

Bild: DALL.E



Höher, schneller, weiter: Neue Qualitäten braucht das Land

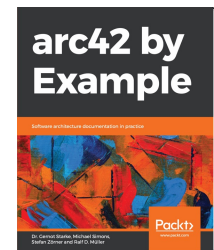
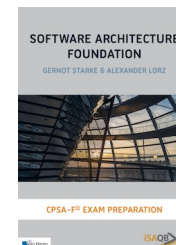
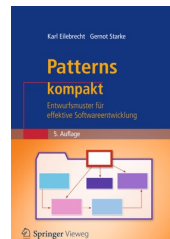
Gernot Starke

INNOQ Fellow

INNOQ

Dr. Gernot Starke

INNOQ Fellow



+49 177 – 728 2570
Gernot.Starke@innoq.com
<https://arc42.de>

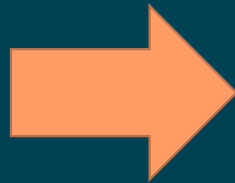
INNOQ

Warum das Thema?

Quelle: unbekannt...



Warum das Thema?



<https://www.innoq.com/de/articles/2022/02/kleine-geschichte-zu-qualitaet/>



Kaffee...

<https://unsplash.com/photos/pMW4jzELQCw>



**Kaffee
macht
glücklich...**



guter

**Kaffee
macht
glücklich...**



guter

Kaffee?

<https://unsplash.com/photos/pMW4jzELQCw>



Qualität von Kaffee?

<https://unsplash.com/photos/pMW4jzELQCw>



kombiniere...

Bulletproof Coffee...



Qualität von Kaffee?

**Americano, Espresso, Ristretto,
Macciato, Cortado**

**Guatemala, Nicaragua,
Mexiko?**

Kuh-, Soja-, Hafer-, Mandelmilch?

Karamell? Kokos?

Siebträger, French-Press, Filter?

Zucker? Süßstoff?

Kapseln oder Bohnen?

Koffein oder nicht?

Qualität von Kaffee?

Geschmack

Zutaten

Zubereitung

Produktion

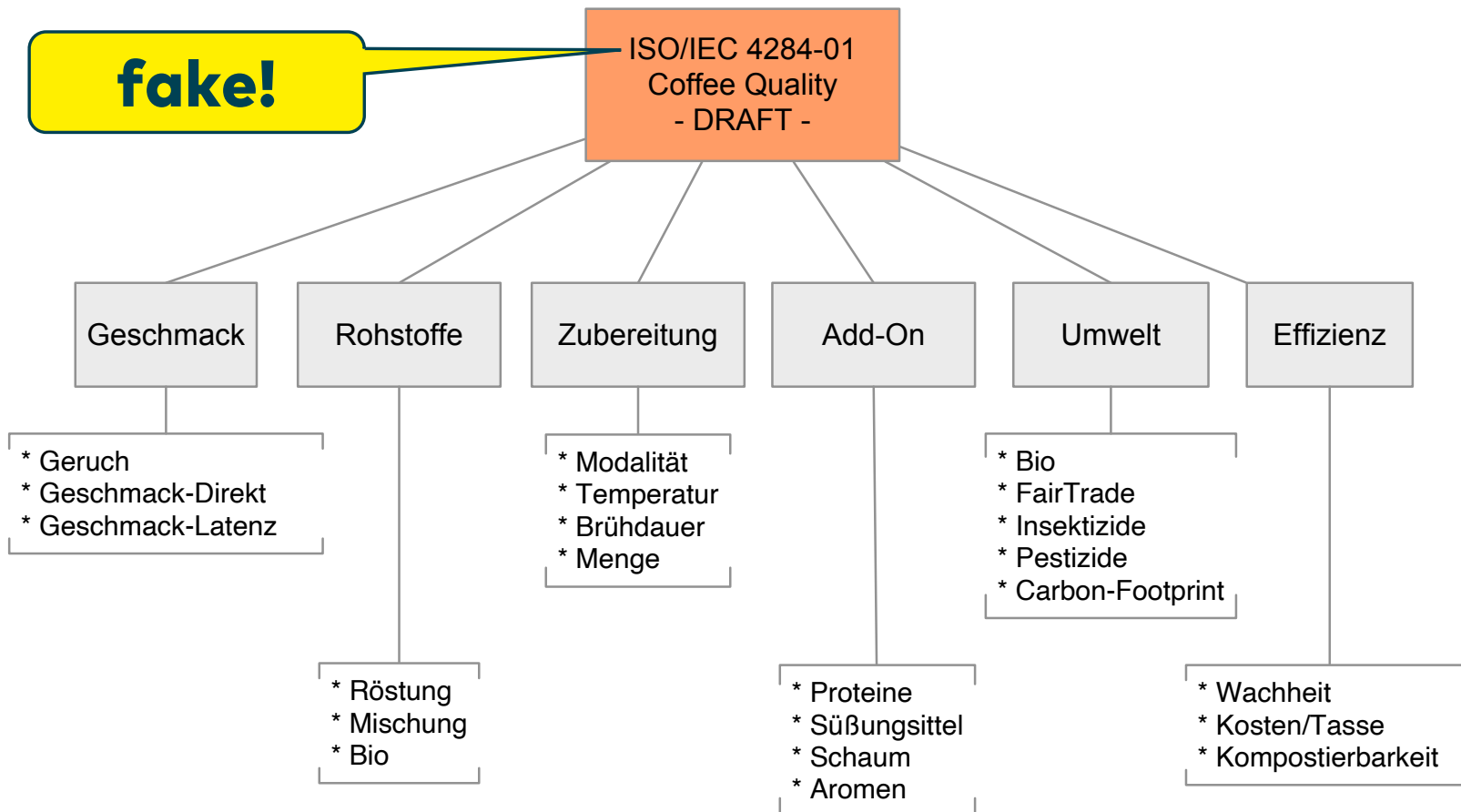
Temperatur

Inhalts-
stoffe

Preis

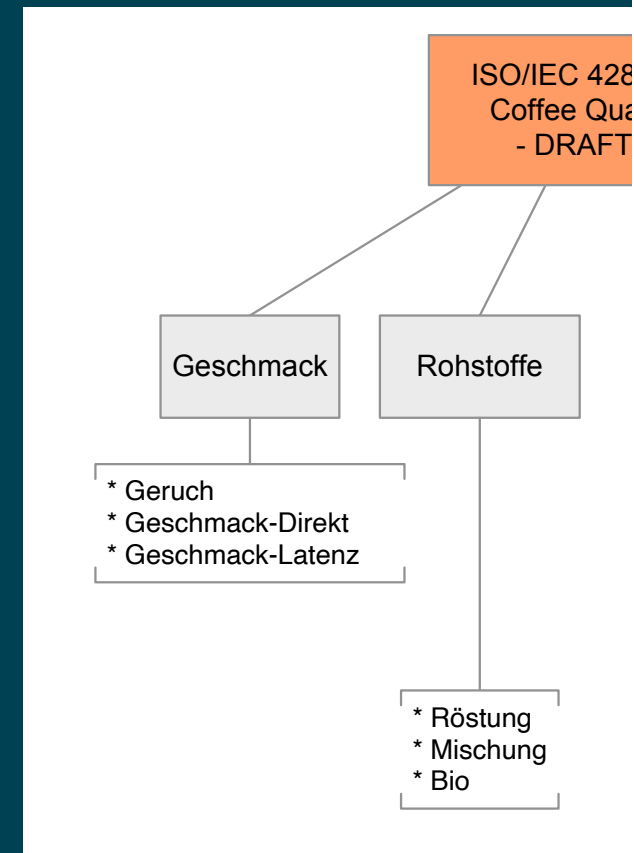
...

