Automotive SPICE®
Basic`s and
Overview v. 3.0

tecmata GmbH

Sulzbach, 09.05.2017
Core Competencies

- Functional Safety
- Embedded Software Engineering and Test
- Process Management

- Requirements-Engineering
- Systemtest
- Integrations-test
- Software Architecture / Design
- Modultest
- Implementation
- Functional Safety
- Process Management
Agenda

SPICE - Software Process Improvement and Capability dEtermination

Speaker: Vera Gebhardt
Company: tecmata GmbH
**SPICE - Software Process Improvement and Capability dEtermination**

- is an international standard for performing a validation of business processes focused on software development

- SPICE is now also been used for assessments of system processes and organizational maturity

- SPICE provides a procedure for process assessments
SPICE ?!? 

- SPICE is *no product standard*
- SPICE specifies *no procedure model*
- *No methods or tools* are specified or favored
- The results may *not be used in common* (just in context)
- SPICE is not automatically a *process improvement*, but it can be a basis for it
Complexity of systems

Source: with courtesy of method park AG
Motivation - YOUR Motivation?

Process Assessment

leads to

Motivation

leads to

influence

Process Improvement

Process Maturity?
Important to understand

Process Assessment / Review Scope

- Overall Results + Results for each Process
- Proceeding with Level xy (0-5 Level)

General Remarks

- An assessment is a snapshot in time based on samples
- The rating of the Automotive SPICE processes is NO rating for the adherence to the internally defined processes
- Presentation contains only the most important aspects for improvement
**Scope**

Internal Assessment Findings for SW-Process Improvement

External Assessment Rates the capability of a project

Supplier

Level 1, 2, 3, 4, 5

Assessment

Customer

Service Provider

Automotive SPICE® is a registered trademark of VDA e.V.
ISO 15504 Part 2

Process Reference Model (PRM)

Measurement Framework

PAM
Process Assessment Model

Initial Input
Organisation/Project

Assessment Process

Roles and Responsibilities

Improvement

Output
Rating & improvement successions

Normative elements - performing an assessment
Choose your processes?

Primary Life Cycle Processes

**Acquisition Process Group (ACQ)**
- ACQ.1 Acquisition preparation
- ACQ.2 Supplier selection
- ACQ.3 Contract agreement
- ACQ.4 Supplier monitoring
- ACQ.5 Customer acceptance
- ACQ.6 Technical requirements
- ACQ.11 Legal and administrative requirements
- ACQ.12 Project requirements
- ACQ.13 Request for proposals
- ACQ.15 Supplier qualification

**Supply Process Group (SPL)**
- SPL.1 Supplier tendering
- SPL.2 Product release
- SPL.3 Product acceptance support

**Engineering Process Group (ENG)**
- ENG.1 Requirements elicitation
- ENG.2 System requirements analysis
- ENG.3 System architectural design
- ENG.4 Software requirements analysis
- ENG.5 Software design
- ENG.6 Software construction
- ENG.7 Software integration
- ENG.8 Software testing
- ENG.9 System integration
- ENG.10 System testing
  - ENG.11 Software installation
  - ENG.12 Software and system maintenance

**Operation Process Group (OPE)**
- OPE.1 Operational use
- OPE.2 Customer support

Support Process Group (SUP)
- SUP.1 Quality assurance
- SUP.2 Verification
- SUP.3 Validation
- SUP.4 Joint review
- SUP.5 Audit
- SUP.6 Product evaluation
- SUP.7 Documentation
- SUP.8 Configuration management
- SUP.9 Problem resolution management
- SUP.10 Change request management

Organizational Life Cycle Processes

**Management Process Group (MAN)**
- MAN.1 Organizational alignment
- MAN.2 Organizational management
- MAN.3 Project management
- MAN.4 Quality management
- MAN.5 Risk management
- MAN.6 Measurement

**Process Improvement Process Group (PIM)**
- PIM.1 Process establishment
- PIM.2 Process assessment
- PIM.3 Process improvement

**Resource and 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
- REU.2 Reuse program management
- REU.3 Domain engineering
### HIS Scope

**ORGANIZATIONAL Life Cycle Processes**

**Management Process Group (MAN)**
- MAN.3 Project management

**Acquisition Process Group (ACQ)**
- ACQ.4 Supplier monitoring

**Engineering Process Group (ENG)**
- ENG.2 System requirements analysis
- ENG.3 System architectural design
- ENG.4 Software requirements analysis
- ENG.5 Software design
- ENG.6 Software construction
- ENG.7 Software integration test
- ENG.8 Software testing
- ENG.9 System integration test
- ENG.10 System testing

