Martin Glinz

Software-Qualität – Ausgewählte Kapitel

Kapitel 8

Qualitätsanforderungen

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Qualitätsanforderungen

Qualitätsanforderung – Eine Anforderung, welche sich auf die Attribute eines Systems bezieht, d.h. Leistungsanforderungen und spezifische Qualitäten.

Das Thema wird anhand von Publikationen im Sonderheft "Quality Requirements" von IEEE Software (Vol. 25, Nr. 2, März/April 2008) diskutiert:

❍ Artikel von Martin Glinz (pp. 34-41) und nachstehende Folien

❍ Artikel von Björn Regnell, Richard Berntsson Svensson und Thomas Olsson (pp. 42-47)

❍ Point-Counterpoint-Debatte von Tom Gilb und Alistair Cockburn (pp. 64-68)

Literatur

A. Cockburn (2008). Subjective Quality Counts in Software Development. Point-counterpoint statement, *IEEE Software* **25**, 2. 65-67.

T. Gilb (2008). Metrics Say Quality Better than Words. Point-counterpoint statement, *IEEE Software* **25**, 2. 64, 66-67.

M. Glinz (2008). A Risk-Based, Value-Oriented Approach to Quality Requirements. *IEEE Software* **25**, 2. 34-41.

B. Regnell, R. Berntsson Svensson, T. Olsson (2008). Supporting Roadmapping of Quality Requirements. *IEEE Software* **25**, 2. 42-47.

Anhang: Vortragsfolien zu Glinz (2008)

A Risk-Based, Value-Oriented Approach to Quality Requirements

A New Look at an Old Problem
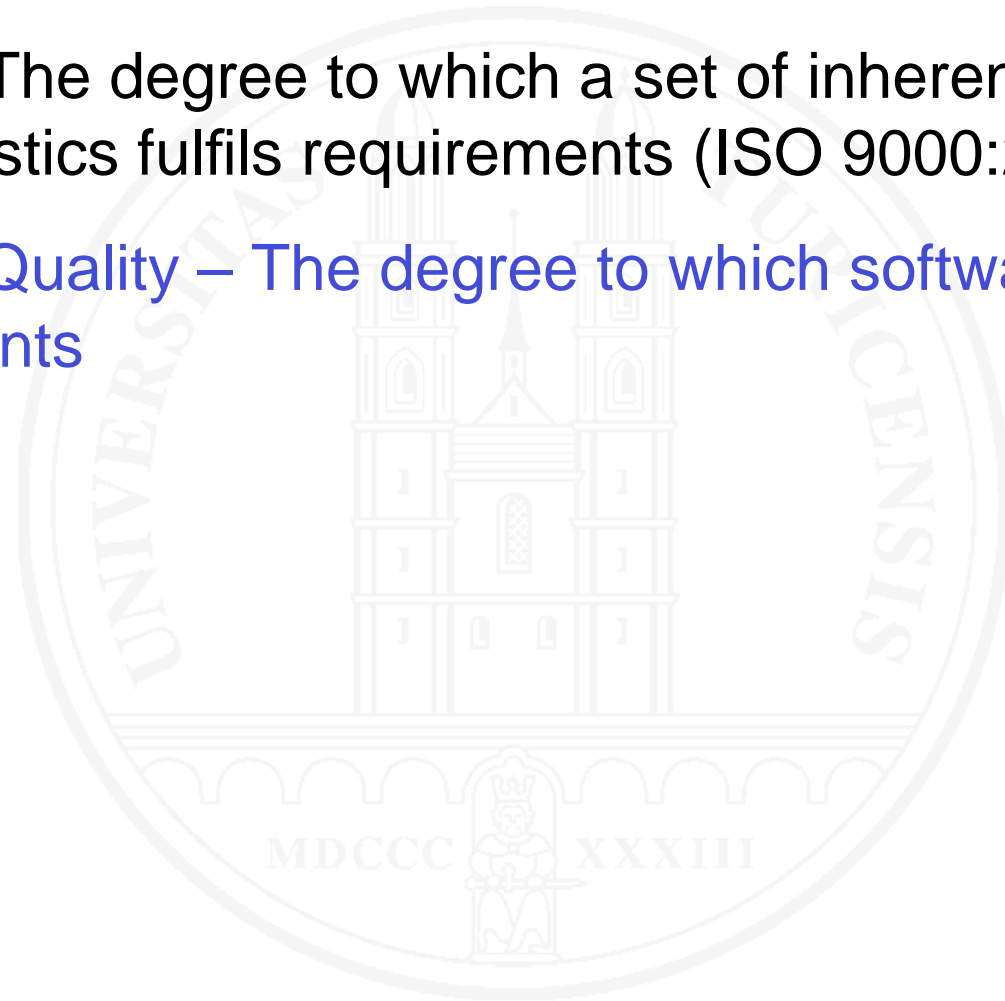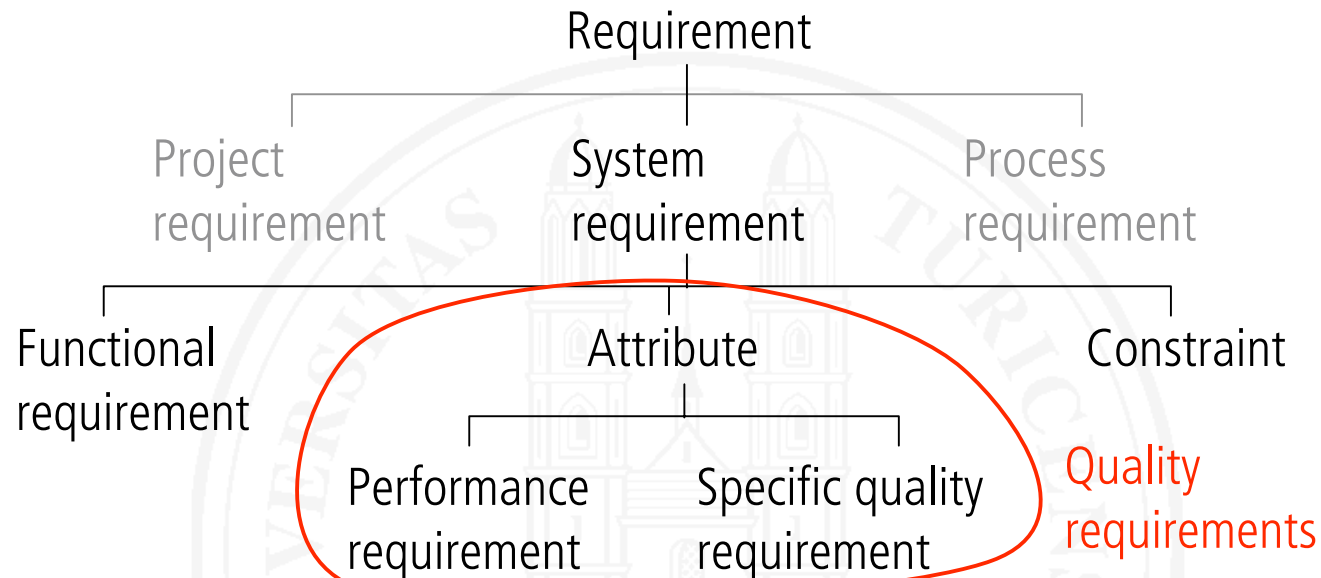
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Software Quality

