

Methoden zur Konformitätsprüfung im Rahmen der ISO 9241

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Methoden zur Normenkonformitätsprüfung im Rahmen von ISO 9241

Matthias Rauterberg

Forschungsgruppe "Mensch-Maschine Interaktion"
Institut für Hygiene und Arbeitsphysiologie
Eidgenössische Technische Hochschule Zürich

Anschrift:

Dr. M. Rauterberg

IHA-ETHZ

Clausiusstrasse 25

CH-8092 Zürich

Schweiz

Tel: 0041-1-632 7082

Fax: 0041-1-632 1173

Email: rauterberg@iha.beprethz.ch

Internet: <http://www.iha.beprethz.ch/pages/forschung/MMI/MMI.HTM>

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.

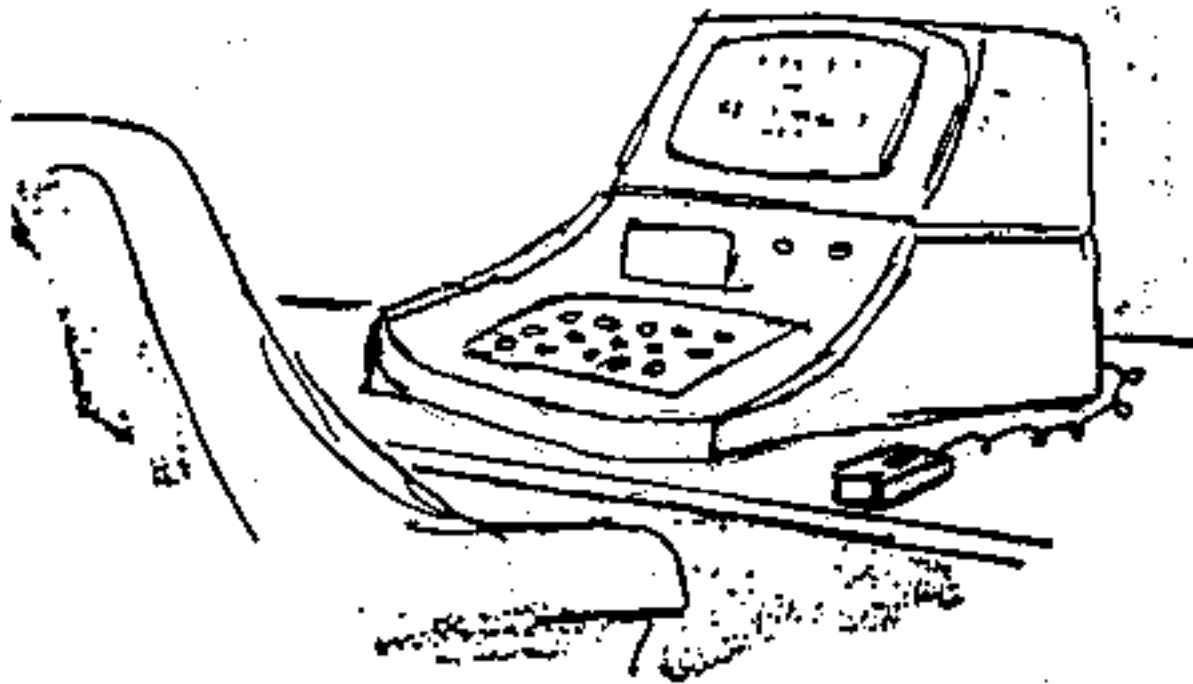
Was nun?

Methoden zur Qualitätssicherung

Benutzer
vorhanden...

