1 HCI and the Web

1.1 HCI – A Quick Reminder
1.2 Web Technology – A Brief Overview
1.3 Web Usability
1.4 Designing Web Sites for Usability
1.5 Web Accessibility

Literature:

- Steve Krug: Don’t Make Me Think, New Riders 2006 (2nd ed.)
- Shneiderman, Plaisant: Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition)
Jakob Nielsen's Alertbox, October 3, 2005 and update 2007:
Top Ten Web Design Mistakes of ...

2005
1. Legibility Problems (small font size, low contrast)
2. Non-Standard Links
3. Flash
4. Content That's Not Written for the Web
5. Bad Search
6. Browser Incompatibility
7. Cumbersome Forms
8. No Contact Information or Other Company Info
9. Frozen Layouts with Fixed Page Widths
10. Inadequate Photo Enlargement

2007
1. Bad Search
2. PDF Files for Online Reading
3. Not Changing the Color of Visited Links
4. Non-Scannable Text
5. Fixed Font Size
6. Page Titles With Low Search Engine Visibility
7. Anything That Looks Like an Advertisement
8. Violating Design Conventions
9. Opening New Browser Windows
10. Not Answering Users' Questions

http://www.useit.com/alertbox/9605.html
Jakob Nielsen's Alertbox, 2007:
Top Ten Web Design Mistakes of 2007

1. Bad Search
   - People do not find the information – they leave

2. PDF Files for Online Reading
   - People are interrupted and are presented with a different UI, non-navigable

3. Not Changing the Color of Visited Links
   - People revisit pages by error, mental load is increased

4. Non-Scannable Text
   - People are overwhelmed with boring text – they leave

5. Fixed Font Size
   - People’s preferences are ignored, harder too read for many – they leave

6. Page Titles With Low Search Engine Visibility
   - People do not find the information – they do not arrive at the page

7. Anything That Looks Like an Advertisement
   - People have learned to ignore ads – they do not find the information

8. Violating Design Conventions
   - People expect something different – they leave

9. Opening New Browser Windows
   - People loose control over their browser, back button stops working

10. Not Answering Users' Questions
    - People get confused and frustrated - they leave

Find more details at http://www.useit.com/alertbox/9605.html
How to assess usability?

- Use potential errors to create a checklist
- Use expert evaluation and checklist to assess the usability
- Analyses of use (log files)
- Heuristic evaluation
- User studies

- See the whole set of techniques of MMI1
Nielsen’s Usability Engineering Life Cycle

Pre-Design Phase:
- Conduct a field study on how users work in their environment
- Run a small user test analysis on the old design
- Make a comparative user test on competing web sites

Design Phase:
- Use parallel design to make simple prototypes of different design approaches
- Select the best design from the previous step and develop it further, then do more user testing
- Iterate this design as many times as your time and budget allows
- Almost finish site and do one market test

Post-Design Phase:
- Get statistics and feedback about real use of the web site
- Refresh your web site (minor changes)
- Start planning for the next redesign of the web site
Web Design - See Books

Many books available,
   – E.g. Mutz et al. Web Creative
   – E.g. Götz, Raster für das Webdesign
Hypertext Components

Structure
   – hypertext document: directed graph

Components
   – node: information unit
   – anchor: Information chunk within a node, target for a link
   – link: connections between nodes
Node

Single media nodes
  – only one media type per node

Mixed media nodes
  – different media types possible per node
  – alternatives, combination

Systems with limited content size
  – no internal navigation
  – e.g. HyperCard

Systems with unlimited content size
  – internal navigation necessary
  – e.g. scrolling
Anchor

Types of anchors
  – source anchor
  – target anchor

Represented as
  – button
  – icon
  – text (e.g. underlined)
  – hidden
  – animation (e.g. mouse over)
  – ...

