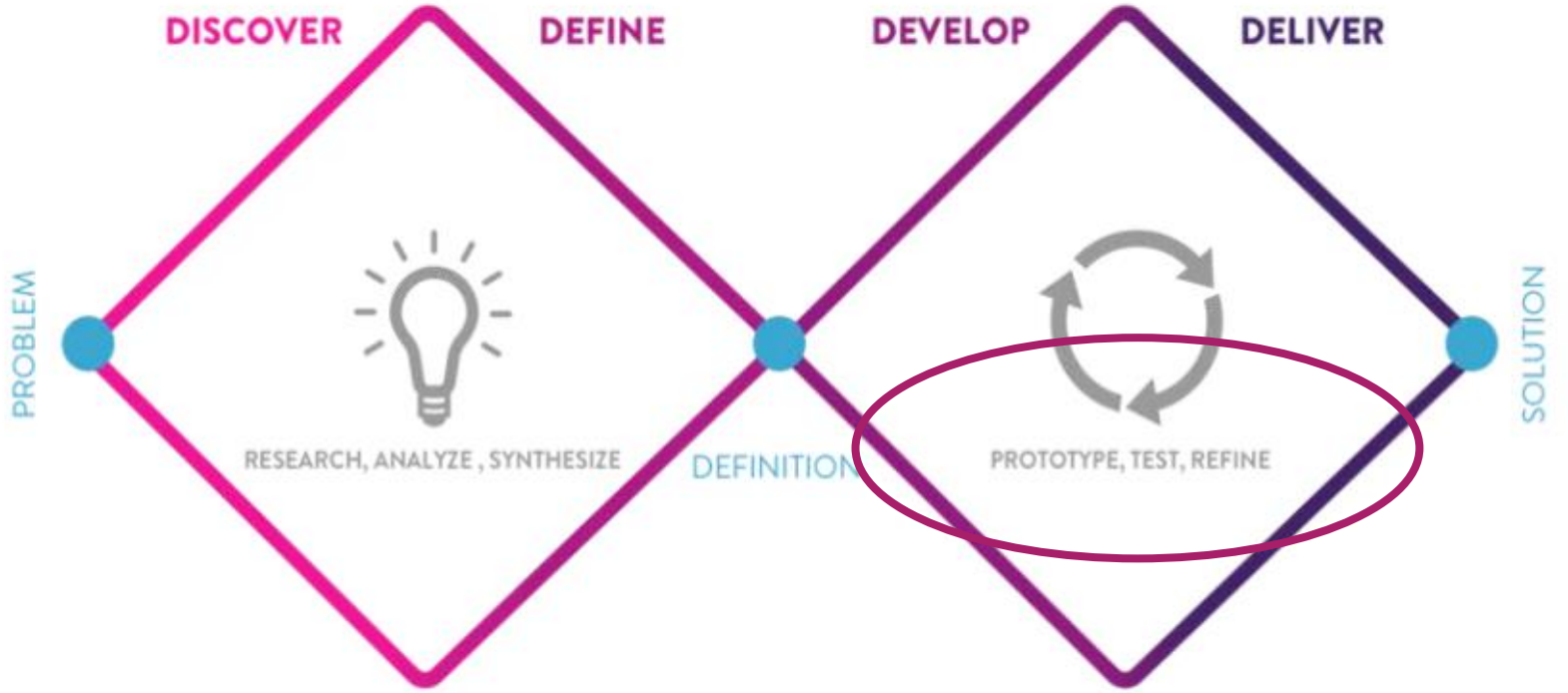
Design

Univerzitet u Kragujevcu
Prirodno-matematički fakultet
Institutat za matematiku i informatiku

Design steps

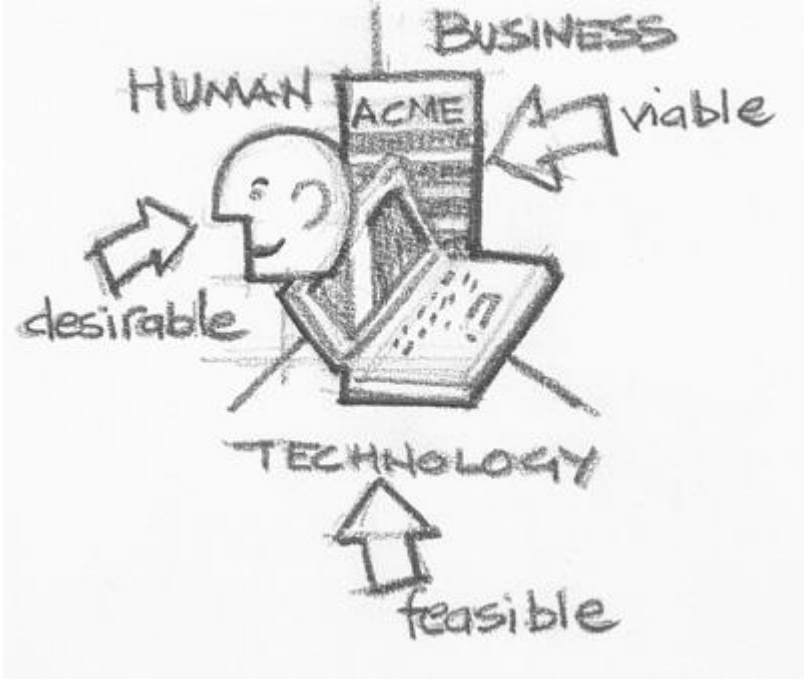


From Analysis To Design

- Analysis produces lists of issues/problems = requirements
  - Requirements also from elsewhere – e.g., marketing
- But not necessarily how to address those requirements
  - Tradeoffs between conflicting goals
  - Gap between Analysis and Design
- Note: design of UI, not design of the software

Design

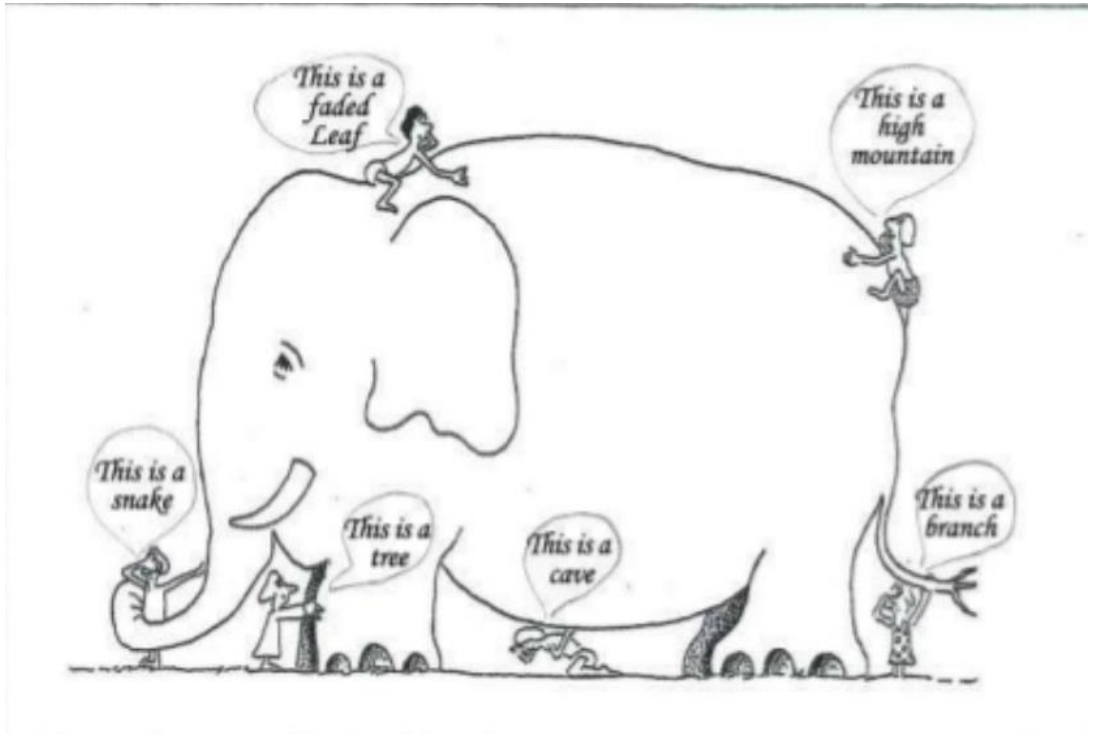
- Design is
  - Creative
  - Informed
  - Respectful
  - Responsible
- Tradeoffs
  - Time-to-market vs. good design
  - Cost
  - “Curse of individuality”
    - Has to be different
  - Legal considerations
    - Amazon – 1-click buy patent
  - When usability is not desired
    - Login
  - Client isn’t the user
  - Market Forces:
    - Creeping Featurism



http://designthinking.ideo.com/?p=49

Mental Models

- Mental models: something the user has (forms)
  - users “see” the system through mental models
  - users rely on mental models during usage
  - mental models can support or impede users’ interaction
- People use their mental models to reason about a system
  - how to interact with it; how it works
  - figuring out what to do when things go wrong
- Mental models are incomplete.
  - not accurate representation (contain errors and uncertainty measures)
  - provide a simple representation of a complex phenomena
  - constantly evolving



