Prototyping

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Prototyping and Sketching

— Not just a “byproduct” of design but substantial “instrument” of creative thinking and learning processes
— Both, the ability to “draw” and “read” sketches are qualifications that distinguish designers from non-designers
— It’s not the result that matters, but the process!
— Smooth transition between sketch and prototype
Prototypes, Mock-ups

What is a prototype?

- A prototype is a limited representation of a design at an early design stage. The goal of the prototype is to test and inspect usability, and to detect and correct potential design failures as early as possible.

What is a mock-up?

- A mock-up in software engineering is a rudimentary throw-away prototype software that will look like the UI without having to build the software or the underlying functionality.

Is there a difference?

- Not really

- “A mock-up is a prototype if it provides at least part of the functionality of a system and enables testing of a design”

Quellen: https://tugll.tugraz.at/akhci/weblog/565.html
Different Types

Low and High Fidelity Prototypes
Low Fidelity Prototyping

- for testing ideas and sequences
- fast, cheap, easy to change, throw-away
- very communicative as all parties involved can be included (everybody can draw, no need to be a graphic designer)
- No/little functionality —> limited ability to detect errors
- Not all ideas might be technically feasible
High Fidelity Prototyping

- for testing details specific functionality
- more functionality, closer to the final product
- easier to test, as users can interact with the prototype
- expensive and time consuming —> reluctance to change (due to high costs)
Paper Prototyping

- Low-fidelity method
- for websites, desktop tools, but also for mobile applications
- start with selecting the task that the user should do
- manually "draw" screenshots
Example: Export Images from PDF

Example: Page setup

Quelle: http://www.snyderconsulting.net/us-paper.pdf
Example: Power Point

Example: Multi-View Visualization
Example: Multi-View Visualization
Example: Smartphone app

Basic UI Design Sketches for the Smartphone App "opera.guru"
Example: Device prototypes


Wooden PalmPilot - Mark Richards 1995
Interacting with paper prototypes

Web mail paper prototype
https://www.youtube.com/watch?v=GrV2SZuRPv0#t=98

App paper prototype
http://www.youtube.com/watch?v=6TbyXq3XHSc
Exercise: 5 minutes

- Goal: Make a paper prototype for a mobile “slim u:space” app that allows students to sign up for their courses (task)
- Use different panels to “imitate” interactivity
- Use only pen and paper
Exercise 2: 5 minutes

- Describe an instance of the user task to be performed with this paper version of your design
- Test it with the person next to you
- Be open for ideas and comments
## Paper Prototyping

### Useful for checking
- understandable terminology?
- Does the navigation work as expected by the user?
- Is all the necessary information provided?
- Layout (too much/too little information, what is where)
- Missing functionality?

### Not so useful for checking
- technical realisation
- response times
- certain interactions: scrolling, ... 
- colors, fonts,... (if hand-drawn)

Quelle: http://www.snyderconsulting.net/us-paper.pdf
Mockup/Wireframe tools

Axure (http://www.axure.com/)
Balsamiq (http://balsamiq.com)
Mockflow (http://www.mockflow.com)
appery.io (http://appery.io)
Pencil (http://pencil.evolus.vn)
Mockingbird (https://gomockingbird.com)
WireframeSkatcher (http://wireframesketcher.com)
Web Site Wireframe Tool (http://wireframe.talltree.us/default.asp)
Hot Gloo – The Online Wireframe App (http://www.hotgloo.com/)
Cacoo (https://cacoo.com)
Lumzy (http://lumzy.com/app/)
iPhone Mockup Web App (http://iphonemockup.lkmc.ch/)
DISCUSSION

Hand-drawn paper vs. Actual design through mockup tool
Sketchy Rendering/Wireframing

Trying to combine the benefits

Sketchy rendering for visualizations
http://www.gicentre.net/handy/sego

balsamiq
https://balsamiq.com/
Low-Fidelity Prototypes

- Paper Prototypes
- Storyboards & sketches
- Concept videos

- Cheap, good for basic concepts
- Early in development
- No technology barrier

- May alienate users
- Often limited coverage of system features
High-Fidelity Prototypes

- **HTML, Javascript**
- **Flash, Director**
- **GUI Builders**

**Level of Detail**

- **Great detail in visual design**
  - **Concept Visualization**
  - **Background Model**

**Front end**

**Back end**

**System Layers**

**High degree of technical detail**

**Advantages**
- Realistic impression
- Detailed user feedback
- Timing, interaction

**Disadvantages**
- Expensive
- Functionality needs to be restricted
- May limit creativity of test users
High-Fidelity Prototypes

Trombosonic
New digital music instrument

Ferrari prototype
(Photo Brad Anderson)
High-Fidelity Prototypes

**Looks & feels like the final product to the user**
- Colors, screen layout, fonts, text used...
- Response time and interactive behavior!

