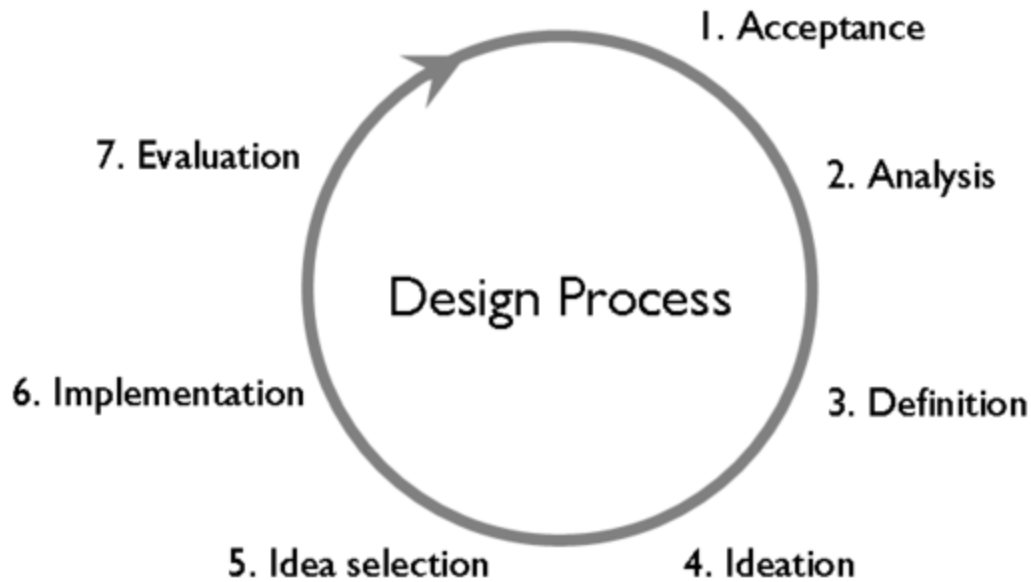


CS 315 – Intro to Human Computer Interaction (HCI)

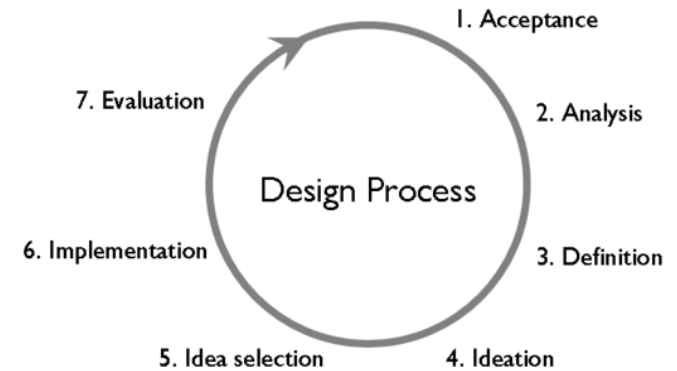
A decorative graphic consisting of a solid blue horizontal bar that spans the width of the slide. Below this bar, on the right side, are several horizontal lines of varying lengths and colors (light blue and white) that create a stepped, layered effect.

The Design Process [Koberg & Bagnall]



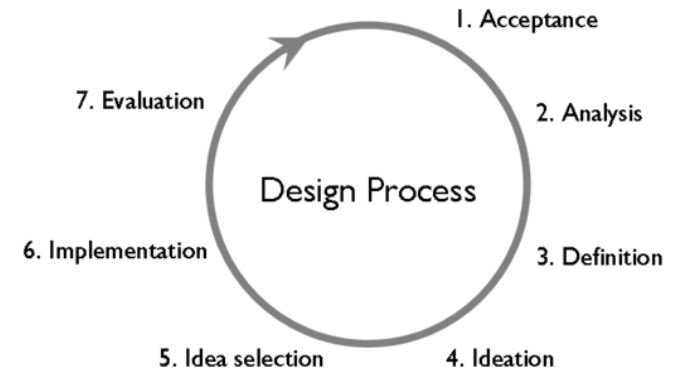
Acceptance

- Getting started
 - Because of a deadline
 - Because of possible reward
 - Because you are forced to
- Commitment
 - Time
 - Resources
 - Responsibility
- Key is to set motivation



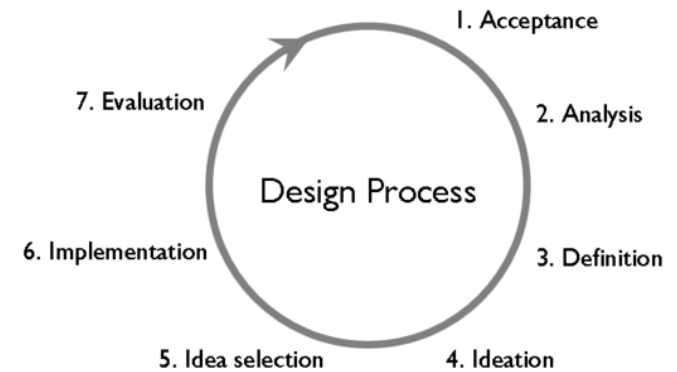
Analysis

- Understand users and tasks
- Who are the users?
- What are their tasks?
- Observe and test, don't guess
- Tools
 - Notebook
 - Tape recorder
 - Camera
 - Video camera



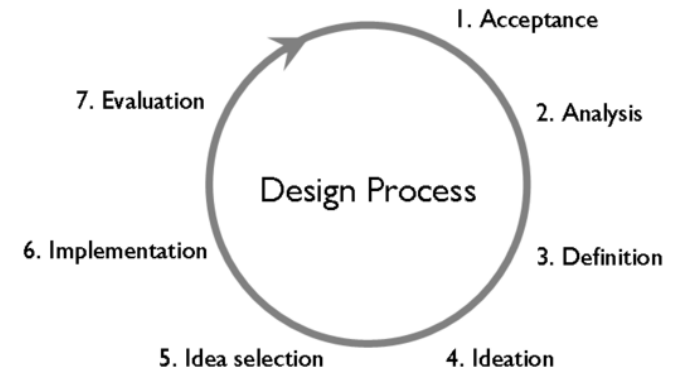
Definition

- Focus on the problem
 - Choose appropriate level of detail
- Posing the right problem is critical, neither too narrow, nor too fuzzy