Qualitätsmodell für Kaffee



Qualitätsmodell für Kaffee...

- **Geruch**
 - Grad der olfaktorischen Anregung bei spezifizierten Umweltbedingungen
- **Geschmack-Direkt**
 - Grad der unmittelbaren geschmacklichen Anregung bei Konsum einer definierten Menge mit definierter Temperatur
- **Geschmack-Latenz**
 - Grad der geschmacklichen Anregung nach Verstreichen einer definierten Zeit



Qualität von Kaffee?

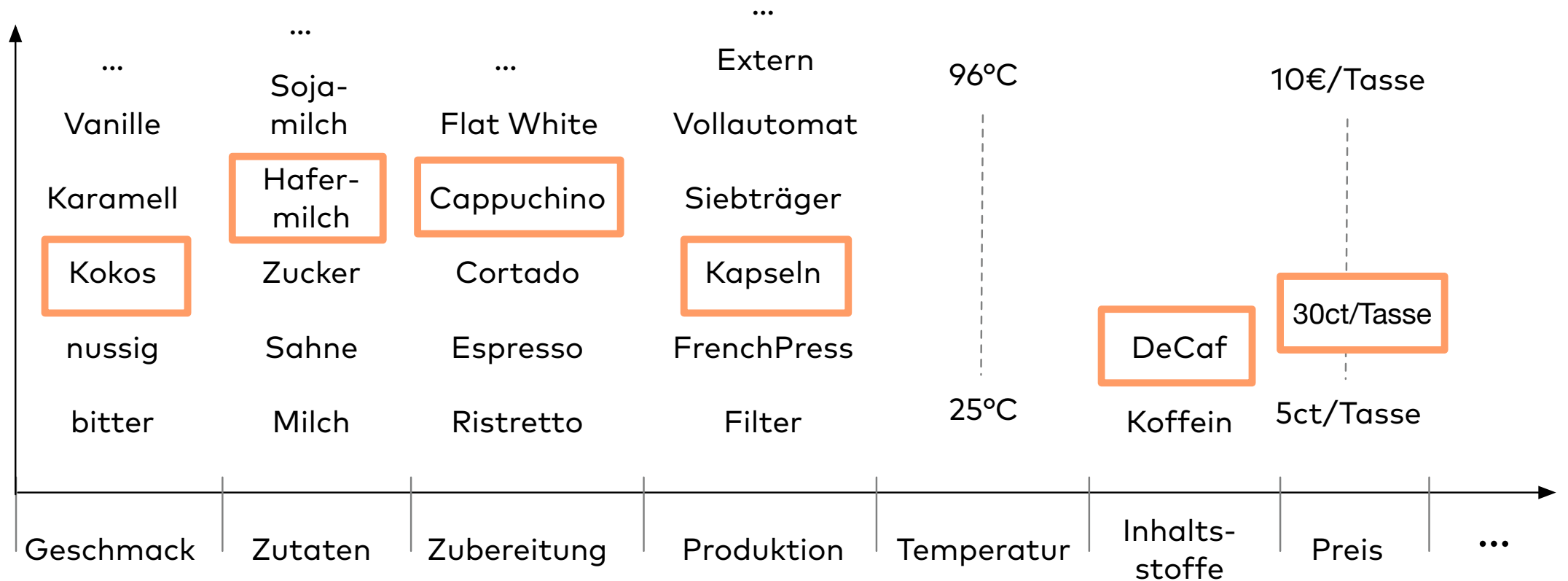
**Dimension 2:
Ausprägungen**



**Dimension 1:
Eigenschaften**



Qualität von Kaffee?



Qualität von Kaffee?



Qualität von Kaffee?

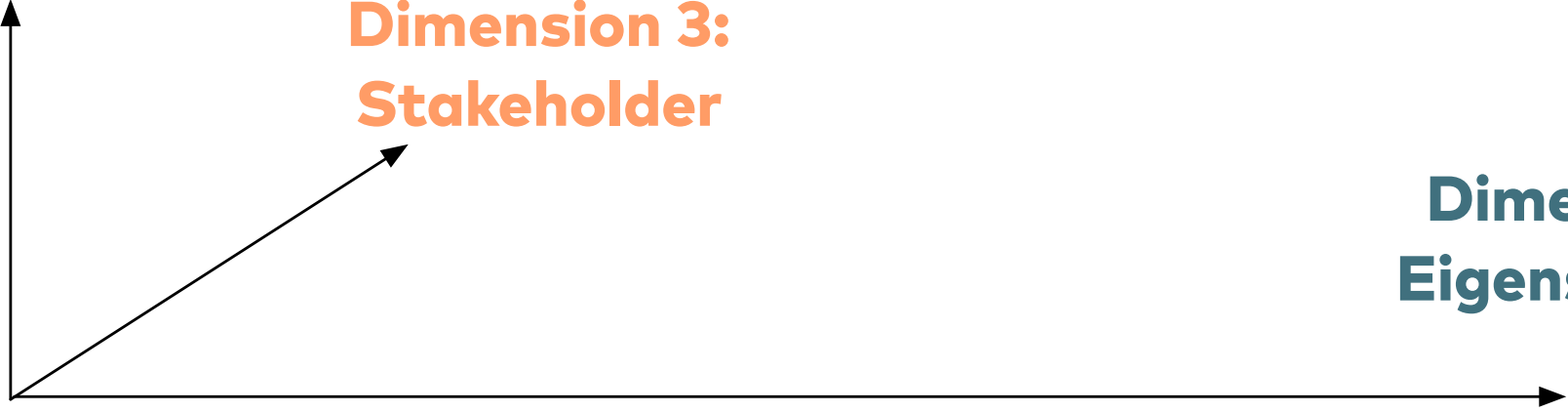
- **Consumer (Gernot)**
 - Bulletproof, FlatWhite
 - morgens Koffein, abends ohne
- **Consumer (N.N.)**
 - Cold-Drip Zubereitung
- **Consumer (Sportler:in)**
 - hoher Koffeingehalt
- **Dev-Team („Barrista“):**
 - Pflegeleichte Maschine
 - Ergonomische Aufstellung
 - Leichte Reinigung
- **Management**
 - günstige Einkaufspreise
 - Keine Verschwendung von Rohstoffen
 - Vor-Ort Wartung

Qualität von Kaffee?