**Support Process Group (SUP)**
- SUP.1 Quality Assurance
- SUP.8 Configuration Management
- SUP.9 Problem Resolution Management
- SUP.10 Change Management

**PRIMARY Life Cycle Processes**

**Acquisition Process Group (ACQ)**
- ACQ.4 Supplier monitoring

**Engineering Process Group (ENG)**
- ENG.2 System requirements analysis
- ENG.3 System architectural design
- ENG.4 Software requirements analysis
- ENG.5 Software design
- ENG.6 Software construction
- ENG.7 Software integration test
- ENG.8 Software testing
- ENG.9 System integration test
- ENG.10 System testing

**SUPPORTING Life Cycle Processes**

**Support Process Group (SUP)**
- SUP.1 Quality Assurance
- SUP.8 Configuration Management
- SUP.9 Problem Resolution Management
- SUP.10 Change Management

**HIS (Herstellerinitiative Software)**
Scope refers to those 15 processes required by OEMs

Without subcontractors: \(\leftrightarrow\) Elimination of ACQ.4 Supplier Monitoring
Only 3 Steps

- Maturity, Capability (SPICE, CMMI)
- Process models (RUP, V-Modell)
- Project

Processes

Proceeding / Methods

Execution
"What"

Follow the defined system and software development principles and observe the organizational culture change. Maturity Models support to understand "WHY" and in which way there is a professional context.

"Hands on - Guidance"

Tools, Templates, Methods, Metrics, "Best Practice Guidance", Roles + Skills, Tailoring Rules integrate in the temporal relationships.

"Do it"

Tailoring, Planning und Project Implementation compliant to the process model, generate measurements results.
Purpose of the process

Outcomes of the process

Base Practices (Best Practices)

<table>
<thead>
<tr>
<th>Output Work Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>08-52 Test plan [Outcome 1]</td>
</tr>
<tr>
<td>08-50 Test Specification [Outcome 1, 4]</td>
</tr>
<tr>
<td>13-50 Test Result [Outcome 4, 5]</td>
</tr>
<tr>
<td>11-05 Software unit [Outcome 2]</td>
</tr>
<tr>
<td>13-22 Traceability record [Outcome 3]</td>
</tr>
</tbody>
</table>
**Purpose of a process**

**e.g. MAN.3:** General purpose is to identify, establish, plan, coordinate and monitor the activities, tasks, and resources in the context of the project’s requirements and constraints.

![Diagram of process steps]

**e.g. ENG.2:** Purpose is to transform the defined customer requirements into a set of desired system technical requirements that will guide the design of the system.
Tailoring means

Deviation of a project specific version of the adequate standard process using the instructions and the projects context.
Tailoring on project level

Mandatory standard processes

Project processes + Customer processes

Processes adjusted to the specific project conditions
6 Levels

**Optimizing**
Quantitative measures are implemented to continuously improve the process

**Predictable**
Metrics for the measurement and control of process performance and outcomes are applied.

**Established**
Defined processes are tailored to specific projects, resources are managed.

**Managed**
Processes and work products are managed, responsibilities are identified.

**Performed**
Processes are intuitively performed, incoming and outgoing work products exist.

**Incomplete**
Not structured processes / processes which not fulfill Automotive SPICE requirements.
ASPICE in common

- All processes according to V-Model
- Mandatory to fulfill processes purpose
- Create their outcomes → work products...
- ... as result for fulfillment
- Represent recommended activities for each process (BP`s)
Traceability

Traceability to MAN processes and vertical-horizontal traceability in Engineering
Automotive SPICE 3.0
Automotive SPICE 3.0 may be used for assessments in agreement with the sponsor
3.0 Who's working on it?

- Created by the Working Group 13 of the Quality Management Center (QMC) within the (VDA)
- Represents members of the Automotive Special Interest Group (SIG) - review only, and with the agreement of The SPICE User Group.
- This agreement is based on a validation of the Automotive SPICE 3.0 version - regarding any ISO copyright infringement and the statements given from VDA QMC to the SPICE User Group.
Deployment and timeline

- Automotive SPICE 2.3 is still the version which is considered mandatory by the VDA

- Automotive SPICE versions 2.3 or 2.5 may still be used

Mandatory rules for the Automotive SPICE 3.0 transition are decided by the VDA Quality Management Board with the release of the new Blue/Gold Volume by VDA
ASPICE 3.0 comprises PRM and PAM on one single document/ (replaces PAM 2.5 and PRM 4.5)