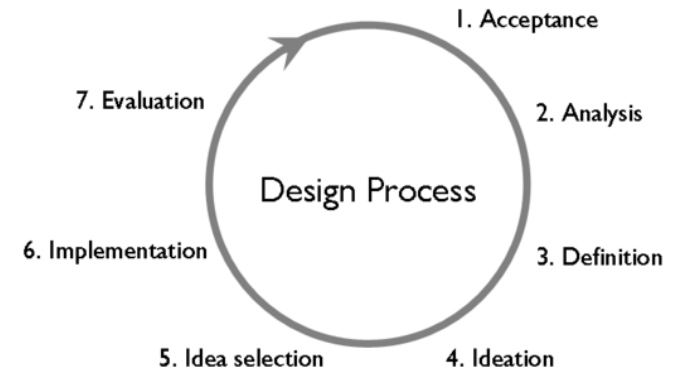
Ideation

- Brainstorming
 - Stretch mental muscles
 - Loosen up with simple games
 - Do homework
 - Seed with related ideas/objects
 - Get physical
 - Sketch
 - Make models
 - Act out
 - IDEO rules
 - One conversation at a time
 - Stay focused
 - Encourage wild ideas
 - Defer judgment
 - Build upon idea from others
- Aim for quantity, hope for quality 😊



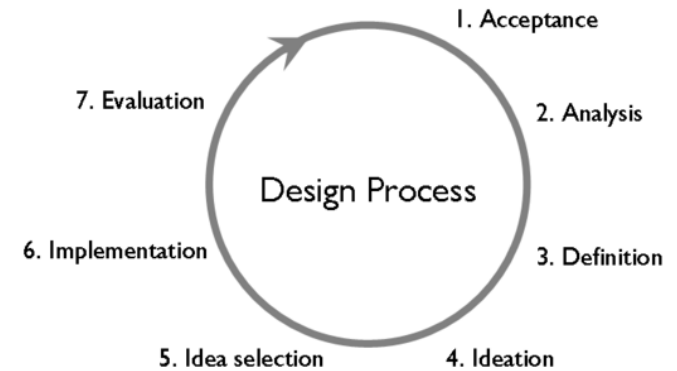
Idea Selection

- Define importance of each idea
 - Does it address problem
 - Will target users like it
 - Is hardware available
 - Is software available
 - What is the cost
 - Market window
- Rank ideas according to your criteria
- Pick top N
 - Choices depend on resources and stage of the project



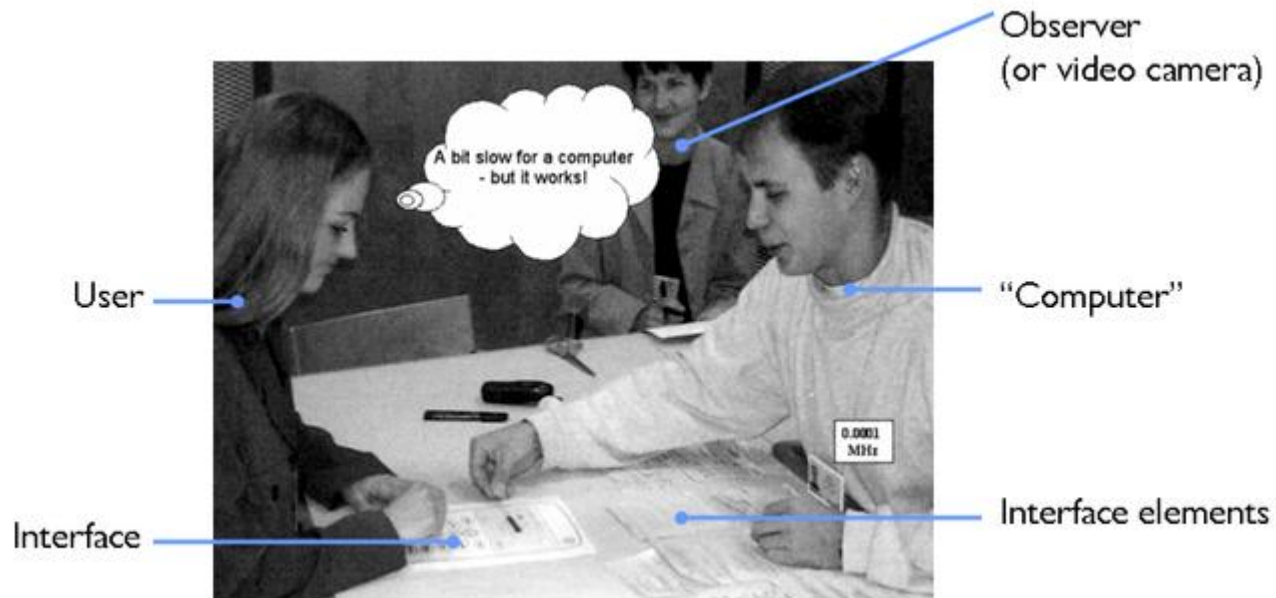
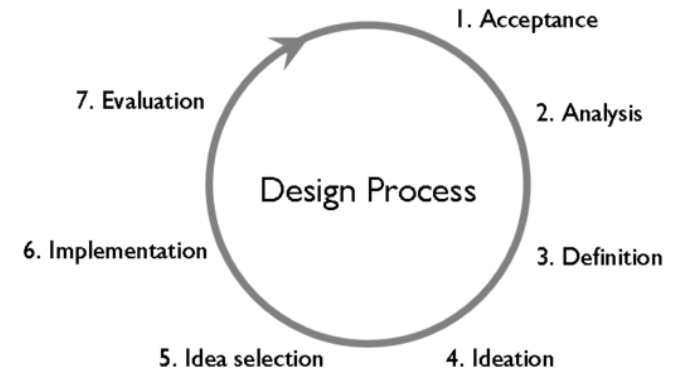
Implementation

- Scale up low -> high fidelity
 - Low-fidelity (quick, cheap, dirty)
 - sketches, paper models, foam core, ...
 - Medium fidelity (slower, more expensive)
 - Flash, JavaScript, AJAX, ...
 - High fidelity (slowest, most expensive)
 - The full interface



Evaluation

- Prototype Walkthroughs



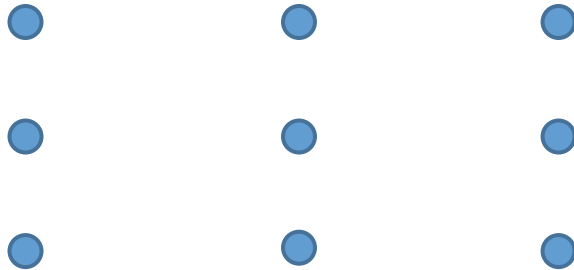
Your Brainstorming Session

Psychology of Creativity

- Conformity: the enemy of creativity
- Pressure to conform affects judgment and perception
- People in minority will adopt majority opinion and even manufacture their own explanation for them

Enhancing Creativity

- Thinking outside the box
 - Draw a series of 4 straight lines through all the points below, without lifting pen from paper



Why was this hard?

