AZ ISO/IEC-9126 SZOFTVER MINŐSÉGI SZABVÁNY ÁTTEKINTÉSE

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Motiváció

- Szoftver követelmény specifikálás
  - Szoftver minőségbiztosítási terv
  - Számszerű minőségi elvárások
- Szoftverminőség modellezése
  - Flexibilis keretrendszer
  - Alkalmazható konkrét termékre és szoftver kategóriára is

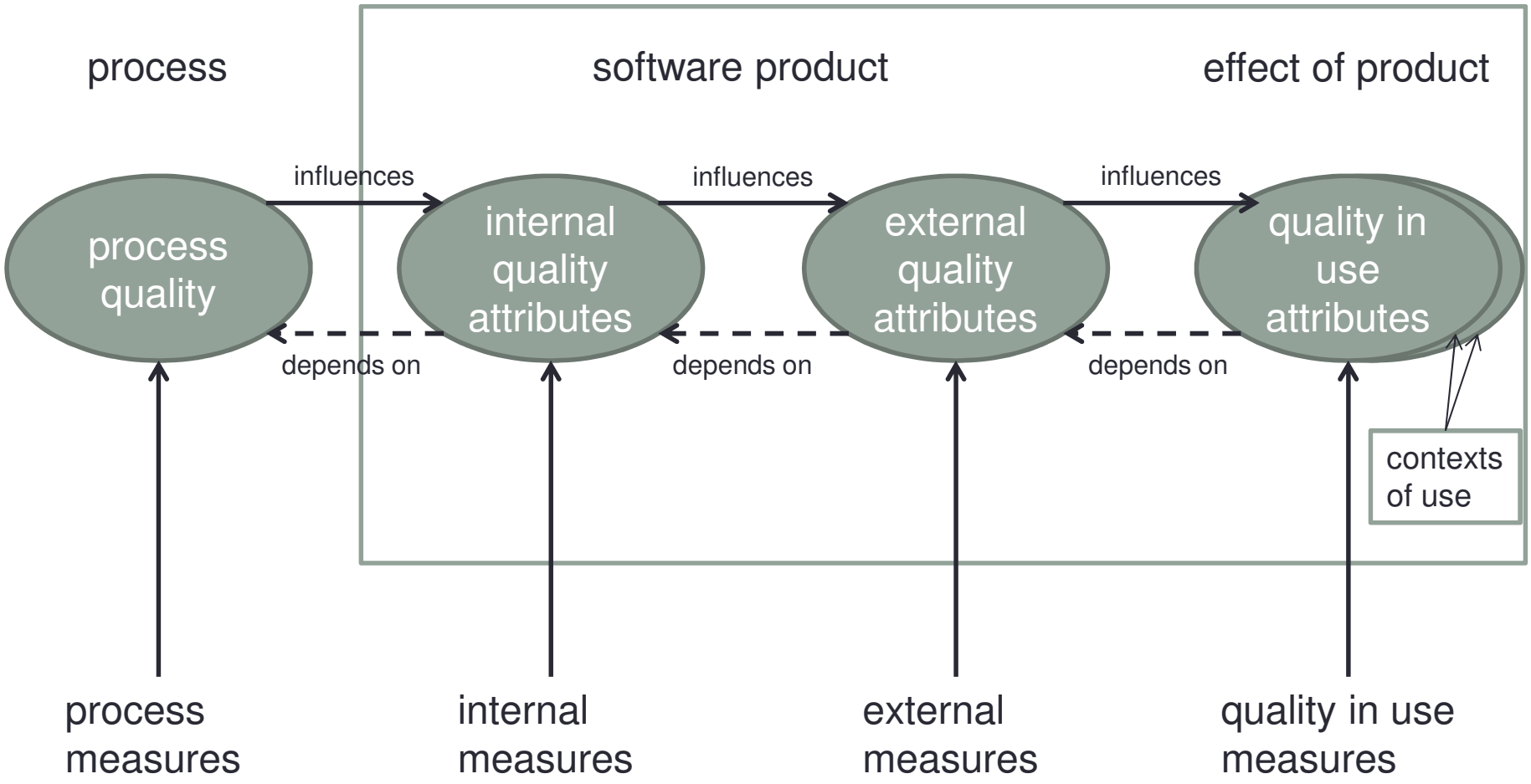
Történelem

- McCall, 1977
  - Minőség ábrázolása faktorokkal
  - 11 faktor, 3 kategória:
    - Revision
    - Transition
    - Operation
- Boehm, 1978
  - Megjelennek a hardverrel kapcsolatos jellemzők is
  - 6 faktor, 2 kategória + *Portability*
    - As-is utility
    - Maintainability
    - Portability
- ISO/IEC 9126, 1991 (2001)

