

Mensch-Maschine-Interaktion II

Human-Machine Interaction II

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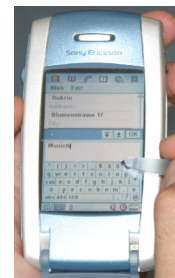
(Lehrkonzept: Prof. Hußmann)

Structure

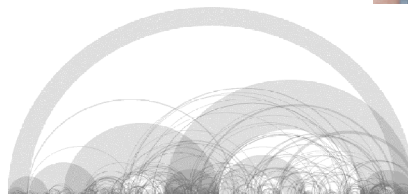
- Chapter 1:
HCI and the WWW



- Chapter 2:
Mobile and Ubiquitous User Interfaces



- Chapter 3:
Information Visualization



1 HCI and the Web

1.1 HCI – A Quick Reminder

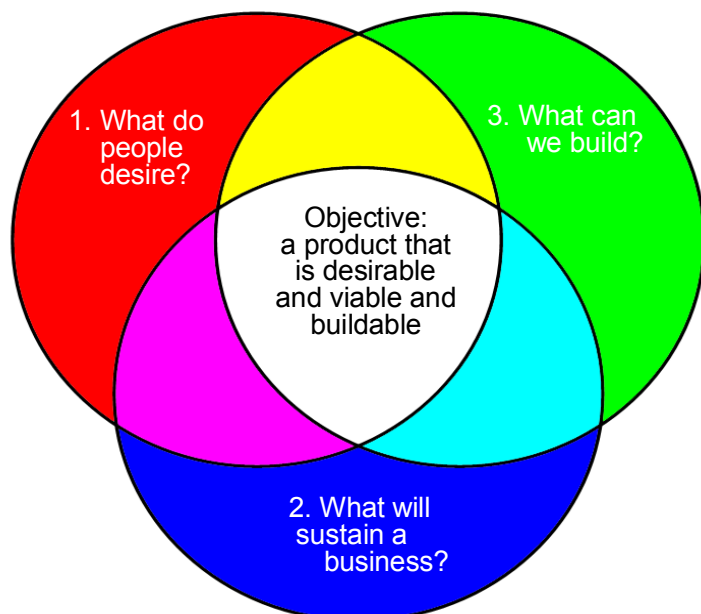
- 1.2 Web Technology – A Brief Overview
- 1.3 Web Usability: How Do We Use the Web?
- 1.4 Designing Web Sites for Usability
- 1.5 Web Accessibility

Literature:

- Jakob Nielsen: Designing Web Usability, New Riders 2000
- Steve Krug: Don't Make Me Think, New Riders 2006 (2nd ed.)

Building Successful Digital Products

- Tension
 - different objectives
 - different design goals
- Step by step 1-2-3
- Solution
 - Products in the overlapping space



From A. Cooper, About Face 2.0

What is Usability?

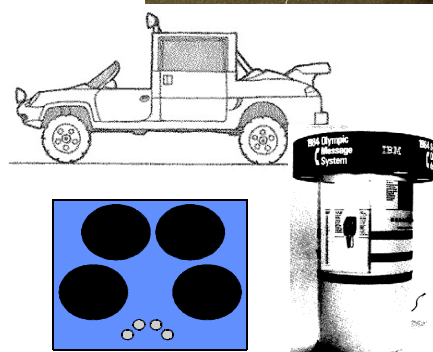
- “Usability is a quality attribute that assesses how easy user interfaces are to use. The word ‘usability’ also refers to methods for improving ease-of-use during the design process.” (Jakob Nielsen)
- “Scientific discipline using observation, measurement and design principles to enhance a site visitor’s 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)

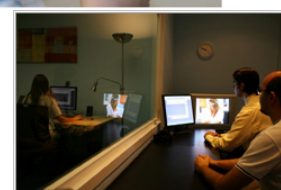
Human-Computer Interaction Basics (1): Views and Models

- 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

```
<!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 name="author" content="Heinrich Hussmann">
```

```
<META name="description" content="Just for demo">
```

```
</HEAD>
```

```
<BODY>
```

```
A simple text. <BR>
```

```
<FONT FACE="Helvetica">Font Helvetica</FONT> <BR>
```

```
<FONT FACE="Times">Font Times</FONT> <BR>
```

