Automotive SPICE

Free model: http://www.automotivespice.com/fileadmin/software-download/Automotive_SPICE_PAM_30.pdf – or just search for “aspice pdf”

Even-André Karlsson

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QUALITY IMPROVEMENT

Introduction

- Even-André Karlsson– 30 years of Process and Quality improvement
  - Model based Improvement CMMI, A-SPICE
  - System engineering, Architecture, Tools, Requirements engineering
  - Agile, Lean, Team based organisation and Coaching
  - Automotive, Mechanical, Mobile, Telecom
- Company changes but with continued focus and services:
  - Process improvement
  - Software Quality
  - Software Safety
  - Supplier Management
  - Open Source Software

- SPICE/CMMI references
  - Accel, Atlas Copco, Autoliv, BorgWarner, Consat, GM, Mecel, Stoneridge, Volvo
  - ABB, Ericsson, FMC, IKEA, Kongsberg, QLIK, SAAB, Thales, Visma

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Principles

- Focus
  - Respect times
  - Email/phone
  - Active
- Communication
  - Listen
  - Respect
  - Seek understanding
- Parking lot

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Agenda – Automotive SPICE

- Need for defined processes
- Background of SPICE
- Automotive SPICE
  - Introduction
  - Process Reference Model
  - Process Assessment Model
  - Challenging Areas
  - Assessments
  - Improvement Programs
- Summary

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Defined Processes

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Performance and Capability in R&D ...

- The R&D organization's performance is typically measured as e.g.
  - Quality of product/service
  - Completeness of expected functionality
  - Cost
  - Lead time from order to delivery
- The capability to perform well, is given by how the work is planned, structured, performed, monitored and by whom.
  - Processes
  - Tools
  - Staff qualification

"The quality of a SW system is governed by the quality of the processes used to develop the system"

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Critical thoughts about processes…..

- I do not need defined processes if I have
  - Really good people
  - Advanced technology
  - An experienced manager
- Defined processes interfere with creativity
- Defined process = bureaucracy
- Process = process description

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High Capability Process

- Defined
- Documented
- Used
- Enforced by management
- Trained
- Measured
- Supported by tools and technology
- Controlled
- Tailored
- Maintained
- Improved

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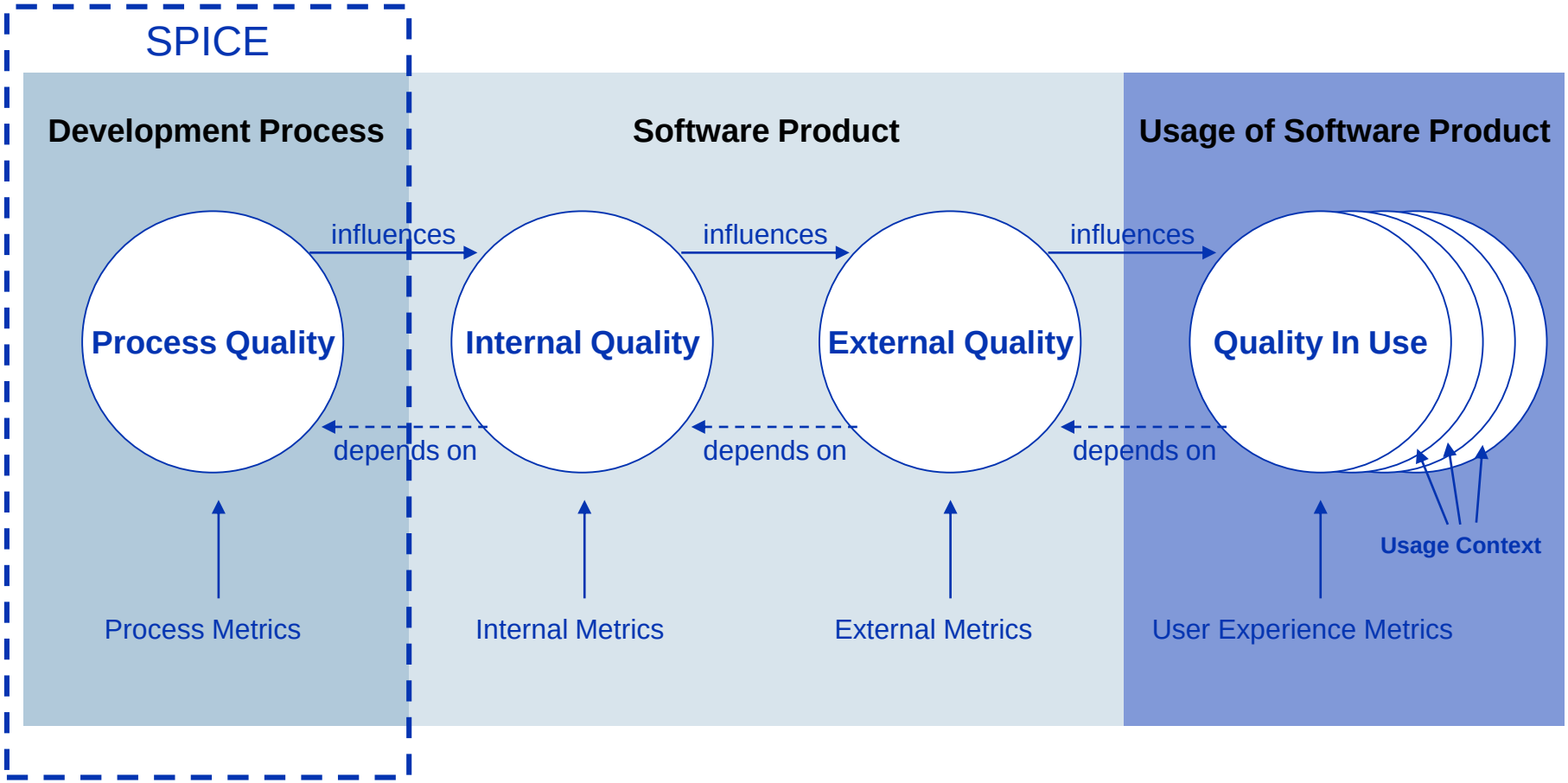
Quality in different perspectives



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SPICE

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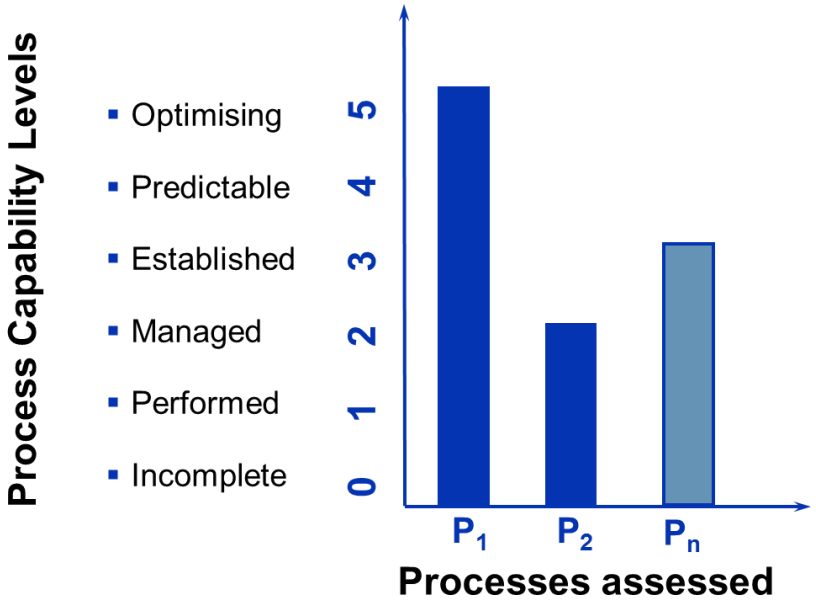
History of SPICE

- Unifying different maturity approaches: CMM, BOOTSTRAP, Trillium, ...
- Published as ISO-standard
  - 1993 a working group was formed in to draft the international standard (SPICE)
  - 1998 as TR (Technical Report) ISO/IEC 15504:1998
  - 2003-2005 revision of TR in Form as International Standard
  - 2015: 15504 was replaced by ISO 33001



