



# The Future for SPICE – the Evolution of ISO 15504

SPICE 2002 Conference, Venice

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## Agenda

- ❖ **Background**
  - ❖ **SPICE History**
- ❖ **ISO 15504 – evolving**
  - ❖ **Architecture**
  - ❖ **Process Models**
  - ❖ **Measurement Scale**
  - ❖ **Current status**
- ❖ **SPICE – the community**
  - ❖ **Process Reference Models**
  - ❖ **SPICE Research**
  - ❖ **SPARC Benchmarking**



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## What is ISO/IEC TR 15504?

- ❖ International standard for assessing software processes
- ❖ Purpose:
  - ❖ Continuous process improvement
  - ❖ Capability determination
- ❖ Scope:
  - ❖ Processes include acquisition, supply, development, operation, maintenance and support

ISO/IEC TR 15504 is an emerging standard currently in transition to full International Standard status



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## The need for a standard

- ❖ The increasing number of assessment approaches available.
- ❖ The increasing use of the technique in commercially-sensitive areas.
- ❖ Improve-IT study funded by UK Defence Research Agency.
- ❖ Study group report for JTC1/SC7:
  - ❖ the international community should pool its resources to develop a standard for software process assessment, incorporating the best features of existing software assessment methods.



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## Requirements

- ❖ **Process assessment as the basis for both process improvement and capability determination.**
- ❖ **Flexibility: applications, sectors, size, projects and organisations.**
- ❖ **Coverage: process, people and technology.**
- ❖ **Output: as profiles.**
- ❖ **Supportive of existing standards: ISO 9001, ISO 12207.**
- ❖ **Reliable and consistent assessment.**
- ❖ **Simple to use and understand.**
- ❖ **Objective, and quantitative wherever possible.**
- ❖ **Not presumptive of specific:**
  - ❖ **organisational structures or management philosophies;**
  - ❖ **lifecycle models, technologies or development methods.**



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## Software Process Assessment - History

- ❖ **1987 Humphrey / Sweet report from SEI.**
- ❖ **1989 SEI issues its first questionnaire.  
Watts Humphrey's book published.**
- ❖ **1991 CMM V1.0 released.  
ISO requests a study on process assessment.**
- ❖ **1993 ISO accepts new work item for standard.  
CMM V1.1 released.**
- ❖ **1995 ISO 15504 (SPICE) first draft released.**



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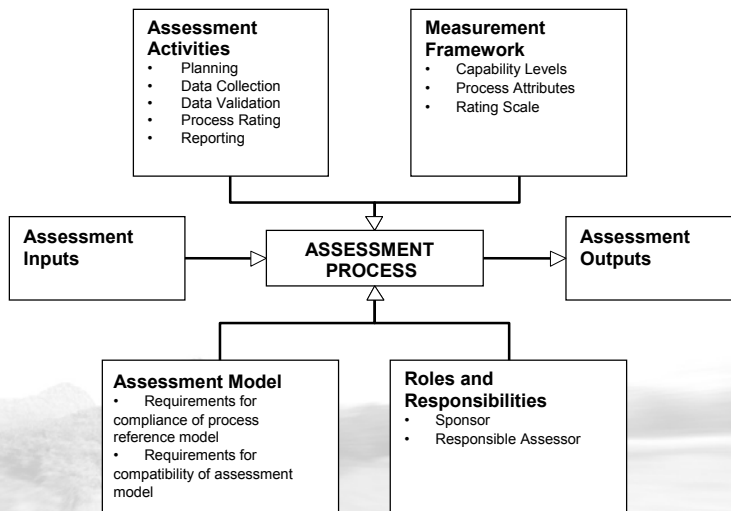
# Software Process Assessment - History

- ❖ 1998 ISO 15504 published as TR2.  
Revision authorised
- ❖ 2001 CMMI V1.0 released
- ❖ 2002 CMMI V1.1 released  
ISO 12207 Amd, ISO 15288, ISO TR 15504-2 Amd,  
ISO 15504-2 scheduled for publication.



