

IT QM Part2 Lecture 4

SIEMENS



Lectures at the University of Bratislava/Spring 2008

- 21.02.2008** **Lecture 1 Impact of Quality-From Quality Control to Quality Assurance**
- 28.02.2008** **Lecture 2 Organization Theories-Customer satisfaction-Quality Costs**
- 06.03.2008** **Lecture 3 Leadership-Quality Awards**
- 13.03.2008** **Lecture 4 Creativity-The long Way to CMMI level 4**
- 03.04.2008** **Lecture 5 System Engineering Method-Quality Related Procedures**
- 10.04.2008** **Lecture 6 Quality of SW products**
- 17.04.2008** **Lecture 7 Quality of SW organization**

- 30.09.2008** **Vorlesung 1 Der weite Weg zu CMMII-Level 4**
- 07.10.2008** **Vorlesung 2 System Entwicklungsprozess + Planung**
- 14.10.2008** **Vorlesung 3 Verfahren 1 (CM, Reviews, Aufwandsabschätzung (Function Point))**
- 16.10.2008** **Vorlesung 4 Verfahren 2 (Wiederverwendung, Dokumentation, Case- Tools)**
- 13.11.2008** **Vorlesung 5 Qualität von SW 1 (Testen, Q-Bewertung, Quality in Use,)**
- 27.11.2008** **Vorlesung 6 Qualität von SW 2 (Quality Function Deployment, Zertifizierung von
Hypermedia-Links bei InternetApplikationen, Technology Management Process)**
- 11.12.2008** **Vorlesung 7 Qualität einer SW-Organisation (ISO 9001, CMMI, BSC)**

CMMI: Capability Maturity Model

BSC: Balanced Scorecard

- Impact of Quality
 - Quality wins
 - Quality deficiencies
- Standards
 - Quality definition
- Evolution from quality control to TQM
 - Shewhart, Deming, Juran, Feigenbaum, Nolan, Crosby, Ishikawa
- Evolution of organization theory
 - i.e. Taylorism, System Dynamics, System Thinking, Quality Assurance
- Product liability
- Customer satisfaction
 - Criteria, two-dimension queries, inquiry methods

- Quality costs
 - Failure prevention, appraisal, failure, conformity, quality related losses, barriers
- Leadership
 - Behavior, deal with changes, kinds of influencing control, conflict resolution, syndromes to overcome when introducing changes
- Audits
- Quality awards
- Creativity techniques
 - Mind Mapping, Progressive Abstraction, Morphological Box, Method 635, Synectics, Buzzword Analysis, Bionic, De Bono
- Embedded Systems
- FMEA-Failure Mode Effect Analysis

- SEM
 - Overview
 - Tailoring
 - Phase Organization
 - Areas of responsibility
- PM
 - Overview
 - Planning (Component, Organization, Volume, Course of the Project, Risk)
 - Tender and Commissions
 - Procurement of HW and SW
 - Project Checks and Project Control (Progress, Effort, Cost)
 - Coordination, Organization, Administration
 - PROWEB

- CM
 - Configuration Identification
 - Configuration Control
 - Configuration Status Accounting
 - Configuration Auditing
 - Interface Control
- Reviews
 - Review techniques
 - Quality of reviews
 - Intensive inspections (Size, Roles, Expenditures, Classification of Errors)
- Expenditure Estimation
 - Estimation Methods
 - Function Point
 - Effort Estimation Meeting
 - Tools and further Methods

- Reuse & Reusability
 - Definition
 - System
 - Documents
 - Documentation
 - Overview
 - Responsibility
 - Point in Time
 - Checklists for Templates
 - Checklists for Structuring
 - Case
 - Applications of Case
 - Case in different Phases
 - Promises of Case
 - Classification
 - Challenges
- Requirements
 - Evaluation Criteria
 - Tracing Problem
 - Introduction
 - Experiences

