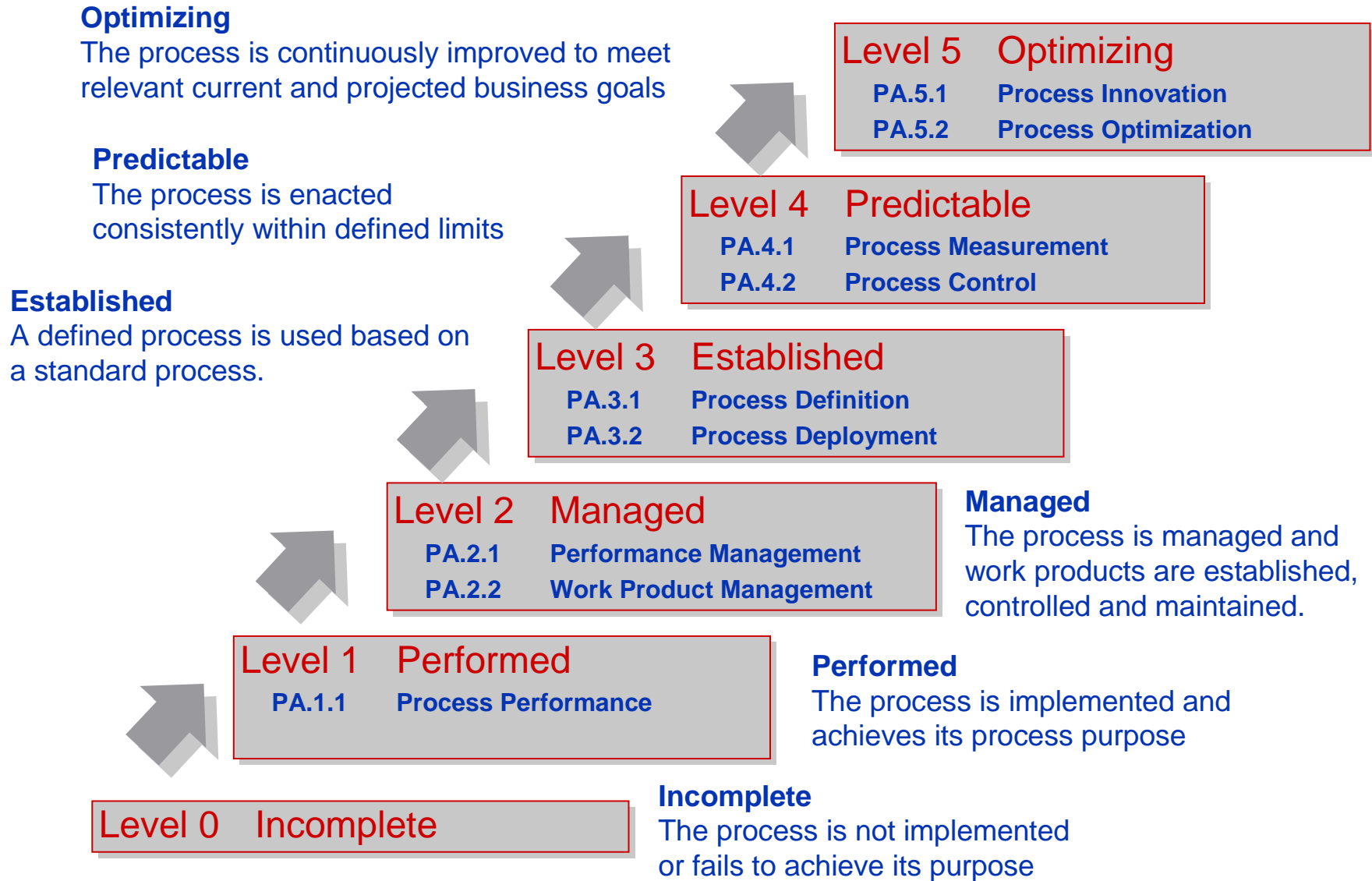
## Two-dimensional model for processes and process capability

