

# PART II: Development Process

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## Managing the Design Process

SEEM3510 Human-Computer Interaction

By Prof. Helen MENG & Prof. Philip FU

# Course Outline

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|                                     |  |           |
|-------------------------------------|--|-----------|
| Part 1:<br>Basics                   | Week 1 - Usability of Interactive Systems<br>Week 2 - Universal Usability<br>Week 3 - Guidelines, Principle and Theories | By Helen  |
| Part 2:<br>Development<br>Process   | Week 4 - Design Process (Assignment 2)<br>Week 5 - Evaluation (Assignment 3)   | By Philip |
| Part 3:<br>Interaction<br>Paradigms | Week 6 - Direct Manipulation & Immersive Environments  | By Philip |
|                                     | Week 7 Midterm Review and Exam (weeks 1-6 material)  | By Philip |
|                                     | Week 8 - Fluid Navigation: Menu and Form Fill-in   | By Philip |
|                                     | Week 9 Expressive Human and Command Languages  | By Helen  |
| Part 4:<br>Additional<br>Topics     | Week 10 Interaction Devices<br>Week 11 Communication and Collaboration   | By Philip |
|                                     | Week 12 Timely User Experience<br>Week 13 Information Search and Data Visualization                                      | By Helen  |

# Recap

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So far, we have gone through all the Basics!!!

- **Usability:** usability, user experience, usability goals (five human factors), universal usability, etc.
- **Guidelines, Principles, and Theories**

We now move to the Development Process:

- **Week 4: Managing** the Design Process
- **Week 5: Evaluating** Interface Designs

-> Re-organize what you have learnt and see them in  
*another perspective!!!*

-> You may see again some terms, e.g., usability,  
guideline (best practices), etc.

# Managing the Design Process

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- Reading – Textbook
- Goal:
  - Give you an overview of steps and procedures to manage UI design in development
  - Overview
    - Organizational Design
    - Four Pillars of Design
    - UI Mockup: Lo-fi and Hi-fi Prototyping
    - Development Methodologies
    - User studies and Observations
    - Legal Issues
    - Intelligent User Interface (IUI) Design

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## Topics:

- **Organization's View: Why UX?**
- Four Pillars of Good UI Design
- UI Mockup: Lo-fi and Hi-fi Prototyping
- Development Methodologies
- User studies and Observations
- Legal Issues
- Intelligent User Interface (IUI) Design

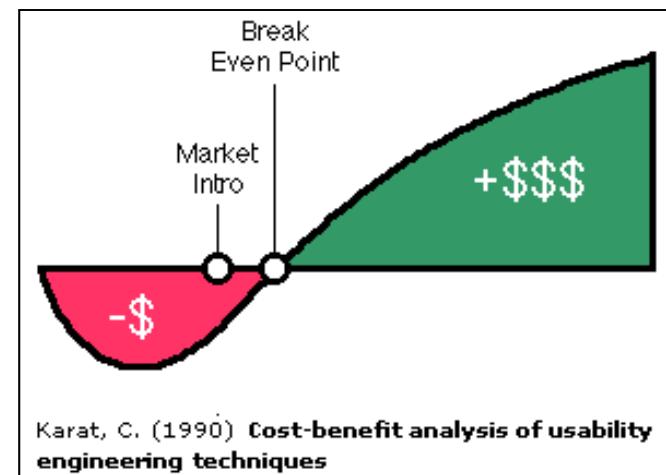
# Business Organization

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Currently...

- Most companies already have user experience (UX) team:
  - “Usability Engineers” and “UI architects”
  - Webpage, apps, etc.
- Moreover, human-factors groups and Usability Labs
  - Each project – a designated UI architect (see week 5 notes)
- Return On Investment (ROI) for usability testing:
  - The value of the investment of time or resources relative to the expense of the effort

<http://www.humanfactors.com/coolstuff/roi.asp>



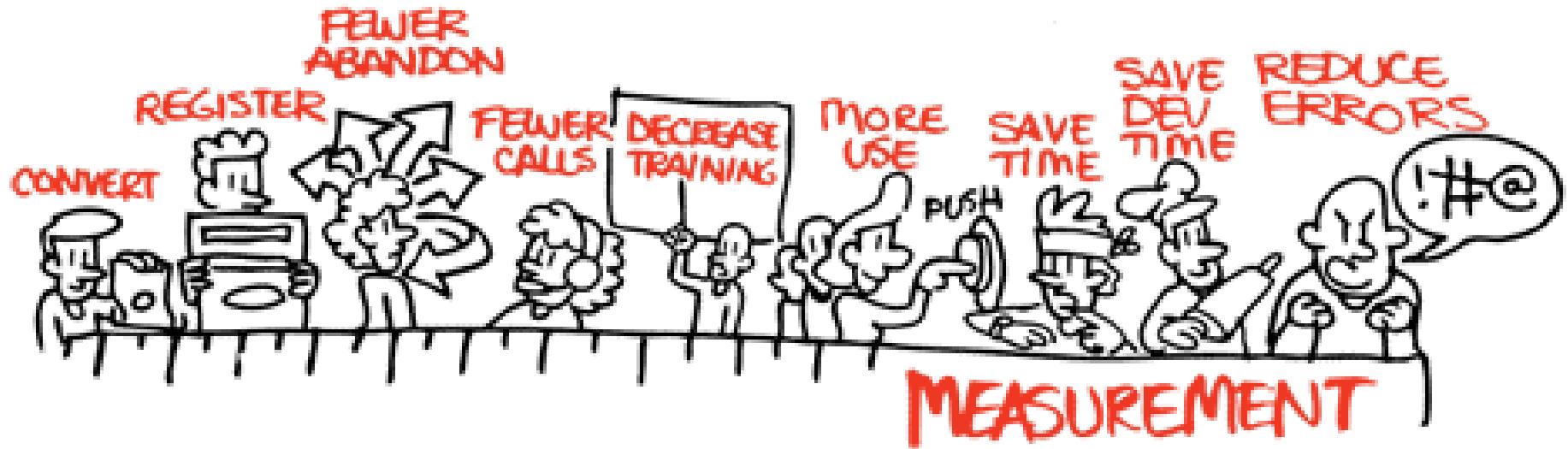
# Background: Business Cases

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- More examples:

The ROI of User Experience with Dr. Susan Weinschenk

<https://www.youtube.com/watch?v=O94kYyzqvTc>



# Job Market in Feb 2018

Search for “user experience” in 2018

The screenshot shows a search results page for 'user experience' on jobsDB.com. A red box highlights the search bar and the results count. Another red box highlights the job listing for a UI/UX Designer at Openrice Limited.

98 jobs containing user experience in All locations

UI/ UX Designer  
Openrice Limited  
Quarry Bay

UX/UI Designer (3 years contract)  
Cathay Pacific Airways Ltd  
Lantau Island

98 jobs containing user experience in All locations

Get email updates for the latest jobs containing user experience | ...show all

Enter your email...

Last 30 days Show Saved jobs APPLY NOW Save job Print Report Share View in new tab Views:

Discover a world of opportunity in the air and on the ground.  
Let your passion fly.

25-Jan-18 HK\$14k - 20k /month (negotiable)

25-Jan-18 Salary negotiable

25-Jan-18 CATHAY PACIFIC

25-Jan-18 jobsDB ref: JHK100003005864764

HK: <http://hk.jobsdb.com/HK/en/> (UX: user experience)

# Job Market in Feb 2019

A screenshot of a web browser showing the jobsDB.com website. The search bar at the top contains the query "user experience". A red box highlights the search bar and the text "1-30 of 575 jobs" below it. To the right, a callout box says "Search for ‘user experience’ in 2019". The main content area shows two job listings: "Junior Web / UI / UX Designer" by Next Insurtech Limited and "Senior UI/UX Designer / UI/UX Designer" by uBeing Mobility Limited. Each listing includes a summary, location (Kwun Tong), salary (HK\$14k - 20k/month), and a timestamp (22 hours ago). The right side of the screen displays the "Requirements" for the first job, which is a bulleted list of 12 items.

Search for “user experience” in 2019

user experience

All Locations

All Job Functions

Search

1-30 of 575 jobs

Junior Web / UI / UX Designer

Next Insurtech Limited

- Responsible for UI and UX sketches
- 5-Day work week (Bank Holidays)
- Welcome fresh graduates with passions

Kwun Tong

HK\$14k - 20k /month

22 hours ago more

Senior UI/UX Designer / UI/UX Designer

uBeing Mobility Limited

- UI/UX Designer
- Software / SaaS / I.T. / Retail / ICT industry

Requirements:

- University graduate in Computer Science, Multimedia Design or related discipline.
- Minimum of 5 years of relevant working experience in digital project.
- Highly proficient in UI/UX software, Microsoft Windows and Office
- Experience with managing projects using Agile methodology such as Scrum.
- Experience with User Research techniques and usability testing a plus.
- A strong portfolio of previous UX/UI design projects.
- Strong interpersonal and communication skills to collaborate with various stakeholders and ability to discuss/explain design options.
- A good team player and able to work under pressure and tight schedules.
- Good command of both written and spoken English and Chinese.

# Job Market in Feb 2020

User experience jobs - Feb 2020 | +  
← → C https://hk.jobsdb.com/hk/search-jobs/user-experience/1

**jobsDB.com**

x

v

v

**Salary** **Job type** **Career level**

**1-30 of 343 jobs**

Search for “user experience” in 2020  
Note: due to the recent coronavirus outbreak

**vtech**  
Product Specialist (UX design) (VTT176/J05)  
VTECH TELECOMMUNICATIONS LTD

# Job Market in Feb 2021

User experience jobs - Feb 2021 | +

Not secure | hk.jobsdb.com/hk/search-jobs/user-experience/1

JobsDB My JobsDB Career Advice

user experience All Locations All Job Functions

Salary Job type Date posted Sort By Relevance

1-30 of 602 jobs

Pathsight Your Pathway Guide

**UX/UI Designer (Web & App)**  
Pathsight Limited  
Hong Kong

- Strong conceptual thinking and design sense
- Creative, Innovative
- Outstanding experience in UI/UX Design

5h ago

Search for “user experience” in 2021  
Note: it bounced back



We have 602 jobs for you  
Select a job to view details

# Job Market in Feb 2022

User experience jobs - Feb 2022 | +  
hk.jobsdb.com/hk/search-jobs/user-experience/1

JobsDB by SEEK Profile Career Advice

Search for “user experience” in 2022

user experience All Locations All Job Functions Search

Salary Job type Date posted Sort By Relevance

1-30 of 836 jobs

Apply Now View in new tab

DigiSalad

UX Lead / (Senior) UX & UI Designer  
DigiSalad Solutions Limited  
Tsuen Wan Area  
• UX-Driven Digital Agency  
• Fun and Young Working Environment  
• Birthday Leave and Medical Coverage  
3d ago

Responsibilities:

- Utilize industry design standards and best practices to define and implement design criteria using a variety of methods to convey ideas and concepts (e.g. personas, user flow diagrams, wireframes, design prototypes, etc)
- Design and specify UX and UI design for Responsive Web and Mobile application (iOS & Android)
- Deliver inventive, durable and thoughtful, solutions from concept to launch
- Apply conceptual thinking to create desirable and feasible digital solutions across multiple platforms
- Work closely with a blended cross-functional team and tackle all aspects of the design process
- Maintain knowledge of design trends and assist with implementation of design innovations
- Less Experience will be considered as Senior UX & UI Designer or UX & UI Designer

Requirements:

UX/UI Designer - GoGo

hk.jobsdb.com/hk/en/job/ux-ui-designer-100

GMail Yahoo Mail ESTR1002a CUHK CSE B

## What we're looking for:

GoGo Limited

GoGo Limited empowers people to move anywhere from the convenience of their smartphones. We're a startup focused on revolutionizing the way people move at a time - and we need your help! If you see something you like, please reach out!

UX/UI Designer

What you'll do:

As a UX/ UI Designer, you will primarily work on product design initiatives. You'll be running the full lifecycle of your designs, from concept to execution, working closely with others product team's members and shape how the product features, and make a positive impact on how the design is received by the rest of the company.

- 2-4 years of experience building multifaceted, responsive web projects that span desktop, tablet, and mobile. You've got a solid mix of client services, digital agency, in-house department, or start-up product building experiences under your belt.
- Experience with conducting research via focus groups and usability tests.
- Understanding of user-centered design methods and best practices

## Requirements:

- High Diploma/University in Design related discipline
- Fluent in English and Chinese communication
- Ability to communicate your ideas to a wide variety of key stakeholders
- Expert knowledge of design tools such as Sketch, PhotoShop, Illustrator, Invision, or any other softwares for creating high-fidelity prototypes

Note: **Findability** is the ease with which information contained on a website/app/UI can be found

The screenshot shows a web browser window for 'User experience pccw jobs - Feb' on the 'JobsDB by SEEK' website. The search bar contains 'user experience pccw'. The results page displays two job listings:

- UI/Web Designer** at **PCCW Solutions** in **Wan Chai**, posted **7d ago**. The job description includes:
  - Collaborate with product management and development team to define and implement innovative solutions for the product direction, visuals and experience
  - Create personas through user research and data
  - Understand product specifications and user psychology
  - Define the right interaction model and evaluate its success
  - Find creative ways to solve UX problems (e.g. usability, findability)
  - Communicate design ideas and prototypes to the team and developers
  - Develop wireframes and prototypes around customer needs
  - Conduct concept and usability testing and gather feedback
  - Able to manage project(s) from beginning to end and meet deadlines
- Senior Solution Analyst** at **PCCW Media** in **Kowloon Bay**.

A red box highlights several key requirements in the UI/Web Designer's job description, specifically: 'evaluate its success', 'UX problems (e.g. usability, findability)', 'Develop wireframes and prototypes', and 'usability testing and gather feedback'.

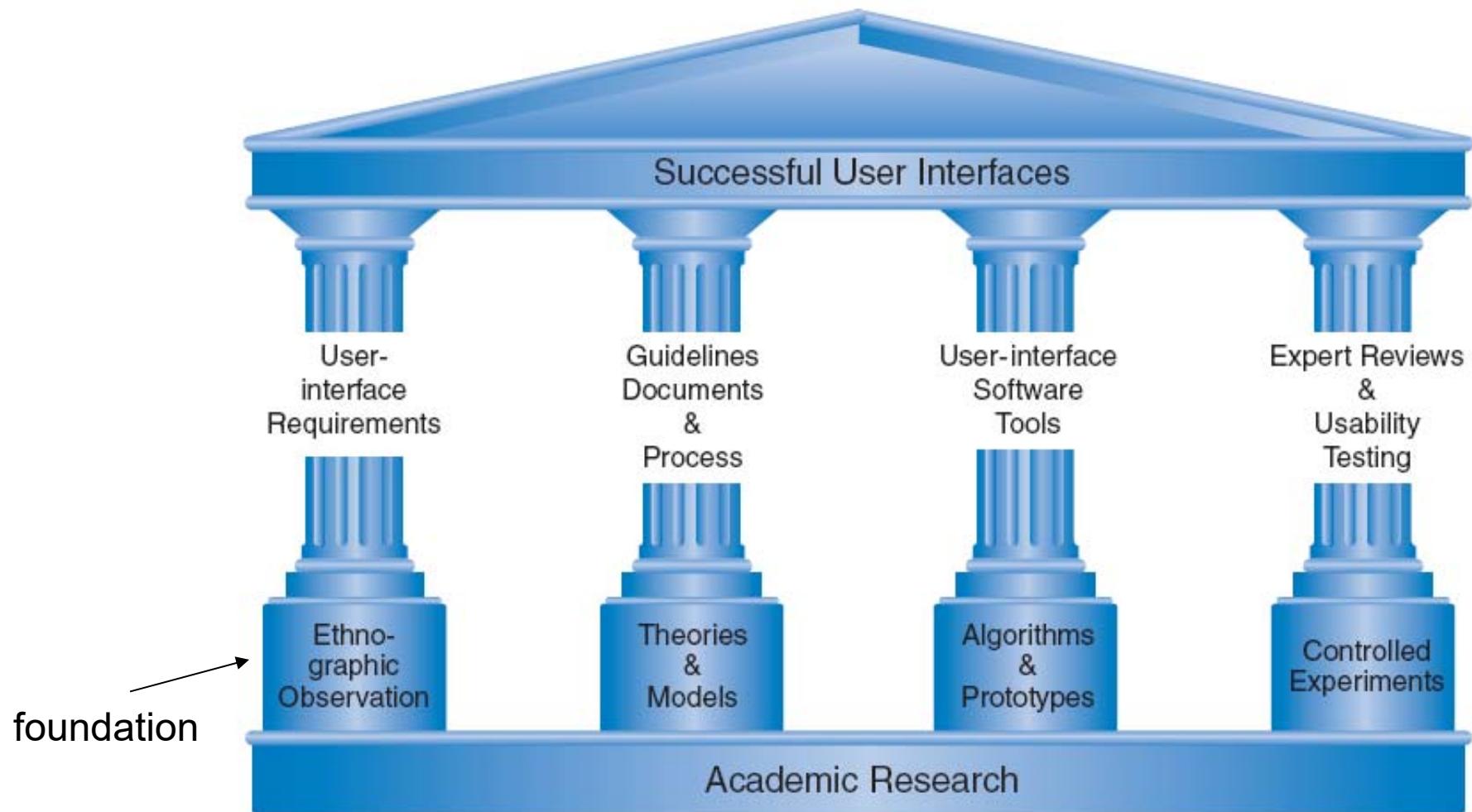
<https://hk.jobsdb.com/hk/search-jobs/user-experience-pccw/1>