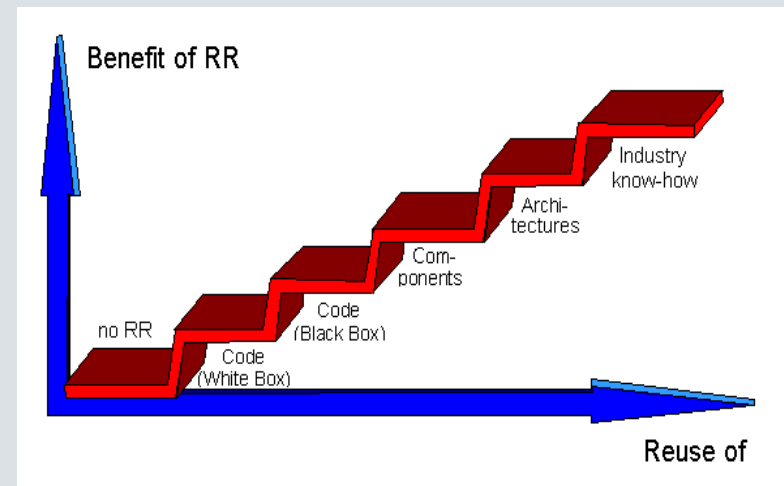
- Testing
 - Definition
 - Structuring
 - V-Model
 - Testlevels
 - Types of Tests (Black Box- White Box)
 - White Box (C0, C1, C2)
 - Testcases
 - End of Test Criteria
 - Conducting Tests
 - Test Evaluation
- SW Quality Evaluation
 - Motivation
 - Quality Characteristics (Subcharacteristics, List of Criteria, Evaluation Procedures)
- Quality in Use
 - Needs
 - Needs and Requirements
 - Relationship between different Quality Characteristics)

- **What is reusability?**
 - Reusability is the characteristic of an object
 - document, source code, concept, etc.
 - or of an experience
 - to be able to be reused in a different operations environment to the one intended for the initial use.
 - While this involves a higher level of effort in the short term
 - higher level of abstractness
 - higher quality requirements
 - effort for managing the RR parts
 - it can result in considerable savings in the medium term.

- **What is important about reusability?**
- ***Reusability is not obtained by chance!***
 - Project results whose reusability is supposed to have come about "quite naturally" generally cannot be used!
- ***Reusability is expensive!***
 - Experts report that the specific development of reusable components can involve up to 30 times the effort of a "normal" development.
 - The more general a component is to be in its reusability, the more effort generally needs to be invested in it!

- **Hint for object-oriented development:**
However, the guidelines for creating patterns make it easier to produce reusable components
- ***Specific reusability pays dividends!***
 - If it is possible when making the initial decision to develop reusable parts to estimate where and how often the parts will be reused,
 - the benefits can be calculated in advance and can then be achieved.
 - Reuse can generally be estimated
 - within one's own project
 - within "related" projects
 - within projects in the same Business Unit or Division.

- Experience gathered in reuse situations has shown that the benefit of **reuse is larger the greater the move away from code reuse to knowledge reuse** (in the form of architectures, branch know-how) and the **use of "best practice" patterns**.
- A specific reuse must be tailored to the company's current corporate goals and the business processes occurring within that company in order to ensure that it is not a question of reusing as much as possible, but rather the amount that is actually required.



- An effective measure to increase the productivity in the development is the re-use of already existing elements.
- As these elements are already established
 - apart from the productivity increase
 - also a quality increase is to be expected.

Reuse and reusability/6

For the increase of the RR measures different areas are necessary

- reusable organization of the elements
- reuse as aspect during the development process
- measures in the infrastructure (RR System)

Reuse and reusability/7

- For the promotion of reuse there is in each business field
- one person which is responsible for RR
 - both for the organization of reusable elements (RR elements)
 - and for their application
- spreading common regulations and measures
 - are coordinated by PSE QA

Reusability is the degree of the suitability of a unit to be used

- in same or modified mode of functioning,
- in same or other employment environment,
- in the presented form .

- As necessary condition it is considered that the effectiveness of the item under consideration is well-known.
- The degree of the suitability is identifiable by the amount of the modifications of the item under consideration.

Under the term “item under consideration” are among others:

- Know-how,
- (Market) analyses
- Actual state collections
- Actual state analyses
- Means of publicity
 - i.e. set of slides
- Methods and concepts.