Representation of source anchors as link

Representation of target anchors is often hidden
Links

Information content of a link

- simple (untyped) links
- typed links
  - e.g. categorized according to semantic or type of target
Linear Structures I

pure linear

strict guidance (directed)
little choices for the user
pre-caching possible
Linear Structures II

pure linear

strict guidance
little choices for the user
pre-caching possible
Linear Structures III

linear with options

guidance
some choices for the user
active interaction
different levels of detail
scenarios: different level of expertise, profiles
Linear Structures IV

linear with alternatives

guidance
some choices for the
user active interaction
scenarios: questionnaires
Linear Structures V

linear with side branches

additional information on side path
guidance on main path
Circular Structure

closed guided path
variants / side paths
entry

E.g. Web Rings
http://dir.webring.yahoo.com
Information Grid

ordered on two orthogonal criteria

user get a „feeling of space“

e.g. product catalog

possible for more dimensions
Example
Grid Information Structure I

catalog
2 dimensions

screws

M4

M6

M8

nut

M4

M6

M8

discs

4mm

6mm

8mm
Example

- catalog
- 3 dimensions
Hierarchical Information Structure

deep hierarchy

flat hierarchy
Lookup table (A-Z)
6-10 is reasonable
(cognitive psychology)
Linked Information Structures

pure webs

difficult for orientation
extremely expressive
Web Structures

When to use what? - Time to think ...

• Pure linear (directed, undirected)

• Linear with options

• Linear with alternatives

• Linear with side branches
Web Structures

- Circular - closed path
- Information grid
- Hierarchy - deep
- Hierarchy - flat
- Pure webs
1   HCI and the Web

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1.5   Web Accessibility
Accessibility & Universal Access
... why is it important?

Figures from the USA

– In 1997, 52.6 million people (19.7 percent of the population) had some level of disability
– 33.0 million (12.3 percent of the population) had a severe disability.
– About 10.1 million individuals (3.8 percent of the population) needed personal assistance
– 2.2 million used a wheelchair.
– Another 6.4 million used some other ambulatory aid such as a cane, crutches, or a walker.
– About 7.7 million individuals have problems reading letters in ordinary newspaper print; of them, 1.8 million were unable to see.

– From http://www.census.gov/hhes/www/disable/sipp/disab97/asc97.html
Accessibility & Universal Access
... why is it important?

– From http://www.census.gov/hhes/www/disable/sipp/disab97/asc97.html
– And http://www.census.gov/prod/2008pubs/p70-117.pdf
Accessibility & Universal Access
... why is it important?

Figures from Germany
- 155,000 blind people
- 500,000 visually impaired
- 1,1 Million have motor deficiencies (movement and control of body parts)
- 236,000 are hard of hearing or deaf

Assistive technologies
- Use of associative technologies is widespread in these groups (~30%)
- Large screens and magnified presentation
- Braille Displays
- Text to speech (screen readers)
- Speech input and speech control
- Special keyboards and input devices (if motor control for standard mouse and keyboard is not sufficient)
Accessibility & Universal Access
... why is it important?

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<th>Menschen mit Behinderung</th>
<th>2001</th>
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</table>

http://www.sgipt.org/gesko/stat/behind0.htm
Accessibility - Legal Base

Legal requirements

- In Germany:
  - Behindertengleichstellungsgesetz
    http://www.behindertenbeauftragte.de/cln_153/nn_1040386/DE/Gleichstellung/
    Behindertengleichstellungsgesetz/Behindertengleichstellungsgesetz__node.html
  - Verordnung zur Schaffung barrierefreier Informationstechnik nach dem
    Behindertengleichstellungsgesetz (BITV)
    http://www.gesetze-im-internet.de/bitv/BJNR265400002.html

- USA
  - Section 508
    http://www.section508.gov/

It is required by law (Germany)

- Since 31. December 2005 for general information
- Since 31. December 2003 for information that is targeted at people with disabilities
Types of Disabilities

Visual
- Blindness
- Low vision
- Color blindness

Hearing
Motor skills

Cognitive disability
- Reading disorders
- Attention disorders
- Memory impairments

See, e.g. http://www.web-accessibility.co.uk/types-of-disability.asp
Blindness

User cannot see visual content
- Pictures, diagrams, animations, etc.

May use a screen reader to get information
- Cannot scan a page quickly
- Must navigate linearly through text

Solutions
- Provide structure to text for easy navigation
- Add text or audio descriptions to images/video
- Follow standards for maximum compatibility with screen readers
Low vision

Many types
  – Poor vision quality
  – Partially occluded vision

Very common in seniors

Low-contrast text difficult to read

Solutions
  – Allow font resizing
  – Allow color schemes to be changed
  – Add text or audio descriptions to images/video
Color blindness

Inability to distinguish between certain colors
  – Affects 10% of males
  – Often have problems with red and green

Solutions
  – Allow color schemes to be changed
  – Don’t differentiate on hue alone
    • Saturation
    • Value
    • Shape
Color blindness

What most people see

What color-blind users see

visibone.com
Color blindness

Vischeck
Is this accessible?