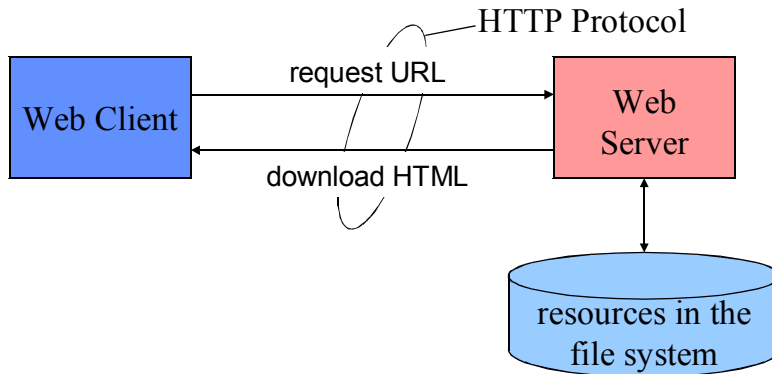
```
<B>Bold</B> <I>Italic</I>
```

```
</BODY>
```

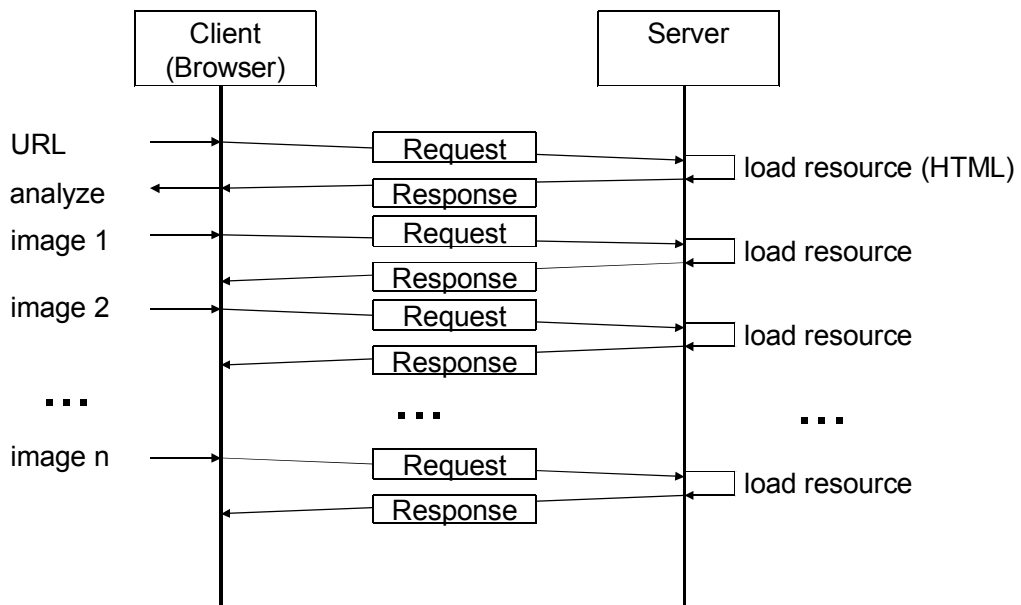
```
</HTML>
```

Architecture and Protocol (simplified)

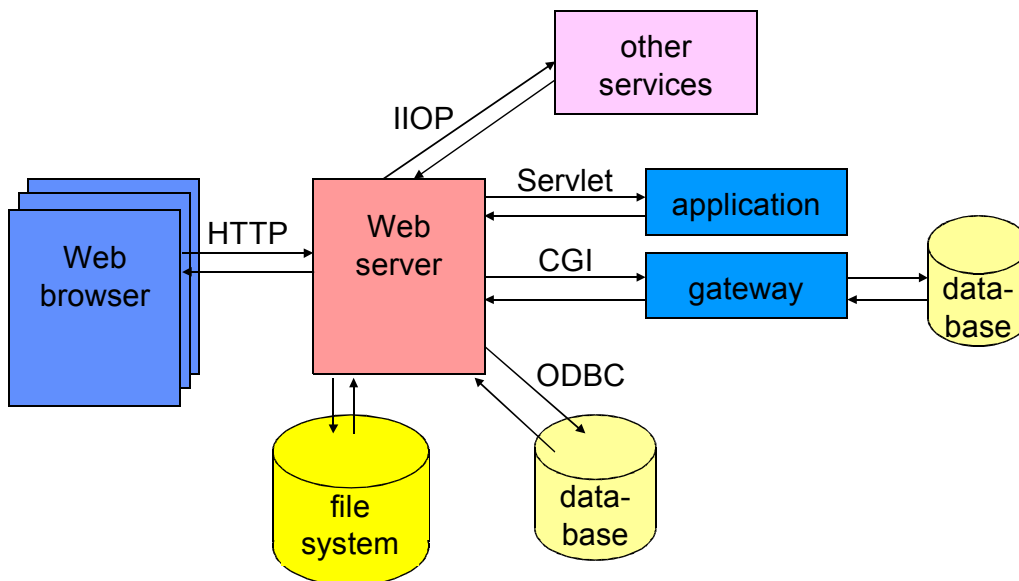
- Client-server architecture
- Synchronous communication model (request/response)
- Resources
 - Unit that is communicated between Client and Server
 - Static or dynamic



Documents and Resources



Example Architecture



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.
    