- System specifications,
- Detail specifications
- Source code,
- Object code
- Data,
- Plans
 - Project, Test, CM, QA, or parts of it,
- Complexes,
- Components,
- Procedures,
- Copies,
- Macros
- Enterprise Java Beans
- Applets
- Test cases
- FMEA

The presented form is ascertained through:

- **the data medium i.e.**
 - paper,
 - CD Rome
 - Drive assembly
 - URL
- **the Tool with exact indication of**
 - version
 - operating system
- **the type of representation i.e.**
 - text
 - diagram

- The competence for the RR systems lies in the business fields;
- In each BF
 - a RR system is established
 - and a RR responsible person designated.

- the documents should correspond to the regulations
 - specified in the RR system
 - concerning interfaces, standards and methods
 - development -, design methods....
- they should be provided
 - data processing-supported i.e.
 - word processing system, CASE Tool...

From documents the following parts can be reused:

- Table of Contents
- Text passages
- Tables
- Diagrams
- Print formats
 - Ranges
 - Paragraphs
 - Pages
 - Header
 - Footer...

All documents provided in the course of the project are in principle at least partly reusable

Such documents in the SEM development process are for example:

- Proposal
- User requirement specification
- Requirement specifications
- Project plan
 - Structure plans, Gantt charts and network plans should be provided
 - by network plan tools
 - Expenditure plans
 - by estimation Tools
- QA plan
- CM plan

- Test plan
- Integration plan
- System specification
- Detail specification
- Technical SW documentation
- User documentation
- Development report (HW)
- Production documents (HW)
- UML Diagrams
- Pattern
- Frameworks

- Should fulfill the criteria of the quality characteristic Technical Portability
 - Technical Portability is according to the SEM Software Quality Evaluation
 - a Subcharacteristic of Portability
- Fulfill Programming conventions,
- Contain inline documentation,
- Capable of parameterization
- Correspond to the interface conventions of the RR system.

- Capable of parameterization
 - Should fulfill the criteria of the quality characteristic Technical Portability
 - Technical Portability is according to the SEM Software Quality Evaluation
 - a Subcharacteristic of Portability
 - Be testable
 - Correspond to the interface conventions of the RR system

The test environment should be anytime both ready for

- use and
- operation.

- Project development is always connected
 - with the production and actualization of a multiplicity of documents.
- As a project is not insignificantly presented
 - inward and outside
 - by the quality of these documents
 - regarding contents and layout
 - the production is to be given an appropriate attention.

- As creators of project documents all project coworkers come into consideration
 - In order to ensure a uniform and consistent designing of the documents
 - header, first page, print formats, etc..
 - appropriate templates are to be defined at project start
 - and must be documented in the QA plan.
 - In the sense of the RR proven templates of earlier projects can be applied.
- Further SEM offers standard templates
 - i.e. .doc. .pdf, .xls,.

- Templates must be defined at project start
- Documents which are ongoing compiled
 - Are developed in the course of the project
 - According to the presetting of SEM
- Documents which can be updated are subjected to strict version control
 - i.e. project phases, QA plan
- Treatment of outdated versions must be specified
- Destruction or keeping in history files must be devised

- Requirement catalog
- User requirement specification
- Solution study
- Requirement specifications
- Project plan
- QA plan
- CM plan

- System specification
- Detail specification
- Test plan
- Test specification
- Integration plan
- Parts list (collecting map) (HW)
- Invitation
 - Meetings
 - Review,
 - etc..

Reports:

- Project report
- Monthly report
- QA report
- Test report
- Phase acceptance report
- Development report
- Acceptance report

- Minutes of
 - Meetings
 - Reviews
- User documentation
- User manual
- Technical documentation

- As reason for the definition of templates again the uniform and consistent representation of the project is mentioned
 - as substantial quality criterion
 - Look and Feel principle for the document addressee.
- Beyond that a not insignificant gain of time results in particular
 - in the case of documents (reports)
 - which are provided, periodically.

