



Measuring UX – Two Examples

School of Computer Science | Software Analysis and Design

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Overview of this lecture

- Some Announcements
- Types of Evaluation
- Measuring UX of Virtual Reality System
- Measuring UX of a Task Oriented Software

- Reading in Additional Material
 - ID book - Chapter 14.1 – 14.3
 - User Evaluations of Virtually Experiencing Mount Everest
 - Measuring the User Experience of a Task Oriented Software



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Mid Term Evaluation – Possible Improvements

- Descriptions of the assignments
 - Could be more simple
 - Are time consuming
 - Some of the wording is not good
 - Please make notes in Piazza about text in the descriptions of the assignments that are unclear
- Have longer project solving classes
 - Actually you can choose in which class you attend
- TAs could be better prepared
 - I will explain better the assignments during our weekly meeting



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In the News Paper – Thursday 3. October 2019



Í dag er ekki hægt að sækja um hefðbundin lán, eins og til dæmis húsnæðislán í Búnq. En Ali segir að það gæti breyst í framtíðinni. „Við erum í stöðugu samtali við notendur okkar og reynum að bregðast við þörfum þeirra,“ segir hann. kristinnhaukur@frettabladid.is



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Success Rate - Árangursstig

- Success rate – author Jakob Nielsen

– <https://www.nngroup.com/articles/success-rate-the-simplest-usability-metric/>

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
User 1	F	F	S	F	F	S
User 2	F	F	P	F	P	F
User 3	S	F	S	S	P	S
User 4	S	F	S	F	P	S

Note: S = success, F = failure, P = partial success



- In total, we observed 24 attempts to perform the tasks. Of those attempts, 9 were successful and 4 were partially successful. For this particular site, we gave each partial success half a point.
- In this example, the success rate was $(9 + (4 \cdot 0.5)) / 24 = 46\%$



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Success Rate and Average Time Per. Task Problem Solving 4

- Overview

	Árangursstig	Tími
Opnunartími	100%	25.3
Upplýsingar um ákveðið vín	98%	34.2
Finna uppskrift	100%	61.7
Finna afhendingarmáta	95%	38.3
Finna vín undir 2000 kr.	80%	97.0
Útreikningur magns fyrir veislu	99%	59.7

- How would you react to these results?



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Types of Evaluation



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Why, what, where, and when to evaluate

Iterative design and evaluation is a continuous process that examines:

Why: To check users' requirements and confirm that users can utilize the product and that they like it

What: A conceptual model, early and subsequent prototypes of a new system, more complete prototypes, and a prototype to compare with competitors' products

Where: In natural, in-the-wild, and laboratory settings

When: Throughout design; finished products can be evaluated to collect information to inform new products



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10

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Why you need to evaluate

Bruce Tognazzini says:

“Iterative design, with its repeating cycle of design and testing, is the only validated methodology in existence that will consistently produce successful results. If you don’t have user-testing as an integral part of your design process you are going to throw buckets of money down the drain.”

See AskTog.com for topical discussions about design and evaluation



11

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Where Evaluation Takes Place

- **Controlled settings** that directly involve users (for example, usability and research labs)
- **Natural settings** involving users (for instance, online communities and products that are used in public places)
 - Often there is little or no control over what users do, especially in in-the-wild settings
- **Any setting** that doesn’t directly involve users (for example, consultants and researchers critique the prototypes, and may predict and model how successful they will be when used by users)

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12

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Evaluation methods

Method	Controlled settings	Natural settings	Without users
Observing	X	X	
Asking users	X	X	
Asking experts		X	X
Testing	X		
Modeling			X

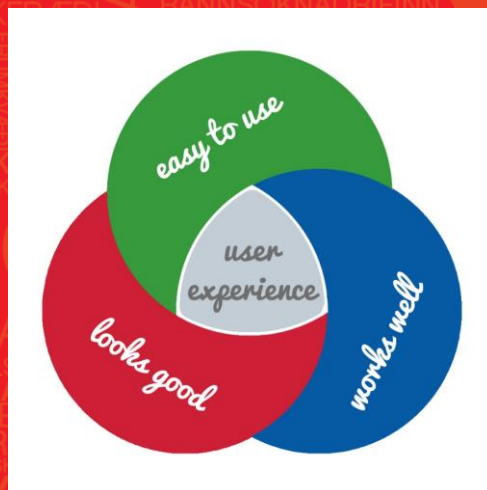


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13

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Measuring UX – One Example



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Virtually Experiencing Mount Everest



- The company Sólfar wanted our advices of how to conduct user evaluations



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The User Evaluations



User evaluations:

