

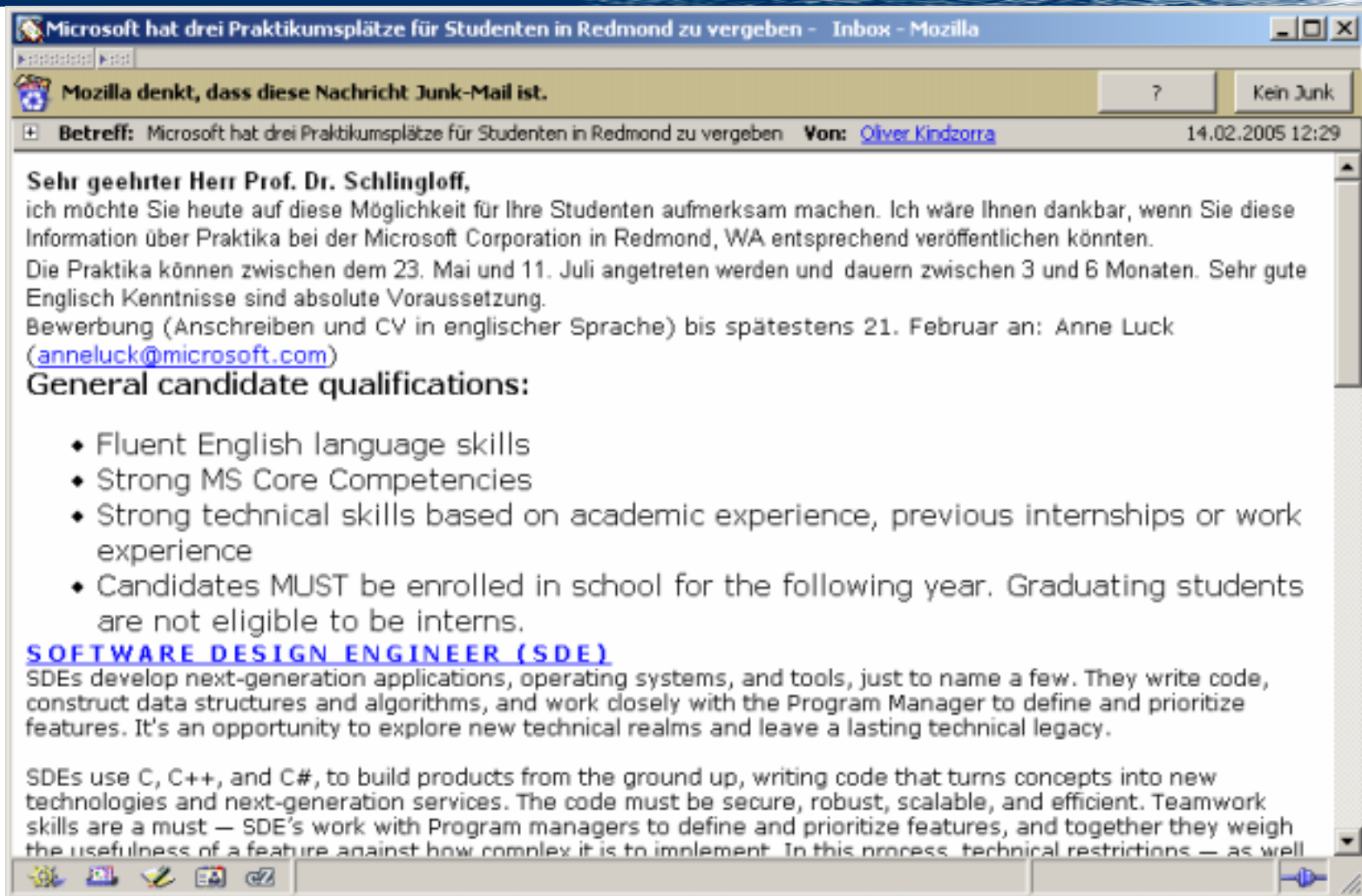


Qualitätssicherung von Software

Prof. Dr. Holger Schlingloff

Humboldt-Universität zu Berlin
und
Fraunhofer FIRST

Ein Hinweis von Microsoft



SPICE (ISO 15504)

SPICE: **S**oftware **P**rocess **I**mprovement **C**apability
Determination



- SPICE ist ein Projekt der ISO zur Entwicklung eines Standards für Software Process Assessments
 - erstmals 1998 als technischer Bericht publiziert
 - Standard aktuell überarbeitet: ISO IEC 15504:2003 (Juli 2003)
- Dokumente
 - <http://www.sqi.gu.edu.au/spice/>
 - <http://www.isospice.com>
- Zielsetzung: Umfassender Rahmen, Integration verschiedener vorhandener Ansätze (ISO, CMM, Bootstrap, ...)
 - Stark an CMM angelehnt
 - Bewertung von *Prozessen*, nicht von *Organisationen*