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

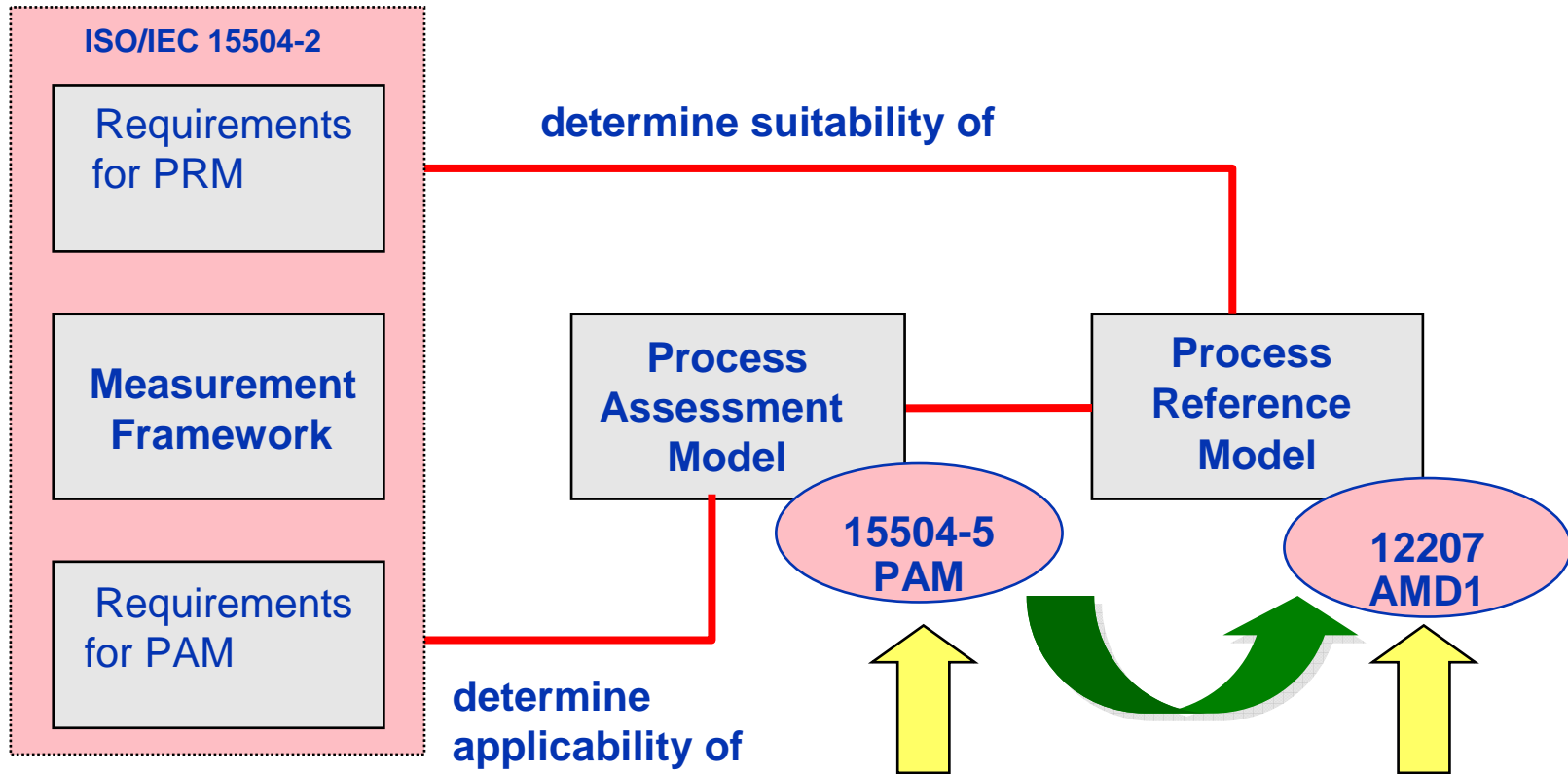


**Each process receives a capability level rating**

# Capability Levels and Attributes



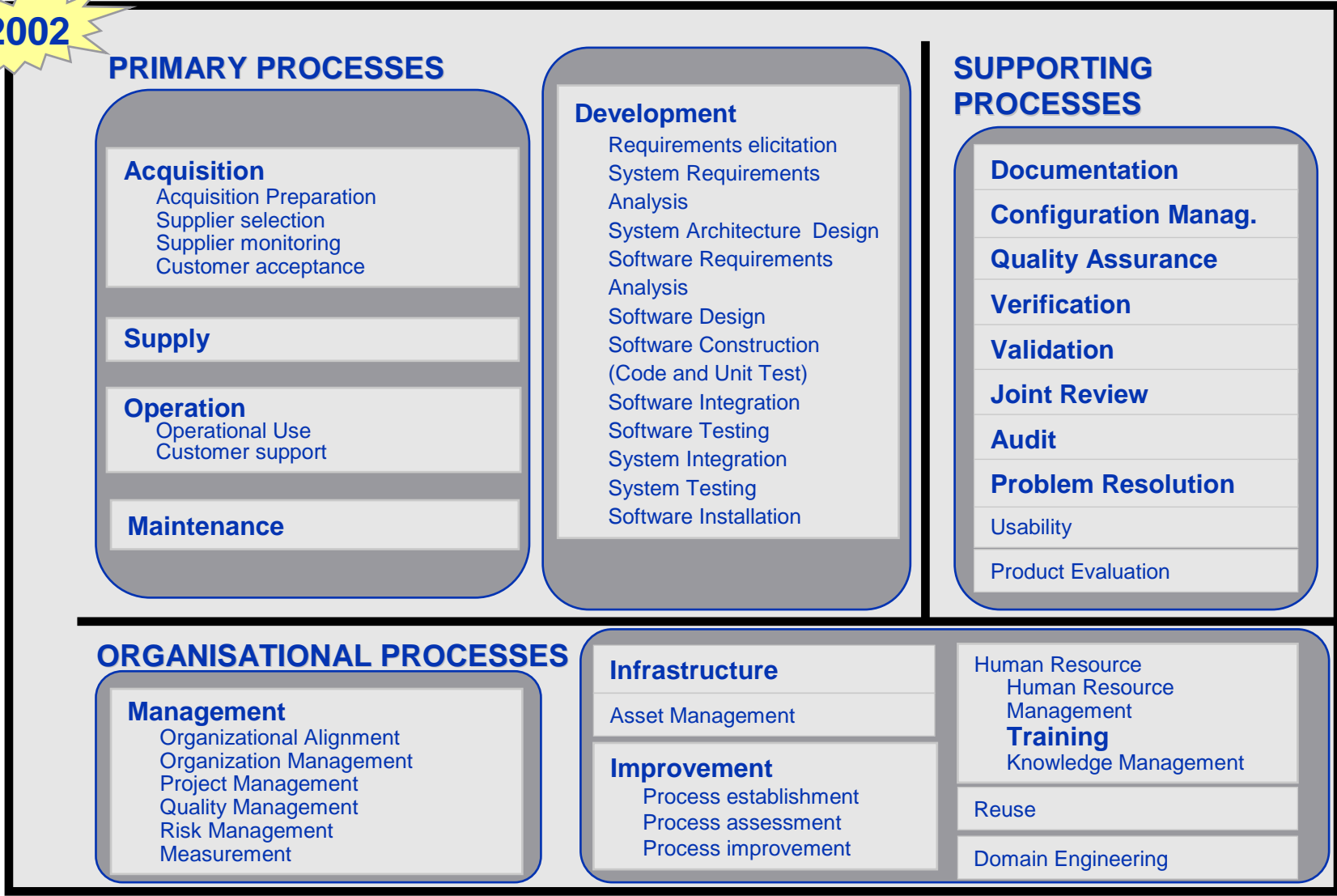
# ISO/IEC 15504 International Standard



Linked PRM and PAM for  
Software Life Cycle Processes

# Process Reference Model – 12207 AMD1

MANAGING RISK



# Automotive SPICE - Process Reference Model

MANAGING RISK