- Bringing into the CM/into the project file is facilitated.
- It's to note that a set from documents has to be reviewed
 - Must be devised in the QA plan
 - which are the appropriate documents
- Apart from the technical examination of the documents
 - thereby are also checks about the formal criteria

Documentation/9

Checklists for the Structuring/1

- Project designation
- Titles
- Date of preparation
- Authors
- Inspectors
- (Current) Version

Documentation/10

Checklists for the Structuring/2

- File reference
 - i.e. document file, file#
- Technical file name of the document
- Distributor list
- Paging
- Status
 - In development
 - Tested
 - in review
 - Released
 - etc
- Possibly Siemens article code

Documentation 11

Checklist for Structuring/3

- Footer
 - at least on title page/first page
- Copyright entry
 - (COPYRIGHT SIEMENS AG AUSTRIA)
- Classification according to IS (Information Security) regulation
 - Only for the internal use
 - Confidentially
 - Strictly confidential

Documentation 12

Checklist for Structuring/4

- Table of contents
- Index
- Abbreviation listing
- Glossary

Documentation 13

Checklist for Structuring/5

- For the better orientation in documents
 - Representations on high abstraction level are to be given under initial chapter which should encompass
 - Purpose, Goals and Application
 - Summary
 - Overview
 - Introduction to the topic

Documentation 14

Checklist for Structuring/6

- before enumerating
 - a structured overview should be provided
 - as possible graphically prepared
 - i.e. in requirement specifications
 - first function arrangement/function tree
 - then description of the individual functions.

Documentation 15

Checklist for Structuring/7

- At the arrangement of the contents of the documents
 - Pay attention that used terms are
 - Clear
 - Simple
 - Uniform
- The documents should be provided in the diction of the addressee
 - great importance is to be attached to term consistency.
- The production of the user documentation as hypertext system is to be considered.

Documentation 16

Checklist for Structuring/8

- Short sentences increase the comprehensibility of documents.
- Circumstances are to be represented actively
 - instead of passive
- Instead of redundant representations
 - assert references
 - Facilitates modifying
- Ambiguous constructs of the language should be avoided
 - i.e. in the error case a message on the screen **or** an entry into the log file **and** a buzzing signal are displayed

Documentation 17

Checklist for Structuring/9

- The employment of spell checker should be considered
 - in particular with documents addressed to the client.
- Dealing with foreign-language documents this is particularly important.
- For English documents there are also grammar checkers in place
 - information about in stdSEM.

Documentation 18

Checklist for Structuring/10

- Documents are to be signed and countersigned by
 - the author
 - the inspector
- Documents are to be kept and stored in the sense of the regulations of information security
 - copies in fire protection areas
 - or to be destroyed
 - use of shredders with documents which are treated confidentially.

Benefits of CASE/1

- Higher project quality
 - improves clarifying setting of tasks
 - more transparency
- Higher product quality
 - improves structuring
 - improves documentation
 - improves check ability
 - automatic examinations
- Lowering of the Life Cycle costs
 - higher development costs (?)
 - smaller maintenance costs

- Top down
- Bottom up
- Incremental/gradual refinement
- Data flow representation
- Data descriptions
- Entity relationship model
- Control data flow representation
- Time constraints
- State transitions
- Descriptions of function (Minispec)
- Representation of the dismantling hierarchy
- Object/messages for object-oriented development

▪ **Structured**

- Class diagram
- Use case diagram
- Component diagram
- Deployment diagram

▪ **Dynamic**

- Statechart diagram
- Activity diagram
- Sequence diagram
- Collaboration diagram

- Structogram
- Pseudo code
- SDL (Specification and Design Language) diagrams
 - state diagrams are particularly suitable for representing communication systems using block-tree diagrams, block-interaction diagrams and state-stimulus diagrams.
- Other representations...
- Information transfer from system design

- Generation of code from detail specification
- Coding
 - Code analysis statically/dynamically
 - Compiling
 - Information transfer from detail design

- Test case generator for component test
- Test frameworks
- Test coverage
- Test case generator for system test
- Regression test
- Debuggers

- Check for completeness vertically
- Check for completeness horizontal
- Check for consistency vertically
- Check for consistency horizontal

- Storage
- Version administration
- Access rights (data security)
- Data storage
- Import/export
- Types of Configuration Items

Applications of CASE/9 Documentation

- Text
- Graphics

- Product structure planning/controlling
- Project structure planning/pursuit
- Project organization planning
- Process planning
- Expenditure planning/controlling
- Cost planning/controlling
- Personnel planning - scheduling/controlling
- Risk management planning

