

7. Brugbarhed



- Brugbarhedsvurderinger:
 - Andre evalueringsformer
 - Diskussion: placering af tænke-højt og spørgeskema-baseret
 - Øvelse: Heuristisk inspektion
 - Tænke-højt versus inspektion
- Brugbarhedslaboratorium
- Dokumentation af resultater

Evalueringsformer

	Bruger kontrollerer	Udvikler kontrollerer
Laboratorium	Konstruktiv interaktion	Heuristisk inspektion
Brugerorganisation (felt)	Fokusgruppe Observation Anvendelsesstatistik	Tilbagemelding Interview Spørgeskemaer

Andre dimensioner: Rigorisme (planlagt og styret forløb) ⇔ Realisme
Kvalitativt ⇔ Kvantitativt

Diskussion



- Hvor placerer vi de to kendte former
(forstå tabellen bedre med kendte eksempler)
- Tænke-højt:
 - Laboratorium ⇔ Brugerorganisation
 - Brugerkontrolleret ⇔ Udviklerkontrolleret
- Spørgeskema-baseret:
 - Laboratorium ⇔ Brugerorganisation
 - Brugerkontrolleret ⇔ Udviklerkontrolleret

Laboratorium + Brugerkontrol



Konstruktion interaktion

- Brugerne udfører et tænke-højt forsøg to sammen
- Derved presses de til at tænke højt

Brugerorganisation + Brugerkontrol



- Fokusgruppe
 - Brugerne diskuterer på eget initiativ kvaliteter og problemer
- Observation
 - Brugerne observeres i deres arbejde
- Anvendelsesstatistik
 - Brugernes anvendelse logges

Brugerorganisation + Udviklerkontrol



- Tilbagemelding
 - Telefon, support, brugerservice
- Interview
 - Begrænset antal brugere interviewes om deres erfaringer og vurdering
- Spørgeskemaer
 - Et større antal brugere udfylder et spørgeskema

Laboratorium + Udviklerkontrol



Heuristisk inspektion

- Deltagerne gennemgår systemet ud fra en checkliste
- Scenario med relevante opgaver kan strukturere processen
- Systemet gennemgås to gange:
 - Fokus på helhed og umiddelbare indtryk
 - Fokus på detaljer såsom funktioner i forhold til opgaver
- Deltagerne arbejder individuelt og noterer problemer
- I fællesskab udarbejdes en samlet liste
- Problemerne kategoriseres (kritisk, alvorligt, kosmetisk)
- Rettelsesforslag udarbejdes, prioriteres og overdrages til udviklerne

Eksempel på checkliste:

- Enkel og naturlig dialog
- Tal brugerens sprog
- Minimer krav til hukommelsen
- Sørg for konsistens
- Giv feedback
- Lav tydelige udgange
- Lav genveje
- Giv konstruktive fejlmeddelelser
- Forebyg fejl

Øvelse (1)



Antal inspektioner – Molich & Nielsens resultater:

1: ca. 35% af alle problemer findes

3-5: ca. 70% af alle problemer findes

Denne påstand er meget omdiskuteret

Øvelse (fra Molich & Nielsen):

Functionality: A service from Manhattan Telephone (MANTEL) to home users. Typical users have little knowledge of data processing. They can dial into the system, which will provide the name and address of a telephone subscriber in the United States, given the telephone number of the subscriber.

Assumptions: For each telephone number there is at most one subscriber. All telephone numbers consist of exactly ten digits (3 digit area code and 7 digit local number). The user's computer has a traditional alphanumeric, monochrome display with 24 lines of 80 characters each and a typewriter-like keyboard with the usual extra keys found on most keyboards, including 10 function keys marked PF1-PF10.

Øvelse (2)

Dialogue: Enter by selecting "Computer Telephone Index" from the main MANTEL menu. The system then issues the prompt:

ENTER DESIRED TELEPHONE
NO. AND RETURN

If the user enters anything other than exactly 10 digits to this prompt, the system answers:

ILLEGAL NUMBER: TRY AGAIN

If the user enters a telephone number which is not in use, the system answers:

