

CPT208 Human-Centric Computing

03. Conceptual Prototyping and Practical Guide

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Today's plan

1. Introduction of prototyping
2. Three reasons/usages of prototyping
3. Common tools in prototyping
4. Fidelity in prototyping

Prototyping and Implementation

Chapter 12

Lecture Syllabus

1. Introduction
2. Discovering requirements
3. **Conceptual Prototyping and Practical Guide**
4. Heuristic Evaluation, Questionnaire, and interview
5. Design Principles and Design Alternatives
6. Prototyping Fidelity and Dimensions
7. SAT reading week
8. Group Project Demonstration Day
9. Usability Testing & Experimental Design
10. Interfaces and Research Considerations
11. Field Study and Analytics
12. Flipped Classroom: Selected Coursework Demonstration
13. Revision

Learning outcomes

The main goals of Prototyping and Implementation are to accomplish the following:

- Describe prototyping and the different types of prototyping activities.
- Enable you to produce simple prototypes from the models developed during the requirements activity.
- Enable you to produce a conceptual model for a product and justify your choices.
- Explain the use of scenarios and prototypes in design.
- Introduce both physical computing kits and software development kits and their role in construction.

This lecture is based Chapter 12 of the ID book.

Prototyping

Chapter 12

What is a prototype?

In other design fields a prototype is a small-scale model:

→ a miniature car



→ a miniature building or town



What is a prototype?

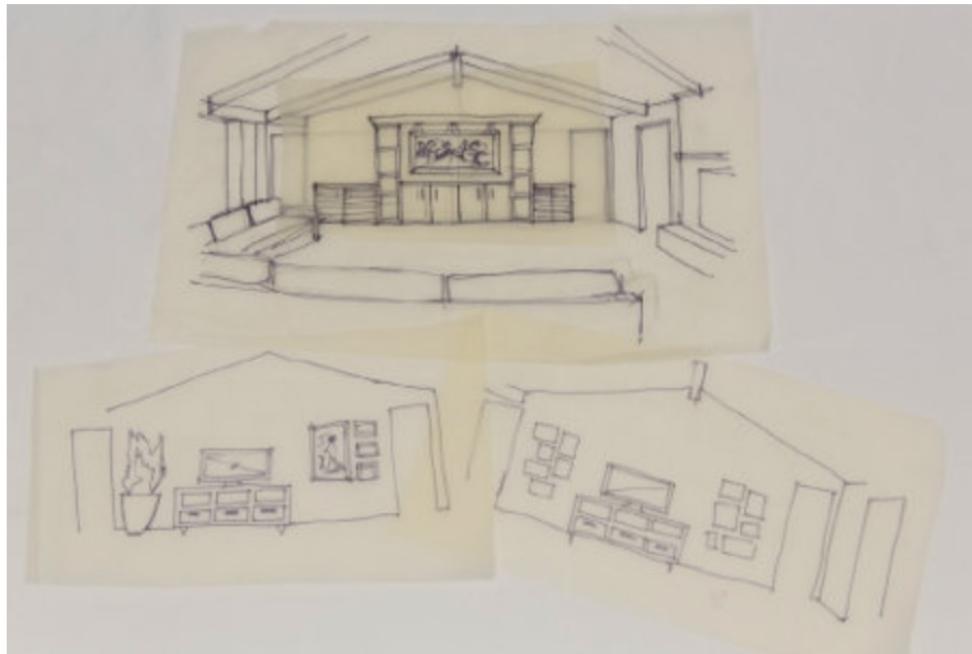
The Oxford definition of a prototype is:

- “A first, typical or preliminary model of something, especially a machine, from which other forms are developed or copied”

The word originates from the Greek *prōtotupos*

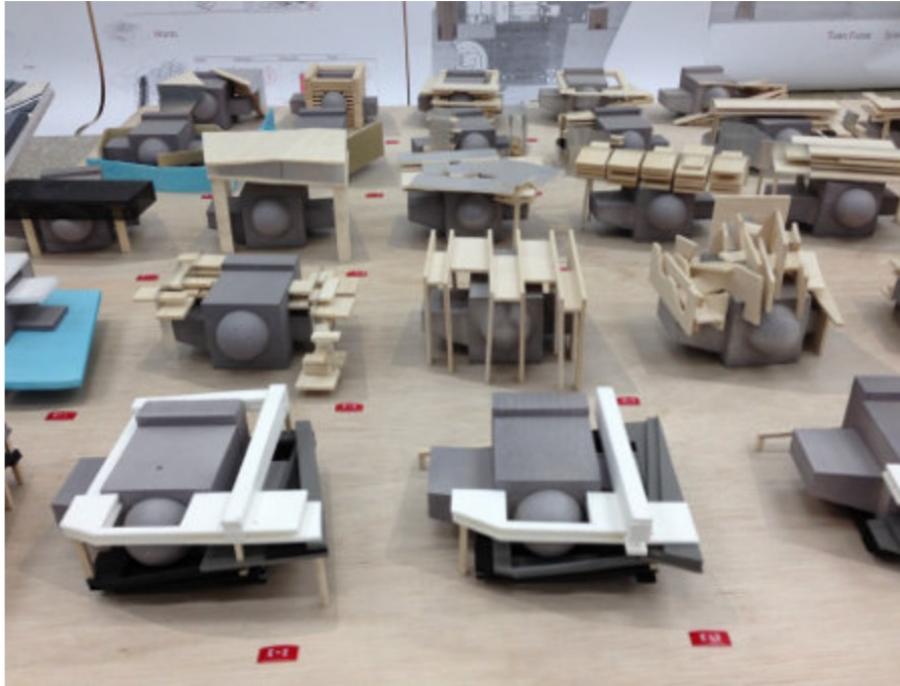
- meaning “first example”

