

Software Quality Management

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Agenda

- Quality definition
- Software quality management
- Software quality attributes
- Software standards
- Software measurement
- Software improvement





What is Quality?

- Quality is ...
 - ... Degree to which a set of inherent characteristics fulfills requirements [ISO 9000]
 - ... Degree to which a component, system or process meets specified requirements and/or user/customer needs and expectations [IEEE 610]
 - ... Value to someone [Gerald Weinberg]
 - ... Fitness for purpose



What is Quality?

- Quality in the context of software engineering:
 - Functional quality – how well the product complies to a given design, based on functional requirements or specifications
 - Structural quality – how well the product meets non-functional requirements that support the delivery of functional requirements



What is Quality?

- Common problems for software systems:
 - Tension between customer quality requirements and developer quality requirements
 - Difficult to specify requirements in an unambiguous way
 - Specifications are usually incomplete and often inconsistent
- How to „ensure“ quality?



What is Quality Management?

- Concerned with ensuring that the required level of quality is achieved in a software product
- Focus on:
 - A quality product which meets the requirements and satisfies the user
 - A quality culture in the organisational environment where quality is viewed as everyone's responsibility (e.g. standard processes, best practices, tools)



What is Quality Management?

- 4 main components/layers:
 - Quality assurance
 - Quality planning
 - Quality control
 - Quality improvement
- Independent quality team
- Particularly important for large, complex systems



Quality Management & SDLC



Quality Management & SDLC

- Support the whole SDLC:
 - Collecting requirements and defining scope
 - Designing the solution
 - Solution implementation
 - Change management
 - ...



Software quality attributes

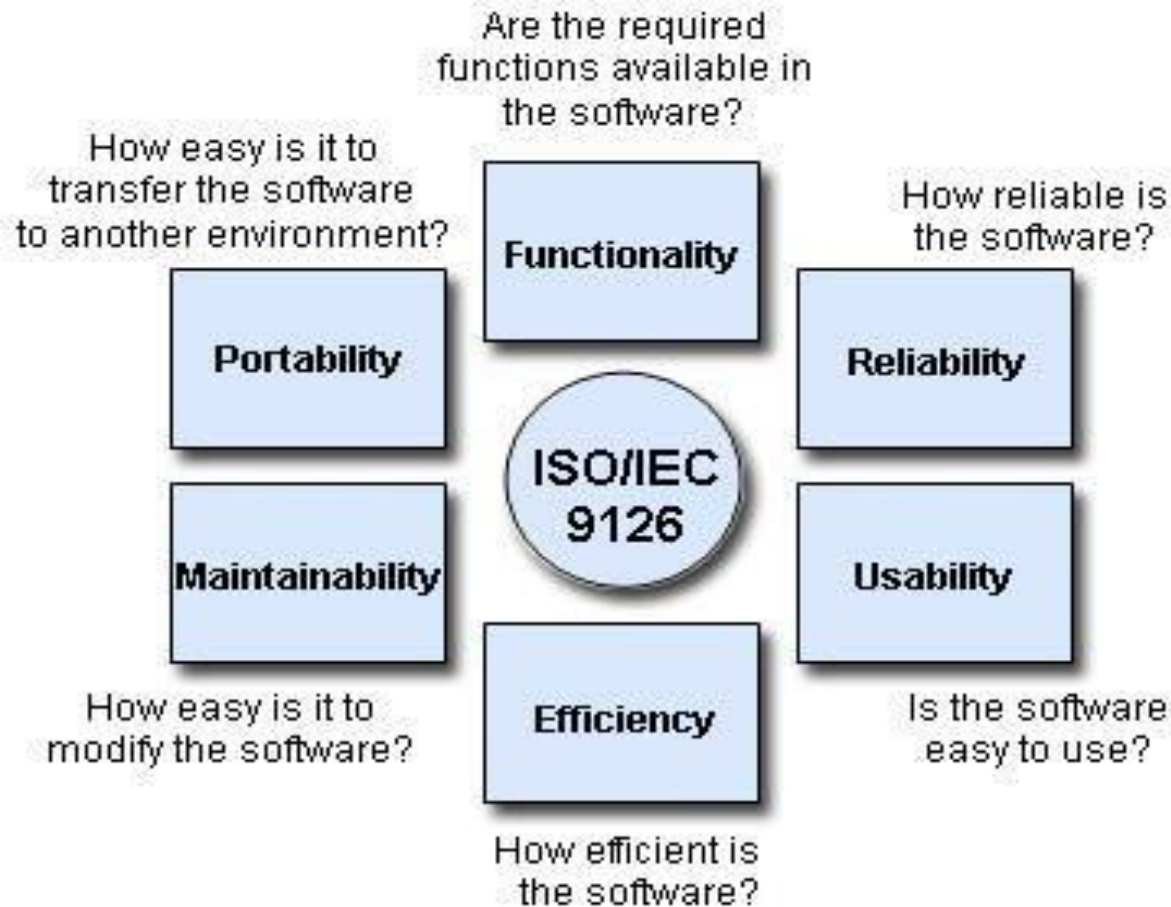
- Quality plan defines the most important quality attributes and ways of assessing their presence

