Modul: Mensch-Computer-Interaktion

Human Computer Interaction

Prof. Dr. Albrecht Schmidt
Sommersemester 2011

Organisatorisches

- Leistungspunkte (LP): 6.0
- SWS: 4 (3V+1Ü)
- Schriftliche Prüfung: 90 Min
- Prüfungsvorleistung: Übungschein
- Turnus: Sommersemester
- Sprache: Deutsch, Unterlagen: Englisch

Lernziele

Studierende entwickeln ein Verständnis für Modelle, Methoden und Konzepte der Mensch-Computer-Interaktion.

Sie lernen verschiedene Ansätze für den Entwurf, die Entwicklung und Bewertung von Benutzungsschnittstellen kennen und verstehen deren Vor- und Nachteile.

Organisatorisches (2)

- Zuordnung zum Curriculum:
  - B.Sc. Informatik, 4. Semester -> Kernmodule
  - B.Sc. Softwaretechnik, 4. Semester -> Ergänzungsmodule
  - B.Sc. Wirtschaftsinformatik, 6. Semester -> Wahlpflichtbereich

- Voraussetzungen:
  - 051520005 Programmierung und Software-Entwicklung
  - 051200005 Systemkonzepte und -programmierung

- Abschätzung Arbeitsaufwand:
  - Präsenzzeit ca. 42 Stunden
  - Nachbearbeitungszeit ca. 138 Stunden

- Modulkürzel: 051900001; Modulnummer im Prüfungsamt: 10210

Organisatorisches (3)

- Vorlesungsunterlagen
- Lesematerial
- Übungsaufgaben
- Übungsabgaben
- Foren
- ...

Bitte registrieren und Übungsgruppe auswählen (bis Montag, 2.5. 12 Uhr)

Organisatorisches (Übung)

- Vertiefung von Themen der Vorlesung
  - Lesematerial
  - Übungsauflagen
- Erarbeiten von praktischen Fähigkeiten, z.B.
  - Konzeptentwurf
  - Erstellung von Prototypen
  - Programmierung von Benutzungskonzepten
  - Evaluation
- Schreiben eines Buchkapitels zu einer Vorlesung (ca. 5000 Wörter)
  - Lesematerial (prüfungsrelevant)

- Übungsblätter in Kleingruppen
- Übungstermine zum Besprechen und Vorstellen der Lösungen

- Kriterien für den Übungschein:
  - Abgabe aller Übungsblätter mit einem sinnvollen Ansatz (oder zumindest einem Lösungsversuch)
  - Vorstellen der eigenständigen Lösungen in der Übung
  - Abgabe des Buchkapitels
Chapter 1: Introduction

Is it difficult to create user interfaces?

Usable products = successful products?

Examples?  Counter-examples?

Utility, Usability, Likeability

- Utility: a product can be used to reach a certain goal or to perform a certain task. This is essential!
- Usability: relates to the question of quality and efficiency. E.g., how well does a product support the user to reach a certain goal or to perform a certain task.
- Likeability: this may be related to utility and usability but not necessarily. People may like a product for any other reason...

Chapter 1
Introduction

- Motivating Human Computer Interaction
- Terms and Concepts
- How to make usable products?
- Structure of the Human Computer Interaction course
What is Usability

Usability 101 by Jakob Nielson [5]

- "Usability is a quality attribute that assesses how easy user interfaces are to use. The word 'usability' also refers to methods for improving ease-of-use during the design process."

- Usability has five quality components:
  - Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?
  - Efficiency: Once users have learned the design, how quickly can they perform tasks?
  - Memorability: When users return to the design after a period of not using it, how easily can they reestablish proficiency?
  - Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
  - Satisfaction: How pleasant is it to use the design?