What is a prototype? - Examples



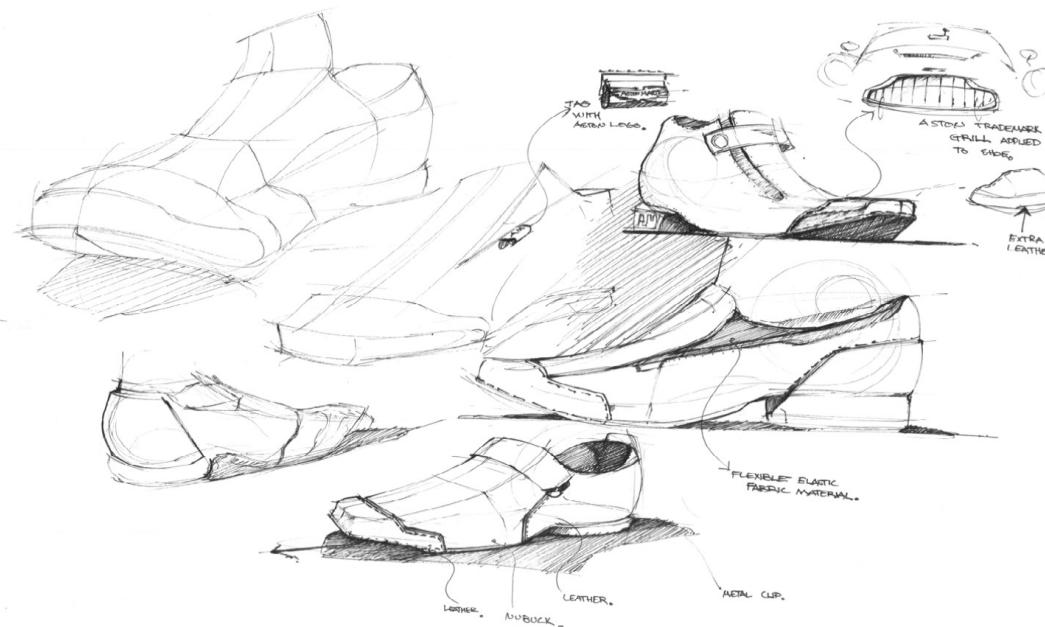
Drawing alternative furniture layouts is a prototype for decorating your house

What is a prototype? - Examples



Architects create models and prototypes that are used to test floor plans, airflow, daylight, and materials

What is a prototype? - Examples



Industrial designers sketch and prototype before choosing the proper, final form for their specific use case

What is a prototype? - Examples



BackRub is a "web crawler" which is designed to traverse the web.

Currently we are developing techniques to improve web search engines. We will make various services available as soon as possible.

Sorry, many services are unavailable due to a local network failure beyond our control. We are working to fix the problem and hope to be back up soon. 12/4/97

We have a demo that searches the titles of over 16 million urls: [BackRub title search demo](#)

BackRub search with comparison (type in top box, ignore cgi-bin errors) New systems will be coming soon.
Some documentation from a talk about the system is [here](#).

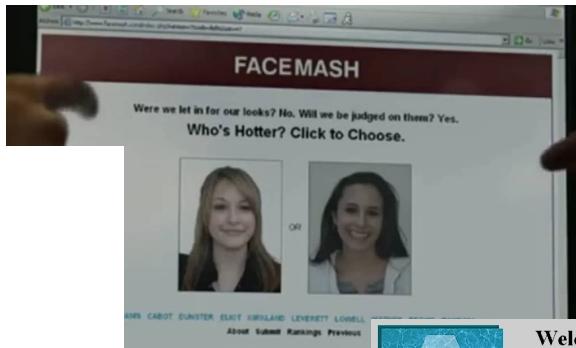
BackRub is a research project of the [Digital Library Project](#) in the [Computer Science Department](#) at Stanford University.

Some Rough Statistics (from August 29th, 1996)
Total indexable HTML: urls: 75,266 Million
Total content downloaded: 207,022 gigabytes
Total indexable HTML: pages downloaded: 1,625,554 Million
Total number of URLs which have not been attempted yet: 30,6822 Million
Total robots.txt excluded: 0.224249 Million
Total socket or connection errors: 1,31841 Millions

BackRub is written in Java and Python and runs on several Sun Ultra's and Intel Pentiums running Linux. The primary database is kept on an Sun Ultra II with 250GB of disk. [Scott Hassan](#) and [Alan Sternberg](#) have provided a great deal of very talented implementation help. [Sergey Brin](#) has also been very involved and deserves many thanks.

Before emailing, please read the [FAQ](#). Thanks.