Safety	Understandability	Portability
Security	Testability	Usability
Reliability	Adaptability	Reusability
Resilience	Modularity	Efficiency
Robustness	Complexity	Learnability

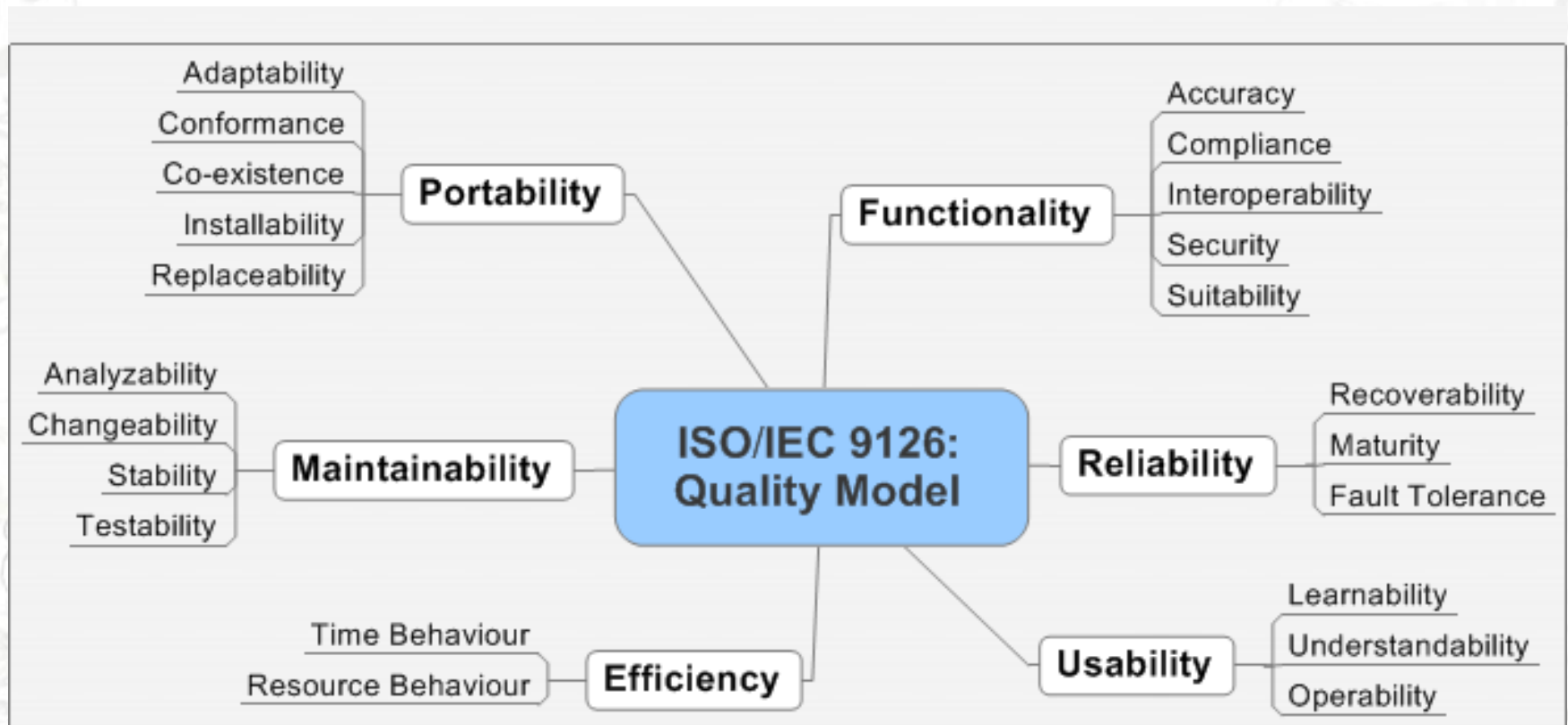
- It's not possible for any system to be optimized for all of these attributes



What are the attributes of good software?



What are the attributes of good software?



Quality Assurance activities in Playtech

- Code review
- Unit testing
- Functional testing
- Usability testing
- Failover and recovery testing
- Performance testing
- Continuous integration
- ...



