Bridging the gap
Requirements Engineering meets Usability Engineering

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- Usability and user experience
- Human-centred quality versus technology-centred quality
- Human-centred design process
- User requirements versus system requirements
- User requirements and user experience requirements
- Certified Professional for User Requirements Engineering
Speaker

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- Full-time usability engineer and requirements engineer since 1993
- Founder and president of the International Usability and User Experience Board (UXQB)
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- Deputy head of ISO committee “Software Ergonomics”
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The concept of usability

ISO 9241-11 “Guidance on usability”

Effectiveness

- Accuracy and completeness with which users achieve specified goals.

Efficiency

- Resources expended in relation to the accuracy and completeness with which users achieve goals.

Satisfaction

- Freedom from discomfort, and positive attitudes towards the use of the product.

ISO 9241-110 “Dialogue principles”

- Suitability for the task
- Self descriptiveness
- Conformity with user expectations
- Suitability for learning
- Controllability
- Error tolerance
- Suitability for individualization

ISO 9241-11
ISO 9241-110

- ISO 9241-11 “Guidance on usability”
- ISO 9241-110 “Dialogue principles”

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User experience and usability interplay

User Experience
“person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service“ (ISO 9241-210)

- Anticipated use
  - Perceptions about a product
  - Before having used it (or even purchased it)

- Actual use
  - Task completion is
  - effective
  - efficient
  - satisfactory
  - Identification with the product
  - (or development of a negative attitude)

- Digested use
  - Perceptions and responses resulting from use, i.e.

Usability (ISO 9241-11)

User Experience (ISO 9241-210)
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Usability and user experience as part of quality

Human-centred quality (actively perceived by the customer)
(ISO/DIS 9241-220)

- Usability
- Accessibility
- User Experience
- Avoidance of harm from use

Technology-centred quality (assumed by the customer)
(ISO/IEC 25010)

- Functional Appropriateness
- Performance efficiency
- Compatibility
- Reliability
- Security
- Maintainability
- Portability

“Above the hood”

“Under the hood”
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Human-centred design process (ISO 9241-210)

1. Plan the human-centred design process
2. Specify the user requirements
3. Produce design solutions to meet user requirements
4. Evaluate the designs against requirements
5. Understand and specify the context of use
6. Designed solution meets user requirements
7. Iterate, where appropriate
8. Specify the user requirements

(Flowchart diagram showing the iterative process of human-centred design.)
Definition Context of use

Context of use

Users, tasks, resources (equipment and material), and the physical and social environments in which a product is used.

(ISO 9241-210)
Context of use > User needs > User requirements

Source: ISO/IEC CD 25065 „User requirements specification“
Translating user needs into user requirements

**Context of use:**
Users, tasks, resources, environment

**Context of use (example):**
Many citizens avoid taxis, since they cost more than public transport. Sometimes these people take taxis when they are in a group.

**User needs statement:**
„The <user group> needs <resource or information> in order to <make decision / act / react>.

**User needs statement (example):**
The potential taxi guest needs to know, how much a taxi would actually cost (before taking the taxi), in order to decide, which means of transport to take.

**User requirement(s)**

With the system the user shall be able to see/overview?

With the system the user shall be able to select?

With the system the user shall be able to input?

With the system the user shall be able to see the costs of a taxi ride to a specific location.

With the system the user shall be able to select a target destination.

With the system the user shall be able to input the maximum amount willing to contribute for a shared ride.
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Integrating user requirements with other requirements

Stakeholder requirements:
- Legal and regulatory requirements
- Market requirements
- Organizational requirements
- Requirements on the quality of output
- User requirements

System requirements

Stakeholder:
- Legislator
- Buyer / Purchase decision maker
- Management of the organization
- Indirect user
- Direct user

User requirements:
- System requirements

Stakeholder requirements:
- Stakeholder:
  - Legislator
  - Buyer / Purchase decision maker
  - Management of the organization
  - Indirect user
  - Direct user

Legal and regulatory requirements

Market requirements

Organizational requirements

Requirements on the quality of output

User requirements

System requirements
User requirement:

A statement of what users shall be able to recognize, select or input as part of conducting a task with the interactive system.

Source: Curriculum and Glossary for the “Certified Professional for Usability and User Experience”, www.uxqb.org

User requirements are always based on one or more user needs. They describe what the user shall be able to “do” with the system in order to satisfy one (or more) user needs.

Directions on how to formulate user requirements:

- The user shall be able to recognize / overview <information> with the system.
- The user shall be able to select <information or resource> with the system.
- The user shall be able to input <information or resource> in the system.

A condition can be added (optional).

Example: “Before opening the dish washer (condition) the user shall be able to recognize if the dish washer contains cleaned dishes only (information)”.
Specific case „User experience requirement“

User experience requirement:

A statement of a **perception or response that users shall have** as part of performing a task with the interactive system.

Source: ISO/IEC 25065 (working draft)

Directions on how to formulate user experience requirements:

**Syntax:**
The user **shall have <specific perception/reaction>** when using the system.
A condition can be added (optional).

**Example:**
“The user shall experience a sense of enjoyment, when being woken up by the alarm clock.”
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“Condition or capability that must be met or possessed by a system, system component, product, or service to satisfy an agreement, standard, specification, or other formally imposed documents”


Stakeholder requirements
Stakeholder requirements describe the needs, wants, desires, expectations and perceived constraints of identified stakeholders.
(Source: ISO IEC 15288:2008, clause 6.4.1.3)

System requirements
specify, from the supplier’s perspective, what characteristics the system is to possess and with what magnitude in order to satisfy stakeholder requirements.
(Source: ISO IEC 15288:2008, clause 6.4.2.1)
User requirements versus system requirements

Case study “Boiling eggs with an automatic egg boiler”

The following example demonstrates the difference between a user requirement and a system requirement, considering an automatic egg boiler.

User requirement

“The user shall be able to select how many eggs are to become hard-boiled, how many medium-boiled, and how many soft-boiled.”

System requirement

“The egg boiler must be able to determine the temperature in the middle of the yolk for each egg over time.”
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User Requirements Engineering
CPUX-UR

Usability Testing and Evaluation
CPUX-UT

Interaction Specification, Information Architecture and Prototyping
CPUX-IIP

User Experience Management
CPUX-M

CPUX Advanced Level
Certified Professional for Usability and User Experience

UXQB Certified Professional User Experience
Foundation Level (CPUX-F)
Conclusions

- Usability Engineering strictly focusses on analysis and implementation of user requirements (for human-centred quality)
- User requirements are a particular type of stakeholder requirement
- Identifying user requirements systematically requires skill in context-of-use analysis and user needs analysis
- UXQB delivers the curriculum for professional User Requirements Engineering