User Experience (UX)

- "A person's perceptions and responses that result from the use or anticipated use of a product, system or service"


- For an in-depth analysis of user experience

User Experience in Detail

- read the article (and watch the video) at: http://www.interaction-design.org/encyclopedia/user_experience_and_experience_design.html

Aspects of Product Design

- Product Design is part of Interaction Design

Factors Influencing the UX

- Product Design
- Context of Use
- User Experience (UX)
- Users’ Skills and Expectations

Understanding the Design Space

Implicit and explicit multimodal interaction

<table>
<thead>
<tr>
<th>modality</th>
<th>mode of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>command line</td>
<td>explicit</td>
</tr>
<tr>
<td>GUI &amp; direct manipulation</td>
<td>explicit</td>
</tr>
<tr>
<td>gestures &amp; speech</td>
<td>implicit</td>
</tr>
<tr>
<td>tangible and physical UIs</td>
<td>implicit</td>
</tr>
<tr>
<td>eye gaze / physiological sensors</td>
<td>implicit</td>
</tr>
</tbody>
</table>
Chapter 1
Introduction

- Motivating Human Computer Interaction
- Terms and Concepts
- How to make usable products?
- Structure of the Human Computer Interaction course

Examples: Communication Appliances

- The bed: a medium for intimate communication

Examples: Unconventional Game Interface

- You’re In Control: A Urinary User Interface

Mini-Exercise
World Time Clock

- Design a user interface for the following scenario:
  Mary works at XY-import-export GmbH in Stuttgart. She often phones up customers and suppliers all over the world. For her work it is helpful to know the local time at the destination she calls. For some of the contacts she has the phone number only, for others additionally the town or country.

- Task: draw a sketch of a user interface for an application that supports Mary in her work.
- Think about how you would integrate such an application with her current computer system and software infrastructure

Reflect on your result...

HCI is Central to the Design and Development Process

- even if done unconsciously. Decisions made in the development process are likely to influence how a product can be used.
- Thinking about the user interface when a first version of a product is finished is too late!
- Good user interfaces – and often good products – are a joined effort of all participants in the design and development process
It is not Simple to Make Good User Interfaces

- Basic misconceptions
  - If I (the developer) can use it, everyone can use it
  - If our non-technical staff can use it, everyone can use it
  - Good user interfaces are applied common sense
  - A system is usable if all style guidelines are met

- Examples of bad software are easy to find in the WWW or in various “Usability Hall of Shame”

- Creating usable systems is a structured process and can be achieved by use of different methods

Discussion

How to create usable interactive products?

The Development Process

- Analysis
- Design
- Implementation
- Evaluation

Adapted from Paul Nobles

Human-centered Design Process

ISO 13407 standard for human-centered design processes for interactive systems (superseded by ISO 9241-210:2010)

Structured Process for Creating Usable Interactive Products

- Precondition
  - Understanding how people interact with their environment
  - Understanding the capabilities and limitations of users
  - Basic ergonomics

- Analyze what interaction is required and what technical options are available in a user-centered way, evaluate the results of the analysis

- Design and prototype user interfaces with user involvement, evaluate prototypes

- Implement an interactive digital product

- Test and study the product created

- User Interface Engineering is a part of the overall development

- The process is iterative (overall and at each step)

Evolution of the Software Development

From A. Cooper, About Face 2.0 [6]
How it does NOT work

- Usability tests at the end when the product is ready and needs to be shipped
- Designing a new and pretty skin to a product
- Introducing HCI issues after the system architecture and the foundations are completed

Comparison: An interior designer cannot make a great house if the architect and engineers forgot windows, set the doors at the wrong locations, and created an unsuitable room layout.

How to Achieve Usability

(high level overview – more details later)

- Identify what utility and usability for the product mean
  - main purpose of the product
  - anticipated users, target audience
- Common effort in the design and development process
  - trade-offs between design, engineering, and usability, business
- Iterative evaluation
  - usability testing with different methods at various stages of the development process
- Improvement after product release
  - monitoring user behavior
  - evaluation of changes to the product (e.g. adding a new feature to a web shop)

Usability Testing I

(high level overview – more details later)

- Usability testing of software/web applications assesses several factors, e.g.
  - Does application functionality match the user’s needs?
  - Is the application easy to learn?
  - How easy is it for the user to accomplish tasks with the application?
  - Is it easy to remember how to use the application?
  - Does the user enjoy using the application, or does he/she become easily frustrated by it?
  - Does the application do what the user expects?

Usability Testing II

(high level overview – more details later)

- Ways to quantify usability include measuring
  - How many mistakes get made in a given time period?
  - How long does it take users to complete a specific task successfully?
  - How long does it take users to learn the application’s distinct functions/features?
  - How repeatable are users’ experiences?
  - What paths do they take in trying?
  - What are the users’ satisfaction levels?
  - How long does it take to correct an error?

Building Successful Digital Products – Not only what users want!