ISO SPICE

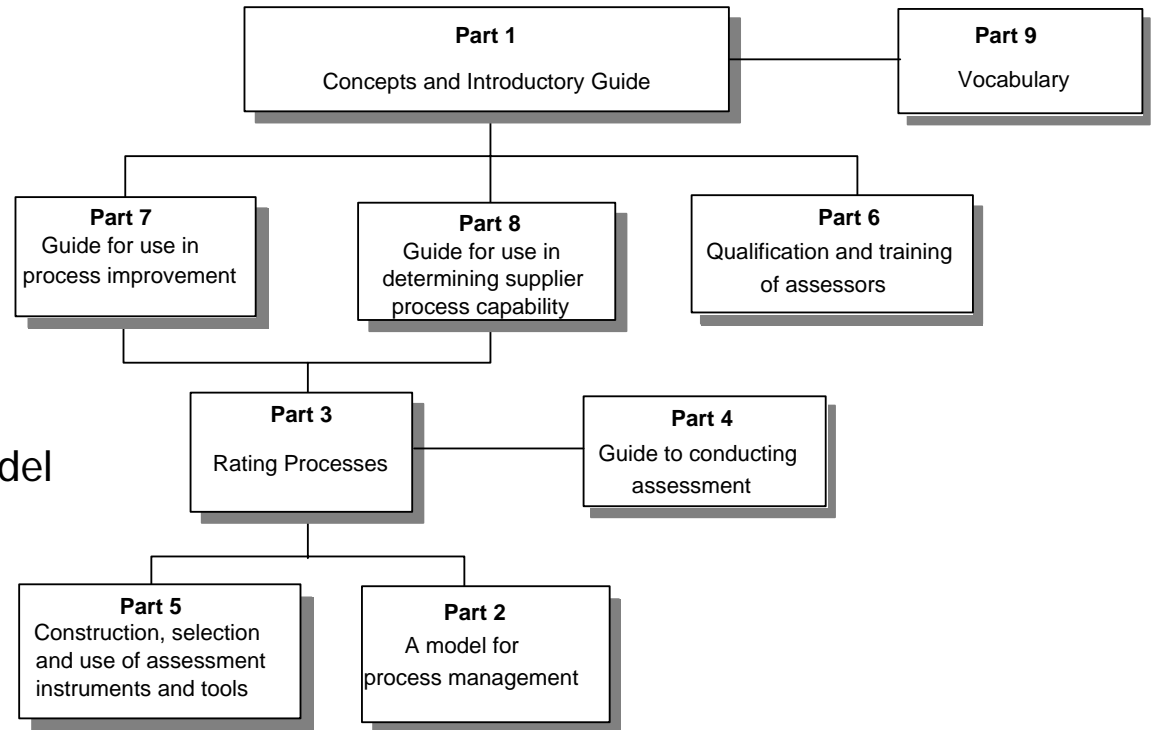
Charakteristika von SPICE

- Abdeckung einer weiten Spanne von SW-Organisationen und Anwendungen
- Referenzmodell
- Vergleichbarkeit, Wiederholbarkeit, Objektivität
- keine weiteren Voraussetzungen
- praktische Durchführbarkeit, Effizienz
- „can be used by organizations involved in planning, managing, monitoring, controlling and improving the acquisition, supply, development, operation, evolution and support of software“
- Aspekte
 - Bewertung (Assessment),
 - Verbesserung (Improvement)
 - Beurteilung (Determination)