◯ Quality – The degree to which a set of inherent characteristics fulfils requirements (ISO 9000:2000)

◯ Software Quality – The degree to which software meets its requirements

Classifying requirements

Requirement

Project requirement — System requirement — Process requirement

Functional requirement — Attribute — Constraint

Attribute: Performance requirement — Specific quality requirement

Quality requirements

| Functionality and behavior: Functions Data Stimuli Reactions Behavior | Time and space bounds: Timing Speed Volume Throughput | "-ilities": Reliability Usability Security Availability Portability Maintainability ... | Physical Legal Cultural Environmental Design&Implementation Interface ... |

Focus of this talk: Quality requirements

Quality requirement – Those requirements that pertain to a system's attributes such as performance attributes or specific qualities.

Examples:

○ "The system shall be user friendly."

○ "The time interval between two consecutive scans of the temperature sensor shall be below two seconds."

○ "The probability of successful, unauthorized intrusion into the database shall be smaller than 10^{-6}."

The problem: qualitatively stated requirements

"We need a secure system"

❍ Ambiguous

❍ Difficult to verify

Potential problems:

1. System delivers less than stakeholders expect

2. System delivers more than stakeholders need

3. Developers and customers disagree whether the system meets the requirements

The eleventh commandment
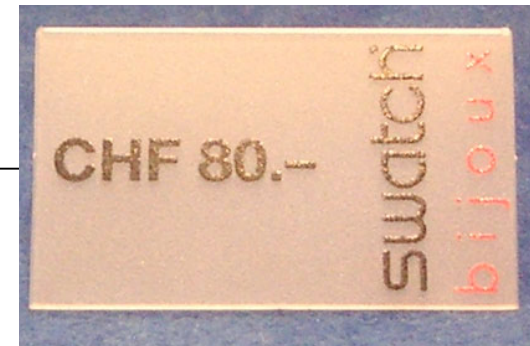
Thou shalt quantify.