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# Framework for Process Assessment

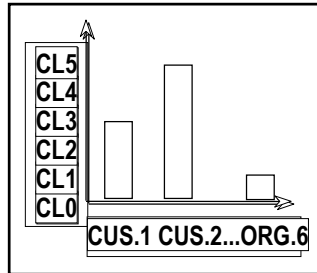


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# The Assessment Framework

## Two-dimensional model for processes and process capability

- ❖ **Process Dimension**
  - Process Categories
  - Processes (P1, ..., Pn)
- ❖ **Capability Dimension**
  - Capability Levels (CL1, ..., CL5)
  - Process Capability Attributes



Each process receives a capability level rating

This is referred to as a Continuous Model



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## TR 15504: Processes

### Customer-Supplier

- CUS.1 Acquisition**
  - CUS.1.1 Acquisition Preparation
  - CUS.1.2 Supplier Selection
  - CUS.1.3 Supplier Monitoring
  - CUS.1.4 Customer Acceptance
- CUS.2 Supply**
- CUS.3 Requirements Elicitation**
- CUS.4 Operation**
  - CUS.4.1 Operational Use
  - CUS.4.2 Customer Support

### Support

- SUP.1 Documentation**
- SUP.2 Configuration Management**
- SUP.3 Quality Assurance**
- SUP.4 Verification**
- SUP.5 Validation**
- SUP.6 Joint Reviews**
- SUP.7 Audit**
- SUP.8 Problem Resolution**

### Management

- MAN.1 Management**
- MAN.2 Project Management**
- MAN.3 Quality Management**
- MAN.4 Risk Management**

### Engineering

- ENG.1 Development**
  - ENG.1.1 System Requirements Analysis & Design
  - ENG.1.2 Software Requirements Analysis
  - ENG.1.3 Software Design
  - ENG.1.4 Software Construction
  - ENG.1.5 Software Integration
  - ENG.1.6 Software Testing
  - ENG.1.7 System Integration & Testing
- ENG.2 System & Software Maintenance**

### Organisation

- ORG.1 Organisational Alignment**
- ORG.2 Improvement**
  - ORG.2.1 Process Establishment
  - ORG.2.2 Process Assessment
  - ORG.2.3 Process Improvement
- ORG.3 Human Resource Management**
- ORG.4 Infrastructure**
- ORG.5 Measurement**
- ORG.6 Reuse**



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# TR 15504-2 Amendment

## Customer-Supplier

- CUS.1 Acquisition**  
 CUS.1.1 Acquisition Preparation  
 CUS.1.2 Supplier Selection  
 CUS.1.3 Supplier Monitoring  
 CUS.1.4 Customer Acceptance

## Acquirer

- ACQ.1 Acquisition Policy  
 ACQ.2 Acquisition Strategy  
 ACQ.3 Benefits Analysis  
 ACQ.4 Technical requirements  
 ACQ.5 Legal & Administrative Requirements  
 ACQ.6 Financial Requirements  
 ACQ.7 Project Requirements  
 ACQ.8 Request for Proposals  
 ACQ.9 Supplier Qualification  
 ACQ.10 Proposal Evaluation  
 ACQ.11 Contract Establishment  
 ACQ.12 Supplier Monitoring  
 ACQ.13 Acceptance  
 ACQ.14 Contract Closure  
 ACQ.15 Supplier Relationships  
 ACQ.16 User Relationships  
 ACQ.17 Financial Management

## Substitute Processes

Other processes read in context of acquisition

Software lifecycle >> acquisition lifecycle

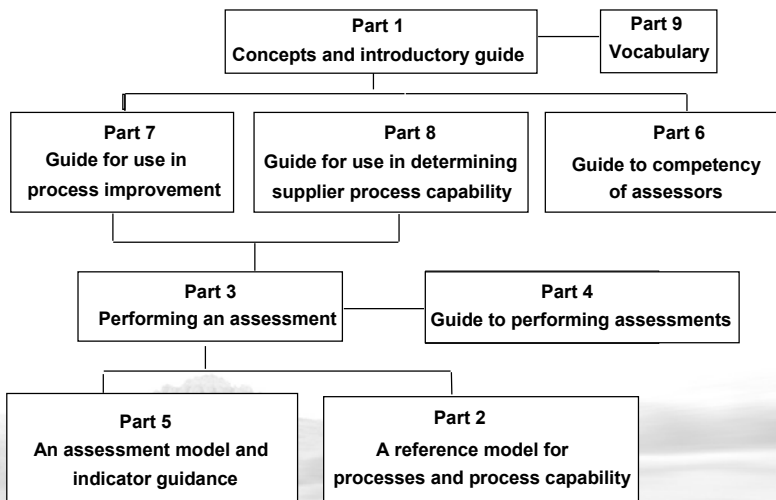
Software work product >> acquisition work product