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## Topics:

- Organization's View: Why UX?
- **Four Pillars of Good UI Design**
- UI Mockup: Lo-fi and Hi-fi Prototyping
- Development Methodologies
- User studies and Observations
- Legal Issues
- Intelligent User Interface (IUI) Design

# Four Pillars of “Good” Design



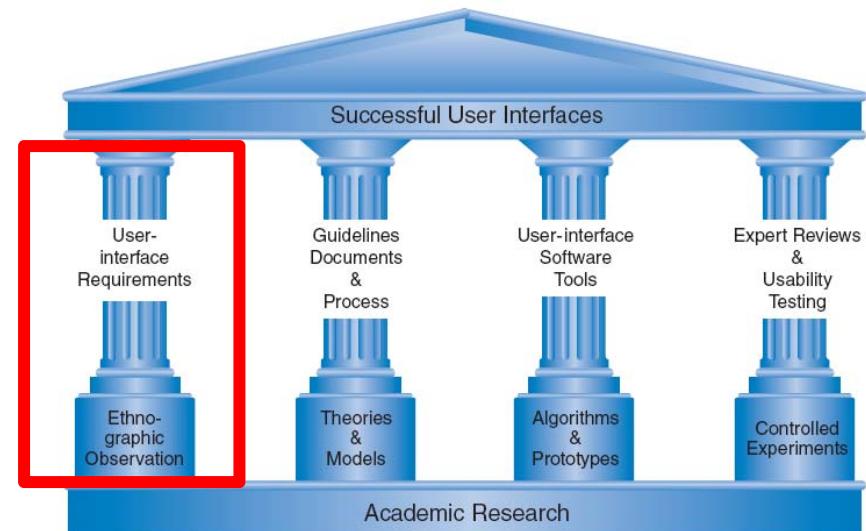
# Purpose of the Four Pillars

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They are elements that “*help*”

- User-interface (UI) architects to turn good ideas into successful systems
- Speed-up the design process and facilitate the creation of excellent systems

What's next?



# Pillar 1: UI Requirements

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- **User Interface Requirements**
  - Soliciting and clearly specifying user requirements is a major key to success in any development activity, e.g.,
    - User: a clear specification of the user community
    - Task: tasks that the users perform
    - Hardware sys. requirements: hardware/software/performance/reliability
    - User interface requirements: I/O, devices, functionality, etc.
  - Examples:
    - Performance requirements, e.g., system response time
    - Functional requirements, e.g., require user login  
(see also the previous modules on usability/task requirement)
- **Ethnographic Observation (a method to know users)**
  - Identifying and observing the user community in action
  - Discussed later (next lecture module)

# Pillar 2: Guidelines

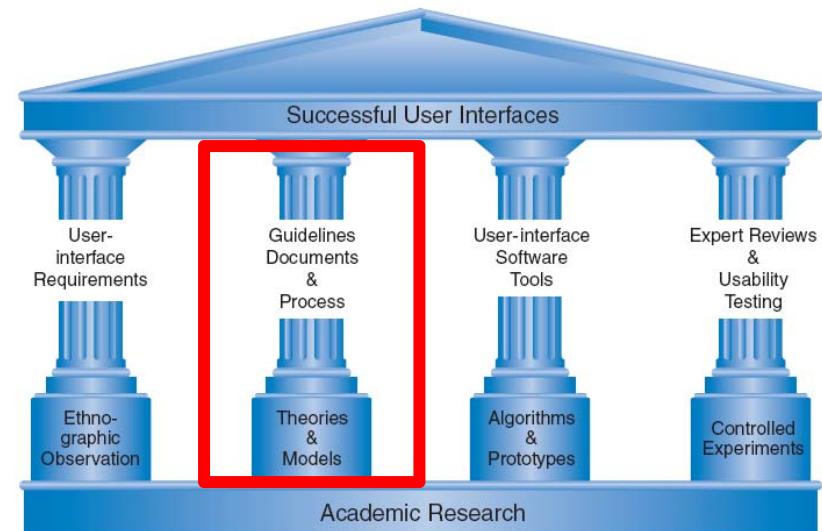
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- **Guidelines documents and processes**

Solid guidelines (as discussed in previous lectures) should be established to guide the design process.

- Guidelines help keep the  for:

- Words, icons
- Screen layout
- Input and output
- Action sequences
- Training

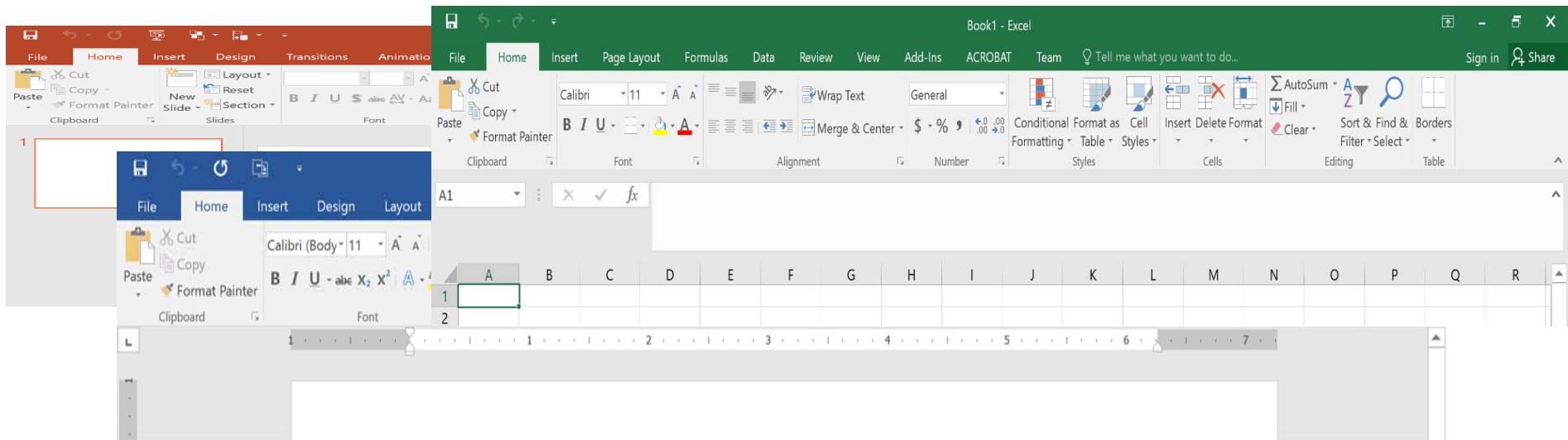


# Recap: Guidelines

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## #1: Words, icons, and graphics

- Terminology (objects and actions), abbreviations, and capitalization
- Character set, fonts, font sizes, and styles (bold, italic, underline)
- Icons, graphics, line thickness, and
- Use of color, backgrounds, highlighting, and blinking



# Recap: Guidelines

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## #2: Screen-layout issues

- Menu selection, form fill-in, and dialog-box formats
- Wording of prompts, feedback, and error messages
- Justification, white space, and margins
- Data entry and display formats for items and lists
- Use and contents of headers and footers

## #3: Input and output devices

- Keyboard, display, cursor control, and pointing devices
- Audible sounds, voice feedback, touch input, and other special devices
- Response time for a variety of tasks
- Any alternatives for disabled users

# Recap: Guidelines

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## #4: Action sequences

- Direct-manipulation clicking, dragging, dropping, and gestures
- Command syntax, semantics, and sequences
- Programmed function keys / shortcut keys
- Error handling and recovery procedures

## #5: Training

- Online help and [tutorials](#)
- Training and reference materials
- Command syntax, semantics, and sequences

# Guideline example: iOS

A screenshot of a web browser window displaying the Apple Human Interface Guidelines for iOS Themes. The URL in the address bar is <https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/>. The page title is "Human Interface Guidelines". On the left, there's a sidebar with a tree view:

- ios
  - Themes
  - Mac Catalyst
  - Interface Essentials
  - > App Architecture
  - > User Interaction
  - > System Capabilities
  - > Visual Design
  - > Icons and Images
  - > Bars
  - > Views

The main content area features three iPhone mockups showing different grid-based layout examples. The top phone shows a 3x3 grid, the middle phone shows a larger 4x6 grid, and the bottom phone shows a 2x4 grid. All screens have dashed grid lines overlaid.

<https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/>

# Example Guidelines for mobile app.

## Example 1: Principles of Mobile App

Design: Introduction (from Google)

1. Show the value of your app upfront
2. Make it easy to manually change location -> save user time...

...

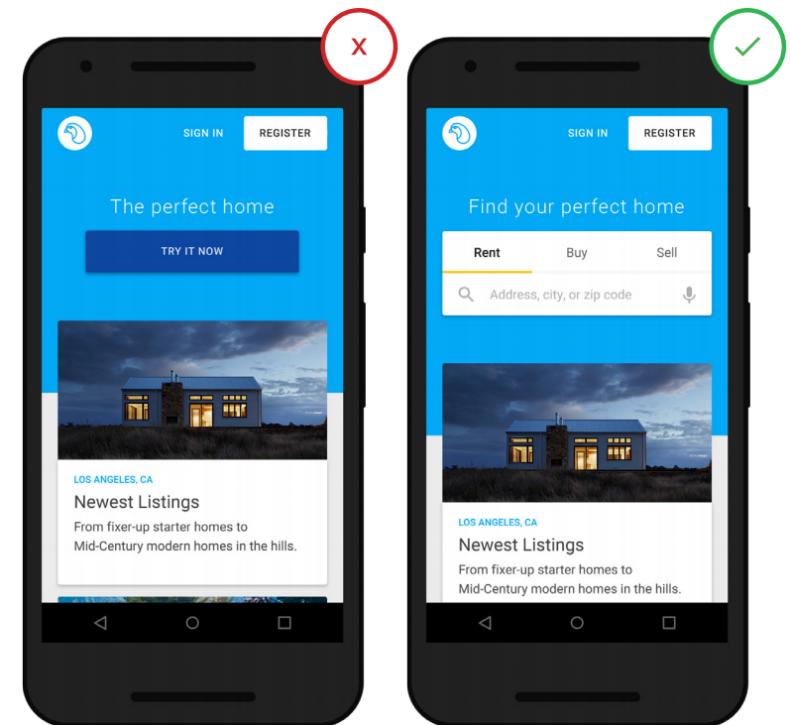
## Example 2:

The 10 principles of mobile interface design

By Creative Bloq Staff

1. Mobile mindset
2. Mobile contexts

...



Example 1: <https://www.thinkwithgoogle.com/marketing-strategies/app-and-mobile/chapter-1-app-navigation-and-exploration/> (suggestion: read this before you do assignment 2)

Example 2: <http://www.creativebloq.com/mobile/10-principles-mobile-interface-design-4122910>

Example 3: <https://altexsoft.medium.com/mobile-app-ux-design-principles-15-rules-for-creating-apps-that-stick-e7f42fb68d3a>

# New: Guidelines – Why & How?

Guidelines creation should be a social process within an organization to help it gain visibility and build support

- Provides a social process for developers
- Records decisions for all parties to see
- Promotes consistency and completeness
- Facilitates automation of design
- Allows multiple levels:
  - Rigid standards
  - Accepted practices
  - Flexible guidelines
- Announces policies for:
  - Education: How to get it?
  - Enforcement: Who reviews?
  - Exemption: Who decides?
  - Enhancement: How often?

## Four Es

- Need training & discussion
- Need someone to verify regularly
- For creative ideas and new tech.
- To keep the guideline up-to-date

# Pillar 3: UI Software Tools

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#1: User Interface Mock-up

(next topic in this lecture notes)

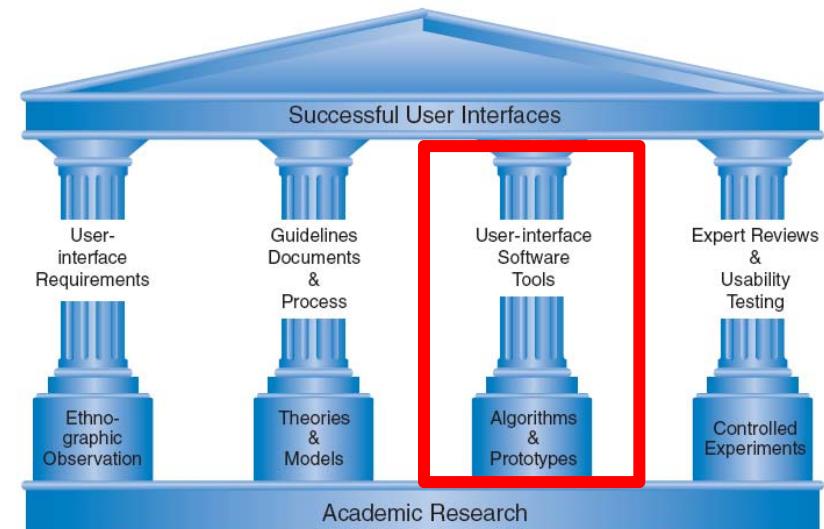
#2: User Interface Development Tools

(Adobe illustrator, Qt, Visual Basic, etc.)

Any others?

- Logging tools,  
automatic UI  
evaluation, etc.

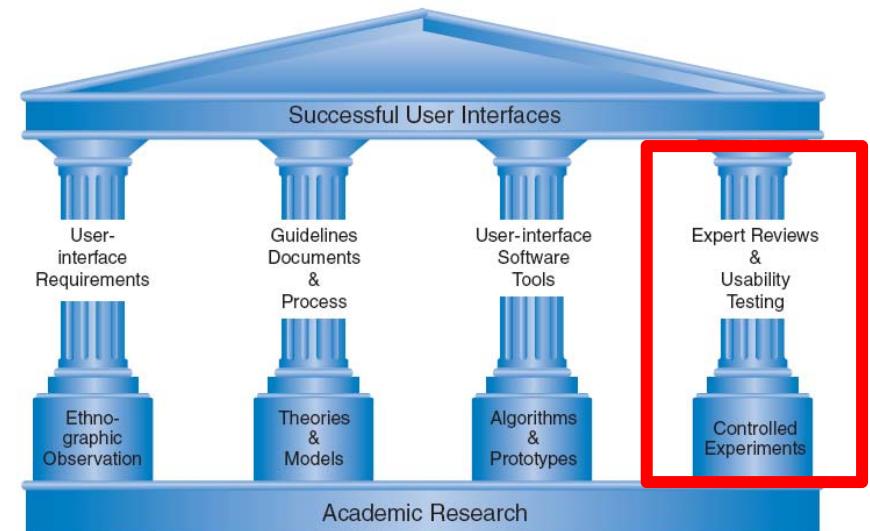
(see next lecture note)



# Pillar 4: Expert Review & Usability Test

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- This is a big topic; to cover in week 5:
  - Expert Review
  - User Labs
  - Questionnaires/Surveys
  - Acceptance Testing
  - Continuous feedback  
(evaluation during active use)



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## Topics:

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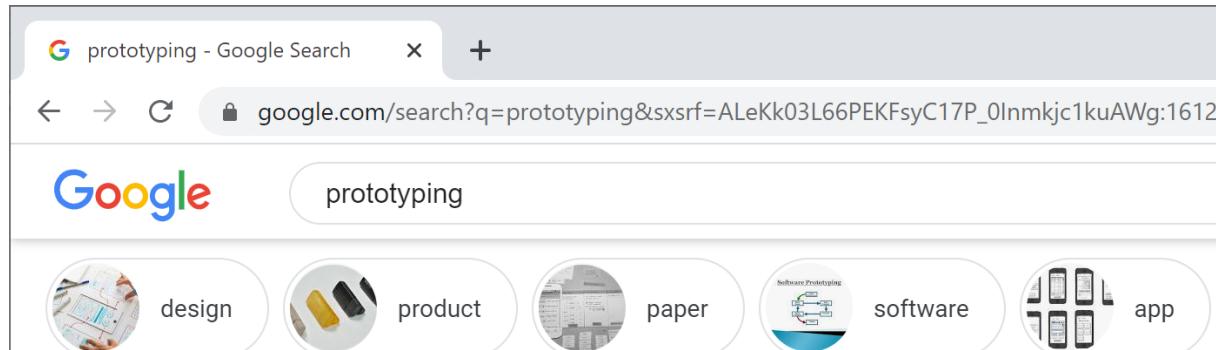
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## Topic details...