**Dimension 2:
Ausprägungen**

**Dimension 3:
Stakeholder**

**Dimension 1:
Eigenschaften**



Qualität von Software

**Eigenschaften
(„Dimension-1“)**

isolation, Fault tolerance, Faultlessness,
onal constraint, Performance efficiency,
rface aesthetics, Vulnerability

Ordnung im Begriffsdickicht:

„Qualitätsmodelle“

1977 - 2022

Ordnung im Begriffsdickicht (Dimension 1, Eigenschaften)

„Qualitätsmodelle“

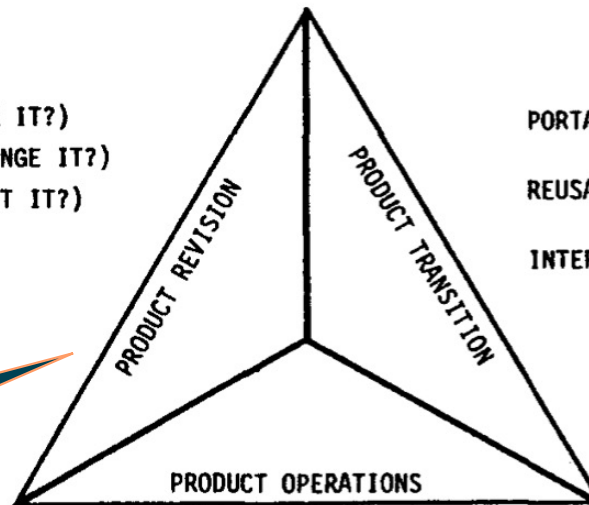
1977 - 2022

Qualitätsmodelle für Software

Autor:innen,	Jahr	Art	Anzahl der Eigenschaften	Eigenschaften
McCall	1977	Hierarchisches Modell, zwei Ebenen Einstiegspunkte Operation, Revision, Transition	11	Kaum Unterschied zwischen Revision und Transition
Barry Boehm	1978	Hierarchisches Modell, drei Ebenen Einstiegspunkte Utility, Maintainability, Portability	23	
ISO 9126	1991	Zweistufiges Modell, sechs Top-Level-Eigenschaften	27	Security nur nachgelagert
R. Grady, „FURPS“	1992	Einstufiges Modell, Functionality, Usability, Reliability, Performance, Supportability	5	
IBM FURPS+	1999	Erweitert das FURPS-Modell um zahlreiche Untermerkmale	ca. 30	Teil des (zu) umfangreichen Rational-Unified Process
VOLERE	1999	In umfassendes Requirements Template integriert	8	Kombiniert Q-Anforderungen mit Constraints
ISO 25010	2011	Hierarchie mit zwei Ebenen, acht Top-Level- Merkmale	32	Teils unpraktikable Begriffs- definitionen, nicht mehr zeitgemäß
SEI	2022	Eine Ebene, siehe [1]	10	Manche Details zu hoch priorisiert
ISO 25010-2022 (Draft-Version)	2022	Erweitert auf neun Top-Level-Merkmale	9	39 Sub-Merkmale, teils überschneidend

Qualitätsmodell McCall

MAINTAINABILITY (CAN I FIX IT?)
FLEXIBILITY (CAN I CHANGE IT?)
TESTABILITY (CAN I TEST IT?)



PORTABILITY (WILL I BE ABLE TO USE IT ON ANOTHER MACHINE?)
REUSABILITY (WILL I BE ABLE TO REUSE SOME OF THE SOFTWARE?)
INTEROPERABILITY (WILL I BE ABLE TO INTERFACE IT WITH ANOTHER SYSTEM?)

1977 / 1978

<https://dl.acm.org/doi/10.1145/953579.811113>

CORRECTNESS (DOES IT DO WHAT I WANT?)
RELIABILITY (DOES IT DO IT ACCURATELY ALL OF THE TIME?)
EFFICIENCY (WILL IT RUN ON MY HARDWARE AS WELL AS IT CAN?)
INTEGRITY (IS IT SECURE?)
USABILITY (CAN I RUN IT?)

SEI Quality Model
(by Len Bass et. al.,
2022)