Unambiguous • Verifiable • Low risk

If it's not measurable, make it measurable:

o Define / agree upon indirect measures for the desired property

o Demonstrate empirically that these indirect measurements are highly correlated with the quality we actually want to measure

There's a price tag

CHF 80.–

❍ **Defining** metrics **costs**

❍ Demonstrating **validity** of metrics **costs**

❍ Example:

Quantifying "The system shall be user-friendly" according to ISO-IEC 9126 usability characteristics

- Elicitation: Elicit values for 28 subcharacteristics
- Verification: Compute values for 28 metrics

Operationalization

○ Expressing quality requirements as functional properties

○ An alternative way of making quality requirements verifiable and unambiguous

○ Solution-oriented

○ Connection to original quality requirements frequently lost

○ Not considered here

Requirements are a means, not an end

○ Requirements shall deliver value

○ Value of a requirement:

- The benefit of reducing development risk
  (i.e. the risk of not meeting the stakeholders' desires
  and needs)

- minus the cost of specifying the requirement

A new look: risk-based, value-oriented

❍ Classic thinking:
Only a quantified quality requirement is a good quality requirement.

❍ New approach:
A quality requirement should be represented such that it delivers optimum value.

- Broader perspective
- Does not dismiss full quantification
- Choosing representation based on assessment of risk

Assessing risk
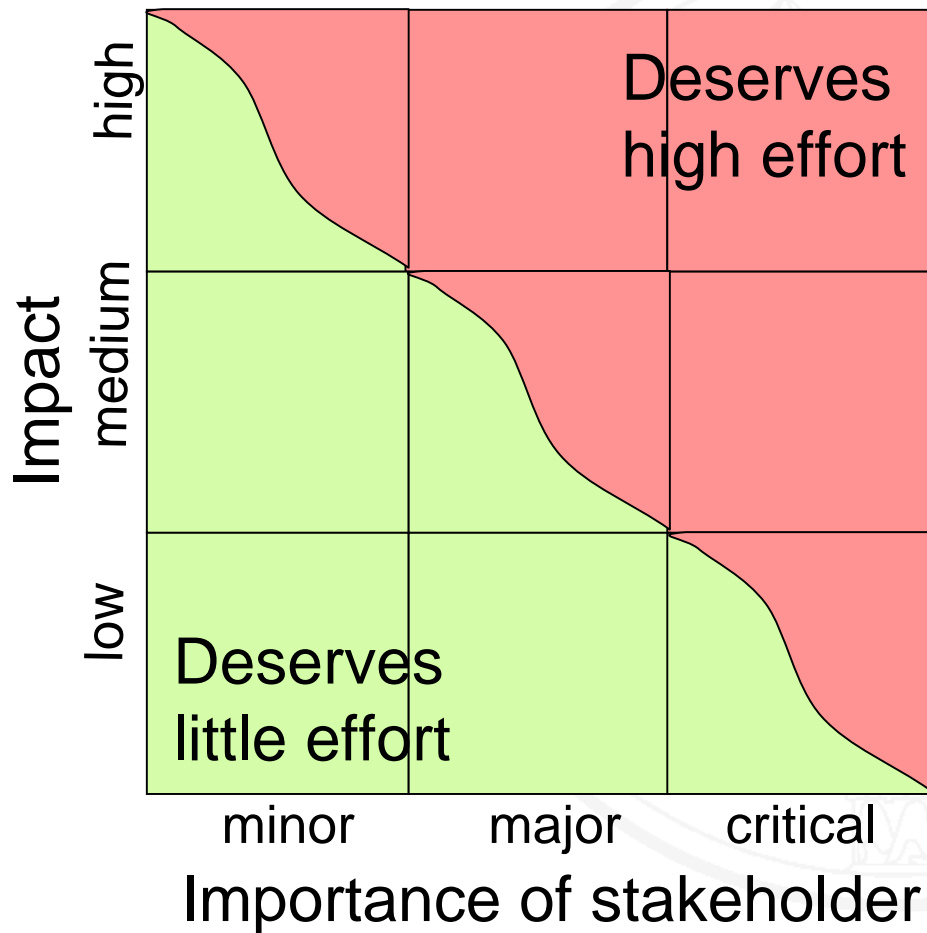
o Assess the criticality of the requirement