UNKNOWN TELEPHONE NUMBER

If the area code is 212 (Manhattan), the system will normally display the the screen shown within 5 seconds. For other area codes, the system must retrieve the necessary information from external databases. This may take up to 30 seconds.

```
PORT073      MANTEL INFO RELEASE 4.3      USER - JOHNSMIT      17-OCT-88      11:27:23

.....
C O M P U T E R   T E L E P H O N E   I N D E X
.....

THE SUBSCRIBER IS

>
> JONES
> JIM E.
>
> 17 PINE STREET
>
> NEW YORK
> NY 10012

PF1 = HELP      PF2 = DIRECTORY INFORMATION      PF5 = OTHER SERVICES
PF4 = VIDEOTEXT
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Øvelse (3)

SIMPLE AND NATURAL DIALOGUE

PROBLEM 1. The screen design uses upper-case letters only, although we know from human factors studies that mixed-case text is much more readable. It is OK to use upper-case letters for a limited number of words that you want to emphasize.

PROBLEM 2. If there is room, you should write out the entire word instead of using abbreviations. Thus, "October" is preferable over "Oct."

PROBLEM 3. Spelling error: "SUBSCRIPER" should be "subscriber." Spelling errors distract users and make them suspect a generally poor quality of the system.

PROBLEM 4. The USERNAME is unnecessary information since it must be assumed that users know who they are, even without being told by the system. In an information system for telephone numbers, the date and time are also unnecessary bits of information. See problem 12.

PROBLEM 5. The characters ">" are mysterious—especially at the blank lines. An alternative might be to show the field labels instead. This would also make it clear why some of the fields are not filled in. In the case of name and address, however, the meaning of the fields will be obvious to any user if we remove the ">" and change the order of the fields as discussed in problem 7.

PROBLEM 6. The blank lines in the middle of the information reduce the readability and may confuse the user. Therefore, we should restructure these fields so that lines without information are suppressed rather than output to the user as blanks. In the example in this exercise, this means that we should skip the fields for c/o address, etc.

PROBLEM 7. The first name should be written *before* the last name since this is the natural ordering. Furthermore, the system should present the user with a single-merged name field instead of two separate fields for first name and last name. It is of no interest to the user of this system how the database is structured internally. The same goes for the city name, state, and zip code.

PROBLEM 8. The function keys should be listed in some logical order, e.g., numerically. The blank space between PF2 and PF5 should be eliminated.

Øvelse (4)

SPEAK THE USER'S LANGUAGE

PROBLEM 9. *This problem does not appear in the English translation of the exercise. Avoid the use of English terms if a proper Danish term exists. Use the Danish abbreviation "Okt." instead of OCT. Replace HELP with the Danish term "Hjælp" or "Forklar" (Explain).*

PROBLEM 10. *This problem does not appear in the English translation of the exercise. Use the Danish national characters æ and ø instead of the Swedish or German equivalents ä and ö.*

PROBLEM 11. From the USERNAME in the example it appears that the system truncates the user's name to eight characters. In general, computer systems should allow users to enter user and file names of any reasonable length. Otherwise, the system will either force users to use unnatural abbreviations or distort the information entered by the user by only making use of the first *N* characters.

PROBLEM 12. The information PORT073 and MANTEL INFO RELEASE 4.2 may be difficult to understand for many users. Since this information will rarely be needed by ordinary users, it may be either deleted or moved to a separate display where it may be explained in more depth. In distinguishing between problems 4 and 12, the keywords that we looked for were "unnecessary" for problem 4 and "difficult to understand" for problem 12.