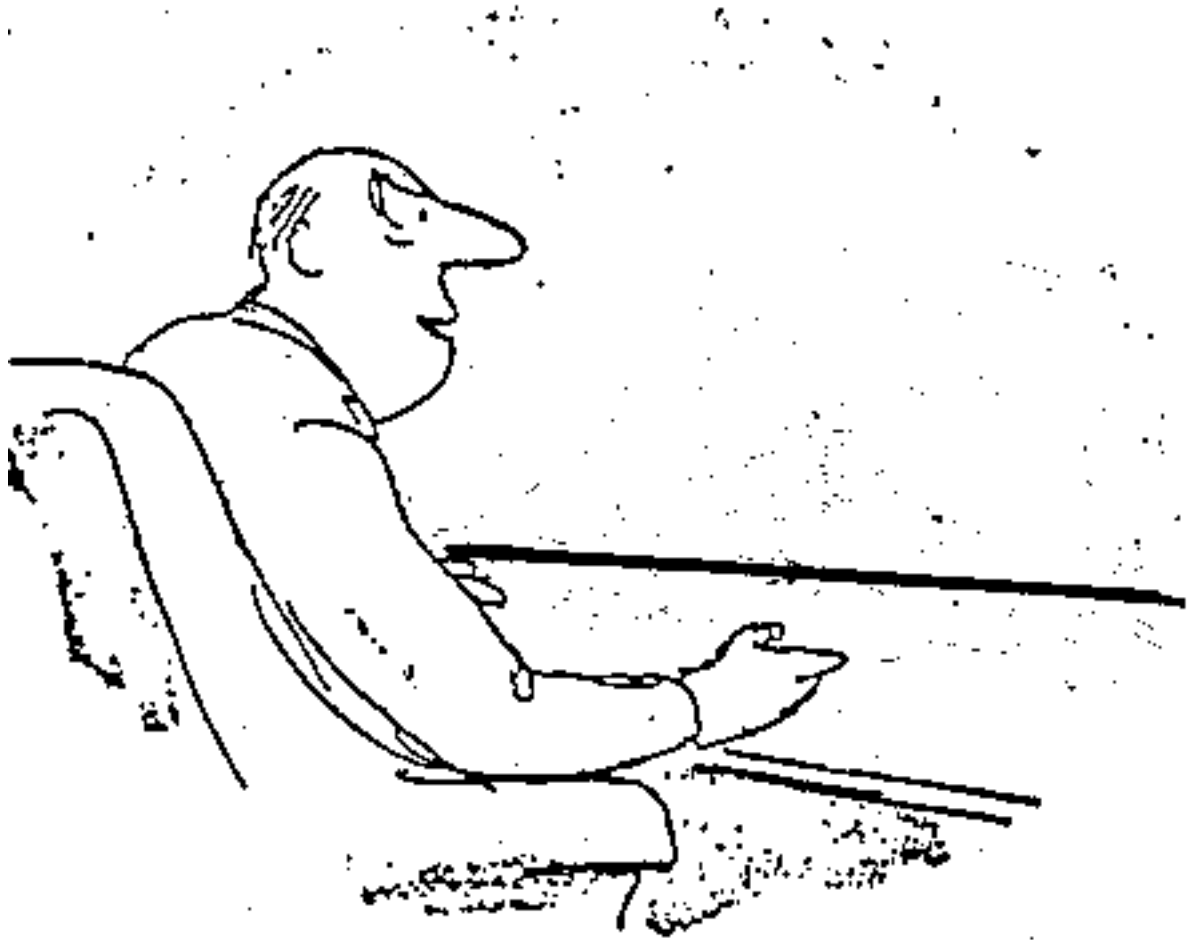
		virtuell	real	
Computer vorhanden...	virtuell	formaler Ansatz: formale Theorie	benutzer-zentriert: Fragebogen, Interview, Mock-ups	ökologische Validität
	real	produkt-zentriert: Experten Evaluation	interaktions-zentriert: Usability-Test	
		Aufwand und Kosten		