Automotive SPICE 3.0 is yet not mandatory

ASPICE is no longer using ISO/IEC 12207 as guidance

Process CL and attributes adapted to the measurement framework of ISO/IEC 33020 (ISO 15504 Harmonisation)
ISO/IEC 33004:2015 sets out the requirements for:

- process reference models,
- process assessment models, and
- maturity models
The requirements defined in this International Standard form a structure which specifies:

a) the relationship between the classes of process model associated with the performance of process assessment,
b) the relationship between process reference models and prescriptive/normative models of process performance, as constituted by, for example, the activities and tasks defined in ISO/IEC 12207 and ISO/IEC 15288,
c) the integration of process reference models and process measurement frameworks to establish process assessment models,
d) the use of common sets of assessment indicators of process performance and process quality in process assessment models,
e) the relationship between maturity models and process assessment models and the extent to which a maturity model can be constructed using elements from different process assessment models.
ISO/IEC 33020:2015 defines a process measurement framework that supports the assessment of process capability, in accordance with the requirements of ISO/IEC 33003.

The process measurement framework provides a schema that can be used to construct a process assessment model conformant with ISO/IEC 33004 - which can be used in the performance of assessment of process capability according to the requirements of ISO/IEC 33002.
Process needs to meet defined goals

In the context of this and related standards, process capability is a process quality characteristic related to the ability of a process to consistently meet current or projected business goals.

The process measurement frameworks defined in ISO/IEC 33020:2015 form a structure which:

a) facilitates self-assessment,
b) provides a basis for use in process improvement and process quality determination,
c) is applicable across all application domains and sizes of organization,
d) produces a set of process (capability) attribute ratings (process profile),
e) derives a process capability level
What`s new?

Some answers!
Plug in concept

SYS = System Engineering
SWE = Software Engineering
HWE = Hardware Engineering
MEE = Mechanical Engineering

= no HIS scope
= HIS scope as part of Automotive SPICE® v3.0 PRM and PAM
= not developed by VDA, not part of Automotive SPICE® v3.0 PRM or PAM
### Some structural changes

<table>
<thead>
<tr>
<th><strong>ASPICE 2.5</strong></th>
<th><strong>ASPICE 3.0</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG (Engineering processes)</td>
<td>SYS (System Engineering), SWE (Software Engineering) acronym changed</td>
</tr>
<tr>
<td>Unit construction and unit verification are one process</td>
<td>Unit construction process + Unit verification process</td>
</tr>
<tr>
<td>No integration of HW and Mechanical processes</td>
<td>Plug in concept allows integration of HW/Mechanical processes</td>
</tr>
<tr>
<td>Known process names</td>
<td>The name of some processes have changed, but not their intention</td>
</tr>
<tr>
<td>Known reference standards, Traceability diagram Annex E</td>
<td>Updated references, Traceability diagram Annex D (will be shown on page 9)</td>
</tr>
</tbody>
</table>
Some examples of main changes

- No planning aspects at Level 1 (of course not in MAN.3) -> were available in 2.5 moved to Level 2
- Proceeding is part of the strategy/plan
- Qualification is explicit required (GP2.1.6)
- Modifications on work product characteristics
- Simulation is explicit mentioned as possible verification criteria (interesting e.g. at architectural design)
Some examples of changed content

**Architectural Design**
Dynamic behavior has to be explicitly addressed
Evaluation of alternative solutions, according to defined criteria
Recorded evaluation result includes rational for the selection

**Quality Assurance**
Is simplified in general - Independence is still required
Objectivity is added (because review of work products can’t be performed independently)

**Test Processes**
SYS.4, SYS.5, SWE.5, SWE.6 require, that the selection of test cases is based on the test strategy for the relevant test steps
Traceability

Traceability and consistency now split into two Base Practices for all traceability of each process.

Refers:
- of references or
- links between work products

Consistency:
- nothing is missing (references/links)
- References/links are correct
- Proven by technical review

Supports:
- coverage analysis,
- impact analysis,
- Status tracking of requirements implementation

New traceability requirements:
- Traceability between test cases and results
- Between change requests and wp`s (affected by these changes)
Automotive SPICE Objectives

- Development of products which
  - can be tested traceable and
  - manage the complex line between mechanical design, hardware and software ( = manage „systems“)

- Processes which
  - really can be used by and within the whole organisation and
  - based on best practices
    ( = „Learning Organization“)

- A development organisation which
  - meets defined (performance) targets - measurable
  - can respond quickly to deviations

- An optimal management of complex system releases

- Stable, functional and bug free mature products
Thank you for your attention!
Questions?

Thanks to methodpark for the slide support!