Dokumente im Standard

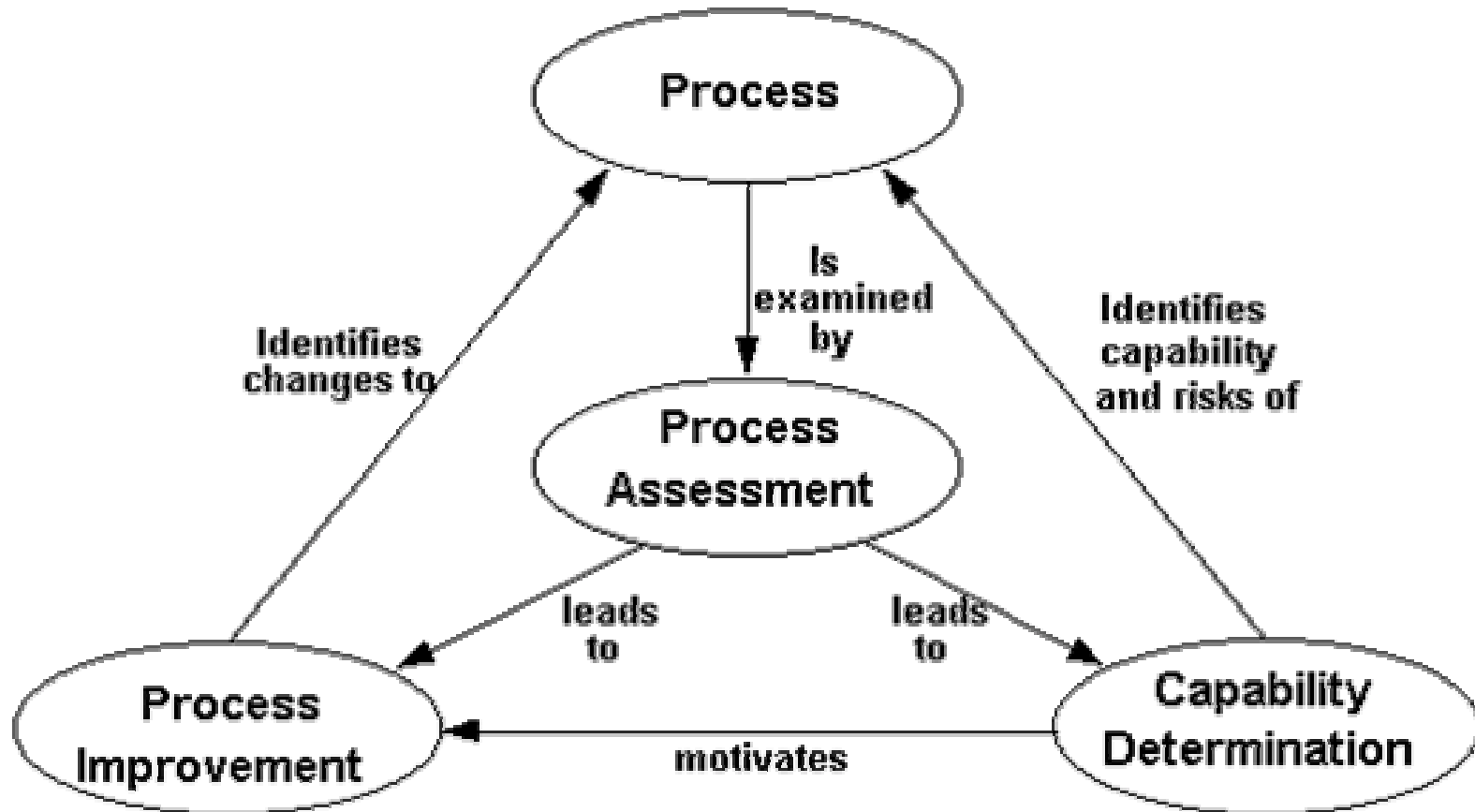
- Standard

- Part 1: Concepts and introductory guide
- Part 2: A reference model for processes and process capability
- Part 3: Performing an assessment
- Part 4: Guide to performing assessments
- Part 5: An assessment model and indicator guidance
- Part 6: Guide to competency of assessors
- Part 7: Guide for use in process improvement
- Part 8: Guide for use in determining supplier process capability
- Part 9: Vocabulary



- Nur wenige normative Teile (2,3,5), sonst Leitfäden

Struktur des Modells



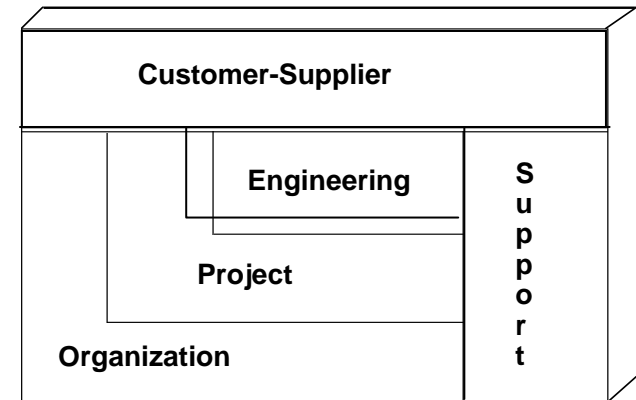
Prozess-Kategorien

Process category	Brief description
Customer-Supplier	Processes that directly impact the customer
Engineering	Processes that specify, implement, or maintain a system and software product
Project	Processes that establish the project, and co-ordinate and manage its resources
Support	Processes that enable and support the performance of the other processes on the project
Organization	Processes that establish the business goals of the organization and develop process, product, and resource assets which will help the organization achieve its business goals