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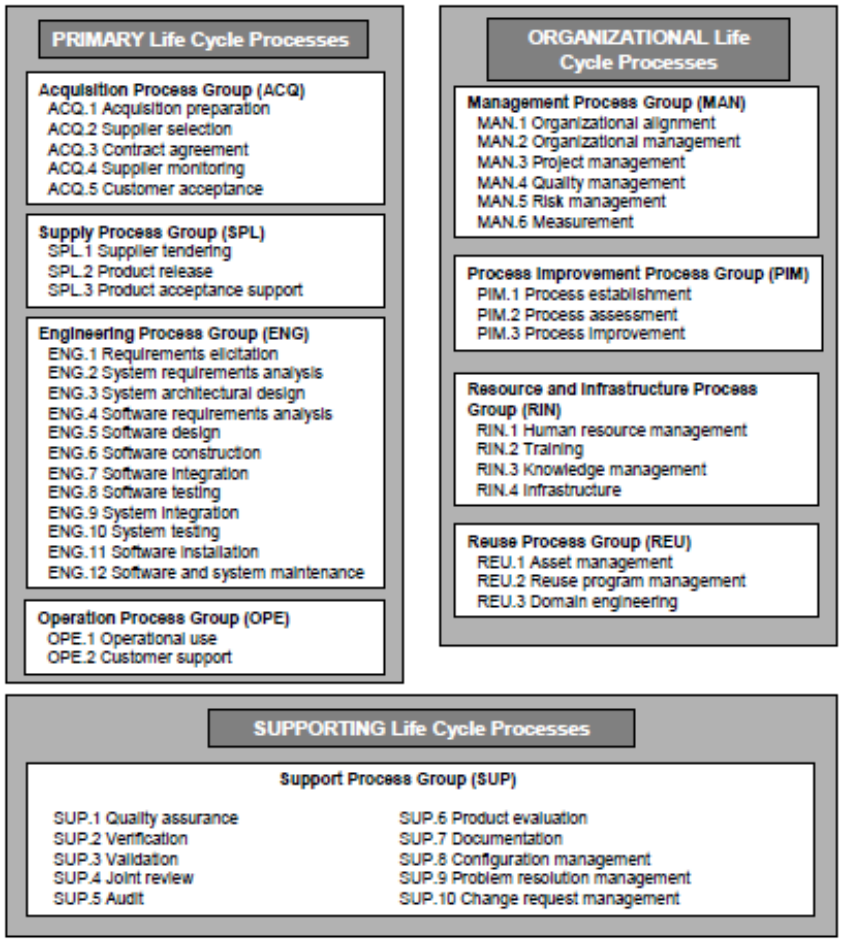
Categories & Groups from ISO/IEC 12207



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Automotive SPICE Introduction

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Automotive SPICE background

- Automotive SPICE Process Assessment Model published in 2005 by Automotive Special Interest Group (ASIG)
- Objective is to harmonize SPICE assessments in the Automotive domain to support OEMs to compare assessment results
- Currently driven by Automotive Special Interest Group and the Quality Management Center in the German Association of Automotive Industry (VDA QMC)

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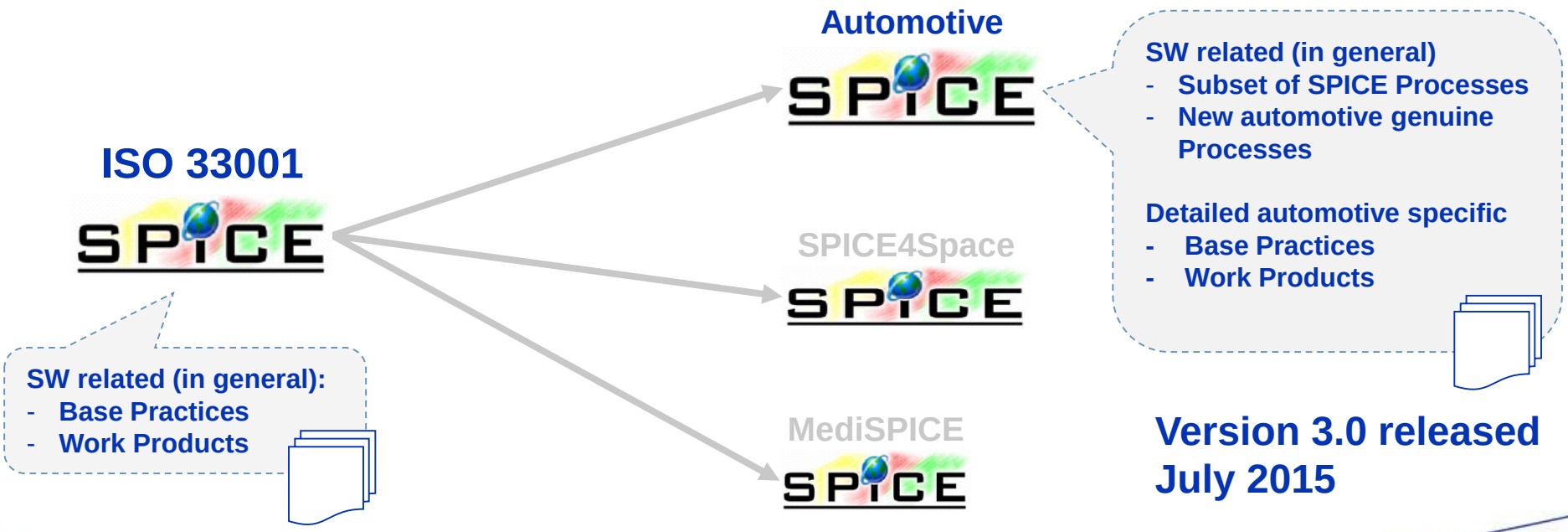
SPICE and Automotive SPICE

SPICE provides a generic framework to incorporate Process Reference and Assessment Models

Adoption to several industrial sectors:



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Automotive SPICE in a nutshell

Automotive SPICE is an adaption of ISO 33001 for automotive domain with

…is a model / framework good practices being used throughout automotive industry. It describes “What” should be done” not “How”.

… …is a collection of process areas of the whole product life cycle: Acquisition & Supply, Systems & Software Engineering, Support & Organization, and Project & Process Management

…is a capability model for rating and improving process capability

…provides guidance for improving the organization’s processes

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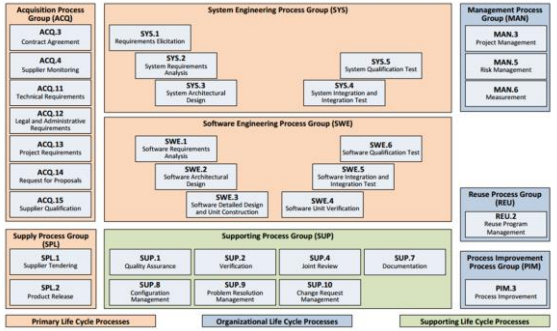
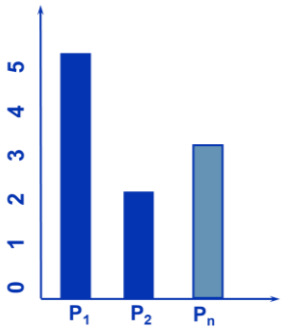
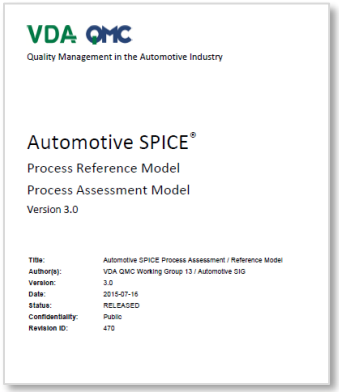
Automotive SPiCE in a nutshell (cont'd)

- Process Reference Model:
  "set of processes and process groups"



- Process Assessment Model
  to determine process capability




VDA QMC
Quality Management in the Automotive Industry

Automotive SPICE®
Process Reference Model
Process Assessment Model
Version 3.0

Title:	Automotive SPICE Process Assessment / Reference Model
Author(s):	VDA QMC Working Group 13 / Automotive SIG
Version:	3.0
Date:	2015-07-16
Status:	RELEASED
Confidentiality:	Public
Revision ID:	470