### – **UI Mockup: Lo-fi and Hi-fi Prototyping**

- **What & Why prototyping?**
- Before Lo-fi paper mockup
- Lo-fi prototyping
- Why Lo-fi prototyping?
- Hi-fi prototyping

# What is Prototyping?



Google search results for "prototyping" showing categories: design, product, paper, software, and app.

The Benefits of Prototyping - UX24/7  
ux247.com

Stage Four Of Design Thinking  
careerfoundry.com

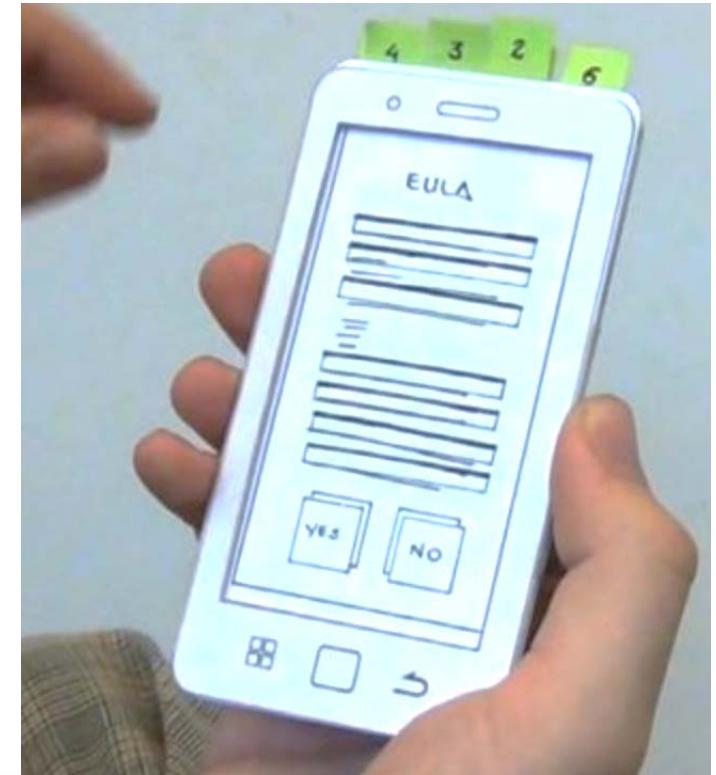


<https://www.google.com/search?q=prototyping&tbo=isch>

# What is Prototyping?

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- Prototype (“mock up”)
  - Does not have to be functional (preferably *not* functional)
  - Simply design its outlook and how it works: buttons, menus, potential user actions, page transition, etc.
  - Can be as simple as a hand-drawn picture, or PowerPoint slides, Dreamweaver, etc.
- Provides a “vision” for both developers & clients to discuss and confirm the design

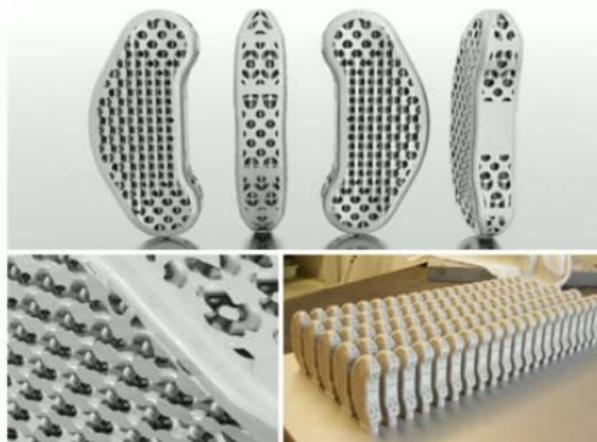
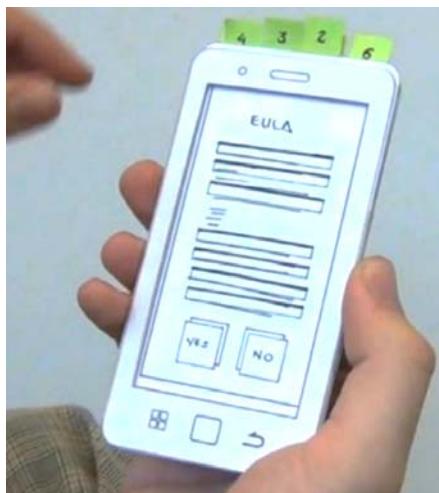


*User interfaces can be quickly prototyped and tested. Image source: Vimeo*

# Why Prototyping?

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- Get **feedback** on our design faster
  - saves money
- Experiment with a **design**
- Fix problems earlier (before code is written)
- Keep the design centered on the user



Example: Rapid Prototyping, or 3D printing:  
[http://en.wikipedia.org/wiki/Rapid\\_prototyping](http://en.wikipedia.org/wiki/Rapid_prototyping)

# Why UI Mock-up?

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- When designing interactive systems
  - Users and customers may not have a nice idea of what the system will look like
- But unfortunately, major changes to an implemented system are
  - Difficult
  - Costly
  - Time-consuming

# “Fidelity” in Prototyping

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- Fidelity refers to the  (LoD)
- High fidelity
  - prototypes look like the final product
- Low fidelity
  - artists renditions with many details missing

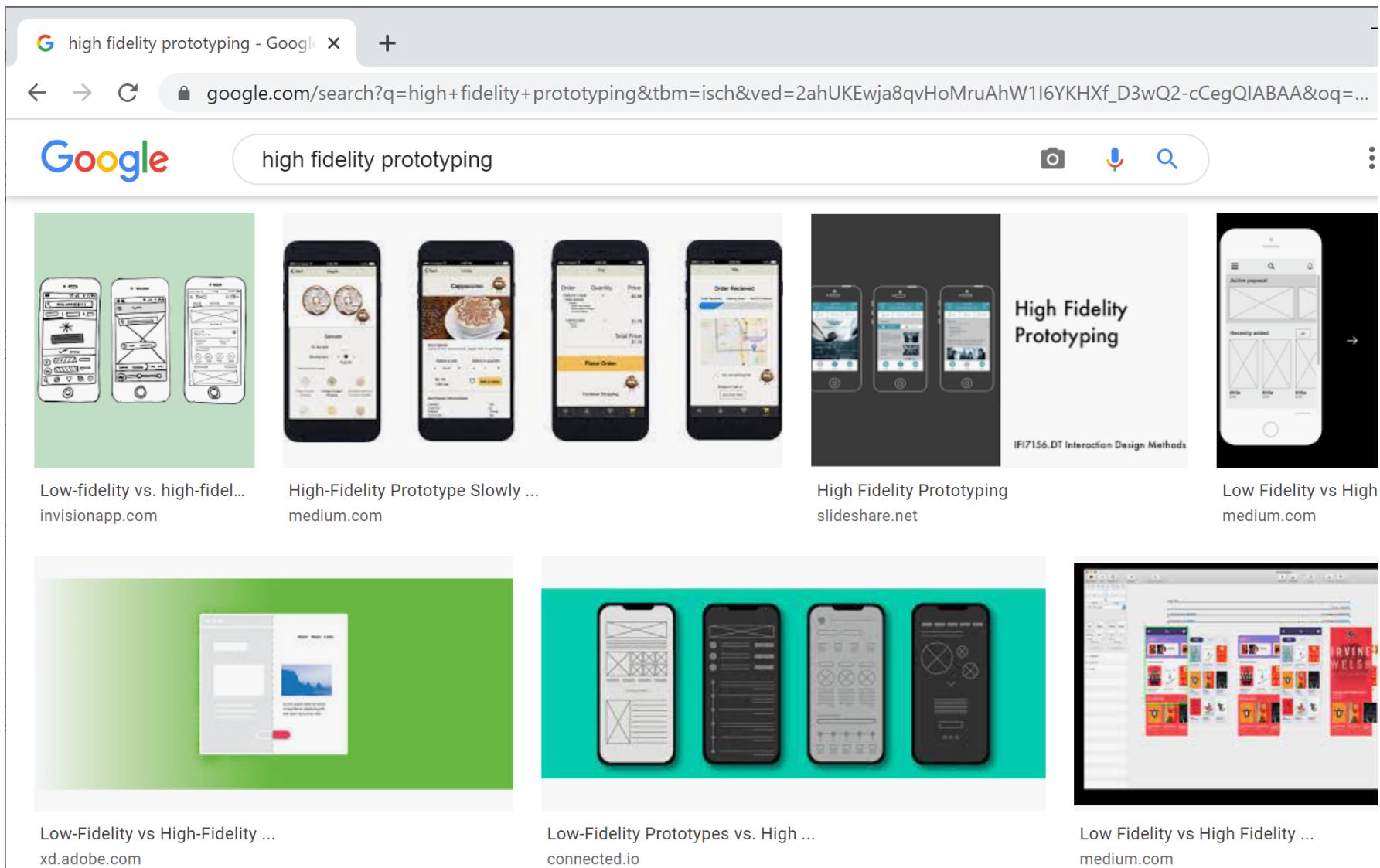


# “Fidelity” in Prototyping (low)

The collage consists of nine images arranged in three rows:

- Row 1:**
  - Low-fidelity vs. high-fidelity prototypes**: A comparison showing three mobile phone wireframes on the left and three detailed high-fidelity prototypes on the right.
  - Low Fidelity Prototyping: The Cheapest ...**: A collection of hand-drawn mobile app wireframes for a closet management app.
  - High-Fidelity Prototype Slowly ...**: A series of four mobile phone screens showing a messaging application interface.
  - Low fidelity prototyping**: A hand-drawn mobile app wireframe for a food delivery service, with a yellow box highlighting the "Add Food" button.
- Row 2:**
  - How To Create A Low Fidelity Prototype ...**: An illustration of a hand holding a smartphone with a wireframe overlay, connected by red arrows to a series of five mobile phone wireframes.
  - Low-Fidelity Prototype, Web Portfolio ...**: A grid of six mobile phone wireframes for a fitness app.
  - Low Fidelity vs High Fidelity ...**: A diagram comparing a low-fidelity wireframe on the left with a high-fidelity prototype on the right.
- Row 3:**
  - https://www.google.com/search?q=low+fidelity+prototyping&tbo=isch**: A screenshot of a Google search results page for "low fidelity prototyping". The search bar shows the query, and the results include the images from the first two rows.

# “Fidelity” in Prototyping (high)



A screenshot of a Google search results page for "high fidelity prototyping". The search bar at the top shows the query. Below it, there are eight search results, each with a thumbnail image and a brief description.

- Low-fidelity vs. high-fidel...**  
[invisionapp.com](https://invisionapp.com)  
Thumbnail: Three mobile phone screens showing low-fidelity wireframes.
- High-Fidelity Prototype Slowly ...**  
[medium.com](https://medium.com)  
Thumbnail: Four mobile phone screens showing high-fidelity prototypes of a food delivery app.
- High Fidelity Prototyping**  
[slideshare.net](https://www.slideshare.net)  
Thumbnail: Three mobile phone screens showing high-fidelity prototypes of a mobile application.
- High Fidelity Prototyping**  
[IFI7156.DT Interaction Design Methods](https://IFI7156.DTInteractionDesignMethods)  
Thumbnail: A smartphone screen displaying a high-fidelity prototype of a mobile application interface.
- Low Fidelity vs High**  
[medium.com](https://medium.com)  
Thumbnail: A smartphone screen displaying a high-fidelity prototype of a mobile application interface.
- Low-Fidelity vs High-Fidelity ...**  
[xd.adobe.com](https://xd.adobe.com)  
Thumbnail: A smartphone screen displaying a high-fidelity prototype of a mobile application interface.
- Low-Fidelity Prototypes vs. High ...**  
[connected.io](https://connected.io)  
Thumbnail: Four mobile phone screens showing high-fidelity prototypes of a mobile application.
- Low Fidelity vs High Fidelity ...**  
[medium.com](https://medium.com)  
Thumbnail: A computer screen showing a high-fidelity prototype of a mobile application interface.

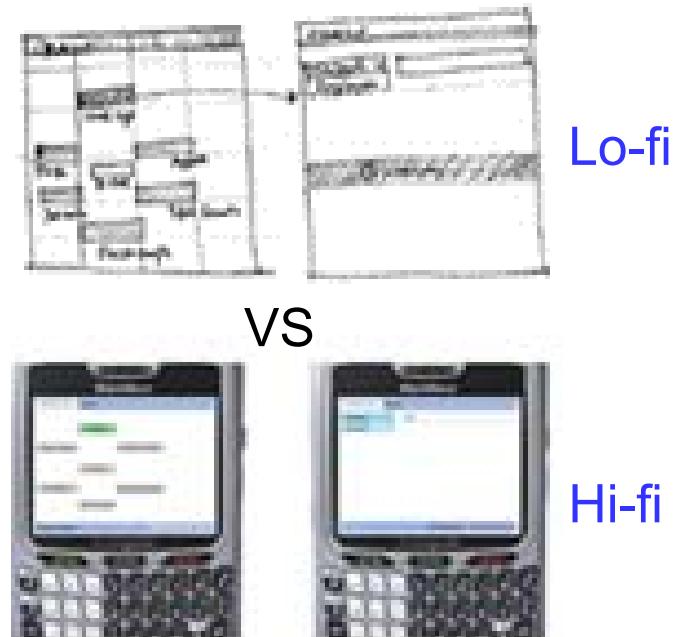
<https://www.google.com/search?q=high+fidelity+prototyping&tbo=isch>

# Problems with Hi-fi Prototypes

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Why not start with Hi-fi?

- Perceptions of the tester/reviewer?
  - formal representation indicates “finished” nature
    - comments on color, fonts, and alignment
- Time?
  - encourage precision
    - specifying details takes more time
- Creativity?
  - lose track of the big picture



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## Topic details...

### – **UI Mockup: Lo-fi and Hi-fi Prototyping**

- What & Why prototyping?
- **Before Lo-fi paper mockup**
- Lo-fi prototyping
- Why Lo-fi prototyping?
- Hi-fi prototyping

# Story Board: Film Industry

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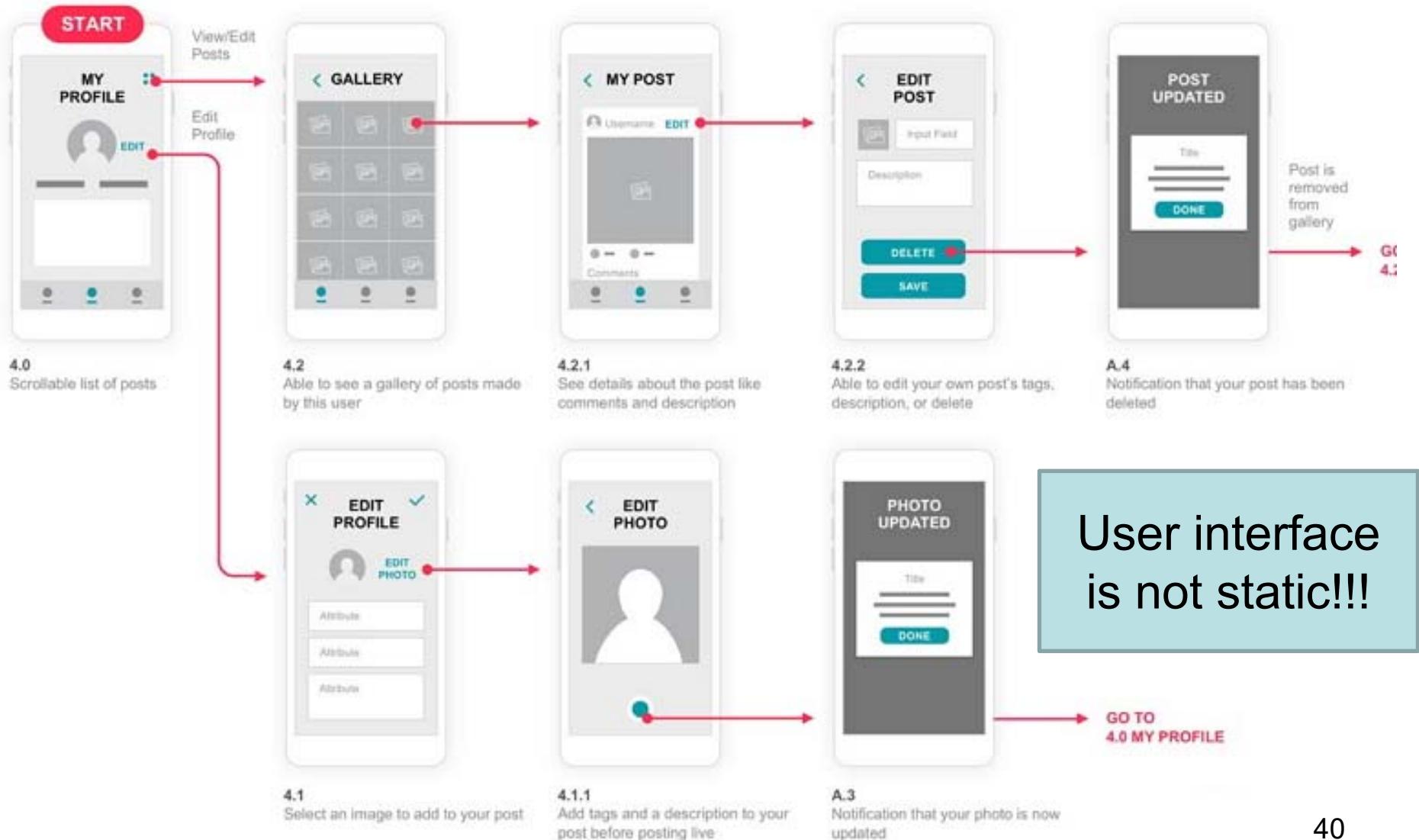
Key frames!!!