ISO 9126 felépítése

- ISO 9126-1: *Quality model*
  - Faktorok hierarchiája
- ISO 9126-2: *External metrics*
  - Tesztelési időben mérhető tulajdonságok
- ISO 9126-3: *Internal metrics*
  - Fejlesztési időben mérhető tulajdonságok
- ISO 9126-4: *Quality in use*
  - A felhasználó által érzett minőség

Minőség életciklus modell



ISO 9126-1: Quality Model

- Közös modell a külső (external) és a belső (internal) tulajdonságok számára

- Karakterisztikák, al-karakterisztikák, attribútumok
  - *Functionality*
  - *Reliability*
  - *Usability*
  - *Efficiency*
  - *Maintainability*
  - *Portability*

Functionality

- „*The capability of the software product to provide functions which meet stated and implied needs when the software is used under specified conditions.*”

- Suitability
- Accuracy
- Interoperability
- Security
- Functionality compliance

Reliability

- „*The capability of the software product to maintain a specified level of performance when used under specified conditions.*”

- Maturity
- Fault tolerance
- Recoverability
- Reliability compliance

Usability

- „*The capability of the software product to be understood, learned, used and attractive to the user, when used under specified conditions.*”

- Understandability
- Learnability
- Operability
- Attractiveness
- Usability compliance

Efficiency

- „*The capability of the software product to provide appropriate performance, relative to the amount of resources used, under stated conditions.*”

- Time behaviour
- Resource utilisation
- Efficiency compliance

Maintainability

- „*The capability of the software product to be modified. Modifications may include corrections, improvements or adaptation of the software to changes in environment, and in requirements and functional specifications..*”

- Analysability
- Changeability
- Stability
- Testability
- Maintainability compliance

Portability

- „*The capability of the software product to be transferred from one environment to another.*”

- Adaptability
- Installability
- Co-existence
- Replaceability
- Portability compliance

Példa: belső metrikák

Name	Purpose	Measurement, formula	Interpretaion of the results	Metric scale type	Measure type	Input to measurement	Target audience
I/O Utilization	What is the estimated I/O utilization to complete a specified task?	X = numbe of buffers	The shorter the better.	Ratio	X=size	Source code	Developers
I/O Utilization Message Density	What is the density of messages relating to I/O utilization in the lines of code responsible in making system calls?	X=A/B A = number of I/O related messages B: number of lines of code directly related to system calls	The greater the better.	Absolute	X=count/ count A=count B=count	Source code	Developers
Memory utilization	What is the estimated memory size that the product will occupy to complete a specified task?	X = size in bytes	The lesser the better.	Ratio	X=size	Estimated size of memory utilization.	Developers
Memory utilization Message Density	What is the density of messages relating to memory utilization in the lines of code responsible in making system calls?	X=A/B A = number of memory related error messages B = number of lines of code directly related to system calls	The greater the better.	Ratio	X=count/ count A=count B=count	Source code	Developers
Transmission utilization	What is the estimated amount of Transmission resources utilization?	X=bits/time	The lesser the better.	ratio	X=time	Known operating system. Estimated time in system calls.	Developers

Példa: külső metrikák

Name	Purpose	Measurement, formula	Interpretaion of the results	Metric scale type	Measure type	Input to measurement	Target audience
I/O devices utilization	Is the I/O device utilization too high, causing inefficiencies?	X = A / B A = time of I/O devices occupied B = specified time which is designed to occupy I/O devices	0 <= X <= 1 The less than and nearer to the 1.0 is the better.	Absolute	A= Time B= Time X= Time/ Time	Testing report Operation Report	Developer Maintainer SQA
I/O loading limits	What is the absolute limit on I/O utilization in fulfilling a function?	X = Amax / Rmax Amax = MAX(Ai), (for i = 1 to N) Rmax = required maximum I/O messages MAX(Ai) = Maximum number of I/O messages from 1st to i-th evaluation N = number of evaluations.	0<= X The smaller is the better.	Absolute	Amax =Count Rmax =Count Ai = Count N= Count X = Count/Count	Testing report Operation report showing elapse time	User Developer Maintainer SQA
Mean I/O fulfillment ratio	What is the average number of I/O related error messages and failures over a specified length of time and specified utilization?	X = Amean / Rmean Amean = Σ(Ai)/N Rmean = required mean number of I/O messages Ai = number of I/O error messages for i-th evaluation N = number of evaluations	0<= X The smaller is the better.	Absolute	Amean = Count Rmean = Count Ai = Count N= Count X = Count/Count	Testing report Operation report showing elapse time	User Developer Maintainer SQA
User waiting time of I/O devices utilization	What is the impact of I/O device utilization on the user wait times?	T = Time spent to wait for finish of I/O devices operation	0 < T The shorter is the better.	Ratio	T= Time	Testing report Operation report	User Developer Maintainer SQA