## 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

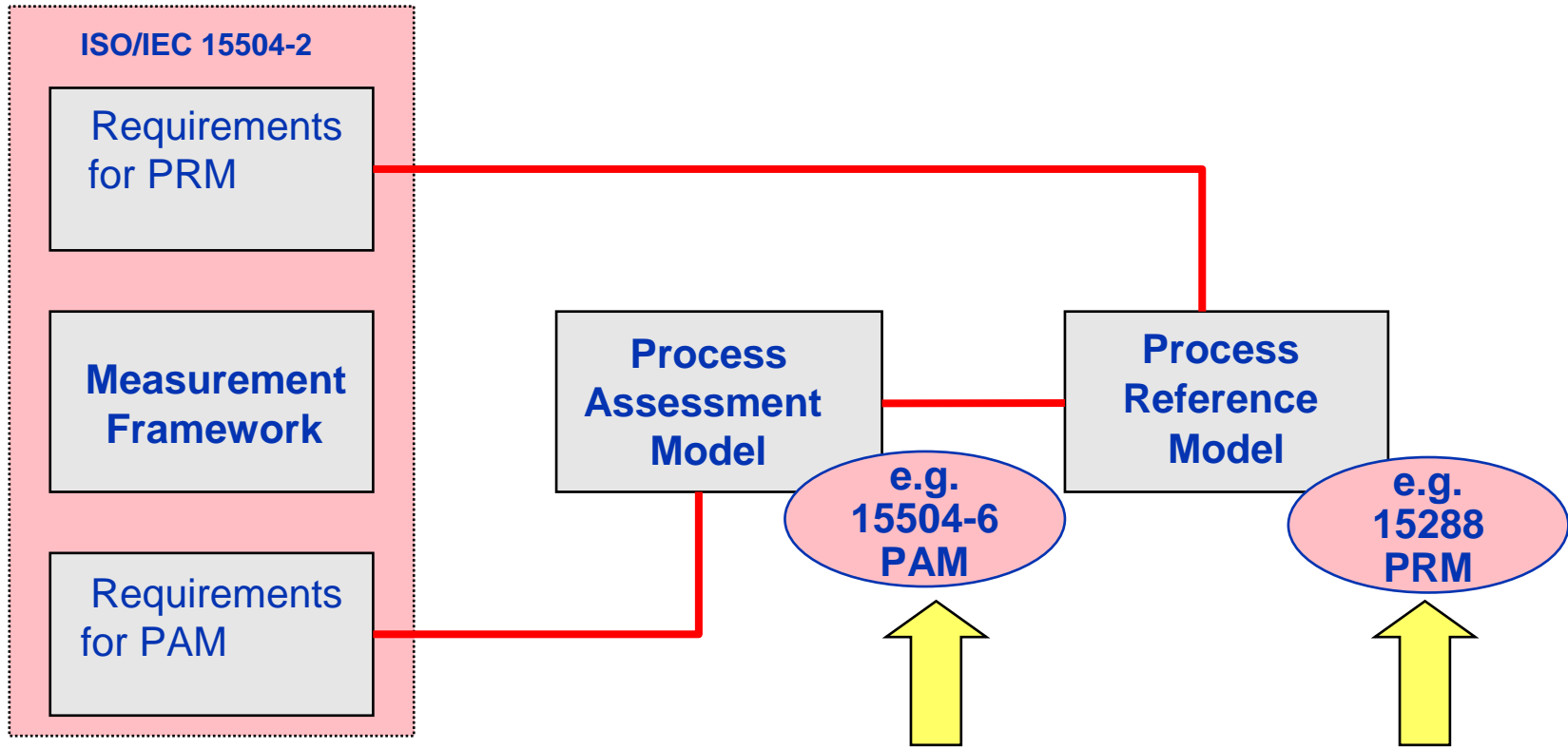
2005-07

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

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

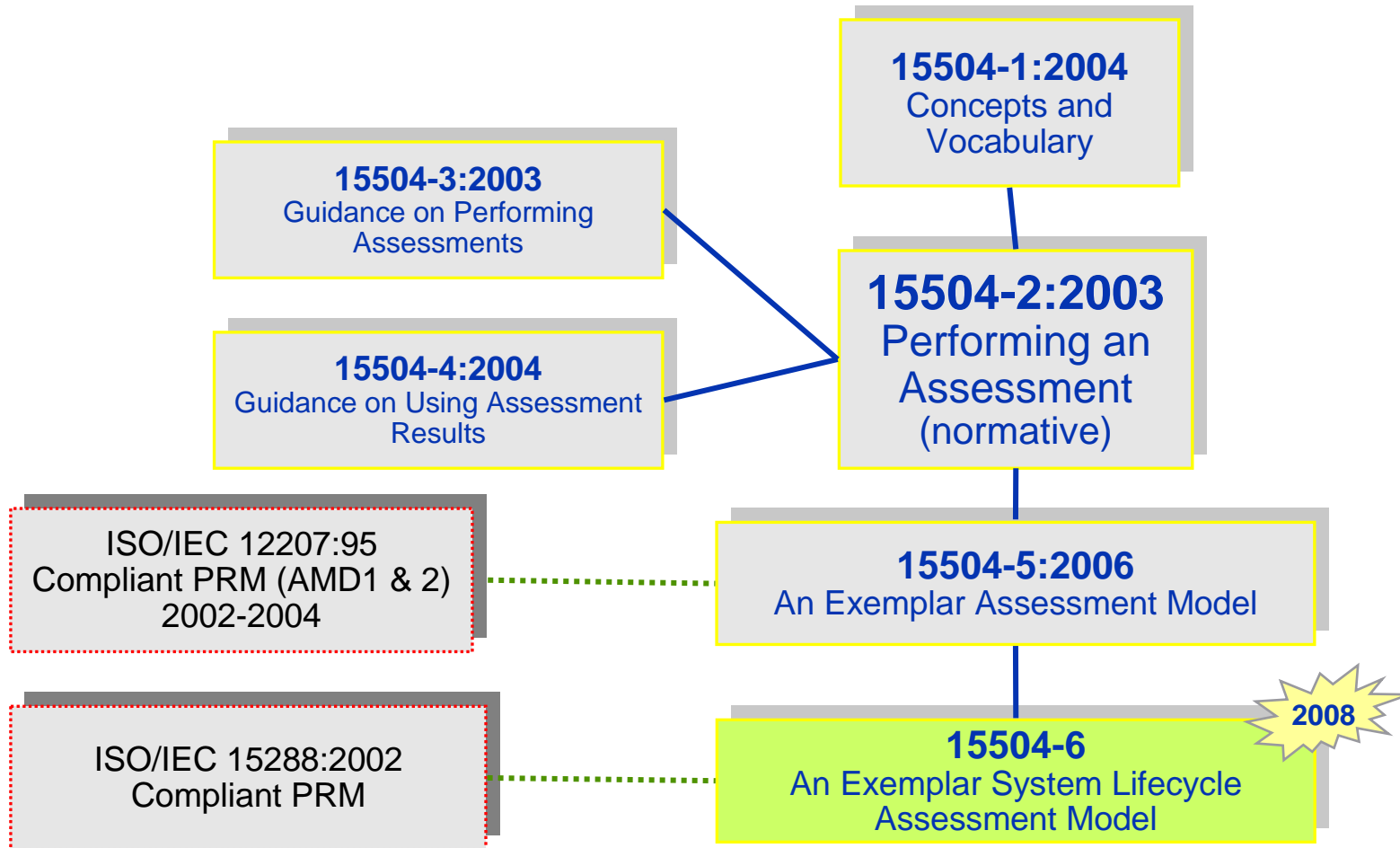
Automotive SPICE™ Process Reference Model (PRM) RELEASE v4.4 - 2008-08-01

# ISO/IEC 15504 applied on 15288



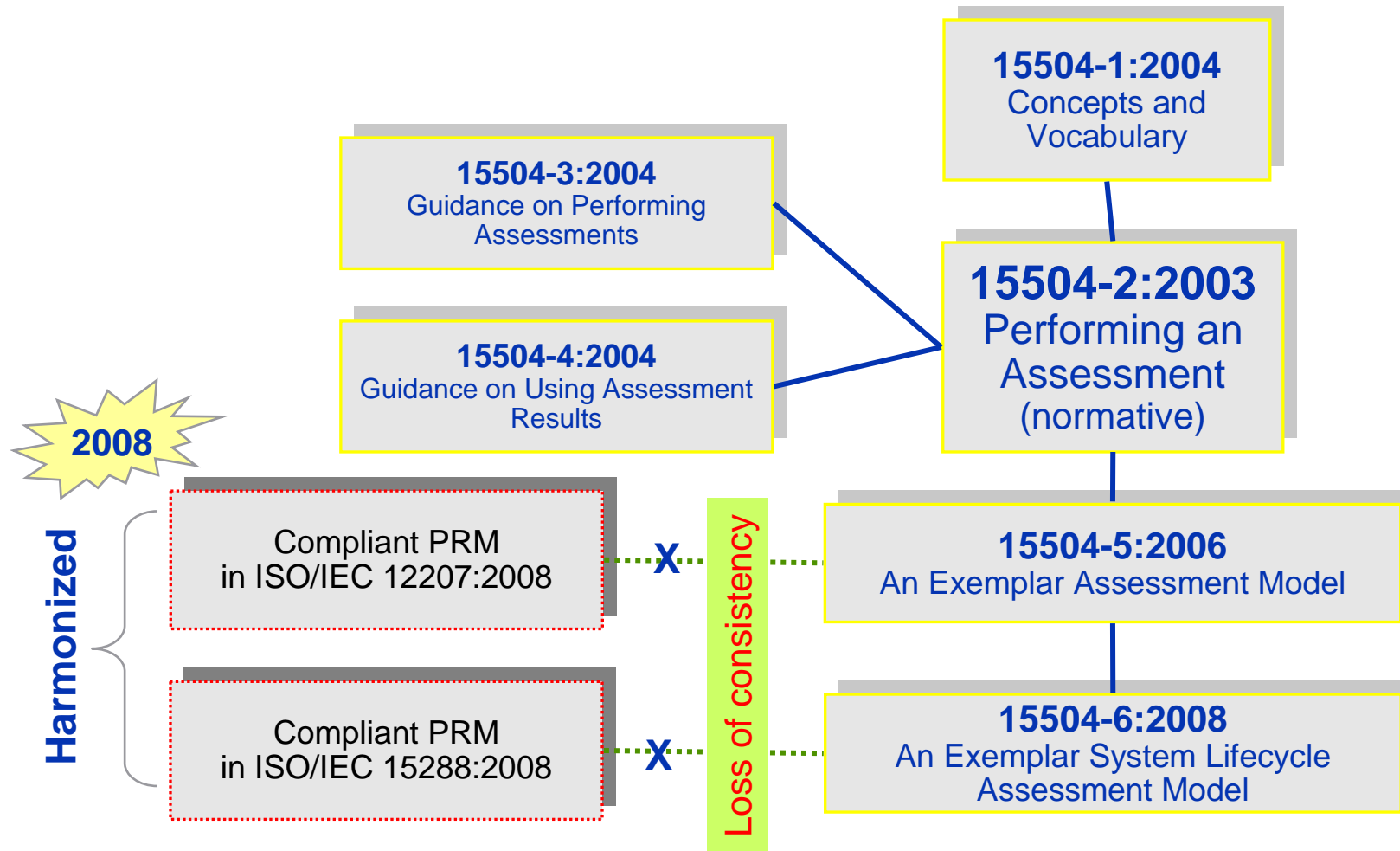
Linked PRM and PAM for System Life Cycle Processes

