Mensch-Maschine-Interaktion II
Human-Machine Interaction II

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(Lehrkonzept: Prof. Hußmann)

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- Chapter 2: Mobile and Ubiquitous User Interfaces
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1.2 Web Technology – A Brief Overview
1.3 Web Usability: How Do We Use the Web?
1.4 Designing Web Sites for Usability
1.5 Web Accessibility

Literature:

- Steve Krug: Don't Make Me Think, New Riders 2006 (2nd ed.)

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Building Successful Digital Products

- Tension
  - different objectives
  - different design goals

- Step by step 1-2-3

- Solution
  - Products in the overlapping space

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From A. Cooper, About Face 2.0
What is Usability?

- “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.” (Jakob Nielsen)

- “Scientific discipline using observation, measurement and design principles to enhance a site visitor’s ability to perform specific tasks” (Kathy Gill)

- “… the effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks …” (ISO)

Why is Usability Important?

- Improving usability can
  - increase productivity of users
  - reduce costs (support, efficiency)
  - increase sales/revenue (web-shop)
  - enhance customer loyalty
  - win new customers

- Several case studies that show the benefit of usability

- Usability is often considered as sign of quality

- Working with users can create ideas for new products, e.g. "similarities" feature (people who bought this also bought that) at amazon.com
  (Source: Interview Maryam Mohit)
Human-Computer Interaction Basics (1): Views and Models

- Facade & machinery and their integration
  - What the user sees and what happens in the background
  - What humans can perceive
    » Physiological and psychological limitations
  - What users want
  - What humans make of what they see
    » Mental models

- Create adequate conceptual models
  - Make the application domain visible/tangible
  - Know Thy User
  - Map internal functions to externally visible affordances
  - Create an experience

Human-Computer Interaction Basics (2): Process

- Investigate requirements seriously
  - Observations, studies, focus groups

- Usability is a central element of all development activities
  - Part of quality assurance

- Iterative development
  - Early prototypes: Paper prototypes, mock-ups
  - High-fidelity prototypes & user studies

- Guidelines and principles
  - E.g. learnability, efficiency, memorability, errors, satisfaction (Nielsen)

- Evaluation
  - Usability engineering as an empirical discipline
Web Usability

- Usability of Web sites and applications delivered over the WWW
- Dependent on several issues related to
  - Web technology
  - Web design
  - Project Management
  - Usability evaluation
- Web usability is **not** about “adding some fancy graphics, color, and cool styles at the end of the project”
- Web usability can be measured!

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What do we need for a distributed system to share documents?

- How are documents encoded?
  - Content
  - Semantics
  - Presentation
- How are documents identified?
  - Where is data held?
  - How can data be accessed?
- How are documents transmitted/transported to the user?

Distributed File Servers

- Document format
  - Any document

- Mechanism for identification
  - File name (Alias for server name and path)

- Transfer protocol
  - E.g. SMB/CIFS, NFS, AFP
The WWW Approach

- Document format
  - Hypertext Markup Language, HTML
    » Document Type of
    Standardized General Markup Language (SGML)
  - Alternative (simpler): XHTML, based on XML

- Mechanism for identification
  - Uniform Resource Identifier, URI
    » used as Uniform Resource Locator, URL

- Transfer protocol
  - Hypertext Transfer Protocol, HTTP
    » ASCII-coded Request-Reply protocol using TCP/IP

Mixture of Content, Semantics, Presentation

```xml
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/REC-html41/loose.dtd">

<html>
  <head>
    <title>Simple Example Document in HTML</title>
    <meta content="Heinrich Hussmann" name="author"/>
    <meta content="Just for demo" name="description"/>
  </head>

  <body>
    A simple text.  
    <font face="Helvetica">Font Helvetica</font>  
    <font face="Times">Font Times</font>  
    <b>Bold</b>  
    <i>Italic</i>
  </body>
</html>
```
Architecture and Protocol (simplified)

- Client-server architecture
- Synchronous communication model (request/response)
- Resources
  - Unit that is communicated between Client and Server
  - Static or dynamic

Documents and Resources

- URL analyze
- Request
- Response
- Load resource (HTML)
- Image 1
- Request
- Response
- Load resource
- Image 2
- Request
- Response
- Load resource
- ...
The WWW is a Distributed System

- What is a distributed System?
  - Tanenbaum, A.S. (from Computer Networks)
    "...in a distributed system, the existence of multiple autonomous computers is transparent (i.e., not visible) to the user."
  - Leslie Lamport:

    Received: by jumbo.dec.com (5.54.3/4.7.34)
    id AA09105; Thu, 28 May 87 12:23:29 PDT
    Date: Thu, 28 May 87 12:23:29 PDT
    From: lamport (Leslie Lamport)
    Message-Id: <8705281923.AA09105@jumbo.dec.com>
    To: src-t
    Subject: distribution

    There has been considerable debate over the years about what constitutes a distributed system. It would appear that the following definition has been adopted at SRC:

    A distributed system is one in which the failure of a computer you didn’t even know existed can render your own computer unusable.
Information Exchange Between Browser and Server