Availability

Deployability

Energy
Efficiency

Performance

Modifiability

Integrability

Safety

Security

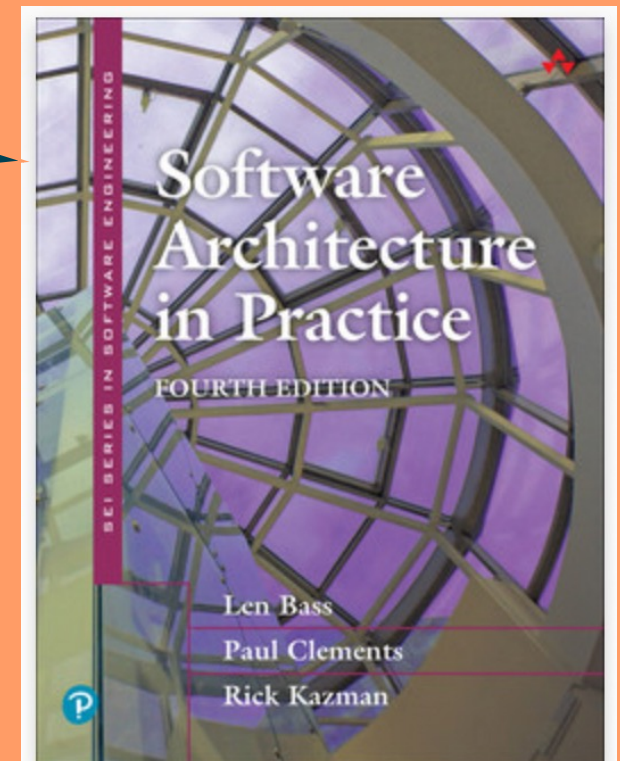
Testability

Usability

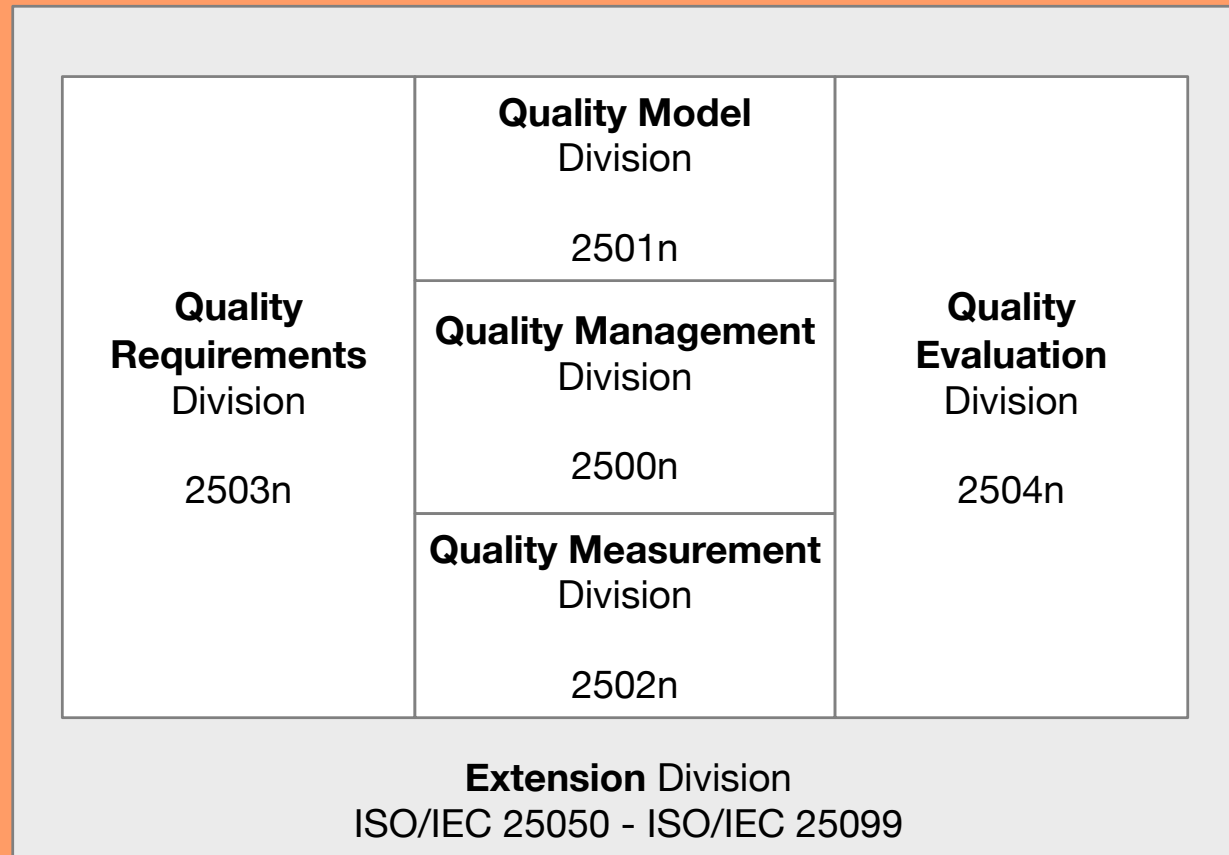
Qualitätsmodell SEI

super Buch!

**teils SEHR
speziell...**



Qualitätsmodell ISO 250xx



ISO 250xx kostet €2600

Title	Price (CHF)
2500n Quality Management Division	
25000: Guide to SQuaRE	145
25001: Planning and management	92
25002: Quality models overview and usage	61
2501n Quality Model Division	
25010: Product quality model (2011)	145
25011: IT service quality models	124
25012: Data quality model	92
25019: Quality-in-use model	61
2502n Quality Measurement Division	
25020: Quality Measurement Framework	145
25021: Quality measure elements	166
25022: Measurement of quality in use	166
25023: Measurement of system and software product quality	166
25024: Measurement of data quality	166
25025: Measurement of IT service quality	124

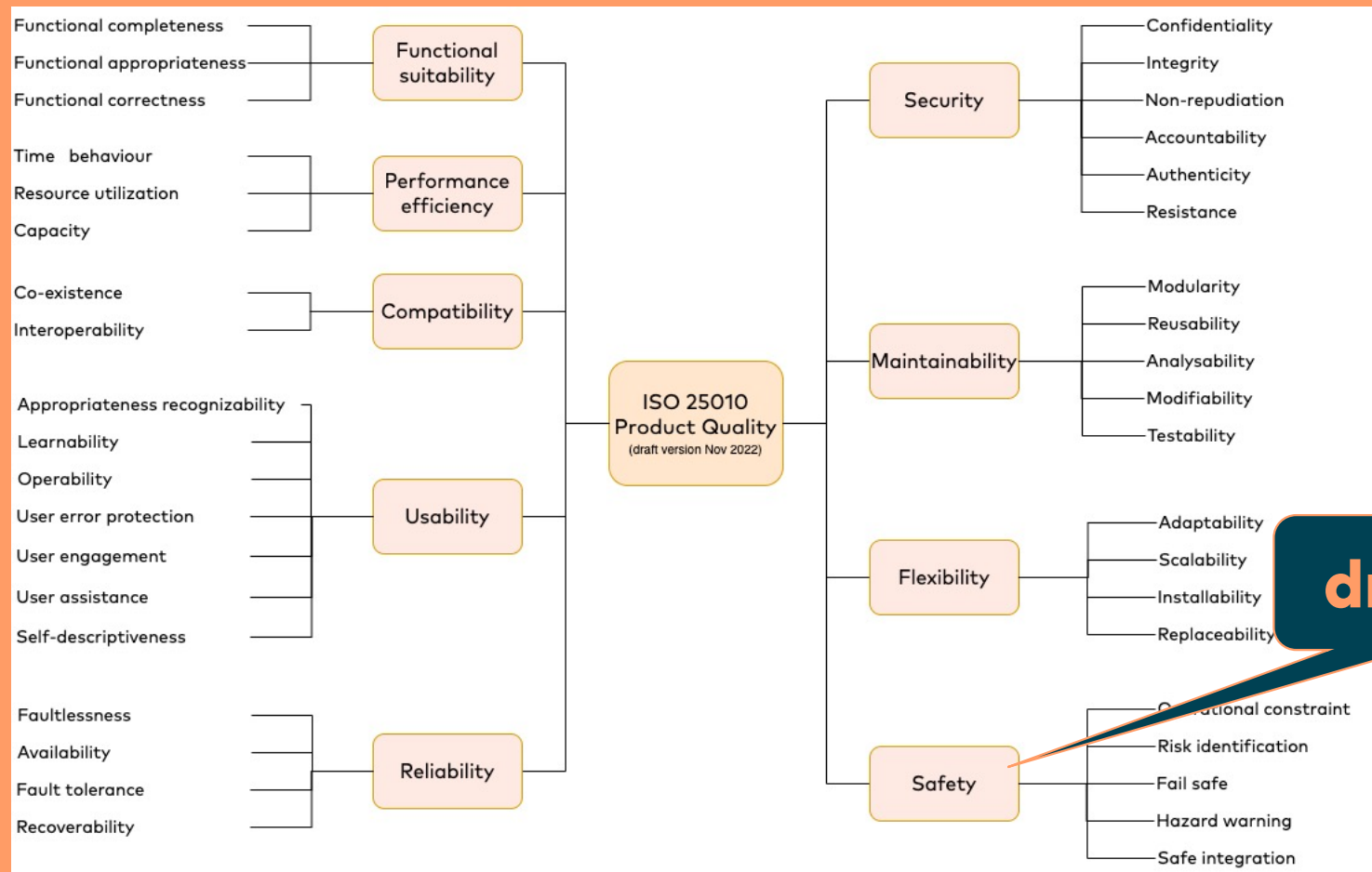
2503n Quality Requirements Division	
25030: Quality Requirements Framework	166
2504n Quality Evaluation Division	
25040: Evaluation process	166
25041: Evaluation guides	187
25042: Evaluation modules (not available)	
25045: Evaluation module for recoverability	166
25050-25099 Extensions	
25051: Requirements for quality of Ready to Use Software Product	145
25052: Cloud services - Part 1: Quality model	92
25059: Quality model for AI systems	61
=====	2636 CHF

