



Aalto University  
School of Arts, Design  
and Architecture

# Designing the interactions

**MUO-E3036 Interaction Design (IxD)**

**24 January 2022**

**Antti Salovaara**

MyCourses > Interaction design > Split S > Lecture slides >  
Week3-Day1-Designing-the-interactions.pdf

# Contents of the day

Review on where we are now in the course

+ what tasks are lying ahead

This week's group task

1. Scenario design and definition of your UX goals
2. Task structure design
3. Interaction sequence / sitemap design
4. UI sketching

Introduction to detailed IxD

Repetition of contents from UID course lecture

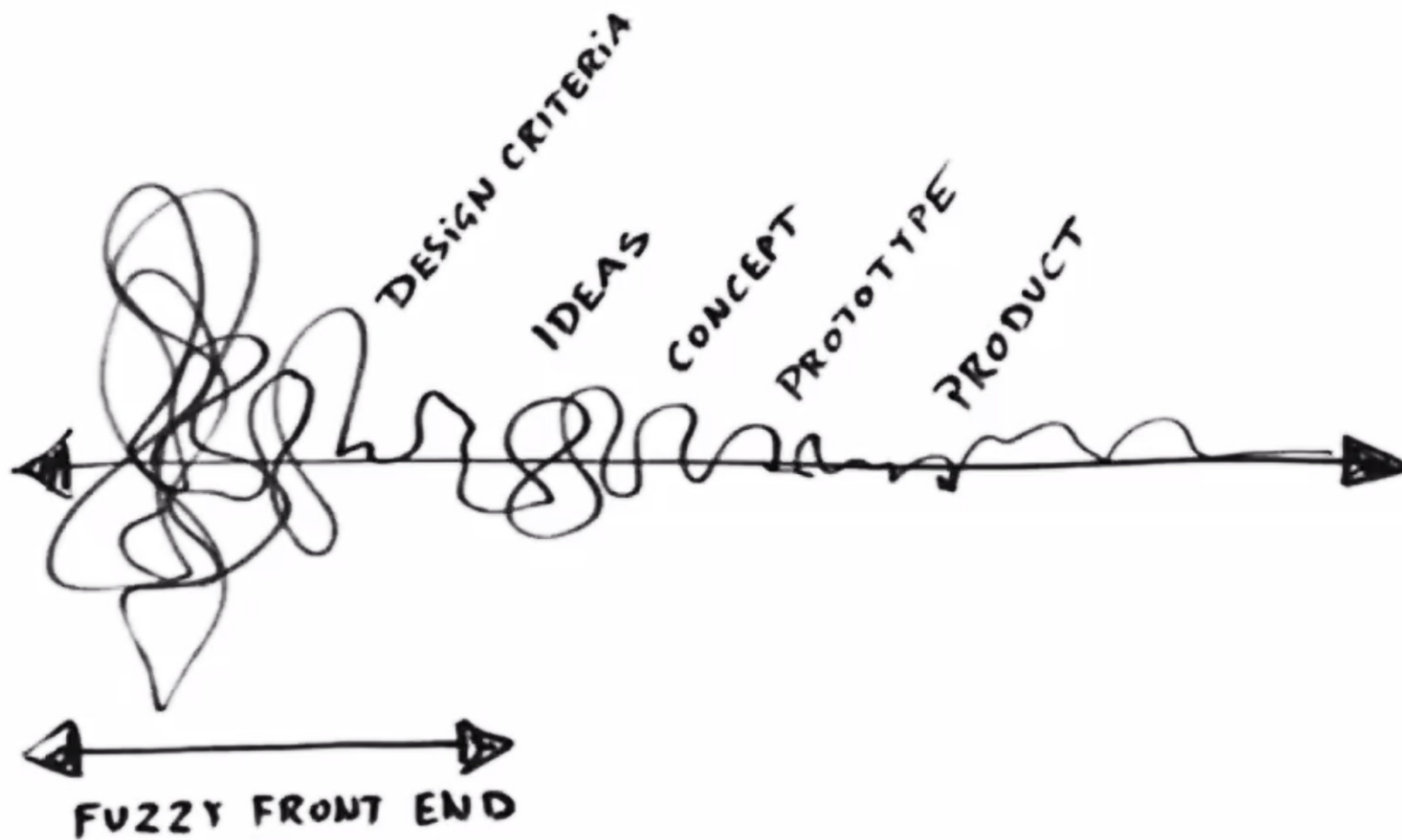
Friday's presentation instructions

Reading material for Friday

Tutor meetings

**Where are we now?**

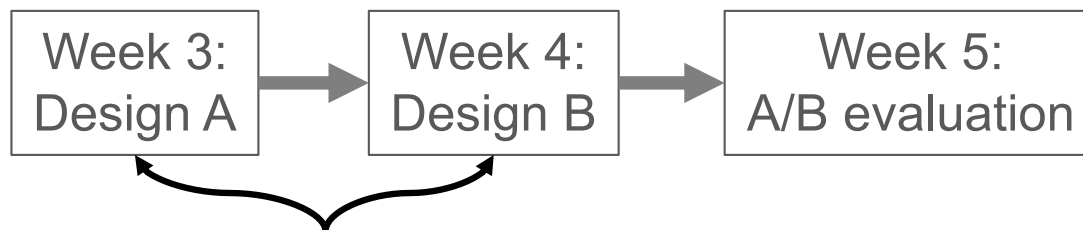
And enjoy the user research in the wild!



Sanders & Stappers (2008). Co-creation and the new landscapes of design. CoDesign, 4(1), 5--18.  
<https://doi.org/10.1080/15710880701875068>

# Schedule

Week 1	User research ✓
Week 2	Google Design Sprint ✓
Week 3	Interaction prototyping pt. 1
Week 4	Interaction prototyping pt. 2
Week 5	User evaluation (small A/B test)
Week 6	Wrapping up



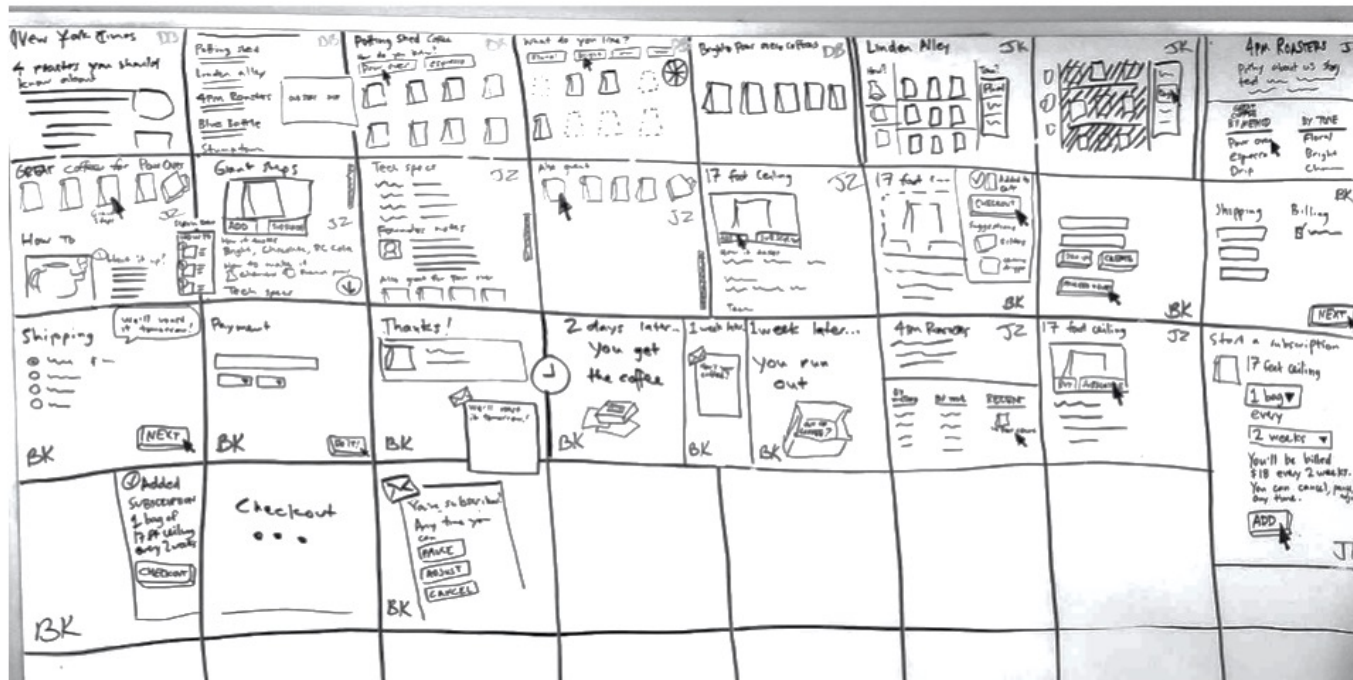
E.g., different interaction  
in one part of UI

# This week's group task

1. Scenario design and definition of your UX goals
2. Task structure design
3. Interaction sequence / sitemap design
4. UI sketching

# 1. Scenario design + your UX goals

Starting point: Your storyboard from Wednesday



Storyboard shown in the Sprint book

# 1. Scenario design + your UX goals...

Create an improved scenario for your product/service

With improvements, based on what you learned via prototyping (Thursday) and testing (Friday)

Think: What problem / need does your product/service address?

Think: What is the situation where the product/service is used \*

What are the criteria, goals and requirements for UX of your design?

Do you aim for simplicity? Minimalism? Particular kind of aesthetics? Learnability? Efficiency? Prevention of errors? \*\*

Do not choose too many goals

\* See section 2.6 in Benyon's book in this week's reading materials and a PACT graph in the later slides.

\*\* The usability criteria (see later slides) can be a good (but not complete) source of inspiration.



# 1. Scenario design + your UX goals...

From the storyboard, choose a sequence that you will design in more detail

Example:

1. The user searches for some information
2. User contacts some friends
3. User goes to meet them
4. User sends IMs on the way.
5. When friends meet, they book a table together from a restaurant
6. They divide the costs evenly between themselves.

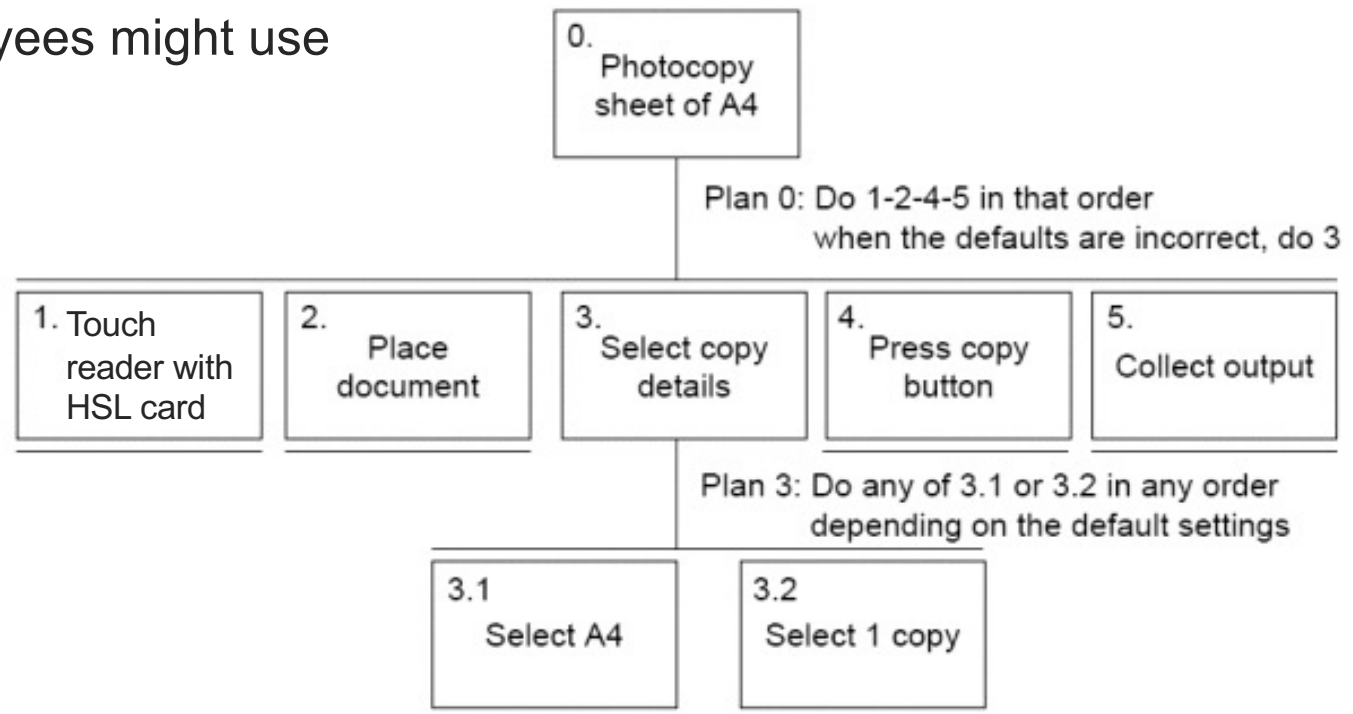
=> Select which part of the story will you focus on, because there can be a need for a different app for each stage