PROBLEM 13. The system uses the notation "PF1=HELP" to explain the use of the function keys. The meaning of this notation—in particular the use of the equals sign—is not clear to novice users. On the other hand, it is easy to understand for users who know about function keys and who have seen the notation in other systems. It is a compact notation which is an advantage in systems which must display much more information on each screen than is the case in this system. It is not obvious which solution to suggest since the need to explain things in detail for the novice user contrasts with the need to be consistent with the notation known by experienced users from other systems. Because of the specific emphasis on usability for novice users in this system, we prefer the solution which is better for novices.

PROBLEM 14. Questions to the user must be expressed from the user's point of view and not from the system's point of view. The initial question should not be "Enter desired telephone number...", since the user does not want the telephone number but rather name and address. The initial question should be something like "Enter telephone number for which you want name and address."

Øvelse (5)

MINIMIZE THE USER'S MEMORY LOAD

PROBLEM 15. (serious). The telephone number entered by the user should be displayed together with the subscriber information. The telephone number should appear in a format that is well-known by the user and accepted as input by the system.

BE CONSISTENT

PROBLEM 16. Several different terms are used for the same concept: Number, Telephone No., and Telephone number.

PROBLEM 17. The specification does not state where error messages are displayed on the display. It should be emphasized that all error messages should be displayed in the same location. Since the current system appears to be a sub-system of some general information system, the format and placement of error messages should be coordinated with the rest of the system. Similar coordination considerations apply to the general screen layout, function key assignment, and wording.

PROVIDE FEEDBACK

PROBLEM 18. (serious) A response time of 30 seconds to a command from the user is unacceptable. For technical reasons it may take the system as long as 30 seconds to retrieve the requested information from external databases. To tell the user what is going on and to show that the system is active, however, the system should display a message like "Telephone number (203) 456-7890 is outside the 212 area code so it may take up to 30 seconds to retrieve the information." Every five seconds the system should also display some indication that it is still working on the command.

PROBLEM 19. (serious) The screen contains no information about what users should do once they have read the information and want to continue.

Øvelse (6)

PROVIDE CLEARLY MARKED EXITS

PROBLEM 20. (serious) There is no indication of how users may exit from the system without answering the initial prompt to enter a telephone number.

PROBLEM 21. When users request information about a telephone number outside the 212 area code, the system may take up to 30 seconds to answer. The system should provide a facility for aborting the information retrieval.

PROBLEM 22. (serious) The system specification does not indicate whether the user can edit a partially entered telephone number. It is an essential "emergency exit" to allow users to use the BACKSPACE key, for example, to correct errors in a text they have typed.

PROVIDE SHORTCUTS

(In the English version it would be reasonable to accept user input consisting of only seven digits with a 212-area-code default for the expected large number of local requests. Because of the structure of Danish telephone numbers, a similar suggestion would not be appropriate for the original exercise.)

PROVIDE GOOD ERROR MESSAGES

PROBLEM 23. The system should not use the word "ILLEGAL" in an error message. Users do not break the law because they enter a wrong number. In any situation, the system should not intimidate the user by suggesting that he or she must be stupid to make such a mistake.

PROBLEM 24. (serious) The error messages are too vague. The system should inform the user as exactly as possible about what it knows about the problem—for example, if the area code is missing.

PROBLEM 25. The system should report back to the user how it has interpreted his or her input. An example: "The system cannot understand the telephone number W3 QV" This is especially important in this system which is accessed by users via a modem and possibly noisy telephone lines. Users have a right to know whether a problem is due to a transmission error or a user mistake.

