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Methoden zur Normenkonformitätsprüfung im Rahmen von ISO 9241

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Usability Methods

Usability inspection is the name of a set of highly cost-effective methods for finding usability problems and improving the usability of a user interface design by inspection.

Topics to be covered include...

- **Definition of usability inspection,**
- the heuristic evaluation method,
- other inspection methods.
- Relation between usability inspection methods and user testing.
- Severity of usability problems found by usability inspection.
- Cost-benefit characteristics of usability inspection methods.
- Positioning inspection in the usability engineering lifecycle.

Evaluation

Assessing the usability of an existing design

- finding usability problems (to fix them)
- formative evaluation: improve interface, find good/bad parts
- summative evaluation: are goals met?

Only one part of the usability engineering lifecycle (task analysis, goal setting, design, prototyping, iteration, field studies, etc.)
Inspection methods

• **pluralistic walkthrough** [Bias 1991]
  – define a scenario (linear path through interface)
  – get users, designers/developers, usability specialists in one room
  – show user interface one screen at a time (e.g., overheads)
  – have participants write down problems before discussion
  – discuss the screen (let users speak first)
    {may use designer/developer as 'living manual' for early help}

• **standards inspection** [Wixon, Jones, Tse & Casaday 1994]
  – have a standard expert inspect interface for compliance
    {may cover most of standards without much task knowledge}

• **consistency inspection** [Wixon, Jones, Tse & Casaday 1994]
  – team of designers/developers (one from each project) inspects a set of
    interfaces
    for more than one system/application, one at a time

• **feature inspection** [Bell 1992]
  – imagine typical user task
  – list sequence of features used to accomplish the task
  – check for long sequences, cumbersome steps, additional knowledge, etc.

• **cognitive walkthrough** [Polson, Lewis, Rieman & Wharton 1992]
  – imagine typical user task
  – use the system to perform the task, 'defining' the correct solution sequence
  – hand-simulate user's problem solving process at each step
  – check if user's goal/memory leads to the defined solution sequence

• **quantitative metrics** [Rauterberg 1994]
Evaluation methods

- **highly informal evaluation: heuristic evaluation**
  Look at interface and make lists of its problems [Nielsen and Molich 1990]:
  - according to checklist of established usability heuristics
  - may also apply any additional usability knowledge
  Two or more passes through interface:
  - inspect flow of interface
  - inspect each screen (dialog box, system message, etc.), one at a time
  Typical session length: 1–2 hours.
  May use observer to help evaluator and note problems mentioned.
  Afterwards: aggregate lists of problems from multiple evaluators

- **informal evaluation: usability inspection**
  Goals to be met in a somewhat systematic way:
  - generate list of usability problems (main goal)
  - contribute to building design rationale (artifact inspection)
  - provide feedback in design courses [Nielsen et al. 1992]
  - evolve a parallel design [Nielsen 1993]
  Tools support for inspection:
  - mostly none
  - online forms for cognitive walkthroughs [Lewis et al. 1992]
  - online/hypertext guidelines/standards documents
  - CSCW tools for team heuristic evaluations
  (show panel to be discussed for annotation/drawing/pointing)

- **structured evaluation: usability tests**
Frage:
Gibt es Methoden zur Normenkonformitätsprüfung im Rahmen der ISO 9241?

Antwort:
Nein!

Begründung:
Die ISO 9241 enthält keine ge-"normten" Metriken mit zugehörigen Grenzwerten.

Was nun?
## Methoden zur Qualitätssicherung

Die Methoden zur Qualitätssicherung umfassen verschiedene Ansätze, die unterschiedlich auf den Benutzer abstellen:

<table>
<thead>
<tr>
<th>virtuell</th>
<th>real</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>formaler Ansatz:</strong> formale Theorie</td>
<td><strong>benutzer-zentriert:</strong> Fragebogen, Interview, Mock-ups</td>
</tr>
<tr>
<td><strong>produkt-zentriert:</strong> Experten Evaluation</td>
<td><strong>interaktions-zentriert:</strong> Usability-Test</td>
</tr>
</tbody>
</table>

Die virtuellen Ansätze sind interaktions-zentriert, produkt-zentriert, benutzer-zentriert, während die realen Ansätze lediglich benutzer-zentriert sind.

### Aufwand und Kosten

Die virtuellen Methoden erfordern weniger Reales aufwand und Kosten, während die realen Methoden einen höheren Aufwand und Kosten haben.
der produkt-zentrierte Meß-Ansatz

- Checklisten
- Experten-Evaluation
der benutzer-zentrierte Meß-Ansatz

• mündliche Befragung (Interview)
• schriftliche Befragung (Umfragen)
• Diskussionen (zB. in Workshops)
interaktions-zentrierter Meß-Ansatz

He!
Ich Chef - du Werkzeug!
Begreifen?