**Functionality might still be restricted**
- Only certain functions might work
- Functionality is targeted towards the tasks (e.g. a search query is predetermined)
- Non-visible issues (e.g. security) are not regarded

**Can be used to predict task efficiency of the product**
Cheap "High-Fidelity" Prototypes
“Wizard of Oz”

Metro-Goldwyn-Mayer 1939
Example: Audience participation
Example: Audience participation

“Video Sketch”

Simple video to demonstrate a prototype idea
Using stills for UIs, short clips for interaction
Avoid video editing software, use slideshow
Example:

https://www.youtube.com/watch?v=_A0qsWMDMFc
OETICKET

GÖDTFREY
ARENA WIEN

KAUFEN
Different Types

**Horizontal and Vertical Prototypes**
Horizontal and Vertical Prototyping

Different features

Full System

Horizontal and Vertical Prototyping

Different features

Horizontal PT

Full System

Horizontal Prototypes

**Demonstrate the feature spectrum of a product**
- Allows the user to navigate the system
- The actual functions are not implemented

**Helps to evaluate / test**
- Navigation (e.g. finding a specific function or feature)
- Overall user interface concept
- Feature inclusions and placement
- Accessibility
- User preferences

**Often used in early stages**
Horizontal and Vertical Prototyping

Different features

Full System

Vertical PT

Functionality

Vertical Prototypes

Demonstrate a selected feature of a product
- Allows the user only to use this specific function
- The details of the function/feature are shown/implemented

Helps to evaluate / test
- The optimal design for a particular function
- Compare different designs of a function
- Optimize the usability of this function
- User performance for this particular function

Mainly used in high-fidelity prototyping but can be applicable to low-fidelity
The Prototyping “T”

Different features

Full System

Functionality

Cheap Prototype: Scenarios

http://www.nngroup.com/articles/guerrilla-hci/
“Icicle” Prototypes

Different features

Functionality

Full System
Prototyping

**When?**

**How often?**
Rapid Prototyping

 ![Diagram of the prototyping process]

- **Rapid Prototyping**
- **Analysis** → **Design** → **Implementation** → **Validation**
Rapid Prototyping

Increasing fidelity of prototypes

Products (Releases) including Prototypes
“Fake it till you make it”

Make fake apps
Show people
Learn from their feedback

Serial/Parallel Prototyping

Does creating and receiving feedback on single prototypes serially or on multiple prototypes in parallel lead to better design?
Serial/Parallel Prototyping

Dow et al., Experiment:

- independent novice designers
- task: design a web advertisement
- condition 1 „serial": receive design feedback after each prototype
- condition 2 „parallel": receive design feedback on multiple prototypes

Dow, Steven P., et al., TOCHI (2010).

Results

Parallel prototyping significantly outperformed serial prototyping

- higher click-through rates
- more time spent on the target client web site
- higher ratings by the clients and ad professionals

Independent raters found Parallel prototypes to be more diverse

Participants reported a larger increase in task-specific self-confidence
Benefits of Parallel Prototypes

Promotes Comparison
Encourages Exploration
Fosters Design Confidence
In Sum:
Parallel prototyping produces better design results

Prototyping

SUMMARY
Prototyping: Summary

Types
- Low-fidelity and high-fidelity
- Horizontal and vertical

Examples
- paper prototyping
- mockup tools
- wizard of oz

When and how often
- Rapid prototyping
- Parallel Prototyping
Prototyping: Rules of Thumb

In the beginning: “Keep it ugly”
Rapid, iterative, parallel
Task-driven testing
“Fake it till you make it”
Questions or Comments?