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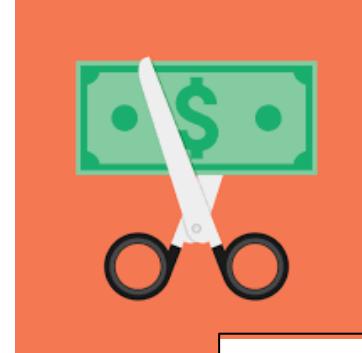
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What are these famous websites?

Can you identify some **commonalities**?

Cheaper & Faster!



Easier to communicate!



Direct feel!

What is a prototype?



Everything Is a Prototype

Each thing that you make or activity that you do can be improved.

Nothing is ever completely finished; you simply run out of time for the current release. Even if you're happy with the product you deliver, your users will have feedback, and there are bound to be tweaks and changes that you need to make for future versions or releases.

What is a prototype?

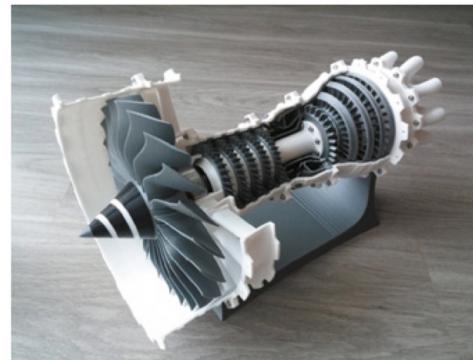
- Instead of an object, it is more a way of thinking.
 - The design can not be done at once
 - Be brave to show the work in progress
 - Listen to feedbacks
 - Be practical

What is a prototype (in design)?

In **interaction design** it can be (among other things):

- a series of screen sketches
- a storyboard, i.e., a cartoon-like series of scenes
- a PowerPoint slide show
- a video simulating the use of a system
- a lump of wood (e.g., PalmPilot)
- a cardboard mock-up
- a piece of software with limited functionality written in the target language or in another language

What is a prototype?



Why prototype?

- Evaluation and feedback are central to interaction design
- Stakeholders can see, hold, interact with a prototype more easily than a document or a drawing
- Team members can communicate effectively
- You can test out ideas for yourself
- It encourages reflection: very important aspect of design
- Prototypes answer questions, and support designers in choosing between alternatives

Why prototype?

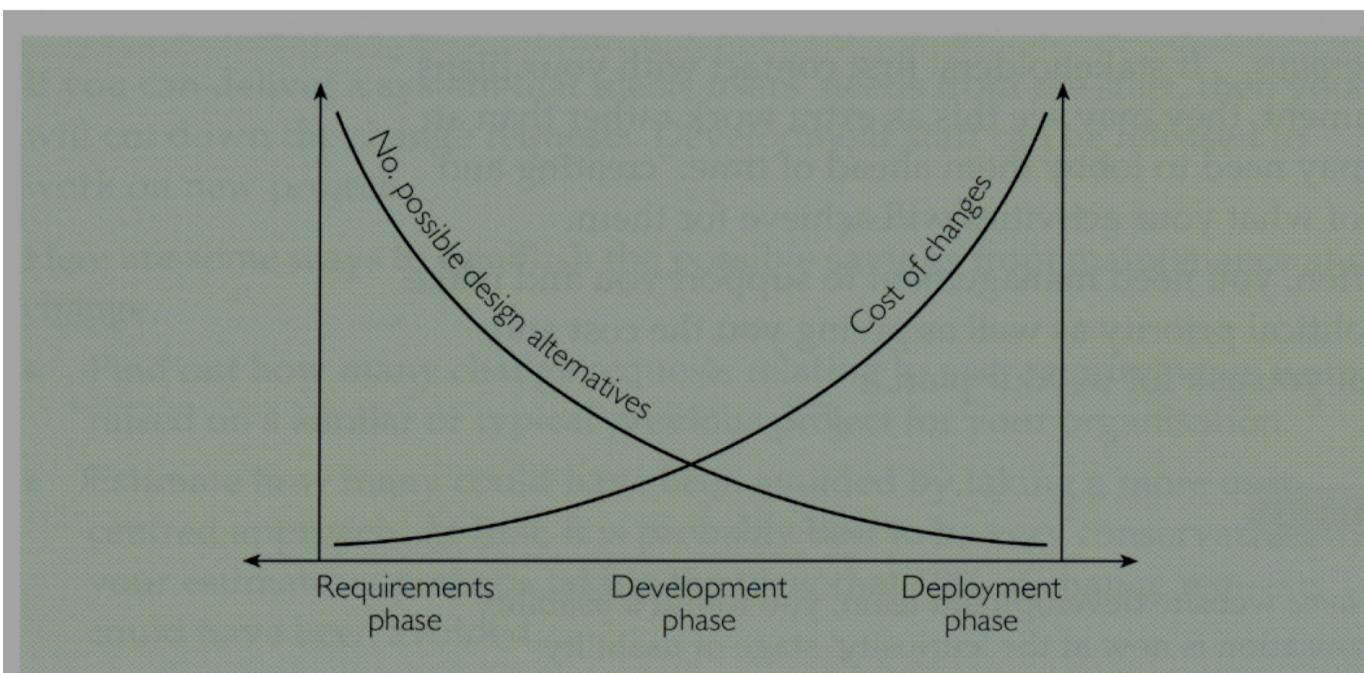


Figure 7 The number of possible designs decreases as the cost to make changes increases (from Ehrlich and Rohn 1994)