User interface  
is not static!!!

<https://www.premiumbeat.com/blog/the-benefits-of-storyboarding-your-next-film/>

# Story Board: User Interface



# Low-fi Storyboards

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How to start with Low-fi?

- What are storyboards?
  - High-level representation of important user actions & consequences
  - Visualize (can see) the story!!!
- Where do storyboards come from?
  - Film & animation
- Give you a “script” of important events
  - Leave out the details
  - Concentrate on the important interactions

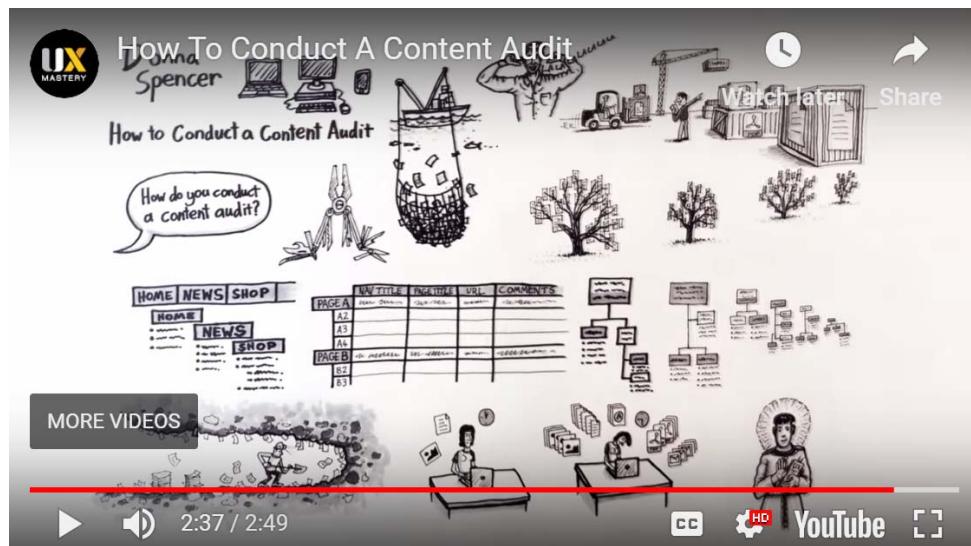
# Before Low-fi paper mockup...

## #1: Contents inventory (or Content Audit)

- A simple list of UI features and UI elements: text, images, documents, and applications

<https://www.usability.gov/how-to-and-tools/methods/content-inventory.html>

Further study: <https://uxmastery.com/how-to-conduct-a-content-audit/>



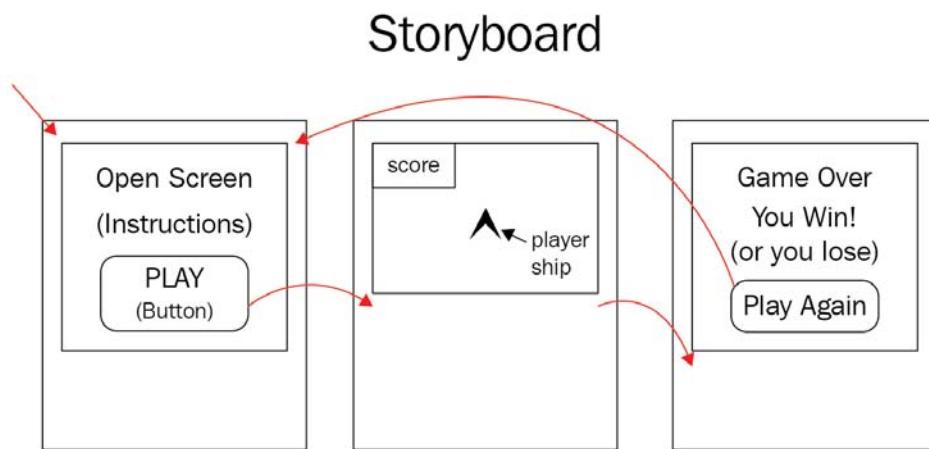
[https://youtu.be/ALU-1M\\_-jbq](https://youtu.be/ALU-1M_-jbq)

Caution: for your assignment 2, please decide what contents and organize them!!!

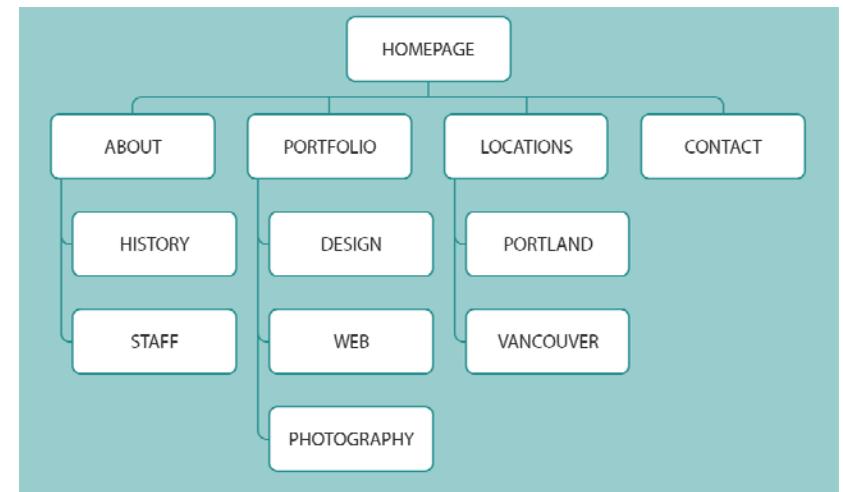
# Before Low-fi paper mockup...

## #2: Navigation Flow / Path

- Organize your contents!!!
- Views (pages) and Transitions (like a flow chart)



<https://subscription.packtpub.com/book/all-books/9781838644659/14/ch14lvl1sec98/changes-to-main.cpp>



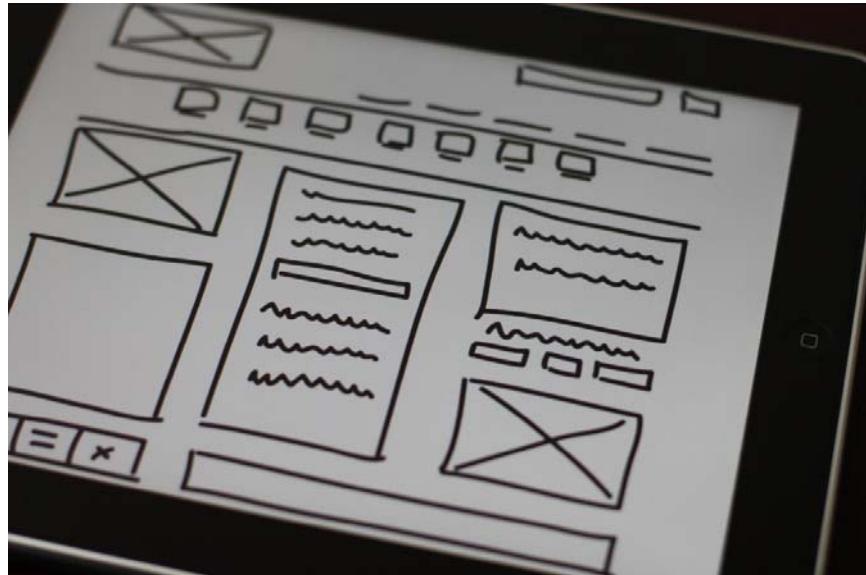
<http://edgemm.com/how-to-improve-user-experience-with-better-website-navigation/>

Caution: when you do your assignment 2, **NO HI-FI details!!!**

# Before Low-fi paper mockup...

## #3: Wireframes

- For each page: outline the arrangement of components on the interface



<https://www.uxpin.com/studio/ui-design/what-is-a-wireframe-designing-your-ux-backbone/>

**Default / Browser**  
Viewport: 1024x768 - Grid Width: 140

**Tablet Portrait**  
Viewport: 768x1024 - Grid Width: 72

**Smartphone**  
Viewport: 320x480 - Grid Width: 28

**A Big Title**

**Intro Copy Headline**

**Image Gallery of Featured Products**

**Item Title**  
Item Category  
\$88.00

**Quick Links**

[Home](#)  
[About](#)  
[Contact](#)  
[Support](#)  
[FAQ](#)

**Announcements / Promoted Content**

**Coming Soon**

**Image of featured product**

**A Big Title**

**Intro Copy Headline**

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**Coming Soon**

**Image of upcoming product**

**A Big Title**

**Intro Copy Headline**

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Item Category  
\$88.00

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[Home](#)  
[About](#)  
[Contact](#)  
[Support](#)  
[FAQ](#)

**Announcements / Promoted Content**

**Coming Soon**

**Image of upcoming product**

<https://www.mockplus.com/blog/post/basic-uiux-design-concept-difference-between-wireframe-prototype>

Caution: when you do your assignment 2, avoid HI-FI details!!!

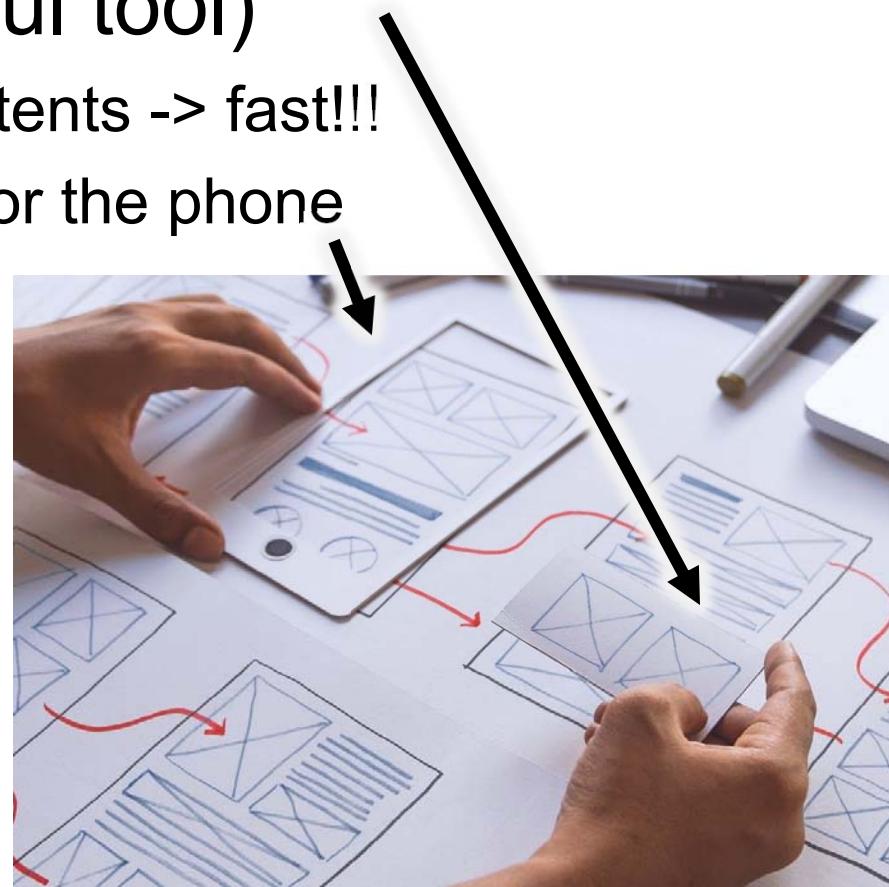
# Before Low-fi paper mockup...

## #4: Sticky notes (useful tool)

- Visual but physical contents -> fast!!!
- Create a paper frame for the phone



<https://rebeccajl.com/2013/05/05/design-wall/>



<https://www.getcloudapp.com/blog/prototype-fidelity-guide>

---

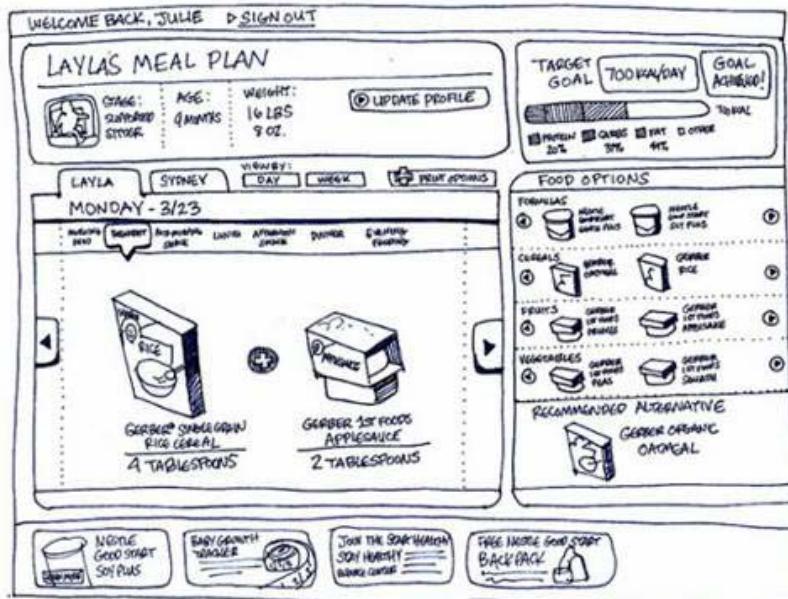
## Topic details...

### – **UI Mockup: Lo-fi and Hi-fi Prototyping**

- What & Why prototyping?
- Before Lo-fi paper mockup
- **Lo-fi prototyping**
- Why Lo-fi prototyping?
- Hi-fi prototyping

# What's inside a Low-fi design?

## 1. Main Interface itself



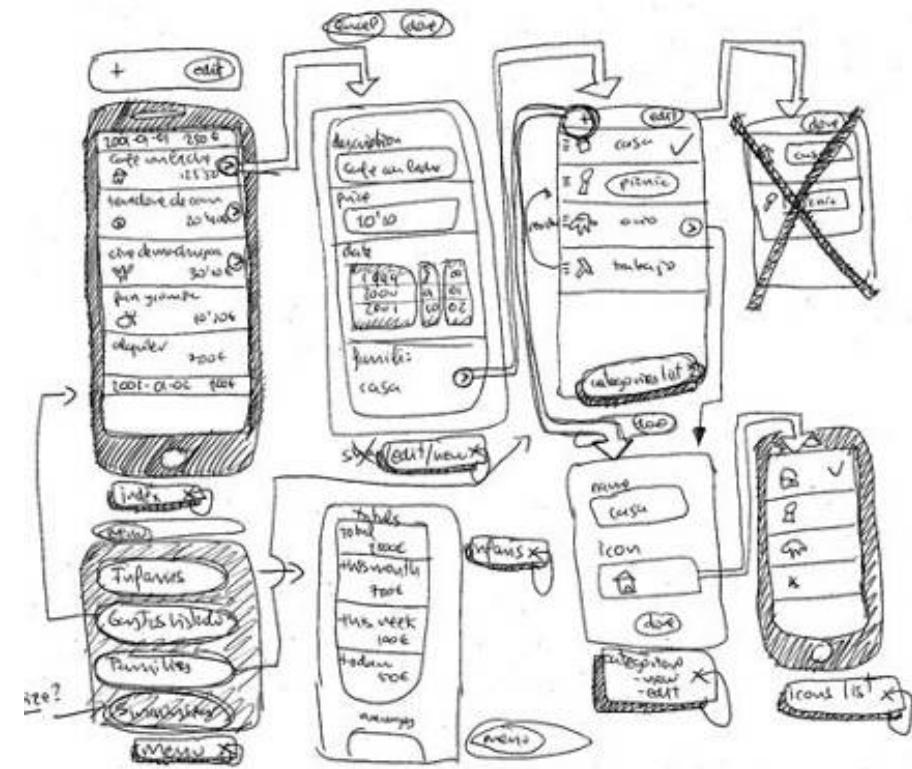
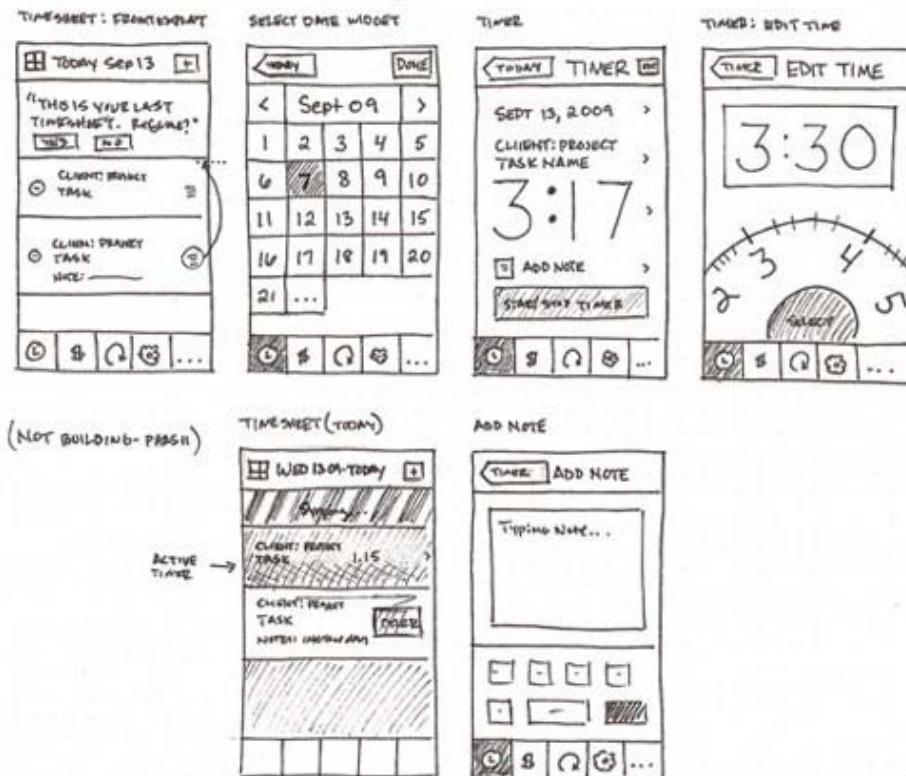
Desktop or web UI