Increase of

- the productivity **
- the product quality *
- the project quality *

*** after empiric reports realistically to expect**

**** only medium-term**

UPPER CASE

Analysis

Requirement
Specification

System design
Detail design

Application

Acceptance

System test

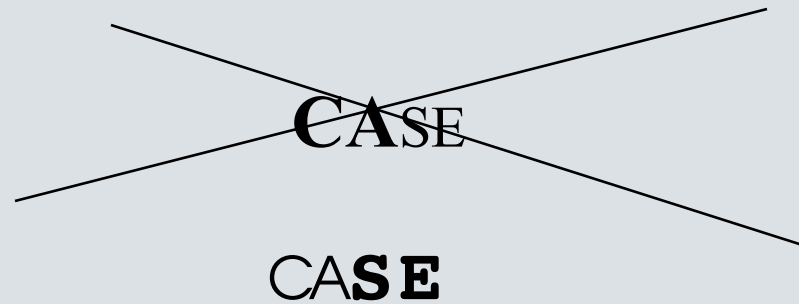
Integration

Implementation

Component test

Compilation

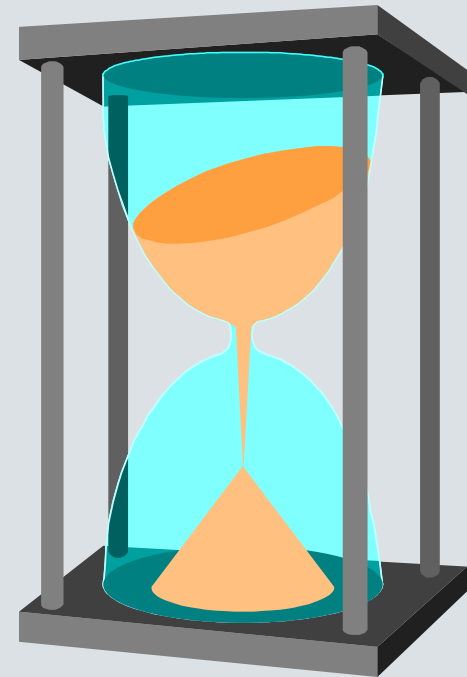
LOWER CASE



Don't focus on tool but on methodology

CASE Challenges

- Selection
- Availability
- Price
- Training
- Acceptance
- Quality
- Flexibility
- Interfaces