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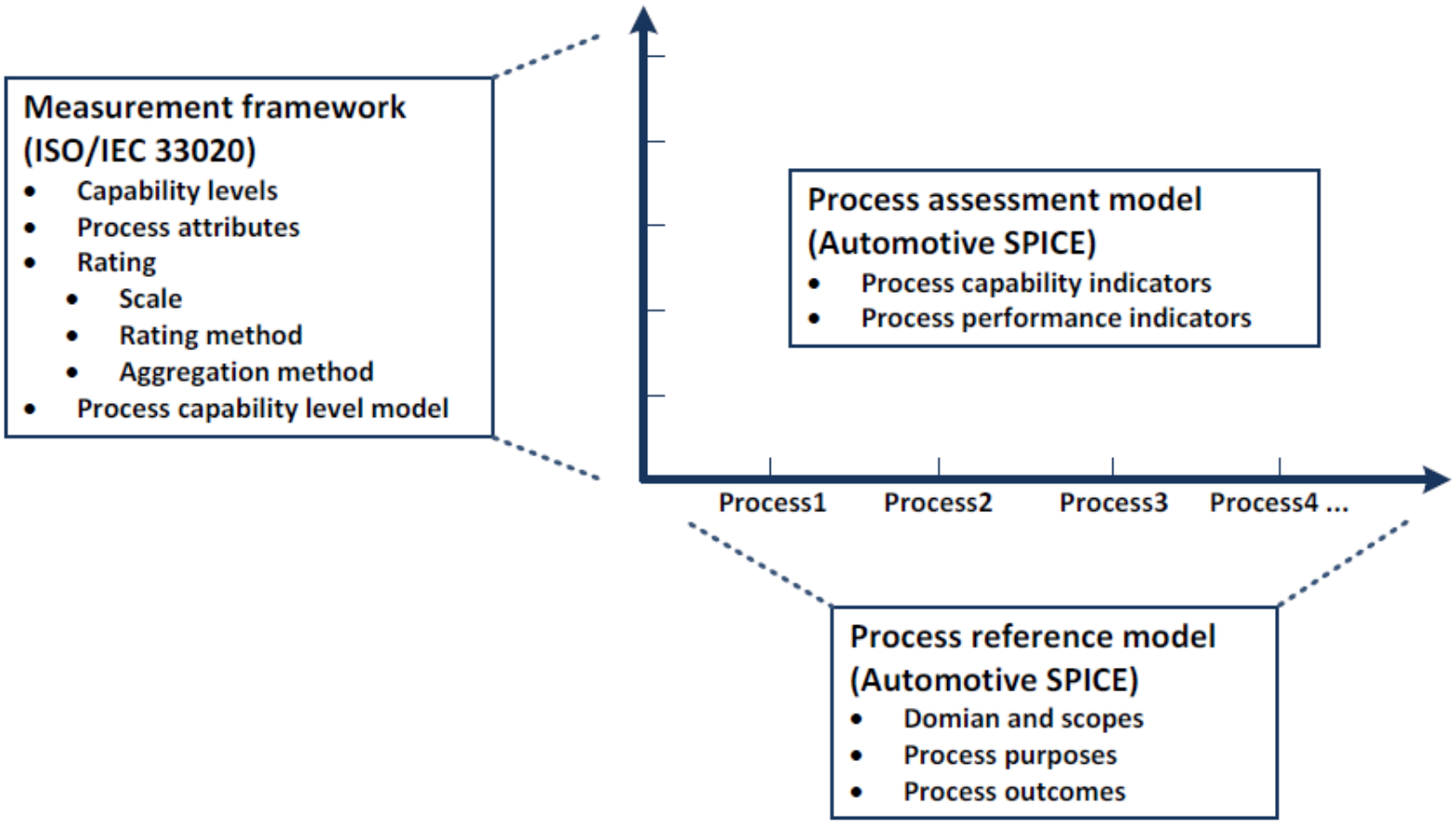
Process capability determination



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Automotive SPICE Process Reference Model

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SPICE / Automotive SPICE

PRIMARY Life Cycle Processes

Acquisition Process Group (ACQ)

- ACQ.1 Acquisition preparation
- ACQ.2 Supplier selection
- A ACQ.3 Contract agreement
- A ACQ.4 Supplier monitoring
- ACQ.5 Customer acceptance
- A ACQ.11 Technical requirements
- A ACQ.12 Legal and administrative requirements
- A ACQ.13 Project requirements
- A ACQ.14 Request for proposal
- A ACQ.15 Supplier qualification

Supply Process Group (SPL)

- A SPL.1 Supplier tendering
- A SPL.2 Product release
- SPL.3 Product acceptance support

Engineering Process Group (ENG)

- A SYS.1 Requirements elicitation
- A SYS.2 System requirements analysis
- A SYS.3 System architectural design
- A SWE.1 Software requirements analysis
- A SWE.2 Software design
- A SWE.3 Software construction
- A SWE.4 Software unit verification
- A SWE.5 Software integration and test
- A SWE.6 Software Qualification Test
- A SYS 5 System integration and test
- A SYS.6 System Qualification testing
- ENG.11 Software installation
- ENG.12 Software and system maintenance

PRIMARY Life Cycle Processes (cont.)

Operation Process Group (OPE)

- OPE.1 Operational use
- OPE.2 Customer support

SUPPORTING Life Cycle Processes

Support Process Group (SUP)

- A SUP.1 Quality assurance
- A SUP.2 Verification
- SUP.3 Validation
- A SUP.4 Joint Review
- SUP.5 Audit
- SUP.6 Product evaluation
- A SUP.7 Documentation
- A SUP.8 Configuration management
- A SUP.9 Problem resolution management
- A SUP.10 Change request management

ISO/IEC 15504-5 process

A Automotive SPICE process

HIS-Scope

not included in ISO/IEC 15504-5

ORGANIZATIONAL Life Cycle Processes

Management Process Group (MAN)

- MAN.1 Organizational alignment
- MAN.2 Organizational management
- A MAN.3 Project management
- MAN.4 Quality management
- A MAN.5 Risk management
- A MAN.6 Measurement

Resource & Infrastructure Process Group (RIN)

- RIN.1 Human resource management
- RIN.2 Training
- RIN.3 Knowledge management
- RIN.4 Infrastructure

Reuse Process Group (REU)

- REU.1 Asset management
- A REU.2 Reuse program management
- REU.3 Domain engineering

Process Improvement Process Group (PIM

- PIM.1 Process establishment
- PIM.2 Process assessment
- A PIM.3 Process improvement

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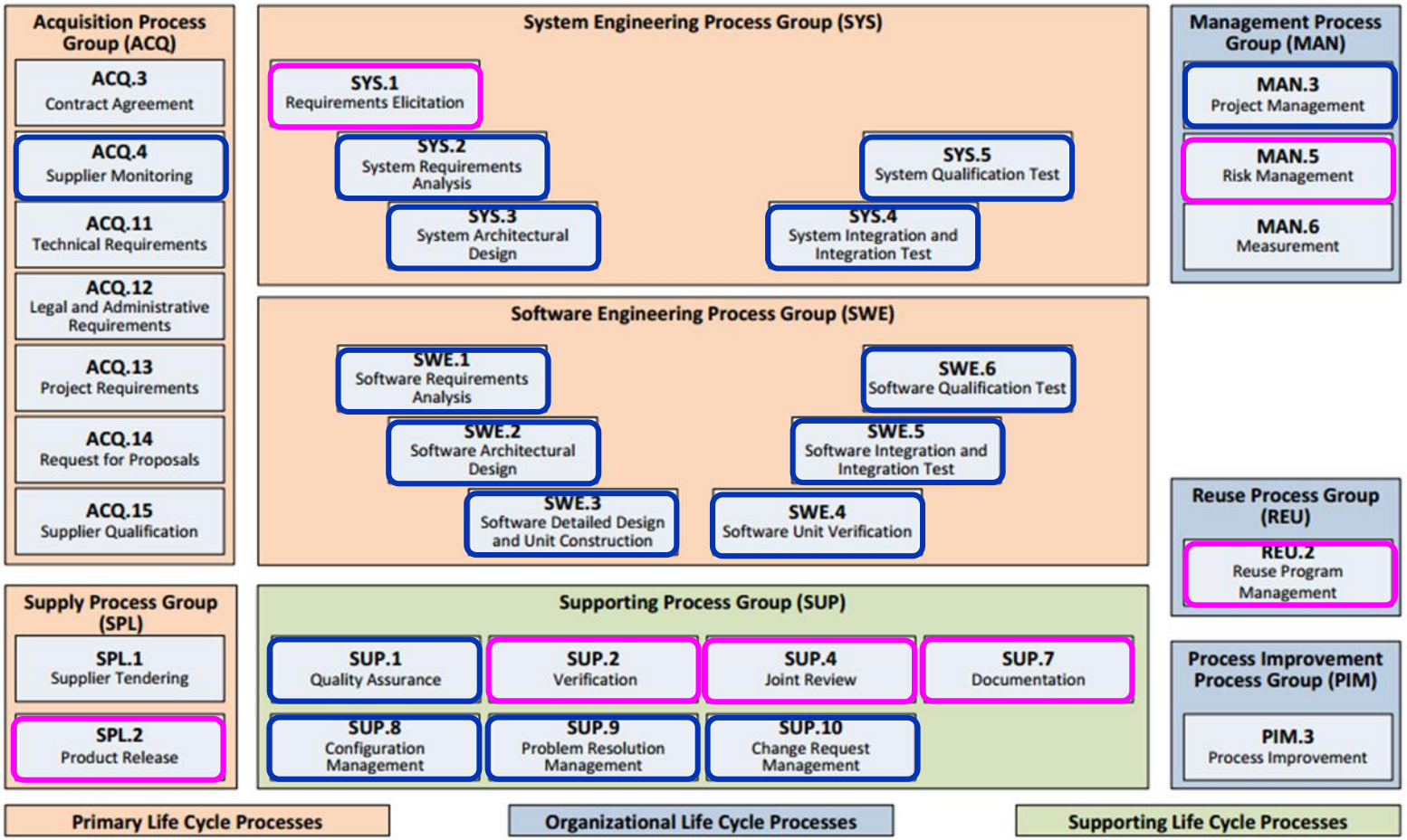
Automotive SPICE (Version 3.0)