Mobile apps

# What's inside a Low-fi design?

## 2. Different modes and transitions of the interface

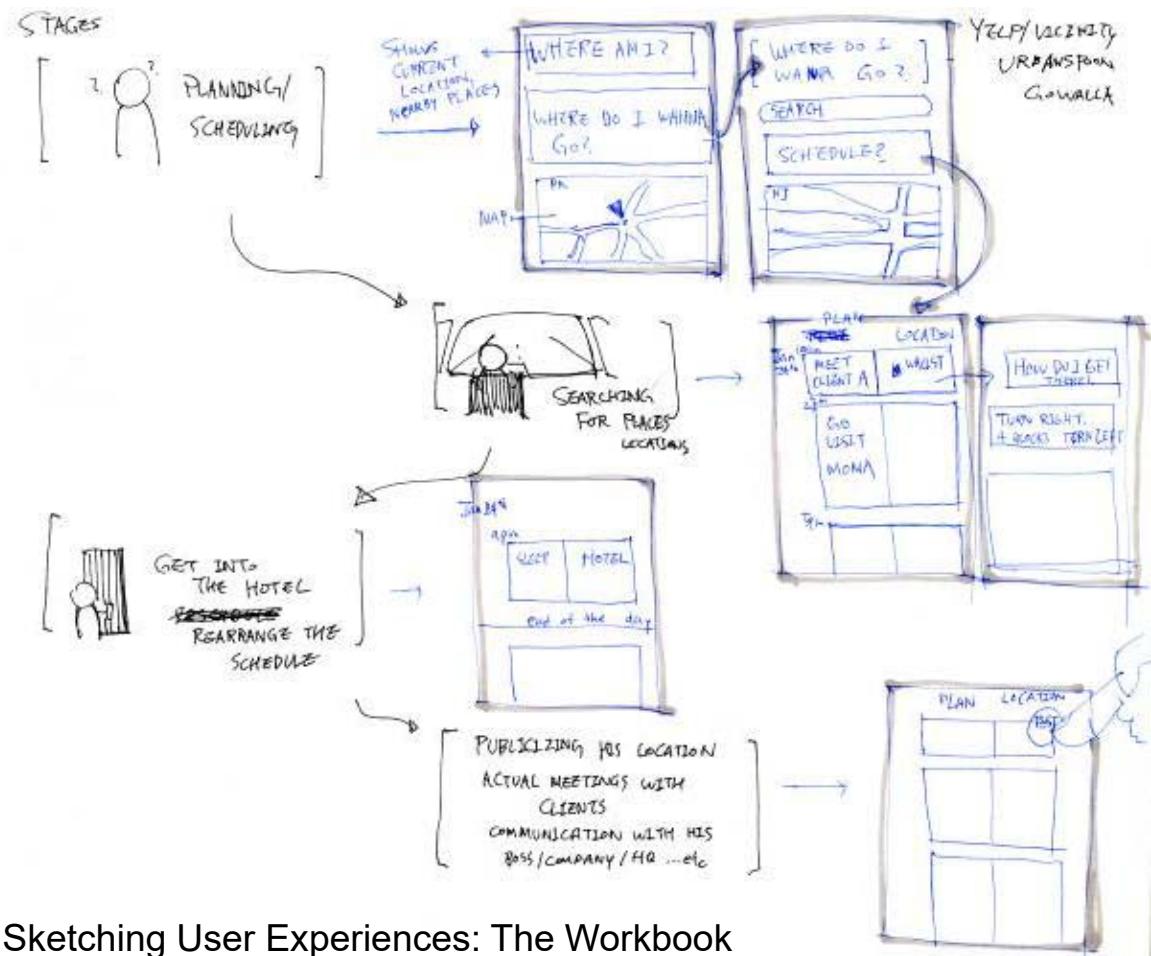
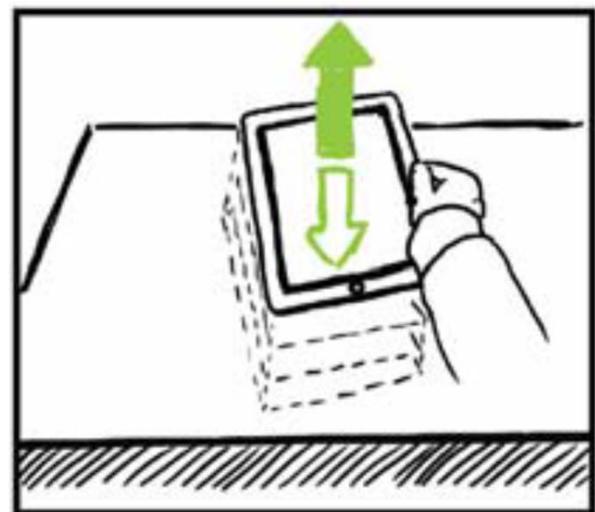
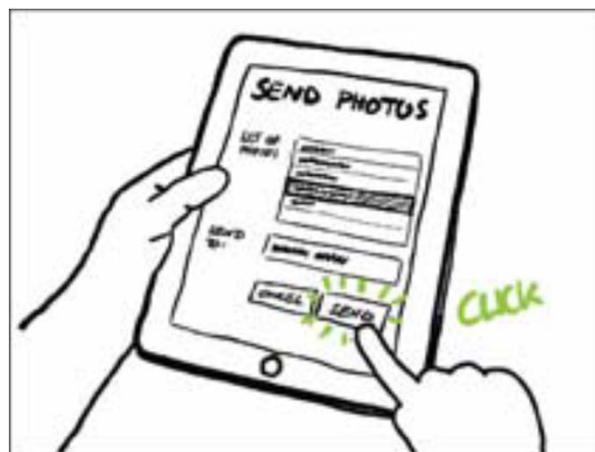


<http://sixrevisions.com/user-interface/website-wireframing/>

For phones: portrait vs landscape

# What's inside a Low-fi design?

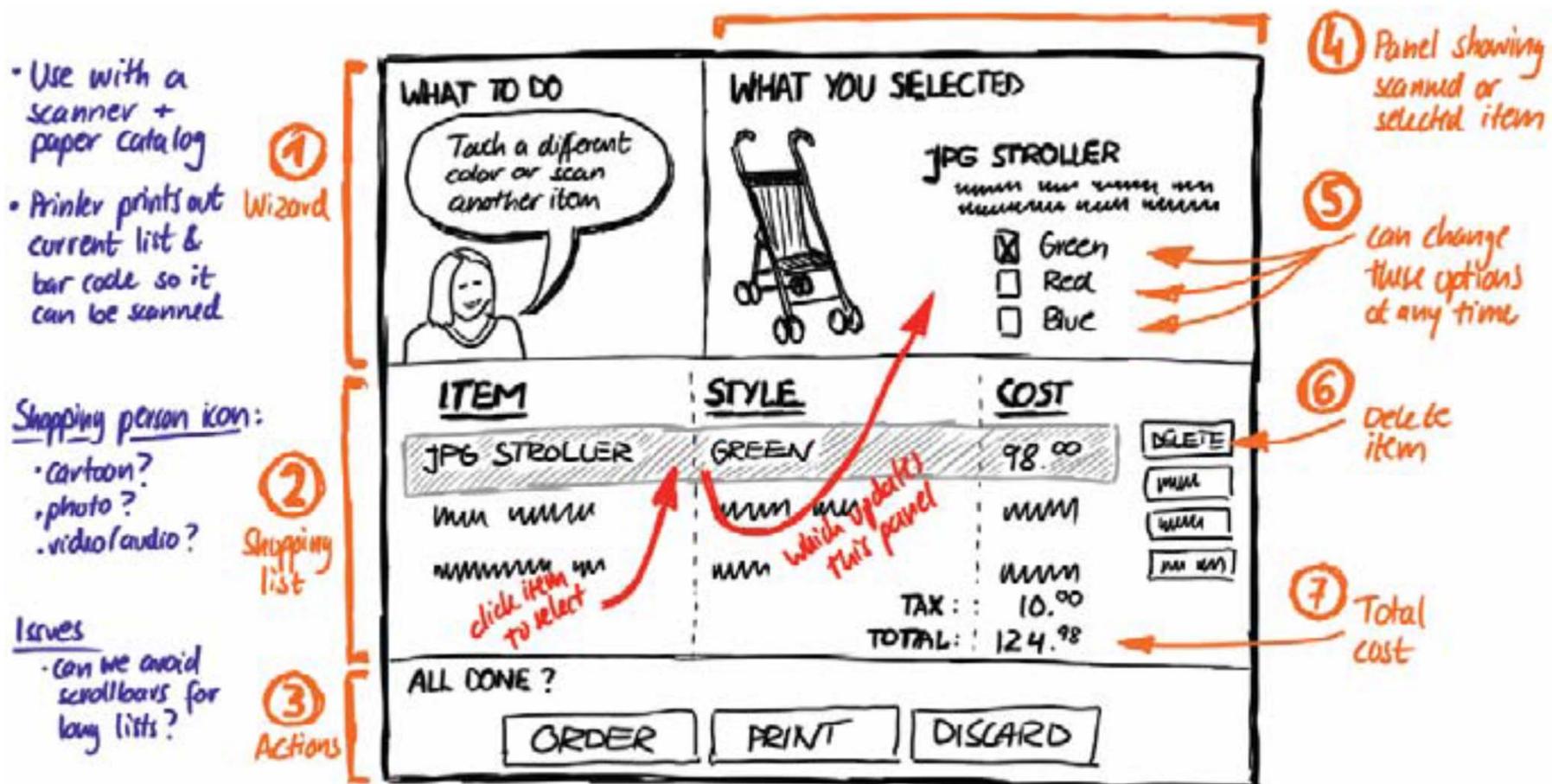
## 3. User actions with the interface



Sketching User Experiences: The Workbook  
by Bill Buxton et al., pub. Morgan Kaufmann, 2007

# What's inside a Low-fi design?

Note: please annotate your sketch!



Colors carry meanings!!! Not for aesthetic purpose!!! Also, consistent!!!

---

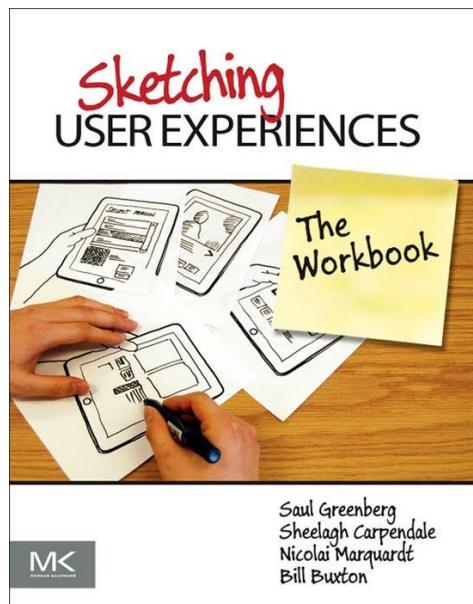
## Topic details...

### – **UI Mockup: Lo-fi and Hi-fi Prototyping**

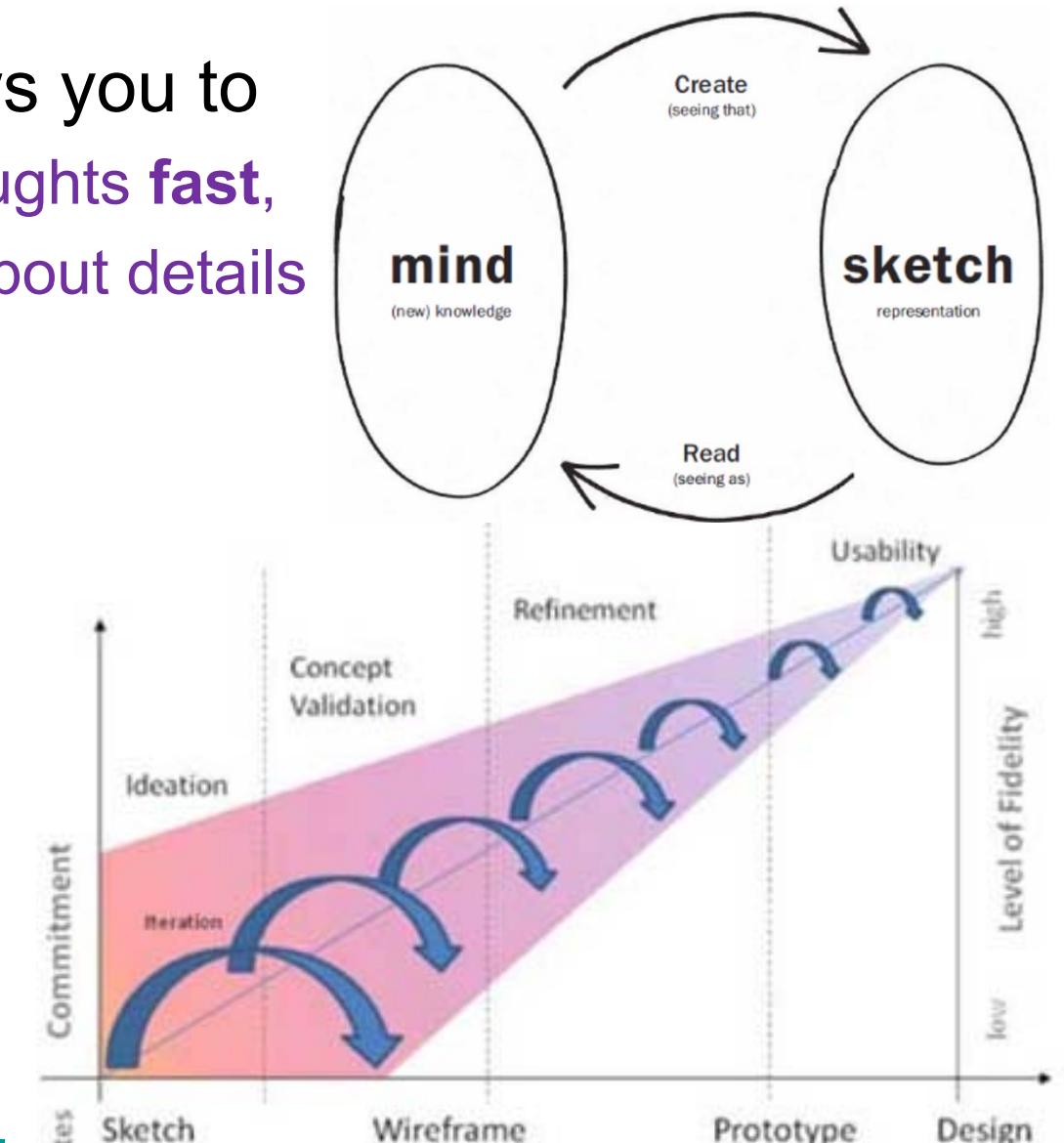
- What & Why prototyping?
- Before Lo-fi paper mockup
- Lo-fi prototyping
- **Why Lo-fi prototyping?**
- Hi-fi prototyping