Software Standards

- Standards define the required attributes of a product or process:
 - Product standards define characteristics that all software components should exhibit e.g. a common programming style
 - Process standards define how the software process should be followed
- Standards may be international, national, organizational or project standards



Software Standards - Importance

- Standards play an important role in quality management:
 - Encapsulation of best practice – avoids repetition of past mistakes
 - They are a framework for defining what quality means in a particular setting i.e. that organization's view of quality
 - They provide continuity – new staff can understand the organisation by understanding the standards that are used
 - Baseline for indicating maturity (certifications)



Product and Process Standards

Product standards	Process standards
Design review form	Design review conduct
Requirements document structure	Submission of new code for system building
Method header format	Version release process
Java programming style	Project plan approval process
Project plan format	Change control process
Change request form	Test recording process



Software Standards - Problems

- They may not be seen as relevant and up-to-date by software engineers
- They often involve too much bureaucratic form filling
- If they are unsupported by software tools, tedious form filling work is often involved to maintain the documentation associated with the standards
- Find the proper balance!



Software Quality Standards

- ISO 9000 quality management systems
 - ISO/IEC 9126 quality model
 - IEEE 730 standard for software quality assurance plans
 - CMMI, TMMi Maturity models
 - ISTQB professional certification
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- Especially important in areas where people's lives are at risk (e.g. Safety-critical systems)



Certifications in Playtech

- ISO 27001:2005 information security management
- PCI:DSS data security standard
- ISTQB certified QA engineers

- Playtech products regulatory compliance in various gambling jurisdictions – Italy, Spain, Denmark, Alderney, Finland, ...



Software measurement – Motivation

- Measuring software quality is motivated by at least two reasons:
 - Risk management
 - Cost management
 - ...



Software measurement

- Software measurement is concerned with deriving a numeric value for an attribute of a software product or process
- Allows for objective comparisons between techniques and processes



Software measurement

- Metric – any type of measurement which relates to a software system, process or related documentation
 - Code coverage
 - Number of lines of code
 - Bugs per line of code
 - Cyclomatic complexity
- May be used to predict product attributes or to control the software process



Software measurement

- Use of measurements:
 - To assign a value to system quality attributes
 - To identify the system components whose quality is sub-standard
 - To predict project cost and help in project planning/scheduling
- More common in academic and governmental organisations

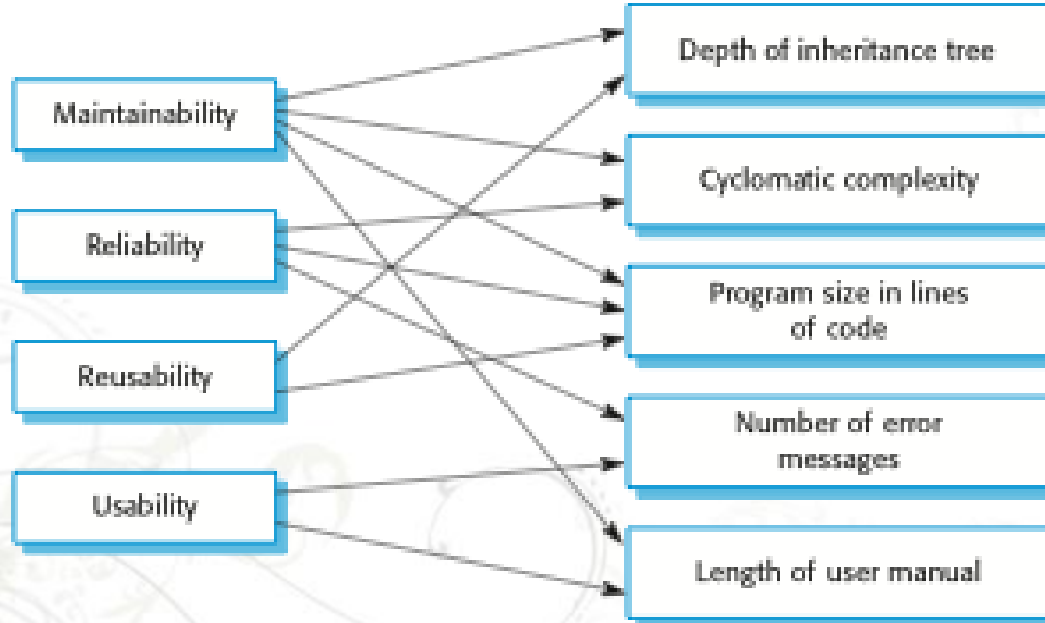


Software measurement

- Relationship between internal and external attributes

External quality attributes

Internal attributes



Software measurement - problems

- It is impossible to quantify the return on investment of introducing an organizational metrics program
- Introducing measurement adds additional overhead to processes
- In many companies, software processes are not standardized and are poorly defined and controlled
- Should be used with „common sense“