o Consider other factors (next slide)

o Use requirements triage techniques

Assessing risk: other factors

○ Quantification effort

○ Validity of obtained measurements

○ Distinctiveness

○ Shared understanding

○ Reference systems

○ Length of feedback-cycle

○ Kind of customer-supplier relationship

○ Certification required

The range of adequate representations

Situation	Representation	Verification
1. Implicit shared understanding	Omission	Implicit
2. Need to state general direction Customer trusts supplier	Qualitative	Inspection
3. Sufficient shared understanding to generalize from examples	By example	Inspection, (Measurement)
4. High risk of not meeting stake-holders' desires and needs	Quantitative in full	Measurement
5. Somewhere between 2 and 4	Qualitative with partial quantification	Inspection, partial measurement

A case study: Jane's volunteer driver service

An organization of volunteers who drive elderly or disabled people

○ When a person needs transportation, he calls the number of the volunteer drivers' service.

○ Two dispatchers, Jane and Peter, alternate in servicing incoming calls, making schedules, and calling volunteer drivers, giving them driving orders.

○ They use a spreadsheet to create schedules.

○ Jane, with help from Peter and his wife, founded the service three years ago. Jane and Peter are friends and know each other's work habits and preferences pretty well.

Jane's volunteer driver service – 2

❍ Today, the service has grown to 20 volunteers and is still growing.

❍ The board has decided they need a computer system to support the ordering and dispatching processes.

❍ In his professional life, Peter is the owner and chief engineer of a 10-person software company.

❍ He has decided to contribute by building an open source, free system by his company.

Stakeholder analysis

○ Critical:
   ● Dispatcher

○ Major:
   ● Service user
   ● Volunteer driver
   ● System operator

○ Minor:
   ● Developer
   ● Executive board member
   ● Person calling the service for somebody else
   ● Any other stakeholder

Some samples and how to treat them

Lucy (a 76-year-old service user): "It would be great if I could make reservations over the Internet some weeks in advance and also view a list of my current reservations—I am a bit forgetful, you know. However, it must be very simple and easy to use."

"Some weeks in advance"

Major stakeholder, low impact, easy to quantify ⇨ Quantify.

"Very simple and easy to use"

Major stakeholder, low to medium impact, Hard to quantify ⇨ Don't quantify. Reduce risk with user interface prototyping and let selected service users inspect the fulfillment of this requirement by working with the prototype.

Some samples and how to treat them – 2

John (a deaf service user): "As I can't make calls myself, I need a Web-based reservation option. It should have the same service level as provided by calling today, in particular immediate confirmation in most cases."

"Same service level as provided by calling today"

Major stakeholder, low to medium impact, reference system available, hard to quantify ⇨ Don't quantify. Instead, use current system as a reference system; maybe elaborate some examples that illustrate the current service level. Let selected service users inspect the fulfillment of this requirement by working with the prototype.

"Immediate confirmation in most cases"

Major stakeholder, low to medium impact, easy to quantify ⇨ Quantify. For example, quantify "immediate" as "in less than 30 seconds" and "most cases" as "in at least 90% of all cases."

Some samples and how to treat them – 3

Jane (dispatcher): "My biggest concern is that the system must support the growing number of service requests but <mark>remain as simple to use as our current spreadsheet</mark>."

"As simple to use as our current spreadsheet"

Critical stakeholder, medium impact, shared understanding between stakeholder and system architect, hard to quantify ⇨ Don't state explicitly as a requirement.

Some samples and how to treat them – 4

Peter (the dispatcher and head of the development team): "I primarily want the system to help me work faster— that is, on average, I'll <mark>need less time to service an incoming request than today</mark>."

"Need less time to service an incoming request than today"

Critical stakeholder, high impact, distinctive, easy to quantify ⇨ Quantify

Further reading

quality requirements......

A Risk-Based, Value-Oriented Approach to Quality Requirements

Martin Glinz, *University of Zurich*

This value-oriented approach to specifying quality

hen quality requirements are elicited from stakeholders, stated qualitatively, such as "the response time must be fast" a highly available system." (See the "Defining Quality R sidebar for a definition of quality requirements.) However,

Conclusion

❍ A new look at an old problem: getting optimum value from your effort to specify software quality

❍ Traditional quantification of every quality requirement does not always deliver optimum value

❍ This value-based, risk-oriented approach

- extends the classic approach
- helps treat quality requirements adequately over a wide range of project situations

⇨ helps advance software quality

References and further reading

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