- aufgaben-orientierte Usability-Tests
- induktive Usability-Tests (formative evaluation)
- deduktive Usability-Tests (summative evaluation)
Modell-1

Auftraggeber  Software-Entwickler  BenutzerIn

Modell-2

Auftraggeber  Software-Entwickler  BenutzerIn

Usability-ExpertInnen

Modell-3

Auftraggeber  Software-Entwickler  BenutzerIn
Das Quadranten-Modell

[BOSS-Projekt, Rauterberg 1991]
ein formale Gestaltungs-Theorie

- Metriken
An abstract concept to describe usability aspects

function space FS

perceptible functions PF

[hidden] dialog functions HDFIP

perceptible application functions PAFIP

[hidden] application functions HAFIP

δ

α
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<thead>
<tr>
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<tr>
<td>USA.20742</td>
<td>Shneiderman</td>
<td>Ben</td>
</tr>
</tbody>
</table>
quantitative measure of "feedback":

\[
FB = \frac{1}{D} \sum_{d=1}^{D} \left( \frac{\#PF_d}{\#HF_d} \right) \times 100\%
\]

quantitative measure of "interactive directness":

\[
ID = \{ \frac{1}{P} \sum_{p=1}^{P} \min[lng(PATH_p)] \}^{-1} \times 100\%
\]

[visual] feedback (FB)

<table>
<thead>
<tr>
<th></th>
<th>low</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>low interactive directness (ID)</td>
<td>batch</td>
<td>menu interface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MI</td>
</tr>
<tr>
<td>high</td>
<td>command language</td>
<td>desktop style</td>
</tr>
<tr>
<td></td>
<td>CI</td>
<td>direct manipulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DI</td>
</tr>
</tbody>
</table>
The outcomes of nine (9) different comparison studies between command (CI) and menu (MI) interfaces.

"CI < MI" means that the average usage/preference with/for MI is better than with/for CI; "CI = MI" means that there are no published data to decide; "CI > MI" means that the average usage/preference with/for CI is better than with/for MI; "sig." means that $p \leq 0.05$; "not sig." means that $p > 0.05$

<table>
<thead>
<tr>
<th>Reference</th>
<th>Interface</th>
<th>Skill Level</th>
<th>Usability Metric</th>
<th>Outcome</th>
<th>Result</th>
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<tr>
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<td>CI, MI</td>
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<td>CI &lt; MI</td>
<td>sig.</td>
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<td>CI, MI, HY</td>
<td>beginner</td>
<td>preferences</td>
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<td>Roy (1992)</td>
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<td>advanced</td>
<td>error rate</td>
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<td>recognition errors</td>
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The outcomes of twelve (12) different comparison studies between command (CI) and direct manipulative (DI) interfaces.

"CI < DI" means that the average usage/preference with/for DI is better than with/for CI;
"CI = DI" means that there are no published data to decide;
"CI > DI" means that the average usage/preference with/for CI is better than with/for DI;
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</tr>
</tbody>
</table>
Contingency tables of a meta-analysis for all data

[Cell Content: observed frequency  (expected frequency)]

<table>
<thead>
<tr>
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<th>DI</th>
<th>Chi**</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI better as</td>
<td>7</td>
<td>2</td>
<td>5.52</td>
<td>1</td>
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<tr>
<td>CI worse as</td>
<td>12</td>
<td>23</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(3.9)</td>
<td>(5.1)</td>
<td></td>
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<tr>
<td></td>
<td>(15.1)</td>
<td>(19.9)</td>
<td></td>
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</tr>
</tbody>
</table>

\( p \leq 0.019 \)

Contingency tables only for significant differences

(SELECTION for "result" = "sig.").

[Cell Content: observed frequency  (expected frequency)]

<table>
<thead>
<tr>
<th></th>
<th>MI</th>
<th>DI</th>
<th>Chi**</th>
<th>df</th>
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</thead>
<tbody>
<tr>
<td>CI better as</td>
<td>4</td>
<td>1</td>
<td>4.07</td>
<td>1</td>
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<tr>
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<td>9</td>
<td>19</td>
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<tr>
<td></td>
<td>(2.0)</td>
<td>(3.0)</td>
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<tr>
<td></td>
<td>(11.0)</td>
<td>(17.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( p \leq 0.044 \)
quantitative measure of "dialog flexibility":

$$\text{DFD} = \frac{1}{K} \sum_{d=1}^{K} \#\text{HDFIP}_d$$

quantitative measure of "application flexibility":

$$\text{DFA} = \frac{1}{K} \sum_{d=1}^{K} \#\text{HAFIP}_d$$

performance

$$P$$

$$\text{Fl} = \text{DFA} + \text{DFD}$$
mentales Modell

Syntax und Semantik

Dialog-Struktur

Sicht der BenutzerIn ('von aussen')

Operator -> Operation -> Funktion

Sicht der SoftwareentwicklerIn ('von innen')
Zukunftsorientiert handeln!

Die EU-Bildschirmrichtlinie in der Praxis

Ergebnisse aus dem SANUS-Projekt

2. SANUS - Kongreß in Bad Honnef

- Tagungsunterlagen -

Herausgeber: Prof. Dr.Ing. Peter Kern
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