> 200 einzelne Prozesse in diesen Kategorien, die bewertet werden

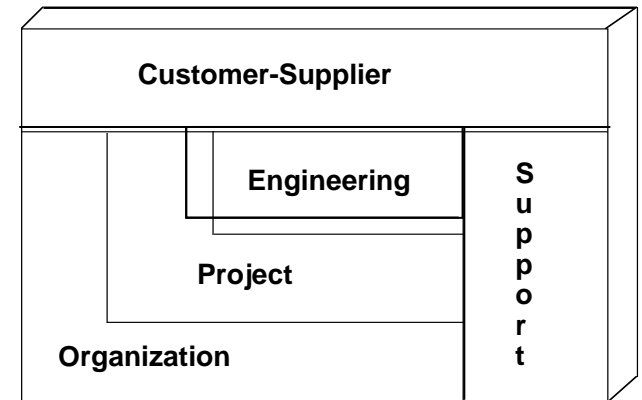
Prozesse Kundenkategorie

- CUS.1 Acquire software product and/or service
 - CUS.1.1 Identify the need
 - CUS.1.2 Define the requirements
 - CUS.1.3 Prepare acquisition strategy
 - CUS.1.4 Prepare request for proposal
 - CUS.1.5 Select software product supplier
- CUS.2 Establish contract
 - CUS.2.1 Review before contract finalization
 - CUS.2.2 Negotiate contract
 - CUS.2.3 Determine interfaces to independent agents
 - CUS.2.4 Determine interfaces to subcontractors
- CUS.3 Identify customer needs
 - CUS.3.1 Obtain customer requirements and requests
 - CUS.3.2 Understand customer expectations
 - CUS.3.3 Keep customers informed
- CUS.4 Perform joint audits and reviews
 - ...
- CUS.5 Package, deliver, and install the software
- CUS.6 Support operation of software
- CUS.7 Provide customer service
- CUS.8 Assess customer satisfaction



Prozesse Entwicklungskategorie

- ENG.1 Develop system requirements and design
- ENG.2 Develop software requirements
- ENG.3 Develop software design
- ENG.4 Implement software design
- ENG.5 Integrate and test software
- ENG.6 Integrate and test system
- ENG.7 Maintain system and software



- **ENG.1.1 Specify system requirements.** Determine the required functions and capabilities of the system and document in a system requirements specification.

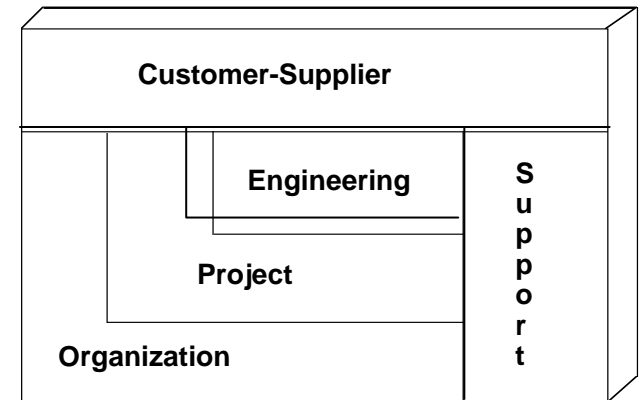
Note: the system requirements specification describes such things as

- functions and capabilities of the system;
- performance of the system;
- safety;
- reliability;
- security;
- human engineering;
- interface;
- operations, and maintenance requirements;
- design constraints and qualification requirements.

See CUS.3 for discussion of customer requirements used as an input to system requirements analysis.

Prozesse Projektkategorie

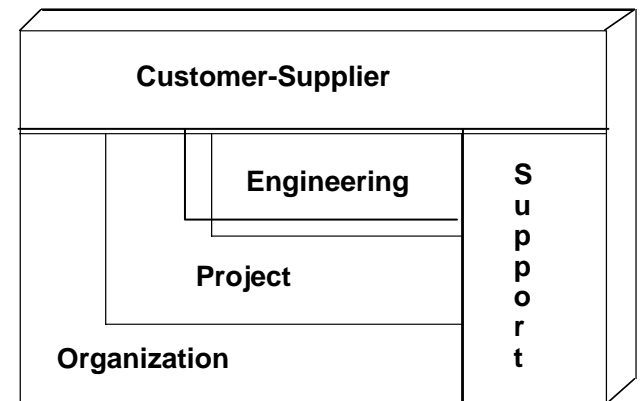
- PRO.1 Plan project life cycle
- PRO.2 Establish project plan
- PRO.3 Build project teams
- PRO.4 Manage requirements
- PRO.5 Manage quality
- PRO.6 Manage risks
- PRO.7 Manage resources and schedule
- PRO.8 Manage subcontractors



- Beispiel:
 - **PRO.5.1 Establish quality goals.** Based on the customer's requirements for quality, establish quality goals for various checkpoints within the project's software life cycle.
 - **PRO.5.2 Define quality metrics.** Define metrics that measure the results of project activities to help assess whether the relevant quality goals have been achieved.
 - **PRO.5.3 Identify quality activities.** For each quality goal, identify activities which will help achieve that quality goal and integrate these activities into the software life cycle model.
 - **PRO.5.4 Perform quality activities.** Perform the identified quality activities.
 - **PRO.5.5 Assess quality.** At the identified checkpoints within the project's software life cycle, apply the defined quality metrics to assess whether the relevant quality goals have been achieved.
 - **PRO.5.6 Take corrective action.** When quality goals are not achieved, take corrective action.