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

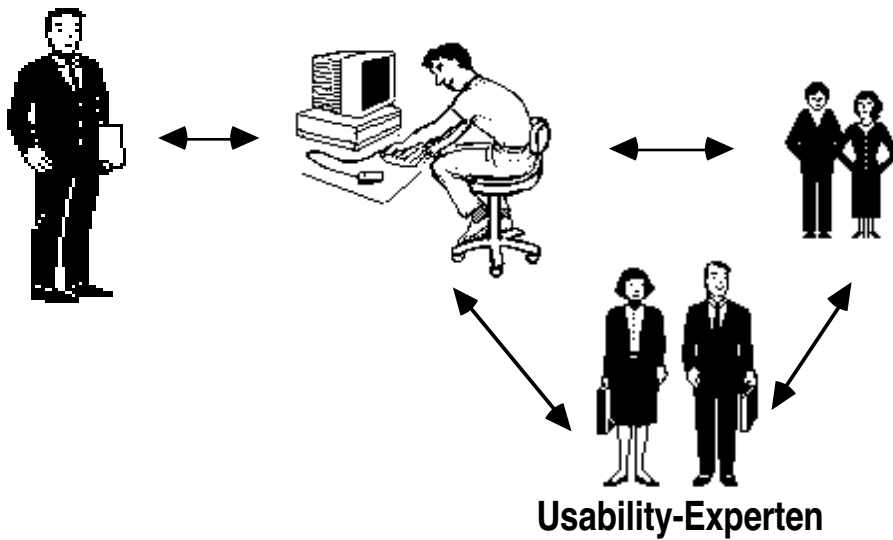


Modell-2

Auftraggeber

Software-Entwickler

BenutzerIn



Modell-3

Auftraggeber

Software-Entwickler

BenutzerIn

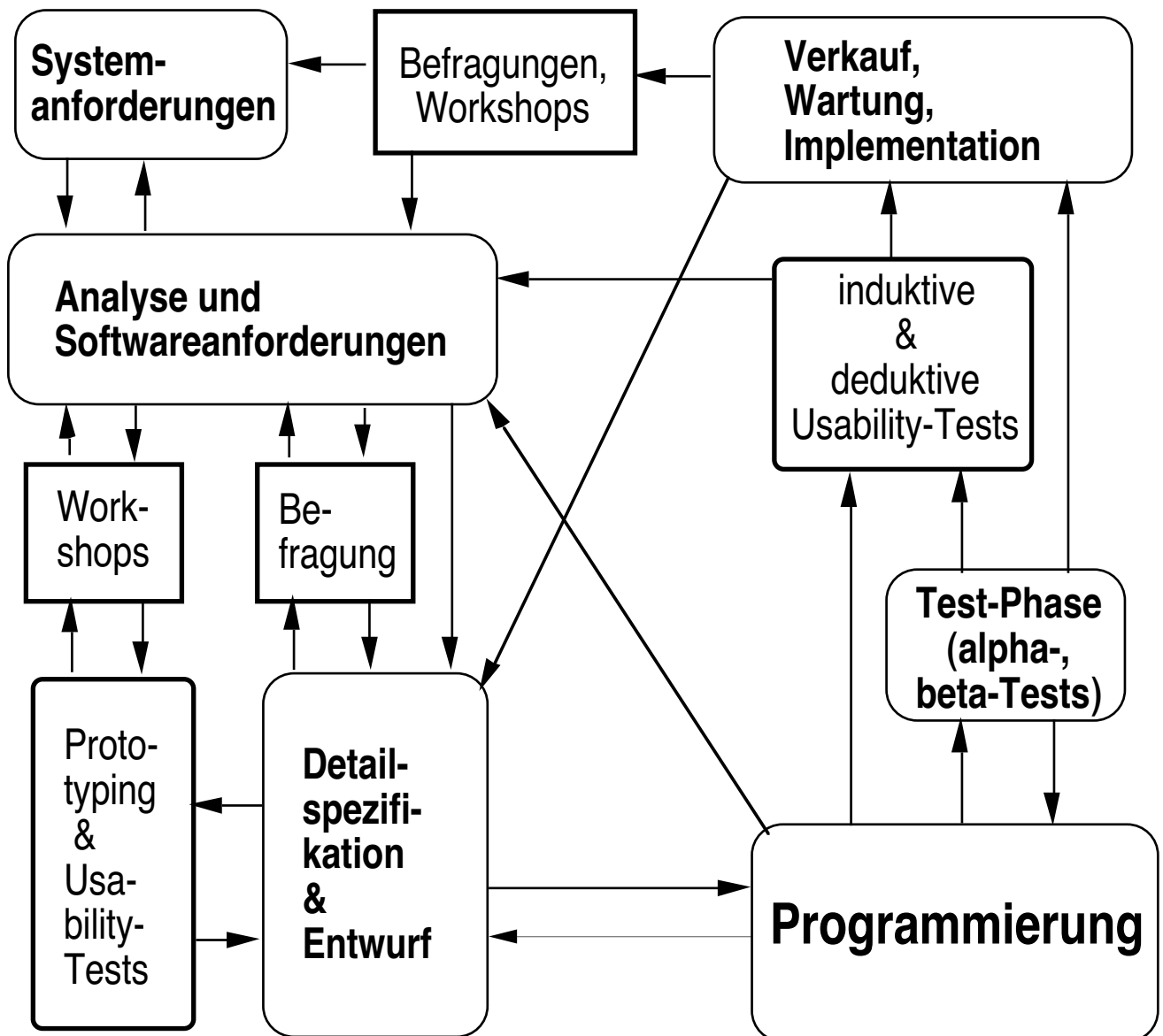


Das Quadranten-Modell

[BOSS-Projekt, Rauterberg 1991]