HIS Scope

Extended HIS Scope



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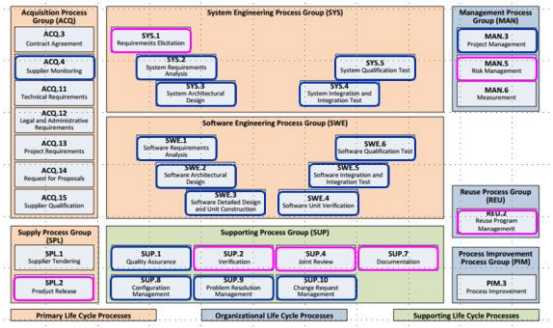
Acqusition and Supply Process Groups

- **ACQ.4 Supplier Monitoring**
  The purpose of the Supplier Monitoring Process is to track and assess the performance of the supplier against agreed requirements.



- **SPL.2 Product Release** EXTENDED
  The purpose of the Product Release Process is to control the release of a product to the intended customer.

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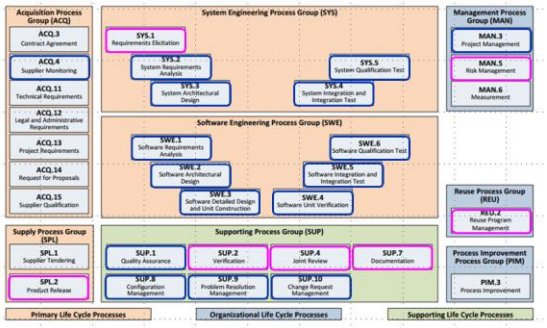
System Engineering Process Group 1(2)

- **SYS.1 Requirements Elicitation** EXTENDED
  The purpose of the Requirements Elicitation Process is to manage stakeholder needs and requirements throughout the lifecycle to form the basis for defining the needed work products.



- **SYS.2 System Requirements Analysis**
  The purpose of the System Requirements Analysis Process is to transform the defined stakeholder requirements into a set of system requirements that will guide the design of the system.

- **SYS.3 System Architectural Design**
  The purpose of the System Architectural Design Process is to establish a system architectural design and identify which system requirements are to be allocated to which elements of the system.

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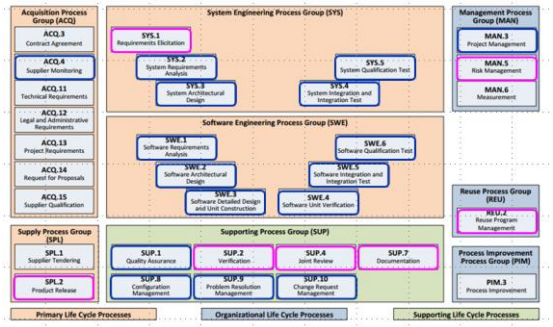
Software Engineering Process Group 1(2)

- **SWE.1 Software Requirements Analysis**
  The purpose of the Software Requirements Analysis Process is to transform the software related parts of the system requirements into a set of software requirements.
- **SWE.2 Software Architectural Design**
  The purpose of the Software Architectural Design Process is to establish an architectural design and to identify which software requirements are to be allocated to which elements of the software.
- **SWE.3 Software Detailed Design and Unit Construction**
  The purpose of the Software Detailed Design and Unit Construction Process is to provide an evaluated detailed design for the software units and to produce the software units.



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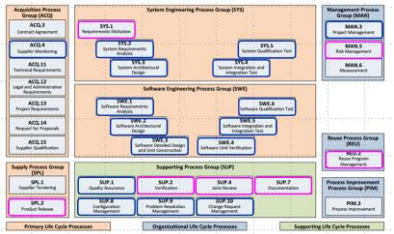
Example of a Process Area



4.4.2. SWE.2 Software Architectural Design

Process ID	**SWE.2**
Process name	**Software Architectural Design**
Process purpose	The purpose of the Software Architectural Design Process is to establish an architectural design and to identify which software requirements are to be allocated to which elements of the software, and to evaluate the software architectural design against defined criteria.
Process outcomes	As a result of successful implementation of this process: 1) a software architectural design is defined that identifies the elements of the software; 2) the software requirements are allocated to the elements of the software; 3) the interfaces of each software element are defined; 4) the dynamic behavior and resource consumption objectives of the software elements are defined; 5) consistency and bidirectional traceability are established between software requirements and software architectural design; and 6) the software architectural design is agreed and communicated to all affected parties.
Base practices	**SWE.2.BP1: Develop software architectural design.** Develop and document the software architectural design that specifies the elements of the software with respect to functional and non-functional software requirements. [OUTCOME 1] *NOTE 1: The software is decomposed into elements across appropriate hierarchical levels down to the software components (the lowest level elements of the software architectural design) that are described in the detailed design.* ! **SWE.2.BP2: Allocate software requirements.** Allocate the software requirements to the elements of the software architectural design. [OUTCOME 2] **SWE.2.BP3: Define interfaces of software elements.** Identify, develop and document the interfaces of each software element. [OUTCOME 3] ! **SWE.2.BP4: Describe dynamic behavior.** Evaluate and document the timing and dynamic interaction of software elements to meet the required dynamic behavior of the system. [OUTCOME 4] *NOTE 2: Dynamic behavior is determined by operating modes (e.g. start-up, shutdown, normal mode, calibration, diagnosis, etc.), processes and process intercommunication, tasks, threads, time slices, interrupts, etc.* *NOTE 3: During evaluation of the dynamic behavior the target platform and potential loads on the target should be considered.* ! **SWE.2.BP5: Define resource consumption objectives.** Determine and document the resource consumption objectives for all relevant elements of

	the software architectural design on the appropriate hierarchical level. [OUTCOME 4] *NOTE 4: Resource consumption is typically determined for resources like Memory (ROM, RAM, external / internal EEPROM or Data Flash), CPU load, etc.* ! **SWE.2.BP6: Evaluate alternative software architectures.** Define evaluation criteria for architecture design. Evaluate alternative software architectures according to the defined criteria. Record the rationale for the chosen software architecture. [OUTCOME 1, 2, 3, 4, 5] *NOTE 5: Evaluation criteria may include quality characteristics (modularity, maintainability, expandability, scalability, reliability, security and usability) and results of make-buy-reuse analysis.* ! **SWE.2.BP7: Establish bidirectional traceability.** Establish bidirectional traceability between software requirements and elements of the software architectural design. [OUTCOME 5] *NOTE 6: Bidirectional traceability covers allocation of software requirements to the elements of the software architectural design.* *NOTE 7: Bidirectional traceability supports coverage, consistency and impact analysis.* **SWE.2.BP8: Ensure consistency.** Ensure consistency between software requirements and the software architectural design. [OUTCOME 1, 2, 5, 6] *NOTE 8: Consistency is supported by bidirectional traceability and can be demonstrated by review records.* *NOTE 9: Software requirements include software architectural requirements, refer to BP6.* ! **SWE.2.BP9: Communicate agreed software architectural design.** Communicate the agreed software architectural design and updates to software architectural design to all relevant parties. [OUTCOME 6]
Output work products !	04-04 Software architectural design → [OUTCOME 1, 2, 3, 4, 5] 13-04 Communication record → [OUTCOME 6] 13-19 Review record → [OUTCOME 5] 13-22 Traceability record → [OUTCOME 5] 17-08 Interface requirement specification → [OUTCOME 3]