CASE Requirements/1

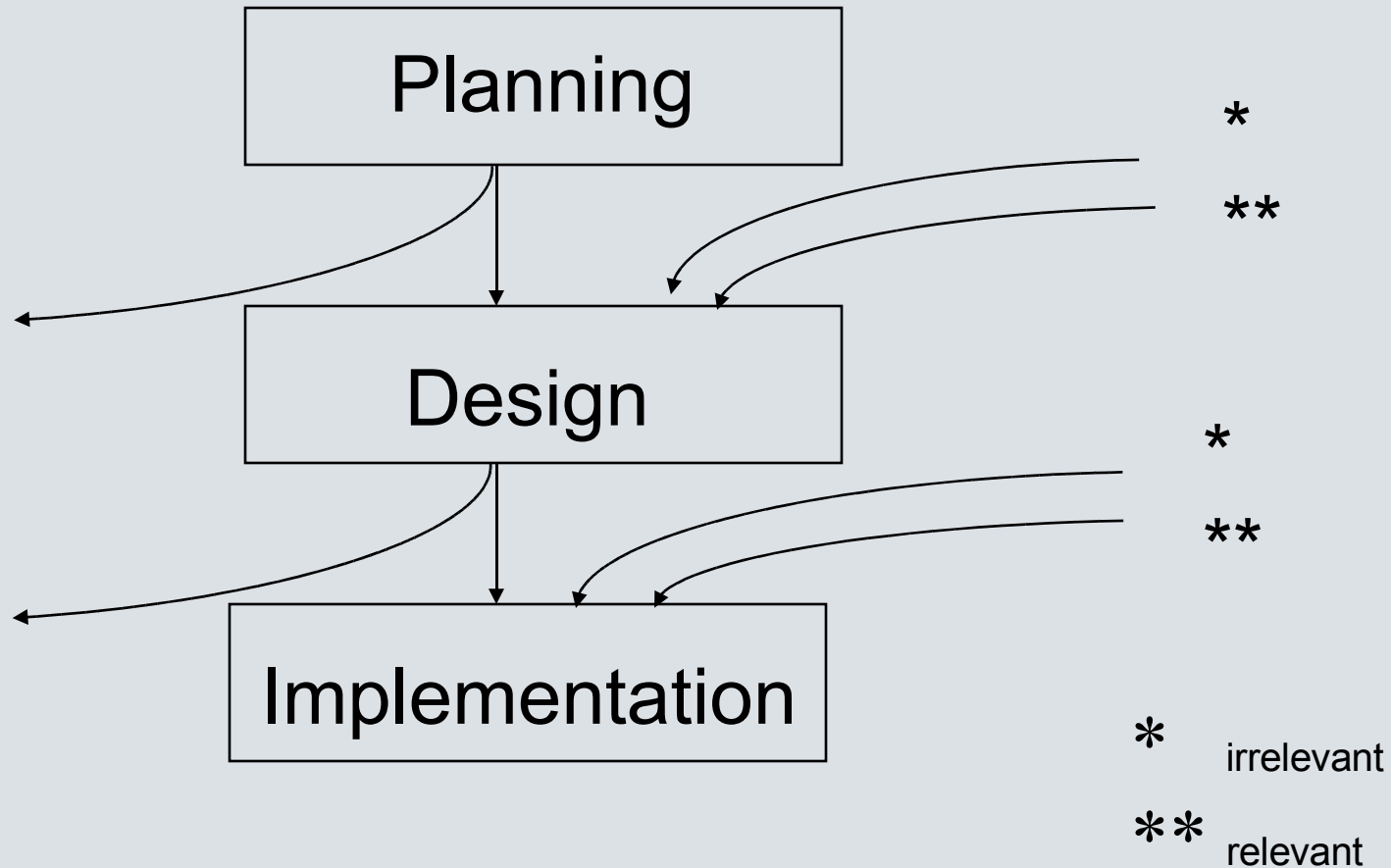
- Continuity
 - Not isolated tools for each development phase
- Multi-user system
- Automatically keeping consistency of the documents after changes
- Ease of Handling
- Applicable on different target platforms

- Should support well-known methods as
 - SA, SADT, OMT, UML...
- Comfortable user interface
 - Graphics, Windows, Menu, Icons
- Configuration management
 - Version administration
 - Redundancy-free storage
 - Data Storage
- Over long time applicable

- Functional requirements
- HW requirements
- Price of the Tools
- Support by vendor
- Guaranteed future
- Economic potential of vendor
- Capacity for teamwork
- Previous knowledge of methods

CASE

Tracing Problem



- Selection/procurement of the tool
- Selection of a pilot project
- Training (method/tool)
- Support
- Rear cover
- Observation of the project
- Decision over broad employment

- Strong extension of planning and design phase
- No universal remedy-no silver bullet
- Uniform documentation form
- Training into the underlying method necessarily

Thank you for your attention!

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Primäre Flächenfarbe:

R 255
G 255
B 255

Sekundäre Flächenfarben:

R 215 G 225 B 225	R 170 G 190 B 195	R 130 G 160 B 165
R 220 G 225 B 230	R 185 G 195 B 205	R 145 G 155 B 165

Akzentfarben:

R 255 G 210 B 078	R 245 G 128 B 039	R 229 G 025 B 055	R 000 G 133 B 062	R 000 G 084 B 159	R 000 G 000 B 000
R 255 G 221 B 122	R 248 G 160 B 093	R 236 G 083 B 105	R 064 G 164 B 110	R 064 G 127 B 183	R 064 G 064 B 064
R 255 G 232 B 166	R 250 G 191 B 147	R 242 G 140 B 155	R 127 G 194 B 158	R 127 G 169 B 207	R 127 G 127 B 127
R 255 G 244 B 211	R 252 G 223 B 201	R 248 G 197 B 205	R 191 G 224 B 207	R 191 G 212 B 231	R 191 G 191 B 191
R 255 G 250 B 237	R 254 G 242 B 233	R 252 G 232 B 235	R 229 G 243 B 235	R 229 G 238 B 245	R 229 G 229 B 229