Quadrant-I: Analyse

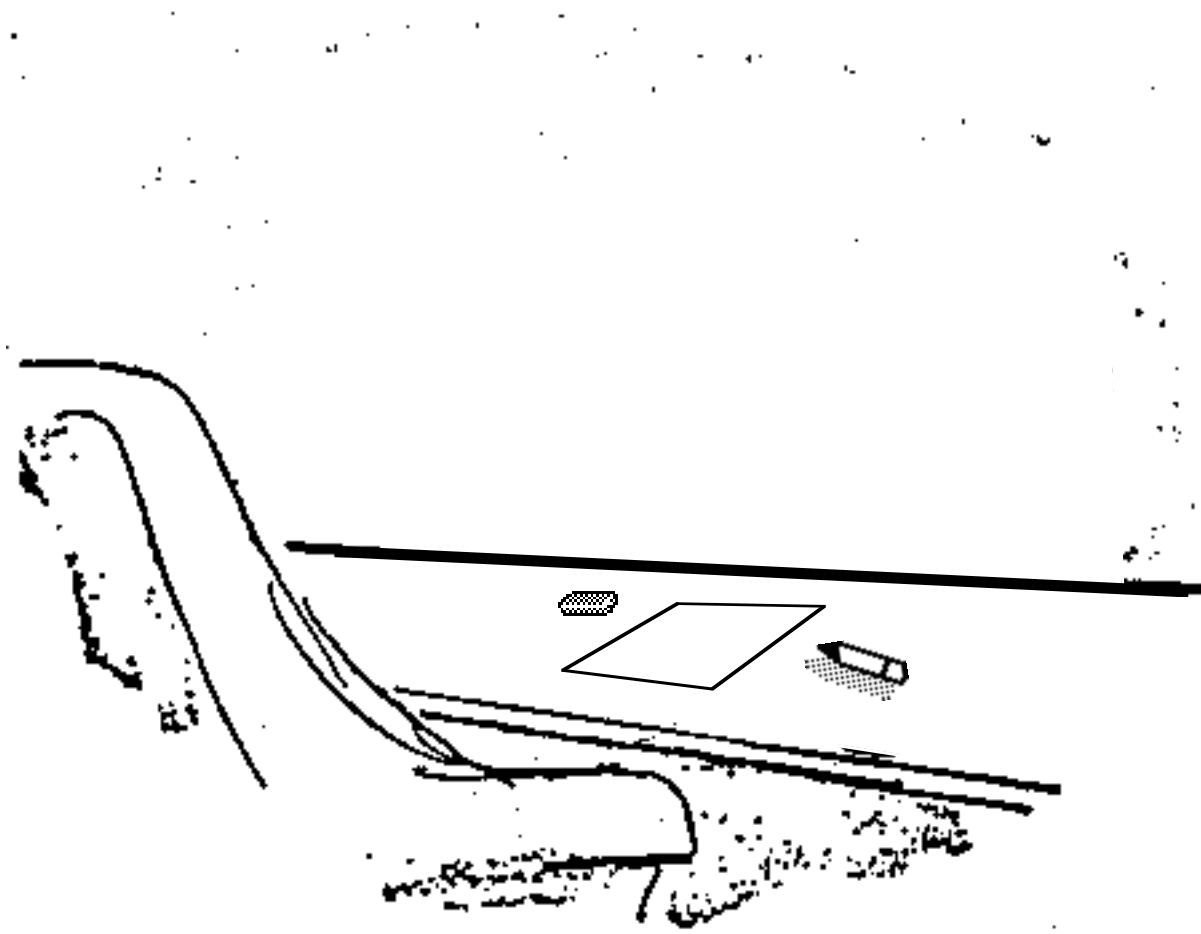
Quadrant-IV: Benutzung



Quadrant-II: Entwurf

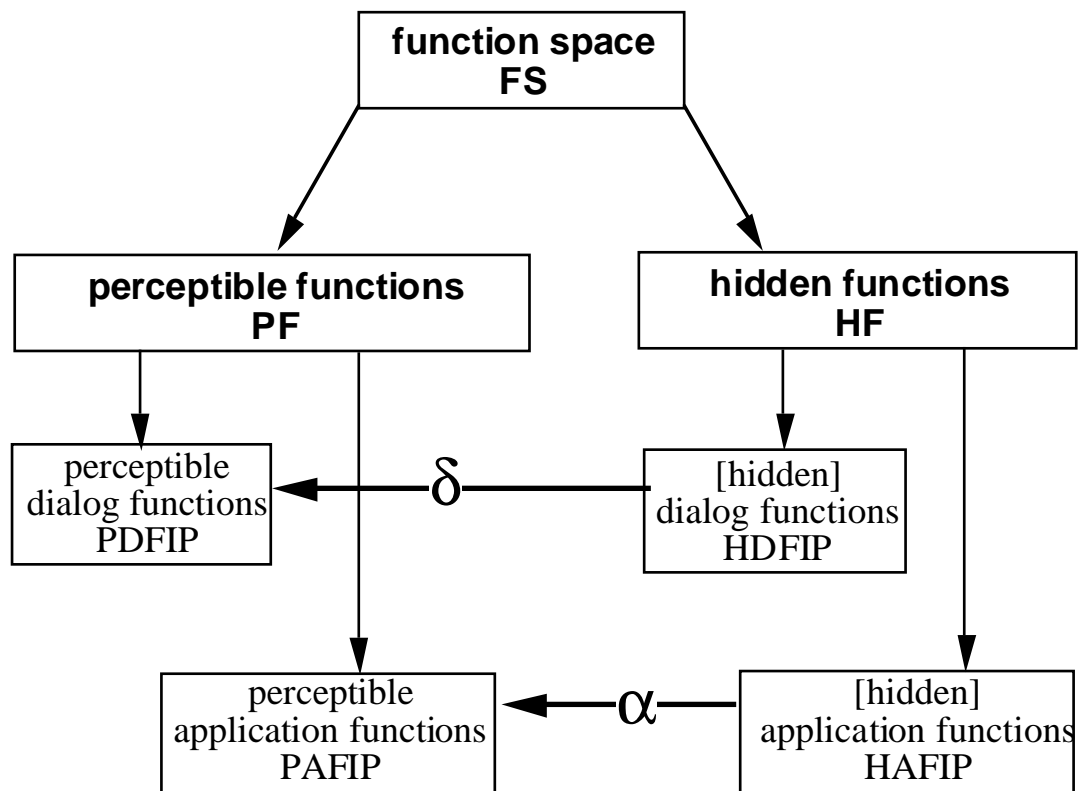
Quadrant-III: Realisierung

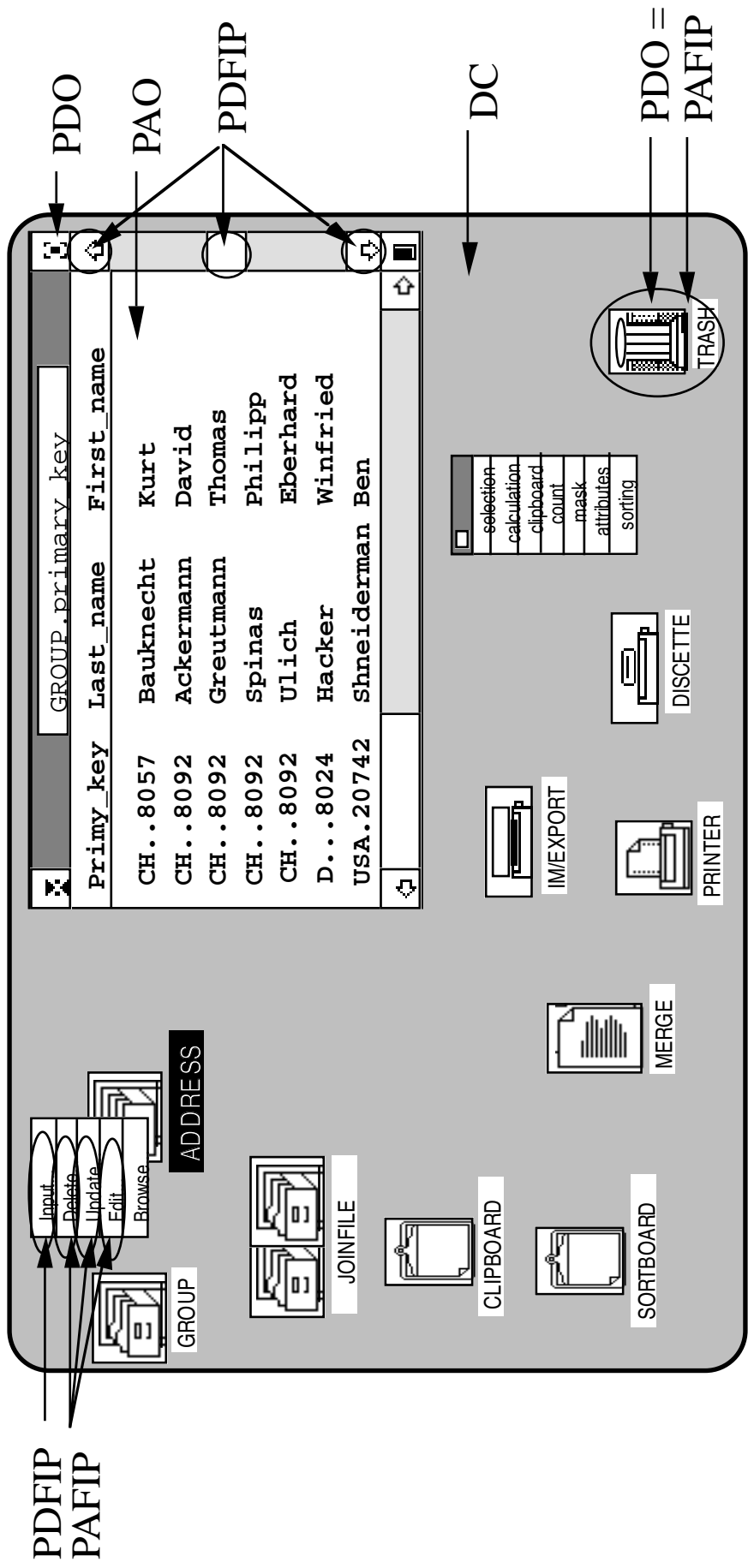
ein formale Gestaltungs-Theorie



- Metriken

An abstract concept to describe usability aspects





quantitative measure of "feedback":

$$FB = 1/D \sum_{d=1}^D (\#PF_d / \#HF_d) * 100\%$$

quantitative measure of "interactive directness":

$$ID = \{1/P \sum_{p=1}^P \min[\ln g(PATH_p)]\}^{-1} * 100\%$$

[visual] feedback (FB)

		low	high
interactive directness (ID)	low	batch	menu interface MI
	high	command language CI	desktop style direct manipulation DI

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 $p > 0.05$

Reference	interface	skill level	usability metric	outcome	result
