Usability

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Slides adapted from Daniela Rosner
Overview

- **Introduction:** What is usability?
- **Design Patterns:** Shared languages
- **New Patterns:** You design
- **Best Practices:** Common solutions

The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

Source: [http://www.usabilitynet.org/tools/r_international.htm#9241-11](http://www.usabilitynet.org/tools/r_international.htm#9241-11)
Definition: **Usability**

- Learnability
- Efficiency of use
- Memorability
- Few Errors
- Satisfaction

— Jakob Nielsen

Principles

- **Perceivable**
  Information and user interface components must be perceivable by users

- **Operable**
  User interface components must be operable by users

- **Understandable**
  Information and operation of user interface must be understandable by users

- **Robust**
  Content must be robust enough that it can be interpreted reliably by a wide variety of user agents

http://www.w3.org/TR/UNDERSTANDING-WCAG20/intro.html
Usability is as important as technical execution.

- **Build it in**
  Ensure a usable product by building usability in from the beginning.

- **Or fix it later**
  Evaluate completed projects for usability. Fix what can be fixed. Implementation may impose constraints.
User-Centered Design

- Based on the work of Alan Cooper, et al.
- Can be used to design non-technical products including bowling balls and ice cream flavors.
- Ideally begins before or coincident with initial product design and development.

http://www.cooper.com

http://en.wikipedia.org/wiki/User_centered_design
Building in Usability

The User-Centered Design Process

- A product development methodology based on actual user needs, abilities and perceptions.
- Offers the most effective path to useful and usable products.

**Personas**

- Are based on actual users.
- Put a human face on the amorphous “user.”
- Save time by focusing development away from unlikely “edge” cases.
Building in Usability

Six phases of UCD

- User Research
- User Modeling
- Requirements Definition
- Delivery Method Definition
- UI Design
- Development Support
Building in Usability

Six phases of UCD

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- Delivery Method Definition
- UI Design
- Development Support

A lot of UX work is required before any UI design can begin. In the Agile process this is referred to as "iteration 0." Sometimes, there is no project-supplied UI. But there is always UX.

Notice how many phases come before UI Design.
Building in Usability

Six phases of UCD

- **User Research**: Who are the users?
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- Requirements Definition
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Building in Usability

Six phases of UCD

- **User Research:** Who are the users?
- **User Modeling:** What are their needs, abilities and perceptions?
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Building in Usability

Six phases of UCD

- **User Research:** Who are the users?
- **User Modeling:** What are their needs, abilities and perceptions?
- **Requirements Definition:** How can the product meet their needs?
- Delivery Method Definition
- UI Design
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Building in Usability

Six phases of UCD

- **User Research:** Who are the users?
- **User Modeling:** What are their needs, abilities and perceptions?
- **Requirements Definition:** How can the product meet their needs?
- **Delivery Method Definition:** How will the product deliver services?
- UI Design
- Development Support
Building in Usability

Six phases of UCD

- **User Research:** Who are the users?
- **User Modeling:** What are their needs, abilities and perceptions?
- **Requirements Definition:** How can the product meet their needs?
- **Delivery Method Definition:** How will the product deliver services?
- **UI Design:** How will the product appear to and work for the users?
- Development Support
Six phases of UCD

- **User Research**: Who are the users?
- **User Modeling**: What are their needs, abilities and perceptions?
- **Requirements Definition**: How can the product meet their needs?
- **Delivery Method Definition**: How will the product deliver services?
- **UI Design**: How will the product appear to and work for the users?
- **Development Support**: How does the test version work for users? How can it be improved before release? How can the next version be improved?
1 User Research

Who are the users?

We are not the users. They are not us.

If we’re not careful, we’ll assume that they are like us, or like someone we know.

The best way to get to know the users is to go to them and see what they’re up to.
1 User Research

Learn about users’

- Goals
- Behaviors
- Attitudes

Methodologies

- Survey
- Observation
- Interview
- Contextual inquiry
- Usability study
- Server log
1 User Research

Contextual inquiry

- Takes place in task setting
- Origins in ethnography
- 1 or 2 people with recording equipment:
  - Note pad
  - Audio recorder
  - Still camera
  - Video camera
- List of topics, and ability to follow the user’s lead
1 User Research

Contextual inquiry would reveal some constraints.

Source: http://www.flickr.com/photos/meestajack/486053407/
Coordinated items external to a system are called **shadow systems**. They can provide important ideas about how to improve usability.
2 User Modeling

Making sense of user research

- Documenting experience
- Analyzing data
- Finding patterns and clusters
- Discovering dimensions
- Eliminating edge cases
- Developing personas
- Writing functional principles
2 User Modeling

Raw data from research phase

- Two months ago
- Sunday afternoon
- With one friend
- Love/Chick flick
- Front row seat
- Wanted my money back
- Scary movie
- With family
- Popcorn
- Yesterday
- Alone
- Matinee
- Last week
- Walked
- Love story
- Ice cream
2 User Modeling

Filter, cluster and organize

- Alone
- With one friend
- With family
- Two months ago
- Last week
- Yesterday

Number of people: lots

Recent, now, long ago
A pattern becomes a persona

“Sylvia”:

- Who: With one person
- When: Yesterday
- What: Love story
- Time: Matinee

A persona is an archetype, not an actual person.

