Tuesday 30 October 2018

**Generative Design**

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<td>What is possible?</td>
<td>What should it be?</td>
<td>Does it work?</td>
</tr>
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**Goal: Create a Design Concept**

Base your design concept on:
- the user profile, grounded in your interviews

“Animate” your personas to:
- walk through the use scenario
- push the limits with your personas / extreme characters

Create a design scenario:
- choose your favorite video brainstormed ideas
- illustrate what happens at each interaction point
- create a sequence of events in the storyboard
- shoot a video prototype to illustrate the concept in context

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**HCI Bootcamp**

**Tuesday 30 October 2018**

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Invention

Design Dimensions

Gather ideas relevant to your design problem:
- some are your own brainstormed ideas
- some are from others, e.g., your web search

Extract different design dimensions that characterize the ideas

Design Space

Select a subset of dimensions and ideas to create a design space

Place each idea where it fits on:
- one or more design dimensions
- at least three ideas per dimension
- generate new ideas if you find gaps
- explore the intersections of different dimensions
Exercise: Design dimensions & Design space

1. Identify the key ideas
2. Categorize the ideas into design dimensions
3. Place the ideas along the design dimensions
   - 3 or more ideas per dimension
   - generate new ideas if you find gaps
   - explore the intersections of different dimensions
4. Create a design space to explore:
   - Choose interesting dimensions and ideas

Design Dimensions: Octopocus

- Dynamic: none, one-step, hierarchy, continuous
- Temporal: none, before, during, after
- Transparency: none, post-hoc, ongoing
- Interactive: system only, user & system, user only

Design space: Octopocus

Design space: Communication Apps

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Generative Design

Design
What should it be?

Design requires choices

Prototyping interaction

Design requires choices

Prototypes help express specific concepts at different levels of representation
Goal: quality, not quantity of ideas

Careful! Each choice limits options
But also poses new questions and may suggest new possibilities

Prototyping interaction

Design scenario
Imagine the system from the user’s perspective

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

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

Simulation
Create a working subset of the system
What is a prototype?

Prototype = concrete representation of an interactive system

Characteristics

<table>
<thead>
<tr>
<th>Representation:</th>
<th>form of prototype</th>
<th>sketches - simulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision:</td>
<td>level of detail</td>
<td>informal - complete</td>
</tr>
<tr>
<td>Interactivity:</td>
<td>interaction</td>
<td>watch - interact</td>
</tr>
<tr>
<td>Evolution:</td>
<td>lifecycle of prototype</td>
<td>throw out - iterative</td>
</tr>
</tbody>
</table>

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

Prototyping helps the designer …

Consider different design alternatives

Ensure usability under diverse conditions

Help users and other stakeholders imagine the interface

Focus on problematic parts of the interface

Representation

Paper ‘take away’ prototypes

Easy and fast to create

Most useful at the beginning of the design process

Examples: sketch storyboard sequences, screen mockups, video prototypes

On-line prototypes

Use the computer, longer to create, more polished

More appropriate later in the design process

Examples: animations, interactive videos, scripting languages, interface builders

Precision

Low 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

(You can omit elements that have not 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.

What’s wrong with wireframes?

- Graphic designers create wireframes focusing on screen layout, not interaction.
- Static, not dynamic.
- Encourages procedural interaction.
- Assumes buttons, sliders and pull-down menus (least efficient forms of interaction).

Interaction designers should focus on interaction:
- Create simple, but powerful interaction.

Competing interaction paradigms

- Computer as tool:
  - First person interfaces
  - Empower users

- Computer as servant:
  - Second person interfaces
  - Delegate tasks

- Computer as medium:
  - Third person interfaces
  - Communication
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 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 details of the interface 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

Video supports every phase of design

Evaluation: Users try new system
Observation: Users in context
Brainstorming: Explore new ideas
Prototyping: Design possibilities
Use scenarios
Interaction principles
Interaction patterns

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 design concept to explore focus on interaction, not just functionality.

Creating a concept

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

Design Trade-offs

Balance trade-off between power of expression and simplicity of interaction
Design Trade-offs

Design challenge: Shift the curve

Simple things should be simple, complex things should be possible

Describe the design concept

How will the user be able to do?
- content
- interaction
- function
- discovery

What are the objects of interest?
- content
- interaction
- function
- discovery

How will users interact with them?

What can the system do?

How will the user learn it?

Describe the design concept

One strategy

Find a key object of interest for the user
- Make it persist
- Make it interactive

Example:
- Search for a route
- Create a ‘route’ object
- Create an interactive route object
  - modify, extend, transform
  - share, compare . . .