- Introduction
- Short interview
- Pre-questionnaire
 - Simulator sickness questionnaire
- Experiencing the prototype
- Post-questionnaire
 - Attrakdiff 2.0
 - Simulator sickness questionnaire
- Debriefing (through video)
- Thanking the user



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Participants

- User testing in one day
 - 5 participants – 4 males, 1 female
 - 25 – 54 years old
- Experiences
 - Had experienced VR before
 - Had some experience in games
 - One experienced in hiking



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Carefully Planned my Using RAMES

Roles	
R1. Users	Five users participated in the evaluation
R2. Evaluators	Conductor: Marta Larusdottir acted as a conductor
R3. Observers	Observers: David Thue and Kurt Van Meter acted as observers and assistants
R4. Recipients	Kurt Van Meter was the main recipient of the results
Activities	
A1. Purpose	To measure the user experience of the current prototype of <i>Everest VR</i> , to enable redesigning the system according to the results
A2. Plan	The user testing took place on Monday the 18 th of April and Tuesday the 19 th of April
A3. Evaluation procedure	<ol style="list-style-type: none"> 1. Greet the participant 2. Short introduction to the procedure of the testing 3. Sign a consent form 4. Interview according to the background questions (Pre-questionnaire list) 5. Fill in the questionnaire about how the participant feels (Pre-questionnaire list) 6. Experience the VR prototype 7. Fill in the questionnaire about how the participant feels (Post questionnaire list) 8. Fill in the user experience questionnaire (AttrakDiff 2.0) 9. Discussion/debriefing about the video 10. Thank the participant
A4. Analysis of results	We used the Instant Data Analysis method described by Kellskov et al [18]
A5. Making Decisions	Kurt was responsible for the decision making based on the results



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RAMES continued

Materials	
M1. Evaluation material	Pre-questionnaire kit including: a) introduction text for the participant, b) declaration of consent, c) pre-test questionnaire on the background, d) simulator sickness questionnaire. Post-questionnaire kit including: a) Post-test questionnaire on the overall feeling, b) simulator sickness questionnaire, c) the AttrakDiff 2.0 for measuring the user experience
M2. Support material	The VR prototype itself explained how to navigate between scenes in <i>Everest VR</i> . We also used a document containing an introduction to the procedure of the testing, and an introduction to the controls and the consent form.
M3. Data gathered	Background material, responses to questionnaires, usability problems, comments during debriefing sessions
M4. Results	Kurt presented the result to the team
M5. Decisions	Kurt kept track of which decisions were made


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RAMES continued

Environment	
E1. Evaluation environment	The evaluations were conducted at Reykjavik University, room M117
E2. Equipment. for data gathering	We used Camtasia to record what the user did during the VR experience
E3. Eq. to analyze results	Excel was used
System	
S1. Characteristics	VR game – Everest VR version 0.121
S2. Type	VR game
S3. Stage	Detailed prototype of the system
S4. Part	We evaluated the helicopter ride and a scene involving the Khumbu Icefall (part of the path up Mount Everest)
S5. Eq. for evaluation	Kurt provided all the equipment needed for the evaluation


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The Documents – Before the VR session

Participant introduction

- This is a verbal introduction and should be explained to and discussed with the participant.
- Show the participant the equipment and describe:
 - The headset
 - It will go on their head and contains a monitor, but it is not possible to see through.
 - The headset is adjustable, so they should let us know if it is uncomfortable.
 - Those that wear glasses can choose to wear or not wear their glasses, the headset has two small round parts. There is no way to adjust these, so we recommend wearing your glasses.
 - Headphones are connected to the headset. Please let us know if you want the volume turned up or down.
 - The controllers
 - Show them how to hold the controllers.
 - Explain that they will be using the gloves in the demo.
 - Show them the controls sheet.
 - The computer set up.
 - This is where the simulation is running.
 - We will also monitor what you are doing in the game.
 - We will also film you from this web camera.
 - The cables
 - These connect the PC to the headset and include HDMI, USB and power cables.
 - We will make sure that they stay out of your way during the demo.
 - The light screens
 - These create the space of the VR room and track the headset and controllers.
 - Boundaries
 - If you get close to the edge of the virtual room, grid-like walls will appear in the virtual space. Notify of this out loud and do not move beyond the point will appear. Please press the same button again to get rid of the walls, or wait for assistance.
 - Remember that everything you see is virtual – what you see is not there and what is there you cannot see. Emphasize caution.
 - Please walk like you are in the virtual space without detaching from your own experience, and note that we will be recording audio as well as visual.
 - If you feel an uncomfortable sense of vertigo, please take a verbal, stop all movement and try resting your feet for a few seconds.
 - If the experience becomes overwhelming or for whatever reason, you may stop at any time. Simply say, "I want to stop now" and we will assist with taking off the headset and ending the experience.