ISO 9126-4: Quality in use

- Effectiveness
  - „*The capability of the software product to enable users to achieve specified goals with accuracy and completeness in a specified context of use.*”
- Productivity
  - „*The capability of the software product to enable users to expend appropriate amounts of resources in relation to the effectiveness achieved in a specified context of use.*”
- Safety
  - „*The capability of the software product to achieve acceptable levels of risk of harm to people, business, software, property or the environment in a specified context of use.*”
- Satisfaction
  - „*The capability of the software product to satisfy users in a specified context of use.*”

Hiányosságok, kritikák

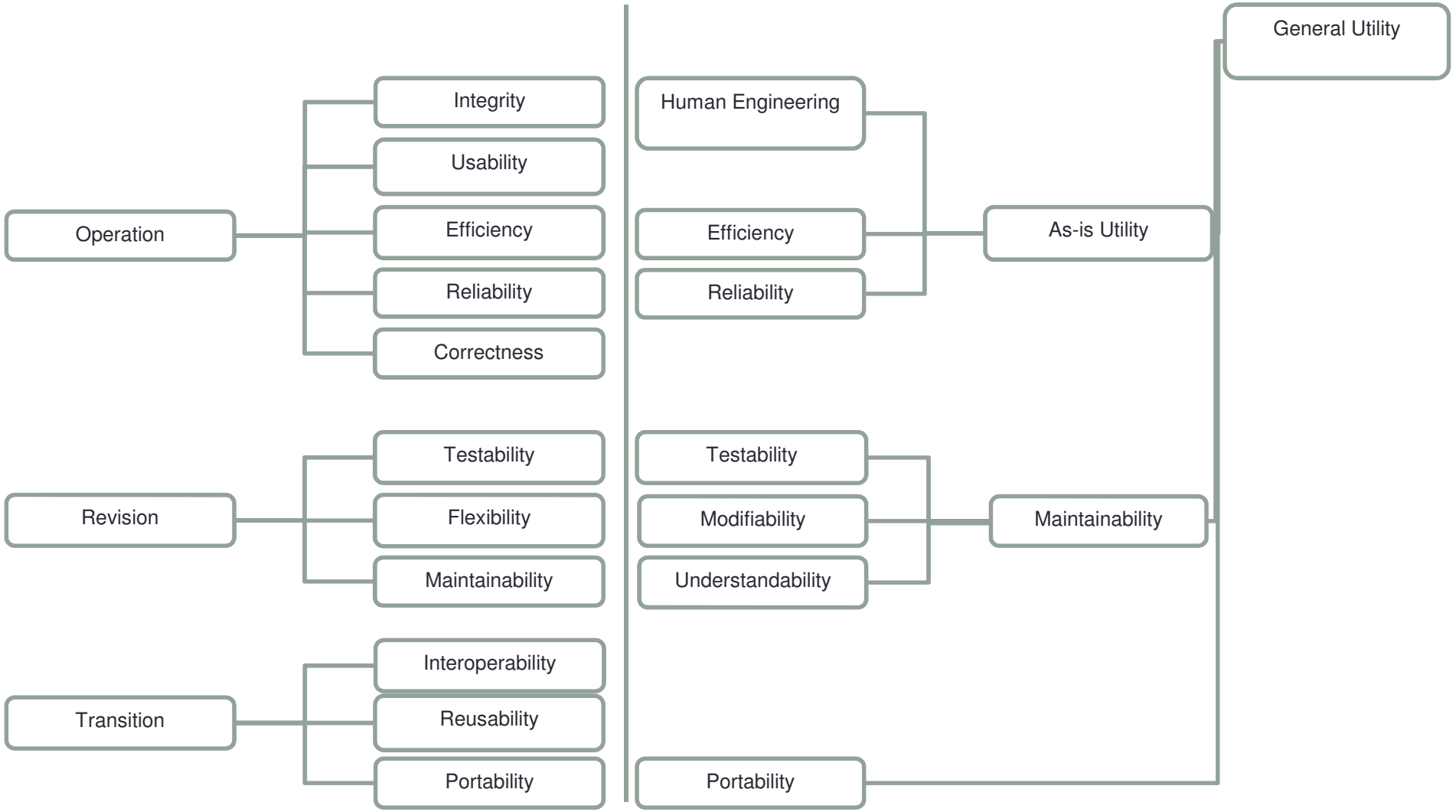
- A modell túl általános
  - Mindenkinek személyre kell szabni
- Hiányos definíciók
  - Be lehet vezetni újabb karakterisztika szinteket?
  - Tartozhat egy tulajdonság több karakterisztikához vagy egyértelmű hierarchiát kell alkotniuk?
- A metrikák közül nem mind alkalmazható

SQuaRE

- **S**oftware product **Qua**lity **R**equirements and **E**valuation
- A 9126-os szabvány leváltása
- ISO 25000, 2005
- ISO 25010, 2011
  - Quality model: 8 karakterisztika, 39 al-karakterisztika
    - Compatibility
    - Security
  - Quality in use:
    - Usability

Köszönöm a figyelmet

Függ. 1: McCall vs Boehm



Függ. 2: Kapcsolat más szabványokkal