Process reference model (Purpose, outcomes)

Process assessment model (BPs, WPs)

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Example work product:

04-03	Domain model	• Must provide a clear explanation and description, on usage and properties, for reuse purposes • Identification of the management and structures used in the model
04-04	Software architectural design	• Describes the overall software structure • Describes the operative system including task structure • Identifies inter-task/inter-process communication • Identifies the required software elements • Identifies own developed and supplied code • Identifies the relationship and dependency between software elements • Identifies where the data (such as parameters) are stored and which measures (e.g. checksums, redundancy) are taken to prevent data corruption • Describes how variants for different model series or configurations are derived • Describes the dynamic behavior of the software (Start-up, shutdown, software update, error handling and recovery, etc.) • Identifies where the data (such as parameters) are stored and which measures (e.g. checksums, redundancy) are taken to prevent data corruption • Describes which data is persistent and under which conditions • Consideration is given to: - any required software performance characteristics - any required software interfaces - any required security characteristics required - any database design requirements
04-05	Software detailed design	• Provides detailed design (could be represented as a prototype, flow chart, entity relationship diagram, pseudo code, etc.) • Provides format of input/output data

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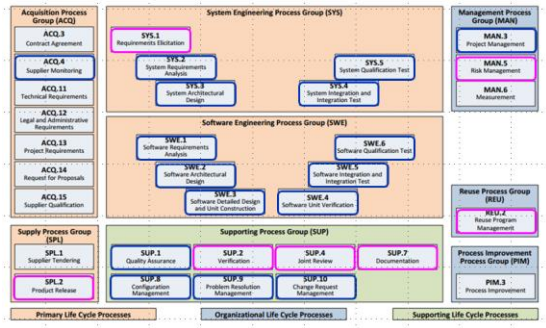
Software Engineering Process Group 2(2)

- **SWE.4 Software Unit Verification**
  The purpose of the Software Unit Verification Process is to verify software units to provide evidence for compliance of the software units with the software detailed design and with the non-functional software requirements.



- **SWE.5 Software Integration and Integration Test**
  The purpose of the Software Integration and Integration Test Process is to integrate the software units into larger software items up to a complete integrated software consistent with the software architectural design and to ensure that the software items are tested.

- **SWE.6 Software Qualification Test**
  The purpose of the Software Qualification Test Process is to ensure that the integrated software is tested to provide evidence for compliance with the software requirements.

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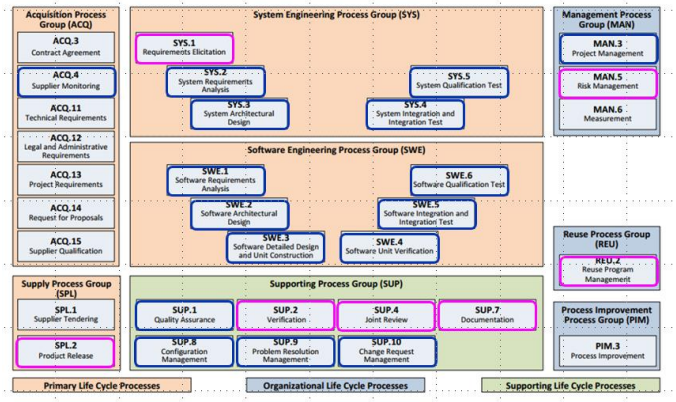
System Engineering Process Group 2(2)

- **SYS.4 System Integration and Integration Test**
  The purpose of the System Integration and Integration Test Process is to integrate and test the system items for compliance of the integrated system items with the system architectural
- **SYS.5 System Qualification Test**
  The purpose of the System Qualification Test Process is to ensure that the integrated system is tested to provide evidence for compliance with the system requirements and that the system is ready for delivery.



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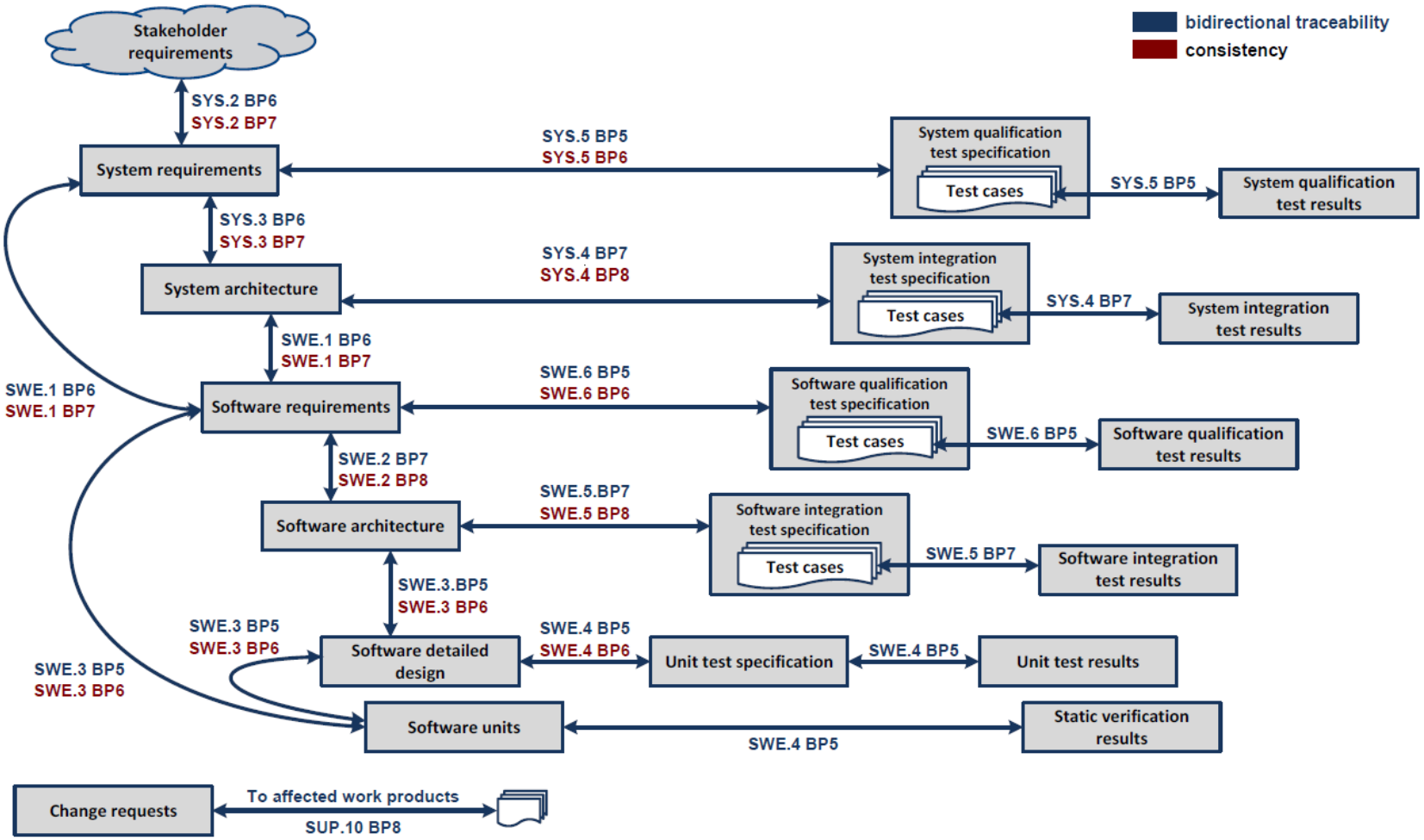
Traceability requirements



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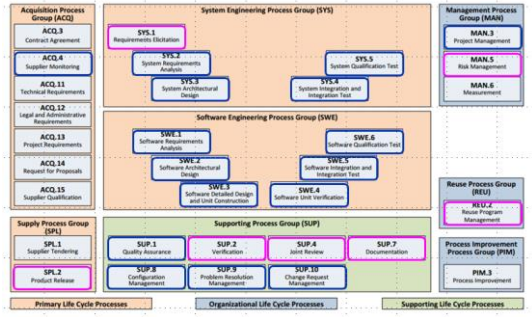
Supporting Process Group 1(2)



- **SUP.1 Quality Assurance**
  The purpose of the Quality Assurance Process is to provide independent and objective assurance that work products and processes comply with predefined provisions and plans and that non-conformances are resolved and further prevented.