Øvelse (7)

PROBLEM 26. (serious) The error messages are not constructive since they do not tell the user how to correct the error. For example, one could supplement the error message just mentioned by "Enter telephone number as ten digits with the area code as the first three."

PROBLEM 27. It is meaningless to ask the user to "Try again!" in an error message since the computer will give exactly the same result the next time. A better message is "Try again with another telephone number," but the best is probably to drop this altogether.

PREVENT ERRORS

PROBLEM 28. This system is to be used by some people who may be totally new to computers. Therefore, it is likely that some users are not used to the sharp distinction in computer systems between the letters "l" (lower case L) and "O" (lower or upper-case O) on the one hand and the digits "1" (one) and "0" (zero) on the other hand. If the system encounters one of these letters where it expects a digit, it should provide a helpful message or simply replace the letter by the corresponding digit.

PROBLEM 29. (serious) Instead of having error messages for input with parentheses around the area code or with extra spaces, the system could just accept these common ways of entering telephone numbers.

PROBLEM 30. Experience shows that some novice users take the prompt "Enter number and RETURN" quite literally and type R-E-T-U-R-N. It is better to write "...and press the RETURN key."

PROBLEM 31. The communication from the system to the user should not be kept in abstract or theoretical terms but should be supplemented by concrete examples, which often increase the users' understanding considerably. In the prompt "Enter telephone number and press the RETURN key," an example of a telephone number in the simplest form accepted as input by the systems should be added—even if this form is different from the output format used by the system to increase readability (see problem 15). The telephone number used in the example should either not be in use or it should be a number of the Manhattan Telephone Operator.

Tænke-højt versus inspektion

	Tænke-højt forsøg	Gruppe-inspektion	Individuel inspektion
Problemtyper (antal)	159	68	49
Problemkategorier			
Kategori 1 (antal)	19	9	8
Kategori 2 (antal)	18	13	9
Kategori 3 (antal)	3	1	1
Ingen aktion (antal)	7	24	29
Unikke problemer for hver metode (antal)	13	1	0
Samlet tid (i timer)	160	118	94
Problemtyper (antal)	159	68	49
Tid/problem	1.0	1.7	1.9
Kategoriproblemer	40	23	18
Tid/SPA	4.0	5.1	5.2

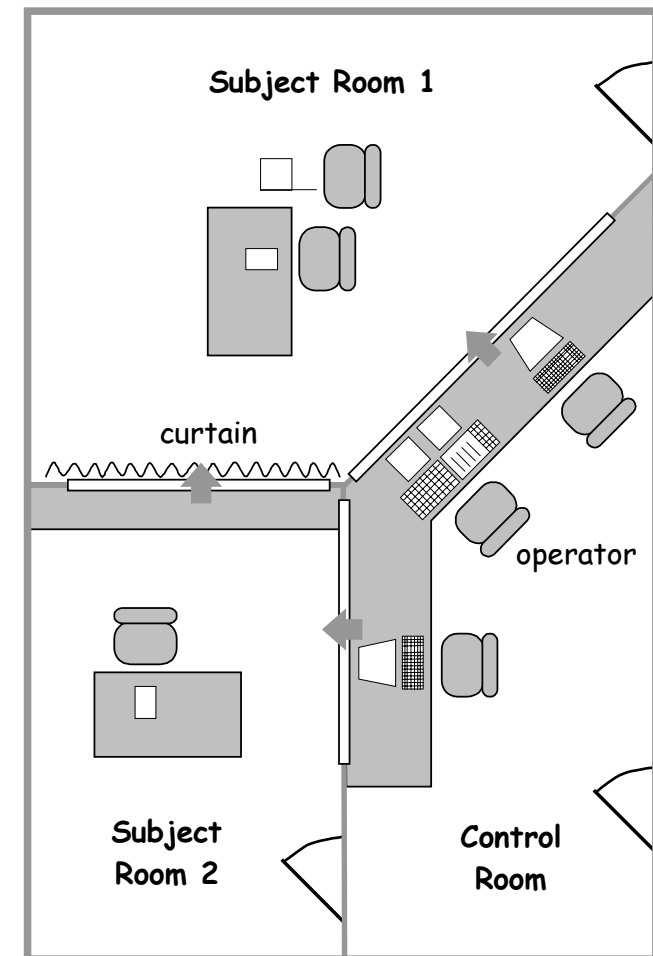
(Karat, Campbell og Fiegel, *Comparison of Empirical Testing and Walkthrough Methods in User Interface Evaluation*, 1992)

Måske i stedet for forrige?

	Tænke-højt forsøg	Gruppe-inspektion	Individuel inspektion
Problemtyper (antal)	159 + 130	68 + 54	49 + 39
Problemkategorier			
Kategori 1 (antal)	19 + 10	9 + 3	8 + 6
Kategori 2 (antal)	18 + 15	13 + 10	9 + 10
Kategori 3 (antal)	3 + 2	1 + 1	1 + 1
No Action	7 + 16	24 + 29	29 + 26
Unikke problemer for metoderne (antal)	13 + 8	1 + 0	0 + 2
Samlet tid (i timer)	160 + 116	118 + 125	94 + 100
Problemtyper (antal)	159 + 130	68 + 54	49 + 39
Tid/problem	1.0 + 1.1	1.7 + 2.3	1.9 + 2.6
Kategoriproblemer	40 + 27	23 + 14	18 + 17
Tid/SPA	4.0 + 5.2	5.1 + 8.9	5.2 + 5.9

Brugbarhedslaboratorium

- Der findes en fast opstilling med opdeling i to eller flere adskilte rum.
- Brugerrummet ligner en rigtig arbejdsplads i brugerorganisationen.
- Operatørrummet er indrettet til at studere brugerens arbejde med et system.
- Der er avanceret udstyr til optagelse, logning mv. af brugerens arbejde.
- Eksemplet til højre viser det brugbarhedslaboratorium som findes på Institut for datalogi, Aalborg Universitet.



Dokumentation af resultater



- Væsentlige afsnit:
 - Sammenfatning: oversigt og hovedkonklusioner (1 side)
 - Metodebeskrivelse: beskrivelse af testsituationen (2-3 sider)
 - Resultater: opsummering og analyse af data (5-7 sider)
 - Samlet konklusion og vurdering af evalueringsmetoden (1 side)
 - Bilag:
 - Opgaver
 - Logfiler
 - Interviewguide (tænke-højt forsøg) og besvarelser for hver forsøgsperson
 - Spørgeskemaer (spørgeskema-baseret) og alle besvarelser
- URL til eksempel på spiseseddel
 - Sammenlign eksemplet med ovenstående