Design and Evaluation of Interactive Systems

Designing your system
(Phase III)

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lectures adapted from Wendy E. Mackay

Homework due today
20 December 2013

1. Group: Finish exercises not done in class:
   Use Scenario
   Design Space

2. Individual: 10 web searches for those that did not do it

Exercises in Class
20 December 2013

1. Design Concept
2. Functional Table
3. (Design Alternatives)
4. Design Scenario
   (will do the Storyboard in Class on Jan, not as homework)

Generative Design

Discovery
Who is the user?

Invention
What is possible?

Design
What should it be?

Evaluation:
Does it work?
Phase I Understanding Users

Finding out about users
- Introspection
- Observation
- Interviews
- Questionnaires

Analyze information
- Grounded theory categories

Create resources for design
- Scenario
- User profile & Persona

Phase II Invention

Collect or sample information
- Web search
- Oral Brainstorming
- Video Brainstorming

Analyze information
- Preference votes
- Technology dimensions

Create resources for design
- Key ideas
- Design space (ideas to pursue)

Generative Design

Discovery
- Who is the user?

Invention
- What is possible?

Design
- What should it be?

Evaluation:
- Does it work?

Design: What should it be?

Collect or sample information
- Design brief
  - + results from earlier phases

Analyze information
- Interaction table
- Alternative designs

Create resources for design
- Design scenario
- Storyboard
- Mockup
- Video prototype

Design brief
- Earlier results
Remember there are many methods!

### Design Brief

Key project planning document, usually generated by a client for a design firm.

Specifies:
- Design problem: what the project has to achieve.
- Design method: means, timeframes and measures of success

Remember:
- One can always question the design brief.
- Your job is to match a solution to a problem.
- **Finding the right problem may be more of a challenge than creating a solution.**

### Creating a concept

Define your project within the scope of the design space.

Identify a real, specific problem.
- Real problems tend to be complex and messy
- Look for a small, simple aspect of a real problem
- Rather than a stereotypical ‘toy’ problem

Trade-off between power and simplicity: **less is more**

Be curious, be creative, seek surprises and new opportunities

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How do you find the **design concept**?

Based on your studies of users:
- Choose a **problem to solve** specific to your audience.

Generate a **variety of ideas** that offer potential solutions.

Create a **design space** to embody the set of alternatives.

Choose a **concept to explore** not just functionality, but also **interaction**

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<table>
<thead>
<tr>
<th>Understand the user</th>
<th>Analyze the user</th>
<th>Invent new ideas</th>
<th>Prototype the system</th>
<th>Evaluate the system</th>
<th>Redesign the system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstorming</td>
<td>Critical incident interview</td>
<td>Contextual inquiry</td>
<td>Design space</td>
<td>Wizard of Oz</td>
<td>Design rationale</td>
</tr>
<tr>
<td>Interview</td>
<td>Questionnaire</td>
<td>Task analysis</td>
<td>Software simulation</td>
<td>Design walkthrough</td>
<td>Design rationale</td>
</tr>
<tr>
<td>Cognitive psychology</td>
<td>Cultural probes</td>
<td>Video transcribing</td>
<td>Usability study</td>
<td>Design rationale</td>
<td>Design rationale</td>
</tr>
<tr>
<td>Grounded Theory</td>
<td>Protocol analysis</td>
<td>Design scenario</td>
<td>Usability study</td>
<td>Design rationale</td>
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Creating a concept

Starts vague, becomes clearer over time
change direction as you get new insights
consider alternatives

some examples …

Remote Window

Create and interactive window
on the wall
Always connect to
grandmother’s house
Walk up and create link

A physical magic lens

Turn your phone into a
physical magic lens
Use to annotate physical
objects

Tangicam

Child’s camera
Frames the image
Squeeze handles to take a
picture
Hold, share, wear around
neck, throw like a frisbee
How to describe a design concept?

How will the system work?
Functionality: what should it do?
User guide: how does it work?
Scenario: what happens in real-world contexts?

Justification
What are the alternatives?
What are the advantages and disadvantages of this solution?

Iterating on a design concept

Based on the use scenario, personas and user profile together with the key ideas from your design space
Discuss your design concept:
Consider how the users in the scenario will react
Does it respond to real user needs?
Is it specific?
Is it technically possible?

Build on your design resources:
User perspective:
System possibilities:
User profile
Design problem
Personas
Design space dimensions
Use characteristics
Key or favorite ideas
Use scenario
Design space

Exercise: Design concept

What is your design concept?
what does it do?