# Why Use Low-fi Prototypes?

1. Sketching allows you to
  - Visualize your thoughts **fast**, without worrying about details



Sketching User Experiences  
pub. Morgan Kaufmann, 2011

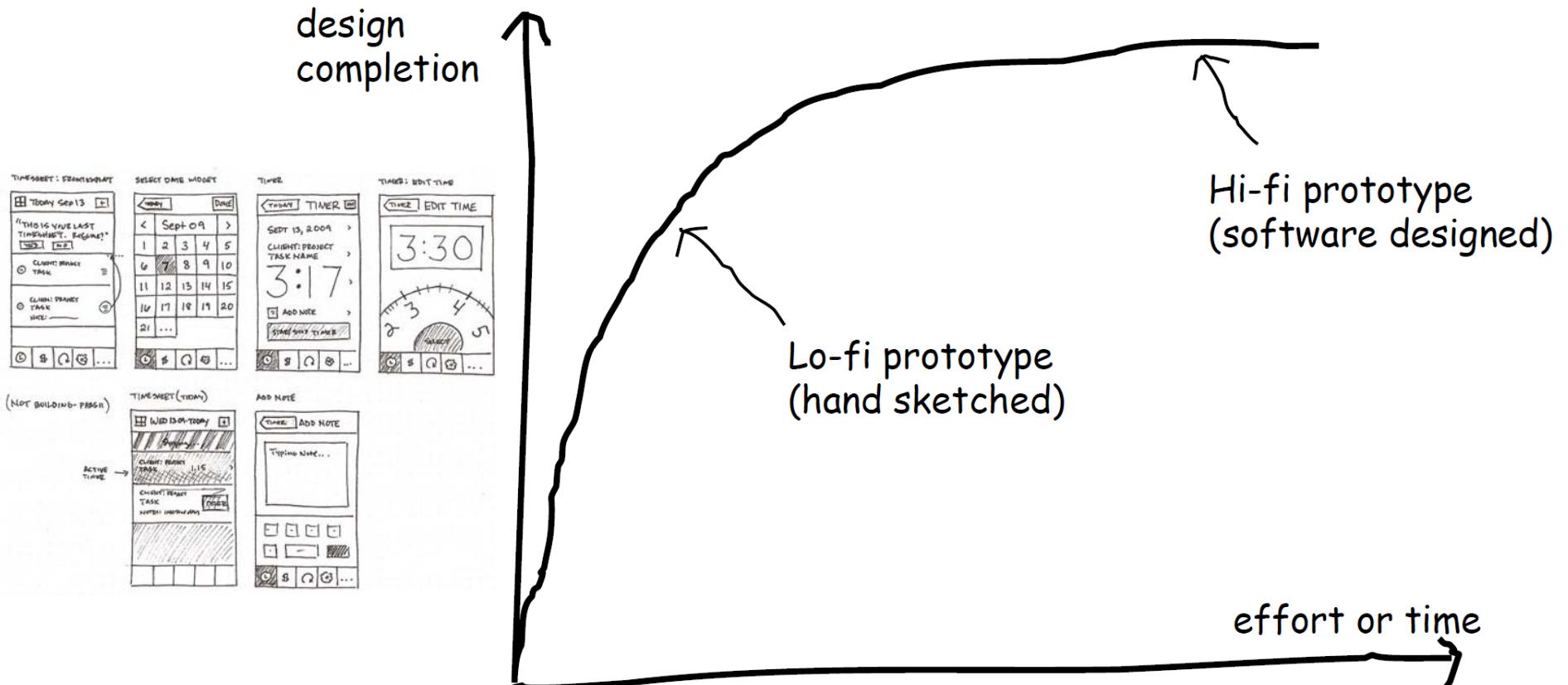


<https://www.usability.gov/how-to-and-tools/methods/prototyping.html>

# Why Use Low-fi Prototypes?

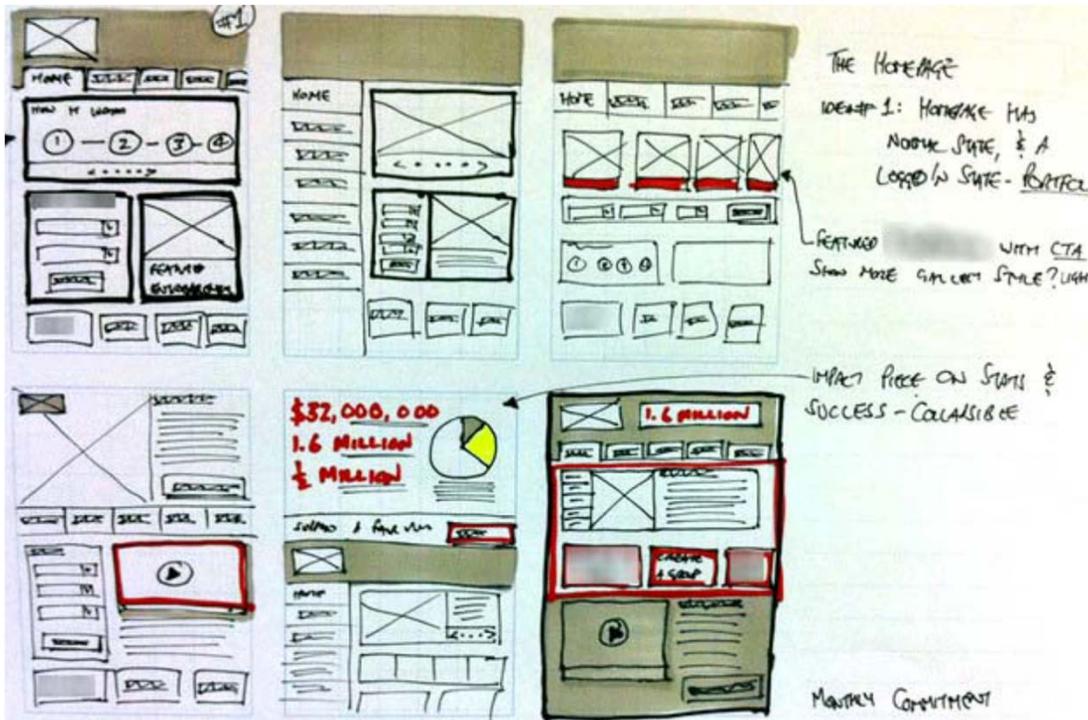
## 2. Avoid the 80-20 rule

- Last 20% of design work takes up 80% of the effort



# Why Use Low-fi Prototypes?

## 3. Try out many different possible interfaces



Six low-fi prototypes

<http://www.boxuk.com/blog/using-sketchboards-to-design-great-user-interfaces>

Post-it notes for quick prototyping

<http://sixrevisions.com/user-interface/website-wireframing/>



# Why Use Low-fi Prototypes?

---

- Traditional methods take too long
  - sketches -> prototype (real code) -> evaluate -> iterate
- Can simulate the prototype
  - sketches -> evaluate -> iterate
  - sketches act as prototypes
    - designer “plays computer”
    - other design team members observe & record
- Kindergarten implementation skills
  - allows non-p

Simulation with a low-fi prototype: <https://www.youtube.com/watch?v=yafaGNFu8Eq>

---

## Topic details...

### – **UI Mockup: Lo-fi and Hi-fi Prototyping**

- What & Why prototyping?
- Before Lo-fi paper mockup
- Lo-fi prototyping
- Why Lo-fi prototyping?
- **Hi-fi prototyping**

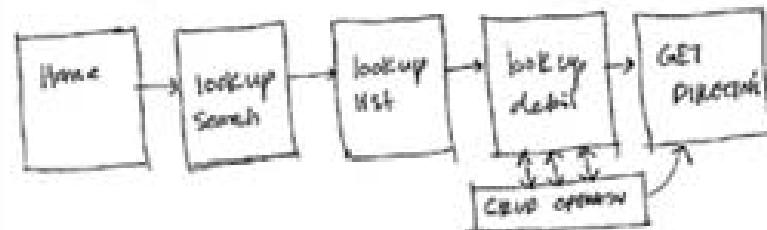
# High-Fidelity Mockup

---

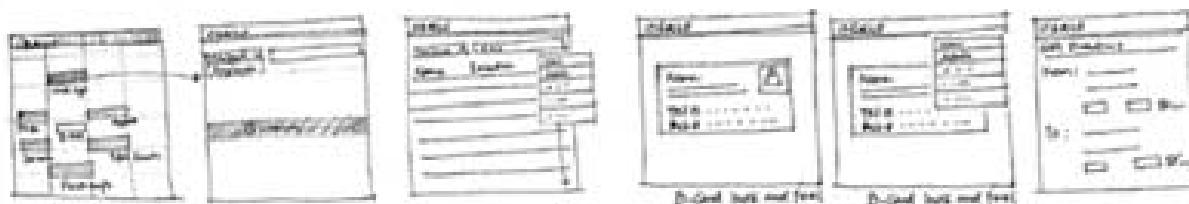
- After lo-fi interface is established, still room for more mockup:
  - color, fonts, layout style, alignment, graphics, etc.
- High-Fidelity can look much more similar to the final product
- Paper-based may still be used OK, but nowadays, most likely using real code or UI design software

# High-Fidelity Mockup

Navigation Flow



Paper Prototype  
(lo-fi)

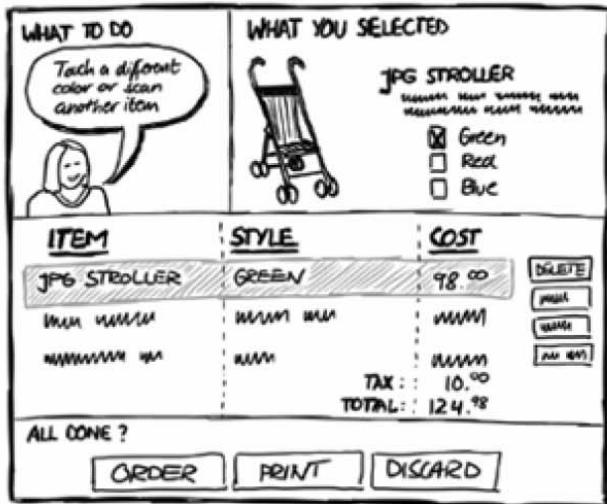


Hi-fi Prototype



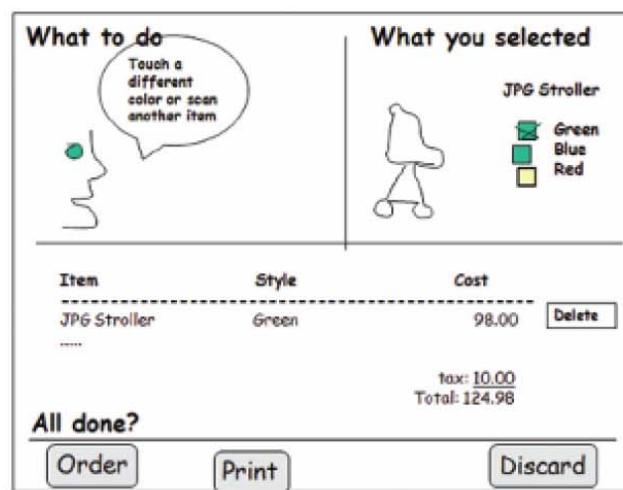
Source: Dhayan Kumar, Oracle Applications Unlimited User Experience

# Hand-drawn vs software-based prototyping



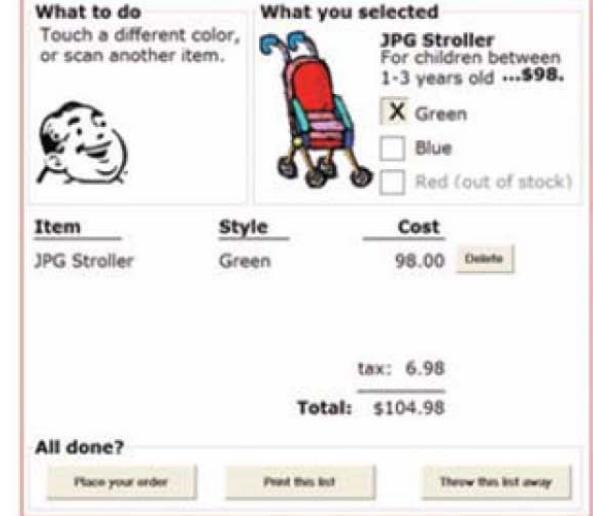
## Hand-drawn Lo-Fi

- informal, inexact, fast, low effort, looks good



## Software-drawn Lo-Fi

- informal, inexact, somewhat fast, moderate effort, looks very messy and jarring



## Software-drawn Hi-Fi

- formal, precise, slow, heavy effort, looks good

Several recent tools aim for hi-fi prototyping, e.g., invision & Proto.io  
<https://www.netsolutions.com/insights/5-mobile-app-prototyping-tools-for-great-ux-design/>

From *Sketching User Experiences: The Workbook*, by Saul Greenberg et al., pub. Morgan Kaufmann, 2011

# Summary

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## Prototyping

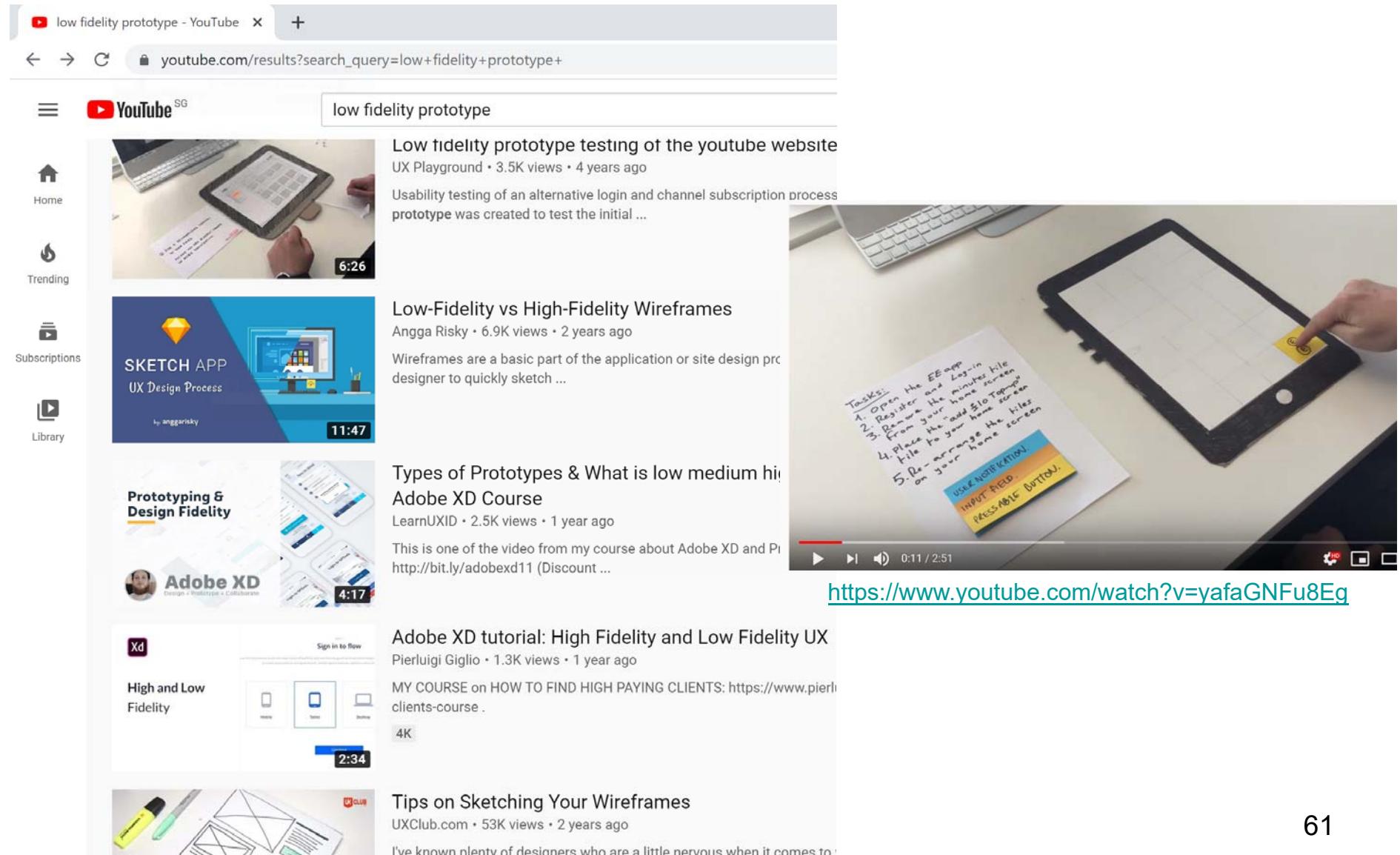
Lo-Fi      vs      Hi-Fi

|  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Used for exploring ideas</li></ul>                     | <ul style="list-style-type: none"><li>• Used for refining ideas</li></ul>                   |
| <ul style="list-style-type: none"><li>• Broadens thinking to different possibilities</li></ul> | <ul style="list-style-type: none"><li>• Narrows thinking towards a final solution</li></ul> |
| <ul style="list-style-type: none"><li>• Invites questions from reader</li></ul>                | <ul style="list-style-type: none"><li>• Provides answers</li></ul>                          |
| <ul style="list-style-type: none"><li>• Tentative</li></ul>                                    | <ul style="list-style-type: none"><li>• Definitive</li></ul>                                |

From: Prof. TJ Cham

A blog in Adobe: <https://blog.adobe.com/en/2017/11/29/prototyping-difference-low-fidelity-high-fidelity-prototypes-use>

# Nowadays, many resources...



low fidelity prototype - YouTube

youtube.com/results?search\_query=low+fidelity+prototype+

YouTube SG

low fidelity prototype

Low fidelity prototype testing of the youtube website  
UX Playground • 3.5K views • 4 years ago  
Usability testing of an alternative login and channel subscription process prototype was created to test the initial ...