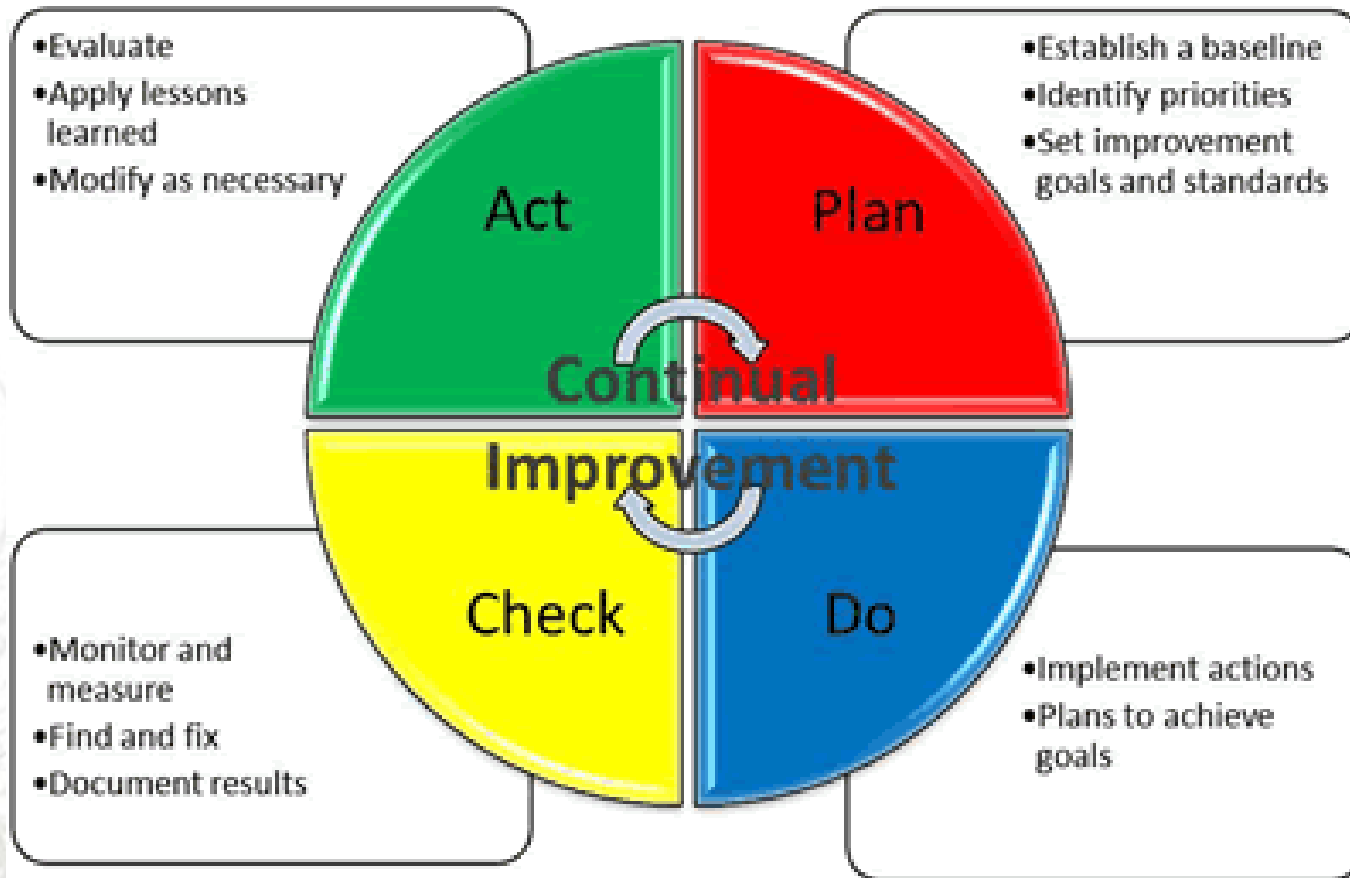


Software Quality Improvement

- There's always room for improvement!
- Motivation:
 - Cost reduction
 - Quality increase
 - ...
- Measure, learn and improve mentality



Software Quality Improvement



Software Quality Improvement

- Software process improvement frameworks and standards:
 - CMMI
 - TMMI
 - ISO/IEC 15504 a.k.a. SPICE
 - ISO 9000 family
 - IDEAL
 - Bootstrap
 - Six Sigma



Lesson take-aways

- Quality is fitness for purpose
- Producing good software is not only a matter of good programming skills
- Quality Assurance processes throughout the whole SDLC
- Follow standards, mixed with a dose of „common sense“
- Always seek to improve



Quality is important!

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