A name & photo is associated, to further humanize each persona.
2 User Modeling

Persona: Example 1

Person - Jen Yang
Researcher, School of Nursing

Description
Jen is a full-time researcher at Stanford's School of Nursing. Along with her typical activities in the lab, she is a member of a 20 person research project studying nursing in the ER.

Jen is confident in her work and the project study but finds herself fighting with the web-based project site. Her team uses for "off-line" communication and to store and share project documents... particularly in finding the most current information.

She's familiar with using computer programs to create documents and exchange emails with colleagues and friends. She also likes to do her Christmas shopping on-line.

Goals
- Be "in the loop" on her projects - have the most current project information
- Not to let team members see her work until she is comfortable with it
- Spend her time doing research and minimize the administration overhead including time posting and finding documents on the Project site

Level of Expertise
Office products, email, on-line shopping

Source: The Fluid Project http://www.fluidproject.org/
2 User Modeling

**Functional principles**

- High level statements about product qualities
- Stable: subsequent UCD phases will not affect them
- Inform subsequent UCD phases, including functional requirements

**Examples**

- Reminds me when I need it, but does not nag *(assists)*
- Tells me when something’s important *(reliable)*
- Keeps my friends informed about my schedule *(extends)*
3 Requirements Definition

**Functional requirements**

- Concrete statements about product features and functions
- Stable: subsequent UCD phases will not affect them
- Inform subsequent UCD phases, including Delivery Method Definition

**Examples**

- Two levels of authentication: user and user’s designates
- Schedule is exportable to iCalendar format
- Course catalog is always current
4 Delivery Method Definition

Examples

- Web application
- Smart phone application
- Voice-only application
- Dedicated hardware device
5 UI Design

Wireframe

- Schematic representation
- Grayscale
- Communication between designers and developers and sometimes stakeholders
- May or may not be interactive
6 Development Support

**Activity**

- Iterate design in response to usability studies and other feedback
Limitations of UCD

Users may not always

Know enough to act in their own best interest.

Be motivated to meet an organization’s goals.

Remediation

Educate the user about the merits of their options.

Communicate the user benefits of the organization’s goals.

Make the institution’s goals at least not conflict with the user’s goals and habits, and at best provide incentives.
Improve Usability

- **Heuristic Evaluation**
  Evaluators examine the interface and judge its compliance with recognized usability principles.

- **Usability Studies**
  Run multiple small studies with users to discover interface elements that should be kept, changed, or removed.

- **Paper Prototypes**
  Involves creating rough drawings of an interface (on paper) to use as models of a design.

- **Comparative Analysis**
  Test interface designs with similar features for similar goals.

Adapted from [http://www.w3.org/WAI/gettingstarted/Overview.html](http://www.w3.org/WAI/gettingstarted/Overview.html)
Heuristic Evaluation

- 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

http://www.useit.com/papers/heuristic/heuristic_list.html
Visibility of system status
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

FedEx

fedex.com Login Registration

Your Login Information

* User ID
  * User ID is at least 6 characters.

* Password
  * Password is at least 6 characters.
  * Password must contain at least one letter and one number.

* Retype Password
Heuristic Evaluation

**Match between system and the real world**
The system should speak the users’ language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

![Image of a rates table showing mortgage, home equity, and CDs options with rates and APRs.](image_url)
**User control and freedom**

Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Heuristic Evaluation

Consistency and standards
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions. Consistency builds the user’s feeling of mastery over the interface through recognizability, predictability, empowerment, and efficiency.
Error prevention
Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
Recognition rather than recall
Minimize the user’s memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Heuristic Evaluation

Flexibility and efficiency of use
Accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

1-Click Ordering
1-Click is the fastest and easiest way to order anything at the Apple Store with a single click of your mouse. Simply activate 1-Click on your computer ...
Aesthetic and minimalist design
Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
Help users recognize, diagnose, and recover from errors
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user’s task, list concrete steps to be carried out, and not be too large.

http://www.useit.com/papers/heuristic/heuristic_list.html
http://www.asktog.com/basics/firstPrinciples.html
Problems in Web Design

- Knowledge about user interface and design is distributed across many people and often not shared.

- Knowledge about what constitutes good user interface is inconsistent among designers and users.

- Each person has their own agenda and goals motivating the design of the interface.

- Design is not always valued as much as compiled code is. If almost anyone can make a web page, how hard can design be?
Confusion in Web Design

According to Jakob Nielsen, multiple studies showed “23% of [web] design elements were done in so many ways that no single approach dominated.” Such design elements included:

► The main navigation schemes (left-hand menu, tabs across the top, navbar across the top).

► Placement of the search feature, which included upper right, upper left, middle, and elsewhere on the page.

► The sign-in process.
Web Design Patterns

What are Web Design Patterns?

- Design Patterns are **best practices** and common practices in web design.
- They are **not style guides**, rules or a mandate.
- **Flexible** for different contexts and applications.
Web Design Patterns

Example: A group of interrelated web design patterns
Web Design Patterns

Wireframe using web design patterns
Web Design Patterns

What are Web Design Patterns?