€2600



Qualitätsmodell ISO 25010

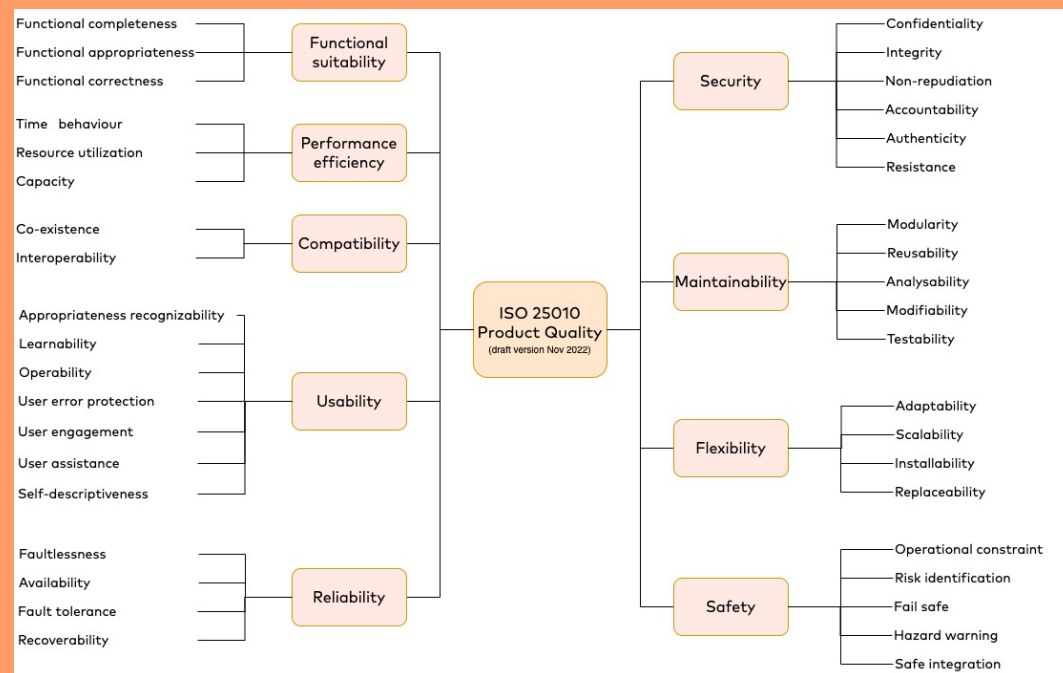
Nov. 2022



ISO 25010 einsetzen...

Begriffe („Dimension 1“) konkretisieren...

**aber: ISO 25010
enthält Definitionen**

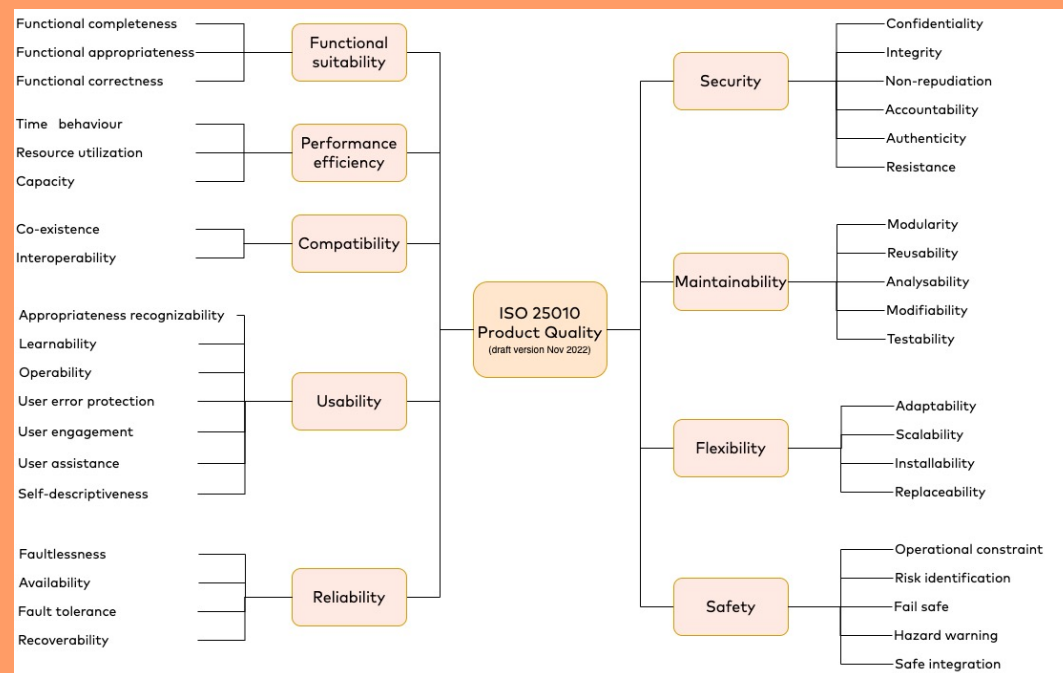


ISO 25010 einsetzen...

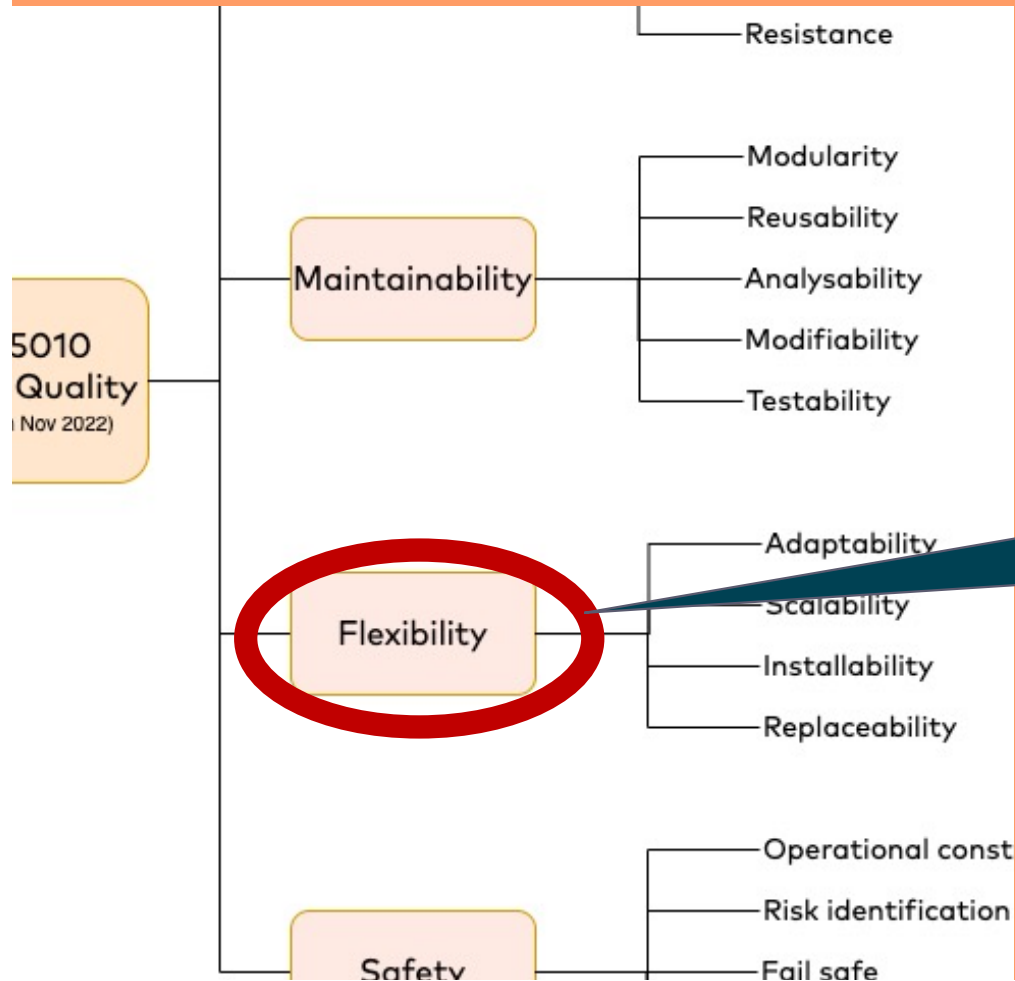
Stakeholder müssen Definitionen der ~40 Begriffe

1.) kennen &

2.) akzeptieren



Beispiel: Flexibility



Intuitive
Bedeutung?