## 2. Task structure design

For the chosen sequence, design the structure of that activity

Example of visualizing the structure using hierarchical task analysis:

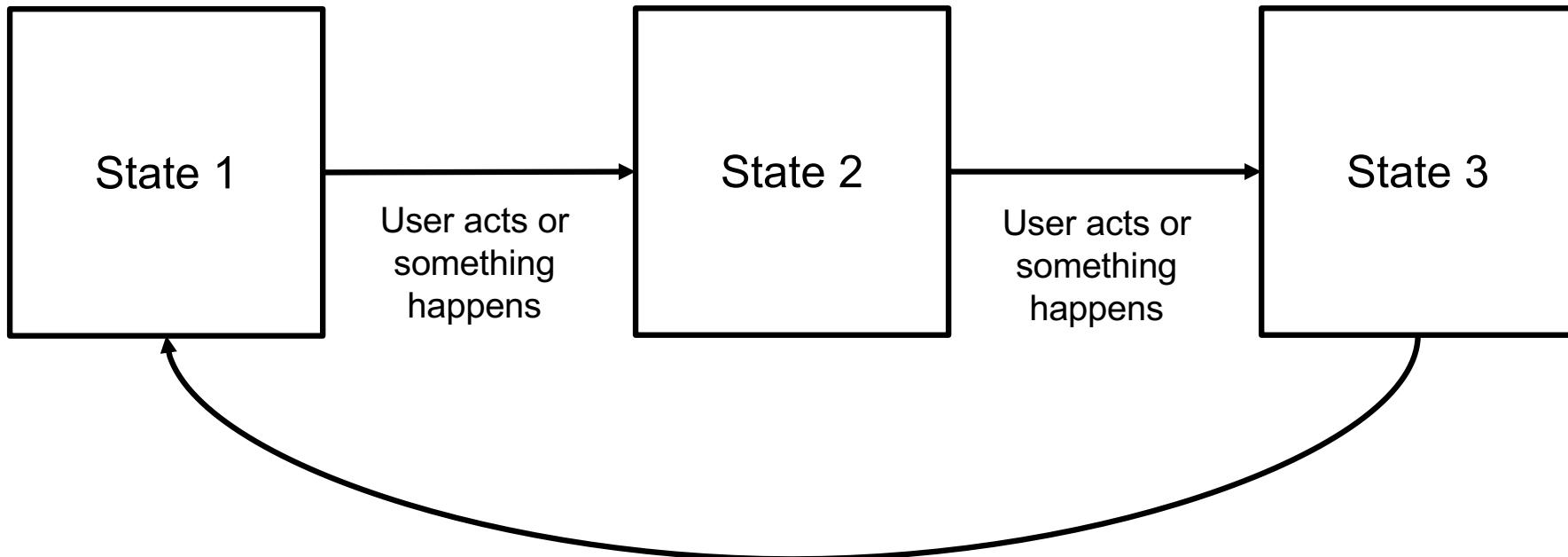
How Aalto employees might use photocopiers:

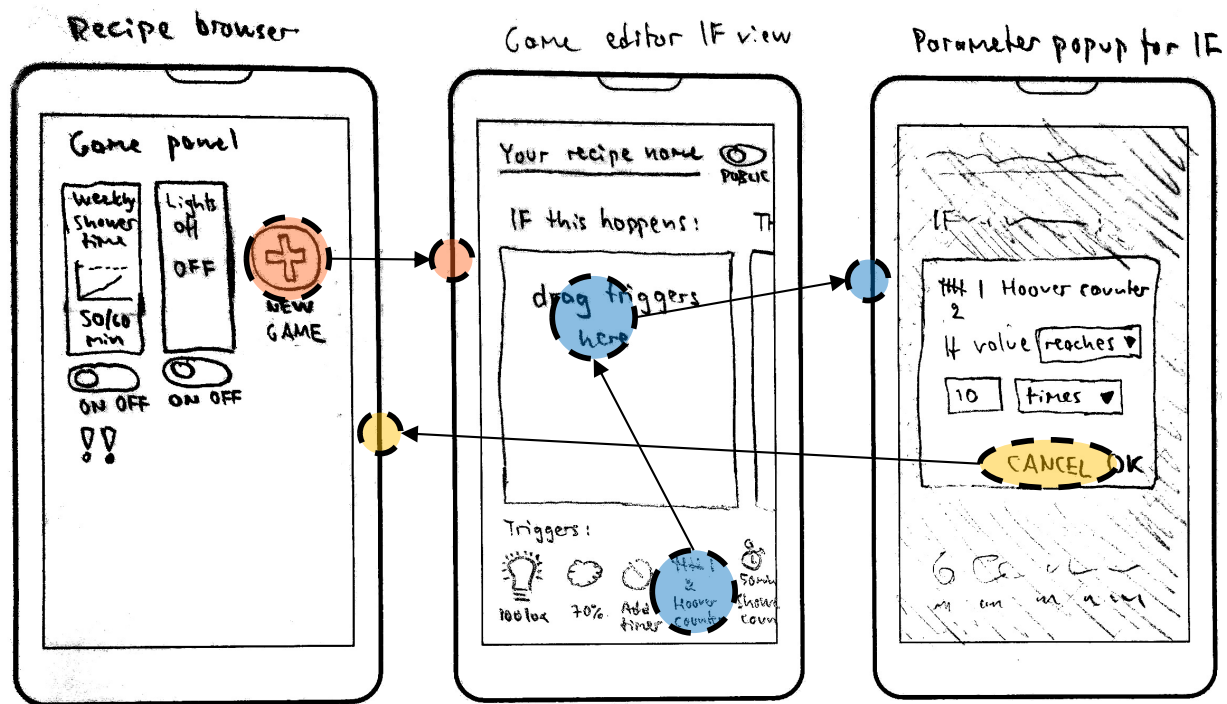
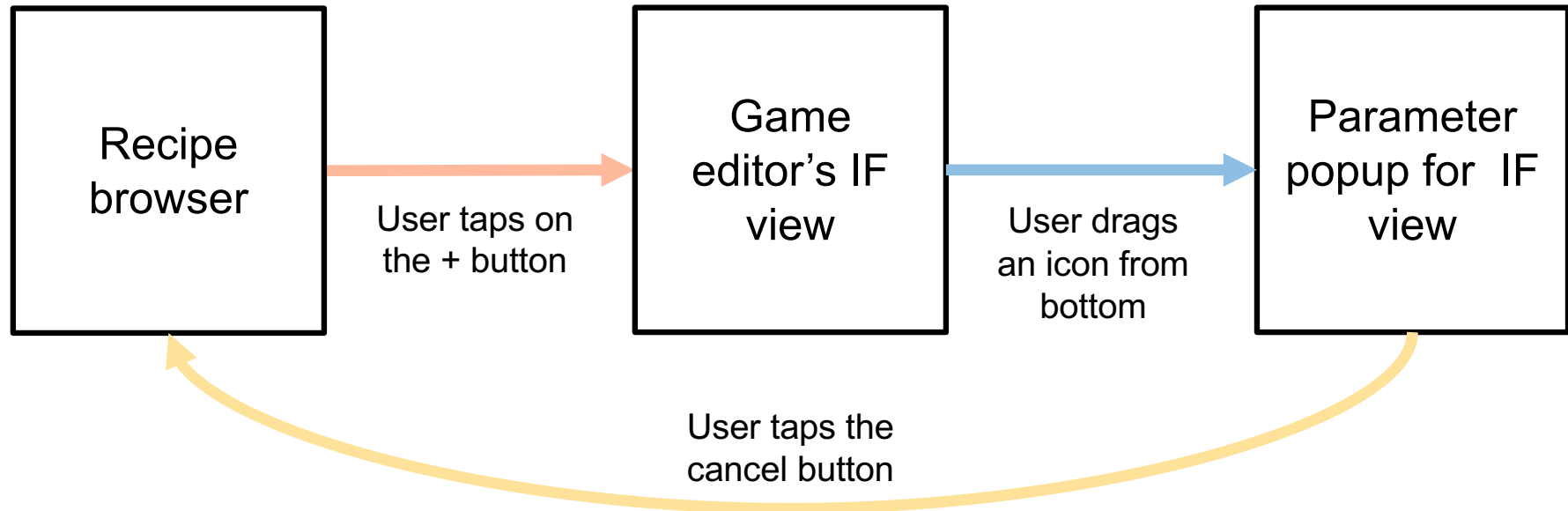


# 3. Interaction sequence / sitemap design

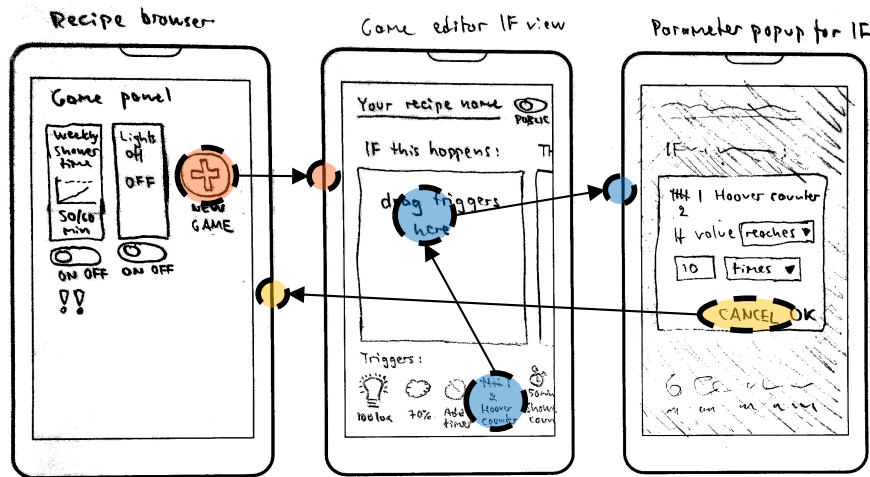
How do the user and the system interact in the task?