- We adopt expectations about the solution
 - Based on conventions
 - Based on what we believe

Creativity and Dissent

- Authentic dissenters:
 - People who really disagree with the group
 - Can enhance group creativity
- Their opinion needn't be right, but they can free the group from stagnant thinking
- The originality of the minority stimulates the majority

IDEO's Brainstorming Rules

- Sharpen the focus
- Playful Rules
- Number your Ideas
- Build and Jump
- The Space Remembers
- Stretch your Mental Muscles
- Get Physical

The Space Remembers

- Covering whiteboards or papering walls with text is extremely useful in group work.



Stretch your Mental Muscles

- Warmups: word games, puzzles
- Get immersed in the domain: go visit the toy shop, or the bicycle shop, phone shop etc...
- Bring some examples of the technology to the brainstormer



The state of HCI art has gone way
past intuition.....

.... though reality doesn't quite reflect that yet

Three levels for better design:

- Guidelines
 - Very specific rule sets usually centered on organizations or commercial entities
- Principles
 - Mid level of abstractions
- Theories and Models
 - Universal notions, capable of being predictive

Guidelines

Guidelines

- Shared language
- Best practices
- Critics
 - Too specific, incomplete, hard to apply, and sometimes wrong
- Proponents
 - Encapsulate experience

Guidelines

- By far the most heavily documented
 - Each set of guidelines is an HCI universe unto itself
- Well known guidelines include:
 - [Apple Human Interface Guidelines](#)
 - [Windows User Experience Interaction Guidelines](#)
 - [Android User Interface Guidelines](#)
- We will focus on specific tidbits of interest from assorted guidelines documents

National Cancer Institute

- 388-guideline set for web pages
 - Standardize task sequences
 - Ensure that embedded links are descriptive
 - Use unique and descriptive headings
 - Use radio buttons for mutually exclusive options
 - Develop pages that will print properly
 - Use thumbnail images to preview larger images

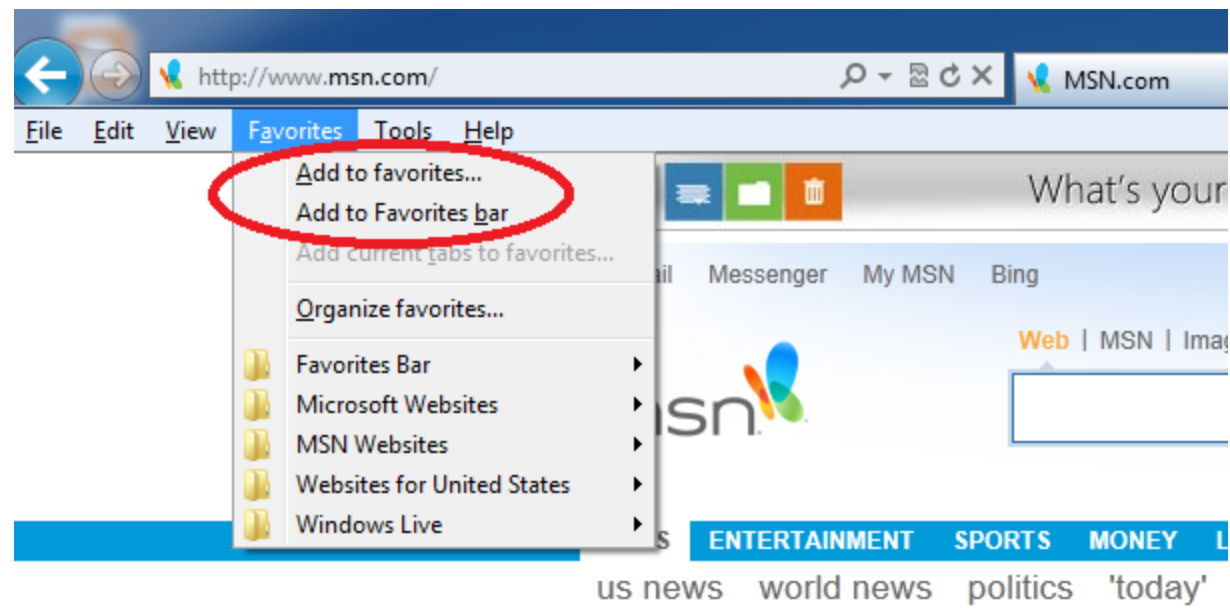
W3C guidelines for accessibility

- Provide a text equivalent for every non-text element
- For any time-based multimedia presentation synchronize equivalent alternatives
- Information conveyed with color should also be conveyed without it
- Title each frame to facilitate form identification and navigation