6:26

Low-Fidelity vs High-Fidelity Wireframes  
Angga Risky • 6.9K views • 2 years ago  
Wireframes are a basic part of the application or site design process for a designer to quickly sketch ...

11:47

Types of Prototypes & What is low medium high  
Adobe XD Course  
LearnUXID • 2.5K views • 1 year ago  
This is one of the video from my course about Adobe XD and Principles of UX. <http://bit.ly/adobexd11> (Discount ...)

4:17

Prototyping & Design Fidelity  
Adobe XD  
Design + Prototype + Consultation

2:34

Adobe XD tutorial: High Fidelity and Low Fidelity UX  
Pierluigi Giglio • 1.3K views • 1 year ago  
MY COURSE on HOW TO FIND HIGH PAYING CLIENTS: <https://www.pierluigigiglio.com/courses/clients-course>.

4K

Tips on Sketching Your Wireframes  
UXClub.com • 53K views • 2 years ago  
I've known plenty of designers who are a little nervous when it comes to ...

<https://www.youtube.com/watch?v=yafaGNFu8Eg>

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## Topics:

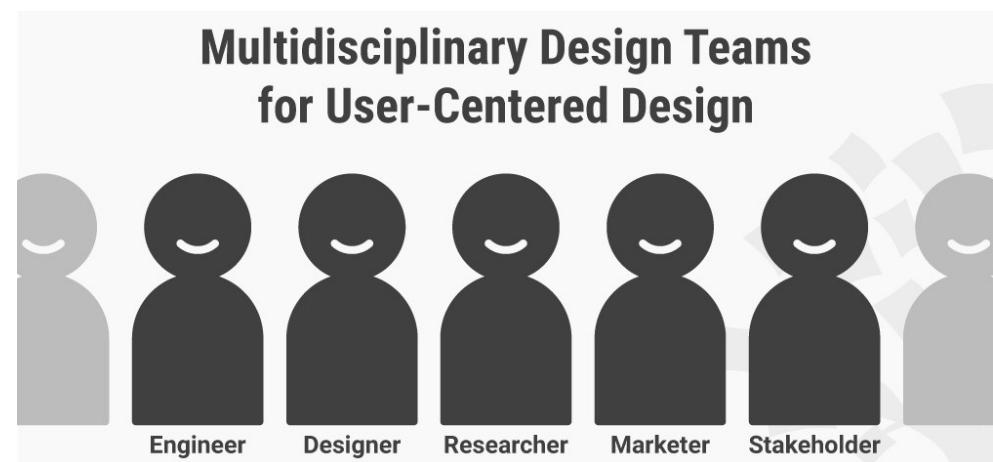
- Organization's View: Why UX?
- Four Pillars of Good UI Design
- Lo-fi and Hi-fi Prototyping
- **Development Methodologies**
- User studies and Observations
- Legal Issues
- Intelligent User Interface (IUI) Design

# Development Methodologies

## (Managing the UI development)

---

- As high as 50% of software projects fail to achieve their goals [Jones 2005]
  - Why? Mostly miscommunication between developers and clients, and developers cannot adequately consider “user’s need” in the design process
- “Development Methodologies” are established to help facilitate projects
  - User-centered Design
  - Parallel Design
  - Card Sorting

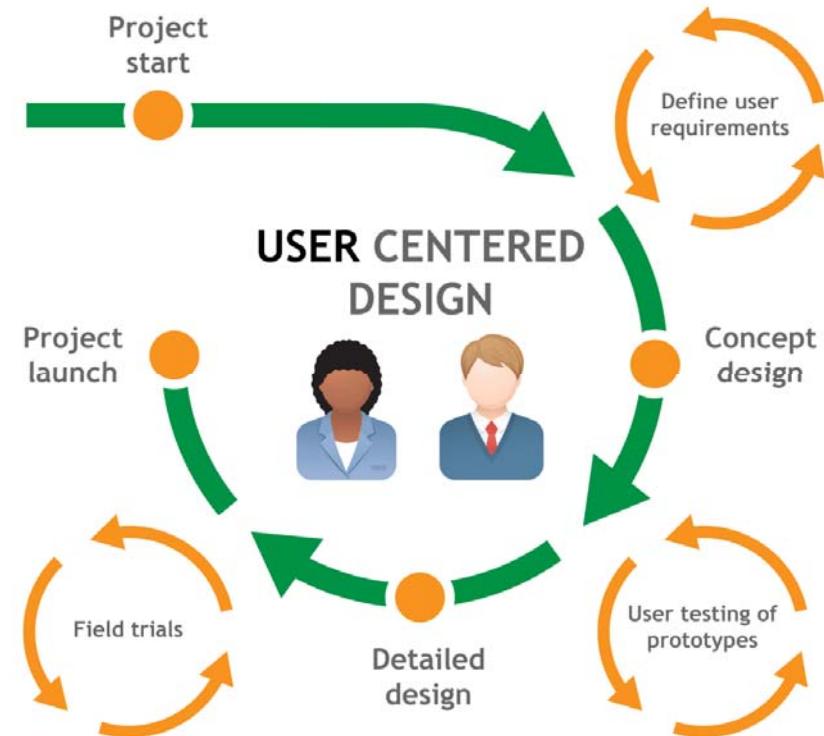


# Topic #1: User-Centered Design (UCD)

---

Many different definitions:

- A well-established process: well-defined steps
- Focus on the potential **users** from the very beginning and checking at each step of the way with these users to be sure they like and are comfortable with the final design



There are many different UCD models, e.g., see next pages

[https://en.wikipedia.org/wiki/User-centered\\_design](https://en.wikipedia.org/wiki/User-centered_design)

# Example #1

## I. IBM's Ease of use Method

phases

| Role/Phase Matrix          | All Phases | Business Opportunity             | Understanding Users           | Initial Design                             | Development                             | Deployment                  | Life Cycle          |
|----------------------------|------------|----------------------------------|-------------------------------|--|---|-----------------------------|---------------------|
| All Roles                  |            |                                  |                               |  |   |                             |                     |
| User Experience Leadership |            | User Engineering Plan-Initial    | User Engineering Plan-Final   | Execution of the User Engineering Plan     | Satisfaction of Established Metrics     | Project Assessment          | Satisfaction Survey |
| Market Planning            |            | Business and Market Requirements | Appropriate User Requirements | Draft Marketing Collateral                 | Detail Marketing Collateral             | Final Marketing Collateral  |                     |
| User Research              |            |                                  | User Requirements             | Appropriate Design                         |   |                             |                     |
| User Experience Design     |            |                                  | Design Direction              | Conceptual Design, Low-Fidelity Prototypes | Detail Design, High-Fidelity Prototypes | Design Issue Resolution     |                     |
| Visual & Industrial Design |            |                                  | Appearance Direction          | Appearance Guidelines                      | Appearance Specification                |                             |                     |
| User Experience Evaluation |            |                                  | Competitive Evaluation        | Conceptual Design Evaluation               | Detail Design Evaluations               | User Feedback and Benchmark | Usage Issue Report  |

IBM's Ease of Use development methodology specifies activities by **roles** and **phases**

# Example #2

---

## II. Rapid Contextual Design Method

Contextual inquiry

Interpretation sessions and work modeling

Model consolidation and affinity diagram building

Personas

Visioning

Storyboarding

User environment design

Paper prototypes and mock-up interviews

Plan/prepare/conduct field interviews

Team discussion & workflow modeling

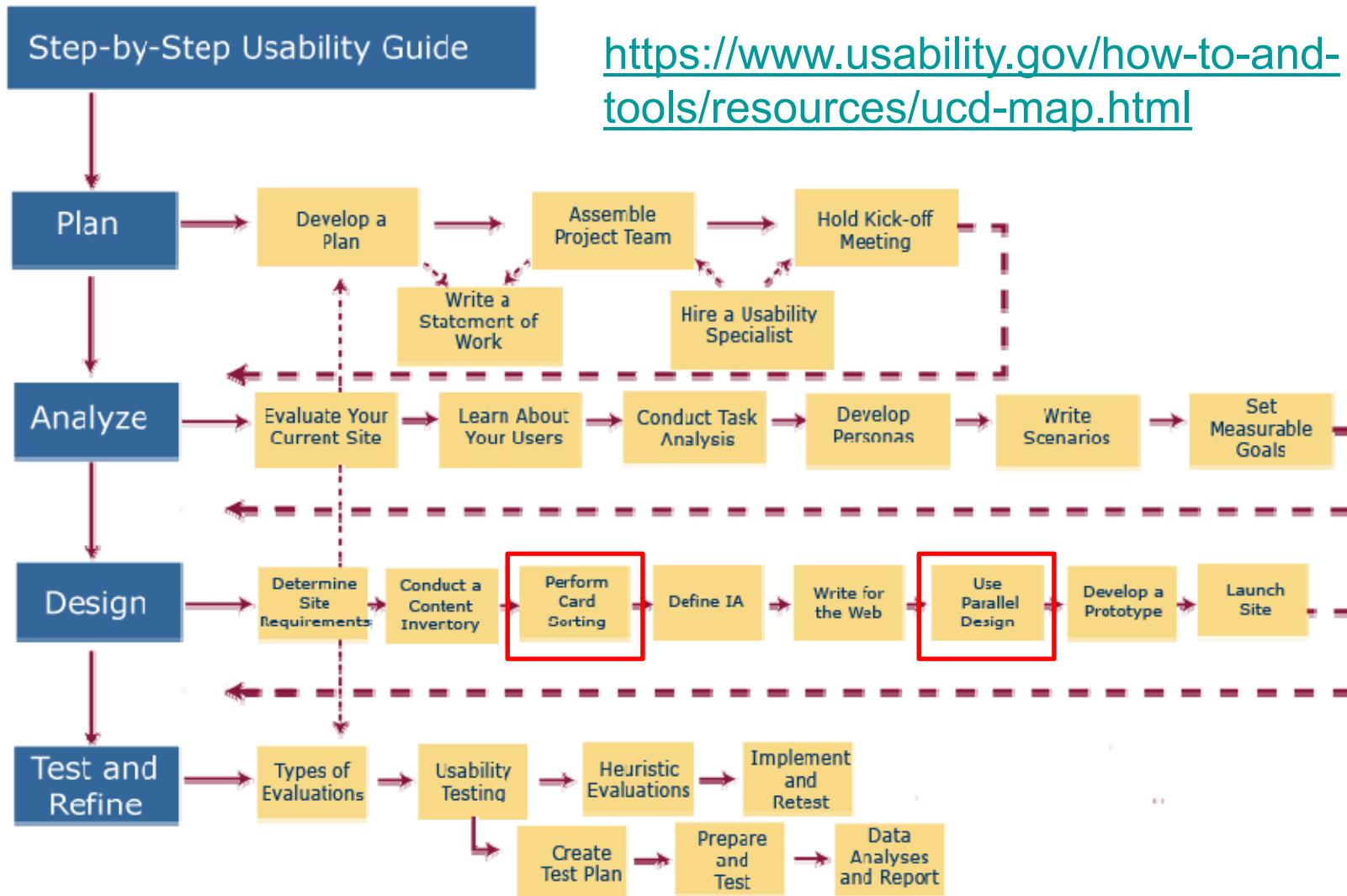
Hierarchical representations of issues to address user needs

(see textbook for detail)

From Holtzblatt, et al. 2008, *Rapid Contextual Design: A How-To Guide to Key Techniques for User-Centered Design*

# Example #3

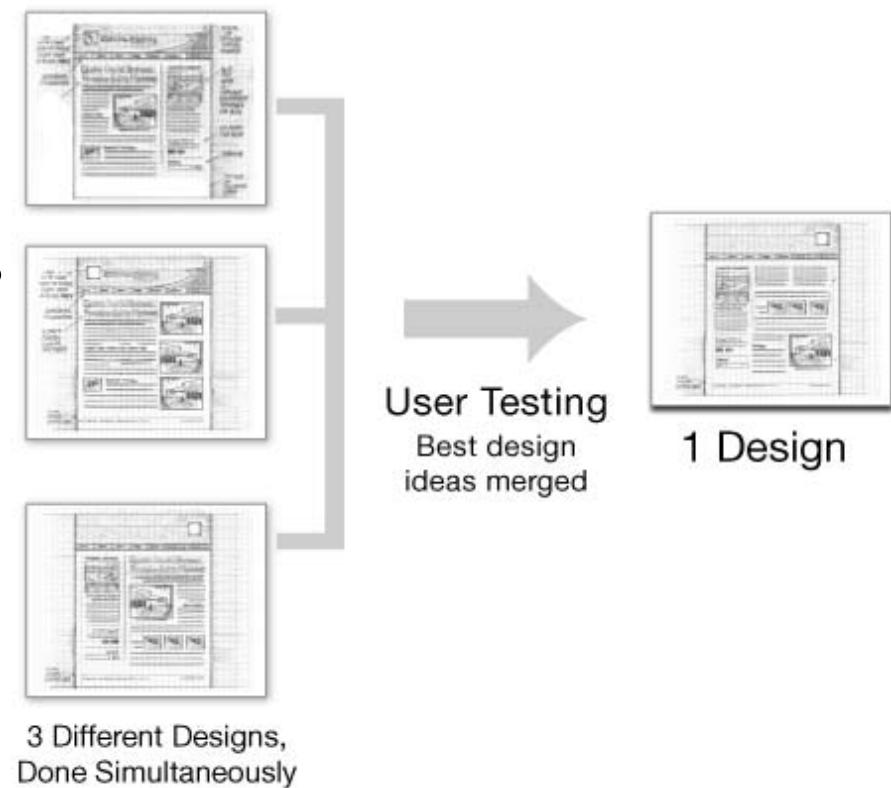
## III. User-Centered Design Process Map



# Technique #1: Parallel Design

---

- Approach:
  - Several people create an initial design **independently** from the same set of requirements
  - **Share** the designs, and each designer uses the best ideas to refine his/her own design
  - Final solution benefits from all ideas proposed

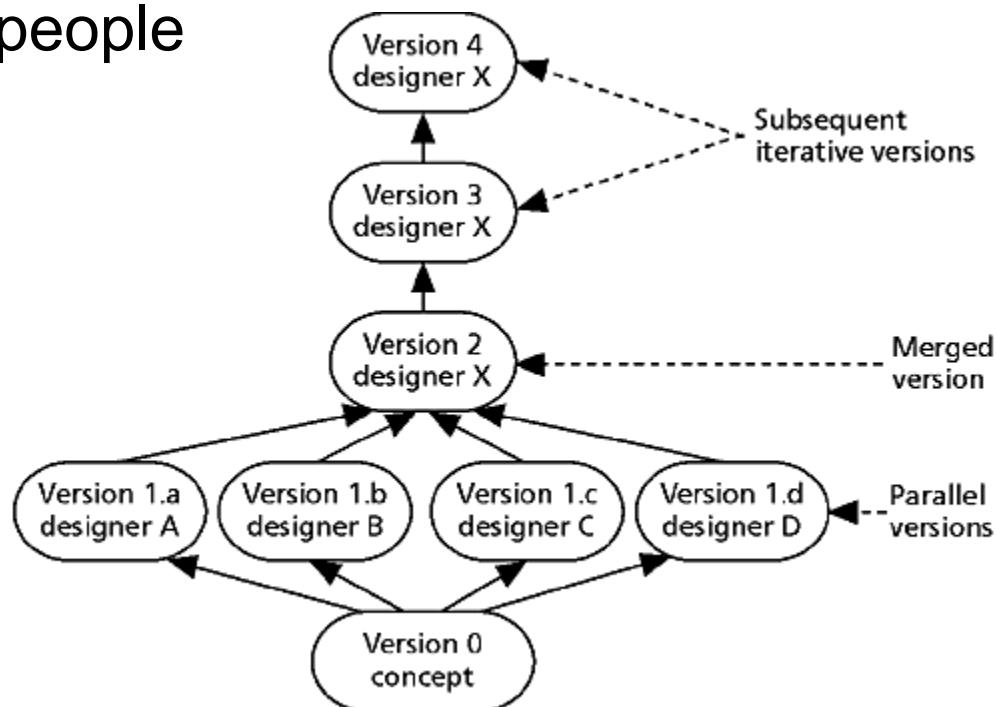


References: <http://www.usability.gov/how-to-and-tools/methods/parallel-design.html>  
<http://www.nngroup.com/articles/parallel-and-iterative-design/>  
<https://www.nngroup.com/articles/parallel-design/>