ISO/IEC TR 15504-2 Amendment – Publication Q1 2002  
 Original Source: Pulse/Probe EC projects



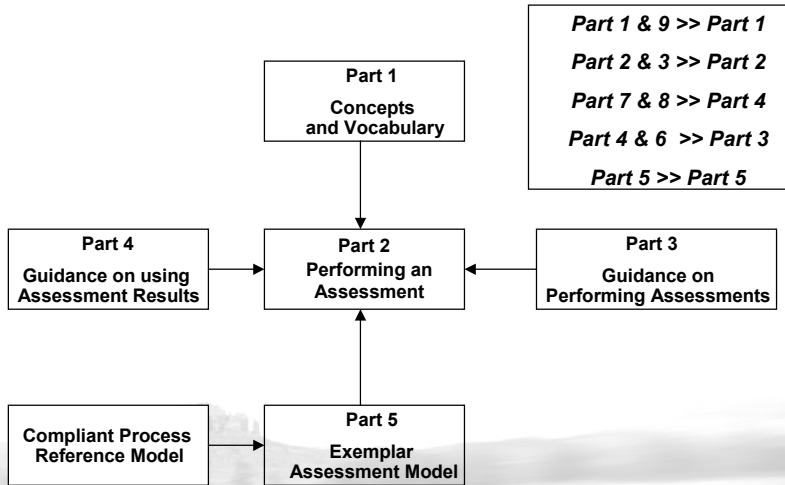
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# ISO/IEC TR 15504 Software Process Assessment



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## ISO/IEC 15504 Process Assessment



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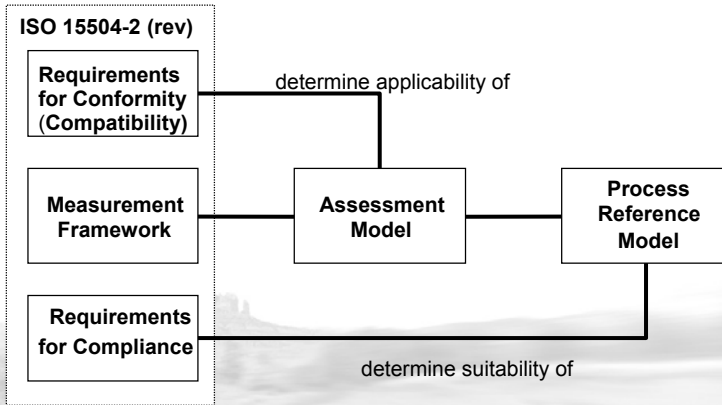
## The Changes

- ❑ Name change from Software Process Assessment to Process Assessment
- ❑ Restructuring from 9 parts to 5 parts
- ❑ Process dimension removed to ISO 12207 AMD1
- ❑ Introduction of Process Reference Model concept
- ❑ Alignment of Capability Dimension with ISO9001: 2000 (under consideration)



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# The Assessment Model



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# Measurement Framework Changes

## Optimising

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

## Level 5 Optimizing

- PA.5.1 Process Innovation
- PA.5.2 Process Optimisation

## Predicting

The process is consistently within defined limits

**L5 - Significant changes in the names and descriptions of the attributes, although the capability issues addressed not affected**

- PA.4.2 Process Control

## Establishing

A defined standard process.

**L4 -Definitions clarified to make the concept of "quantitative understanding" clearer**

- PA.3.1 Process Definition
- PA.3.2 Process Deployment

**L3 - Restructuring - Definition and Deployment as the two aspects of capability - "Process Resource" issues are re-distributed**

- PA.2.1 Performance Management
- PA.2.2 Work Product Management

work products are established, controlled and maintained.