# Assessment Model for System Lifecycle



**Late publication !!!**

# 2008 – Publication of revised 12207 and 15288







MANAGING RISK

## Alignment to software and system lifecycle standards

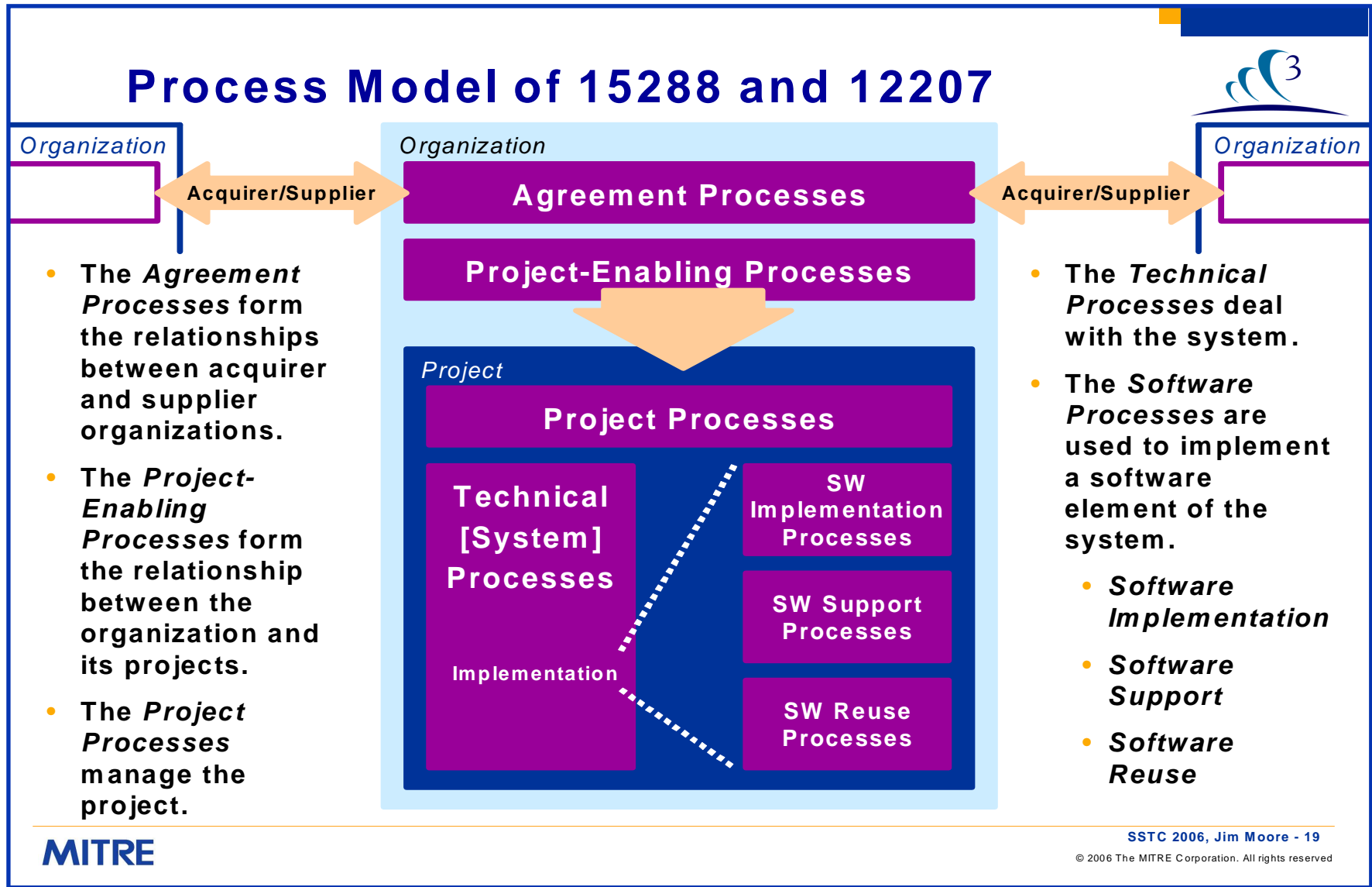


---

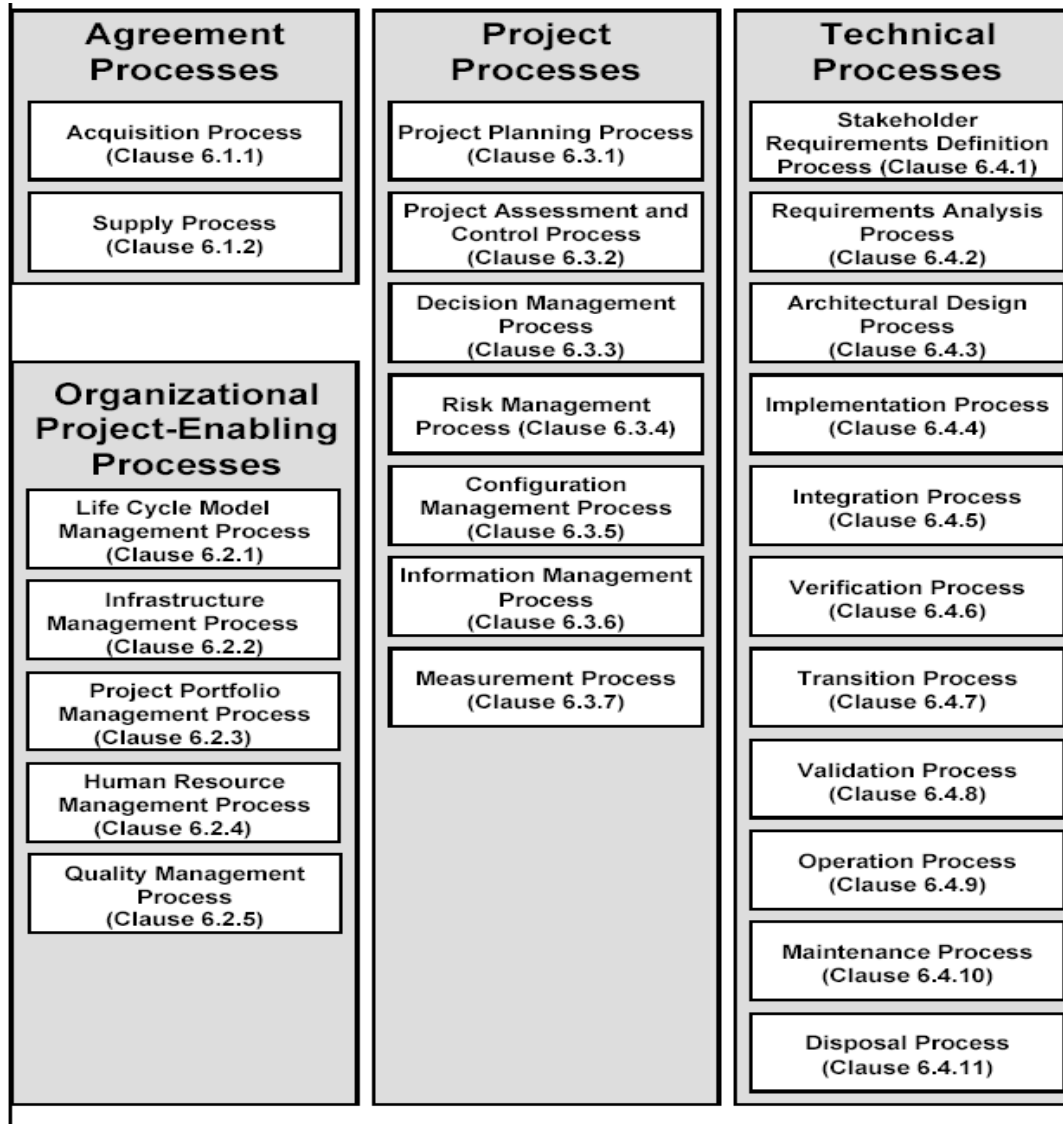
Restore consistency with revised ISO/IEC 12207 & 15288

---

# Harmonized 15288 and 12207

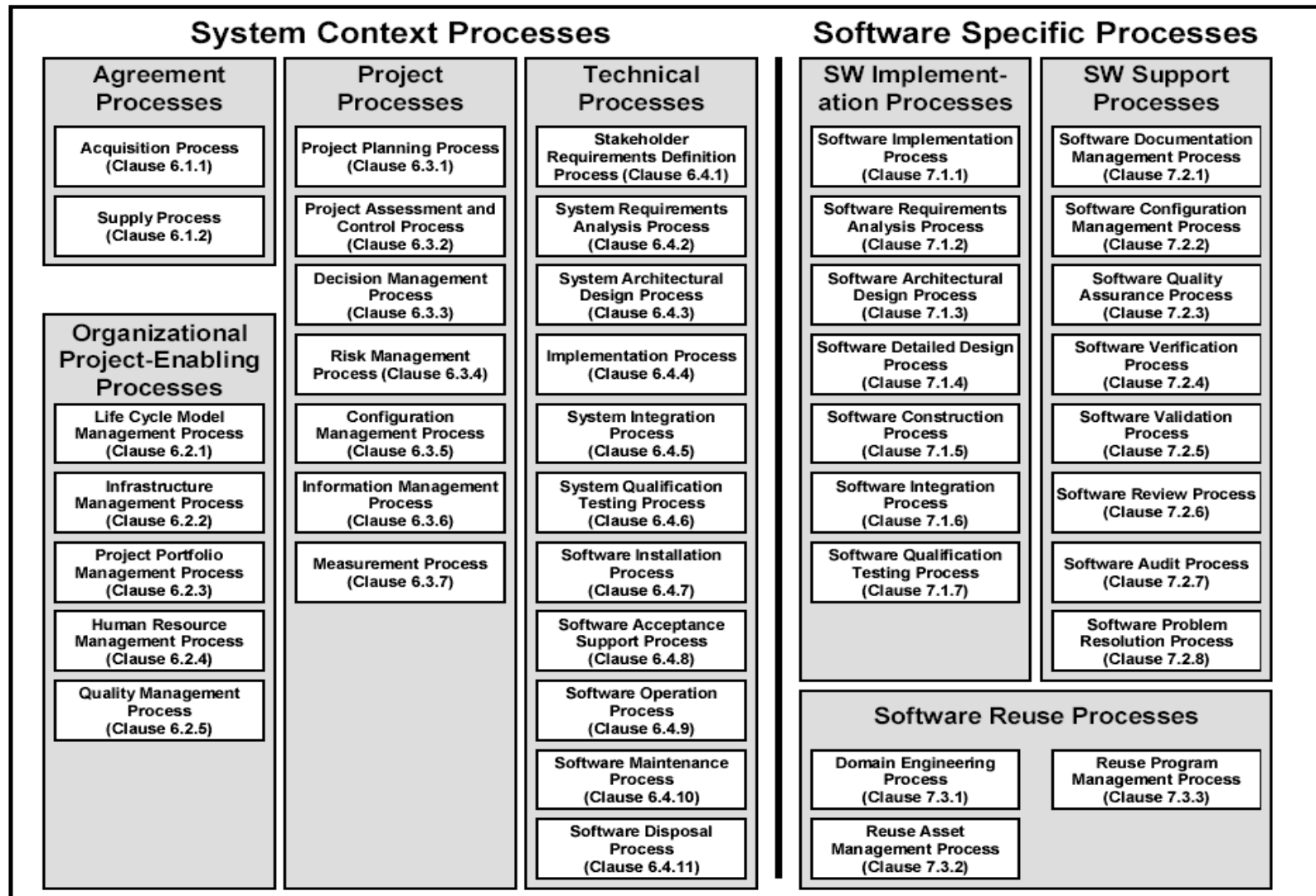


# ISO/IEC 15288:2008 PRM – System Lifecycle



# ISO/IEC 12207:2008 PRM – Software lifecycle

MANAGING RISK





## PAM alignment to 12207 and 15288 (2008)

---

- “Action should be taken in the short term 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