- **SUP.2 Verification** EXTENDED
  The purpose of the Verification Process is to confirm that each work product of a process or project properly reflects the specified requirements.

- **SUP.4 Joint Review** EXTENDED
  The purpose of the Joint review process is to maintain a common understanding with the stakeholders of the progress against the objectives of the agreement and what should be done to help ensure development of a product that satisfies the stakeholders. Joint reviews are at both project management and technical levels and are held throughout the life of the project.

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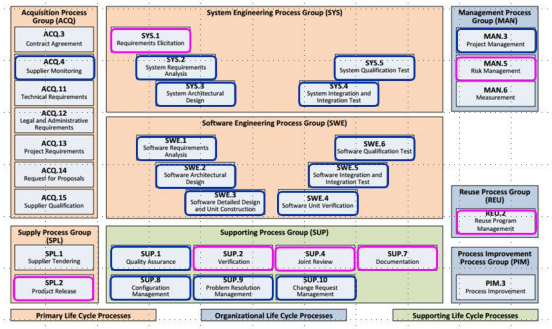
Supporting Process Group 2(2)



- **SUP.7 Documentation** EXTENDED
  The purpose of the Documentation Process is to develop and maintain the recorded information produced by a process.
- **SUP.8 Configuration Management**
  The purpose of the Configuration Management Process is to establish and maintain the integrity of all work products of a process or project and make them available to concerned parties.
- **SUP.9 Problem Resolution Management**
  The purpose of the Problem Resolution Management Process is to ensure that problems are identified, analyzed, managed and controlled to resolution.
- **SUP.10 Change Request Management**
  The purpose of the Change Request Management Process is to ensure that change requests are managed, tracked and implemented.

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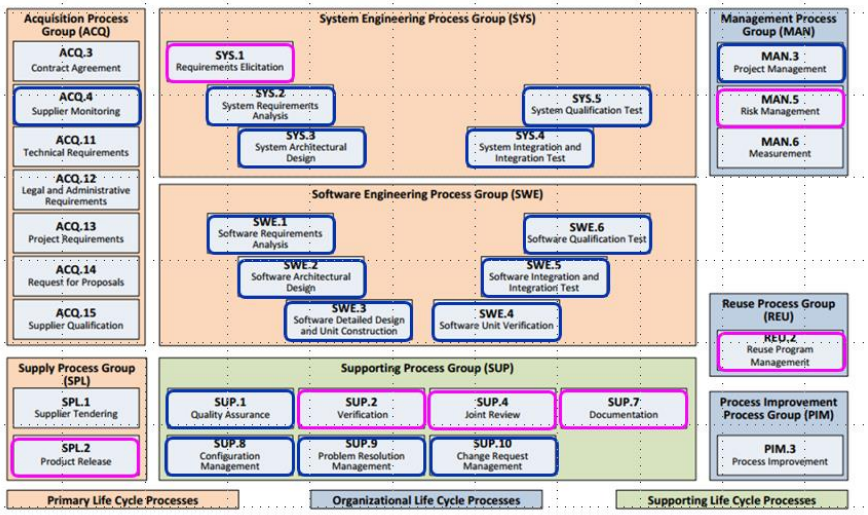
Management Process Group

- **MAN.3 Project Management**
  The purpose of the Project Management Process is to identify, establish, and control the activities and resources necessary for a project to produce a product, in the context of the project's requirements and constraints.
- **MAN.5 Risk Management** EXTENDED
  The purpose of the Risk Management Process is to identify, analyze, treat and monitor the risks continuously.



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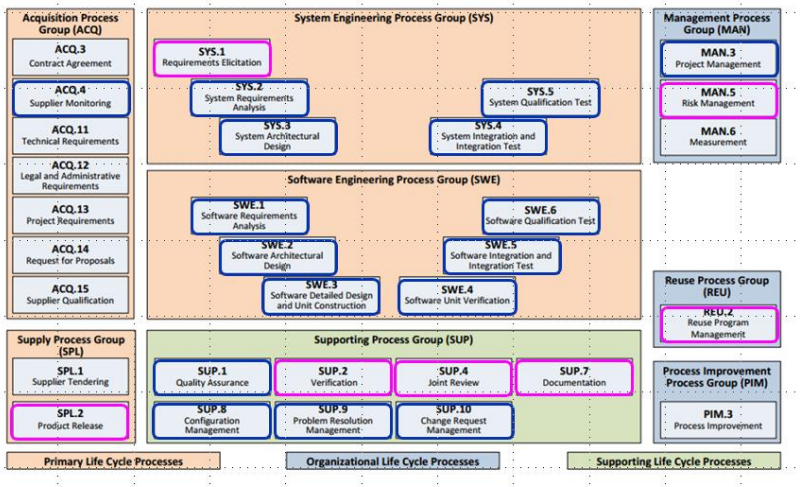
Reuse Process Group

- **REU.2 Reuse Program Management** EXTENDED
  The purpose of the Reuse Program Management Process is to plan, establish, manage, control, and monitor an organization's reuse program and to systematically exploit reuse opportunities.



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TOC

Table of contents

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Automotive SPICE Process Assessment Model

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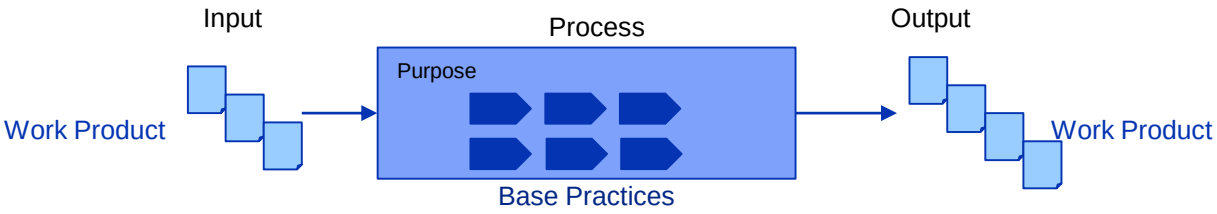
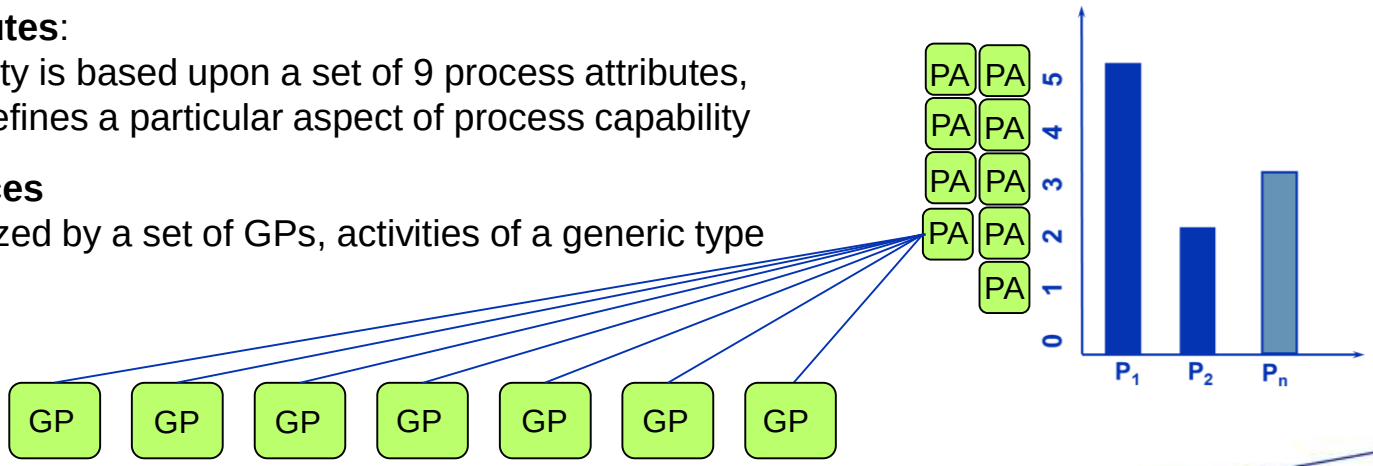
Definition of Key Terms

WHAT but not HOW

- **Base Practice**: A base practice is an activity that addresses the purpose of a particular process.
- **Work Product**: An artefact associated with the execution of a process



- **Process Attributes**:
  Process capability is based upon a set of 9 process attributes,
  Each attribute defines a particular aspect of process capability
- **Generic Practices**
  Each PA is realized by a set of GPs, activities of a generic type



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Capability Levels and Process Attributes

Level 5 - Innovated	Continuous Improvement of the Defined Process	5.2 Process Optimisation
		5.1 Process Innovation
Level 4 - Predicted	Predictable performance of the Defined Process	4.2 Quantitative Control
		4.1 Quantitative Analysis
Level 3 - Established	Established a Defined Process tailored from a Standard Process	3.2 Process Deployment
		3.1 Process Definition
Level 2 - Managed	Manage that the base practices are performed	2.2 Work Product Management
		2.1 Performance Management
Level 1 - Performed	Perform all base practices	1.1 Process Performance
Level 0 - Incomplete		

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Level 0: The Incomplete Process

- The process is not implemented, or fails to achieve its process purpose. At this level, there is little or no evidence of any systematic achievement of the process purpose. Processes are ad-hoc and re-active.
- Success is non-repeatable and incidental. Success or failure only depends on motivation and qualification of team members. („Heroes“, „Fire fighters“).