Describe your design idea:
what technology does it use?
how does it help the users?

Later:
Identify three alternative designs:
don’t stop with your first design idea
don’t explore 50 ideas either
carefully consider three...

In-class Exercise

Design Concept
20 min
Function-Interaction Table

Goal
- Top-down description of the key functions
- Exploration of the interaction details

Procedure
- List the conceptual objects in the system
- List the functions available for manipulating those objects
- Describe how each object is represented in the interface
- Describe how to access each function via interaction techniques
- Describe which interaction techniques affect which functions

Ensure completeness
Ensure coherence

Exercise: Function-Interaction Table

Choose three objects-of-interest

Choose three functions

Choose three interaction techniques for each object-function pairs

<table>
<thead>
<tr>
<th>object-of-interest</th>
<th>function</th>
<th>interaction techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>song</td>
<td>search</td>
<td>scroll down a list of songs, hum the song, click on a song in a tag cloud</td>
</tr>
</tbody>
</table>
In-class Exercise

Table
30 min

Exercise: Concept alternatives

Re-read your original design concept and function-interaction table

Identify several key features of your system

Consider alternatives (interaction techniques) that may improve this functionality

Think of alternative technologies and types of interactions with them

In-class Exercise

Concept Alternatives
15 min

Different Types of Scenarios

Different types of scenarios

All scenarios tell a step-by-step story that illustrates how people interact with technology in a real-world setting

Use scenario: focus on what is now
Draws from real-world observation of people who face challenges that a new technology might address

Design scenario: focus on what could be
Builds upon use scenario and speculates how these people would interact with your new technology in this setting
Edit your existing use scenario

- Ensure that it is written like a tiny one-act play, sub-divided into one-paragraph micro scenes that describe a series of interaction points.

- Include one or more personas (characters), each with:
  - name, age, gender, motivation
  - usually with a profession, expertise
  - usually with a goal or motivation

- Create one or more realistic setting(s):
  - date, time, place, context

- Identify a series of events over a period of time

Revise it to create a design scenario

- Think about your design concept, including the alternatives and the function-interaction table.

- Go through each interaction point:
  - what does the user see (or hear)?
  - what does the user do?
  - what does your system do?

- Remember, tell a story, step-by-step, about how your personas will interact with your new system.

- Use the process to help you define the details of your system

Scenarios: what to do

- Create a theme and variations to explore alternatives.

- Balance both ‘normal’ and unusual situations especially breakdowns and errors (‘...and normal is rarely normal’)

- Consider external events that affect interaction as well as motivated action by the user.

- Include patterns of interaction over time including repetitions and wasted effort.

- Highlight surprises

Scenarios: what NOT to do

- Avoid ‘selling’ the technology
  - Explore options rather than one solution.

- Avoid irrelevant detail
  - Focus on interaction, not users’ personal lives.

- Avoid flowery description
  - Stick to the facts

- Avoid humor (or not, up to you)
  - Difficult to do well
  - Often distracting
Exercise: Create a design scenario

Create a realistic account, ideally grounded in real-world observation of users, of a series of activities that serve to illustrate and challenge the use of a new technology.

Goal: to help you think through interaction issues
   NOT to 'sell' the prototype

Techniques:
Extreme users
Theme and variations
Breakdowns

Exercise: Design scenario

Include:
Title: Event or technology being designed
Who?: Characteristics: name, sex, age, profession, ...
What?: Event that sparks the story
Where?: Location
When?: Date, time

Motivation: Why is this happening?
Situation: Relevant detail to aid understanding

Prototyping interaction

Design scenario
   Imagine the system from the user's perspective

Wizard of Oz
   Simulate the system live
   with a human operator ‘behind the curtain’

Video Prototype
   Illustrate the use of the system in context
   “sketch” dynamic, interactive user experiences

Simulation
   Create a working subset of the system

In-class Exercise

Design Scenario
30 min
**What is a prototype?**

Prototype = concrete representation of an interactive system

**Characteristics**

- **Representation:** form of prototype (sketches - simulation)
- **Precision:** level of detail (informal – complete)
- **Interactivity:** interaction (watch – interact)
- **Evolution:** lifecycle of prototype (throw out - iterative)

The choice of prototype depends upon the design phase and the specific needs of the designers.