Mental Models

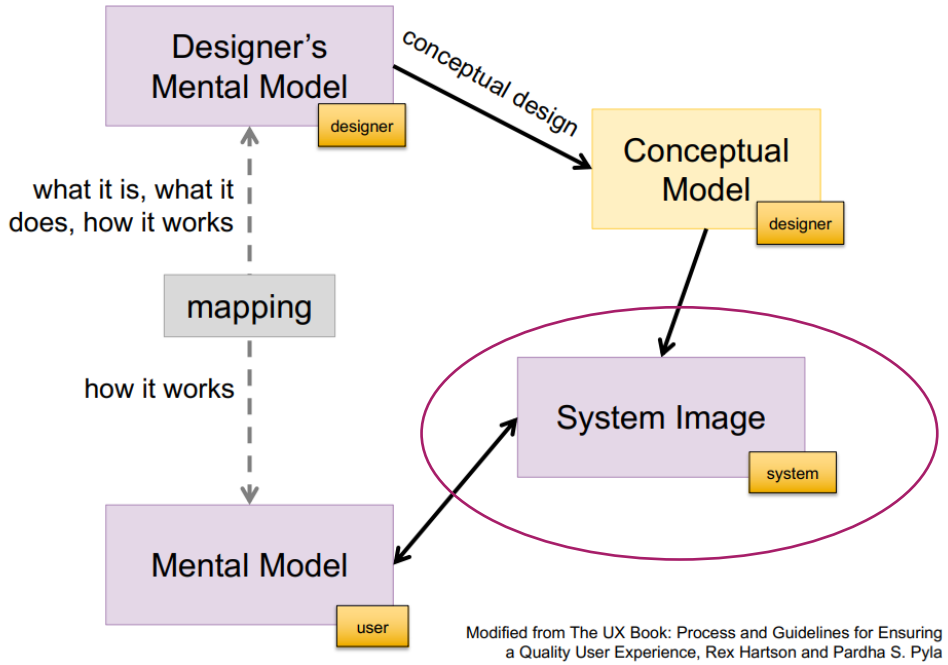
- User interfaces should be based on user mental models rather than implementation models.
- Goal-directed interactions reflect user mental models.

Alan Cooper, *About Face: The Essentials of Interaction Design* 4th Edition

- The interface shows a set of thumbnail images of the photo being edited. A user can tap the thumbnail that best represents the desired setting, which can then be tweaked using the single large slider below the photo.
- The interface follows **mental models of photographers** who are after a particular look, not a set of abstract numeric values.

Conceptual Models vs. Mental Models

- conceptual model a high-level description of how a system works
  - essentially a set of ideas
  - can take many different forms
  - be built through many approaches
  - it's about crossing the gap from requirements to a design solution
    - starts with brainstorming; multiple iterations to narrow down
- conceptual models: something the designer creates to foster good mental model formation by the user
- designer's conceptual model is communicated via system image:
  - interface, appearance, instructions, system behavior
- if system image does not make model clear and consistent:
  - a user's mental model will be inconsistent with conceptual model



https://www.uxpin.com/studio/blog/conceptual-model/

http://cs4760.csl.mtu.edu/2017/lectures/prototypes-and-concept-design/

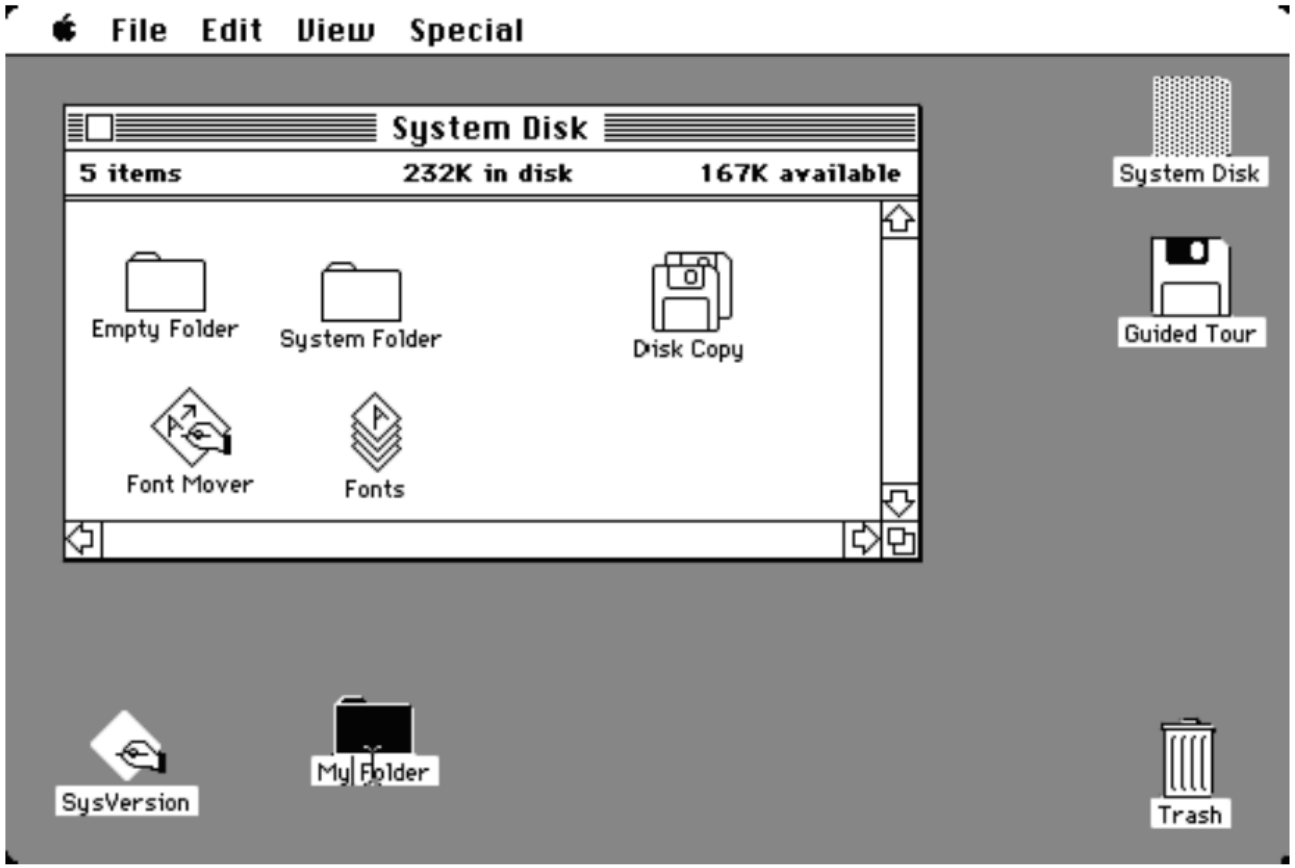
Conceptual model elements

- Interface metaphors
  - some part of an interface to be remind the user of a physical entity (“real-world”) and some of its properties, e.g. desktop metaphor, web portals, GUI button, slider
- Interaction mode
  - Giving instructions - issuing commands using keyboard and function keys and selecting options via menus
  - Conversing - interacting with the system as if having a conversation
  - Manipulating and navigating - acting on objects and interacting with virtual objects
  - Exploring and browsing - finding out and learning things
- Interaction style
  - the kind of interface you implement to support the mode – speech, menu-based, direct manipulation, touch, gesture
- **concepts** – objects, available actions; user roles; attributes of those. e.g., files and folders; both can be opened, have names;
- **relationships among concepts**; e.g., files are contained in folders
- **mappings from concepts** to the user experience envisioned; e.g., the users can browse files, and mark favorites
- **terminology** that will be used (consistently) to tie it all together