Justification
- What are the alternatives?
- What are the advantages and disadvantages of this solution?
Avoid Analysis Paralysis

*CHOOSE SOMETHING!!*

The first idea is NEVER complete or right or “good”

ALWAYS reevaluate, redesign, and refine

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Exercise: Concept

Can you describe your design concept in one sentence?

What user problem(s) does it solve?

Is the interaction clear?

What technology does it use?

How does it help users?

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Exercise: Design alternatives

Don’t stop with your first design concept … but don’t explore 50 ideas either!

Carefully consider 3-5 alternatives

Focus on alternative forms of interaction, not different functionality

Button presses and pull-down menus encourage procedural, annoying interfaces

You can do better!
## Interaction Table

### Goal
Top-down description of key functions and objects and the details of how to interact with them.

### 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

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### Exercise: Interaction table

#### Table 1: Table of functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Object</th>
<th>Interaction</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>scroll</td>
<td>webpage</td>
<td>click on the link</td>
<td>scroll the page</td>
</tr>
<tr>
<td>jump to a link</td>
<td>link</td>
<td>click on the link</td>
<td>go to the destination page</td>
</tr>
</tbody>
</table>

#### Table 2: Table of Objects

<table>
<thead>
<tr>
<th>Object</th>
<th>Properties</th>
<th>Representations</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>web page</td>
<td>HTML, text</td>
<td>window with page</td>
<td>scroll</td>
</tr>
<tr>
<td></td>
<td></td>
<td>link</td>
<td>add Favorites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>content</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>images</td>
<td></td>
</tr>
<tr>
<td>link</td>
<td>page location</td>
<td>undefined text</td>
<td>link</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Design Diagram
Design Diagram

- Capture the essence of your design with a diagram
- Examples:
  - exploded diagram with key functions
  - process diagram with arrows

Using your Design Concept

- Revisit the user profile and personas
- Can you target the users better?
- “Animate” the personas in the use scenario
- How does applying the concept address their issues?
- Can you push the limits to generate something new?

- Create a design scenario
- Revisit each interaction point in the scenario
- Apply video brainstormed or new ideas
- Create a storyboard and a video prototype to illustrate the concept in context
Use Scenario

Reminder: Use scenario

Like a tiny, branching one-act play, sub-divided into one-paragraph micro scenes that describe a series of ‘interaction points’

Create 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

From use scenarios to design scenarios

Tell a story that illustrates how one or more people interact with technology in a real-world setting

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

Design scenario:
- Builds upon current scenarios and speculates how these people would interact with new technology, in this setting

Change the use scenario if it helps you explore alternatives

Tip: Choosing character names

Make names short, ideally one syllable

Either alphabetize them:
- Ann, Bob, Chuck, Dave, Eli

Or link names to functions:
- Pat is a patient
- Sue is a surgeon
### Design scenarios ≠ Concept scenarios

<table>
<thead>
<tr>
<th>Design scenarios</th>
<th>Concept scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help interaction designers explore possibilities</td>
<td>Help market or ‘sell’ the concept</td>
</tr>
<tr>
<td>Value: realism, grounded, challenges ideas</td>
<td>Value: idealized use, market potential</td>
</tr>
</tbody>
</table>

### Contrast with:

<table>
<thead>
<tr>
<th>Concept and marketing videos</th>
<th>Help market or ‘sell’ the concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help market or ‘sell’ the concept</td>
<td>Value: idealized use, market potential</td>
</tr>
</tbody>
</table>

### 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 ‘over-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; at least for now
- Difficult to do well
- Often distracting

### Design scenario format

<table>
<thead>
<tr>
<th>Title:</th>
<th>Event or technology being designed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who?</td>
<td>Characteristics: name, sex, age, profession, ...</td>
</tr>
<tr>
<td>What?</td>
<td>Event that sparks the story</td>
</tr>
<tr>
<td>Where?</td>
<td>Location</td>
</tr>
<tr>
<td>When?</td>
<td>Date, time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motivation:</th>
<th>Why is this happening?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation:</td>
<td>Relevant detail to aid understanding</td>
</tr>
</tbody>
</table>
### Exercise: Design scenario

Create a realistic description of the use in context of a new system

**Procedure**
- Start with the personas and the use scenario
- Decide how they will interact with your new system in a real context
- Tell the story, step by step

### Design scenarios ➔ Video Prototypes

Design scenarios lead to storyboards which lead to video prototypes

Each provides a successively deeper way to think about situated interaction

Each should be considered highly iterative:
- Creating alternatives is cheap
- Use them to explore alternatives
- Don’t be afraid to try and reject ideas

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Scenarios use words to describe situations
- Create multiple paragraphs to explore options

Storyboard break up the action and illustrate it
- forcing you to think more deeply about interaction
- They take more time, so select options carefully

Video prototypes are dynamic sketches of interaction
- Acting out the interaction enhances thinking deeply, remembering ideas
- sharing with users, designers, management, stakeholders deciding what to program or test
Storyboard

Goal
Illustrate the design scenario, emphasizing the details of the interaction with the system being designed.