Prozesse Unterstützungs- und Organisationskategorie

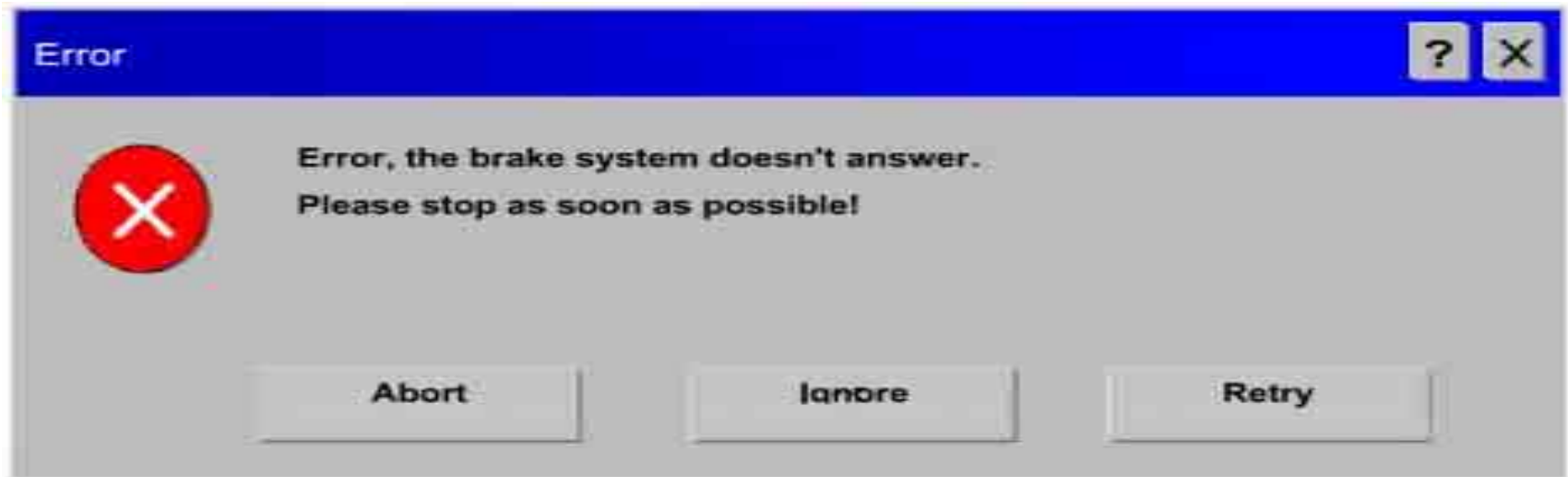
- SUP.1 Develop documentation
 - SUP.2 Perform configuration management
 - SUP.3 Perform quality assurance
 - SUP.4 Perform problem resolution
 - SUP.5 Perform peer reviews
-
- ORG.1 Engineer the business
 - ORG.2 Define the process
 - ORG.3 Improve the process
 - ORG.4 Perform training
 - ORG.5 Enable reuse
 - ORG.6 Provide software engineering environment
 - ORG.7 Provide work facilities