Conceptual model example

- Xerox Workstation's Star interface
- Introduced desktop conceptual model for interacting with a computer based system
- Direct manipulation with objects
  - Drag and drop, cut and paste, embed something, start something

1984 - Macintosh



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OS X

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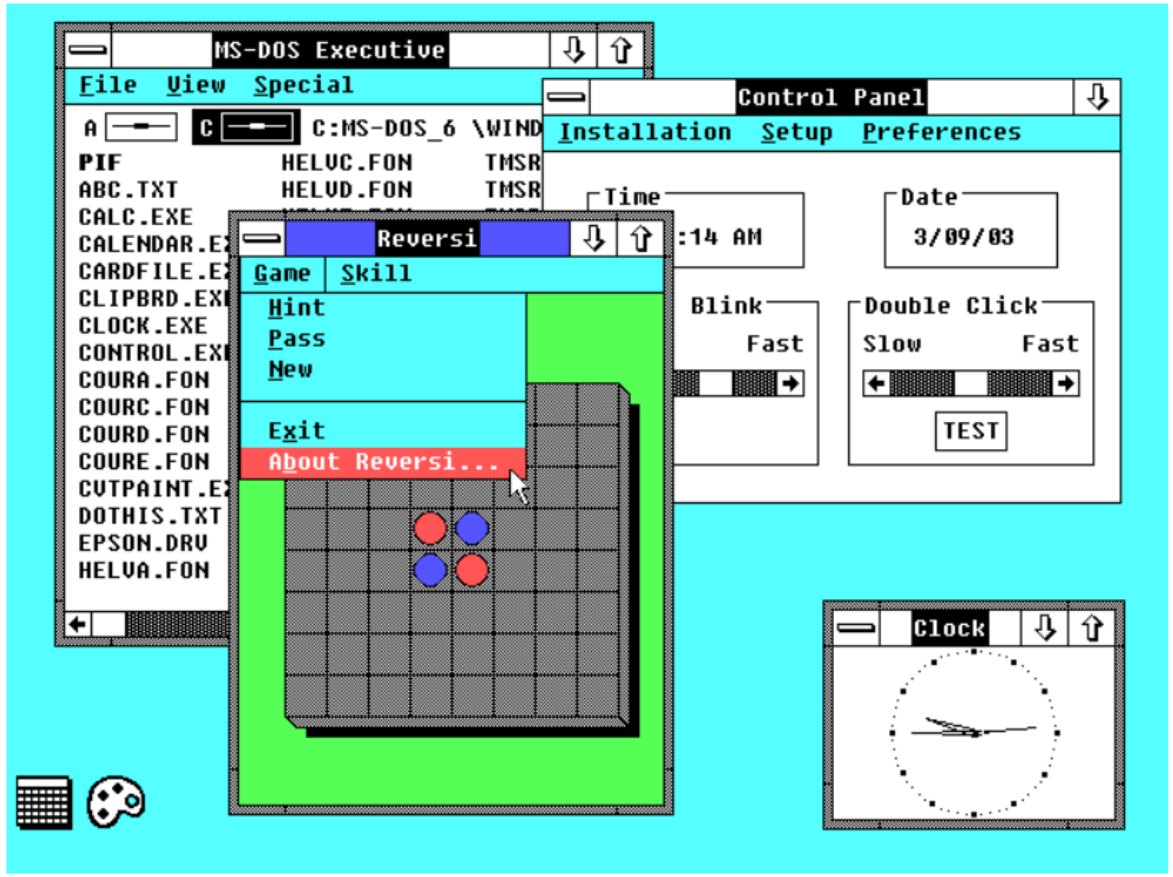
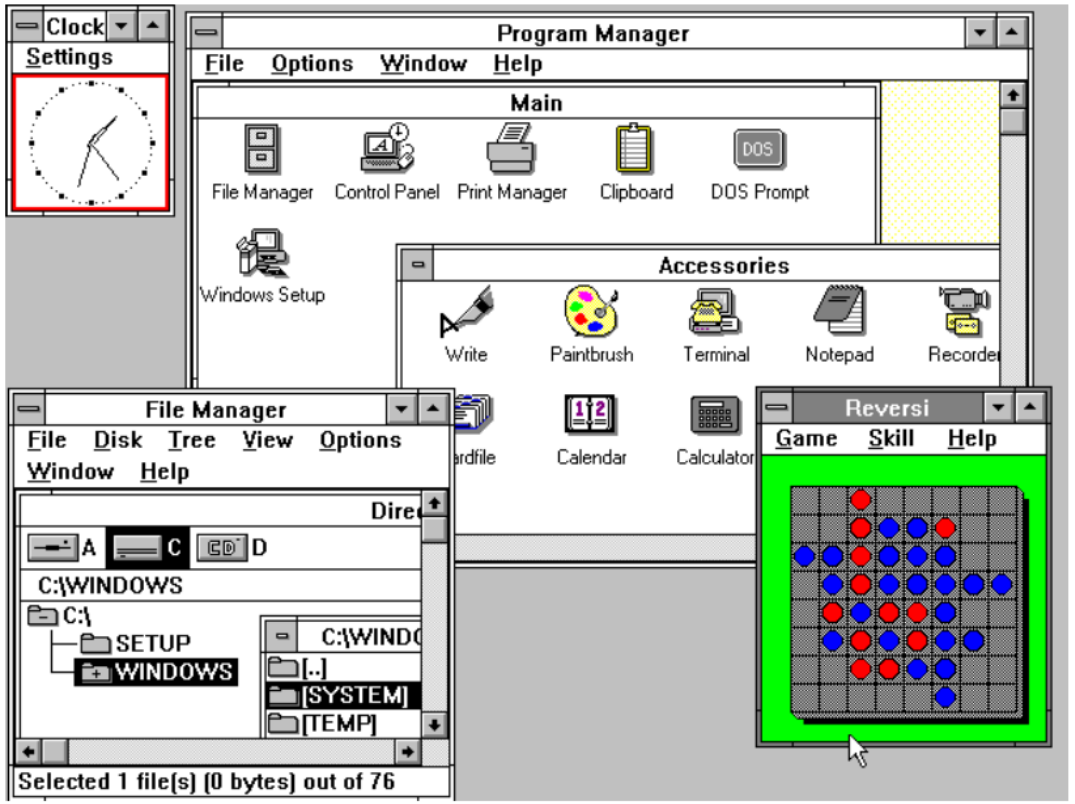
Conceptual model example