Streitz et al. (1987)	CI, MI	beginner	task solving time	CI < MI	sig.
Chin et al. (1988)	CI, MI	beginner	subjective rating	CI < MI	sig.
Ogden & Boyle (1982)	CI, MI, HY	beginner	preferences	CI < MI	sig.
Roy (1992)	CI, MI	advanced	error rate	CI < MI	sig.
Roberts & Moran (1983)	CI, MI, DI	experts	task solving time	CI < MI	sig.
Chin et al. (1988)	CI, MI	experts	subjective rating	CI < MI	sig.
Peters et al. (1990)	CI, MI, DI	experts	slips	CI < MI	sig.
Peters et al. (1990)	CI, MI, DI	experts	recognition errors	CI < MI	sig.
Peters et al. (1990)	CI, MI, DI	experts	efficiency	CI < MI	sig.
Ogden & Boyle (1982)	CI, MI, HY	beginner	task time	CI < MI	not sig.
Roy (1992)	CI, MI	advanced	task solving time	CI < MI	not sig.
Antin (1988)	CI, MI, KMI	advanced	subjective rating	CI < MI	not sig.
Hauptmann & Green (1983)	CI, MI, NO	beginner	task solving time	CI = MI	not sig.
Hauptmann & Green (1983)	CI, MI, NO	beginner	number of errors	CI = MI	not sig.
Hauptmann & Green (1983)	CI, MI, NO	beginner	subjective rating	CI = MI	not sig.
Whiteside et al. (1985)	CI, MI, IO	beginner	task completion rate	CI > MI	not sig.
Antin (1988)	CI, MI, KMI	advanced	preferences	CI > MI	not sig.
Roberts & Moran (1983)	CI, MI, DI	experts	error-free task time	CI > MI	not sig.
Whiteside et al. (1985)	CI, MI, IO	advanced	task completion rate	CI > MI	sig.
Streitz et al. (1987)	CI, MI	advanced	task solving time	CI > MI	sig.
Antin (1988)	CI, MI, KMI	advanced	task completion rate	CI > MI	sig.
Whiteside et al. (1985)	CI, MI, IO	experts	task completion rate	CI > MI	sig.

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;

