

Design Principles

SMD157
Human-Computer Interaction
Fall 2005

Overview

- User-center design
- Guidelines
 - Ten usability heuristics (plus 1)

User-Center Design

Why Involve Users at All?

- **Expectation management**
 - Realistic expectations
 - No surprises, no disappointments
 - Timely training
 - Communication, but no hype
- **Ownership**
 - Make the users active stakeholders
 - More likely to forgive or accept problems
 - Can make a big difference to acceptance and success of product

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Degrees of User Involvement

- **Member of the design team**
 - Full time: constant input, but lose touch with users
 - Part time: patchy input, and very stressful
 - Short term: inconsistent across project life
 - Long term: consistent, but lose touch with users
- **Newsletters and other dissemination devices**
 - Reach wider selection of users
 - Need communication both ways
- **Combination of these approaches**

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How Microsoft Involves Users

- **Users are involved throughout development**
 - "Activity-based planning:" studying what users do to achieve a certain activity (task)
 - Usability tests e.g. Office 4.0 over 8000 hours of usability testing.
 - Internal use by Microsoft staff
 - Customer support lines

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What is a User-Centered Approach?

- User-centered approach is based on:
 - Early focus on users and tasks: directly studying cognitive, behavioral, anthropomorphic & attitudinal characteristics
 - Empirical measurement: users' reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analyzed
 - Iterative design: when problems are found in user testing, fix them and carry out more tests

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Early Focus on Users and Tasks

- Users' tasks and goals are the driving force behind the development
- Users' behavior and context of use are studied and the product is designed to support them
- Users' characteristics are captured & designed for
- Users are consulted throughout development, from earliest phases to the latest, and their input is seriously taken into account
- All design decisions are taken within the context of the user, their work and their environment

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Understanding Users' Work

- Understanding users' work is significant
- Ethnography:
 - From anthropology
 - "Writing the culture"
 - Participant observation
- Difficult to use the output of ethnography in design

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Framework for Using Ethnography in Design

- Distributed co-ordination: distributed nature of the tasks & activities, and the means and mechanisms by which they are coordinated
- Plans and procedures: organizational support for the work, such as workflow models and organizational charts, and how these are used to support the work
- Awareness of work: how people keep themselves aware of others' work

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Coherence

- A method which offers appropriate questions to help address these key dimensions
- For example:
 - Distributed Coordination: How is the division of labor manifest through the work of individuals and its co-ordination with others?
 - Plans and procedures: How do plans and procedures function in the workplace?

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Contextual Design

- Developed to handle data collection and analysis from fieldwork for developing a software-based product
- Used quite widely commercially
- Contextual Design has seven parts:
 - Contextual inquiry
 - Work modeling,
 - Consolidation,
 - Work redesign,
 - User environment design,
 - Mock-up and test with customers,
 - Putting it into Practice

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Contextual Inquiry

- An approach to ethnographic study where user is expert, designer is apprentice
- A form of interview, but
 - At users' workplace (workstation)
 - 2 to 3 hours long
- Four main principles:
 - Context: see workplace & what happens
 - Partnership: user and developer collaborate
 - Interpretation: observations interpreted by user and developer together
 - Focus: project focus to help understand what to look for

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Work Modeling

- In interpretation session, models are drawn from the observations:
 - **Work flow model:** the people, communication and co-ordination
 - **Sequence model:** detailed work steps to achieve a goal
 - **Artifact model:** the physical 'things' created to do the work
 - **Cultural model:** constraints on the system from organizational culture
 - **Physical model:** physical structure of the work, e.g. office layout

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Consolidation

- Each contextual inquiry (one for each user/developer pair) results in a set of models
- These need to be consolidated into one view of 'the work'
- Affinity diagram
 - Organizes interpretation session notes into common structures and themes
 - Categories arise from the data
 - Diagram is built through induction
- Work models consolidated into one of each type

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Participatory Design

- Scandinavian history
- Emphasizes social and organizational aspects
- Based on study, model-building and analysis of new and potential future systems
- Aspects to user involvement include
 - Who will represent the user community?
Interaction may need to be assisted by a facilitator
 - Shared representations
 - Co-design using simple tools such as paper or video scenarios
 - Designers and users communicate about proposed designs
 - Cooperative evaluation such as assessment of prototypes

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Summary from a Participatory Design Session



InteractiveMessageBoard.mpg

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Two Traditions in User-Centered Design

- | | |
|--|--|
| <ul style="list-style-type: none">• Participatory Design<ul style="list-style-type: none">- Natural environments- Users participate- Focus on use- Use model- Design the work- Role playing | <ul style="list-style-type: none">• Contextual Design<ul style="list-style-type: none">- Natural environments- Users participate- Focus on system- System model- Design the artifact (system)- Evaluation |
|--|--|

Note the similarities!

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Guidelines

Ten Usability Heuristics (Plus 1)

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Ten Usability Heuristics

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

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Visibility of System Status

- Appropriate feedback
- Timely feedback
- Application to the Web
 - Where am I?
 - Where can I go next?

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Feedback - Dialog Box

Uppdaterar indexet över personer i databasen

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Web Visibility

Where am I?

Where can I go?