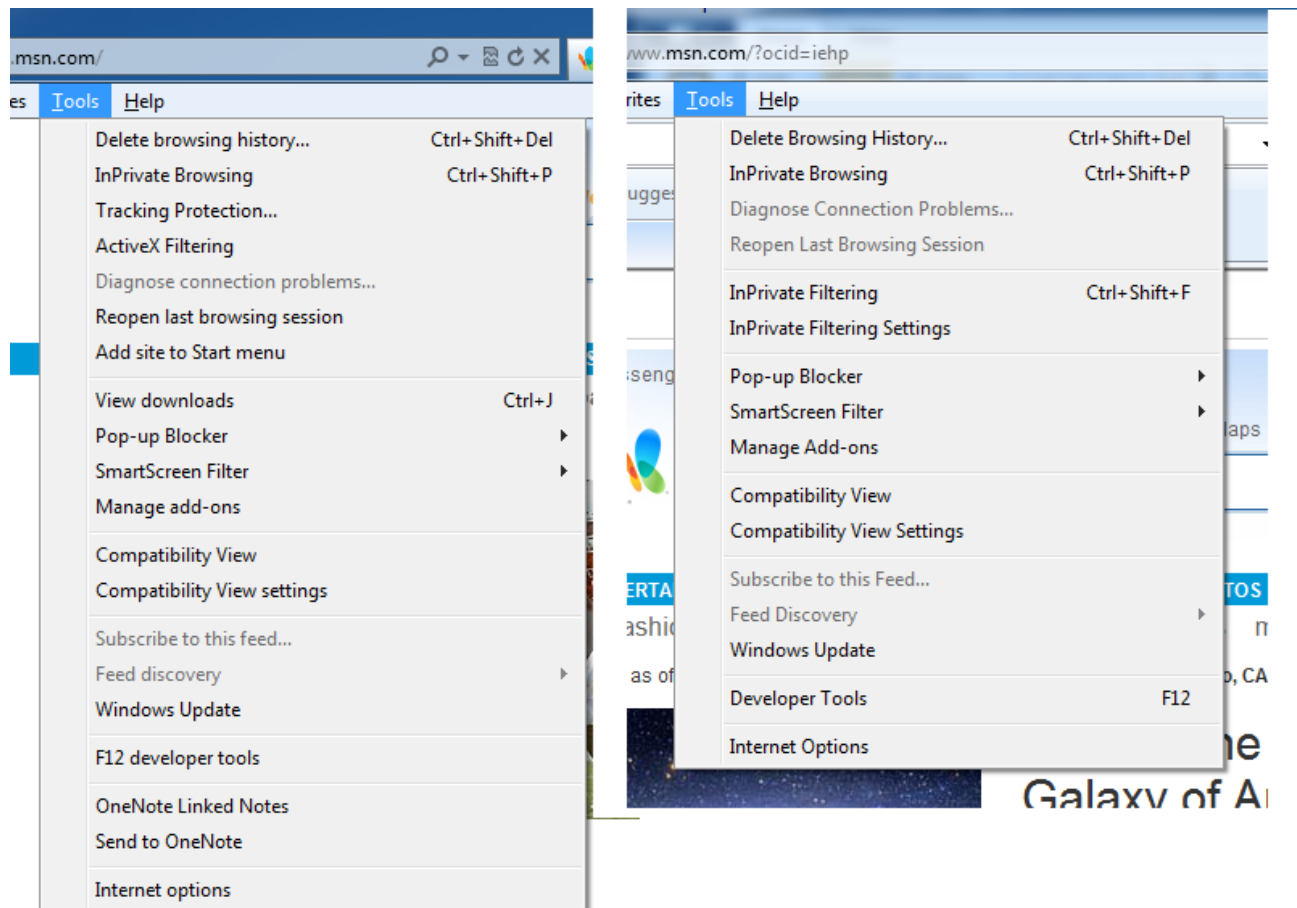
Organizing the display

- Smith and Mosier (1986) offer five high-level goals
 - Consistency of data display
 - Efficient information assimilation by the user
 - Minimal memory load on the user
 - Compatibility of data display with data entry
 - Flexibility for user control of data display

IE9



IE9



- Gabor rushed to hospital
- Women

Entering phone numbers

Phone:

Phone: () -

Getting the user's attention

- Wickens and Hollands (2000) offer these techniques for getting the user's attention:
 - Intensity
 - Marking
 - Size
 - Choice of fonts
 - Inverse video
 - Blinking
 - Color
 - Audio

Use of color

The screenshot displays the Causecast website interface. At the top, the logo "CAUSECAST" is prominently featured in white on a dark blue background. Navigation links include "VIDEOS", "ORGANIZATIONS", "LEADERS", "MEMBERS", "WHO WE ARE", and "DONATE". A search bar is located to the right of the navigation. Below the navigation, a horizontal menu lists various categories: "Explore Causes: ANIMALS, ARTS, COMMUNITY, ENVIRONMENT, HEALTH, HUMAN RIGHTS, YOUTH". The main content area features a large video player on the left showing a person holding a newspaper titled "Human Rights". To the right, a "LATEST VIDEOS" section lists several videos with their titles, dates, and view counts. At the bottom, a pink banner promotes Causecast as a place to explore issues and connect with a community. Below this, there are sections for "Featured News", "Causecast Activity", and a "CAUSECONNECT" form with an "Email Address" input field and a "Subscribe" button.

CAUSECAST is a place to explore issues while helping you connect with a community of people wanting to make a difference. [Join Now](#) or [Log In](#).

CAUSECONNECT
Email Address
[Subscribe](#)

Use of colors and symmetry

REKALL WIN A LUXURY BREAK United States (English)

For The Memory Of A Lifetime

HOME | CHEAP CAR | CHEAP HOTELS | WIFE RESTAURANTS | REALTY CHECKS | EDWORKERS | MARRIAGES

Search: Manage My Account | Live This Site | Memory Questions | Desktop Planning | Special Offers | Contact Customer Services

READY FOR DREAM LAND?
CATALOGUE FOR THE YEAR 2006 NOW AVAILABLE

VIRTUAL TRIPS | FALSE MEMORIES | FAKE JOBS

Realistic Dream Ego Trip

Choose severity: Normal One | Duration Time: 00 Weeks | Details: 00 Subunits

Going to: Mars | Special Package: Fruits & Vegetables | 00 Personalities

I have read and accept Terms of Use | I do not have any previous memory replacements

BOOK CHEAP VIRTUAL TRIP

CHEAP RIDES
WELCOME TO SCRAMMY WORLD

CHEAP VIRTUAL TRIPS AND MEMORIES

- SKI AT THE ANTARCTICA from \$ 99 \$
- VACATION AT BOTTOM OF THE OCEAN from \$ 99 \$
- CLIMB MOUNTAINS OF MARS from \$ 99 \$
- BE A CONSTRUCTION WORKER WITH HUGE DRILL from \$ 99 \$

MORE CHEAP TRIPS AND MEMORIES

ADDITIONAL SERVICES

EXTRA SERVICES

SPECIAL SERVICES

MARS
Three different destinations - Venuslike, Grand Canal, and Mt. Pyramis. Experience the fattuous 9th planet and discover ancient mysteries.
Read More