**Prototyping helps you ...**

- Consider different design alternatives
- Ensure usability under diverse conditions
- Help users and other stakeholders imagine the interface
- Focus on problematic parts of the interface

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**Rapid prototypes**

**Goal:** Design the interface as rapidly as possible to explore ideas

**Materials:**
- Paper (while, colored, transparencies, post-its)
- Colored pens and markers
- Tape, glue, scissors, cutters
- Foam, cardboard, etc.

Show how a user will interact with the device you are designing.

**Representation**

- **Paper prototypes**
  - Easy and fast to create and to throw away
  - Most useful at the beginning of the design process
  - Examples: sketches for an idea for an icon, storyboard sequences, mockups of screens, video prototypes of a complex interaction

- **On-line prototypes**
  - Use the computer; longer to create, more polished
  - More appropriate later in the design process
  - Examples: animations, interactive videos, interface builders
Precision

Lo-fidelity (lofi) prototypes with little detail
Great for rapid exploration of ideas
example: paper sketches, SILK

High-fidelity (hifi) prototypes, very detailed
Good to communicate specific design considerations
example: dialog box with layout alternatives

Note: A detailed representation is not always precise
It is possible to omit aspects that have not yet been decided

Details

A system can be good in theory
but unusable in practice
because of flaws in the interface ... even small ones

Good prototypes let designers work with
different sets of details at the same time

Good prototypes allow users to envision
the final system:
but also to feel comfortable suggesting changes

Level of Interactivity

Non-interactive (fixed)
No interaction, but can show potential interaction
example: a video clip showing user interacting with a device

Low interaction (pre-determined path)
Can test several alternative forms of interaction
example: designer shows a screen shot, user indicates her
action, the designer shows the result

High interaction (open)
Users interacts with the system, with some limitations
example: Wizard of Oz or computer-based simulation

Wizard of Oz

Technique for prototyping
novel user interfaces

Wizard of Oz:
Designer ‘plays computer’
to create an interactive
experience for the user

Useful for creating video prototypes
but also for creating live experiences
that rapidly explore different design
alternatives
Evolution

Rapid prototypes: Early exploration of diverse alternatives
   Easy to create, check, throw away afterwards
   example: paper prototype or interface like SILK

Iterative prototypes: create individual modules
   Create successively more refined versions
   example: series of prototypes, successively more detailed

Evolving prototypes: may become the final product
   Different completed sections are successively added
   example: a software module has functionality added
   before being added to the final system

Prototyping strategies

Horizontal: complete one layer of functionality at a time
   example: develop the interface details without a working database

Vertical: complete functionality of part of the system
   example: develop the spelling checker first

Task: create functionality necessary for a single task
   example: develop the interface for adding and editing an image

Scenario: create functionality needed to run a scenario
   example: develop the functions needed to edit three images and spell-check a document within a design scenario

Design Scenarios lead to storyboards

Title: What is the name of your system?
   (you may use a subtitle too)
Who? Personas: name, sex, age, profession, ...
Where? Location
When? Date, time
Motivation: Why is this happening?
Situation: Relevant detail to aid understanding
Story: Paragraph-by-paragraph description of who does what and why,
   from one interaction point to the next

Regular storyboard

Identify key interaction points in the scenario
Examine the key ideas from the design space (brainstormed ideas)
Illustrate the interaction between user and novel system
Describe key issues on the right

Storyboard structure

- **Situation**
  - Overview: Show the situation
  - Regular shot: Show Pierre & technology
  - Close-up: Show the interaction

- **System Title**
  - Overview: Explain the situation
  - Regular shot: Show forms & technology
  - Close-up: Show the interaction

- **Group**
  - Continue the story
  - Credits: Names of participants

From Woody Mackay

Another example

- This one focuses on a complete interaction
  - From the book "Sketching User Experiences: The Workbook"
  - From Wendy Mackay

Another example

- This one focuses on detailed interaction sequences
  - From the book "Sketching User Experiences: The Workbook"

Prototyping

- Next we will turn our storyboard to a prototype
  - From Wendy Mackay

Another example

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Homework
8 January 2013

midterm evaluation (content adjusted)

1. Individual: Interview, web search

2. Group: Executive summary PDF (5 pages max) to describe:
   - Who is the audience of your system? (User Profile)
   - What is the design concept?
   - Initial design scenario
   - NO Storyboard: will do in class in January

Keep in mind you will need to hand in all exercises done in class at the end of the class. Prepare for it during the holidays …