

Usability Evaluation of a Home Telemedicine System

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Introduction

- ▶ Motivation:
 - Functionality vs. Usability
 - Problem: Usability Evaluations are Expensive
- ▶ Purpose:
 - Cost effective usability evaluation of a telemedicine system



Comparison of two usability evaluation methods

- ▶ Method 1: Traditional Usability Evaluation
- ▶ Method 2: Instant Data Analysis (IDA)

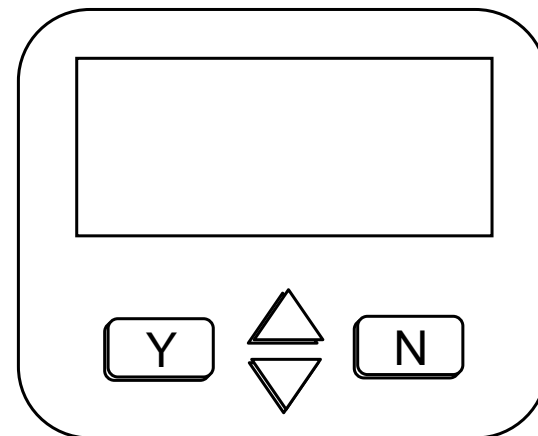
Case: The Home Telemedicine System

▶ Telemedicine system

- Targeted user group: Elderly
- Automatic transfer of data

▶ Secondary devices:

- Blood pressure meter
- Blood sugar meter
- Scale
- Interfaces: Bluetooth, Infrared and serial cable



Method I: Traditional Usability Evaluation (Video Based Analysis - VBA)

▶ Usability lab

- Representative end-users
- Test monitor
- Data logger

▶ Procedure

- Individual task completion

▶ Data collection

- Video and audio recordings
- Notes from data logger

▶ Data analysis

- Video Based Analysis (VBA)

Task #	Task Description
1	Connect and install the HCS and secondary devices
2	Transfer data from the blood sugar meter to the HCS. The blood sugar meter is connected using a cable.
3	Measure the weight and transfer data from the scale to the HCS.
4	A new wireless blood sugar meter is used. Transfer the data from this to the HCS.
5	Clean the equipment.



Method 2: Instant Data Analysis (IDA)

► Usability lab

- Representative end-users
- Test monitor
- Data logger

► Procedure

- Individual task completion

► Data collection

- Notes from data logger
- ÷ Video and audio recordings

► Data analysis

- Structured brainstorm session
- ÷ Video Based Analysis



Results: VBA vs. IDA

▶ Number of identified problems

	Method 1: Traditional (video)	Method 2: IDA
Critical	13	16
Serious	13	13
Cosmetic	18	8

▶ Time requirements

	Method 1: Traditional (video)	Method 2: IDA
Analysis	41.75 h	6 h
Writing and validating problem list	18 h	4.5 h
Total	59.75 h	10.5 h

Conclusions

- ▶ Instant Data Analysis is efficient in identifying critical and serious usability problems (but not cosmetic problems)
- ▶ Instant Data Analysis requires 10.5 hours compared to 60 hours for the traditional approach

Thank you for listening! We always welcome collaboration with industry partners and other researchers

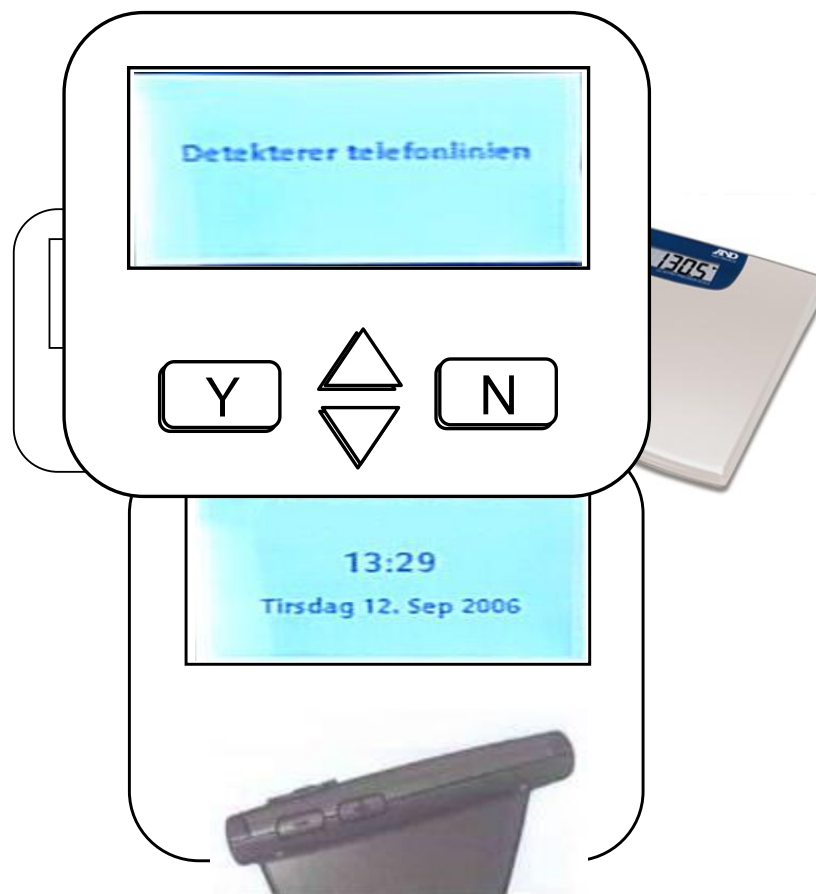
Any questions?