ANTARCTICA
Put on your skis on and get ready for some of your life, too more carrying your heavy gear, no fear of bumping into a dead volcano.
Read More

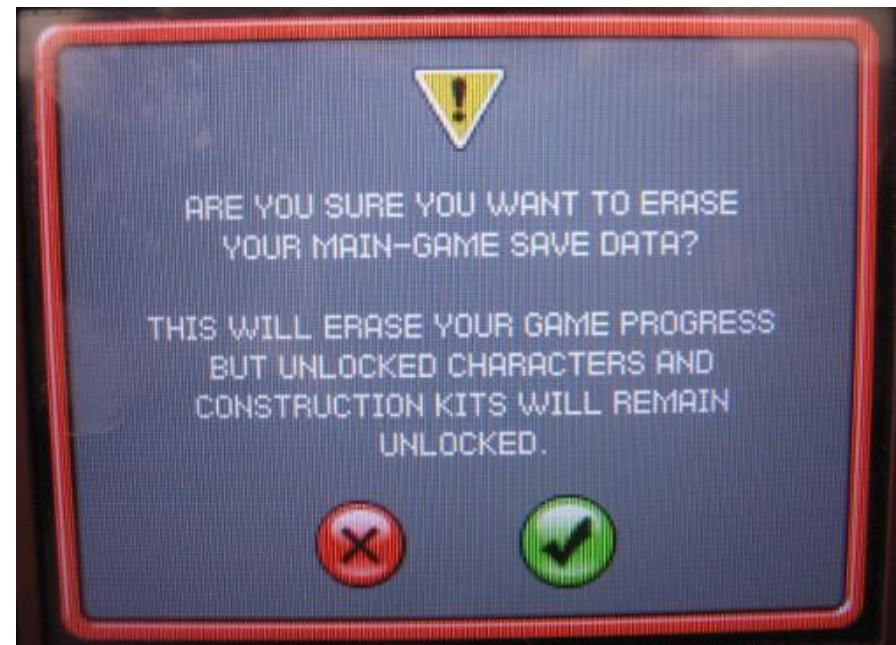
SEALED
Time to wake up for the unique breakfast at bottom of the ocean. For the 4th star hotel, clean water and endless amounts of weed tolex.
Read More

CHEAP SAFETY
JUST ONE CRUNCH AND NO MORE BUGS

THE LAST RESORT CLUB
CLEAN AIR
GAMBLING
MUTANTS

Copyright Rekall Corporation. All rights reserved.
Cheap trips, no travel. Dreams are our business.

Bad UI makes children cry



Caveat on notification

- Notification is an area where trade-offs may occur:
 - Boy-who-cried-wolf syndrome
 - Sound saves display real estate, but like visual attention grabbers, must not be overdone

Facilitating data entry

- Smith and Mosier (1986) offer five high-level objectives as part of their guidelines for data entry
 - Consistency of data-entry transactions
 - Minimal input actions by user
 - Minimal memory load on users
 - Compatibility of data entry with data display
 - Flexibility for user control of data entry

Principles

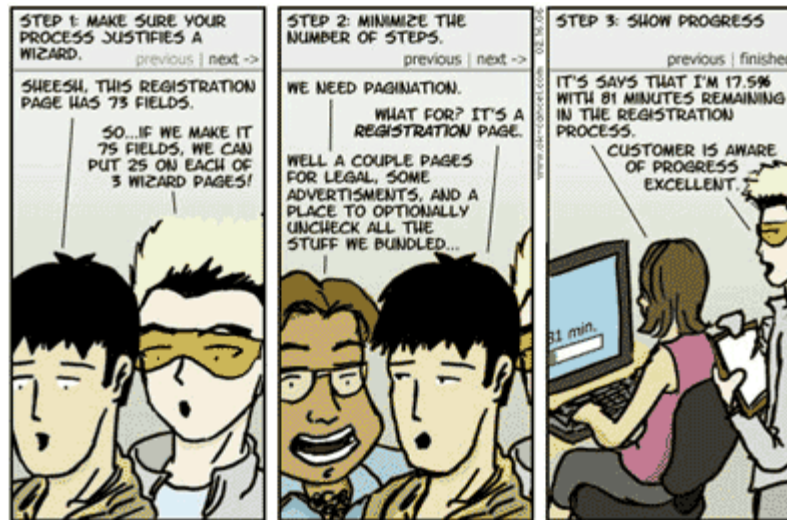
Principles

- More fundamental, widely applicable, and enduring than guidelines
- Need more clarification
- Fundamental principles
 - Determine user's skill levels
 - Identify the tasks
- Five primary interaction styles
- Eight golden rules of interface design
- Prevent errors
- Automation and human control

“Know thy user” Hansen (1971)

- Corollary: If you think you know thy user, think again
- Age, gender, physical and cognitive abilities, education, cultural or ethnic background, training, motivation, goals and personality
- Design goals based on skill level
 - Novice or first-time users
 - Knowledgeable intermittent users
 - Expert frequent users
- Multi-layer designs