Windows 1.0

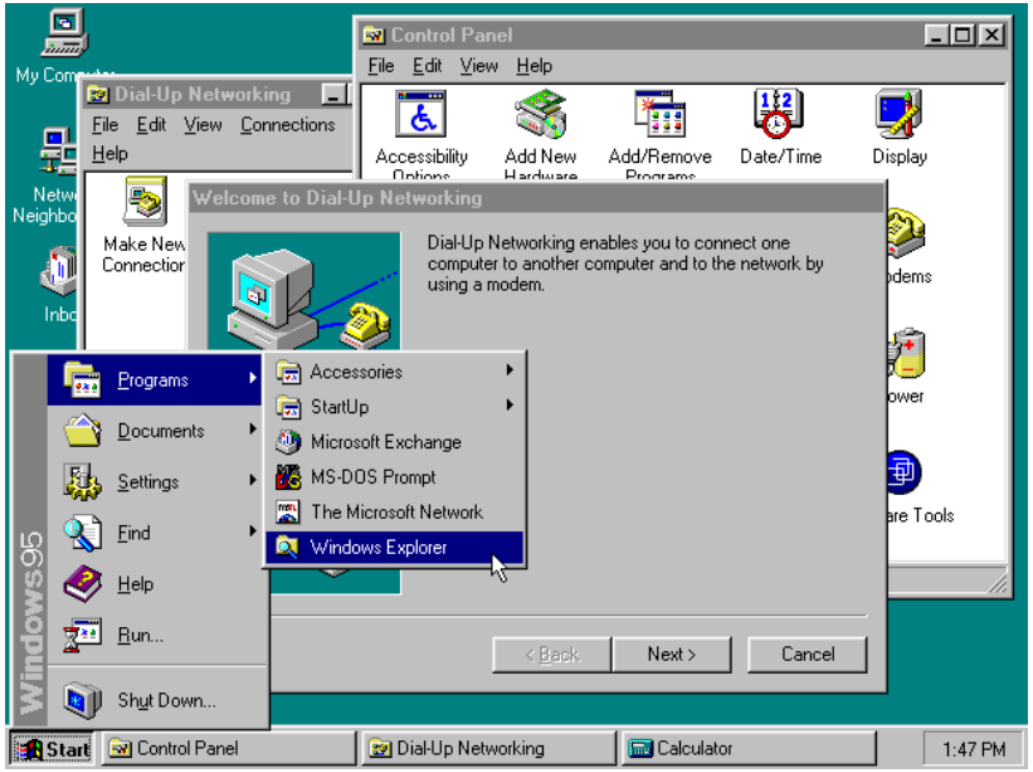


Windows 3.0

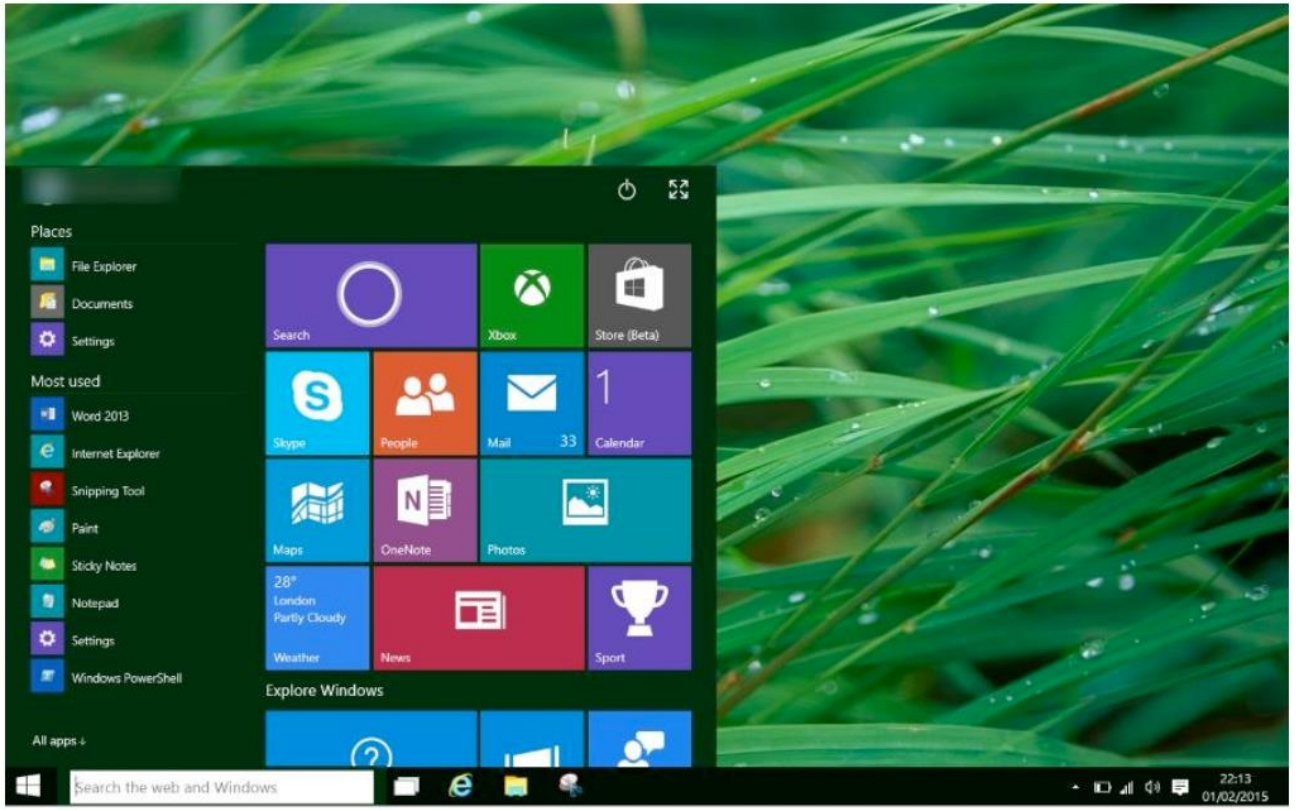


Conceptual model example

Windows 95

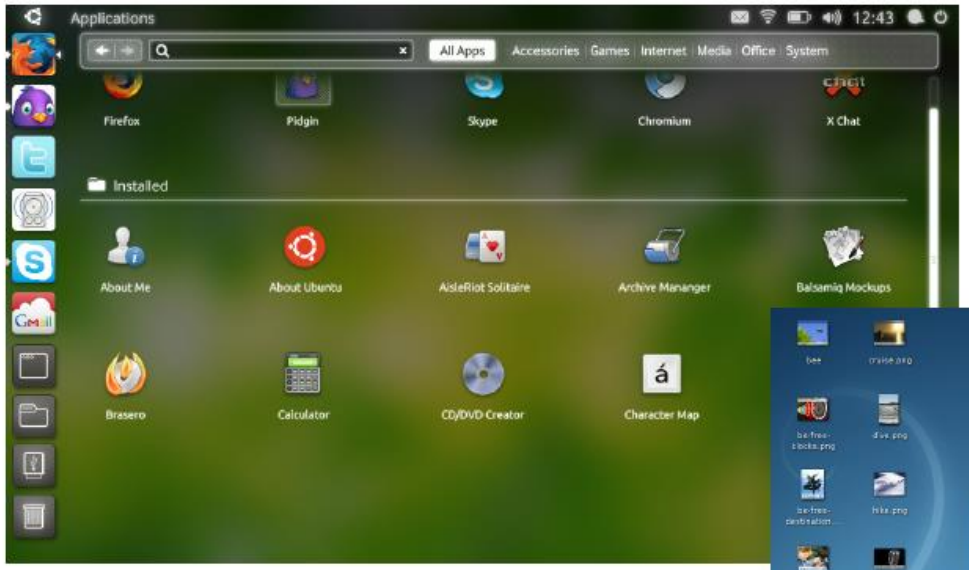


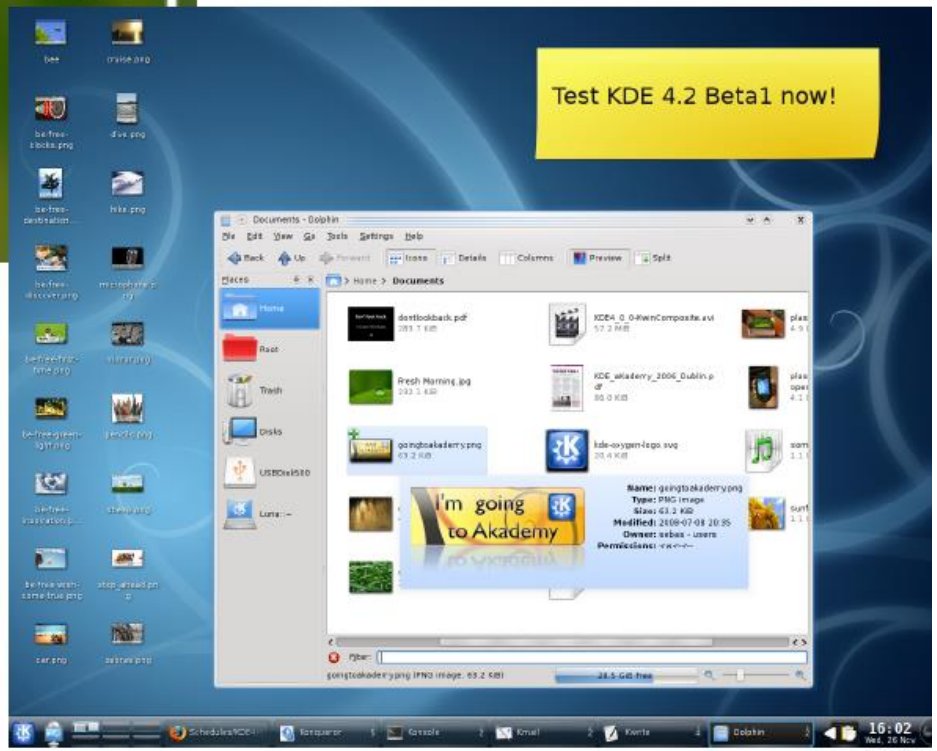
Windows 10



Conceptual model example

On Linux: Gnome & KDE





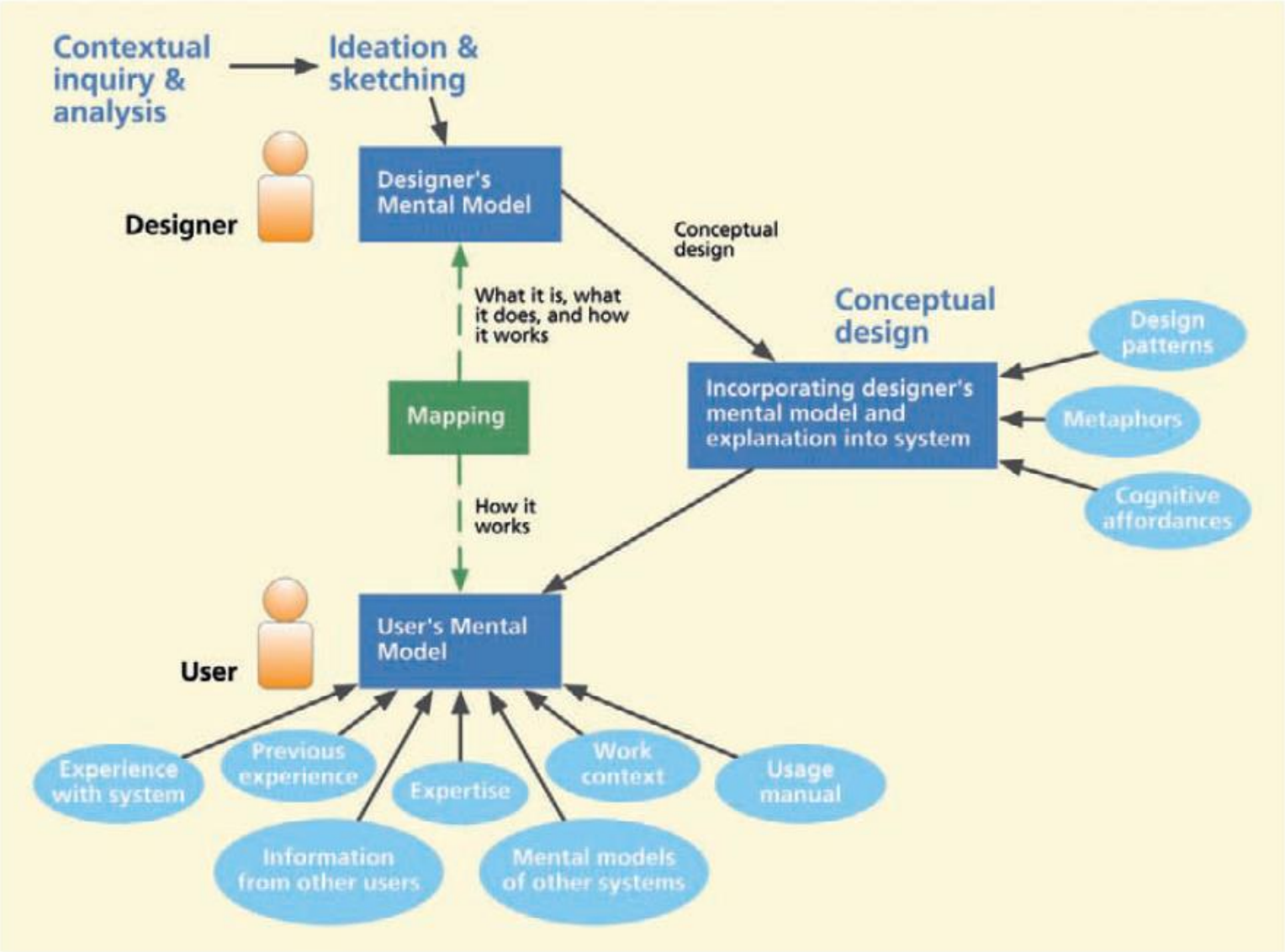
Low Level vs. High Level Design

- Need to design at multiple levels
  - High level: Overall metaphors, styles, approaches
  - Low level: Detailed interactions and content

- High level:
  - Conceptual Models, Mental Models, Mappings
  - Designer's vision of the system
  - Overall metaphors and organization
  - Often inspired by other designs, e.g.
    - "Folders like Outlook" (vs. Gmail's search, later tags)
    - "Scrolling like iPhone"

- Low Level Design:
  - How the specific interactions work
  - Widget Choice
    - E.g., many types of menus
      - Pull-down
      - Cascading
      - Tear off
      - Pop-up menus
      - Context menus
    - Physical buttons