- Obviously the document
- Further information available (e.g. header fields)
  - Browser type and version
  - Operating system (version)
  - Referer
  - Cookies
  - Screen size, window size
  - If Java/JavaScript/VBScript are enabled
  - List of plug-ins installed
  - Network parameter and route
  - ...
- Rich source of information
  - Can make applications more usable
  - Information may not be complete or may be wrong

Try it out at: http://network-tools.com/analyze/

The WWW is a Distributed System Usability Issues

- Network
  - Delay
  - Failure
  - Jitter
  - Latency
  - Bandwidth

- Multi-user System
  - Work load, system performance
  - Concurrency problems
Designing Distributed Applications

- Basics
  - applications consist of several parts (e.g. different processes)
  - in general these parts are executed on different machines
  - these parts of the application are executed concurrently or one after another
  - there is communication between these parts

- Software/Application Design Aspects
  - data
    » analyzing data transfer (optimize for minimum)
    » investigate how caching can be supported
    » keep data safe (minimize data that is given away)
  - functional
    » execute functions where it is most reasonable
    » regard the infrastructure on that the applications will be executed
  - response time (optimize for minimum)

The Web Means Heterogeneity of Platforms

- Processing power
  - Processor, co-processors, cache
  - RAM
- I/O-performance
  - Hard drive speed
  - Network
- Input and Output
  - Displays
  - Keyboard layout
- Additional Hardware and Periphery
  - Video and audio (in/out)
  - Card reader, printer, scanner
- Software,
  - Browser
  - Operating System
Statistics on Platform Usage

- Never trust the statistics!
  - Also small groups of users are important!
  - Statistics may be very unreliable

OS Platform Statistics

Windows XP is the most popular operating system. The windows family counts for nearly 90%:

<table>
<thead>
<tr>
<th>2008</th>
<th>WinXP</th>
<th>W2000</th>
<th>Win98</th>
<th>Vista</th>
<th>W2003</th>
<th>Linux</th>
<th>Mac</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>72.6%</td>
<td>3.7%</td>
<td>1.1%</td>
<td>8.4%</td>
<td>1.9%</td>
<td>3.9%</td>
<td>4.4%</td>
</tr>
<tr>
<td>February</td>
<td>72.3%</td>
<td>4.0%</td>
<td>1.0%</td>
<td>7.6%</td>
<td>1.8%</td>
<td>3.8%</td>
<td>4.3%</td>
</tr>
<tr>
<td>January</td>
<td>73.6%</td>
<td>4.0%</td>
<td>0.8%</td>
<td>7.3%</td>
<td>1.9%</td>
<td>3.6%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

Browser Statistics Month by Month

<table>
<thead>
<tr>
<th>2008</th>
<th>IE7</th>
<th>IE6</th>
<th>IE5</th>
<th>Fx</th>
<th>Moz</th>
<th>S</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>21.9%</td>
<td>30.1%</td>
<td>1.1%</td>
<td>37.0%</td>
<td>1.1%</td>
<td>2.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>February</td>
<td>21.5%</td>
<td>30.7%</td>
<td>1.3%</td>
<td>36.5%</td>
<td>1.2%</td>
<td>2.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>January</td>
<td>21.2%</td>
<td>32.0%</td>
<td>1.5%</td>
<td>36.4%</td>
<td>1.3%</td>
<td>1.9%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Display Resolution

The current trend is that more and more computers are using a screen size of 1024x768 pixels or more:

<table>
<thead>
<tr>
<th>2007</th>
<th>Higher</th>
<th>1024x768</th>
<th>800x600</th>
<th>640x480</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>26%</td>
<td>54%</td>
<td>14%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

w3schools.com
Other Graphical Browsers

Plain Text Browser, e.g. Lynx
Audio Browsing

- There are users who listen to Web sites!
- Example:
  - Web browser Safari
  - Screen reader Voice Over (built into Mac OS)
- Who among the Web designers will think of these users?

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The Web Means Heterogeneity of Users

- In principle, anybody can use the Web!
- Huge span of user variety:
  - Kids
  - Beginners
  - Elderly
  - Experienced technically educated professionals
  - Technically ill-educated professionals
  - Hackers
- “Know Thy User” - Is it possible on the Web?
- Why do people use the Web?
  - Assumedly easy and simple way of achieving things
  - Because it is fun
  - Because there are no other options
- (As always:) Simplicity is most important

Steve Krug: Design and Reality
**Steve Krug: We Don’t Read Pages, We Scan Them**

- We are in a hurry.
- We know that we do not have to read everything.
- We are educated in scanning things.

**Steve Krug: We Satisfice (satisfying & sufficing)**

- We do not make optimal choices
  - We are in a hurry.
  - There is not much penalty for guessing wrong.
  - Weighing options does not guarantee success.
  - Guessing is more fun.
- Gary Klein: Sources of Power - How People Make Decisions
  - Example: Fire commanders do rarely compare options!
    - Find a reasonable plan
    - Check it for obvious problems
    - Try it!
Steve Krug: We Muddle Through

- Users in general do not care **how** and **why** things work
  - Any working solution is accepted
  - We do not have the time to analyze the details
  - There is no incentive for having it understood better

- Example:
  - Use a search box for navigating to a site