- Systematic achievement is characterized by:
  - the routine performance of necessary actions; and
  - the presence of appropriate input and output work products which, collectively, ensure that the process purpose is achieved.

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Level 1: The Performed Process

- The process achieves its defined outcomes
- Success is repeatable and non-incidental

- Base Practices performed
- Process Attributes
  - 1 Process performance

MAN.3 Project management
MAN.3.BP1: Define the scope of work
MAN.3.BP2: Define project life cycle
MAN.3.BP3: Evaluate feasibility of the project.
MAN.3.BP4: Define, monitor and adjust project activities
MAN.3.BP5: Determine, monitor und adjust project estimates and resources.
MAN.3.BP6: Ensure required skills, knowledge, and experience.
MAN.3.BP7: Identify, monitor and adjust project interfaces and agreed commitments.
MAN.3.BP8: Define, monitor and adjust project schedule.
MAN.3.BP9: Ensure consistency.
MAN.3.BP10: Review and report progress of the project.

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Level 2: The Managed Process

- The previously described Performed process is now implemented in a managed fashion (purpose, planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained.

- Base Practices performed
- Process Attributes
  - 1 Process Performance
  - **2.1 Performance Management**
  - **2.2 Work Product Management**

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Level 2: The Managed Process

- 2.1 Performance Management
  - GP 2.1.1 Identify the objectives for the performance of the process.
  - GP 2.1.2 Plan the performance of the process to fulfill the identified objectives
  - GP 2.1.3 Monitor the performance of the process against the plans
  - GP 2.1.4 Adjust the performance of the process
  - GP 2.1.5 Define responsibilities and authorities for performing the process
  - GP 2.1.6 Identify and make available resources to perform the process as planned
  - GP 2.1.7 Manage the interfaces between involved parties

- 2.2 Work Product Management
  - GP 2.2.1 Define the requirements for the work products (WPs)
  - GP 2.2.2 Define the requirements for documentation and control of the WPs
  - GP 2.2.3 Identify, document and control the WPs
  - GP 2.2.4 Review and adjust WPs to meet the defined requirements

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Level 3: The Established Process

- The previously described Managed process is now implemented using a **defined process** that is capable of achieving its process outcomes.

- Base Practices performed
- Process Attributes
  - 1 Process Performance
  - 2.1 Performance Management
  - 2.2 Work Product Management
  - **3.1 Process Definition**
  - **3.2 Process Deployment**

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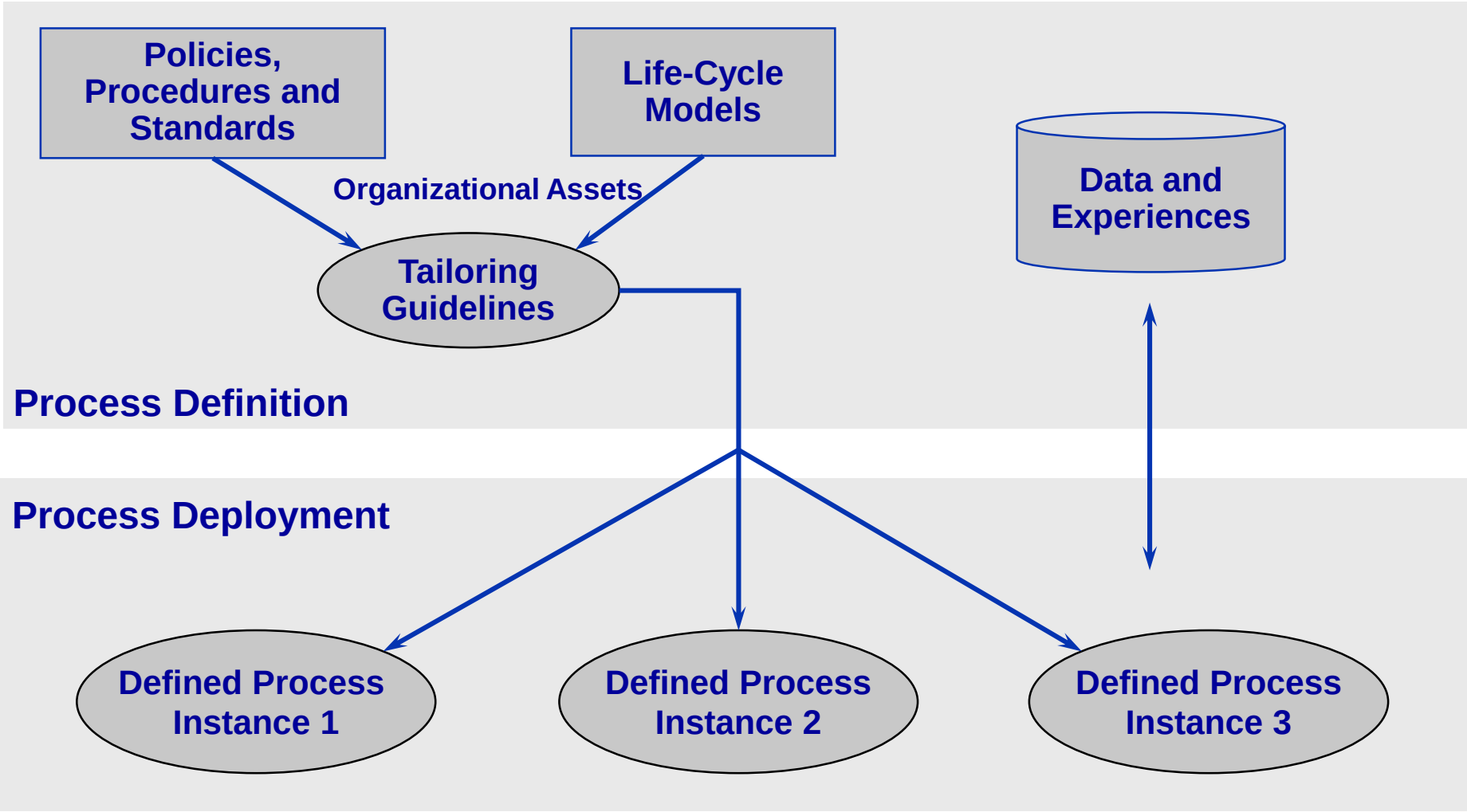
Standard and Defined Processes



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Level 3: The Established Process

- 3.1 Process Definition attribute
  - GP 3.1.1 Define the standard process
  - GP 3.1.2 Determine the sequence and interaction between processes
  - GP 3.1.3 Identify the roles, competencies, responsibilities and authorities
  - GP 3.1.4 Identify the required infrastructure and work environment
  - GP 3.1.5 Determine suitable methods to monitor the effectiveness and suitability
- 3.2 Process Deployment attribute
  - GP 3.2.1 Deploy a defined process
  - GP 3.2.2 Assign and communicate roles, responsibilities and authorities
  - GP 3.2.3 Ensure necessary competencies
  - GP 3.2.4 Provide resources and information
  - GP 3.2.5 Provide adequate process infrastructure
  - GP 3.2.6 Collect and analyze data about performance of the process

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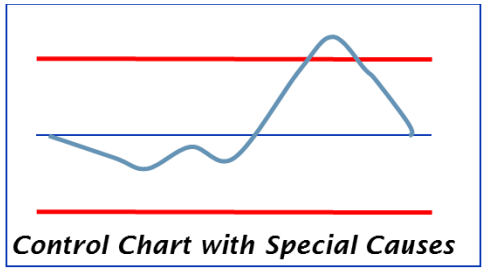
Level 4: The Predictable Process

- The previously described Established process now operates within defined limits to achieve its process outcomes. Process outcomes and its achievement / performance are predictable within the limits.