```

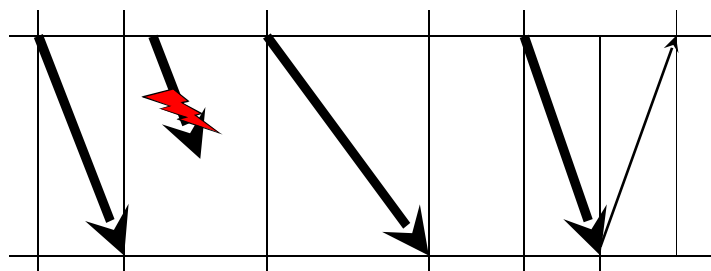
Information Exchange Between Browser and Server

- 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%:

2008	WinXP	W2000	Win98	Vista	W2003	Linux	Mac
March	72.6%	3.7%	1.1%	8.4%	1.9%	3.9%	4.4%
February	72.3%	4.0%	1.0%	7.6%	1.8%	3.8%	4.3%
January	73.6%	4.0%	0.8%	7.3%	1.9%	3.6%	4.4%

Browser Statistics Month by Month

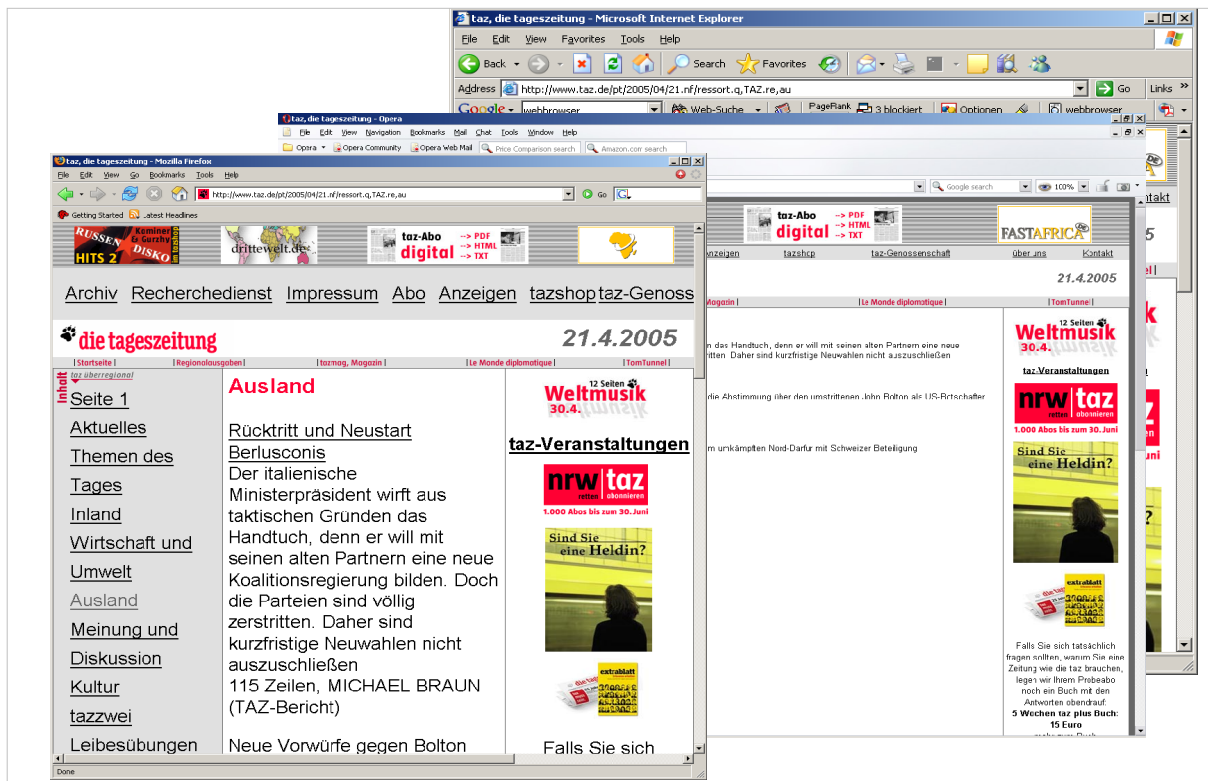
2008	IE7	IE6	IE5	Fx	Moz	S	O
March	21.9%	30.1%	1.1%	37.0%	1.1%	2.1%	1.4%
February	21.5%	30.7%	1.3%	36.5%	1.2%	2.0%	1.4%
January	21.2%	32.0%	1.5%	36.4%	1.3%	1.9%	1.4%

Display Resolution

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