Wizards

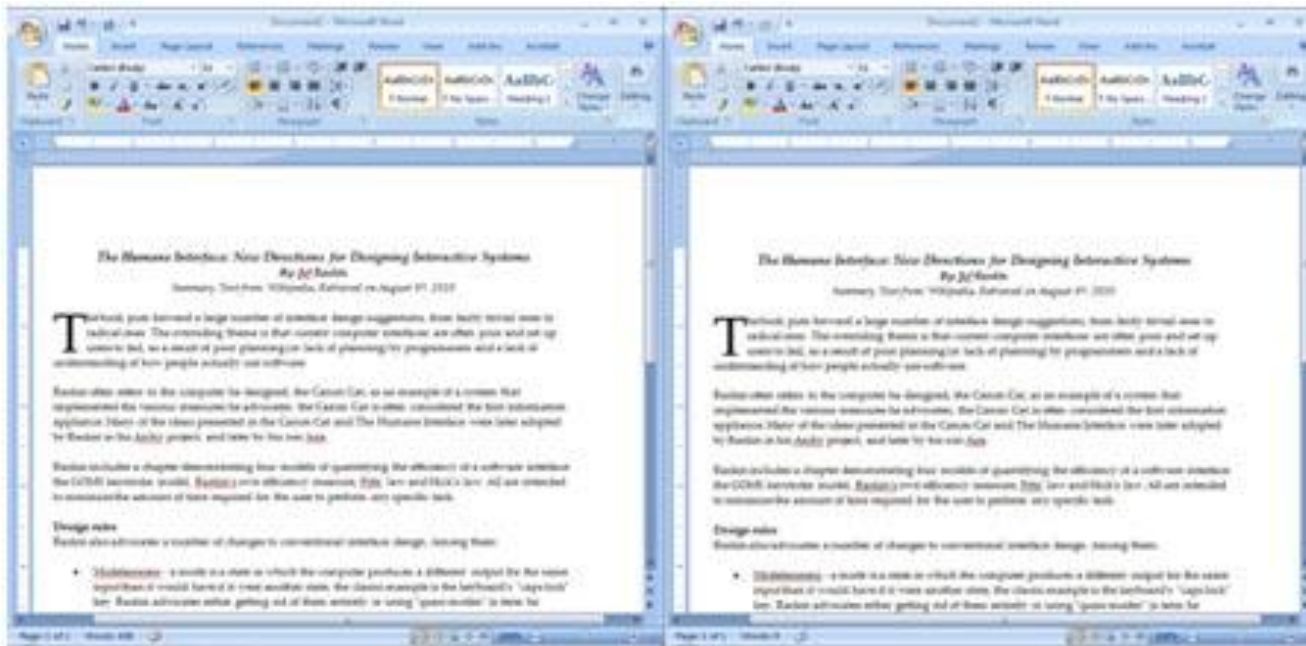


The Wizard of Oz | copyright 2006 Tom chi and Kevin Cheng -

Novice Users



Microsoft word



Accommodating multiple user profiles

- Are we designing for all profiles? Or just a subset?
- Multi-layer, level-structured, or spiral interfaces
 - Novices get training wheels
 - Increased proficiency enables increased functionality
 - Multiple layers include both software and documentation
- Not unlike progressing through a modern video game

Examples

Expert or Novice	Enter:Next
<p data-bbox="743 628 1058 682">Are you A novice ? An expert?</p> <p data-bbox="641 718 1164 739">Press ENTER for the route chosen</p> <p data-bbox="336 779 1449 1043">The user may choose one of two possibilities. With the first possibility, the NOVICE, the user will be asked about general details only. However, the system will provide him/her with important guidelines that will suit most of his/her requests. With the second possibility, the EXPERT, the user will be free to provide more details and use his/her expertise to define work conditions. The system will provide him/her with both general and detailed guidelines.</p>	

Know thy domain

- Identify the tasks
- Task Analysis usually involve long hours observing and interviewing users
- Decomposition of high level tasks
- Relative task frequencies

	TASK				
Job title	Query by Patient	Update Data	Query across Patients	Add Relations	Evaluate System
Nurse	0.14	0.11			
Physician	0.06	0.04			
Supervisor	0.01	0.01	0.04		
Appointment personnel	0.26				
Medical-record maintainer	0.07	0.04	0.04	0.01	
Clinical researcher			0.08		
Database programmer			0.02	0.02	0.05

Choose an interaction style

- Direct Manipulation
- Menu selection
- Form fillin
- Command language
- Natural language

Command Language

```

Telnet daimi.au.dk

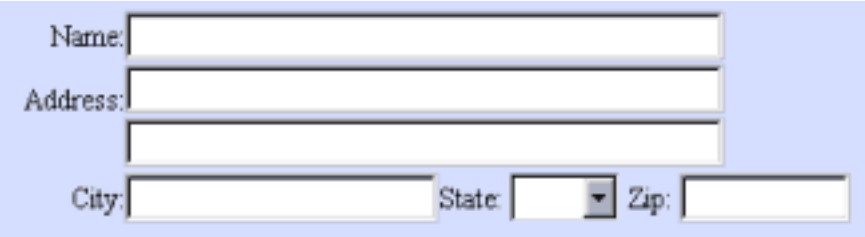
Red Hat Linux release 7.1 (Seawolf)
Kernel 2.4.9-31smp on a 2-processor i686
login: madss
Password:

*****
* Welcome to the Daimi mailserver. In most cases it will be more appropriate *
* if you log onto the host alias                                           *
*                                                                           *
*               fresh-horse.daimi.au.dk                                    *
*                                                                           *
* which is also reachable from outside the firewall.                       *
*****

Trying find a remote host
Trying to guess display
DISPLAY is dhcp-11-21-??:0
[madss@daimi:~]$ ls -al
total 100
drwxr-xr-x  3 madss  users      4096 Apr 21 13:20 .
drwxr-xr-x 37 root   root       4096 Apr 21 03:35 ..
-rw-r--r--  1 madss  users      4517 Feb 12 14:59 .Xdefaults
-rw-r--r--  1 madss  users        68 Apr 21 15:35 .bash_history
-r--r--r--  1 madss  users     3671 Feb 12 14:59 .bash_logout
-r--r--r--  1 madss  users    10540 Feb 12 14:59 .bash_profile
-r--r--r--  1 madss  users     5004 Feb 12 14:59 .bashrc
drwxr-xr-x  8 madss  users     4096 Apr 21 15:35 .daimi-setup
-r--r--r--  1 madss  users     5209 Feb 12 14:59 .emacs
-r--r--r--  1 madss  users     1987 Feb 12 14:59 .fvwmrc
-r-xr-xr-x  1 madss  users     1491 Feb 12 14:59 .gnomerc
-rw-r--r--  1 madss  users        46 Feb 12 14:59 .gtkrc
-r--r--r--  1 madss  users         0 Feb 12 14:59 .hushlogin
-rw-r--r--  1 madss  users        204 Feb 12 14:59 .inputrc
-r--r--r--  1 madss  users    11024 Feb 12 14:59 .login
-r--r--r--  1 madss  users     3591 Feb 12 14:59 .logout
-r--r--r--  1 madss  users     4539 Feb 12 14:59 .tcshrc
-r-xr-xr-x  1 madss  users     4018 Feb 12 14:59 .xinitrc
-rw-r--r--  1 madss  users         0 Apr 21 13:20 my-important-file
-rw-r--r--  1 madss  users         0 Apr 21 13:20 my-very-important-file.doc
[madss@daimi:~]$