Why prototype? -

Understanding

Understanding avoid false assumptions

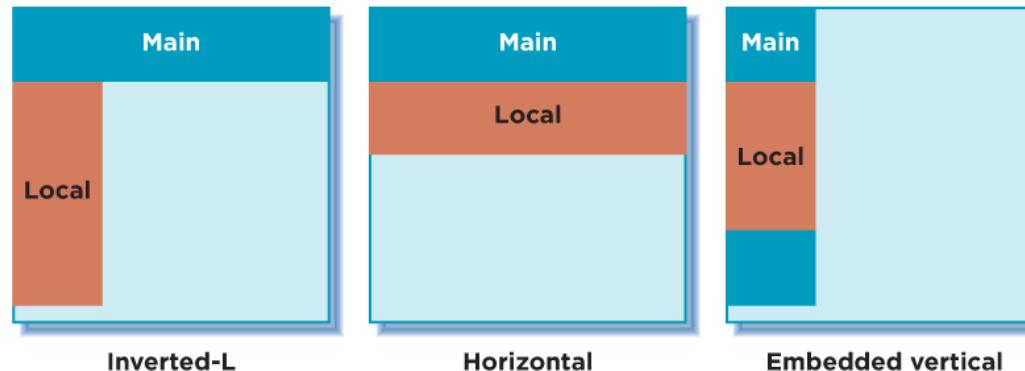
Prototype could help you to understand

- Design alternatives
- Strategy
- User-centred processes

Understand design alternatives

“All roads lead to Rome”

- How can you be sure that the one you choose is the right one for your design?
- **Don't be sure**, make many of them and try!



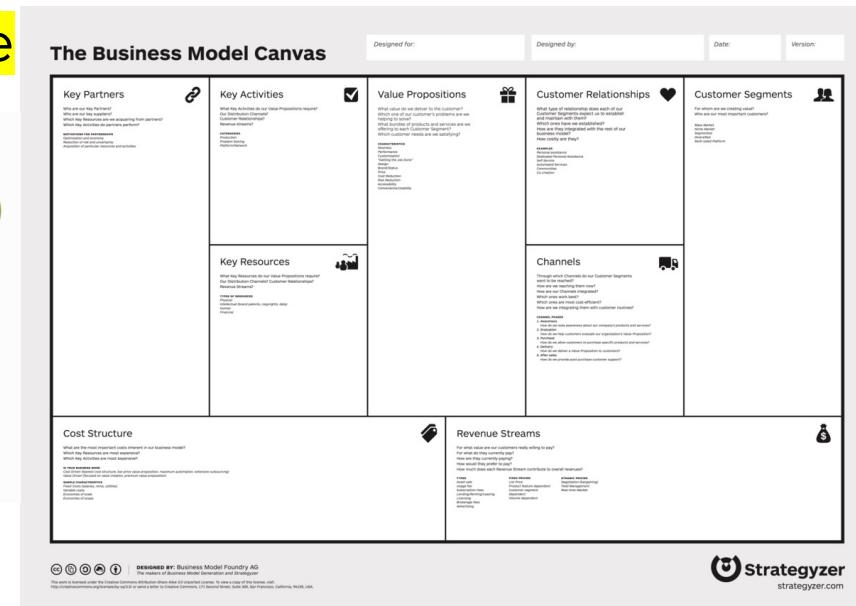
Understand design alternatives



Understand strategy

What are pros and cons?