- Base Practices performed
- Process Attributes
  - 1 Process Performance
  - 2.1 Performance Management
  - 2.2 Work Product Management
  - 3.1 Process Definition
  - 3.2 Process Deployment
  - **4.1 Quantitative Analysis**
  - **4.2 Quantitative Control**



Control Chart with Special Causes

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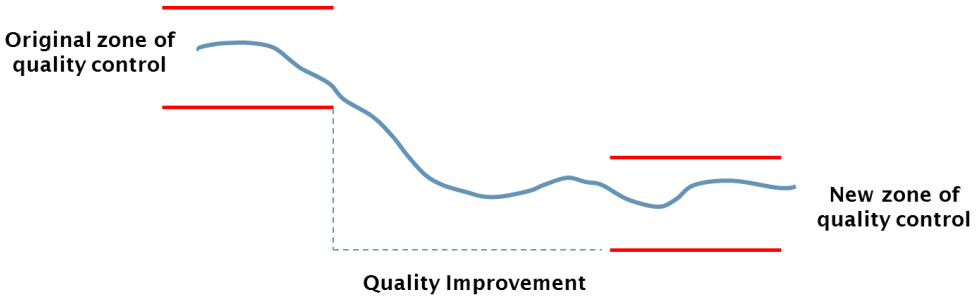
Level 5: The Innovating Process

- The previously described Predictable process is now continually improved to respond to change aligned with organizational goals.

- Base Practices performed
- Process Attributes
  - 1 Process Performance
  - 2.1 Performance Management
  - 2.2 Work Product Management
  - 3.1 Process Definition
  - 3.2 Process Deployment
  - 4.1 Process Measurement
  - 4.2 Process Control
  - **5.1 Process Innovation**
  - **5.2 Process Optimization**



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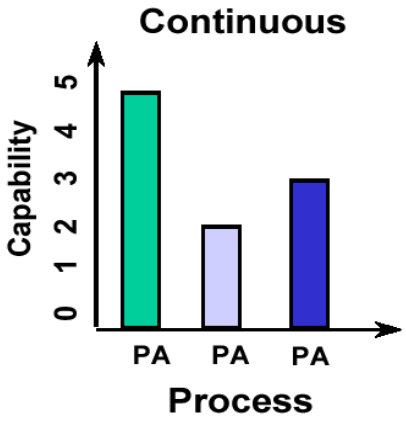
Summary of capability levels

- Level 0 – **Incomplete**
- Level 1 – **Perform** the Base practices
- Level 2 – **Manage** that the base practices are performed
- Level 3 – **Established** a Defined Process tailored from a Standard Process
- Level 4 – **Predictable** performance of the Defined Process
- Level 5 – **Innovating** the Defined Process continuously



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Automotive SPICE Challenging Areas

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Automotive SPICE – Challenging Areas

- Business impact
- Requirements on many levels
- Traceability
- Architecture and Design documentation
- Many levels of test
- Measurement
- Quality Assurance
- Agile and ASPICE
- Defined process ➔ Tailored to project

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Automotive SPICE Assessments

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Generic Assessment Flow

- Planning and preparations
  - Select scope
  - Select sample
  - Plan interviews
  - Gather documentation
  - Train appraisal team
- Data collection
  - Data collection
    - Interviews
    - Document reviews
  - Generate preliminary findings
  - Feedback session
- Report Define rating
  - Define Rating
  - Final Presentation
  - Report Generation

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Rating Scale as defined by ISO 33020

N	Not achieved	0% -15%	*There is little or no evidence of achievement of the defined process attribute in the assessed process.*
P	Partially achieved	16% -50%	*There is some evidence of an approach to, and some achievement of, the defined process attribute in the assessed process. Some aspects of achievement of the process attribute may be unpredictable.*
L	Largely achieved	51% -85%	*There is evidence of a systematic approach to, and significant achievement of, the defined process attribute in the assessed process. Some weaknesses related to this process attribute may exist in the assessed process.*
F	Fully achieved	86% -100%	*There is evidence of a complete and systematic approach to, and full achievement of, the defined process attribute in the assessed process. No significant weaknesses related to this process attribute exist in the assessed process.*

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Example of Process Profiles

N	Not achieved
P	Partially achieved
L	Largely achieved
F	Fully achieved

Capability level:	1	2		3	
Process / Process attribute	PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2
SYS.1 Requirement elicitation	F	F	L	N	N
SYS.2 System requirement analysis	F	F	L	N	N
SYS.3 System architecture design	L	F	L	N	P
SWE.1 Software requirement analysis	F	F	F	L	P
SWE.2 Software architecture design	L	F	F	P	P
SWE.3 Software detailed design and construction	F	L	L	P	P
SWE.4 Software Unit Verification	L	L	L	P	P
SWE.5 Software integration and integration test	L	L	L	P	P
SWE.6 Software Qualificatioon Test	F	L	L	P	P
SYS.4 System integration test	L	L	L	P	P
SYS.5 System Qualification Test	F	L	L	P	P
SUP.1 Quality assurance	P	N	N	N	N
SUP.2 Verification	L	L	P	P	P
SUP.4 Joint review	L	L	L	P	P
SUP.7 Documentation	F	L	L	P	P
SUP.8 Configuration management	L	L	L	L	L
SUP 9 Problem resolution management	F	L	L	P	P
SUP.10 Change request management	F	F	L	L	L
MAN.3 Project management	L	F	F	L	L
MAN.5 Risk management	F	F	L	L	L
MAN.6 Measurement	P	N	N	N	N

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Example of Process Profiles

N	Not achieved
P	Partially achieved
L	Largely achieved
F	Fully achieved

Capability level:	1	2		3	
Process / Process attribute	PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2
SYS.1 Requirement elicitation	F	F	L	N	N
SYS.2 System requirement analysis	F	F	L	N	N
SYS.3 System architecture design	L	F	L	N	P
SWE.1 Software requirement analysis	F	F	F	L	P
SWE.2 Software architecture design	L	F	F	P	P
SWE.3 Software detailed design and construction	F	L	L	P	P
SWE.4 Software Unit Verification	L	L	L	P	P
SWE.5 Software integration and integration test	L	L	L	P	P
SWE.6 Software Qualificatioon Test	F	L	L	P	P
SYS.4 System integration test	L	L	L	P	P
SYS.5 System Qualification Test	F	L	L	P	P
SUP.1 Quality assurance	P	N	N	N	N
SUP.2 Verification	L	L	P	P	P
SUP.4 Joint review	L	L	L	P	P
SUP.7 Documentation	F	L	L	P	P
SUP.8 Configuration management	L	L	L	L	L
SUP 9 Problem resolution management	F	L	L	P	P
SUP.10 Change request management	F	F	L	L	L
MAN.3 Project management	L	F	F	L	L
MAN.5 Risk management	F	F	L	L	L
MAN.6 Measurement	P	N	N	N	N

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Automotive SPICE Improvement Programs

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Improving capability and performance

Improved practices
Improved performance

Existing practices
Current performance

Common Process Improvement Pitfalls

- Process Improvement goals are not aligned with business goals
- Management not committed to Process Improvement
  - Adequate resources not provided
  - Premature delegation of process improvement responsibilities
- Process Theory
  - Process Improvement run from a Process Group away from projects
  - Neglecting existing practices
  - Lots of diagrams but little content
- Overconfidence in or misinterpretation of models
  - There are no ”silver bullets”
  - The check list syndrome
- Everything done at the same time - big bang strategy
- Neglecting the “human side” of the change
  - People change not organizations

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A typical (SPICE) improvement journey

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Summary

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Summary of Automotive SPICE

- Capability drives Performance
- SPICE "*Software Process Improvement and Capability dEtermination*"
- Automotive SPICE
  - Ensure that assessment results that are repeatable, objective and comparable
  - Guide process improvement initiatives
- Process Capability is determined:
  - Process Areas with purpose and outcome
  - Process Assessment model with:
    - Base Practices and Work Products (Level 1)
    - Process Attribute and Generic Practices (Level 2-5)
- Challenge for process Improvement to be successful
  - Focus (management attention, dedicated resources, …)
  - Change Management

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“Excellent firms don't believe in excellence - only in constant improvement and change.”

In Search of Excellence - Tom Peters

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