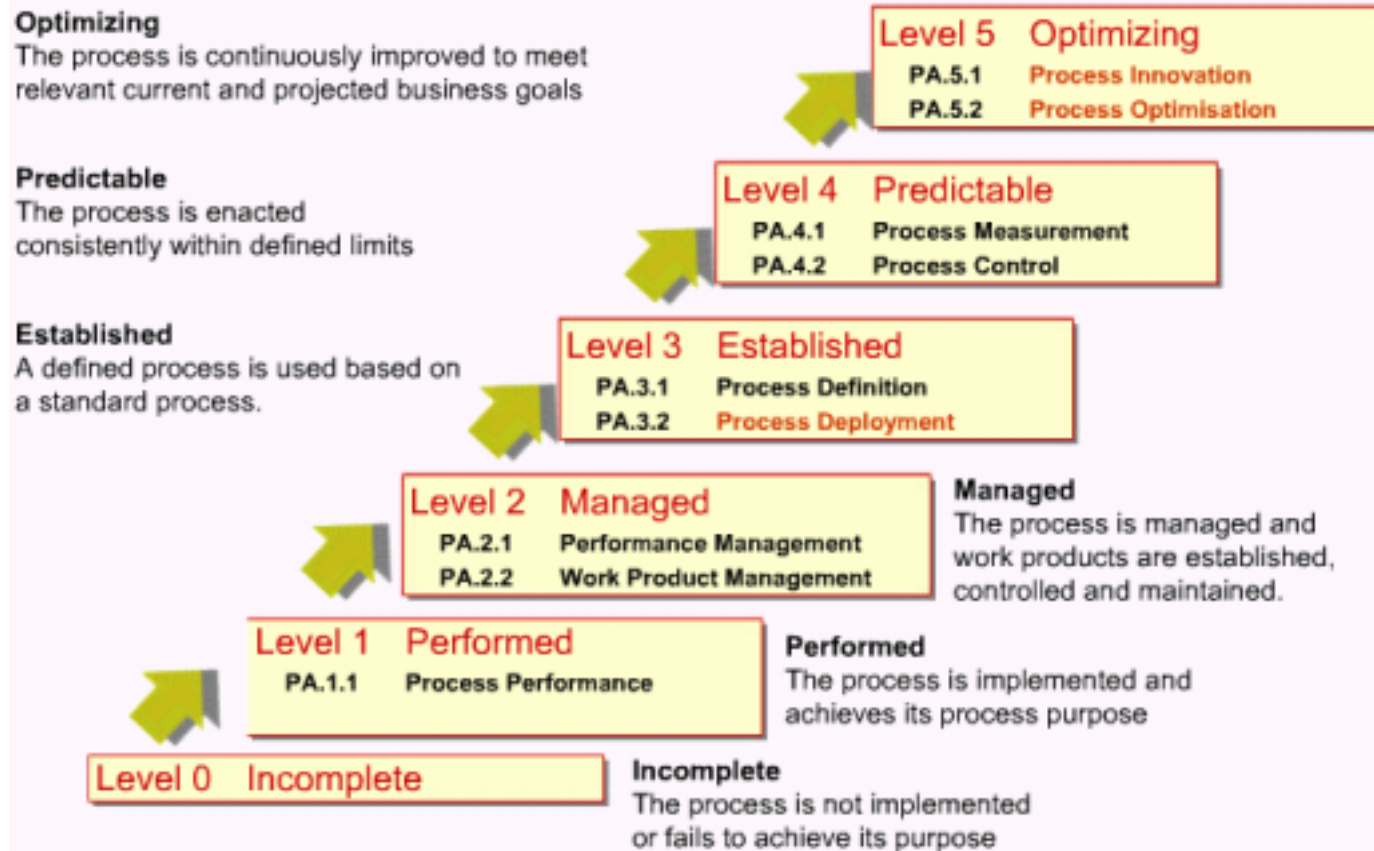
Varianten und Erweiterungen

- Der Standard stellt ein Metamodell für die Bildung von Varianten zur Verfügung
 - Erweiterungen dürfen die Basis nicht beeinträchtigen
 - Varianten sind ausgewählte wohldefinierte Teilmengen
 - Rückverfolgbarkeit, Dokumentation, Abhängigkeiten

Pause!



Reifegrade

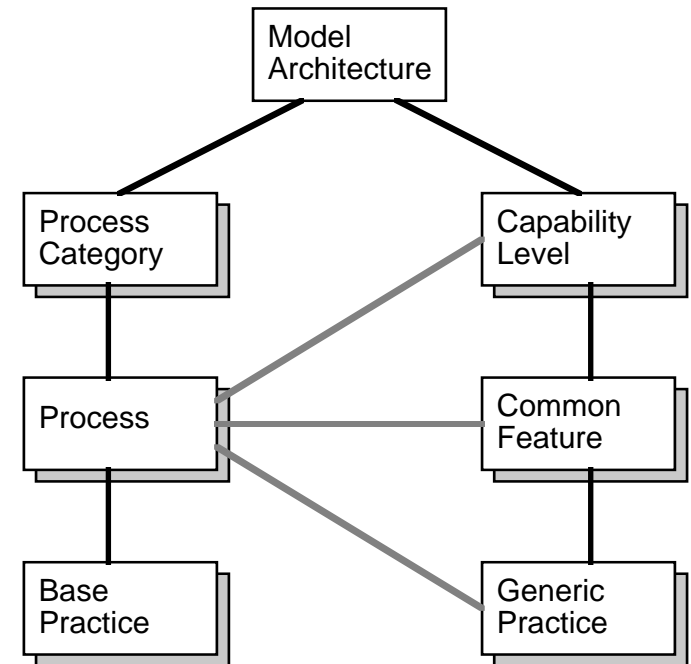


Unterschied zu CMM? Wieso?

- http://www.q-labs.de/images/user/Management_SW_Lieferanten_VW.pdf

Modellarchitektur

- Jeder Prozess gehört zu einer Kategorie und definiert bestimmte Praktiken
- Prozesse werden eingeteilt in Reifegrade (capability levels) auf Grund der Erfüllung von gemeinsamen Merkmalen
- Gemeinsame Merkmale (common features) sind Gruppen von Praktiken, die einen Aspekt der Prozessimplementierung umfassen
- Jedes gemeinsame Merkmal basiert auf generischen Praktiken für dieses Merkmal



Gemeinsame Merkmale (1)