Remember to design the IX sequence from the point of your UX goals



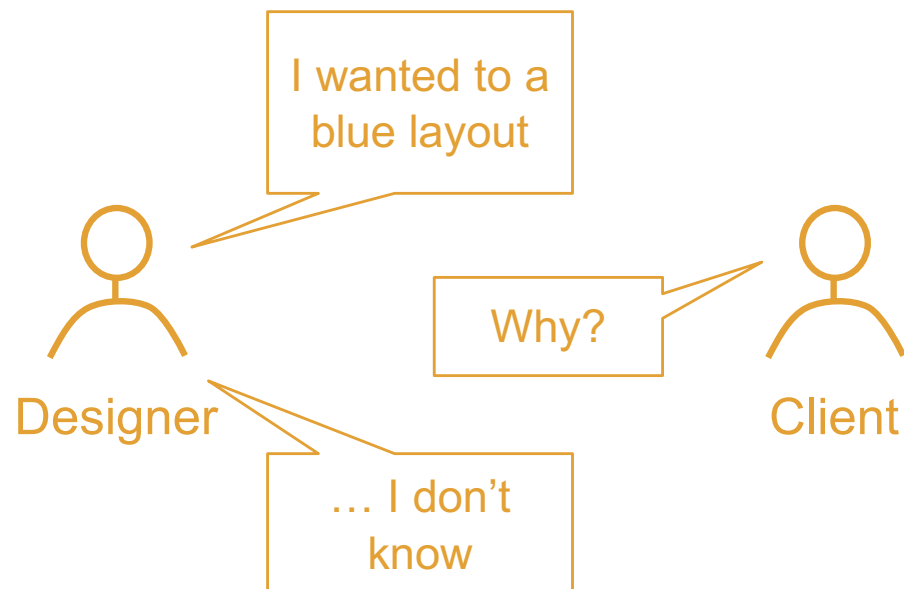


# 4. UI sketching



End of week 3:  
Sketching in Figma  
or some other  
prototyping tool

Why do we need to have so many steps?



# Introduction to detailed IxD

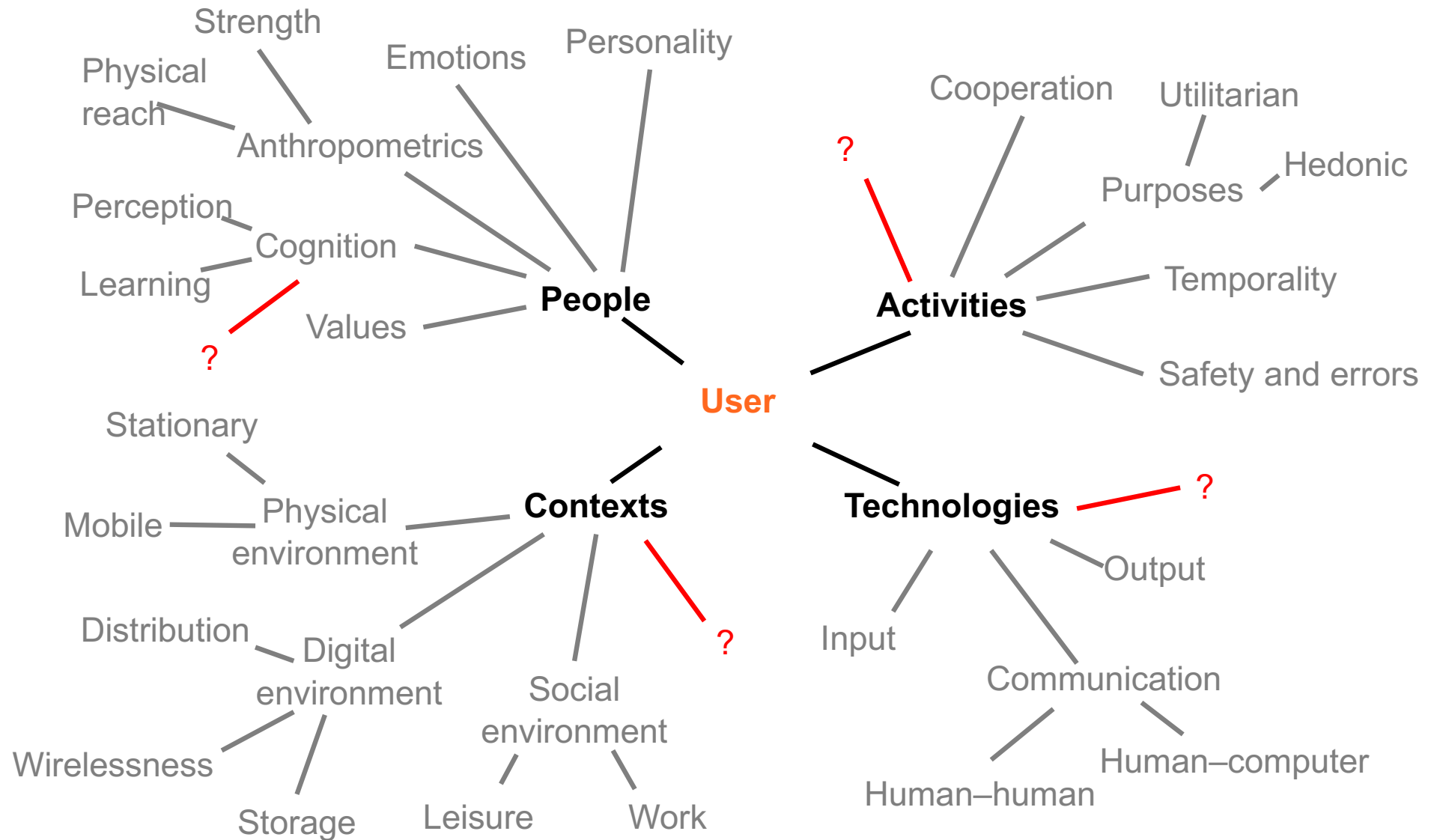
... building on the contents that were already covered in the UID course lecture \*

But let's have a **break** before that!

\* [https://mycourses.aalto.fi/pluginfile.php/1301655/mod\\_folder/content/0/UID-IxD.pdf?forcedownload=1](https://mycourses.aalto.fi/pluginfile.php/1301655/mod_folder/content/0/UID-IxD.pdf?forcedownload=1)

# 1. Scenario design + your UX goals

# Considering user's situation: PACT framework





# Usability criteria (Norman)

Use both knowledge in the world and in the head

Simplify the structure of tasks

Make things visible

Get the mappings right

Exploit the power of constraints

Design for error

When all else fails: Standardize!

“Seven principles for transforming difficult tasks into simple ones”;  
Norman (1988). The psychology of everyday things.

# Usability criteria (Nielsen)

Visibility of  
system  
status

Match  
between  
system and  
the real world

User control  
and freedom

Consistency  
and  
standards

Help users  
recognize,  
diagnose,  
and recover  
from errors

Error  
prevention

Recognition  
rather than  
recall

Flexibility and  
efficiency of  
use

Aesthetic and  
minimalist  
design

Help and  
documen-  
tation

"Usability heuristics"; Nielsen (1993). Usability engineering.

<https://www.nngroup.com/articles/ten-usability-heuristics/>

# Usability criteria (Shneiderman)

Make it clear to user when the task is completed

1  
Strive for consistency

2  
Enable frequent users to use shortcuts

3  
Offer informative feedback

4  
Design dialog to yield closure

5  
Offer simple error handling

6  
Permit easy reversal of actions

7  
Support internal locus of control

8  
Reduce short-term memory load

Make the user feel certain that they are controlling the task, not the computer

"Eight golden rules"; Shneiderman (1988).  
Designing the user interface.

# Usability criteria (Shneiderman)

Easy to learn

Efficient

Memorable

Designed for  
error

Satisfaction

# Your UX goals

Can you think of other goals than the heuristics in the previous slide?

**Simplicity? Minimalism? Particular kind of aesthetics?**  
Learnability? Efficiency? Prevention of errors? \*\*

## **Discussion in the groups (10 minutes):**

From last week's storyboard, what part would each one of you like to focus on in the interaction design?

What UX goals are you interested in?

(Do not choose too many goals, and remember that you don't need to decide it now, during the lecture)

## 2. Task structure design

# Don't forget the user's context

Start by considering the important PACT framework's elements

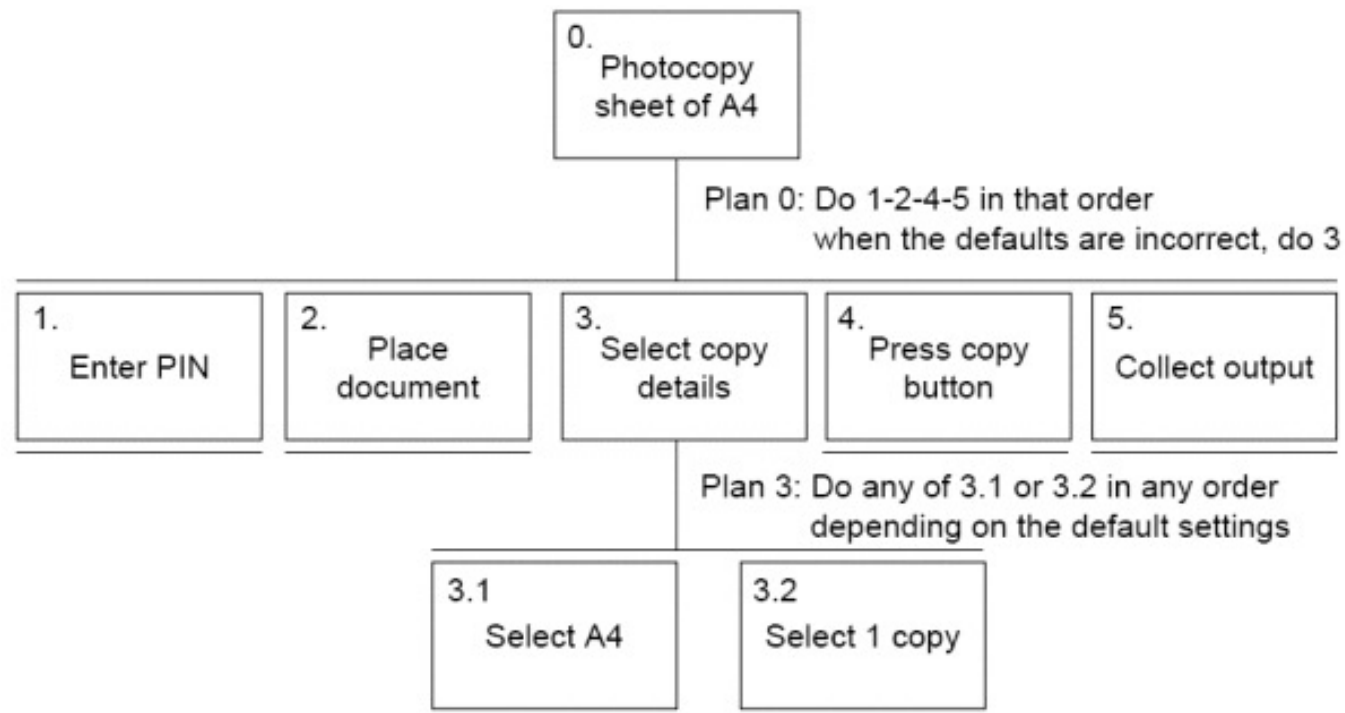
=> You will better understand the opportunities and limitations that the user has

# Hierarchical task analysis

Useful for understanding the structure of **existing** practices

You may then design your system to support this task structure or to re-structure it

Can be generated with observation and interviews

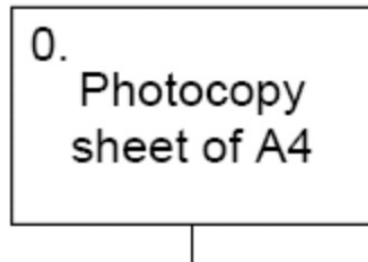


Example of a HTA diagram from <https://aakins1.wordpress.com/2014/02/06/week-1-task-analysis/>



# Notation

Task that has subtasks



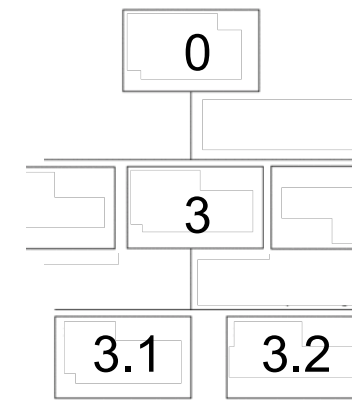
A terminal task that does not have subtasks



Plan for how subtasks are carried out:

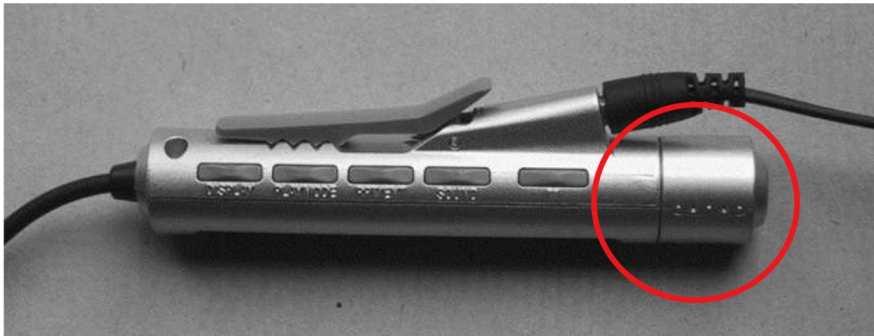
Plan 0: Do 1-2-4-5 in that order  
when the defaults are incorrect, do 3

Task numbering:

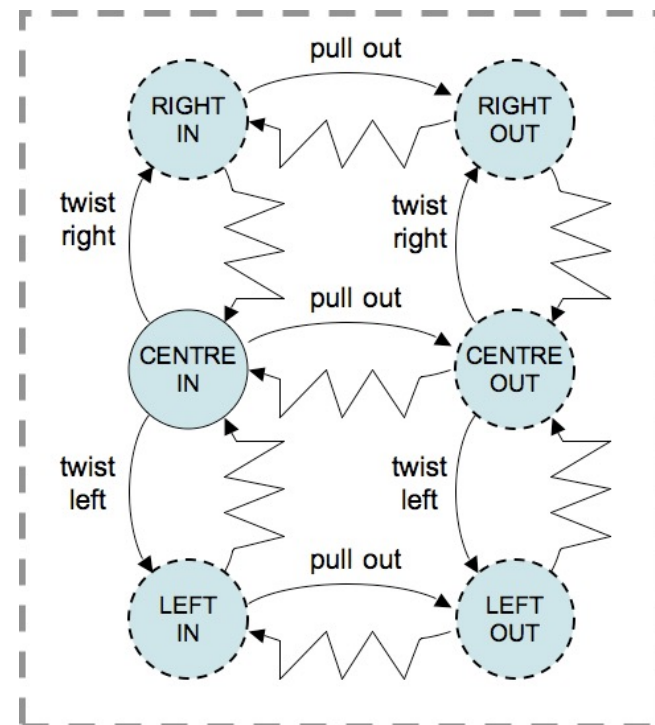


# Alternative: State diagrams

Can be used to express interaction's inputs and outputs



Knob in a music player. When knob is pushed in, the knob controls the volume. When pulled, it switches between tracks.



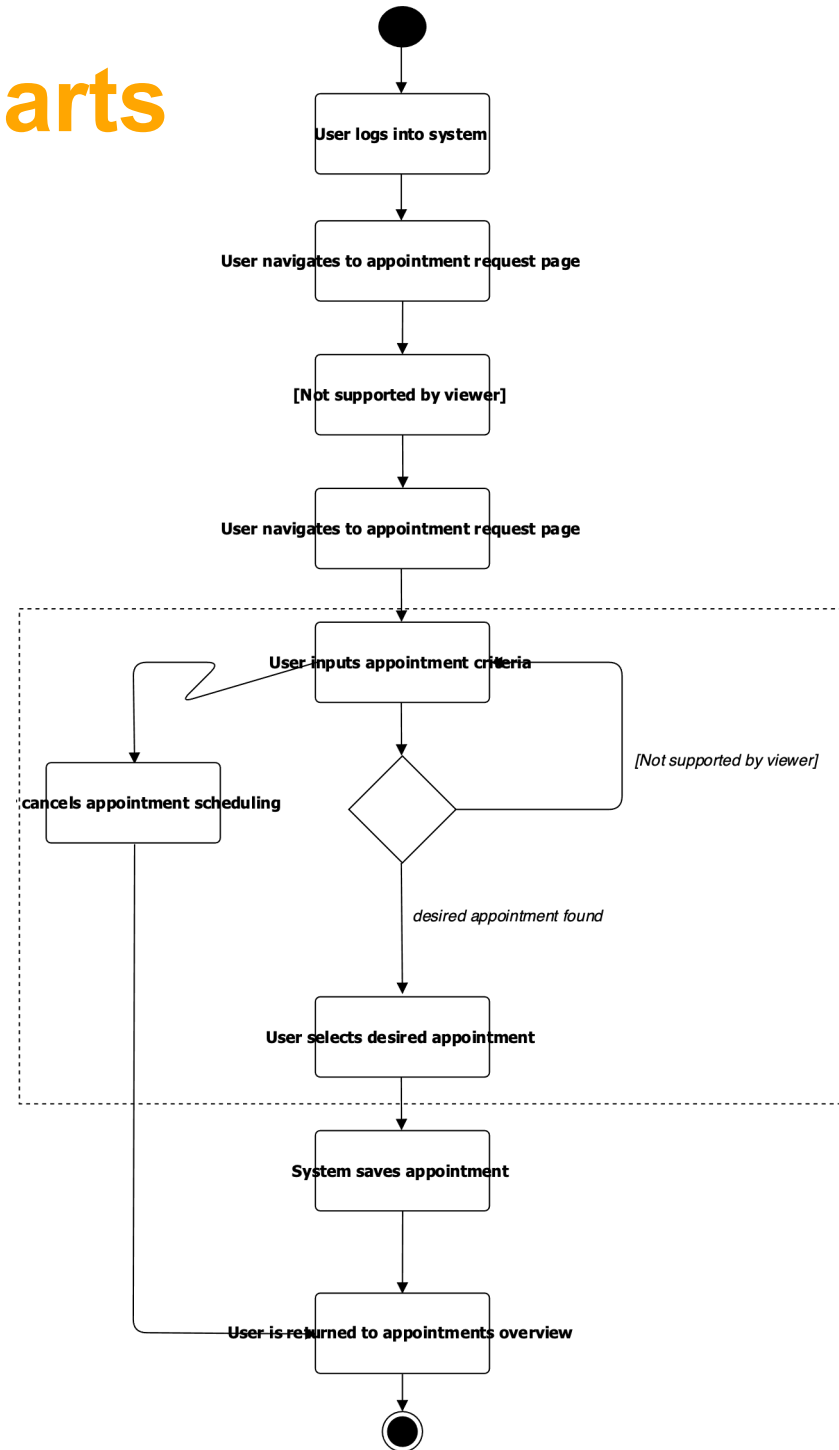
From <http://www.physicality.org/physigrams/>

# Alternative 2: Flowcharts

More info:

Silvio Piccolo (2016): Why Flowcharts are important in UX Design

<https://medium.com/@silvio-piccolo/why-flowcharts-are-important-in-ux-design-f6bf3df080>



“activity diagram requesting appointment” Creative Commons licensed image from <https://freesvg.org/activity-diagram-requesting-appointment>

# Group discussion

1. Select one sequence from your storyboard

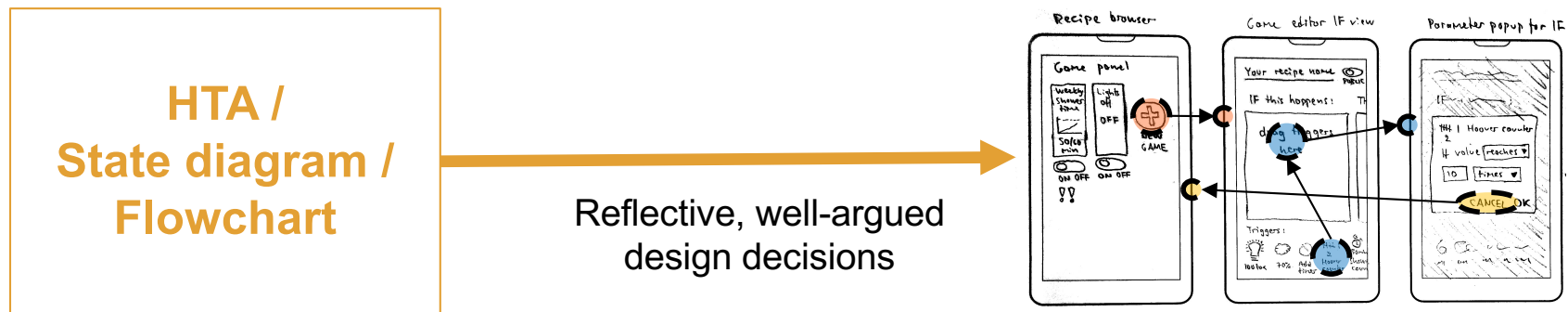
It does not need to be your “final” decision

2. Create two possible task structures for carrying out the task

Use any of the visualizing techniques from previous slides

10 mins

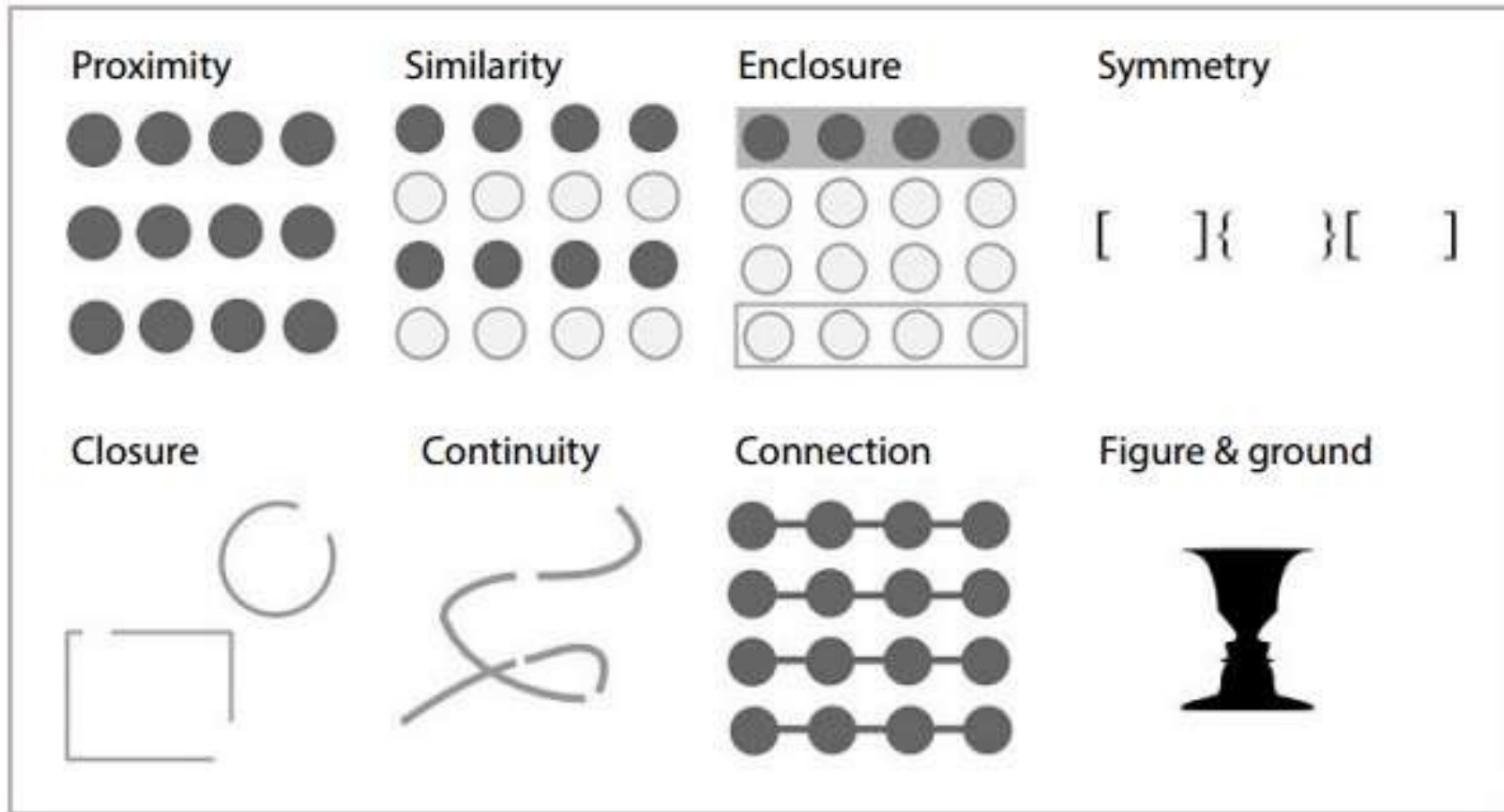
# 3. Interaction sequence / wireframe / sitemap design