MANAGING RISK

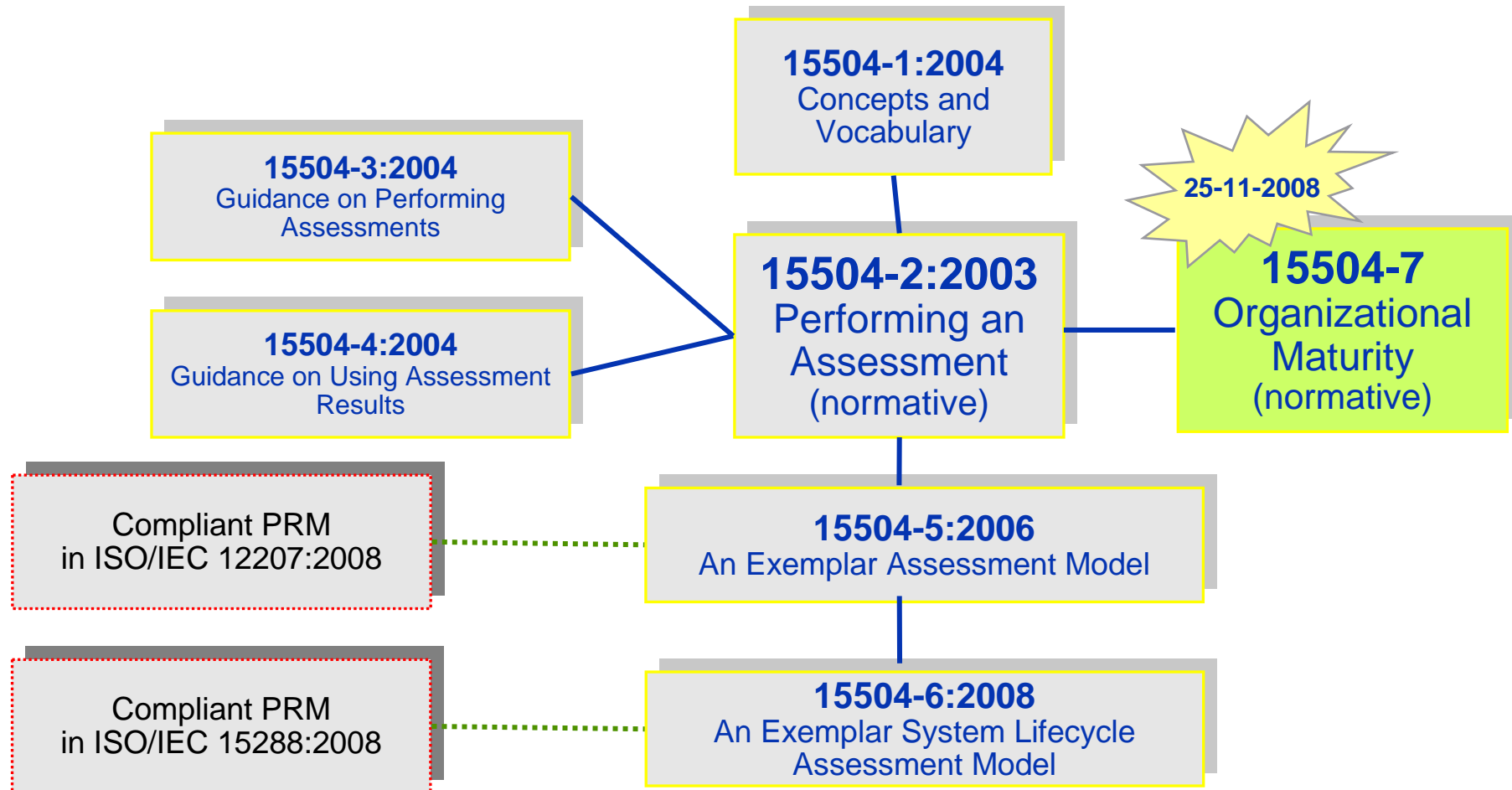
## Unexplored features of part 7

---

Making assessments more robust and  
.....results 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 **classes** – different levels of rigor and confidence in the assessment results
- Assessment **types** – 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
<b>Requirements</b>			
<b>Min. number of process instances</b>	<b>4</b>	<b>2</b>	No constraint
<b>Min number of assessor (including competent assessor)</b>	<b>2</b> <small>Competent assessor must be independent</small>	<b>2</b>	<b>1</b>
<b>Evidence type</b>	Work products + Testimony	Work products + Testimony	No constraint
<b>Rating</b>	Outcomes for each instance (F,L,P,N) Attribute for each instance (F,L,P,N) Overall Attributes (F,L,P,N) Capability Level	Overall Attributes (F,L,P,N) Capability Level	Overall Attributes (F,L,P,N) Capability Level
<b>Document &amp; Reporting weakness/gaps</b>	<b>YES</b>	<b>YES</b>	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	For each process attribute there shall be both work product evaluation and testimony (5.2.3.2.a).
PA 2.1	Testimony	Work product & Testimony	Work product	Testimony	
PA 2.2	Work product	Testimony	Testimony	Testimony	
PA 3.1	Work product	Work product	Testimony	Testimony	
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	Type B	Type C	Type D
<b>Body performing the assessment</b>	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
<b>Competent assessor</b>	Independent of the organization being assessed	Independent of the organization being assessed	Adequate separation of responsibilities from personnel in other functions	Need NOT be independent of the organization being assessed
<b>Assessors (other than competent assessor)</b>		May be from the organization being assessed provided clear separation of the responsibilities of the assessors from personnel in other functions		