- How would you compete with other designs?
- Intangible -> tangible

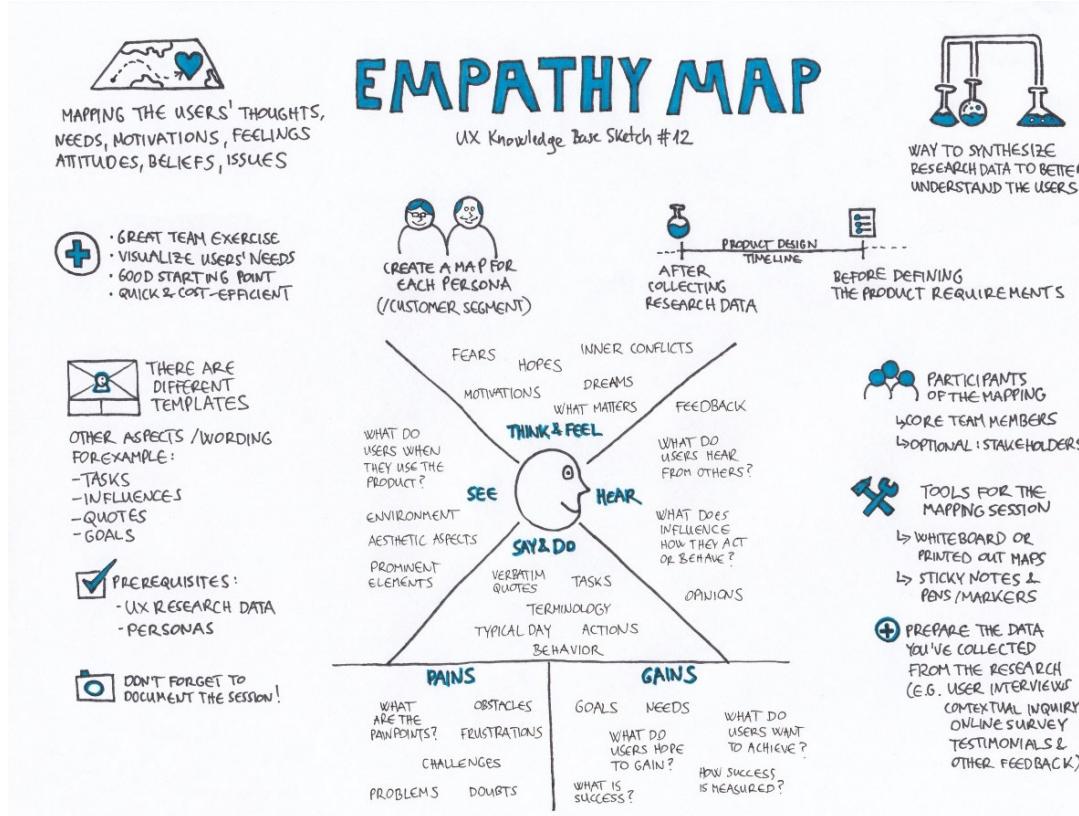


Understand user-centred processes

User-centred design

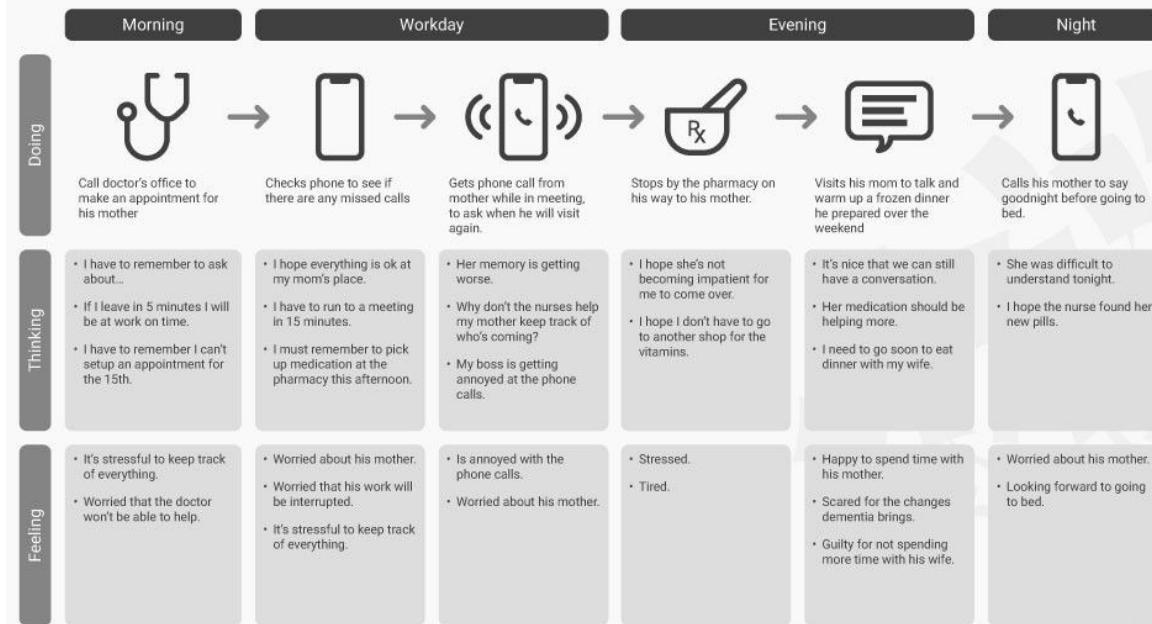
- Don't make false assumptions
- Prototype could build **empathy** between designers and users with concrete ideas
- Useful tools:
 - Empathy map
 - User journey map

Empathy map



User journey map

User Journey Map: Example



User journey map – for a real journey

FINLAND
SEPTEMBER (2019)



DAY 6 (HELSINKI) – SUNDAY 15 SEPTEMBER

MORNING

- Breakfast buffet at hotel
- 8 - 8:30am to latest Walk to [Hakaniemi](#) Market Hall via City Park
- 9am - [Hakaniemi](#) Market Hall
- 9:45am walk around [Kruununhaka](#) neighbourhood
- Walk past the Burgher's Home (oldest wooden building in Helsinki)
- 10:15am Walk around [Töölö](#) island
- 10:45am - Walk to [Uspenski](#) Cathedral
- 11:15am - Walk around [Eira](#) areas

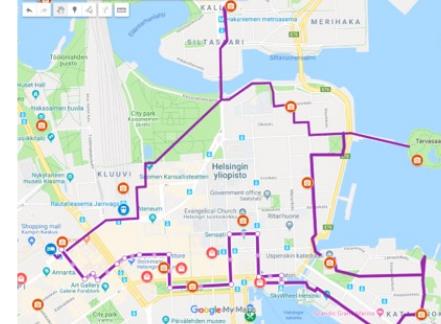
AFTERNOON

- 12pm lunch at the Old Market Hall
- 1:30pm Ferry to [Suomenlinna](#) Island
- 5pm return to Helsinki
- 5:15pm Helsinki Cathedral (outside only)
- Walk through [Esplanadi](#) Park

EVENING

- Shopping in [Esplanadi](#) area
- Dinner at [Zetor](#) restaurant

Purple Route – Total Walking = approx. 12km.