# Reflective, well-argued design decisions

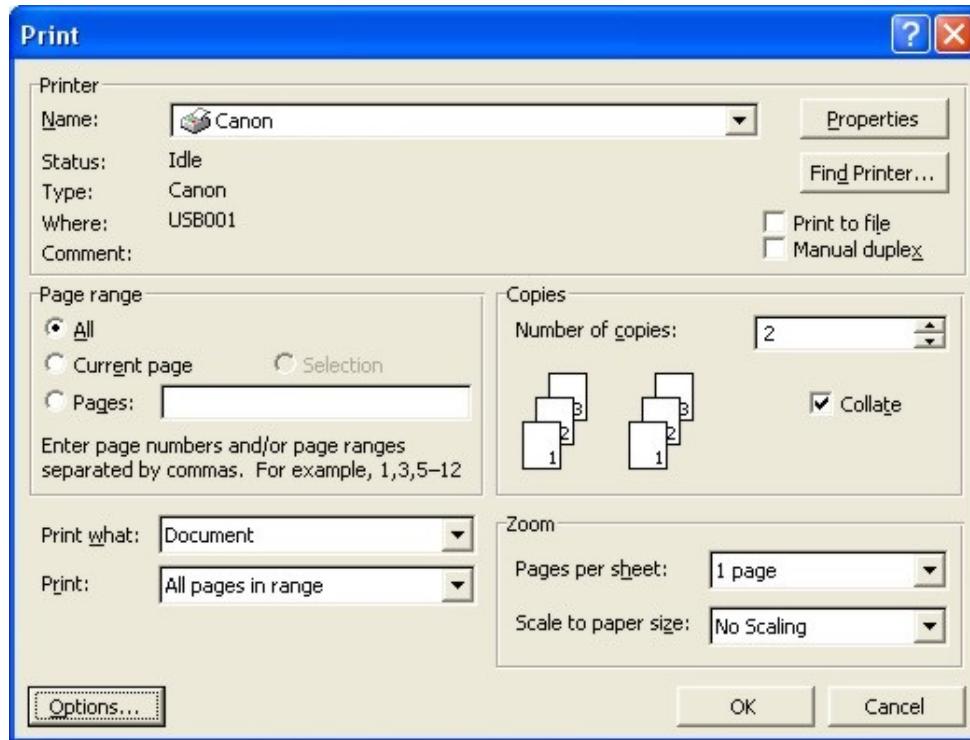
# Visual layout principles: the Gestalt laws

Origin: Germany 1920–1950

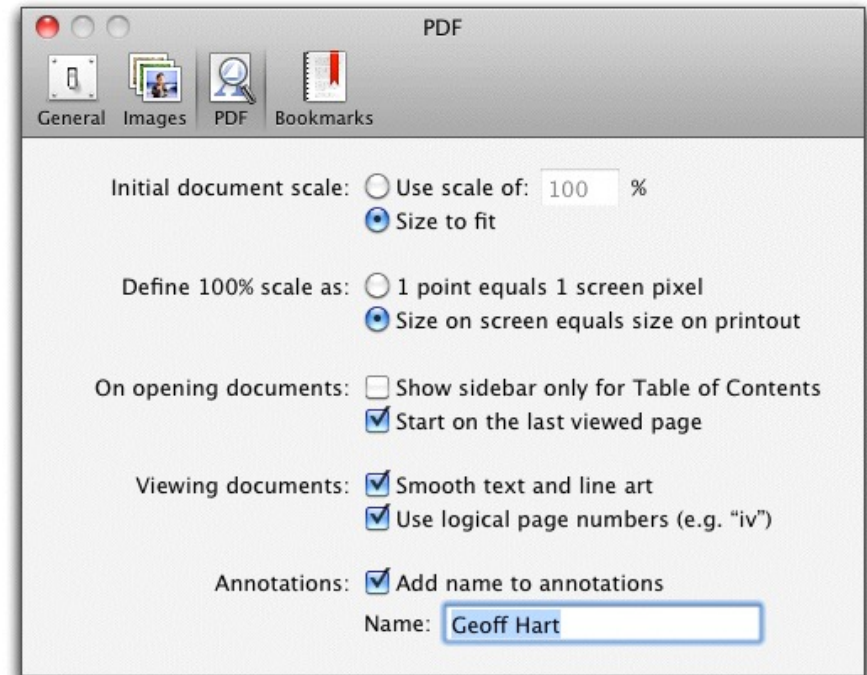


Original sources, Koffka 1935, Wertheimer 1959, Köhler 1969

# Gestalt laws in UI design



Law of enclosure used to group functionally related items together



Law of proximity used to differentiate radio buttons from check boxes

Sources: [Geoff Hart](#) and [Kevin Matz](#)



# Communicating what user can do: Affordances

“Direct perception” of action potential, different for each animal depending on its perceptual and action capabilities

<https://www.needpix.com/photo/download/1097709/away-stairs-gradually-stone-rise-stair-step-staircase-forest-stone-steps>



Image by [Karen Arnold](#) from [Pixabay](#)



Image by [Elias Schäfer](#) from [Pixabay](#)



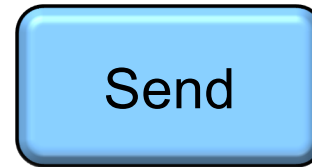
Sources:  
Gibson 1979,  
Norman 1988,  
Gaver 1991

# Affordances in UX design

Communicate possibilities for action with their visualization.

Send

Poor  
perceived  
affordance  
of pressing



Good  
perceived  
affordance  
of pressing

# Conventions

Order of reading and interaction (e.g., in popup windows)



Commonly known icons

[Blue text is a hyperlink](#)



Item is clickable if it changes when it is hovered

# Memory

## Humans:

Good at recognition



GUIs

Bad at recall



Command line interfaces  
(e.g. order of arguments in a  
function call)

Encoding into larger  
chunks of meaning

AACSHCI  
CRSWRK

Recalling vs recognizing  
the colours of euro notes

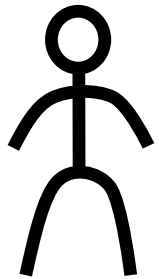


How IDEs help recall

```
Customer c = new Customer();
```

```
type String  
equals(Object obj) boolean  
getClass() Class<?>  
getType() String  
hashCode() int  
notify() void  
notifyAll() void  
setType(String type) void  
toString() String  
wait() void  
wait(long timeout) void  
wait(long timeout, int nanos) void
```

# Sharing of responsibilities: “cognitive offloading”



Pattern recognition

Intuitive interpretation (e.g.,  
“reading between the lines”)

Ill-defined problem solving

Creativity



Brute force solutions

Simulations

Generation of alternatives

Automatable and repetitive tasks

Planning in well-defined problem  
spaces

External memory

Checking for human errors

Suggested reading: Kirsh (1995): The intelligent use of space.

# Use design heuristics as your guide

Use both knowledge in the world and in the head

Simplify the structure of tasks

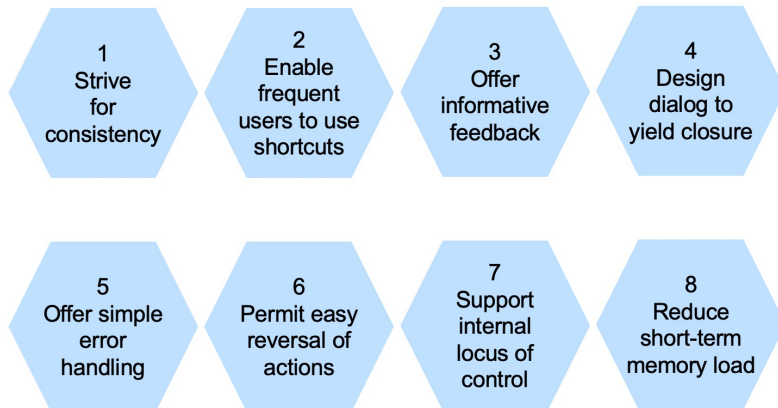
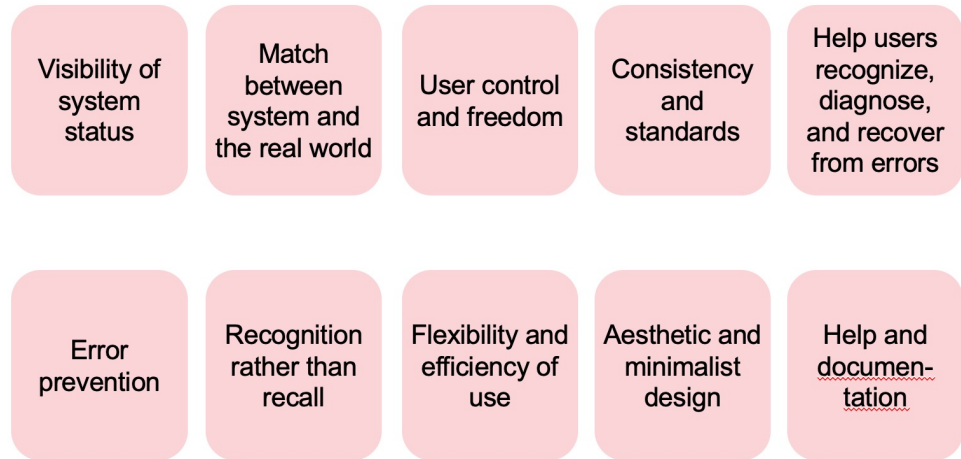
Make things visible

Get the mappings right

Exploit the power of constraints

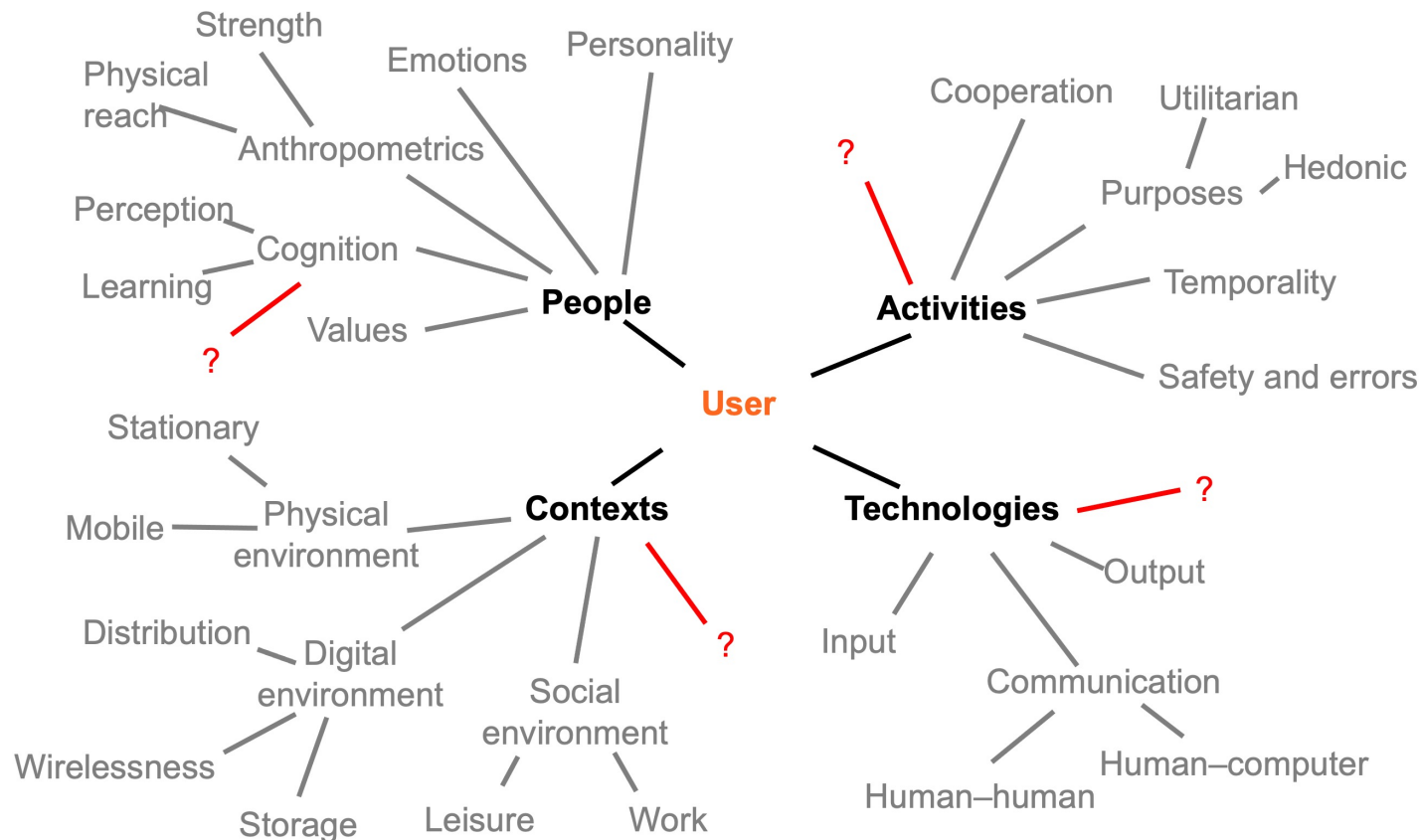
Design for error

When all else fails: Standardize!