Beispiel: Flexibility

- **User:**
Ist es zur Laufzeit anpassbar? (z.B. Layout)
- **Operation / DevOps:**
Ist es flexibel bezüglich Cloud-Provider oder OS?
- **Product Owner:**
Ist es gut erweiterbar?
- **Management:**
Ist es auch nach der nächsten Reorganisation verwendbar?

Beispiel: Flexibility

- **User:**
Ist es zur Laufzeit anpassbar? (z.B. UI, Konfiguration)
- **Operation / DevOps:**
Ist es flexibel bezüglich Provider oder OS?
- **Product Owner:**
Ist es gut erweiterbar?
- **Management:**
Ist es auch nach der nächsten Reorganisation verwendbar?

**ein Begriff,
vier
Interpretationen!**

Flexibility, konkreter

Energy is supplied by a rechargeable onboard battery, that is provided by one of several external suppliers.

The system shall be compatible with battery models provided by the five preferred battery suppliers.

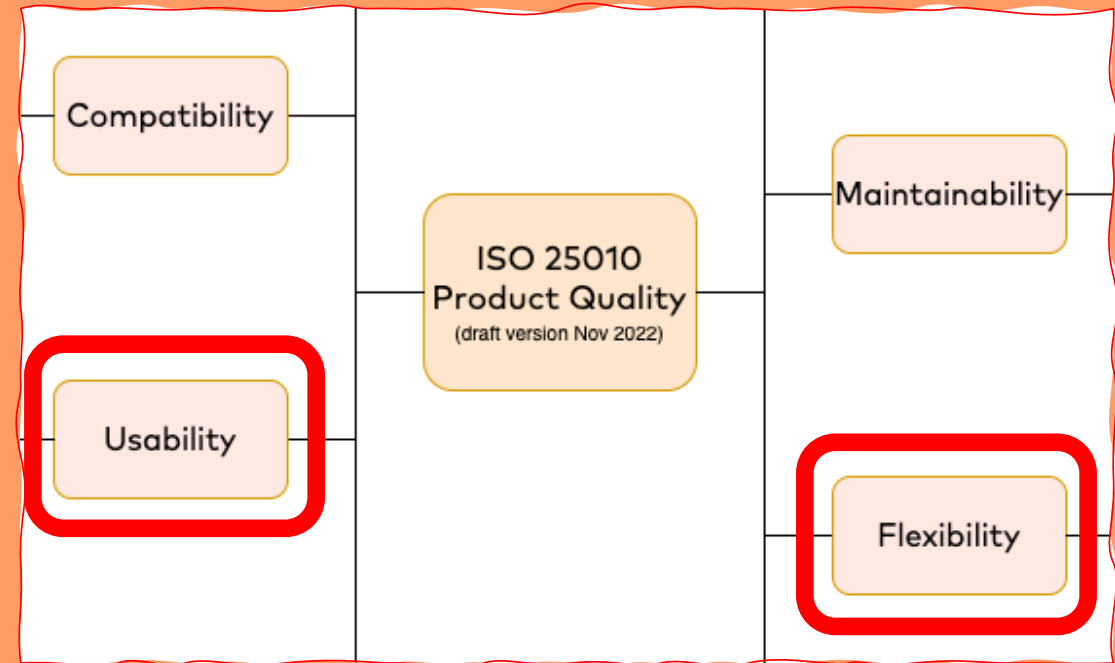


Konkret,
messbar,
testbar

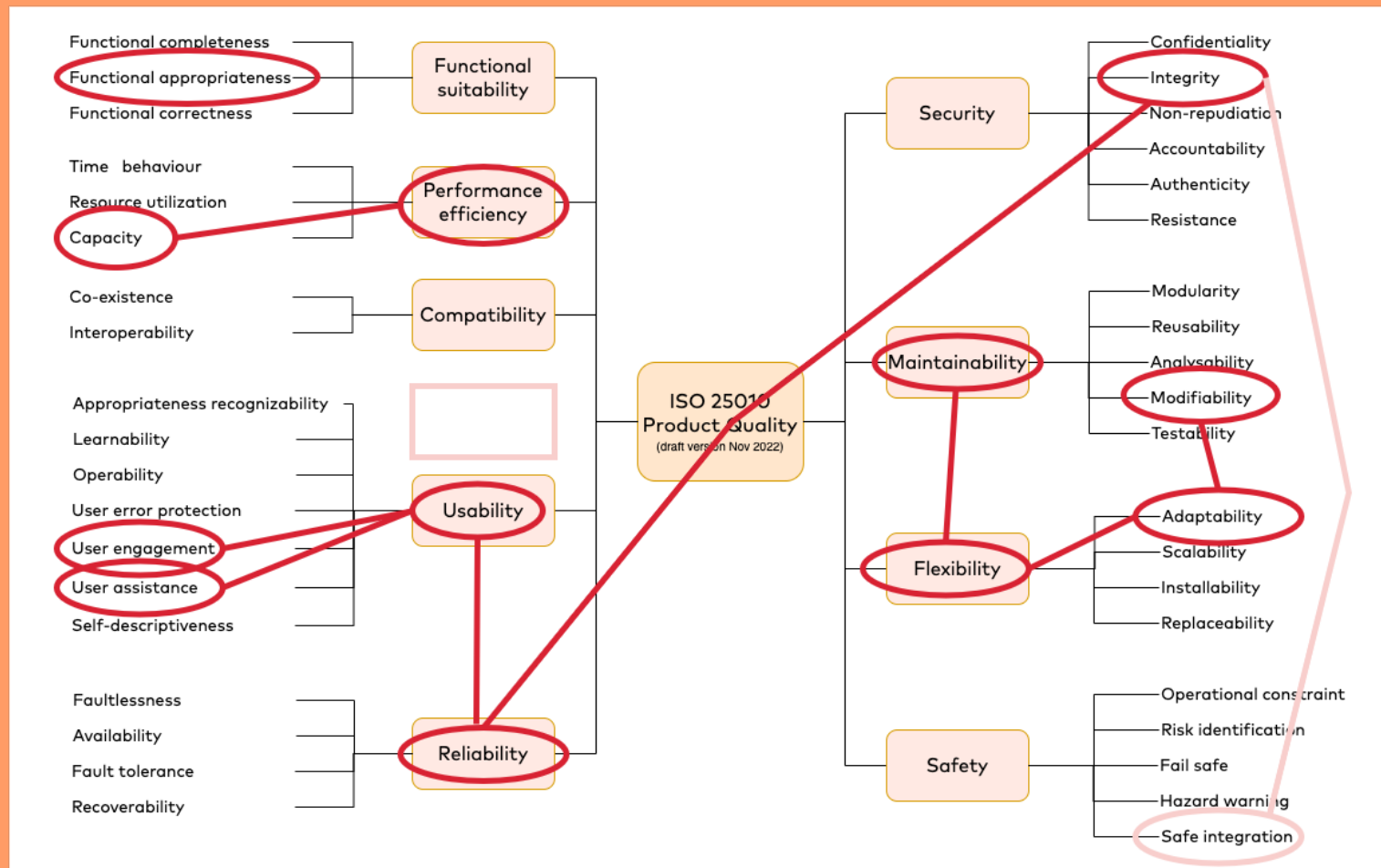
Flexibility, konkret, aber:

Users can change
(customize or configure)
the UI theme at runtime.

Wozu
gehört's?



Qualitätsmodell ISO 25010



Problem



**Handeln statt
jammern!**

INNOQ

arc42 Quality Model



<https://quality.arc42.org>

Ziele von Q42

**Dimension 2:
Ausprägungen**

**konkrete
Beispiele
direkt nutzbar**

**„alle“
Begriffe
erklärt**

**Dimension 1:
Eigenschaften**

arc42 Quality Model



arc42 Quality Model

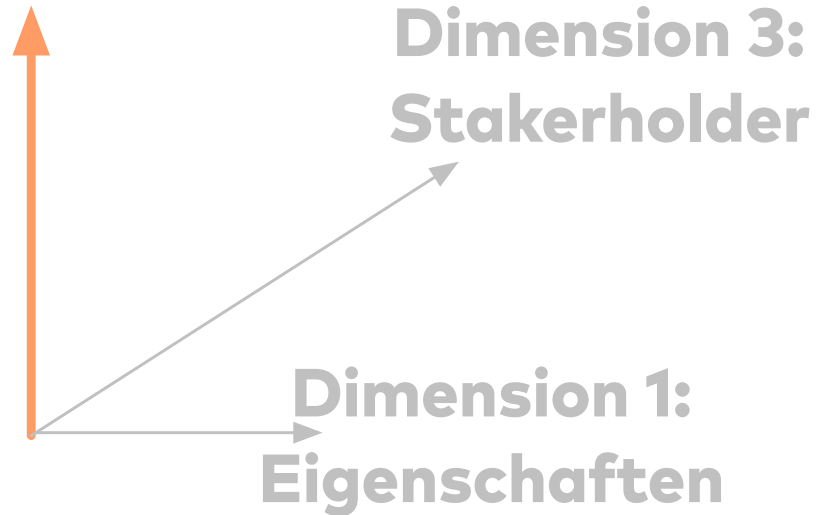
145 quality attributes, explained.

78 examples of quality requirements.

<https://quality.arc42.org>

Dimension 2

Dimension 2: Ausprägungen



...	...	...	Extern	...
Vanille	Soja- milch	Flat White	Vollautomat	96°C
Karamell	Hafer- milch	Cappuchino	Siebträger	
Kokos	Zucker	Cortado	Kapseln	
nussig	Sahne	Espresso	FrenchPress	
bitter	Milch	Ristretto	Filter	25°C
Geschmack	Zutaten	Zubereitung	Produktion	Temperatur



Dimension 2: Beispiele



arc42 Quality Model

145 quality attributes, explained.

78 examples of quality requirements.

Examples of Quality Requirements

Here you find some examples of  *quality requirements* sorted by the  *properties* they are related to, with *related qualities* listed below each requirement.

Within the Software Engineering literature you might find the term “quality scenario” for such examples. That term was coined by authors from the Software Engineering Institute (SEI), especially [Len Bass et al.](#)

Read more on the [background of requirements](#) in our short article.

efficient ²⁶

flexible ¹¹

operable ¹⁴

reliable ²¹

safe ²

secure ¹⁰

suitable ¹³

usable ²²

usable ²²

Vorgehen (inside-out)

**von 8
Oberbegriffen
ausgehen**

#reliable

#flexible

#efficient

#usable

#safe

#secure

#suitable

#operable

by arc42 - 2023

**Ausprägungen
durch Beispiele
erläutern**

**konkrete / spezifische
Qualitätsanforderungen**

Inside-out

**8 wesentliche
Oberbegriffe**

**> 140 mögliche
Eigenschaften**

#reliable

#flexible

#efficient

#usable

#safe

#secure

#operable

#suitable

flexibility, precision, traceability, coherence, faultlessness, recoverability, performance, compatibility, learnability, interface, confidentiality, conciseness, reusability, functionality, understandability, mean, integration, safe, deployment, error-protection, configurability, aesthetics, capacity, authenticity, devops-metrics, accountability, accuracy, risk, dependability, user-engagement, user-assistance, identification, backward-compatibility, maintainability

integrity, accessibility, appropriateness, recognizability, installability, testability, interoperability, self-descriptiveness, co-existence, security, resistance, completeness, appropriateness, adaptability, portability, utilization, analysability, non-repudiation, consistency, latency, tolerance, correctness, replaceability, experience, reliability, isolation, deployability, change-rate, modifiability, availability, degradation, modularity, lead, warning, behaviour, operational, constraint, operability, efficiency, suitability

Vorgehen (outside-in)

von spezifischem
Begriff ausgehen.

Ausprägungen
durch
erlö

Easily understandable generated code

💡 #efficient #usable #suitable

Stimulus: A developer has created a new test case in xml.

Reaction: The code generator creates a source code file.

Metric: A human tester can understand the generated test and enhance it with additional tests or test-data within max 30 minutes.

Background: Test cases for a system are described in a (semi-)formal xml-based language and automatically converted into Java, Kotlin or Groovy source code. This code is later adjusted or enhanced by developers or testers.

understandability

recovery usability
safety frequency scalability
flexibility preciseness traceability
coherence faultlessness recover
performance compatibility learna
functionality confidentiality concise
safe deployment error protection configur
capacity authenticity devops-metrics account
risk dependability user-engagement user-
identification backward-compatibility ma
integrity accessibility appropriateness-recognizak
testability interoperability self-descriptiveness

Q42 - Qualitätsmodell

>70 Beispiele

8 wesentliche
Eigenschaften



arc42 Quality Model

145 quality attributes, explained.

78 examples of quality requirements.

Examples of Quality Requirements

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efficient ²⁶

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suitable ¹³

usable ²²

usable ²²

Beispiele...

Examples of Quality Requirements

Here you find some examples of quality requirements. Within the Software Engineering literature you might find the term “quality scenario” for such examples. That term was coined by authors from the Software Engineering Institute (SEI), especially [Len Bass et. al.](#)

Read more on the [background of requirements](#) in our short article.

efficient ¹⁷

flexible ⁷

operable ¹⁰

reliable ⁸

safe ²

secure ⁶

suitable ⁴

usable ¹⁴

#efficient

- Consistent keyboard shortcuts
- Easily understandable acceptance test cases
- Easily understandable generated code
- Efficient change of business rules

gruppiert nach
„tags“

Beispiele ...