```

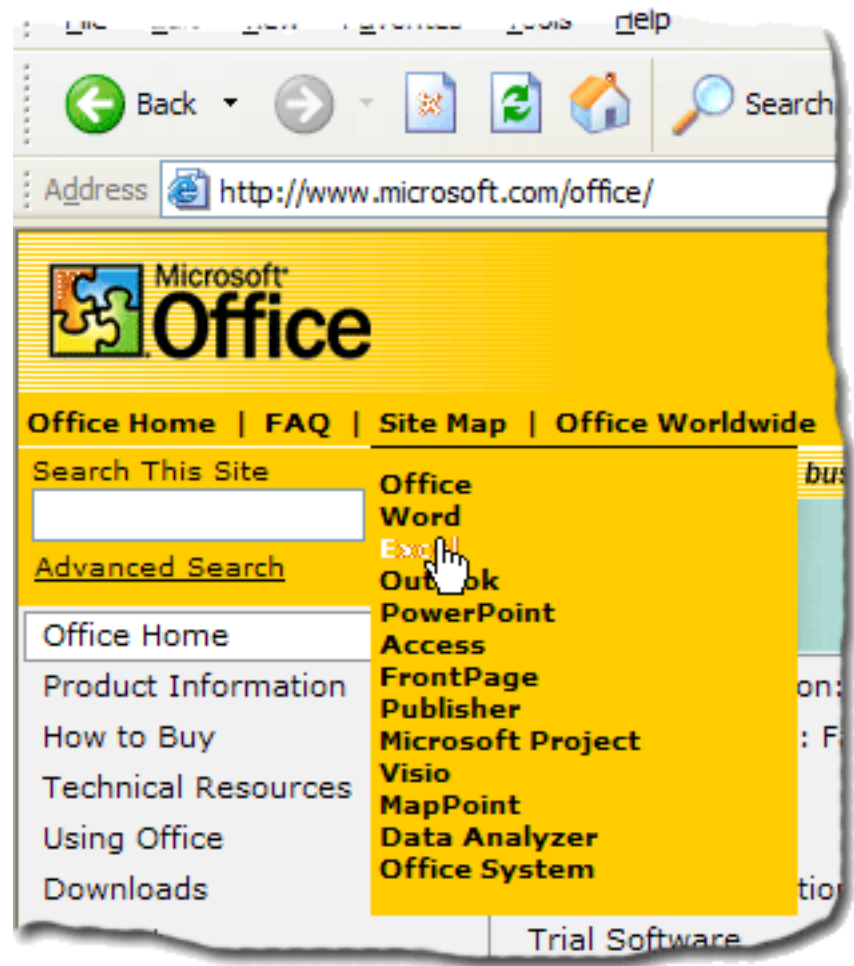
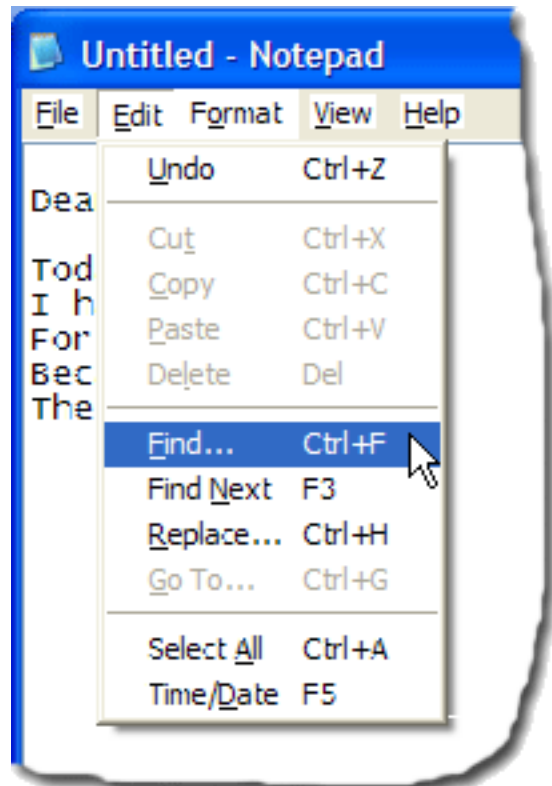
Form Fillin