MANAGING RISK

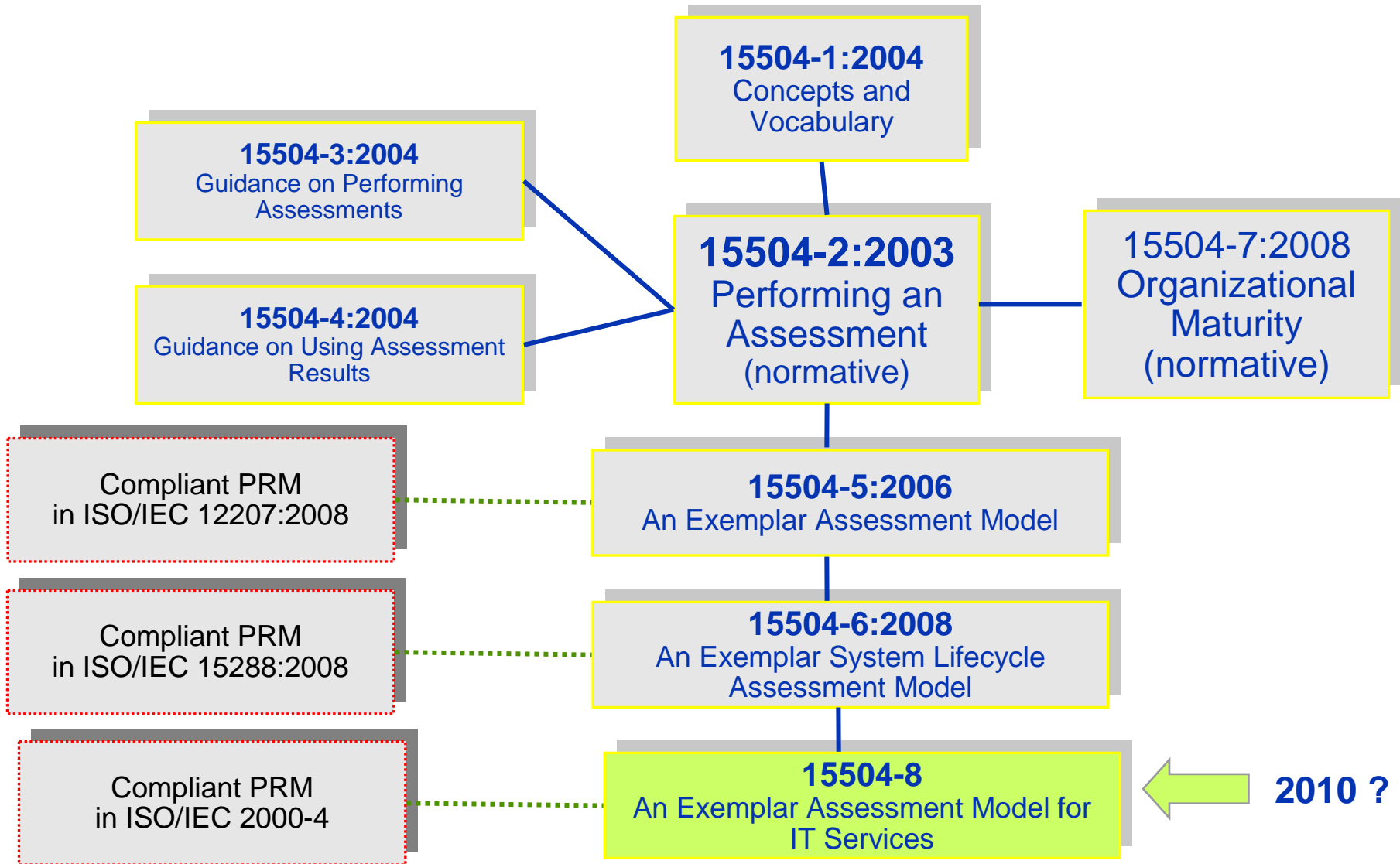
# SPIICE for IT Services

---

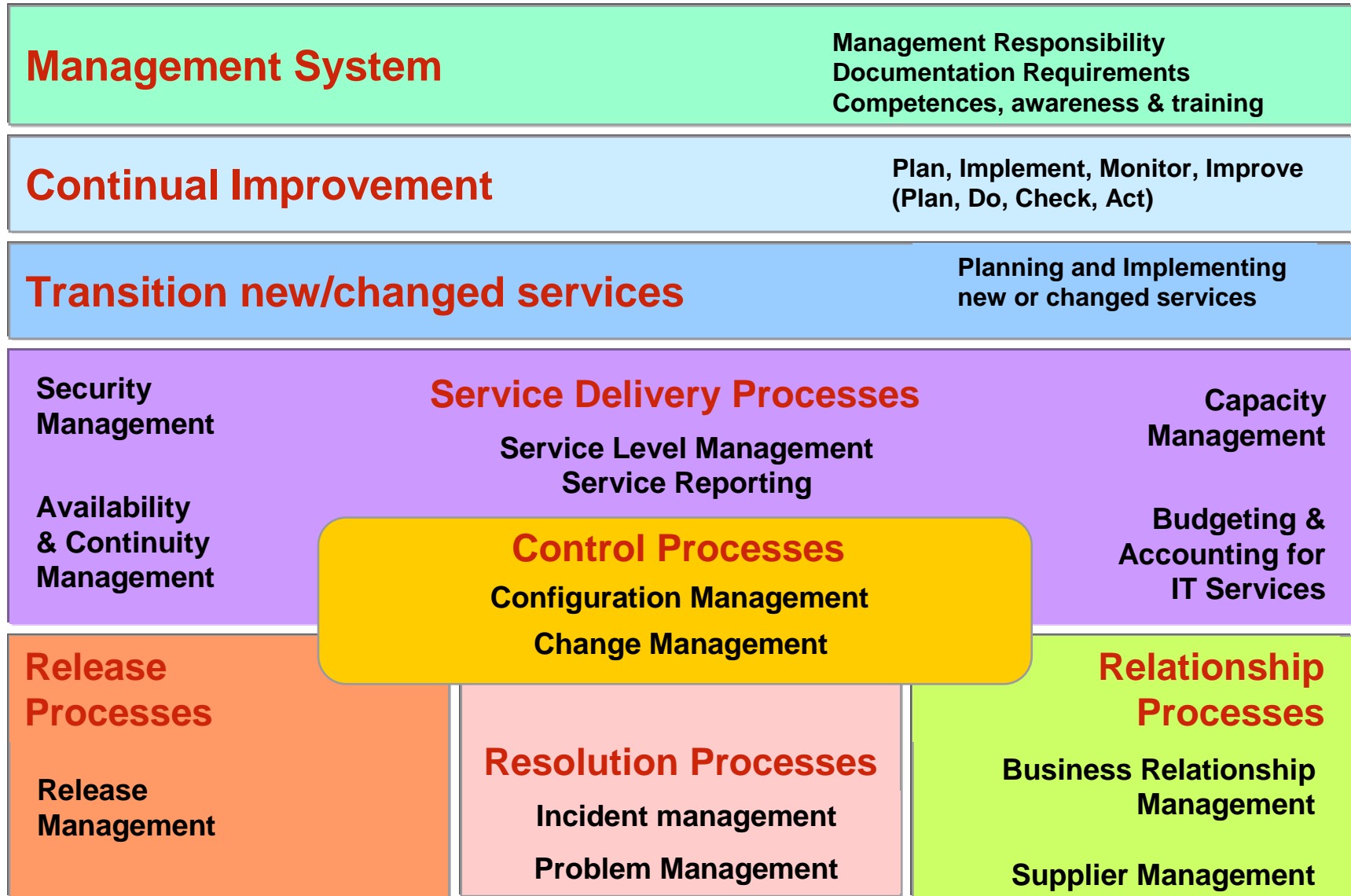
---



# Introducing SPICE for IT Services

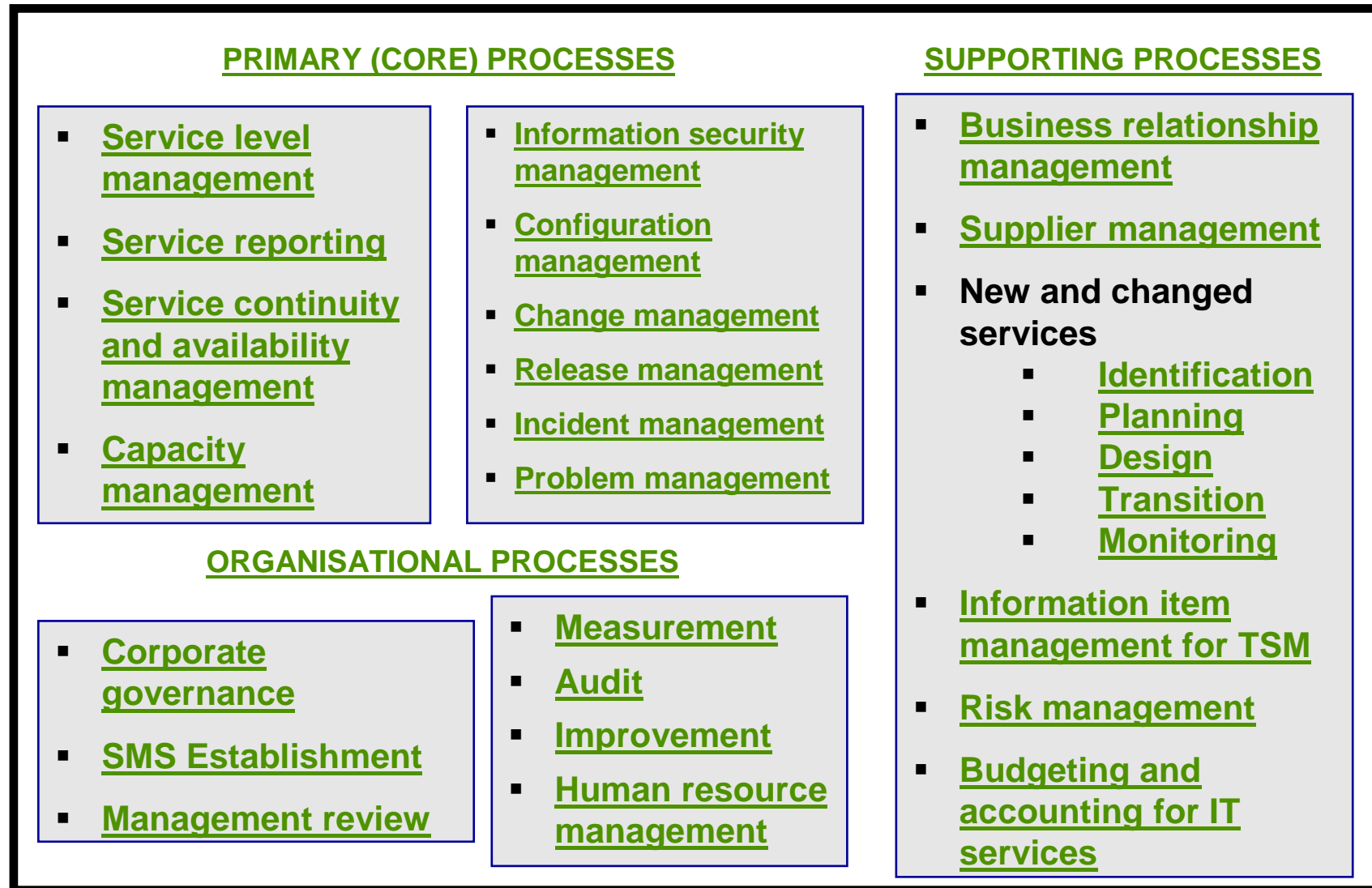


# ISO/IEC 20000-1 – Structure & Content



# Process reference model (ISO/IEC 20000)

MANAGING RISK