Procedure
Divide the design scenario into a series of interaction points
Create a series of images and text to illustrate each point.

Storyboards

Moment
Highlight what matters, omit the rest

Interaction points

Frame
Sense of place, position & focus
Start with overview, then show details
Intertitles, wide shots, close-ups

Image
Evoke characters, objects, environments
Focus on the user's interaction
Use simple special effects

Words
Communicate ideas, voices
Intertitle (silent film)
voice-over (narrated), dialogue

Flow
Guide reader
Linear or branching

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
Fourth interaction

Final credits
Storyboard structure

- **Buena Vista CommApp**
- **System title**
- **Group**
- **Close-up**
  - Show the interaction

- **Ann and Pierre are engaged, but live in different towns.**
- **Intertitle**
  - Explain the situation

- **Establishing shot**
  - Show the situation

- **Pierre leaves a message**
- **Intertitle**
  - Continue the story

- **Mid-shot**
  - Show Pierre and the technology

- **Anne Dubois**
- **Bob Martin**
- **Charles Smith**
- **Credits**
  - Group members

Tuesday afternoon

- Review class exercises:
  - Concept
  - Alternatives
  - Interaction table
  - Design diagram

- **Design scenario**
- **Paper Storyboard 1**

Prototyping interaction

- **Design scenario**
  - Imagine the system from the user’s perspective

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

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

- **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 - simulations
- **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 the designer ...

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

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

Wizard of Oz

- The designer/wizard interprets the actions of the user and controls the responses of the system
- The user experiences what the ‘real’ system might be like
- The system may be: non-existent, partially built, completely functional
- Best for certain types of interaction (based on wizard’s reaction time)
Video supports every phase of design

**Observation:**
- Users in context

**Use scenarios**

**Interaction patterns**

**Prototyping:**
- Exploring interaction patterns

**Evaluation:**
- Users try new system

**Design principles**

**Brainstorming:**
- Visions of future interaction

---

**Regular storyboard**

<table>
<thead>
<tr>
<th>Identify key interaction points in the scenario</th>
<th>Establishing shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examine the key ideas from the design space (brainstormed ideas)</td>
<td>First interaction</td>
</tr>
<tr>
<td>Illustrate the interaction between user and novel system</td>
<td>Closeup shot</td>
</tr>
<tr>
<td>Describe key issues on the right</td>
<td>Second interaction</td>
</tr>
<tr>
<td></td>
<td>Mid-range shot</td>
</tr>
<tr>
<td></td>
<td>Third interaction</td>
</tr>
<tr>
<td></td>
<td>Wide shot</td>
</tr>
<tr>
<td></td>
<td>Forth interaction</td>
</tr>
<tr>
<td></td>
<td>Final credits</td>
</tr>
</tbody>
</table>

**Storyboard structure**

- **System title**
  - **Group**

- **Title**
  - **Buena Vista CommApp**

- **User(s)**
  - **Ann and Pierre are engaged but live in different towns. He's in a meeting...**

- **Situation**
  - **Intertitle**

- **Establishing shot**
  - **Show the situation**

- **First interaction**
  - **Pierre issues a message**

- **Closeup shot**
  - **Intertitle**

- **Second interaction**
  - **Mid-shot**

- **Mid-shot**
  - **Show Pierre and the technology**

- **Mid-shot**
  - **Intertitle**

- **Mid-shot**
  - **Show Pierre and the technology**

- **Mid-shot**
  - **Intertitle**

- **Third interaction**
  - **Show the situation**

- **Mid-shot**
  - **Show Pierre and the technology**

- **Mid-shot**
  - **Intertitle**

- **Mid-shot**
  - **Show Pierre and the technology**

- **Mid-shot**
  - **Intertitle**

- **Fourth interaction**
  - **Intertitle**

- **Fifth interaction**
  - **Close-up**

- **Sixth interaction**
  - **Close-up**

- **Fifth interaction**
  - **Intertitle**

- **Final credits**
  - **Group members**

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