## Level 1 Performed

- PA.1.1 Process Performance

## Performed

The process is implemented and achieves its process purpose

**L1-L3 Redrafting to remove ambiguity and increase consistency with ISO 9001:2000**



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## High Capability Processes

- ❖ **The reworking of the high levels of capability clarifies the relationship between “Process Capability” as defined in ISO 15504, and conventional concepts of Statistical Process Control**
- ❖ **Level 4 (the Predictable Process) is concerned with the ability to identify and address special causes of process variation**
- ❖ **Level 5 (the Optimising Process) is concerned with the ability to identify and address common causes of process variation**



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## Current Status

- ❖ **Part 2 has completed “Final Committee Draft” ballot**
  - ❖ **Comments will be addressed at the meeting in Pisa, 18 March**
  - ❖ **A second FCD ballot will be required**
- ❖ **Part 3 has completed “Committee Draft” ballot**
  - ❖ **Comments will be addressed at the meeting in Pisa, 18 March**
  - ❖ **A further FCD ballot will be required**
- ❖ **Part 4 is currently in “Committee Draft” ballot**
  - ❖ **Comments will be addressed in Busan, 13 May**
- ❖ **Part 5 has been developed as a Working Draft**
  - ❖ **For rework next week, and subsequent Registration Ballot**
- ❖ **Part 1 is pending more detailed work on the other parts**



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## Timeline

- ❖ **Part 2 (normative) expected publication mid 2003**
- ❖ **Part 3 to follow two months later**
- ❖ **Remaining parts to be published over the following 12 months**
- ❖ **Project completion expected December 2004**