Source: Alastair Walker





MANAGING RISK

# Target Process Profiles

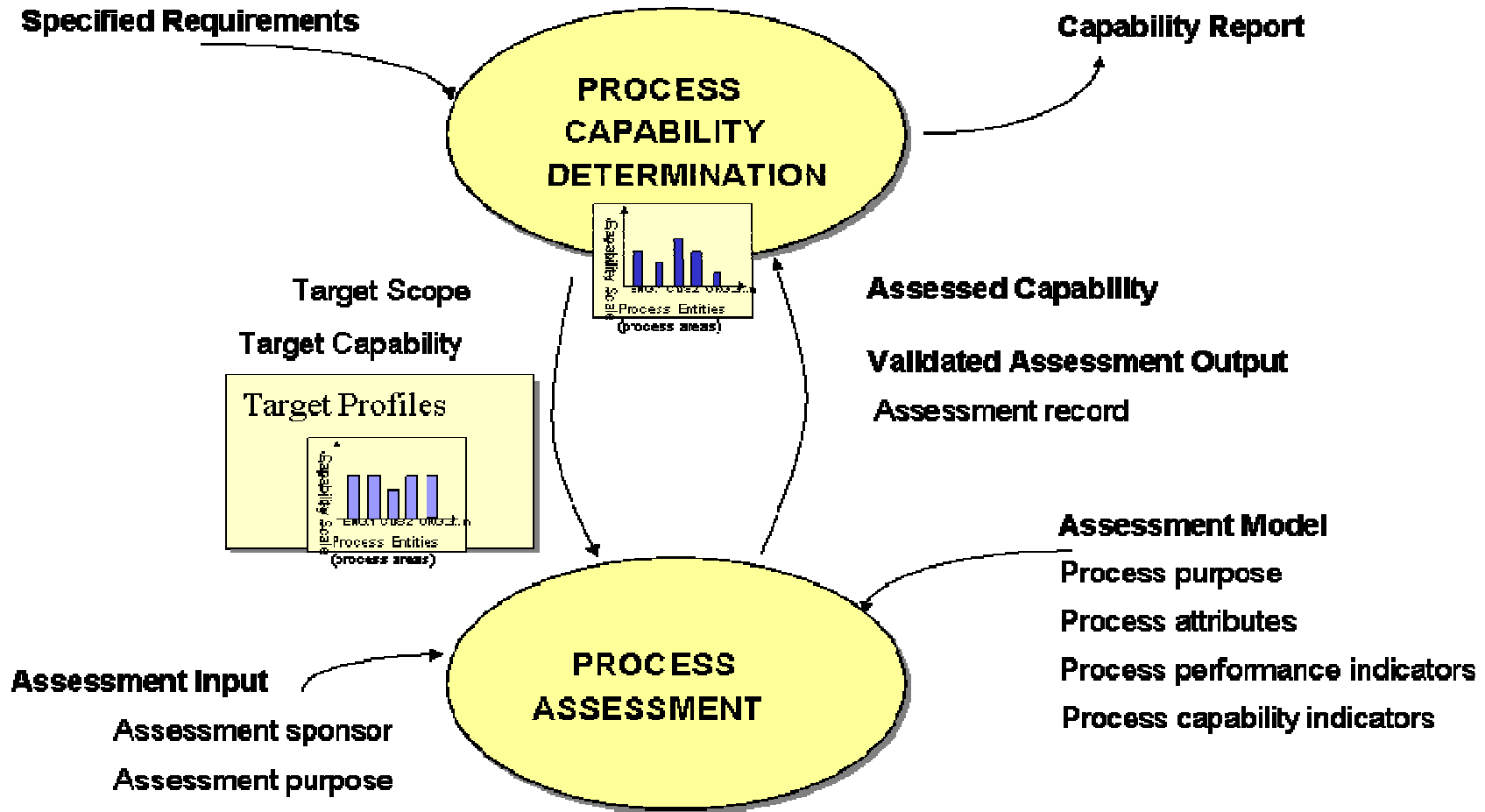


---

ISO/IEC15504-9 – Enhancing Capability Determination

---

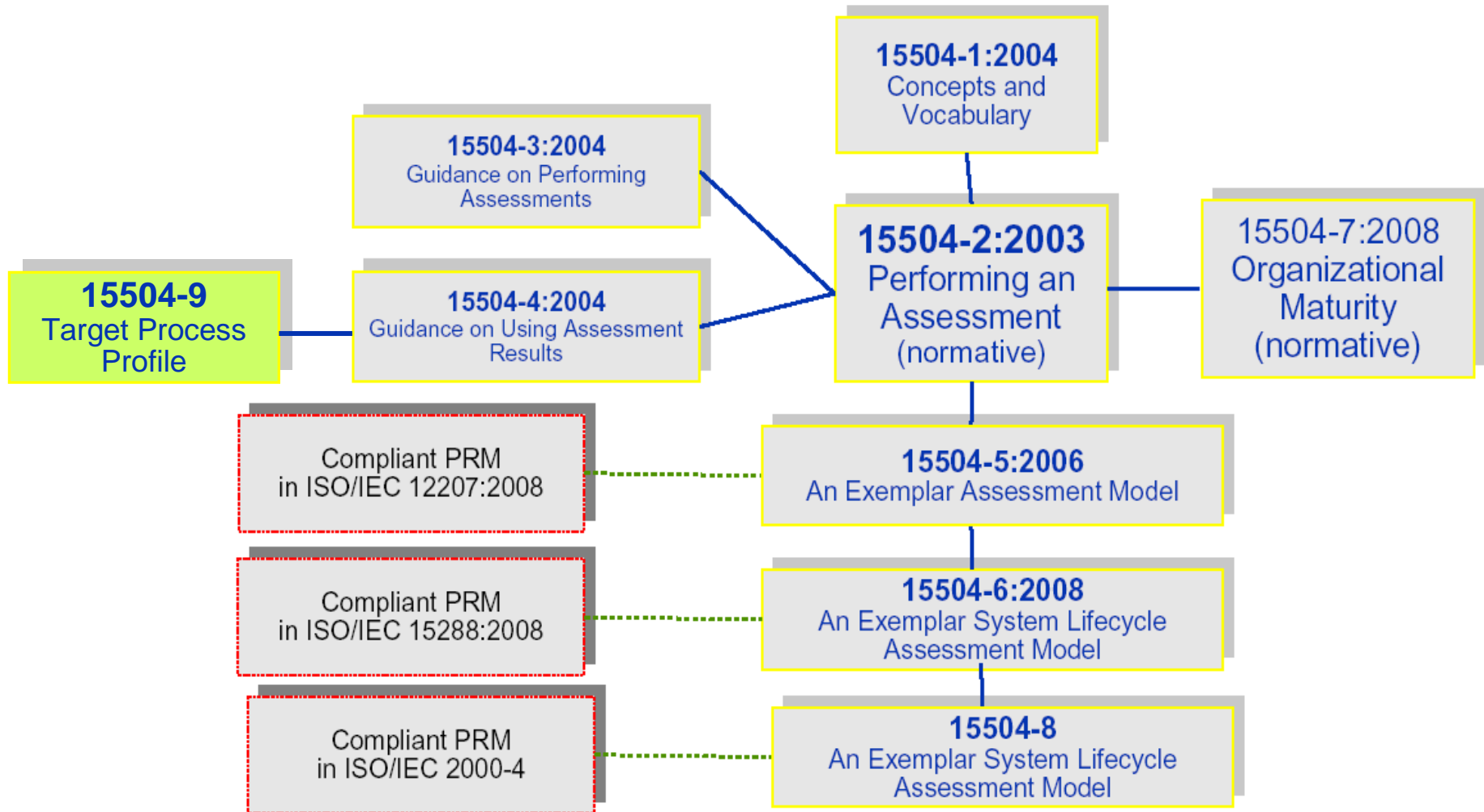
# Target Profiles in capability determination