# Parallel Design

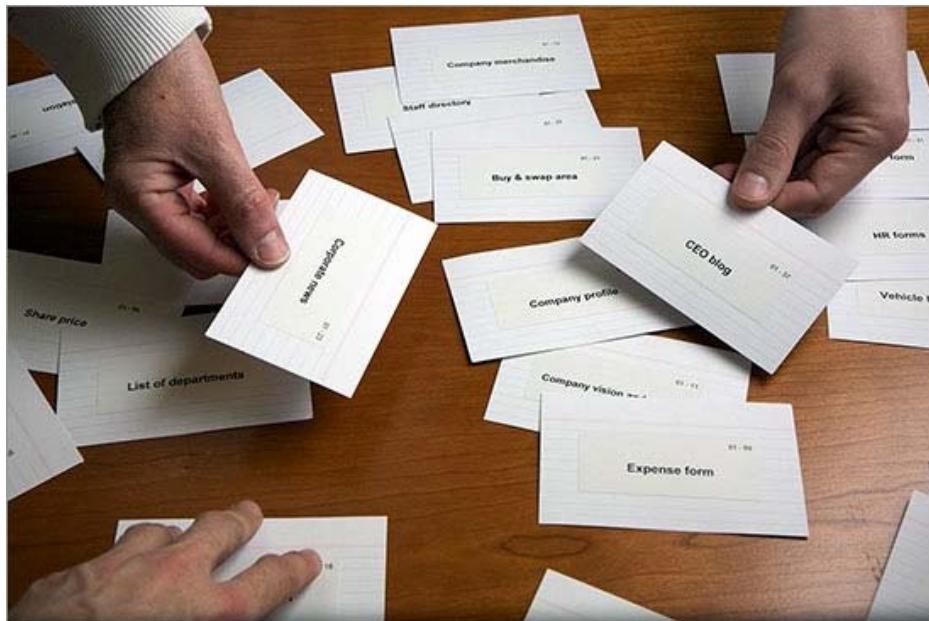
---

- Benefits:
  - Generate a range of ideas quickly and cost effectively
  - Explore several approaches simultaneously, thus shortening the design schedule
  - The final design can combine good ideas from all different people



# Technique #2: Card Sorting

- Low-tech (but quick and inexpensive) approach to organize items on cards
  - Generate or evaluate an overall structure: menu structure, website navigation paths, workflows, etc.



References: <http://www.usability.gov/how-to-and-tools/methods/card-sorting.html>

[http://en.wikipedia.org/wiki/Card\\_sorting](http://en.wikipedia.org/wiki/Card_sorting); <http://www.measuringu.com/blog/card-sorting.php> 70

# Card Sorting

---

- General Procedure:
  - Prepare a set of cards, each with one item
  - Recruit a group of participants: experts or users
  - Shuffle a set of cards for each participant
  - Ask each participant to arrange & cluster the cards to represent the groups/structures they are familiar with
- Two Main Variants:
  - Open Card Sorting (usually Generative)
    - Participants are asked to name each group they created
  - Close Card Sorting (usually Evaluation)
    - Participants are given a pre-defined set of categories during the card sorting process

---

## Topics:

- Organization's View: Why UX?
- Four Pillars of Good UI Design
- Lo-fi and Hi-fi Prototyping
- Development Methodologies
- **User studies and Observations**
- Legal Issues
- Intelligent User Interface (IUI) Design

# User studies and Observations

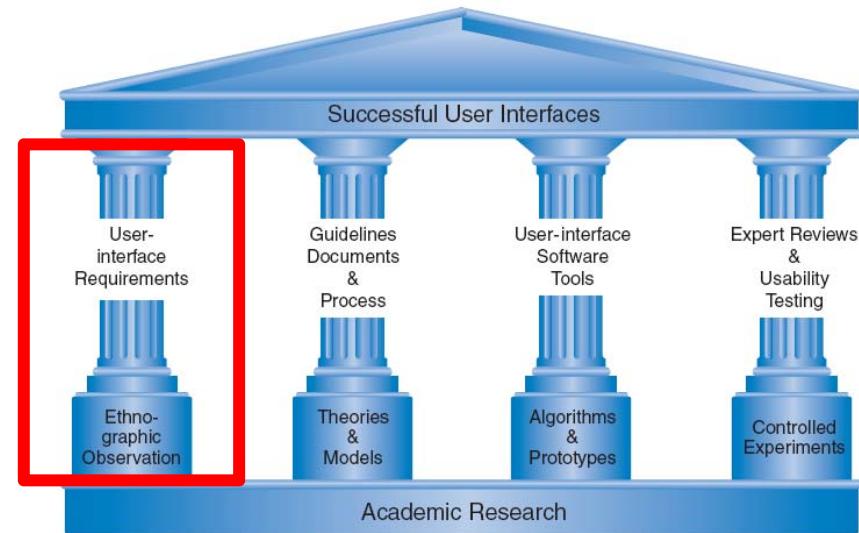
---

In early stage of user interface design (about pillar 1):

Observe “real world” users, e.g., in their home or office environment

Methods:

- Ethnographic observation
- Others:
  - Participatory design
  - Interviews
  - focus group
- Etc.



Some of these are related to the topics that you will see in week 5.

# User Studies: Ethnographic Observation (Pillar 1)

---

- Sends observers to people homes and offices to
  - Quietly observe *user habits, communication patterns, workflows* and *tasks*
  - Ask questions
  - Participate in activities
- Goal: obtain necessary data to influence the interface design
  - Determine workflows
  - Identify inefficiencies
  - Identify opportunities (can they do it better?)
  - etc.



# Examples

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Observe children's reading habits at home



Observe new family-related technologies at home

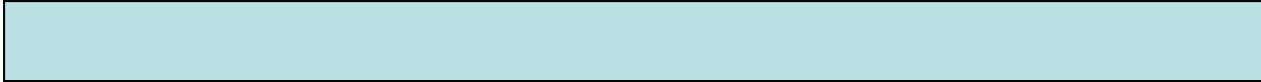
After that, the researchers analyze and report the results

Not necessary at home/office, e.g., bus stop, supermarket, etc.

# Guidelines: Ethnographic Observation

---

## 1) Preparation

- Understand organization **policies** and **work culture**, or the **family values**
- Familiarize yourself with existing interface and its history
- Set initial goals and prepare questions
- Gain 

## 2) Field Study

- Establish rapport (mutual understanding or trust and agreement between people) with managers and users
  - Respect the rules of the workplace
- Observe/interview users in their workplace, and collect subjective/objective quantitative/qualitative data
- Follow any leads that emerge from the visits
- Record the visits

# Guidelines: Ethnographic Observation

---

## 3) Analysis

- Compile the collected data in numerical, textual, and multimedia databases
- Quantify data and compile statistics
- Reduce and interpret the data
- Refine the goals and the process used

## 4) Reporting

- Consider multiple audiences and goals
- Prepare a report and present the findings

---

## Topics:

- Organization's View: Why UX?
- Four Pillars of Good UI Design
- Lo-fi and Hi-fi Prototyping
- Development Methodologies
- User studies and Observations
- **Legal Issues**
- Intelligent User Interface (IUI) Design

# Legal Issues

---

## “Potential Controversies” that affect design

### 1) Privacy

- Examples: Data stored and activities being monitored
- UI designers
  - UI mechanisms to control password access, identity checking, data verification, etc.
  - Provide easily accessible and understandable privacy policies

### 2) Safety and Reliability: For life critical systems

- Can the UI be held responsible for life-death situations?
- Has it been tested to national standards for deployment
  - Good example is for use in a hospital setting

# Legal Issues

---

## 3) Freedom of speech

- Do users have right to make controversial or offensive statements?
- Should network providers be responsible?

## 4) Copyright and patent

- What material is eligible for copyright?
- Are copyrights or patents more appropriate for user interfaces?
- What constitutes copyright infringement?
- Should user interfaces be copyrighted?

# Copyright: Creative Commons

Copyright issues: want to include music, photos, graphics, etc. in your work?  
<http://creativecommons.org/licenses/>

## About

- Want to let people share and use your photographs, but not allow companies to profit from them?
- Looking for access to course materials from the world's top universities?
- Want to encourage readers to re-publish your blog posts, as long as they give you credit?
- Looking for songs that you can use and remix, royalty-free?

If you answered yes to any of the questions above, then you should learn more about the quickest and easiest introduction to CC is to watch the following short video:



## What can Creative Commons do for me?

If you want to give people the right to share, use, and even build upon a work you've created, then Creative Commons is for you.

## Explore / Creative Commons

Many Flickr users have chosen to offer their work under a Creative Commons license, and you can browse or search through content under each type of license.

Here are some recently added bits and pieces:

### Attribution License



» 38,387,639 photos (See more)

### Attribution-NoDerivs License



» 13,783,671 photos (See more)

### Attribution-NonCommercial-NoDerivs License

**Attribution means:**  
You let others copy, distribute, display, and perform your copyrighted work - and derivative works based upon it - but only if they give you credit.



creative commons  
"Creative Commons is a non-profit that offers an alternative to full copyright."  
[creativecommons.org](http://creativecommons.org)

### Briefly...

**Attribution means:**  
You let others copy, distribute, display, and perform your copyrighted work - and derivative works based upon it - but only if they give you credit.



**Noncommercial means:**  
You let others copy, distribute, display, and perform your work - and derivative works based upon it - but for noncommercial purposes only.



**No Derivative Works means:**  
You let others copy, distribute, display, and perform only verbatim copies of your work, not derivative works based upon it.



**Share Alike means:**  
You let others copy, distribute, display, and perform only verbatim copies of your work, not derivative works based upon it.



<http://www.flickr.comcreativecommons/>

# Copyright: Google 2020

Now... when you google...

The screenshot shows a Google search results page for the query "HCI". The search bar at the top contains "HCI". Below it, the "Images" tab is selected. A sidebar on the left lists filters: Size, Color, Type, Usage rights, and More tools. The "Usage rights" dropdown is open, showing the following options:

- Not filtered by license
- Labeled for reuse with modification
- Labeled for reuse
- Labeled for noncommercial reuse with modification
- Labeled for noncommercial reuse

The main search results area displays several images related to Human-Computer Interaction (HCI). One result is a logo for "Hci Human Co". Another result is a diagram titled "Human-Computer Interaction (HCI) - A Systematic Approach". A third result is a diagram titled "History of Human Computer Interaction". A fourth result is a flowchart of the HCI engineering process.

At the bottom of the page, the URL is visible: <https://www.google.com.sg/search?q=HCI&source=lnms&tbo=isch&sa=X&ei=90EQU4>

# Copyright: Google 2021 & 2022

Now... when you google...

The screenshot shows a Google search results page for the query "HCI". The search bar at the top contains "HCI - Google Search". Below the search bar, there are several filters: "All", "Images", "News", "Maps", "Videos", and "More". A red box highlights the "Usage Rights" filter, which has three options: "All", "Creative Commons licenses", and "Commercial & other licenses". The main search results are displayed in a grid:

- Human-computer interaction and relat...** [researchgate.net](https://www.researchgate.net)
- What is Human-Computer I...** [interaction-design.org](https://interaction-design.org)
- Evolution Of Human-Computer Interaction ...** [sixteen-nine.net](https://sixteen-nine.net)
- Human-Computer Interaction** [researchgate.net](https://www.researchgate.net)
- design patterns for social interactions** [slideshare.net](https://www.slideshare.net)
- human computer interaction (H...** [researchgate.net](https://www.researchgate.net)
- What is HCI? Human Computer Interaction ...** [informationq.com](https://informationq.com)
- Human Computer Interaction (HCI) / ...** [pinterest.com](https://pinterest.com)
- What is Hyperconverged Infrastructure ...** [vmware.com](https://vmware.com)
- Human-Computer Interaction (HCI ...** [carleton.ca](https://carleton.ca)

A large red box encloses the top portion of the search results, specifically the first four items. Inside this red box, there is a secondary red box highlighting the "Usage Rights" filter options.

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## Topics:

- Organization's View: Why UX?
- Four Pillars of Good UI Design
- Lo-fi and Hi-fi Prototyping
- Development Methodologies
- User studies and Observations
- Legal Issues
- **Intelligent User Interface (IUI) Design**

# Intelligent User Interface

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## What is Intelligent User Interface (IUI)?

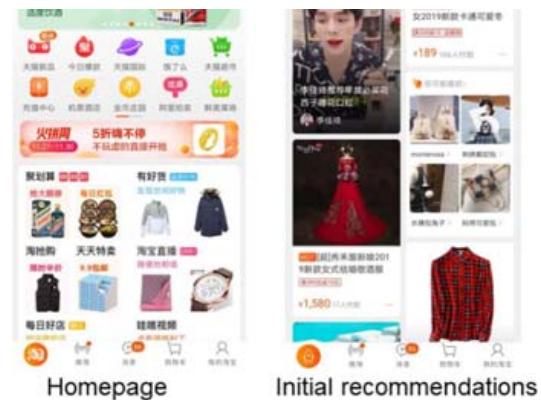
- Another more recent name is “**AI-enabled UI**”
- In general, it means a user interface (UI) that involves some aspect of artificial intelligence (AI)
- Purposes, e.g.,
  - Information overflow problems
  - Offer helps to guide us to use complex systems
  - Minimize the necessary user inputs
  - Help the disabled
  - Overall, extend the human capabilities with AI

A research conference for IUI:

<https://iui.acm.org/2020/acceptedpapers.html>

# Examples

- Chatbot and virtual assistant AI
  - On-line chat conversation via text or text-to-speech, etc.
- Recommendation system
  - automatically filters user information and predicts their preference
- Computer-Vision-based
  - Facial recognition, gesture recognition, human action, etc.



# Design Principles

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- Understand the relevant AI technology, e.g.,
  - Capability: what can it do? Especially, most AIs are specialized
  - Limitations: what are the situations that it won't work?
  - Failure cases? Potential errors or bias?
- Account for any unpredictable situation
  - Does your interface has the “error correction” capability?
  - Make it easy to edit/refine/recover when the AI is wrong
  - Allow human to take control whenever they need so
- Confirmation with the user
  - Give feedback to the user
  - Ask the user for confirmation for (important) decisions



# Design Principles

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- Build trust in users by making the AI decision explainable
  - E.g., reveal the inputs that the AI consumed
- Set the right expectations
  - Help the user to know the capability and limits of the system
- Respect and Enforce the AI Ethical Principles
  - Transparency
  - Fairness and Justice
  - Beneficence
  - Responsibility
  - Privacy



# Intelligent User Interface

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## Extended readings

- The Paradox of Intelligent Assistants: Poor Usability, High Adoption:
  - <https://www.nngroup.com/articles/intelligent-assistants-poor-usability-high-adoption/>
- Guidelines for Human-AI Interaction
  - <https://www.microsoft.com/en-us/research/uploads/prod/2019/01/Guidelines-for-Human-AI-Interaction-camera-ready.pdf>
- AI UX: 7 Principles of Designing Good AI Products
  - <https://uxstudioteam.com/ux-blog/ai-ux/>

# Summary

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- Design is an evolving process
- Four Pillars of Successful UI Design
  - User Interface Requirements
    - Ethnographic Observation
  - Guidelines
    - Establish guidelines to improve consistency and focus
  - Software and Prototypes
    - Development Methodologies
    - Prototype early and often
    - Management Stages for Large Scale UI Design
  - Evaluation: Next Module!!!

# Terminologies you've learnt

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- User Experience (UX)
- User Interface or User Interaction (UI)
- Return on Investment (ROI)
- Four pillars of "Good Design"
- UI Mockup and prototyping
- Navigation Flow, Wireframe & Storyboard
- Lo-fi prototype
- Hi-fi prototype
- User-centered design
- Parallel Design
- Card Sorting (Open vs Close)
- Ethnographic Observation
- Participatory Design
- Four Legal Issues
- Intelligent User Interface