"sig." means that $p \leq 0.05$; "not sig." means that $p > 0.05$

Reference	interface	skill level	usability metric	outcome	result
Altmann (1987)	CI, DI	beginner	task solving time	CI < DI	sig.
Karat et al. (1987)	CI, DI	beginner	task solving time	CI < DI	sig.
Streitz et al. (1989)	CI, DI	beginner	task solving time	CI < DI	sig.
Sengupta & Te'eni (1991)	CI, DI	beginner	task solving time	CI < DI	sig.
Margono et al. (1987)	CI, DI	beginner	number of errors	CI < DI	sig.
Morgan et al. (1991)	CI, DI	beginner	number of errors	CI < DI	sig.
Morgan et al. (1991)	CI, DI	beginner	time between errors	CI < DI	sig.
Karat et al. (1987)	CI, DI	beginner	error correction time	CI < DI	sig.
Morgan et al. (1991)	CI, DI	beginner	error-free time	CI < DI	sig.
Margono et al. (1987)	CI, DI	beginner	subjective rating	CI < DI	sig.
Morgan et al. (1991)	CI, DI	beginner	subjective rating	CI < DI	sig.
Torres-Chazaro et al. (1992)	CI, DI	beginner	subjective rating	CI < DI	sig.
Sengupta & Te'eni (1991)	CI, DI	beginner	efficient usage	CI < DI	sig.
Tombaugh et al. (1989)	CI, DI	advanced	subjective rating	CI < DI	sig.
Torres-Chazaro et al. (1992)	CI, DI	advanced	subjective rating	CI < DI	sig.
Roberts & Moran (1983)	CI, MI, DI	experts	task solving time	CI < DI	sig.
Peters et al. (1990)	CI, MI, DI	experts	oblivion's errors	CI < DI	sig.
Peters et al. (1990)	CI, MI, DI	experts	recognition error	CI < DI	sig.
Peters et al. (1990)	CI, MI, DI	experts	efficiency	CI < DI	sig.
Margono et al. (1987)	CI, DI	beginner	task solving time	CI < DI	not sig.
Morgan et al. (1991)	CI, DI	beginner	task solving time	CI < DI	not sig.
Tombaugh et al. (1989)	CI, DI	advanced	task solving time	CI < DI	not sig.
Roberts & Moran (1983)	CI, MI, DI	experts	error correction time	CI < DI	not sig.
Altmann (1987)	CI, DI	beginner	subjective rating	CI > DI	not sig.
Masson et al. (1988)	CI, DI	advanced	task solving time	CI > DI	sig.

Contingency tables of a meta-analysis for all data

[Cell Content: observed frequency (expected frequency)]

	MI	DI	outcome of this meta-analysis
CI better as	7 (3.9)	2 (5.1)	Chi** = 5.52, df = 1 p ≤ .019
CI worse as	12 (15.1)	23 (19.9)	

	beginner	advanced+	outcome of this meta-analysis
CI better as MI,DI	2 (4.3)	7 (4.7)	Chi** = 2.95, df = 1 p ≤ .086
CI worse as MI,DI	19 (16.7)	16 (18.3)	

Contingency tables only for significant differences

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

[Cell Content: observed frequency (expected frequency)]

	MI	DI	outcome of this meta-analysis
CI better as	4 (2.0)	1 (3.0)	Chi** = 4.07, df = 1 p ≤ .044
CI worse as	9 (11.0)	19 (17.0)	

	beginner	advanced+	outcome of this meta-analysis
CI better as MI,DI	0 (2.4)	5 (2.6)	Chi** = 5.55, df = 1 p ≤ .018
CI worse as MI,DI	16 (13.6)	12 (14.4)	

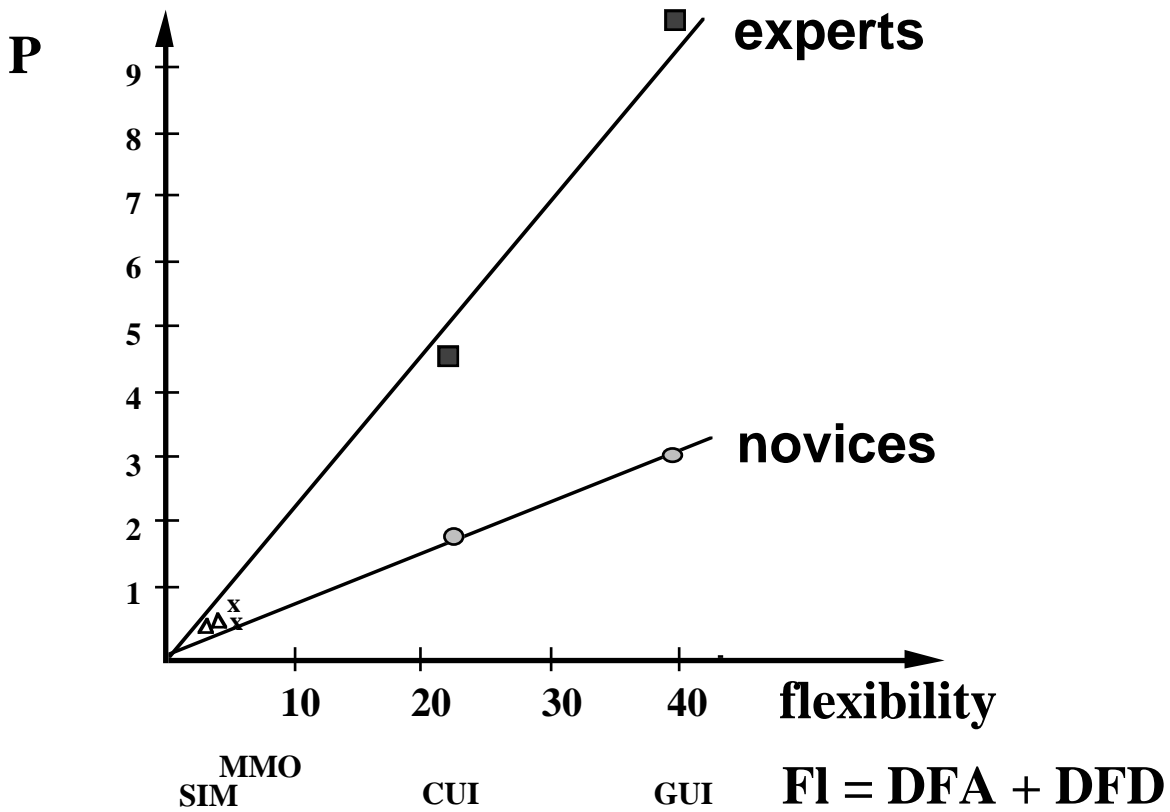
quantitative measure of "application flexibility":