# Group work

What PACT factors you must address well, based on the previous slides about cognition and design heuristics?



# Interaction design patterns



# Design patterns

”A design pattern is the re-usable form of a solution to a design problem” (Wikipedia)

Origins of the design patterns:

Christopher Alexander (architect)

Design patterns described repeatable design solutions to in urban planning and house design

In computer science and interaction design:

Highly adopted especially in object-oriented programming

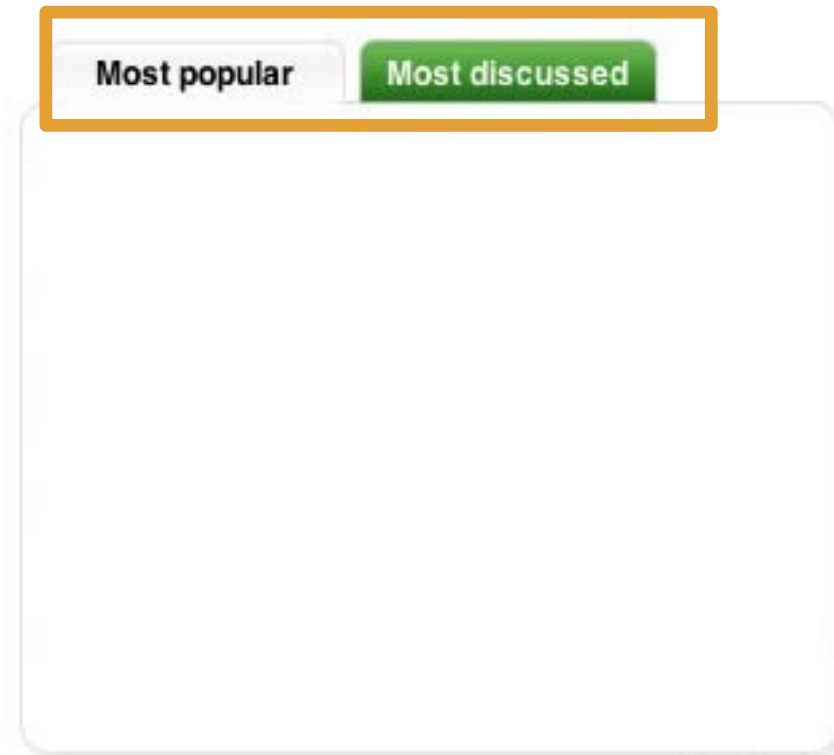
Also in IxD

Consider design patterns as a toolbox of good and tested design solutions

# Wizard

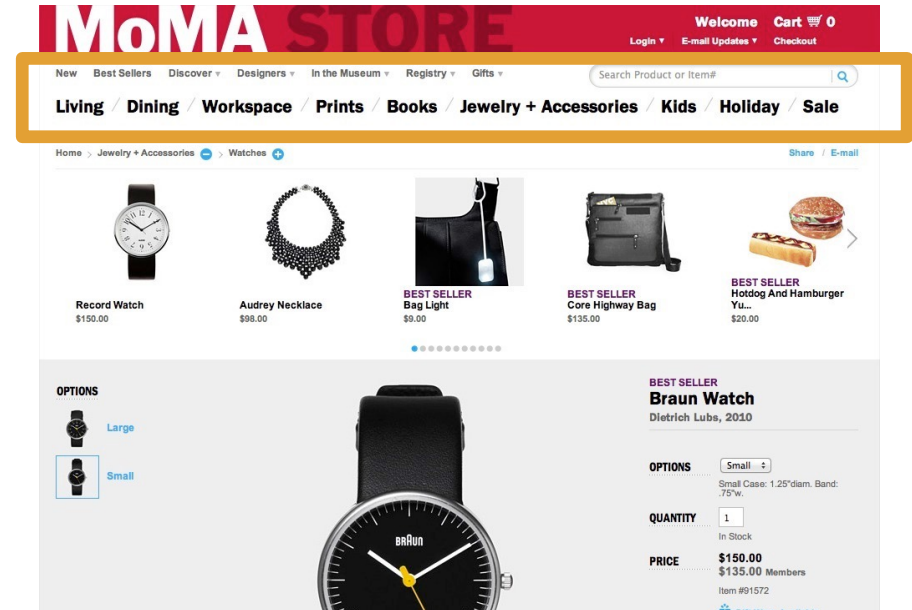
The screenshot shows a Facebook wizard interface. At the top, there is a dark blue header with the Facebook logo on the left and a user profile icon labeled 'Svend' on the right. Below the header, a progress bar contains two steps: 'Step 1 Find your friends' (highlighted with an orange border) and 'Step 2 Add Profile Pic'. The main content area is titled 'Are your friends already on Facebook?' and includes a sub-header 'Many of your friends may already be here. Searching your email account is the fastest way to find your friends on Facebook. See how it works.' Below this, there are four options for finding friends: 'Outlook.com (Hotmail)' with an email input field and a 'Find Friends' button; 'Yahoo!' with a 'Find Friends' button; 'Skype' with a 'Find Friends' button; and 'Other Email Service' with a 'Find Friends' button. At the bottom right of the main content area, there is a 'Skip this step' link. A lightbulb icon is positioned above a paragraph of text: 'Facebook stores your contact list for you so that we can help you reach more people and connect friends. Learn more.'

# Module tabs






From: news.com




# Navigation tabs



# Fat footer

FOLLOW US ON:   

<b>Site Links</b> Home Privacy & Security Help Personal Finance Blog Site Map	<b>Company Information</b> About Mint Awards Reviews Testimonials Contact	<b>Automatic Money Management</b> Online Money Management Investing in Stocks Commodities Investing Savings Account Investment Management	<b>Better Budgeting</b> Personal Budget Planner Real Estate Investing Household Budget Tracking Personal Budgeting Creating a Budget	<b>Personal Finance Made Easy</b> Online Financial Management Credit Card Offers Personal Finance Software Online Budgeting Tools Financial Planning
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# Modal

TOUR CUSTOMERS NEW FEATURES X ENTERPRISE BLOG LOGIN

1. Habits serve a purpose

How many times have you le...  
or turned off the coffee pot?

Invariably, when you go back...  
cooling, even though you hav...  
relegate certain repetitive fun...  
ganglia.

This frees up the cerebral co...  
life, and how your onboardin...

In short, habits free up ment...

*We are creatures of ha...  
change."*  
- A.J. Darkholme, Rise

2. We rely on habits

You know that old saying tha...

A 2006 Duke University study showed that more than 40% of the actions we perform  
every day are driven by habit. That's right: nearly half of what you do every day is

Join over 300,000 designers who  
get our new posts by email.

- ★ - New stories about great designers
- ★ - Free downloads and other goodies
- ★ - Design tips, tricks and more!