Mapping



The UX book: process and guidelines for ensuring a quality user experience

Design

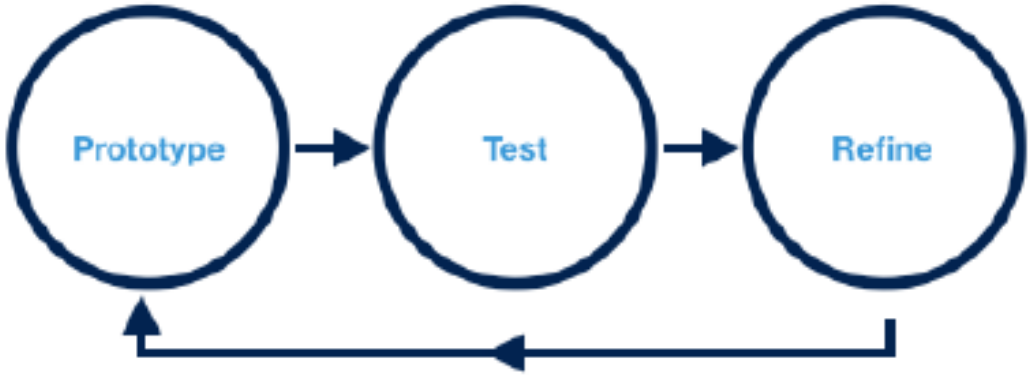


Photo Credit: Marcin Treder, UXPin

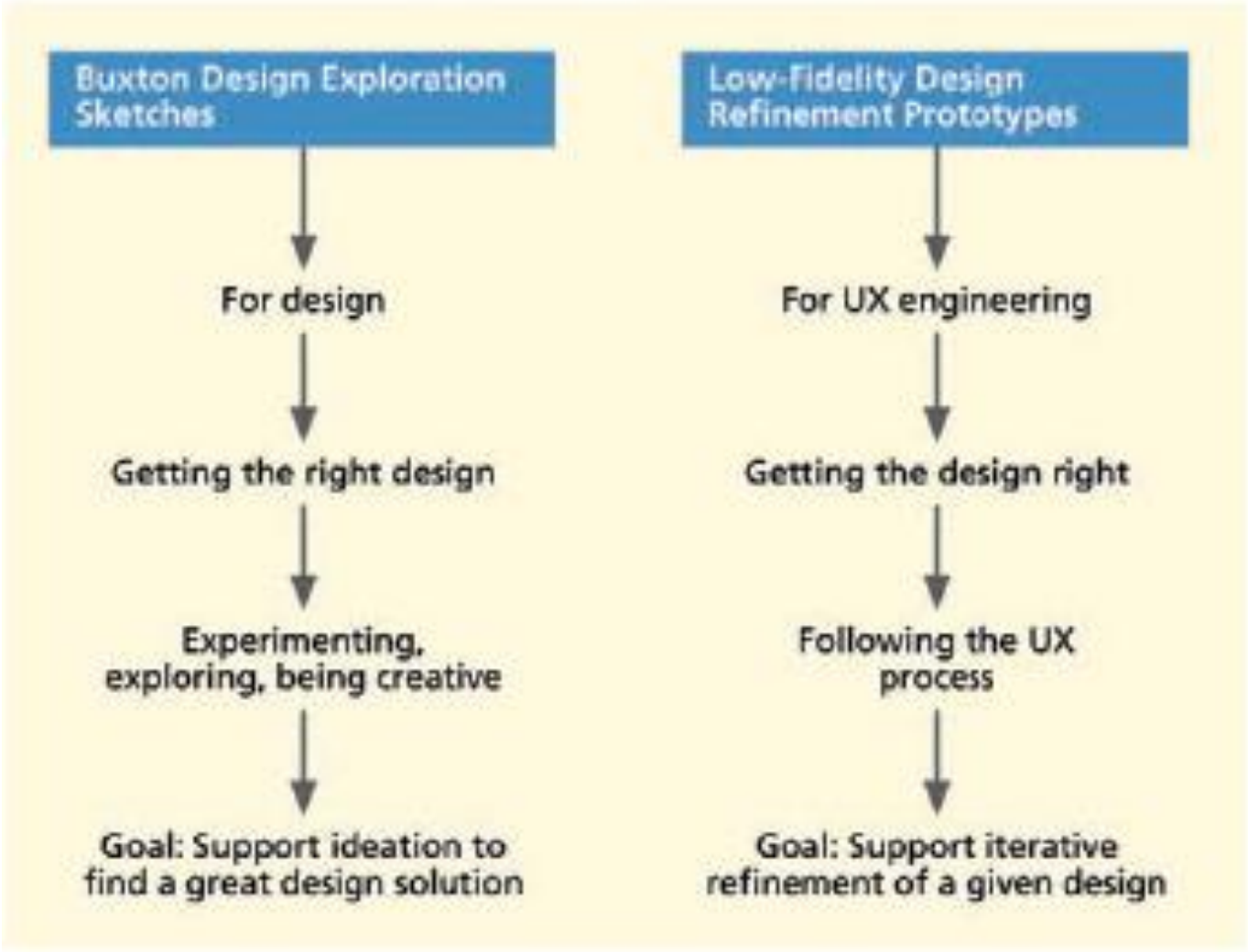
The Ultimate Guide to Prototyping

- Very little of the software is independent of the user interface
  - Database design, data structures, architecture
- But too expensive to build the real system and test it
  - Too hard to redesign
  - Too much is already unchangeable
- So need to build and test = Iterative Design
- Prototype
  - A simulation or sample version of a final product, which is used for testing prior to launch.
  - The goal of a prototype is to test products (and product ideas) before sinking lots of time and money into the final product.
  - "test early and test often."
- How to Prototype: The Rapid Prototyping Process
  - Rapid prototyping is not so much a separate process as it is a filter
  - revising quickly based on feedback and shifting to multiple prototyping approaches based on the requirements
  - A rapid prototype is not designed to evolve into fully functional solutions, but is meant to help the team visualize and craft the UX of the final product.

Sketches

Sketching and Early Prototypes

- Sketch – used to decide what to design
- "Prototype" – Simulation of interface
- Getting the right design, vs. Getting the design right



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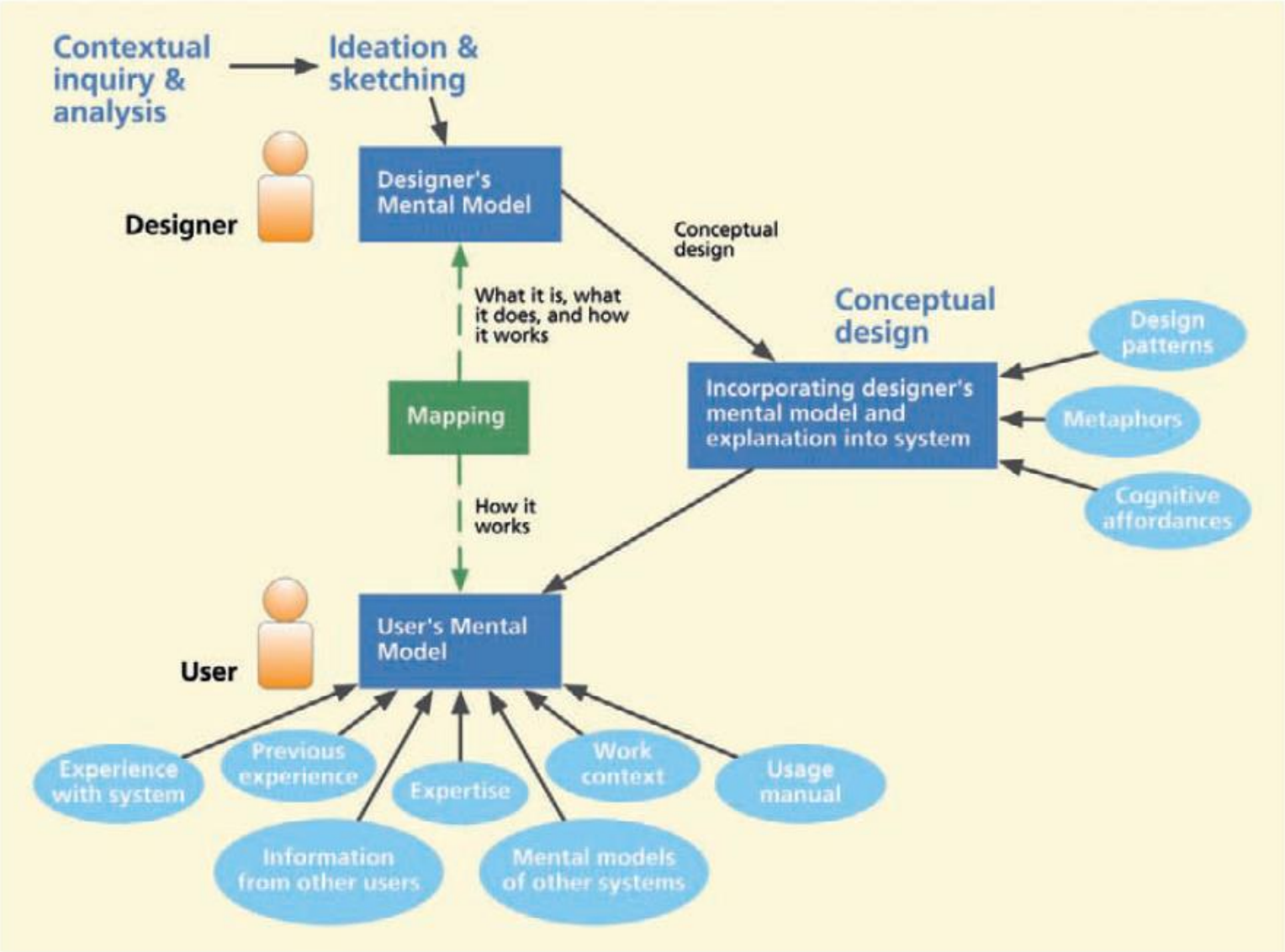