2007	Higher	1024x768	800x600	640x480	Unknown
January	26%	54%	14%	0%	6%

w3schools.com



Other Graphical Browsers

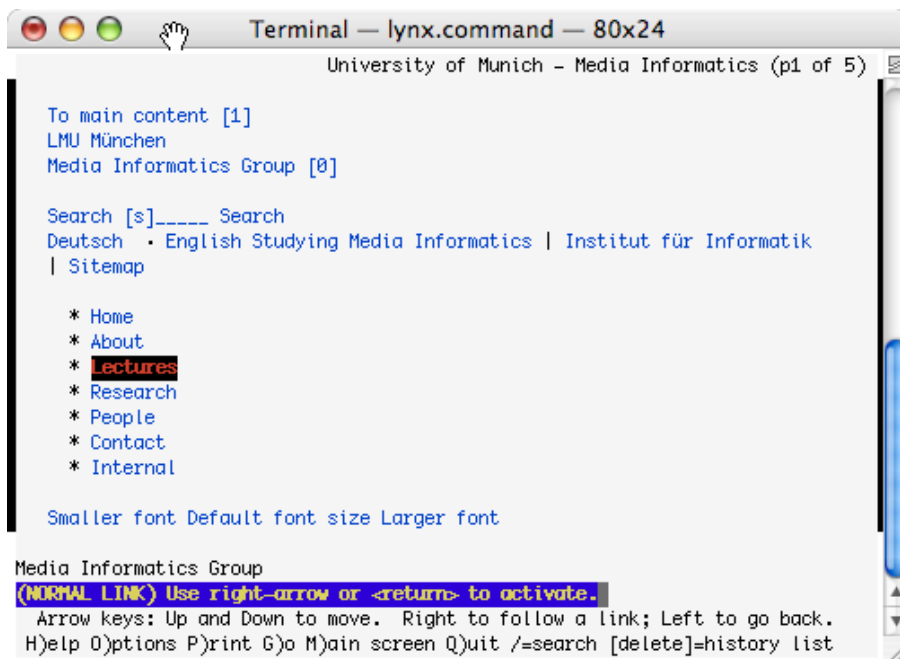


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Plain Text Browser, e.g. Lynx



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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?



VoiceOver

Your Mac speaks for itself.



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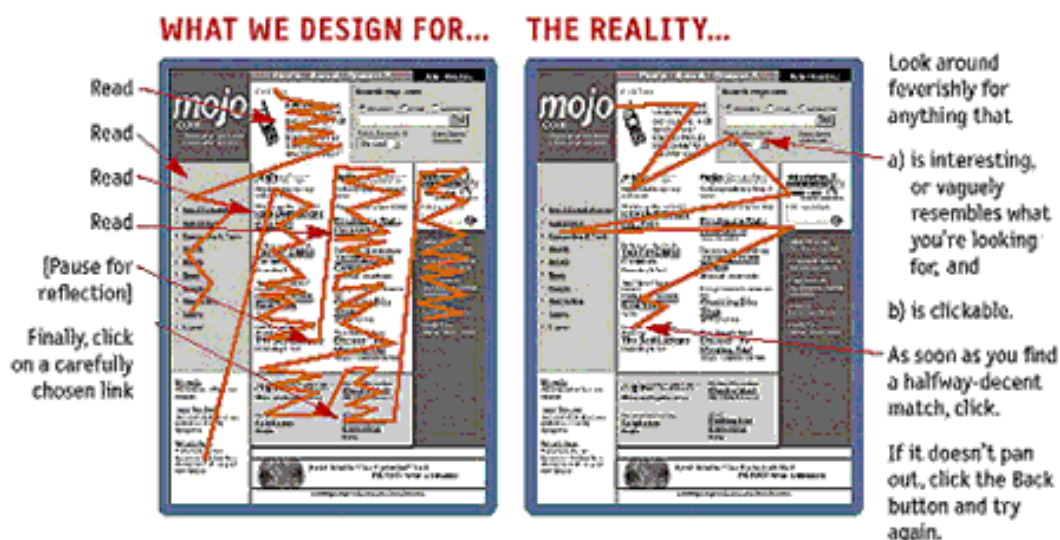
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The Web Means Heterogeneity of Users

- 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