- tension
  - different objectives
  - different design goals
- step by step 1-2-3
- solution
  - Products in the overlapping space
- User centered design is not about creating what users want.

Recording a ringtone

- Why does it take 7 steps after recording to make the recording a ringtone on the iPhone?

How easy is it to work in multidisciplinary teams?

- Many people are involved in the process of designing and implementing an interactive product
  - Different background (design, business, CS, marketing, administration)
  - Different objectives

- Communication can be very difficult!

- To be able to work in a team is essential!
  - Team work is a skill that can be learned
  - We will force this in the exercises!

Chapter 1

Introduction

- Motivating Human Computer Interaction
- Terms and Concepts
- How to make usable products?
- Structure of the Human Computer Interaction course

References

[2] ACM SIGCHI Curricula for Human-Computer Interaction
  http://www.acm.org/sigchi/cdg/
  http://www.id-book.com/
  http://hci.stanford.edu/~winograd/acm97.html
  http://www.useit.com/alertbox/20030825.html

Practical Tools and Techniques

- Concept video to communicate an idea about a new system
- Storyboard
- Key Screens
- Optional: SketchFlow (Expression Blend 4)
Concept Video

- Efficient means for communication of an idea (product, service, tool)
  - In the project team
  - For the customer
  - For the end user (marketing)

- Showing key concepts in easy to understand scenarios
- Create a story board first
- ... like a very short movie – try to tell a story
- Developing scenarios helps to make a meaningful video
- Different levels effort into the video

Steps to a “Quick Video”

- Have an idea :)
- What are the key issues? How to visualize them?
- What is a convincing use-case story – make a storyboard
- take one or more photos digital for each key scene
- If required manipulate the digital photo to highlight a certain action/device/interaction within the picture
- Script audio and written text to explain
- Speak audio and record it or use a good text2speech engine
- Make a movie...
  - Add pictures in a sequence
  - Use transitions and motion to transport you message

Manipulation of the images (1)

- Highlight the center of interest
  How-To:
  - Select the area of interest (e.g. center of action)
  - Inverse section
  - Reduce color and/or contrast

Manipulation of the images (2)

- Overlay images or drawings
  How-To:
  - Select a base image
  - Insert overlay image(s) / drawings on top

Manipulation of the images (3)

- Insert labels and explanations
  How-To
  - Select a base image
  - Insert text, symbols and arrows on top

Combine image manipulation

- Highlight
- Overlay
- Label
Transitions

- Use transitions between stills to introduce motion
- Use transitions between images carefully (flying animations usually do not look good ;)
- Example below: use a fade from one image to the next

Zoom and Motion

- Use zoom and motion to guide the user to look at the “right place”
- Make transitions that support the effect

Hints

- Read a tutorial to your image processing program
- Read a basic tutorial on cutting movies with your favorite program
- Make your concept video between 20 and 90 seconds – do not make them longer
- About the story: sometimes it is useful to make 2 parts. One as it is today (highlighting the problem) and one showing how the new system changes this (showing a solution)

Tools required for “quick videos”

- Hardware
  - Computer
  - Digital camera
  - (Headset)
- Software
  - Audio recorder software or text-to-speech (e.g. http://www.naturalvoices.att.com/demos/)
  - Image manipulation program
  - Video editing program (e.g. Premiere)
  - ... or standard tools on Windows or MacOS will do

Storyboard example (from [2])
Elements of a Story Board (from [2])

1. Level of detail
   - how many objects and actors might be present
   - The level of photo-realism incorporated by the designer
   - choice to display the entire scene or only details of the interface.

2. Inclusion of text
   - tagline narrations for each pane or within individual frames
   - As speech, thought bubbles, or labels and signs

3. Inclusion of people and emotions

4. Number of frames
   - 3 and 6 (but sometimes from 1 and more than 20 frames)

5. Portrayal of time
   - time passing within a storyboard
   - use transitions that convey changes over time

Storyboards / Key Screens

- Storyboards as in movies
  - A picture for each key scene
- Sketch out the application
  - Key screens
  - Main interaction
  - Important transitions
- Helps to communicate and validate ideas
  - Easy to try out different options, e.g. document base vs. application based
- Ignore details, e.g.
  - what font to use, how icons will look like

References

  http://doi.acm.org/10.1145/1142405.1142410

History of Human computer interaction

Discussion:
What were the central innovations in Human Computer Interaction in the last 50 years?