Design and Evaluation
of Interactive Systems

Designing your system
(Phase III)

Anastasia Bezerianos

in|situ| lab, INRIA & Univ Paris-Sud
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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
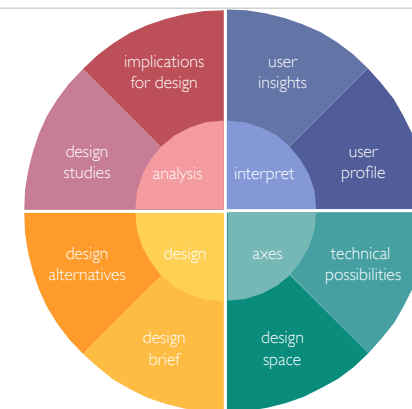(will do the Storyboard in Class on Jan, not as homework)

Generative Design

Discovery
   Who is the user?

Invention
   What is possible?

Design
   What should it be?

Evaluation :
   Does it work?

Phase I Understanding Users
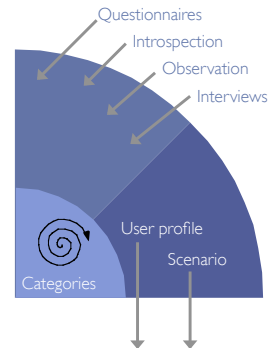
Finding out about users
- Introspection
- Observation
- Interviews
- Questionnaires

Analyze information
- Grounded theory categories

Create resources for design
- Scenario
- User profile & Persona

Questionnaires
Introspection
Observation
Interviews

Categories
User profile
Scenario

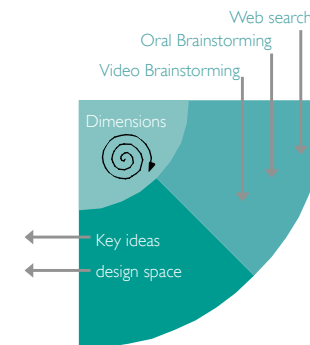## Phase II Invention

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)

Web search
Oral Brainstorming
Video Brainstorming

Dimensions

Key ideas
design space

Generative Design

Discovery
- Who is the user?

Invention
- What is possible?

Design
- What should it be?

Evaluation :
- Does it work?

implications for design
user insights
design studies
analysis
interpret
user profile
design alternatives
design
axes
technical possibilities
design brief
design space
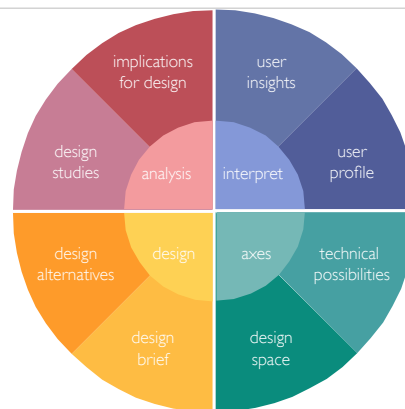
Design: What should it be?
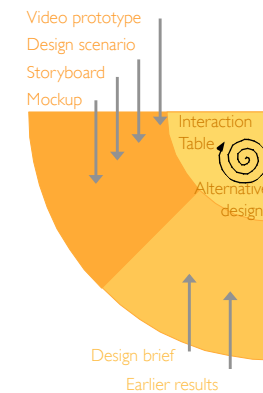
Collect or sample information
- Design brief
  + results from earlier phases

Analyze information
- Interaction table
- Alternative designs

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

Video prototype
Design scenario
Storyboard
Mockup

Interaction Table
Alternative designs

Design brief
Earlier results

Remember there are many methods!

Understand the user	Analyze the user	Invent new ideas	Prototype the system	Evaluate the system	Redesign the system
"Fly-on-the-wall observation *Ethnography*	Interactive Thread *HCI*	Oral brainstorming *Psychology*	Paper prototyping *Participatory Design*	Focus group *Marketing*	Generative Walkthrough *HCI*
Critical incident interview *Human Factors*	Contextual Inquiry *Anthropology*	Design space *Design*	Video prototyping *Participatory Design*	Usability study *Human Factors*	Technology probe *Design/Arts*
Questionaire *Sociology*	Task analysis *Human Factors*	Sketching *Design/Arts*	Wizard of Oz *Human Factors*	Design Heuristics *HCI*	Design Rationale *HCI*
Cultural probe *Design/Arts*	Scenario analysis *Activity Theory*	Video brainstorming *Participatory Design*	Software simulation *Computer science*	Design walkthrough *Psychology*	
Grounded Theory *Cognitive Psychology*	Protocol analysis *Cognitive Psychology*	Design room *Design/Arts*	Design scenario *HCI*	Design Critique (Crit) *Design/Arts*	