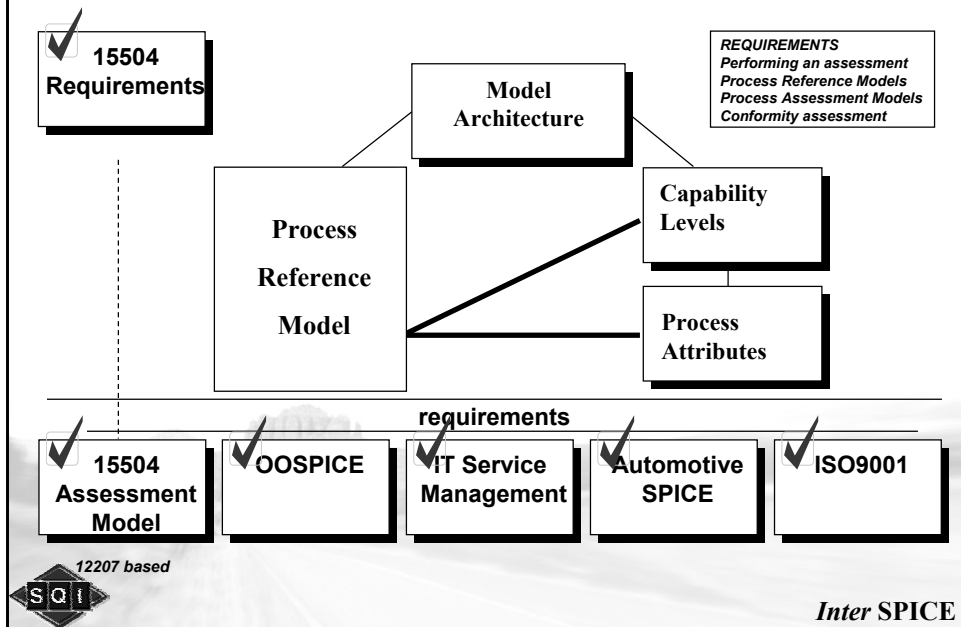


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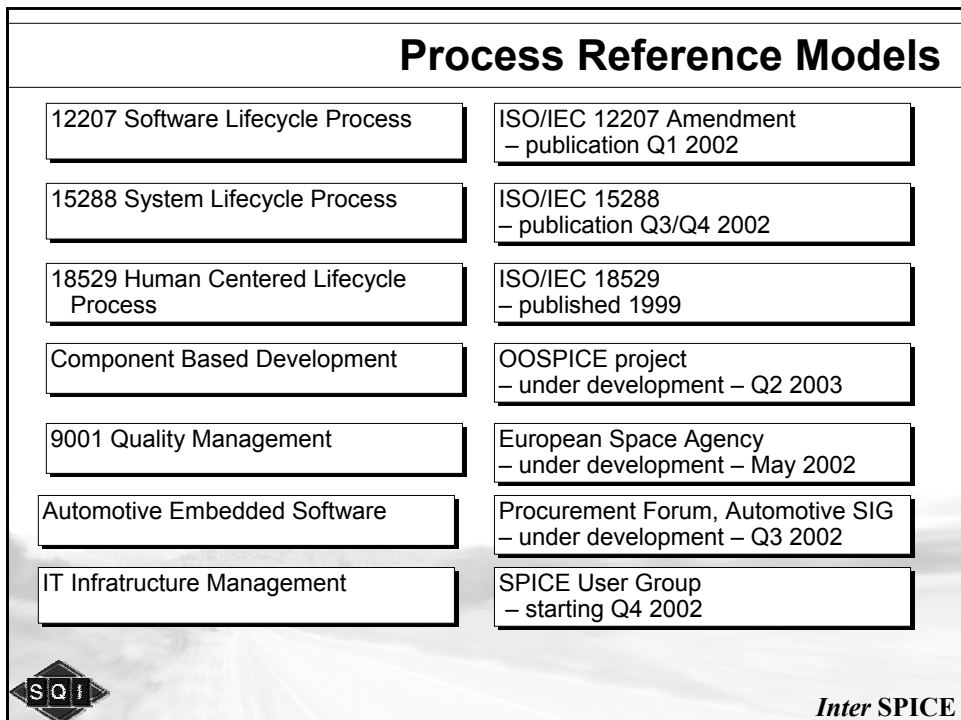


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## Process Reference Models



## Process Reference Models



# CBD PRM

## Engineering

- ENG.1 Modeling**
  - ENG.1.1 Domain Engineering
  - ENG.1.2 Business Modeling
  - ENG.1.3 Requirement Engineering
  - ENG.1.4 Behaviour Specification Architecture
  - ENG.1.5 Provisioning Strategy
  - ENG.1.6 Use Interface Specification
- ENG.2 Application Assembly**
  - ENG.2.1 Application Design
  - ENG.2.2 Component Selection
  - ENG.2.3 Component Assembly
  - ENG.2.4 Application Testing
  - ENG.2.5 Application Delivery
  - ENG.2.6 Legacy Mining
- ENG.3 Component P...**
  - ENG.3.1 Component Intern...
  - ENG.3.2 Component Impl...
  - ENG.3.3 Component Testing
  - ENG.3.4 Component Delivery

## Organisation

- ORG.2 Improvement**
- Customer-Supplier**
- CUS.1 Acquisition**
- Support**
- Implementation**
- Management**
  - MAN.1 Management
  - MAN.2 Project Management
  - MAN.3 Quality Management
  - MAN.4 Risk Management
  - MAN.5 Programme Management

**DRAFT**

Source: OOSPICE project [www.oospice.com](http://www.oospice.com)  
- under development – completion end 2002



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# IT Infrastructure PRM

## IT Infrastructure Management

- Computer Operations
- Network Management
- Service Level Management
- Availability Management
- Contingency Planning
- Capacity Management
- Cost Management
- Software Control and...
- Computer Installati...
- Help Desk
- Problem Management
- Change Management
- Configuration Mana...
- Vendor Management
- Customer and User Liaison
- Facilities Management
- Asset Management

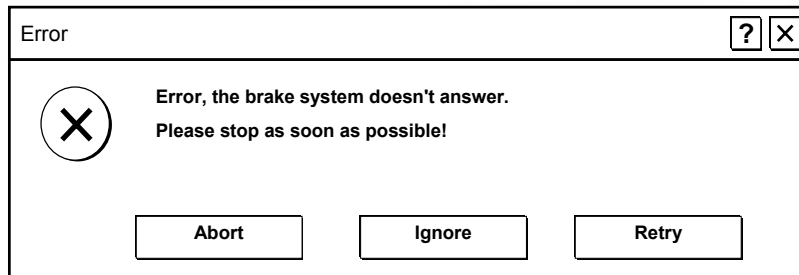
**DRAFT**

Reference: CCTA IT Infrastructure Library



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## Automotive PRM



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## Automotive SPICE

### ❖ **Manufacturers:**

- ❖ DaimlerChrysler, VW, Audi, BMW, Porsche, Opel
- ❖ Volvo, Saab, Fiat, PSA, Renault, Landrover, Jaguar