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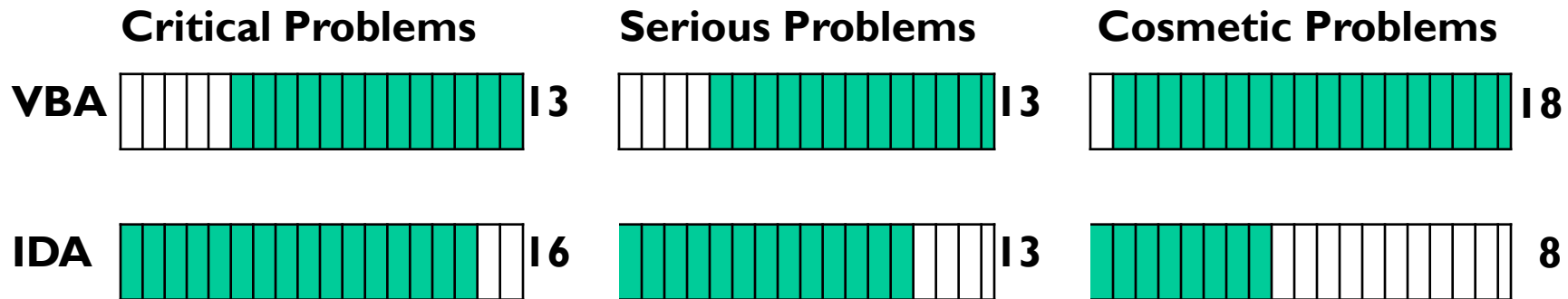
Results: Examples of Experienced Problems

- ▶ Information
 - Does not understand text "Detecting phoneline"
- ▶ User's mental model
 - Unclear how to connect Bluetooth scale
- ▶ Missing feedback
 - Idle screen upon completion of questions
- ▶ Visibility
 - Cannot find volume buttons



Results: VBA vs. IDA

▶ Number of identified problems



▶ Time requirements

	Traditional (video)	IDA
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References

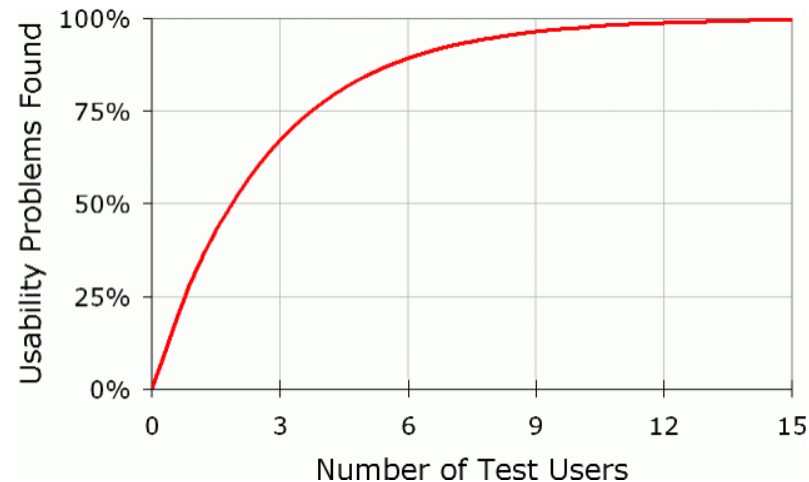
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- ▶ Kaufman, D. R., et al., 2003. Usability in the Real World: Assessing Medical Information Technologies in Patient's Homes. In *Journal of Biomedical Informatics*, Elsevier Science, San Diego, CA.
- ▶ Nielsen, J. and Landauer, T. K., 1993. A Mathematical Model of the Finding of Usability Problems. In *Proceedings of the INTERACT '93 and CHI '93 conference on Human factors in computing systems*. ACM, New York, NY.
- ▶ Spool, J. and Schroeder, W., 2001. Testing Web Sites: Five Users Is Nowhere Near Enough. In *CHI '01 extended abstracts on Human factors in computing systems*. ACM, New York, NY.

Related work

- ▶ Kaufman et al. (2003)
 - Usability evaluation of a similar home telemedicine system
 - Similar types of usability problems
 - "Unnecessarily complex tasks"
 - Feedback issues
 - Information issues

Five users?

- ▶ Nielsen & Landauer (1993)
 - Assumption 1: Identification of usability problems independent of whether or not they have been found previously.
 - Assumption 2: Usability problems are independent of each other.
- ▶ Spool & Schroeder (2001)
 - Niensens model ok, but the variable L needs to be adjusted.
 - 5 users = 35 %
- ▶ Faulkner (2003)
 - 5 users: 55 % \leq UP \leq 99 %
 - Large variations!
 - Most importantly: Select *representative* users!



Source: <http://www.useit.com/alertbox/20000319.html>
Retrieved: Jan 17th 2010

Experienced problems III – Connection and installation

- ▶ Connection and installation difficult!
 - 32 of 51 problems (63 %)
 - Almost all critical (79 %) and serious (80 %) problems
- ▶ Mostly related to information and user's mental model

▶ Information

- Does not understand text

▶ User's mental model

- Does not know how prefix works

	Task	
User	1	2
1	33:25	10:10
2	33:44	09:34
3	28:25	02:26
4	18:43	02:43
5	26:05	01:06
Average	28:09	05:12