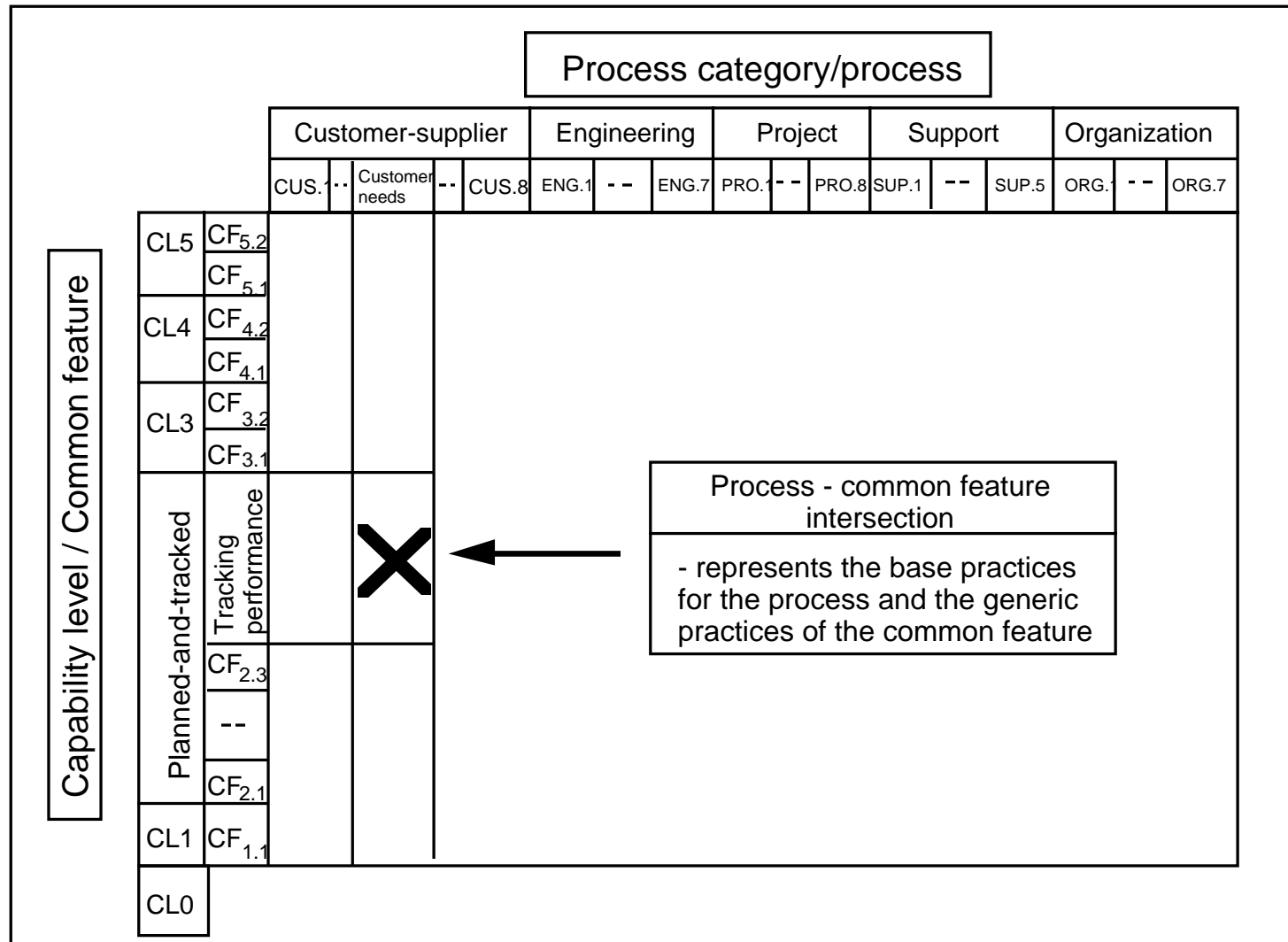
- **Level 1: Performed-Informally Level**
 - **Common Feature 1.1: Performing Base Practices**
 - 1.1.1 Perform the process.
- **Level 2: Planned-and-Tracked Level**
 - **Common Feature 2.1: Planning Performance**

2.1.1	Allocate resources.	2.1.4	Provide tools.
2.1.2	Assign responsibilities.	2.1.5	Ensure training.
2.1.3	Document the process.	2.1.6	Plan the process.
 - **Common Feature 2.2: Disciplined Performance**
 - 2.2.1 Use plans, standards, and procedures.
 - 2.2.2 Do configuration management.
 - **Common Feature 2.3: Verifying Performance**
 - 2.3.1 Verify process compliance.
 - 2.3.2 Audit work products.
 - **Common Feature 2.4: Tracking Performance**
 - 2.4.1 Track with measurement.
 - 2.4.2 Take corrective action.

Gemeinsame Merkmale (2)

- **Level 3: Well-Defined Level**
 - **Common Feature 3.1: Defining a Standard Process**
 - 3.1.1 Standardize the process.
 - 3.1.2 Tailor the standard process.
 - **Common Feature 3.2: Performing the Defined Process**
 - 3.2.1 Use a well-defined process.
 - 3.2.2 Perform peer reviews.
 - 3.2.3 Use well-defined data.
- **Level 4: Quantitatively-Controlled Level**
 - **Common Feature 4.1: Establishing Measurable Quality Goals**
 - 4.1.1 Establish quality goals.
 - **Common Feature 4.2: Objectively Managing Performance**
 - 4.2.1 Determine process capability.
 - 4.2.2 Use process capability.
- **Level 5: Continuously-Improving Level**
 - **Common Feature 5.1: Improving Organizational Capability**
 - 5.1.1 Establish process effectiveness goals.
 - 5.1.2 Continuously improve the standard process.
 - **Common Feature 5.2: Improving Process Effectiveness**
 - 5.2.1 Perform causal analysis.
 - 5.2.2 Eliminate defect causes.
 - 5.2.3 Continuously improve the defined process.