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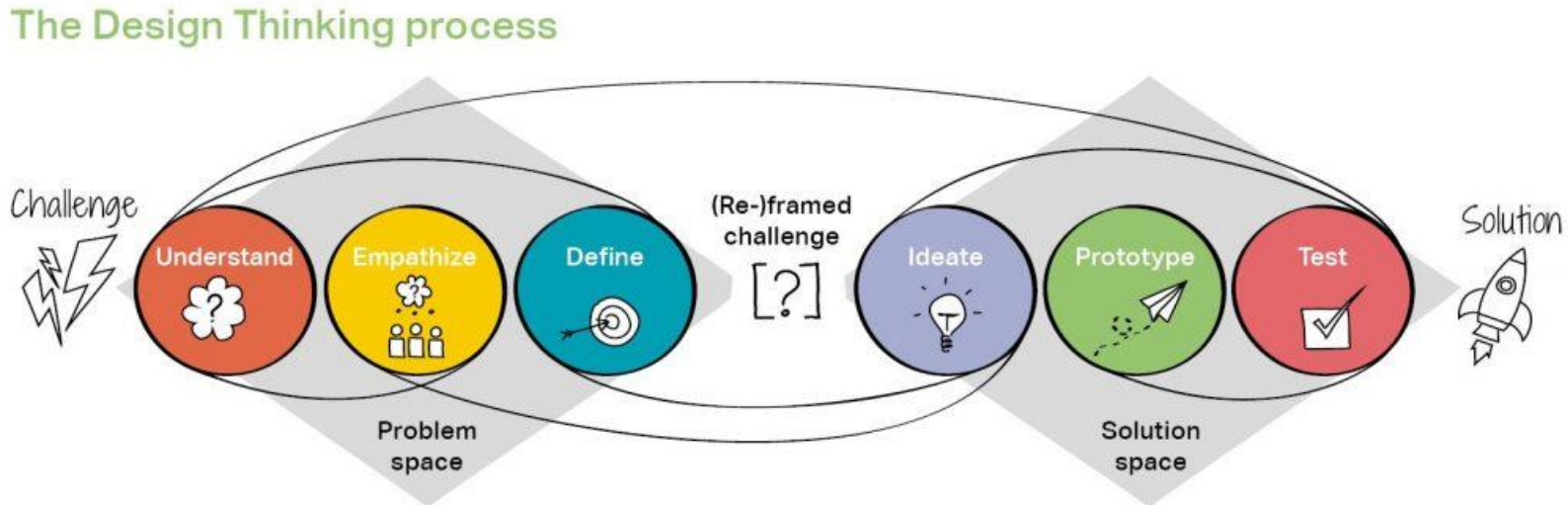
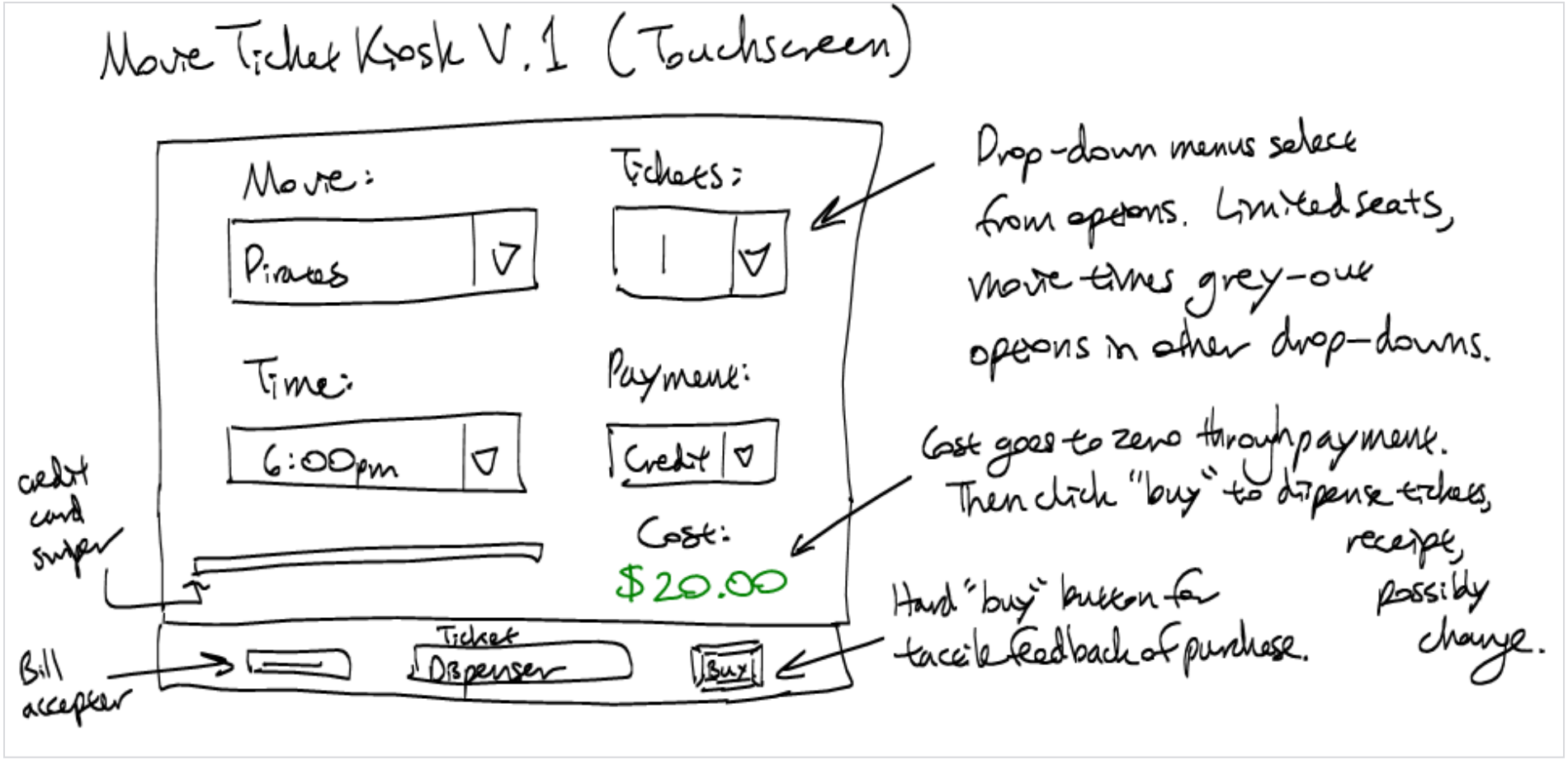
Sketching and Early Prototypes

- Quick and cheap to create
- Designers invent while sketching
  - Don’t have design in their head first and then transfer it to paper
- Sketching aids the process of invention
- Ideation - coming up with ideas to help solve the design problems
- Whiteboards, paper - for collaboration and private investigations
- Multiple Sketches
  - Real design firms – multiple people designing in parallel so multiple ideas
  - Avoid just refining one sub-optimal idea



https://www.integratedconsulting.eu/insights/design-thinking/

Movie Ticket Kiosk



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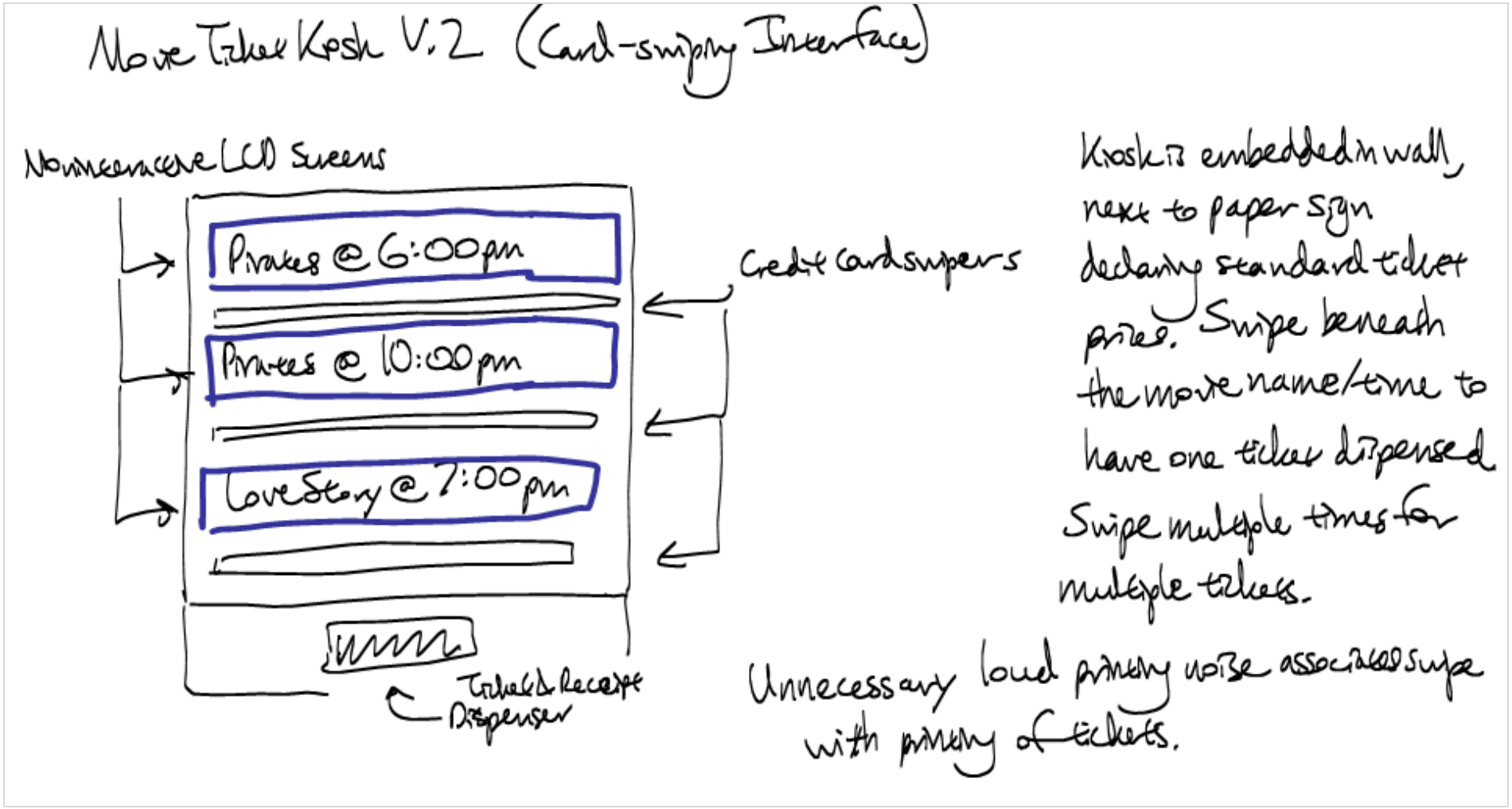