### ❖ **Representative Organisations**

- ❖ VDA, MISRA, INCOSE

### ❖ **Goal**

- ❖ **Common approach for assessing and evaluating suppliers based on 15504 Automotive SPICE PRM**



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# ISO9001: 2000

ISO9001 - process based

ISO9004 Guidelines for Performance Improvement contains guidelines for self-assessment with a set of associated performance maturity levels

## *The burning questions:*

*What process capability levels does an ISO9001 certified company have ?*

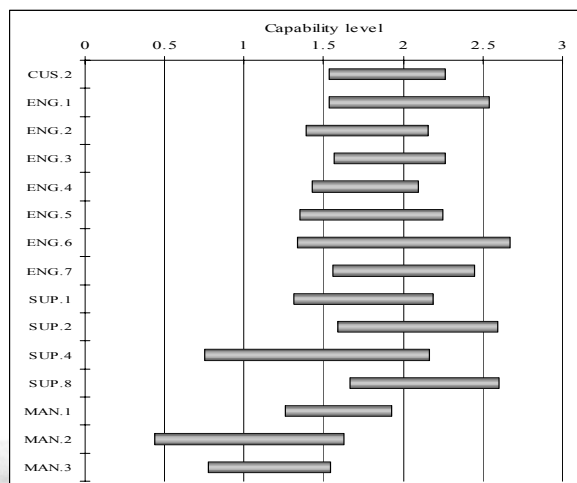
*What is the relationship (if any) between ISO15504 and ISO9001 ?*

*Is it possible to establish an ISO15504 assessment framework based on ISO9001 ?*



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## ISO9001 Assessed Companies - Mean Capability Levels



Source: Bootstrap Institute  
Findings from SPICE trials – Jung, Hunter, Goldenson, EI-Emam



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# ISO9001 PRM

## Organisation

- ORG.1 Management Direction
- ORG.2 Quality Establishment
- ORG.3 Management Review
- ORG.4 Document Control
- ORG.5 Record Control

## Customer Focus

- CUF.1 Requirements Determination
- CUF.2 Requirements Review
- CUF.3 Customer Communication
- CUF.4 Customer Satisfaction
- CUF.5 Customer Property

## Resource and Facilities Management

- RFM.1 Infrastructure Management
- RFM.2 Work Environment Management
- RFM.3 Human Resource Management
- RFM.4 Control and Monitoring of Measuring Devices

## Purchasing Assurance

- PAS.1 Supplier Selection

## Core Processes

- COP.1 Design & Development Management
  - COP.2 Design & Development Assurance
  - COP.3 Technical Review
  - COP.4 Production Assurance
  - COP.5 Product Acceptance & Delivery
  - COP.6 Production Control
  - COP.7 Development Change Management
  - COP.8 Product Identification
  - COP.9 Identification and Control
  - COP.10 System Operation Assurance
- ## Measurement, Analysis & Improvement
- MAI.1 Internal Audit
  - MAI.2 Process Monitoring and Measurement
  - MAI.3 Product Monitoring and Measurement
  - MAI.4 Nonconforming Product Control
  - MAI.5 Data Analysis
  - MAI.6 Continual Improvement
  - MAI.7 Corrective Action
  - MAI.8 Preventive Action

DRAFT

Source: European SPACE Agency project  
 – under development - completion May 2002