2D-Architektur von SPICE



Prozessbewertungen (Assessments)

From process improvement
or process capability determination

Assessment input

- Assessment purpose
- Assessment scope
- Assessment constraints
- Assessment responsibilities
- Extended process definitions
- Additional information to be collected

Assessment instrument

- Process indicators
- Process management indicators

Process Assessment

Process model (Part 2 of this International Standard)

- Process purpose
- Practices

Assessment output

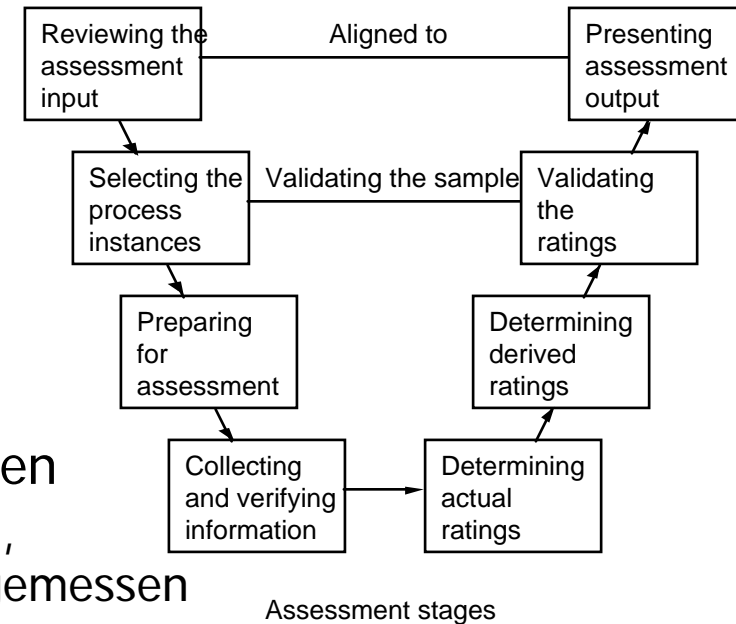
- Generic practice adequacy ratings
- Process capability level ratings
- Assessment record



To process improvement
or process capability determination

Durchführung von Assessments

- Definition der Eingabedokumente
- Festlegung von Verantwortlichkeiten
- Bewertung von Prozessinstanzen
 - Beurteilung der Basispraktiken
 - vorhanden, angemessen?
 - Angemessenheit der generischen Praktiken
 - nicht angemessen, teilweise angemessen, weitgehend angemessen, vollständig angemessen
 - Beurteilung der Gesamtprozessreife
 - Gleichgewichtung der generischen Praktiken!
- Dokumentation der Ergebnisse
 - sämtliche relevanten Informationen (auch: Beteiligte, Werkzeuge, Begründungen, Kommentare, ...)
 - Abgleich mit DB



SPICE vs. ISO 9000

- Etwas anderer Fokus (Verbesserung vs. Zertifizierung)
- SPICE etwas detaillierter und spezifischer, ISO allgemeiner

ISO 9001 requirements	Process categories and processes
4.1 Management responsibility	Engineer the business Manage quality (build project teams) Assess customer satisfaction
4.2 Quality system	Manage quality Perform quality assurance Define the process (Improve the process)
4.3 Contract review	Establish contract Identify customer needs Develop system requirements and design Manage risks (Perform joint audits and reviews)

SPICE vs. CMMI

- CMMI und SPICE sind ähnlich aufgebaut
- CMMI erfüllt die Vorgaben von SPICE bzgl. der Methodik und Strukturen, um Bewertungen von Softwareprozessen durchzuführen
- Das Prozessmodell von SPICE ist feiner gegliedert
- Die Detaillierungstiefe und Ausführlichkeit ist bei CMMI größer (ca. 1000 Seiten gegenüber 360 Seiten)
- SPICE enthält Inhalte, die bei CMMI nicht enthalten sind (z.B. „Identify Interfaces“ in Project Management)
- CMMI enthält Inhalte, die bei SPICE nicht enthalten sind (z.B. Intergroup Coordination)

Erweiterungen von SPICE

- OO-Spice



- Komponentenbasierte Entwicklung
- Objektorientiertes Lebenszyklus-Modell
- Wiederverwendung

- Automotive SPICE

- AutoSPICESIG („Automotive Spice Special Interest Group“)
- Process Reference Model (PRM) und Process Assessment Model (PAM) für Automotive-Software angepasst
- Kritikalität von Software (SIL, Process Capability Level)
- Realzeit, Steuergeräte, Mechatronik
- Zuliefererproblematik