- Models for common problems and appropriate solutions in highly diverse development environments.
- Provide a common language for people to use in their work process.
Web Design Patterns

Breadcrumbs
(Other names for this pattern: Location Indicator, Location Breadcrumbs)

**Design Problem**
The user needs to know their current location within the Web site or application.

**Use When**
- The page displayed is within a hierarchy of pages and is not the topmost page.
- The user arrived at their current location from an external source such as search results, links in email, bookmarks, or any other method that does not lead the user through the site hierarchy.

**Solution**

A. The breadcrumb should always be visible in the browser at the top of the page.
B. The breadcrumb is a horizontal list of pages reflecting the site hierarchy starting from the topmost page (Home) and ending with the current page.
C. Where possible, labels should match the title of the corresponding page, but should not need to scroll to see it.
D. Breadcrumbs often use some symbol like " > " between links to indicate direction.
E. Breadcrumbs should provide links to each page in the trail with the exception of the last. This simplifies the user's current location in the trail.

**Rationale**
- Breadcrumbs give clear visual cues for the user's current location and context.

**Examples**

You are here: Home Page > Music > Wal-Mart CD Store

This pattern from other collections

**Contributors**
Kelly Snow, Tim Dennis
“Each pattern is a three-part rule, which expresses a relation between a certain context, a problem, and a solution”

— Alexander 1979

Christopher Alexander A Pattern Language [Oxford University Press 1979]
Design Problem

How should labels be aligned?

Top

Right

Left
Design Problem

Top aligned labels

Enter Your Information (Already registered? Sign in)

Please enter your U.S. address and email address to create your account.
First Name  Last Name
Street Address
City
State ZIP Code Country or Region United States U.S. addresses only, please.
Phone Number ext:
A valid email address is required to communicate with you.
Email address Re-enter Email address
Design Problem

Top aligned labels

Source: Luke Wroblewski Web Form Design [Rosenfeld 2008]
Design Problem

Top aligned labels

Source: Luke Wroblewski Web Form Design [Rosenfeld 2008]
Design Problem

Top aligned labels

Source: Luke Wroblewski Web Form Design [Rosenfeld 2008]
Design Problem

Right aligned labels

This person's name will appear with their messages, comments, and files and whenever they are responsible for a to-do or milestone.

First Name: Luke
Last Name: Wroblewski
Email:

Choose a user name and password so that this person can log in (they can change this later).

User Name:
Password:

The rest is optional, but some contact info will come in handy when you want to take your communication offline.

Title:
Office #: ext:
Mobile #:
Fax #:
Home #:
Design Problem

Right aligned labels

Right-Justified Horizontal Labels

Source: Luke Wroblewski Web Form Design [Rosenfeld 2008]
Design Problem

Left aligned labels

[Image of a window with labels and input fields for a WEVV Book Type: DMA, including fields for Book Name, Project Year, Month, Enabled for, Type, Share Book, Put Book, Index, Description, and checkboxes for Update default book formula, If PAV exists, use PAV to build SHR book, and Delete number for Not Selected DP.]
Design Problem

Left aligned labels

Source: Luke Wroblewski Web Form Design [Rosenfeld 2008]
More Design Problems

More Design Problems

Can you think of a common design problem?
What’s In A Pattern?

Pattern elements

- Title
- Problem (situation)
- Use When (constraints)
- Solution
- Why (rationale)
- How (to apply)
- Examples
- Related Patterns
- Accessibility
- Code Samples
Design Solution

**Pattern Name:** Quick Access

**Pattern Description:** Context

**User:** Novice and expert

**Workplace:** Website

**Problem:** Help the user find useful pages that need to be accessed from any location on the site, regardless of the current state of the artifact.

**Solution:** Group the most convenient action links, such as home, site map, and help; place it consistently throughout the whole Web site.
Design Ideas: Your Turn

Questions

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Student Portal project
http://campuslife.berkeley.edu/myberkeleyproject
Resources

Print
Brown, Dan Communicating Design [New Riders 2007]
Cooper, Alan About Face 3 [Wiley 2007]
Saffer, Dan Designing for Interaction [New Riders 2007]
Tidwell, Jenifer Designing Interfaces [O’Reilly 2006]
Wroblewski, Luke Web Form Design [Rosenfeld 2008]

Web
Boxes and Arrows: http://www.boxesandarrows.com/
Information Architecture Institute: http://iainstitute.org
Jakob Nielsen: http://www.useit.com
W3C: http://www.w3.org/WAI/gettingstarted/Overview.html

Design Pattern Libraries

Jenifer Tidwell
http://designinginterfaces.com

Open Source Design Pattern Library
http://uidesignpatterns.org/

UC Berkeley’s web pattern library
http://groups.ischool.berkeley.edu/ui_designpatterns/webpatterns2/webpatterns/home.php

UI Patterns
http://ui-patterns.com/

Martijn van Welie
http://www.welie.com

Yahoo Design Pattern Library
http://developer.yahoo.com/ypatterns/