# 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





MANAGING RISK

# SPIICE Safety Extensions

---

ISO/IEC 15504-10

---

# ISO/IEC 15504-10 - Safety Extensions

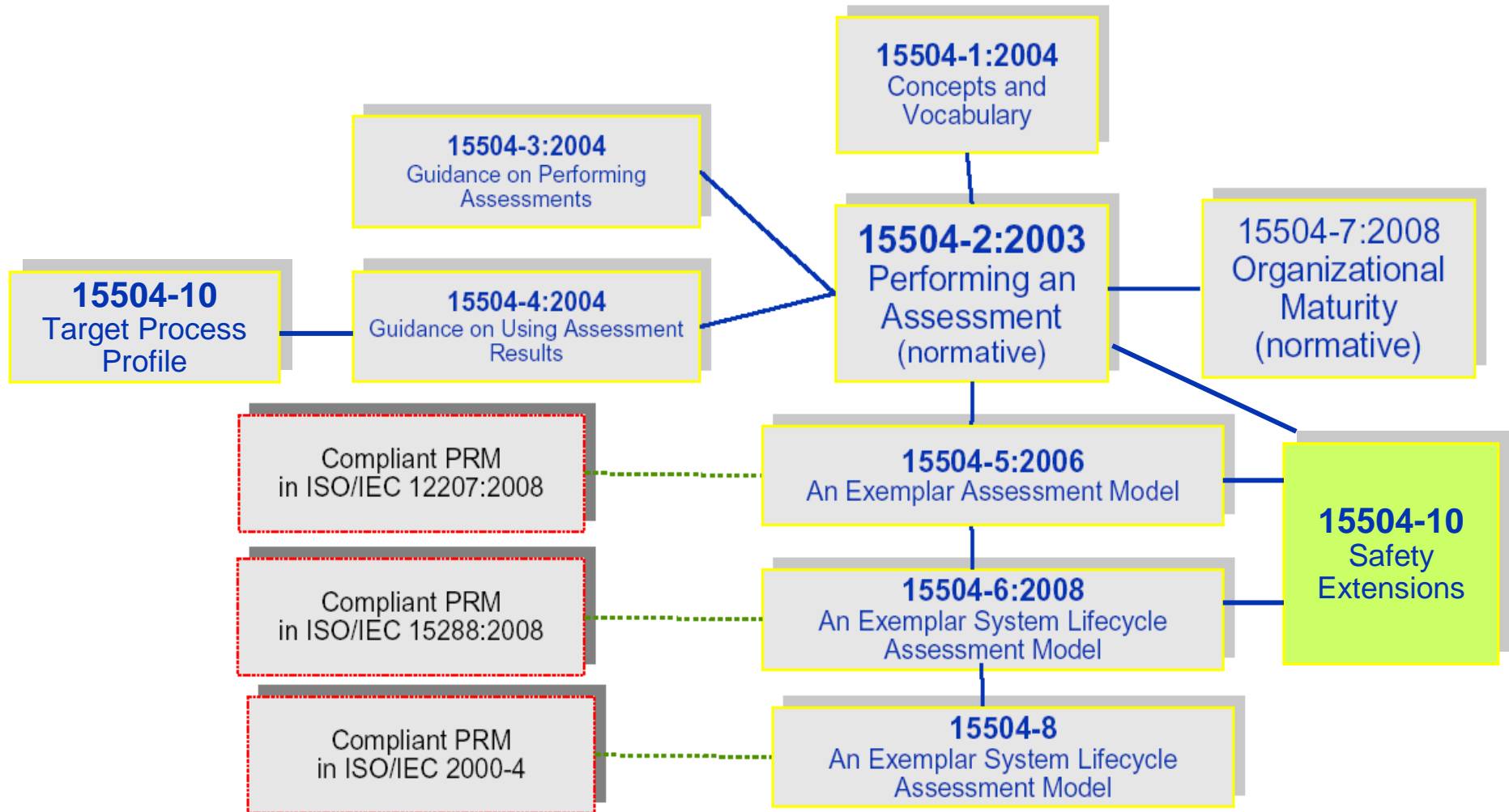
- Current PRMs/PAMs do not cover safety issues adequately
- Need additional **processes and guidance** to support safety related developments
- Will extend the exemplar PAMs for systems and software (ISO/IEC 15504 Parts 5 and 6)
- Independent of domain and of any specific safety standards that define 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.

# 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 Management (WD3)
- 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)*

Assessment Types  
and Classes





MANAGING RISK

## Conformity assessment

---

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

---

- 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 from 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.



MANAGING RISK

# 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

MANAGING RISK



- 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 resolved

- 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.

## 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

## 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

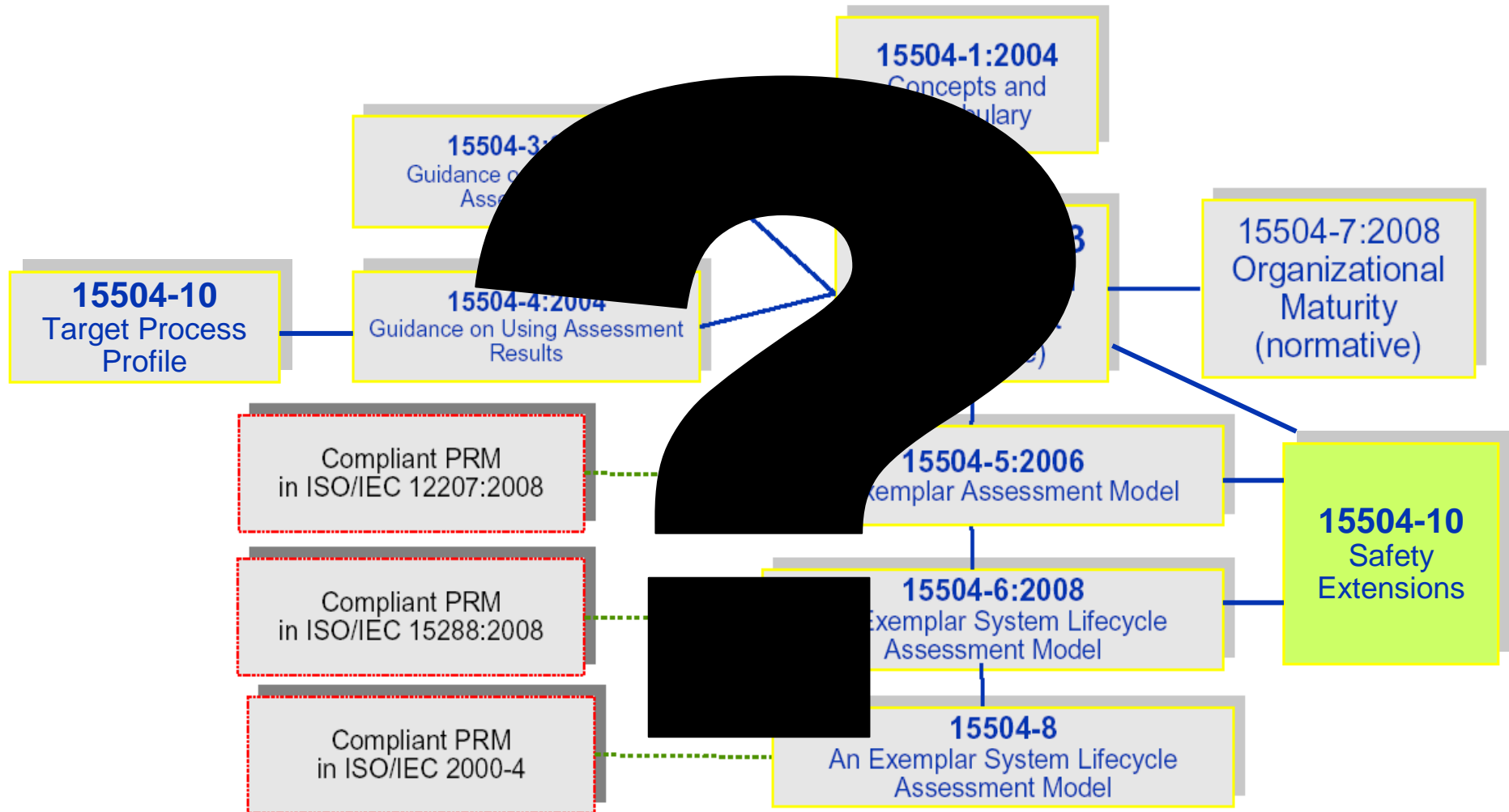
## Process Assessment Models

- 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

# Thank you

---