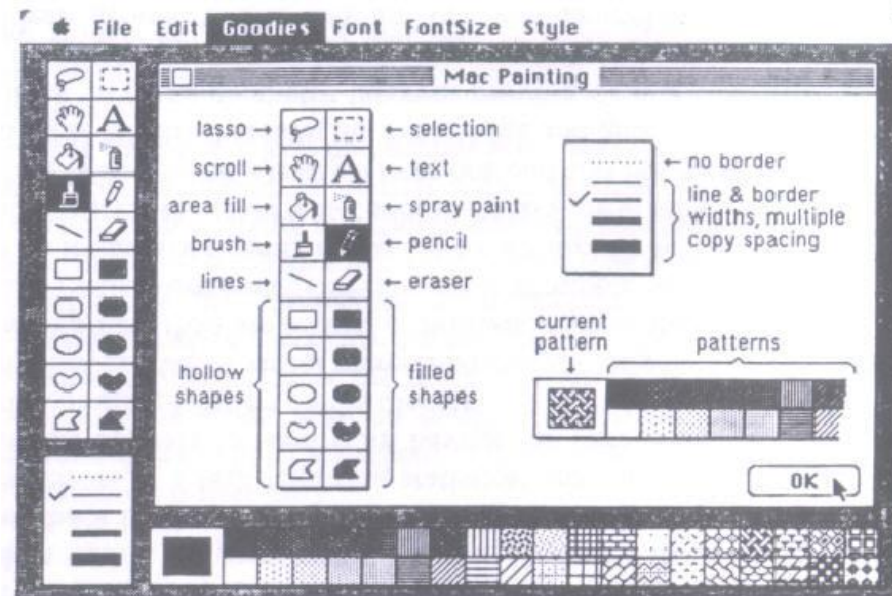
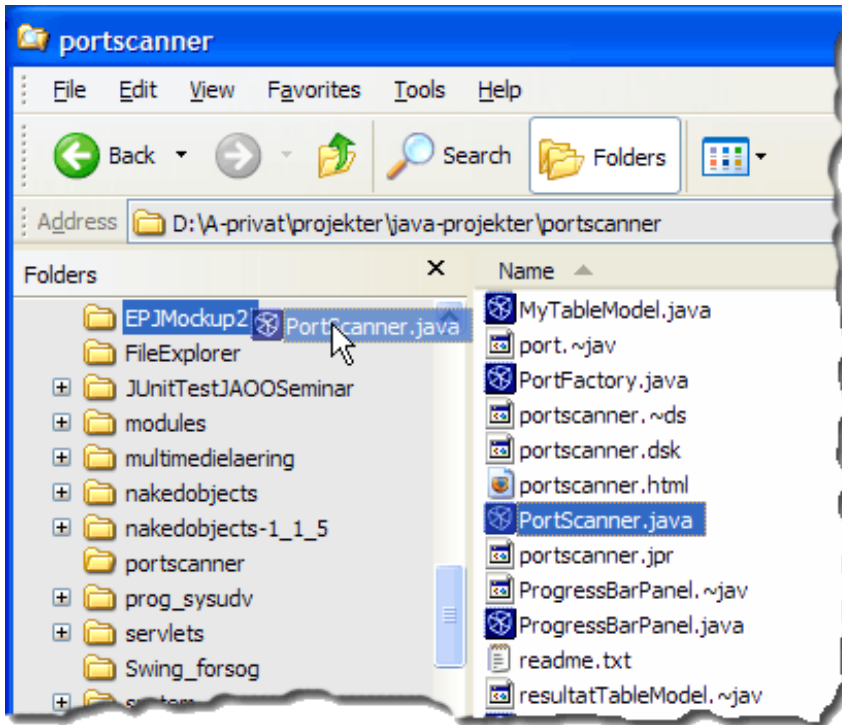
A form with a light blue background. It contains five input fields: a single-line text box for 'Name', a two-line text box for 'Address', a single-line text box for 'City', a dropdown menu for 'State', and a single-line text box for 'Zip'.

Name:	<input type="text"/>
Address:	<input type="text"/> <input type="text"/>
City:	<input type="text"/>
State:	<input type="text"/>
Zip:	<input type="text"/>

Menu Selection



Direct Manipulation



Natural Language



The 8 golden rules of interface design

1. Strive for consistency
2. Cater to universal usability
3. Offer informative feedback
4. Design dialogs to yield closure
5. Prevent errors
6. Permit easy reversal of actions
7. Support internal locus of control
8. Reduce short term memory

Nielsen's Take: Ten Usability Heuristics

1. Simple and natural dialog
2. Speak the user's language
3. Minimize user memory load
4. Consistency
5. Feedback
6. Clearly-marked exits
7. Shortcuts
8. Good error messages
9. Prevent errors
10. Help and documentation

Tognazzini's Take: Sixteen First Principles

1. Anticipation
2. Defaults
3. Human Interface Objects
4. Protect the User's Work
5. Autonomy
6. Efficiency of the User
7. Latency Reduction
8. Readability
9. Color Blindness
10. Explorable Interfaces
11. Learnability — Limit Tradeoffs
12. Track State
13. Consistency
14. Fitts's Law
15. Use of Metaphors
16. Visible Navigation

Discerning Patterns in the Rules

- Despite variations in phrasing and emphasis, certain common themes emerge among these (and other) sets of golden rules — this should give you an idea for prioritization and generality
- One way to reason about these rules objectively is to relate them to how they influence the five metrics of learnability, efficiency, memorability, errors, and subjective satisfaction
- It remains to be seen whether these rules will converge into the “one, true HCI rulebook”

“One Rule to Rule Them All” — Prevent Errors

- If there is any single golden rule that distinctly rises above the rest, it would be Shneiderman #5: Prevent Errors (a.k.a. Shneiderman #6, Nielsen #8 and #9, Tog #7 and #13)
- Consistency and feedback also enjoy multiple appearances in these lists, but they don't have the same bang-for-the-buck as error prevention

Prevent errors

- Make error messages specific, positive in tone, and constructive
- Mistakes and slips (Norman, 1983)
- Correct actions
 - Gray out inappropriate actions
 - Selection rather than freestyle typing
 - Automatic completion
- Complete sequences
 - Single abstract commands
 - Macros and subroutines

Integrating Automation vs. Control

- Sanders and McCormick (1993) suggest that we play to a human being's strengths as opposed to a machine's:
- Avoid routine, tedious, and error-prone tasks — automation
- Focus on making decisions, dealing with the unexpected, and planning for the future — control
- A corollary to control is predictability — we generally don't want the computer to “have a mind of its own”

Integrating Automation vs. Control

- The FAA says it well: “improve system performance, without reducing human involvement” and “train users when to question automation” (2003)
- Automation vs. control grows in significance as anthropomorphic and adaptive user interfaces grow in popularity and sophistication
- Microsoft’s Office Assistants (or sometimes, Microsoft Office itself)
- Assorted “bots” and pseudo natural-language interfaces (online help, search engines)
- “Trained” spam filters
- Amazon and others’ “your store” or “your page” features

Automation and human control

Humans Generally Better

- Sense low-level stimuli
- Detect stimuli in noisy background
- Recognize constant patterns in varying situations
- Sense unusual and unexpected events
- Remember principles and strategies
- Retrieve pertinent details without a priori connection
- Draw on experience and adapt decisions to situation
- Select alternatives if original approach fails
- Reason inductively: generalize from observations
- Act in unanticipated emergencies and novel situations
- Apply principles to solve varied problems
- Make subjective evaluations
- Develop new solutions
- Concentrate on important tasks when overload occurs
- Adapt physical response to changes in situation

Machines Generally Better

- Sense stimuli outside human's range
- Count or measure physical quantities
- Store quantities of coded information accurately
- Monitor prespecified events, especially infrequent ones
- Make rapid and consistent responses to input signals
- Recall quantities of detailed information accurately
- Process quantitative data in prespecified ways
- Reason deductively: infer from a general principle
- Perform repetitive preprogrammed actions reliably
- Exert great, highly controlled physical force
- Perform several activities simultaneously
- Maintain operations under heavy information load
- Maintain performance over extended periods of time