Big Fish Games
Better

PopCap Games
Hearing impairment

User cannot hear audio content

This one is easy to test for
   – Turn off your speakers!

Solution
   – Provide captioning for all audio content
Impaired motor skills

Difficulty using mouse and keyboard
  – Inaccuracy while clicking
  – Slow input
  – May use specialized input device

Solutions
  – Do not require precise clicking
  – Allow alternate input methods
    • Keyboard
    • Mouse
    • Voice
Cognitive disabilities

Many types
- Learning disabilities
- Attention deficit disorder
- Memory impairments
- Impairments of intelligence

May have difficulty focusing on or processing information

Solutions
- Clear, simple design
- Simple navigation
- Avoid distracting elements (video, navigation)
Universal design principles

Equitable Use
- The design is useful and marketable to people with diverse abilities

Flexibility in Use
- The design accommodates a wide range of individual preferences and abilities

Simple and Intuitive Use
- Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Perceptible Information
- The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
Universal design principles

Tolerance for Error
– The design minimizes hazards and the adverse consequences of accidental or unintended actions

Low Physical Effort
– The design can be used efficiently and comfortably and with a minimum of fatigue

Size and Space for Approach and Use
– Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility
Assistive Technologies - Screenreader

Software that reads what is on the screen
Provides navigation
Integrates with application software

Example: JAWS
- Includes a software speech synthesizer
- Can output to Braille display
- Demo: http://www.freedomscientific.com/fs_downloads/jaws.asp

Firefox Plugin
- “We created a Firefox extension to help blind people with CAPTCHAs and image translation! It adds a contextual menu item, so just right click on any image and "Send to CAPTCHA Killer". A new window will popup and display the result. This is very beta - but maybe it will help some of you out there”
Assistive Technologies
Braille Displays

Used with a JAWS screen reader
Refreshable Braille cells act as a tactile monitor (e.g. 44-, 70- and 84-cells)
Navigation controls are on the display
Quite expensive (> 5000 €)

http://www.sightandsound.co.uk/
http://www.accesstech.ch/
Assistantive Technologies
Braille Printer
E.g. Basic-S Printer
Speed
- 150 PPH (pages per hour) or 39 CPS (characters per second).
Technology
- 6 High quality hardened hammers forming against hardened steel anvils

http://www.sightandsound.co.uk/

http://www.brailler.com/juli2.htm
Web Accessibility Evaluation

Guidelines available from W3C
http://www.w3.org/TR/2004/WD-WCAG20-20040311/

Guidelines are divided into three categories of success criteria:

– Level 1 success criteria:
  • do not specify how information is presented
  • are reasonably applicable to all Web sites
  • some are machine-testable. Others require human judgment. Success criteria that require human testing yield consistent results among multiple testers.

– Level 2 success criteria:
  • may require an author to present content in particular ways
  • are reasonably applicable to all Web sites
  • some are machine-testable. Others require human judgment. Success criteria that require human testing yield consistent results among multiple testers.

– Level 3 success criteria:
  • are additional criteria that go beyond Level 1 and 2 that may be applied to make sites accessible to more people with all or particular types of disability

– Conformance
  • WCAG 2.0 A, WCAG 2.0 A+, WCAG 2.0 AA, WCAG 2.0 AAA
Quick Tips to make Accessible Web Sites

- Images & animations: Use the alt attribute to describe the function of each visual.
- Image maps. Use the client-side map and text for hotspots.
- Multimedia. Provide captioning and transcripts of audio, and descriptions of video.
- Hypertext links. Use text that makes sense when read out of context. For example, avoid "click here."
- Page organization. Use headings, lists, and consistent structure. Use CSS for layout and style where possible.
- Graphs & charts. Summarize or use the longdesc attribute.
- Scripts, applets, & plug-ins. Provide alternative content in case active features are inaccessible or unsupported.
- Frames. Use the noframes element and meaningful titles.
- Check your work. Validate. Use tools, checklist, and guidelines at http://www.w3.org/TR/WCAG

http://www.w3.org/WAI/References/QuickTips/
Software to Check Guidelines - Examples

IBM Rational Policy Tester for privacy, quality, and accessibility

http://achecker.ca/checker/index.php
(formerly A-promt: http://aprompt.snow.utoronto.ca/)

http://www.anybrowser.com/
http://www.barrierekompass.de/
http://validator.w3.org/