Accommodation: Scandic Hotel [Siilinkerta](#) (pre-paid)

Why prototype? - Communication

Communication increase the efficiency
in making decision

Prototype could help you to

Communicate with

- Same “language”
- Different stakeholder
- No “maybe”

Same “Language”



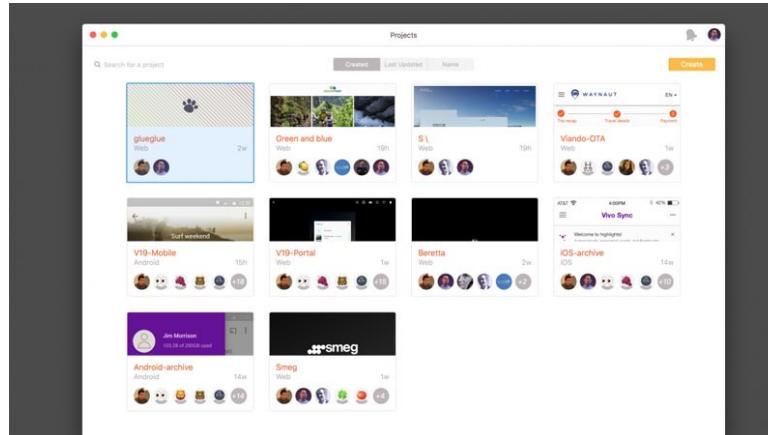
With different stakeholders

Imagine how would you present the prototype with these stakeholders:

- Investors (Highlights/potentials)
- Factory (Materials, scales)
- Users
 - Elderly (caring?)
 - Child (warmth?)
 - Male or female (Cost or privilege?)

No “maybe”

Prototype could save efforts in determining style, size, colour, and interactions through observable objects and peer discussion



Why prototype? – Test and reflection

The main aim of prototype is to examine and improve the current design

Prototype could help you to test and reflect on

- Hypotheses and assumptions
- Other's comments

Hypotheses and assumptions

When we begin the design, we have to make assumptions no matter how hard we try to understand users, for example:

- Users could find the way to specific functions
- The information displayed is straightforward
- Users could understand the UI and texts
- Users' needs could be fully satisfied within this page

The only way to find the answer is to let them play with a mock system, like you need to practice before the presentation

Others' comments

The test and reflection are not only about users, but also within the design group

The prototype is an opportunity for you to
present and promote the idea to peers,
and reflect on the availability and values from different perspectives

Fidelity in prototyping

Chapter 12

What is fidelity?

The fidelity of a prototype refers to how it conveys the look-and-feel of the final product (basically, its level of detail and realism).

Select the right level of fidelity in prototyping is the key to the success of design process.

- Lower fidelity may be useless, higher fidelity may be time- and money-consuming

A simple example...

<https://www.bilibili.com/video/BV1Gj411o7xt/>

Low-fidelity Prototyping

Uses a medium which is unlike the final medium,
e.g., paper, cardboard

Is quick, cheap and easily changed

Examples:

- sketches of screens, task sequences, etc.
- 'Post-it' notes
- Storyboards
- 'Wizard-of-Oz'