Employee attempts to modify pay rate

 #secure



Stimulus: A disgruntled employee at a remote location attempts to improperly modify the pay rate during normal operation.

Response: The unauthorized access is detected and the system maintains an audit trail.

Measure: The correct data is restored within one day.

Source: Bass et. al, 2022

... Tendenz steigend!

Ziel: >150

efficient ²⁶

flexible ¹¹

operable ¹⁴

reliable ²¹

safe ²

secure ¹⁰

suitable ¹³

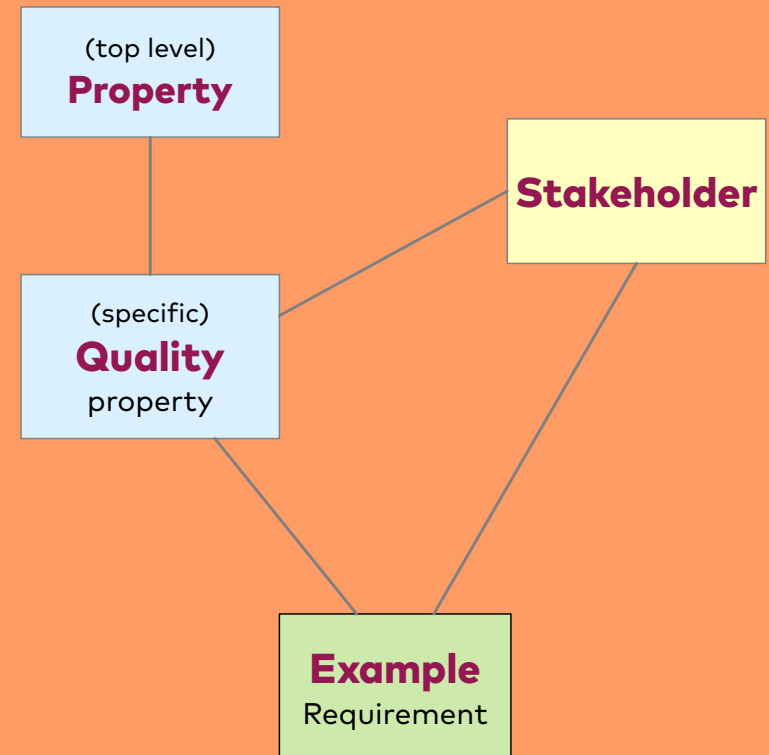
usable ²²

... Begriffe

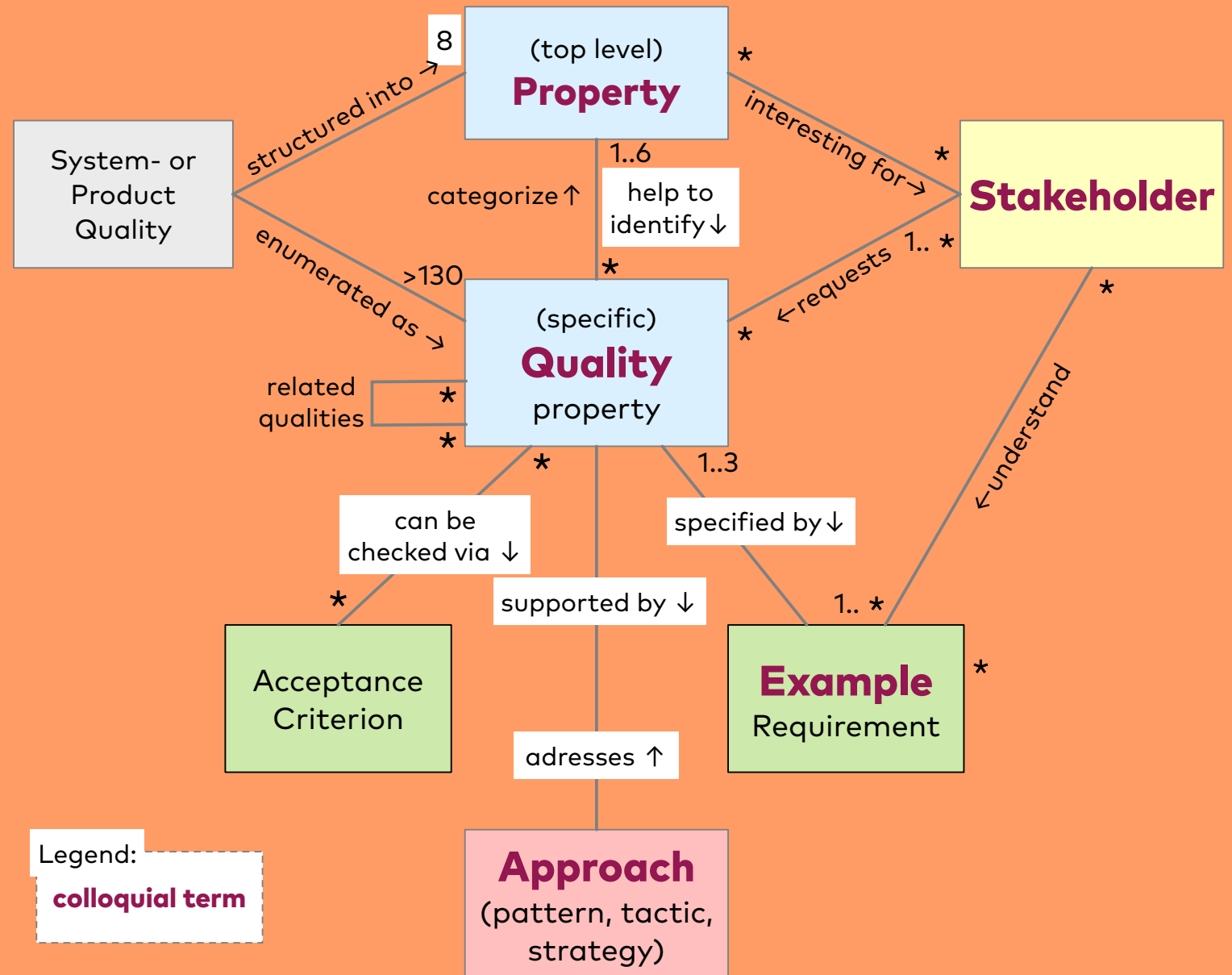
**Dimension 2:
Examples &
Acceptance Criteria**

**Dimension 3:
Stakeholder**

**Dimension 1:
Properties & Qualities**



Metamodell



Ausblick...

- **iSAQB Arbeitsgruppe zum Thema**
- **Abgleich mit iREB und RE-Forschung**
- **Feedback aus Projekten sammeln** 
(pull-requests willkommen)
- **Mehr Beispiele sammeln**

Q42 - Qualitätsmodell



HELP
WANTED

Fazit

**Explizit das
„gut genug“
erklären**

**funktioniert
bei mir**

Thankx

Gernot Starke

gernot.starke@innoq.com

Twitter: @gernotstarke

INNOQ
www.innoq.com