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Match Between System and the Real World

- Speak the users' language
- User, not system-oriented terms.
- Information appears in a natural and logical order.
- For the web \Rightarrow users can be anyone, their language is a challenge

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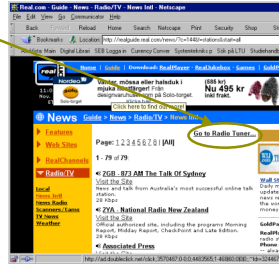
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User's Language

Users Language



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User Control and Freedom

- Clearly marked "emergency exits"
- Support undo and redo.
- Web ⇒ "home" link for your site

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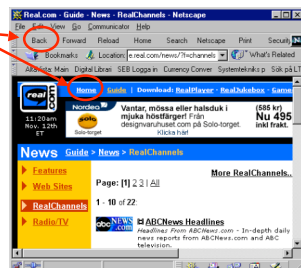
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Emergency Exits

Emergency Exits



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Consistency and Standards

- Same words, situations, and actions throughout.
- Follow platform conventions.
- Web ⇒ users can come from any site to any page

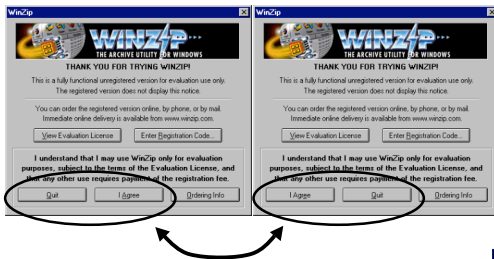
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Consistency: Avoid Symbols that Move



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Consistency: Avoid Different Names for the Same Action

New	Initialize
Open...	Load File
Save	Store
Save As...	Store As...
Print...	Hardcopy
Print Setup...	Print Setup...
Repaginate...	Repaginate...
Exit	Quit


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Consistency: Avoid Different Symbols for the Same Action

- Help Next
- 

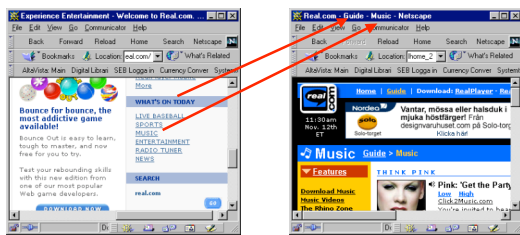
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Consistency?



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Error Prevention

- Gray-out invalid menu items
- Provide templates for fields
- Check form data!

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Recognition Rather than Recall

- Make objects, actions, and options visible
- The user should not have to remember information
- Instructions for use of the system should be visible or easily retrievable
- Web:
 - ⇒ Show path to page, don't make users remember
 - ⇒ Server-side map images are invisible links
 - ⇒ Good labels and descriptive links crucial

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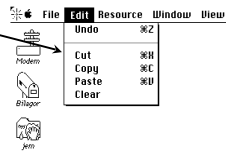
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Flexibility and Efficiency of Use

- Accelerators
- Allow users to tailor frequent actions.
- Web:
 - ⇒ Bookmarks are accelerators
 - ⇒ Do not use frames so that effective bookmarks are prevented
 - ⇒ Do not generate temporary URLs that have a short lifespan



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Aesthetic and Minimalist Design

- Dialogues and displays should not contain information which is:
 - Irrelevant
 - Rarely needed
- Web:
 - ⇒ Use a link for rarely needed information
 - ⇒ Progressive level of detail
 - ⇒ Format for the web

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Help Users Recognize, Diagnose, and Recover from Errors

- Error messages should be expressed in plain language
- Precisely indicate the problem
- Suggest a solution.
 - Web example, if a search has no hits, don't say "broaden", provide a link with a broadened search

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Error Messages

- Avoid
 - Selection from a list/menu
 - Direct manipulation style interfaces
 - Reduce errors by ensuring complete and correct actions:
 - + Correct matching pairs
 - + Complete sequences
 - + Correct command (KERMIT and "recieve".)
- Error Message Requirements
 - What happened?
 - Why did it happened?
 - How serious it is?
 - How is it fixed?

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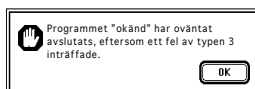
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Bad Error Messages

ERROR 37
YOUR PROGRAM WAS TERMINATED
Segmentation fault (core dumped)



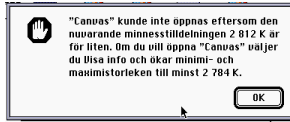
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Right Message, Wrong Reason?



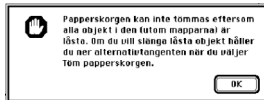
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A Good Error Message



What would make it better?

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Broadening the Search

Selecting one result



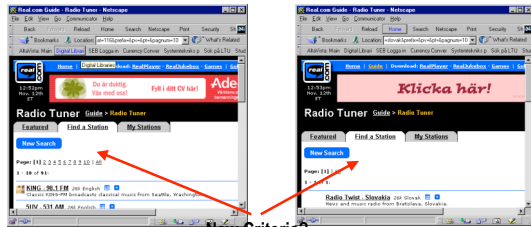
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But, ... Make It Clear



Clicking "Classical"

New Criteria?

Clicking "Slovak"

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Help and Documentation

- Easy to search
- Focused on the user's task
- List concrete steps to be carried out
- Not too large.
- Web ⇒ integrate the documentation into your site!

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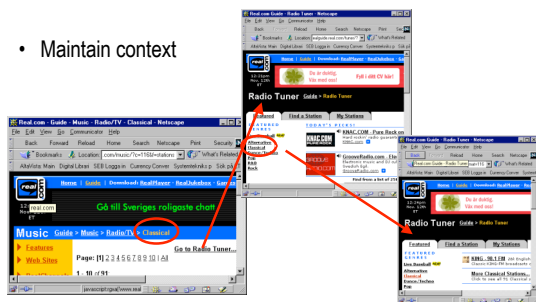
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David's Eleventh Heuristic

- Maintain context



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Summary

- User-center design
 - User participation is essential for usable systems
- Guidelines
 - Ten usability heuristics (plus 1)

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Questions?



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