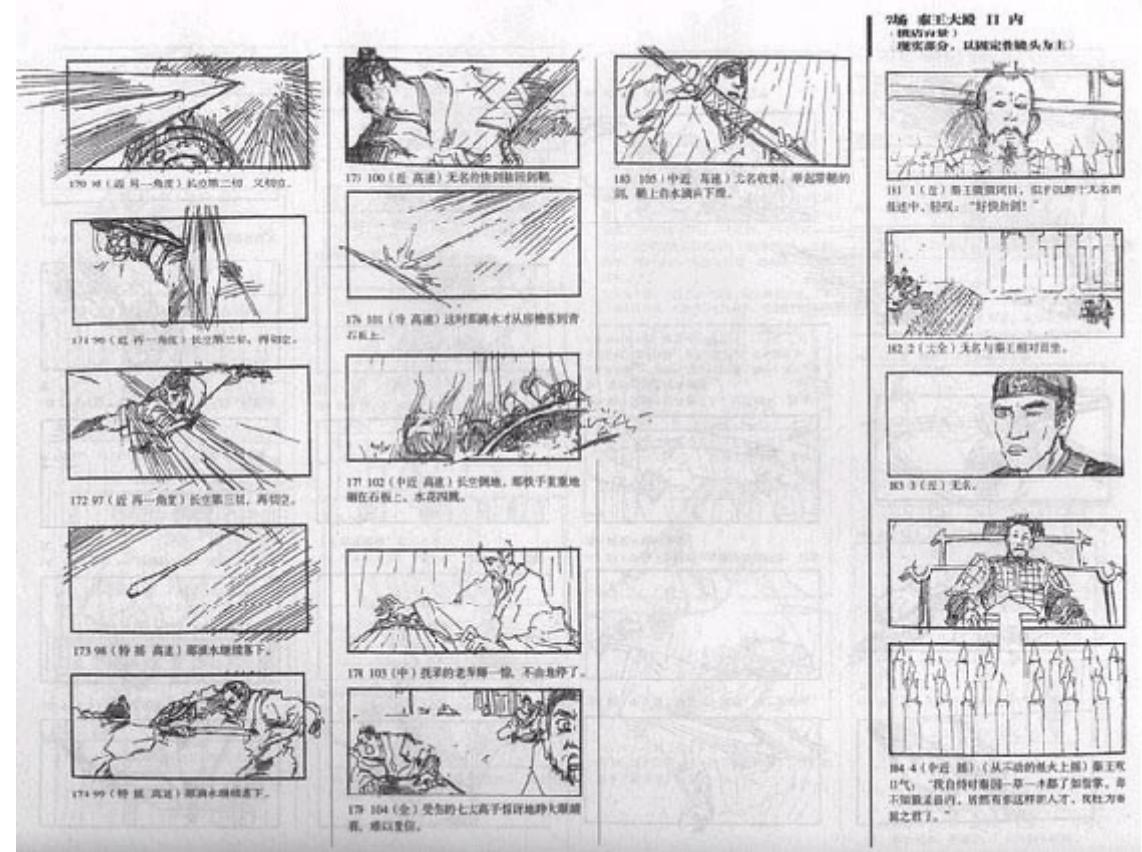
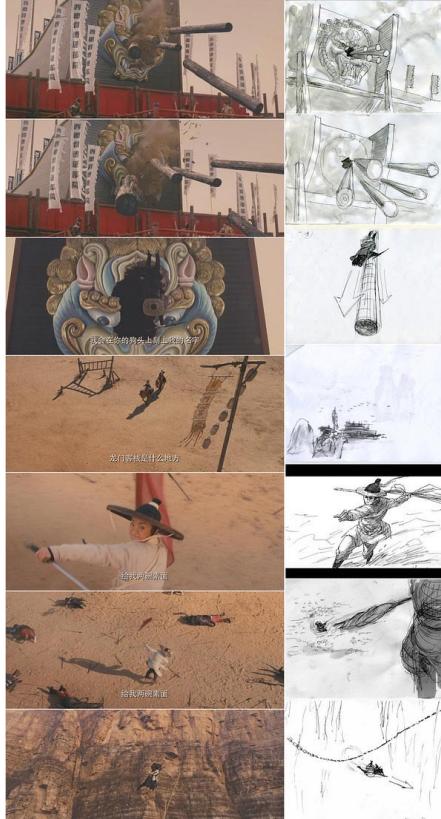
Storyboards

- Often used with scenarios, bringing more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design

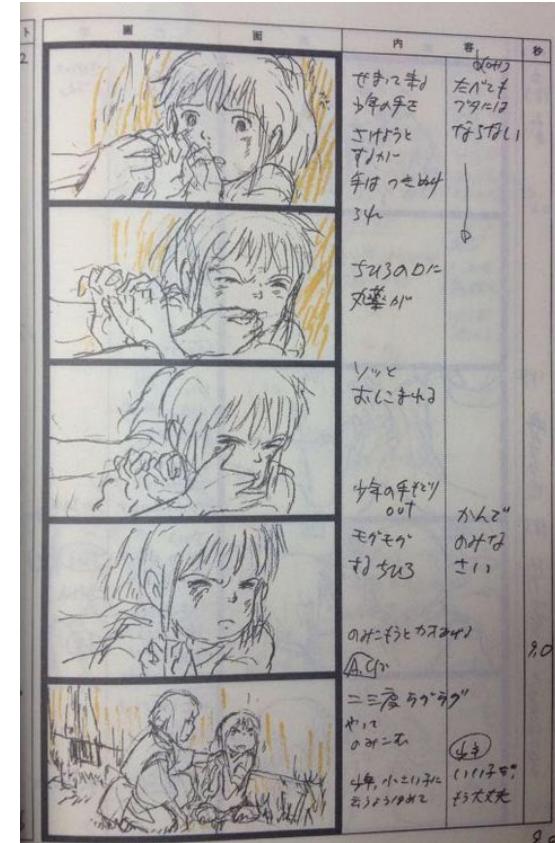
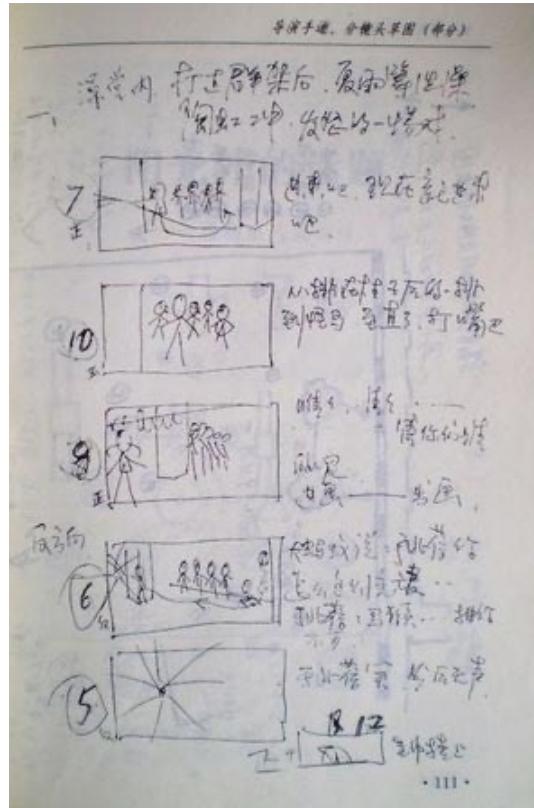
Storyboards