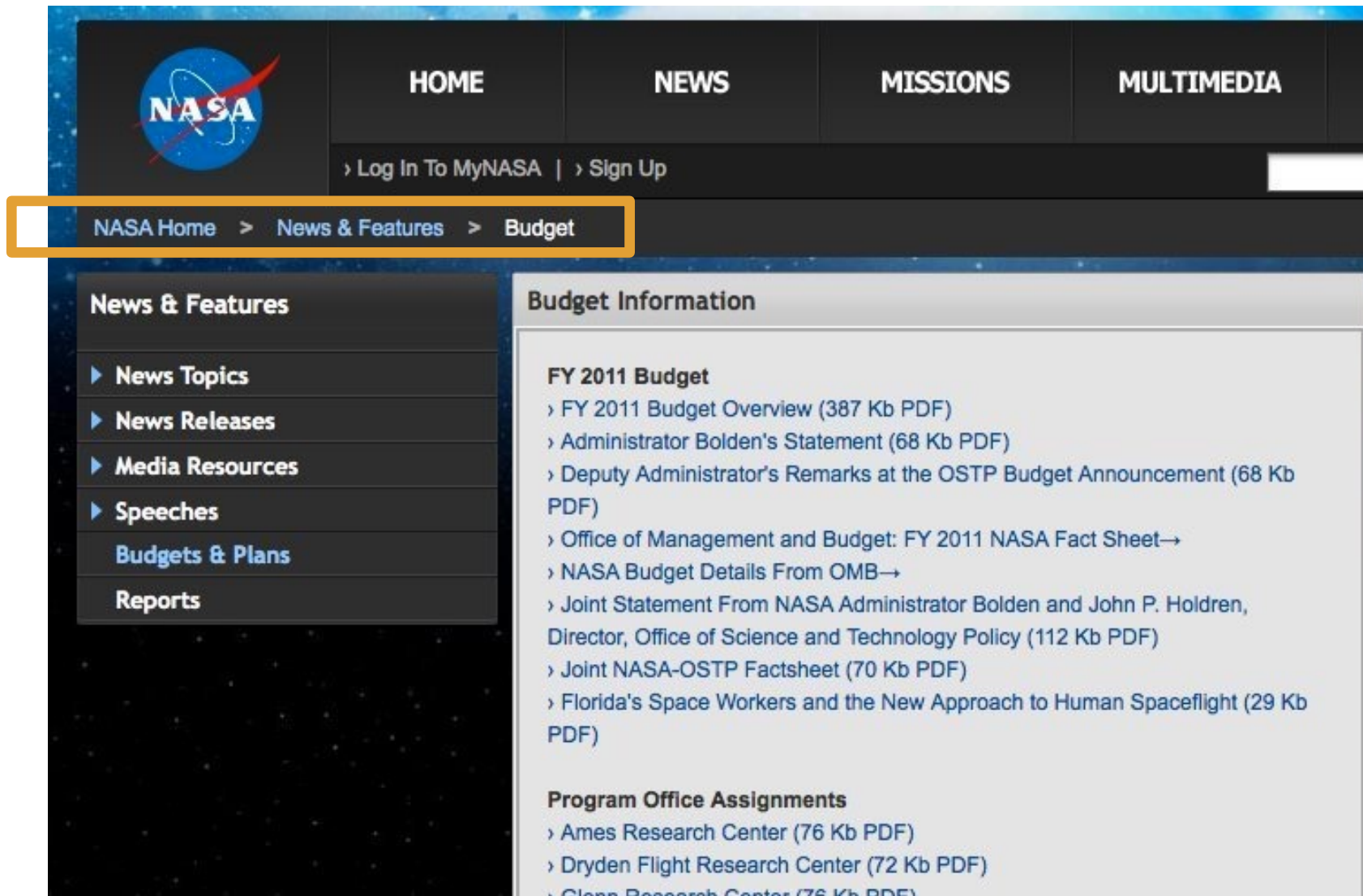
SUBSCRIBE

GET YOUR  
FREE T-SHIRT

ENTER TO WIN

CRAFTED BY  
KYLE STEEN

# Breadcrumbs



The screenshot shows the NASA website's navigation structure. At the top left is the NASA logo. To its right are four main navigation tabs: HOME, NEWS, MISSIONS, and MULTIMEDIA. Below these tabs are links for 'Log In To MyNASA' and 'Sign Up'. A breadcrumb trail is located below the navigation tabs, consisting of three links: 'NASA Home', 'News & Features', and 'Budget'. This breadcrumb trail is highlighted with an orange rectangular box. Below the navigation area, there is a left sidebar with a 'News & Features' section containing links for 'News Topics', 'News Releases', 'Media Resources', and 'Speeches', and a 'Budgets & Plans' section containing a 'Reports' link. The main content area on the right is titled 'Budget Information' and contains two sections: 'FY 2011 Budget' and 'Program Office Assignments'. The 'FY 2011 Budget' section lists several links, including 'FY 2011 Budget Overview (387 Kb PDF)', 'Administrator Bolden's Statement (68 Kb PDF)', 'Deputy Administrator's Remarks at the OSTP Budget Announcement (68 Kb PDF)', 'Office of Management and Budget: FY 2011 NASA Fact Sheet→', 'NASA Budget Details From OMB→', 'Joint Statement From NASA Administrator Bolden and John P. Holdren, Director, Office of Science and Technology Policy (112 Kb PDF)', 'Joint NASA-OSTP Factsheet (70 Kb PDF)', and 'Florida's Space Workers and the New Approach to Human Spaceflight (29 Kb PDF)'. The 'Program Office Assignments' section lists links for 'Ames Research Center (76 Kb PDF)', 'Dryden Flight Research Center (72 Kb PDF)', and 'Glenn Research Center (76 Kb PDF)'.

NASA HOME NEWS MISSIONS MULTIMEDIA

› Log In To MyNASA | › Sign Up

NASA Home › News & Features › Budget

**News & Features**

- ▶ News Topics
- ▶ News Releases
- ▶ Media Resources
- ▶ Speeches

**Budgets & Plans**

**Reports**

**Budget Information**

**FY 2011 Budget**

- › FY 2011 Budget Overview (387 Kb PDF)
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- › Deputy Administrator's Remarks at the OSTP Budget Announcement (68 Kb PDF)
- › Office of Management and Budget: FY 2011 NASA Fact Sheet→
- › NASA Budget Details From OMB→
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- › Florida's Space Workers and the New Approach to Human Spaceflight (29 Kb PDF)

**Program Office Assignments**

- › Ames Research Center (76 Kb PDF)
- › Dryden Flight Research Center (72 Kb PDF)
- › Glenn Research Center (76 Kb PDF)

# Resources on design patterns

Jennifer Tidwell (**Book that covers many patterns**)

[https://primo.aalto.fi/permalink/358AALTO\\_INST/ha1cg5/alma999358717706526](https://primo.aalto.fi/permalink/358AALTO_INST/ha1cg5/alma999358717706526)

UIPatterns.com (**Computer screen oriented**)

Dozens of patterns organized by their type: Getting input, Dealing with data, Navigation, ...

All examples in previous slides were from the Navigation section

<http://ui-patterns.com>

UsabilityGeek (**Mobile UI oriented**)

6 patterns with short descriptions and examples

<https://usabilitygeek.com/ui-patterns-for-navigation-good-ux/>

UxPin (**Computer screen oriented**)

Every pattern presented through Examples, Problem, Solution, and Tips

<https://www.uxpin.com/studio/blog/website-navigation-trends-16-ui-patterns-completely-deconstructed/>

# More "patterns"

Single page app design (as in Gmail)

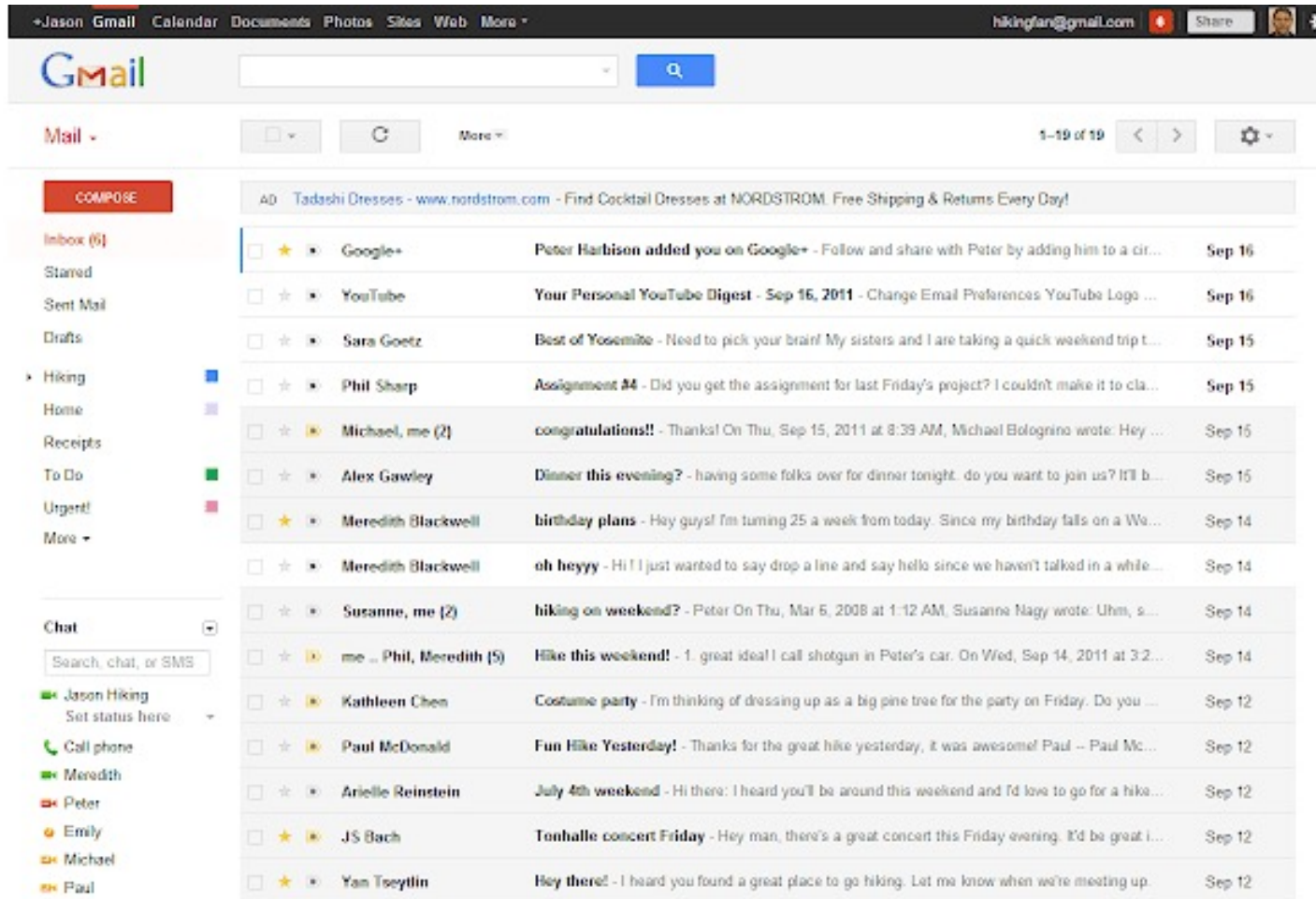
Landing page

Long format instead of a star-like navigation

Responsive design



# Single-page app



The screenshot displays the Gmail web interface. At the top, there's a navigation bar with links for Jason, Gmail, Calendar, Documents, Photos, Sites, Web, and More. The user's email address, hkingfan@gmail.com, is visible in the top right corner. Below the navigation bar is the Gmail logo and a search bar. The main content area shows the 'Mail' section with a list of emails. On the left side, there's a sidebar with navigation options like 'Compose', 'Inbox (6)', 'Starred', 'Sent Mail', 'Drafts', 'Hiking', 'Home', 'Receipts', 'To Do', 'Urgent!', and 'More'. Below the sidebar is a 'Chat' section with a search bar and a list of contacts including Jason Hiking, Meredith, Peter, Emily, Michael, and Paul. The email list contains various messages, including promotional ads, social media updates, and personal communications.

Sender	Subject	Date
AD Tadashi Dresses - www.nordstrom.com	Find Cocktail Dresses at NORDSTROM. Free Shipping & Returns Every Day!	
Google+	Peter Harbison added you on Google+ - Follow and share with Peter by adding him to a cir...	Sep 16
YouTube	Your Personal YouTube Digest - Sep 16, 2011 - Change Email Preferences YouTube Logo ...	Sep 16
Sara Goetz	Best of Yosemite - Need to pick your brain! My sisters and I are taking a quick weekend trip t...	Sep 15
Phil Sharp	Assignment #4 - Did you get the assignment for last Friday's project? I couldn't make it to cla...	Sep 15
Michael, me (2)	congratulations!! - Thanks! On Thu, Sep 15, 2011 at 8:39 AM, Michael Bolognino wrote: Hey ...	Sep 15
Alex Gawley	Dinner this evening? - having some folks over for dinner tonight. do you want to join us? It'll b...	Sep 15
Meredith Blackwell	birthday plans - Hey guys! I'm turning 25 a week from today. Since my birthday falls on a Wa...	Sep 14
Meredith Blackwell	oh heyyy - Hi!! just wanted to say drop a line and say hello since we haven't talked in a while...	Sep 14
Susanne, me (2)	hiking on weekend? - Peter On Thu, Mar 6, 2008 at 1:12 AM, Susanne Nagy wrote: Uhm, s...	Sep 14
me .. Phil, Meredith (5)	Hike this weekend! - 1. great idea! I call shotgun in Peter's car. On Wed, Sep 14, 2011 at 3:2...	Sep 14
Kathleen Chen	Costume party - I'm thinking of dressing up as a big pine tree for the party on Friday. Do you ...	Sep 12
Paul McDonald	Fun Hike Yesterday! - Thanks for the great hike yesterday, it was awesome! Paul -- Paul Mc...	Sep 12
Arielle Reinstein	July 4th weekend - Hi there: I heard you'll be around this weekend and I'd love to go for a hike...	Sep 12
JS Bach	Tonhalle concert Friday - Hey man, there's a great concert this Friday evening. It'd be great I...	Sep 12
Yan Tseytlin	Hey there! - I heard you found a great place to go hiking. Let me know when we're meeting up.	Sep 12

