The Design Cycle and Brainstorming

CS160: User Interfaces
Maneesh Agrawala and Jeffrey Nichols

Instructor: Jeffrey Nichols

Researcher at IBM Almaden
San Jose, CA
Joined IBM December 2006

Work in HCI, Mobile, Web
Automatic interface generation for handheld devices
Multi-device communication infrastructures
Programming-by-demonstration and end-user programming for the web
Visual feedback showing available fonts
Most recently used fonts at top (is this good or bad?)
Due Today (before class)

- Creation of wiki account
- Course petition
- Design assignment: Play and Analyze a Game
- 1 comment per lecture (cs160/cs160Readings)
Design Assignment Examples

Game Description

Design Assignment Examples

Positive Aspect

Negative Aspect
Assigned Today

No Design Assignment this week

Individual Project Proposal: Due Feb 2
Propose idea for course project
  • Based on “games with a purpose” theme
  • Exciting to you
  • Be creative!
  • Consider needs of a well-defined target user group
  • Include sketches as appropriate
Grading details on the web (20 points total)
Description must be posted to wiki before class Feb 2.

Topics
• The Design Cycle
• Brainstorming
The Design Cycle

Design → Prototype → Evaluate
The Art of UI Design

But, there's more to it …

A soufflé is eggs, butter, milk & flour, but the difference between soaring and sinking is in the execution.

The Design Process [Koberg & Bagnall]

1. Acceptance
2. Analysis
3. Definition
4. Ideation
5. Idea selection
6. Implementation
7. Evaluation
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

Not “bicycle cup-holders” but “helping cyclists to drink coffee without accidents”

---

**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
**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
Implementation

Scale up low → high fidelity

– Low-fidelity (quick, cheap, dirty)
  sketches, paper models, foam core, video, …

– Medium fidelity (slower, more expensive)
  Flash, JavaScript, AJAX, …
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

Web design
- Sites created at multiple levels of detail
- Sites iteratively refined at all levels of detail
- Iterate quickly to see what works

Site Maps → Storyboards → Schematics → Mock-ups
Evaluation

Many types of evaluation:
- Prototype walkthroughs
- Think-aloud studies
- Wizard-of-Oz
- Performance comparisons

Type of evaluation chosen depends on the level of implementation, etc.

Walk-through prototype design
Evaluation reveals problems with design. Re-design requires cycling the process.
Design Cycle Over Project Lifespan

Prototype implementations eventually increase in fidelity to reach final product.

Comparison

[Lewis & Rieman]
- Who will use?
- What are their tasks?
- Plagiarize
- Rough out a design
- Think about design
- Create a prototype
- Test it with users
- Iterate
- Build a production version
- Track use
- Evolve the design

[Koberg & Bagnall]

7. Evaluation
1. Acceptance
2. Analysis
6. Implementation
3. Definition
5. Idea selection
4. Ideation

[Lewis & Rieman]
[Koberg & Bagnall]
Comparison

[Lewis & Rieman]  
[Koberg & Bagnall]

• Who will use?
• What are their tasks?
• Plagiarize
• Rough out a design
• Think about design
• Create a prototype
• Test it with users
• Iterate
• Build a production version
• Track use
• Evolve the design

Diagram:

- Design
- Prototype
- Evaluate

Steps:
1. Acceptance
2. Analysis
3. Definition
4. Ideation
5. Idea selection
6. Implementation
7. Evaluation
Waterfall Model (Soft. Eng.)

Application Description → Analysis → Requirements Specification → Design → Implementation → Product

Comparison

Focus differs
- WF has no feedback
  - High cost of fixing errors
  - Increases by 10x at each stage
  - Iterative design finds problems earlier
Video: The Deep Dive

How well do the follow the cycle?
What do they do for each step of the cycle?
How many cycles do you think they went through?

Brainstorming
The Psychology of Creativity

Conformity: the enemy of creativity

Groups and organizations encourage conformity

Part of “brand” or “corporate identity”

The Psychology of Creativity

Pressure to conform affects judgment and perception:
- The emperor’s new clothes
- McCarthyism: if you’re not one of us, you’re one of them…

People in minority will adopt majority opinion and even manufacture their own explanation of it.
Enhancing Creativity

Thinking outside the box:

Draw a series of 4 straight lines through all the points below, without lifting pen from paper:

Why Is This Hard?

We adopt expectations about the solution
- Based on conventions
- Based on what we believe the questioner expects
Creativity and Dissent

Authentic dissenters – people who really disagree with 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
Dissent and Authenticity

The benefits of dissent are weakened if

**Dissent is not real**: A deliberate “devil’s advocate” in the group can actually stifle dissent, because the majority know the opinion is manufactured.

**Dissent is not encouraged**: Polite or pro-forma acceptance is not enough.

IDEO’s Brainstorming Rules

1. Sharpen the Focus
2. Playful Rules
3. Number your Ideas
4. Build and Jump
5. The Space Remembers
6. Stretch Your Mental Muscles
7. Get Physical

*Aim for quantity*
Hope for quality
Sharpen the Focus
Posing the right problem is critical – neither too narrow, nor too fuzzy
Not “bicycle cup-holders” but “helping cyclists to drink coffee without accidents”

Number Your Ideas
Obvious but very useful
Helps keep track of them when the brainstormer is successful (and 100 or more ideas are in play)
Allows ideas to take on an identity of their own
Build and Jump

Build to keep momentum on an idea:
– “shock absorbers are a great idea; what are other ways to reduce coffee spillage on bumps?”

Jump to regain momentum when a theme tapers out:
– “OK, but what about hands-free solutions?”

Concept Refinement

Premature idea rejection is a serious barrier to good design.

One big differentiator between good designers and great ones is the latter’s ability to successfully develop unusual ideas

This requires a strong instinct to be able to distinguish fatal vs. minor flaws in an idea
The Space Remembers

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

It's a very effective form of external (RAM) memory for group

Even better, its shared RAM. Helps group share understanding

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 brainstomer
Get Physical

Sketch
Make models
Act out

Next Time

Be prepared to present game analysis in section

Lecture Topic: Games Overview & Structure

- The Structure of Games, Game Design Workshop Chap 2. Fullerton will need username/password for this one

Don’t forget!

- Read, then write a comment on the wiki
- Individual Project Proposal, Due Feb 2