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
    <u>Finding the right problem may be more of a challenge
    than creating a solution</u>

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*

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

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

Function-Interaction Table

Objects	Representations	Properties	Operations
File	Icon (according to file type) + name	Path Type, name, size, …	Delete Rename …

Operations	Commands	Feedback	Responses
Delete a file	Drag-and-drop the icon into the trash	The ghost of the icon follows the cursor	The icon disappears and the trash can gets bigger
	Select file and hit the Delete key	Selected icon gets highlighted	The icon moves towards the trash can and disappears

Function-Interaction Table

Identifies the relationships among:
   Objects-of-interest to the user
      nouns: song, calendar entry, video clip, sport
   Functions that users can perform on these objects
      verbs: search, delete, send, register
   Interaction techniques so users can manipulate objects
      phrase: scroll through song list, click on delete button,
         type email address, tap tennis ball

Interaction includes:
   system representation: appears on the screen
   user action: what the user does
   result: how the system responds

Exercise: Function-Interaction Table

Choose three objects-of-interest

Choose three functions

Choose three interaction techniques for each object-function pairs

   object-of-interest: song
   function: search
   interaction techniques: scroll down a list of songs
                              hum the song
                              click on a song in a tag cloud

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
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 situtions
   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
  Story: Paragraph-by-paragraph description of
                who does what and why.

In-class Exercise

Design Scenario
30 min

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

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

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 fiirst

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*

Beaudouin-Lafon and Mackay (2007) Prototyping Tools and Techniques

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
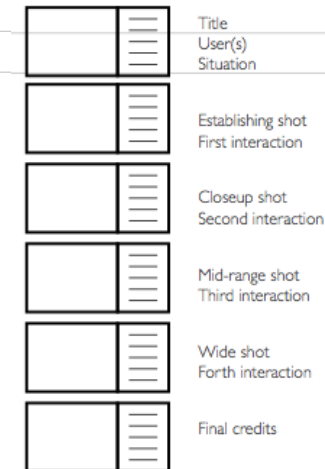
Regular storyboard

Identify key interaction points
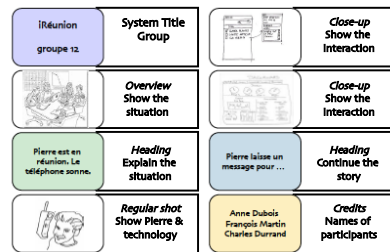   in the scenario

Examine the key ideas from
       the design space
       (brainstormed ideas)

Illustrate the interaction
       between user and
       novel system

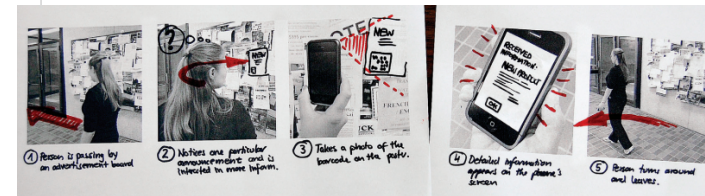Describe key issues
       on the right

Title
User(s)
Situation

Establishing shot
First interaction

Closeup shot
Second interaction

Mid-range shot
Third interaction

Wide shot
Forth interaction

Final credits
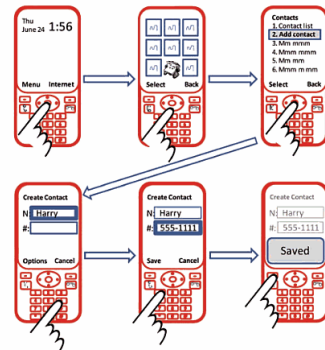
Storyboard structure

From Wendy Mackay

another example

this one focuses on a complete interaction

http://grouplab.cpsc.ucalgary.ca/grouplab/uploads/Publications/Publications/2012-NarrativeStoryboard.Interactions.pdf

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

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 …