Everest VR Usability Study

Declaration of Consent

I hereby declare,

that the experimenter informed me about the nature, meaning, consequences of and risks involved in the scientific research carried out as part of the **Everest VR Usability Study**.

I am aware that I can retract my consent at any time without specifying reasons and without adverse consequences for myself and that all the data will be stored anonymously and ability confidential.

I am willing to take part in the scientific research carried out as part of the above mentioned study.

(place, date) _____

(signature participant)

(signature experimenter)





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The Documents – Before the VR session

Everest VR Usability Testing at the University of Reykjavik

Pre-Test Questionnaire

Date: _____ Age: _____

Participant: _____ Gender: _____

- Have you ever experienced VR before? If so, when and what have you tried?
- How much do you or have you played video games in general?
- Do you have any experience with hiking or mountain climbing?
- Have you ever experienced fear of heights or vertigo? To what degree?
- Have you heard about Everest VR before?
- What do you think you will be able to do in the Everest VR experience?
- In general, how are you feeling right now?

BRIGADATOR DISCOMFORT QUESTIONNAIRE

Kennedy, Lomo, Barbeau, & Clifford (2002)***

Instructions: Circle how much each symptom below is affecting you right now.

1. General discomfort	None	Slight	Moderate	Severe
2. Fatigue	None	Slight	Moderate	Severe
3. Headache	None	Slight	Moderate	Severe
4. Eye strain	None	Slight	Moderate	Severe
5. Difficulty focusing	None	Slight	Moderate	Severe
6. Salivation increasing	None	Slight	Moderate	Severe
7. Dizziness	None	Slight	Moderate	Severe
8. Nausea	None	Slight	Moderate	Severe
9. Difficulty concentrating	None	Slight	Moderate	Severe
10. Fullness of the head	None	Slight	Moderate	Severe
11. Blurred vision	None	Slight	Moderate	Severe
12. Distress with eyes open	None	Slight	Moderate	Severe
13. Distress with eyes closed	None	Slight	Moderate	Severe
14. Vertigo	None	Slight	Moderate	Severe
15. Stomach awareness	None	Slight	Moderate	Severe
16. Bumping	None	Slight	Moderate	Severe



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Virtually Experiencing Mount Everest



- The company Sólfar wanted our advices of how to conduct user evaluations



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Asked all users to explain what they experienced



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The Documents – After the testing

Instant Data Analysis

<u>Issues</u>	<u>Scores</u>	<u>Positive experiences</u>
1. Going back to the Address Box, from having a full view is strange. (2 stars)	2	1. Shaking the rope was cool
2. Strange comment in the presentation (3 stars)	2	2. How to go up the mountain
3. The voice on a black text does not work (1 star)	2	3. Breath taking, really felt I was there
4. Footprints - the transition from tip to the machine was sudden (3 stars)	3	4. The ladder was scary
5. Footprints - the transition from tip to the machine was sudden (3 stars)	3	
6. Poor timing for the vertical ladder to mark (5 stars)	4	
7. Getting to the vertical ladder (5 stars)	3	
8. The character feel robotic (5 stars)	3	
9. Conversation action npc are not realistic (2 stars)	2	1- Totally new 2= We knew but more scenic
10. Instructions can not be repeated (3 stars)	3	3= We knew and had the scenery eating
11. When climbing the ladder you want to see your feet (3 stars)	2	4= We had already plan for fixing
12. Needs more introduction in the beginning (3 stars)	2	5= Not as nice as at thought.
13. It is unclear when you should take action (1 star)	3	
14. The story was silly (1 star)		
15. More audio feedback (2 stars)		
16. It is unclear what is will happen (2 stars)		

Problems Found According to Severity

Table 1: Number of User Problems in Each Severity Category

Severity Category	Number of problems	Average number of users
Showstopper	1 problem	5 users
Very severe problem	5 problems	3,6 users
Moderately severe problem	15 problems	2 users
Minor problem	9 problems	1 user
Total:	30 problems	



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What Was Done About It?

Table 2. Number of User Problems in Each Severity Category

Severity Category (number of problems)	Impact	Marked as useful
Showstopper (1)	Addressed	Very useful
Very severe problem (5)	4 addressed, 1 future design	1 very useful, 1 useful
	10 addressed, 2 no action	4 useful
Medium severe problem (15)	1 new tech needed, 1 not decided, 1 future design	
Minor problem (9)	4 addressed, 3 no action, 2 new tech needed	



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Some Quotes from the QA person

- The showstopper problem:
 - „This testing was the key in pointing out the importance of that“
- One of the very severe problems:
 - „Huge impact on this from testing and we continue to reposition to find the best layout“
- One of the medium severe problems:
 - „Being addressed, and was useful to have fresh eyes to underline the importance of this“