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# SPICE Network

## SPICE User Group

**Membership Services**

**Annual Conference**

**Conformance verification**

**SPICE Network**

**Research**

**Benchmarking**

**Network Partner**

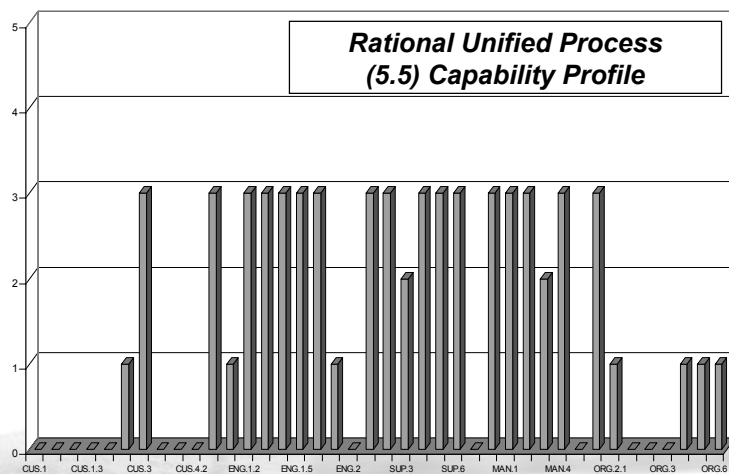


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- ❖ Rational Unified Process
- ❖ Extreme programming
- ❖ Open source
- ❖ Applicable metrics
- ❖ Safety Integrity Levels
- ❖ ISO9001:2000



## Predicting Software Quality with TR 15504

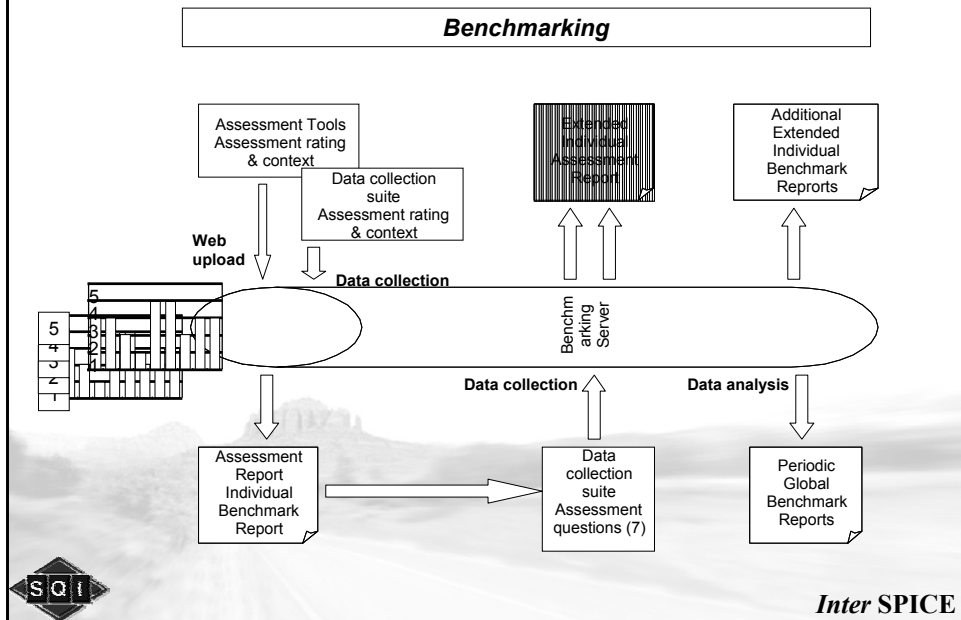


Source: Predicting Software Quality with TR 15504,  
Marie Jakobsson, Master thesis, Hogskolan I Boras





# Benchmarking



## Where to get your SPICE

- SPICE web site ( [www.sqi.gu.edu.au/spice/](http://www.sqi.gu.edu.au/spice/) )
- SPICE User Group ( [www.seg.iit.nrc.ca/spice](http://www.seg.iit.nrc.ca/spice) )
- SUGaR web site ( [www.seg.iit.nrc.ca/spice](http://www.seg.iit.nrc.ca/spice) )
- SUGaR Listserv ( [www.isospice.com](http://www.isospice.com) )
- SPICE Conference ( [www.isospice.com](http://www.isospice.com) )

The SUGaR and SPICE User Group web sites will in the near future be transitioned to  
[www.isospice.com](http://www.isospice.com)  
[www.spiceusergroup.org](http://www.spiceusergroup.org)

Newsletter from Q3 2002  
Intranet from Q3 2002



**Thank you for listening**