# Design fashions

## Skeuomorphism



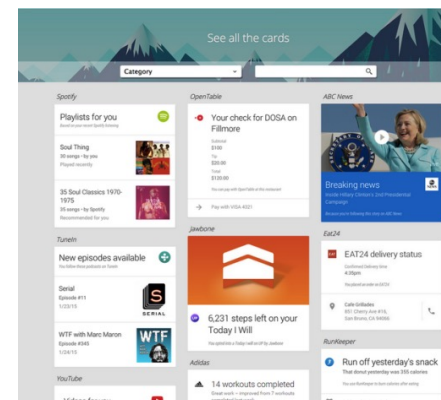
## Flat design



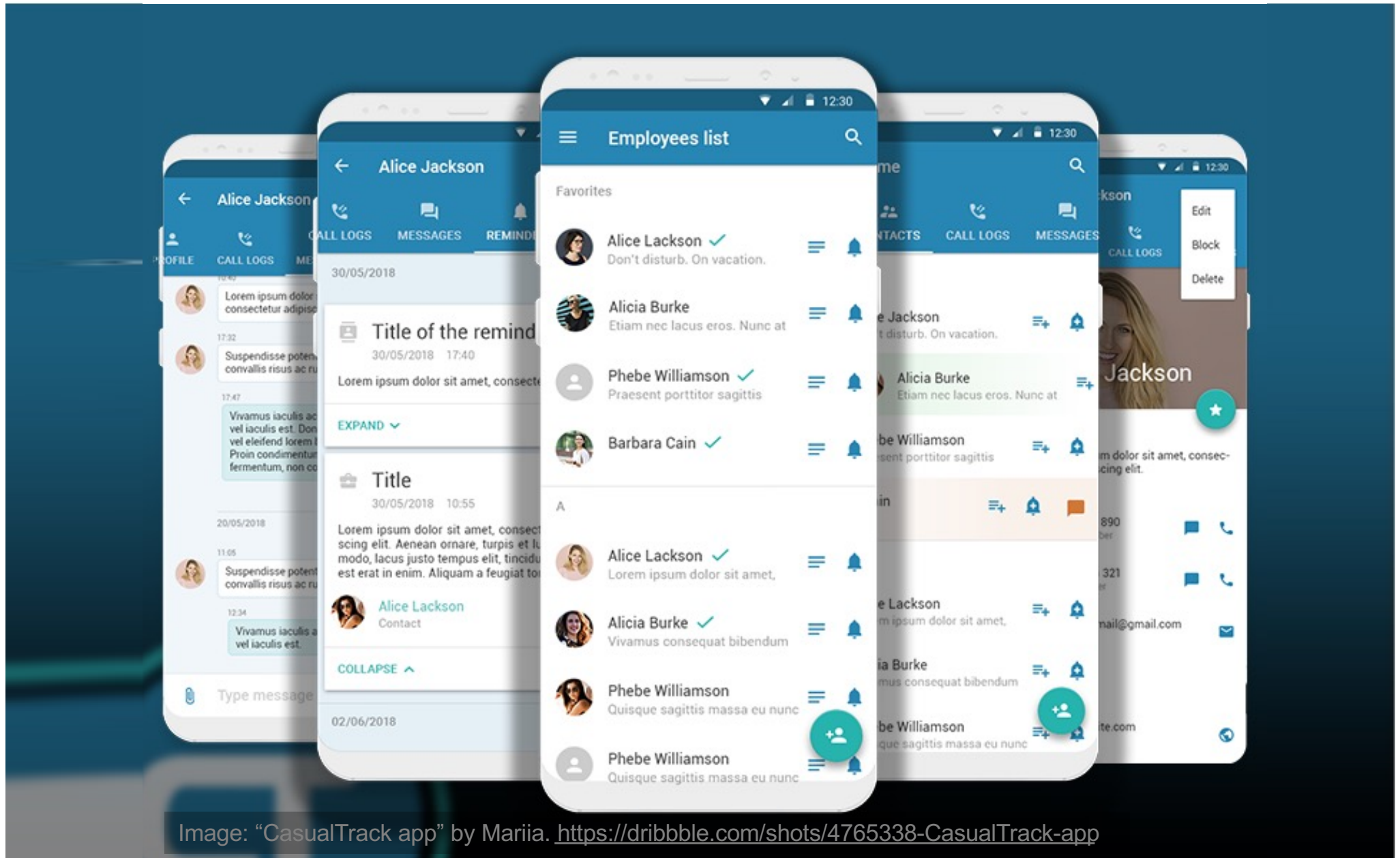
## Infinite scroll vs pagination



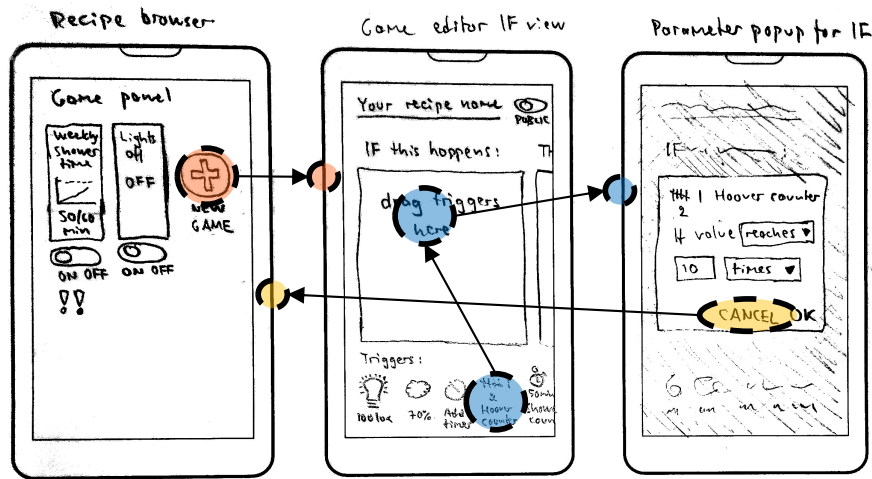
## Card-based design



# Design systems: e.g., Material (Google)



## 4. UI sketching



End of week 3:  
 (Almost) complete  
 interaction sequence  
 design and sketch of the  
 graphical UI  
 Using a design tool of your  
 choice

### Selection criteria for the method

1. What method is best in realizing your solutions to your UX goals?
2. What method provides the most authentic user experience?
3. How much time and skills do you have (evaluations on 5th week)
4. ...

### Possible methods for sketching the interaction sequence:

- Figma
- Wizard of Oz
- Unity
- ...

Be creative, focus on learning!



# Wizard of Oz prototyping



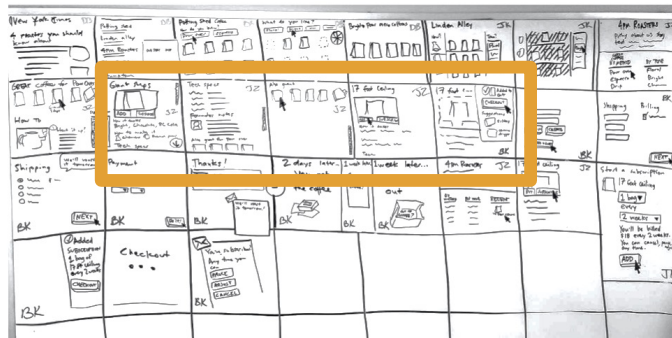
<https://hcde498processlog.wordpress.com/2015/05/11/wizard-of-oz-a-pen-that-corrects-you-when-you-write-off-line/>

# Friday's presentation instructions

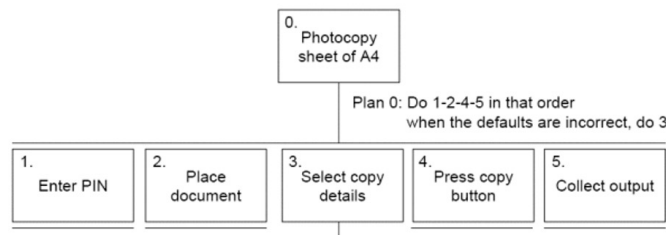
# Presentation structure

10 minutes / group + 10 mins discussion in a “design crit” style

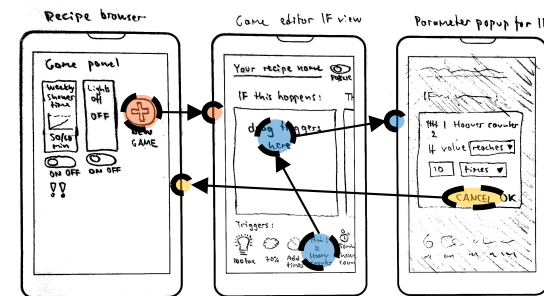
## Part 1: Your focus and UX goals



## Part 2: Task structure design



## Part 3: Interaction sequence + UI sketch

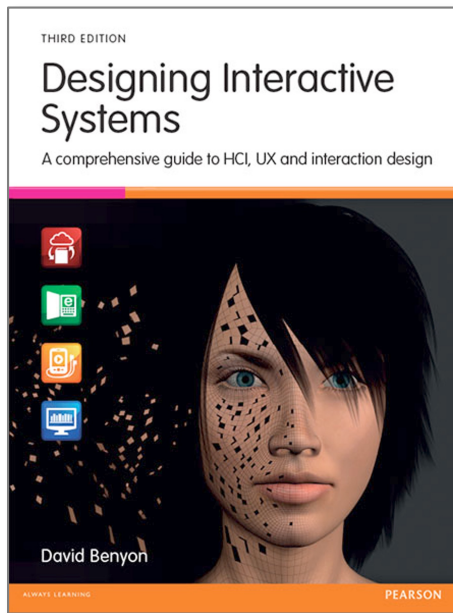


## Part 4: Your design principles

Design patterns, conventions, metaphors, ...



# Reading materials



## David Benyon:

Chapter 2: PACT: a framework for designing interactive systems

Chapter 3: The process of human-centred interactive systems design

[https://primo.aalto.fi/permalink/358AALTO\\_INST/ha1cg5/alma999355378806526](https://primo.aalto.fi/permalink/358AALTO_INST/ha1cg5/alma999355378806526)

### Sitemaps, Storyboards, and Specifications: A Sketch of Web Site Design Practice

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#### ABSTRACT

Through a study of web site design practice, we observed that designers employ multiple representations of web sites as they progress through the design process, and that these representations allow them to focus on different aspects of the design. Designers also employ multiple tools during the course of a project, including graphic design, web development, presentation, and word processing software, as well as pen and paper. Sketching on paper is especially important during the design exploration phase of a project, when designers wish to explore many design possibilities quickly without focusing on low-level details. Web site design tools intended to support the early phases of the design process should employ informal interaction techniques, should support multiple site representations, and should integrate well with other applications that designers use regularly.

#### Keywords

Ethnography, Work Analysis, Web Site Design, Information Architecture, Informal Interfaces.

#### INTRODUCTION

We undertake a study to identify current practices in the field of web design. The goal of this study was to illuminate issues that would guide the design of informal tools for supporting web site design. By “informal” we mean tools whose user interfaces are designed to support natural, ambiguous forms of human-computer interaction [7]. Examples of interaction modes that informal interfaces support include speaking, writing, gesturing, and sketching.

We are interested in the exploration of informal interfaces in general, and in our research group we have developed informal applications to support graphical user interface design [10] and group note taking [9]. We know that designers in general employ ambiguous means of expression and communication (such as sketching on paper).

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paper) when they are exploring design ideas [11, 18]. Since web design is an emerging field, the tools to support it are not yet mature. We believe that there is a real opportunity for improving the state of the art.

In the remainder of this paper we present related work, describe the study that was conducted, present the picture of web design that was observed through the study, discuss the implications of our study towards future web design tools, and briefly describe DENIM, an informal web site design tool that we have developed based on the results of this study.

#### RELATED WORK

Several work practice studies have appeared in the literature that are relevant to our study of web site designers. Sumner and Siskel's study of speech application designers [17] and Bellotti and Rogers' study of editorial staff at several publishing companies [1] showed that designers and editors use multiple intermediate representations of products during their creation, some similar to the representations found in this study.

A certain amount can be learned about web design practice by reading the growing body of literature that covers it [6, 13-15]. Unfortunately, much of this literature is prescriptive rather than descriptive, and may not accurately reflect what designers are actually doing in the field. To learn what designers do, there is no substitute for direct contact. We elected to conduct our investigation into web design practice through field visits and interviews with professional designers. Our approach was inspired by the methods proposed in, for example, [3, 8].

#### DESCRIPTION OF STUDY

We interviewed eleven designers involved in the web site design process. Ten of these designers were at five different companies and one was a freelance designer. We also collected and studied many artifacts of the design process, including sketches, prototypes, written documents, presentations, finished web sites, and several other types of artifacts, some of which will be discussed later. All interviews were conducted in the designers' offices, which facilitated the observation of artifacts and allowed us to observe their working environments.

## Newman & Landay (DIS 2000):

Newman & Landay (DIS 2000): Sitemaps, storyboards, and specifications: A sketch of web site design practice

<https://dl-acm-org.libproxy.aalto.fi/doi/10.1145/347642.347758>

# Tutor meetings

[https://doodle.com/poll/svcbxbhgke7pgmq6?utm\\_source=poll&utm\\_medium=link](https://doodle.com/poll/svcbxbhgke7pgmq6?utm_source=poll&utm_medium=link)