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We Wrote a Paper on This



Hannes Högni Vilhjálmsson
Reykjavik University



David Thue
Reykjavik University



Marta Lárusdóttir
Reykjavik University

Paper title: User Evaluations of Virtually Experiencing Mount Everest,

- published at the HCSE conference, 2018.
- In Canvas as additional material



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Measuring UX – Another Example



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Measuring the UX of Task Oriented Software

- Paper presented at a COST 294 workshop in Reykjavik
- My Co-author was Jónheiður Ísleifsdóttir, master in computer science
- We did think-aloud testing on this system called Vinnustund

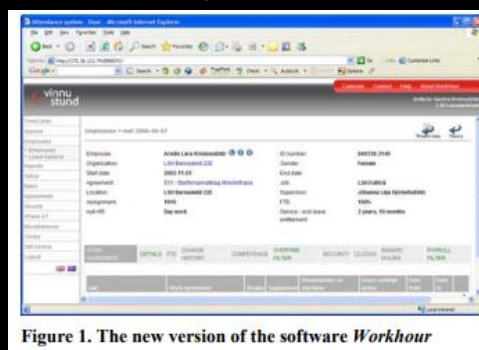


Figure 1. The new version of the software *Workhour*

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The Think-Aloud Tests

- We had 10 users – 5 ordinary users and 5 managers
 - 8 women and 2 men, working at the University Hospital or the Financial Management Authority
- We went to their work environment and did the user testing
- Wanted to focus on user experience before usage and during usage

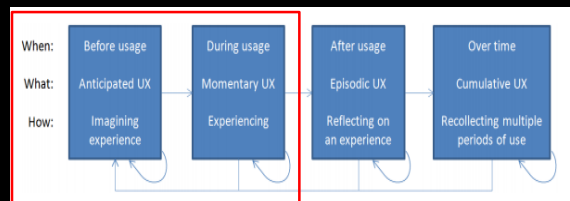
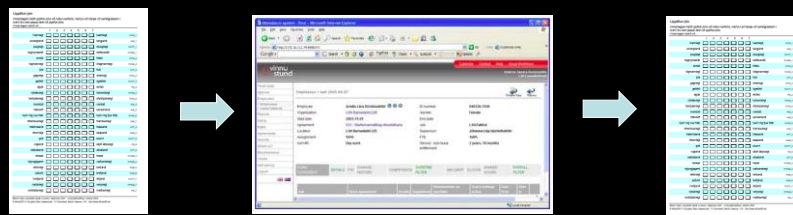


Figure 2. Time spans of user experience, the terms to describe the kind of user experience related to the spans, and the internal process taking place in the different time spans.

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Measuring the UX

- We used Attrakdiff 2 to measure the UX
 - Before the task solving session to measure their expectations
 - After the task solving session to measure their actual user experience during the task solving session



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Factors in Attrackdiff

- *Pragmatic Manipulation (PQ)*
 - Pragmatic attributes are the ones that makes us able to fulfill our goals and what we have until now talked about as usability
- *Hedonic Stimulation (HQS)*
 - The attributes encourage users to develop their skills and knowledge. These can be unused features of a software that the user does not yet use are not a part of the pragmatic experience but are rather perceived as Hedonic
- *Hedonic Identification (HQI)*
 - Hedonic identity attributes are the ones that make us identify with the product in a social context. These attributes are connected to the fact that all persons communicate their identity through things they use and own.
- *Attraction (ATT)*
 - Attraction is used to measure the global appeal of a product and to see how the other attribute affect this global judgment. We judge the product as a whole and use words like good, bad, beautiful and ugly to describe things.



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Results

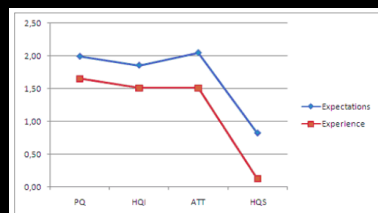


Figure 2. Mean scores for each scale of AttrackDiff 2

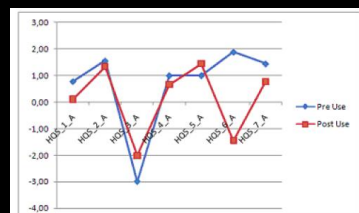


Figure 3. Scores of HQS: Pre- and post-use



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Evaluation methods

Case	Mount Everest	Vinnustund
Why	Measuring UX in user testing. UX was measured right after usage	Measuring usability and UX in user testing. UX was measured before and right after usage
What	Nearly finished prototype – detailed design	Nearly finished prototype – detailed design
Where	In controlled settings	In the users work environment
When	2 months before launching	2 months before launching



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37

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