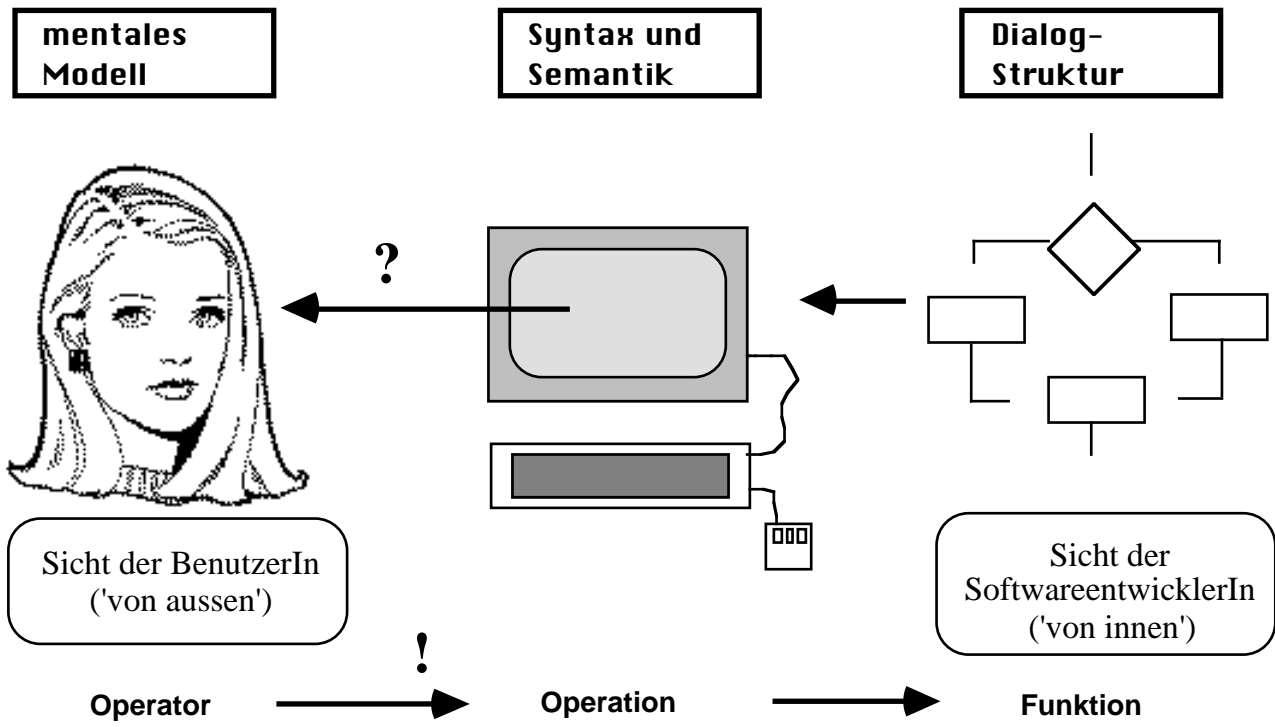
$$DFA = 1/K \sum_{d=1}^K \#HAFIP_d$$

quantitative measure of "dialog flexibility":

$$DFD = 1/K \sum_{d=1}^K \#HDFIP_d$$

performance





Zukunftsorientiert handeln!

Die EU-Bildschirmrichtlinie in der Praxis

Ergebnisse aus dem SANUS-Projekt



2. SANUS - Kongreß in Bad Honnef
23. und 24. Oktober 1997

- Tagungsunterlagen -

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