Storyboards - no perfection



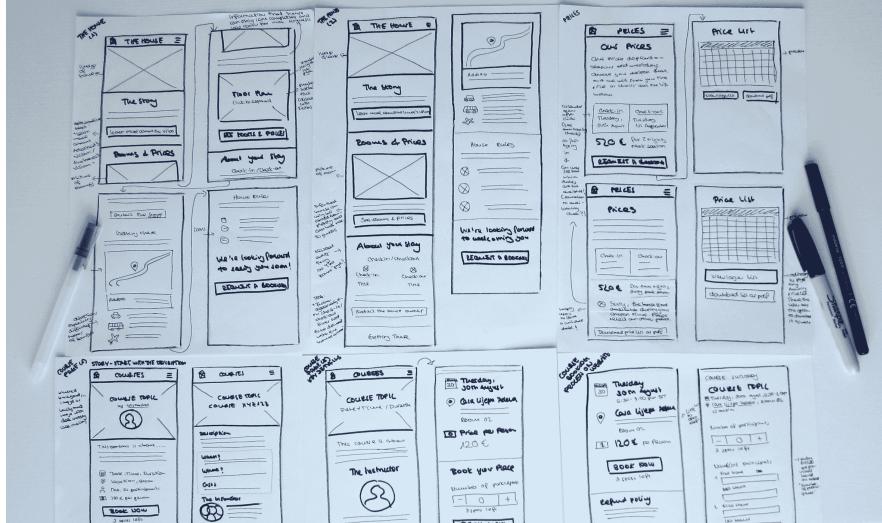
Storyboards - no perfection



Sketching

Sketching is important to low-fidelity prototyping

Same with the storyboard - **Don't be inhibited about drawing ability.** Practice simple symbols with pencil and paper



Using index cards

Index cards (3 X 5 inches)

Each card represents one screen

Often used in

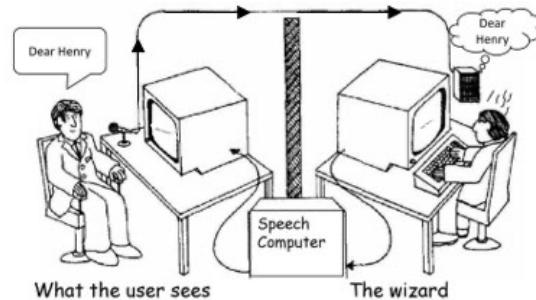
- Website development
- Application
- MiniProgram



‘Wizard-of-Oz’ prototyping

- The user thinks they are interacting with a computer, but a developer is responding to output rather than the system.
- Usually done early in design to understand users' expectations
- What is 'wrong' with this approach?
 - It is “Artificial Intelligence”

Wizard of Oz testing – The listening type writer IBM 1984



‘Wizard-of-Oz’ prototyping



High-fidelity prototyping

- Uses materials that you would expect to be in the final product.
- Prototype looks more like the final system than a low-fidelity version.
- For a high-fidelity software prototype common environments include Macromedia Director, Visual Basic, and Smalltalk.
- Danger that users think they have a full system.....

Compromises in prototyping

- All prototypes involve **compromises**
- For software-based prototyping maybe there is a slow response? sketchy icons? limited functionality?
- Two common types of compromise
 - **'horizontal'**: provide a wide range of functions, but with little detail
 - **'vertical'**: provide a lot of detail for only a few functions
- Compromises in prototypes mustn't be ignored.

Questions first

Are we using the low- or high-fidelity prototype if we used the colored UI/operable interface/coding...?

There is no clear separations!

But we do have measures from different perspectives.

Remember the **compromise!**

- Neither of these is inherently good or bad.
- There are costs and trade-offs with raising or lowering fidelity in any dimension.
- The path you take as the designer to get from the first image to the last is up to you to determine.

Why it matters?

- We are doing a ‘low-fidelity’ prototype!



Or



- Let’s make a ‘high fidelity’ prototype to be tested with customers ASAP!

Summary

- Prototyping
 - Features of prototyping
 - Prototyping is important in
 - Understanding
 - Communication
 - Test and reflection
 - Low- vs. High-fidelity prototyping
 - Examples of prototyping
 - No “low fidelity” versus “high fidelity” in a generic way. Instead, refer to the **primary dimensions** and why they matter for your prototype.

Any Questions?

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