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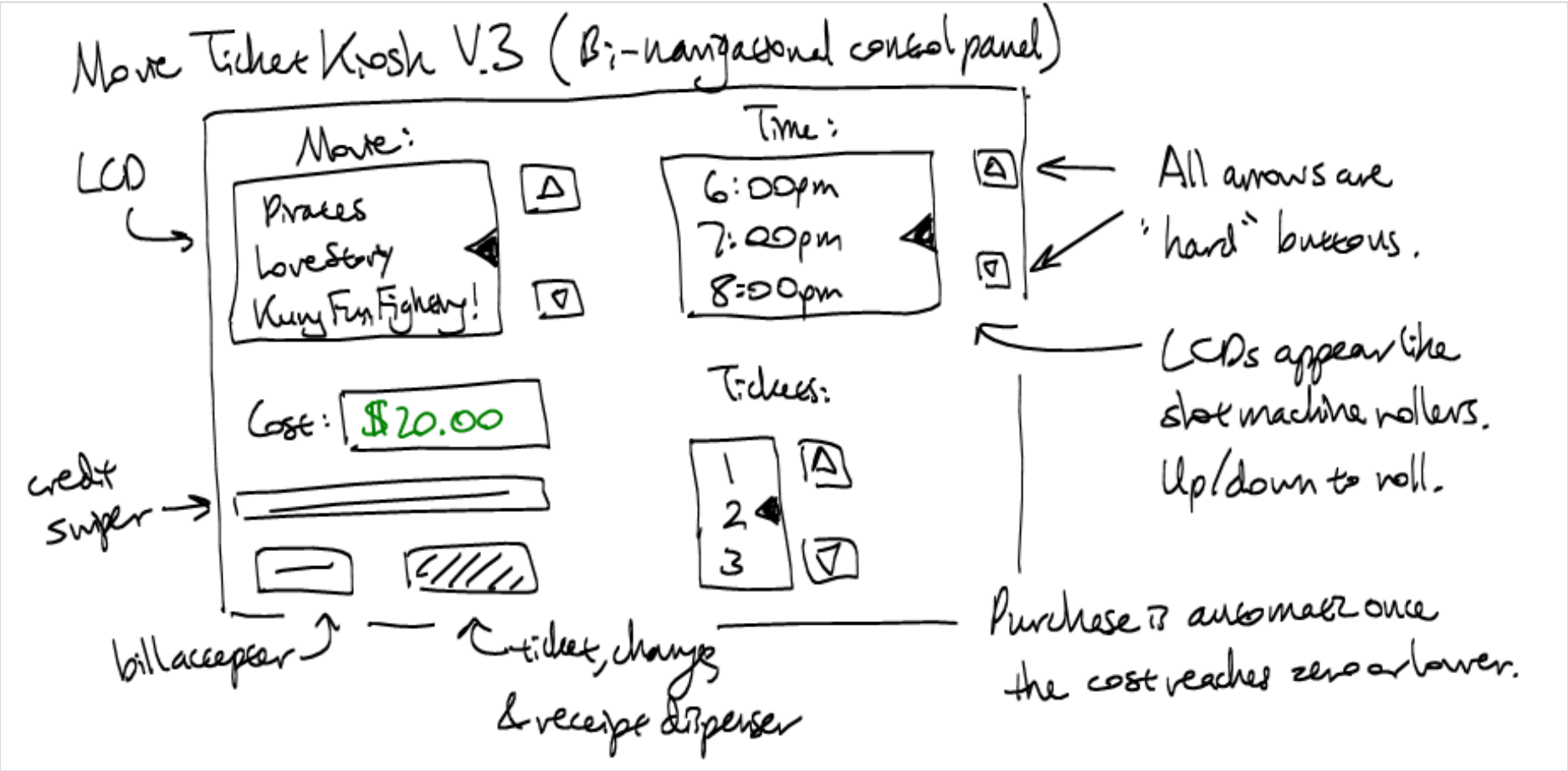
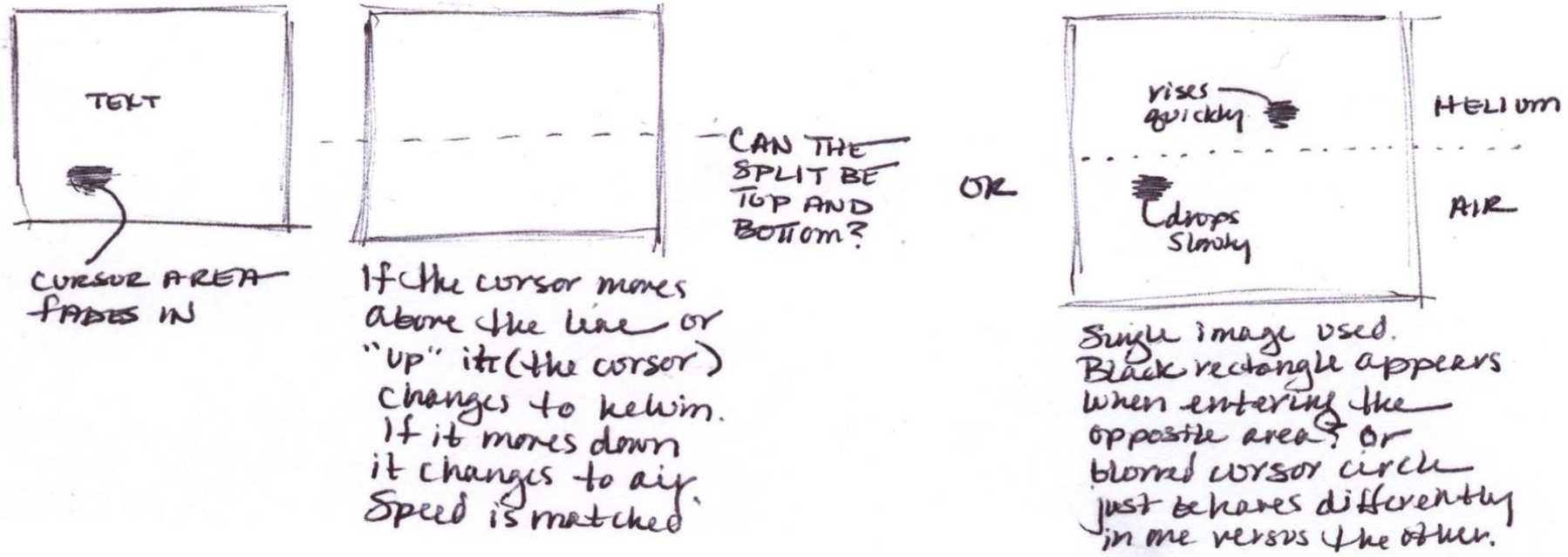


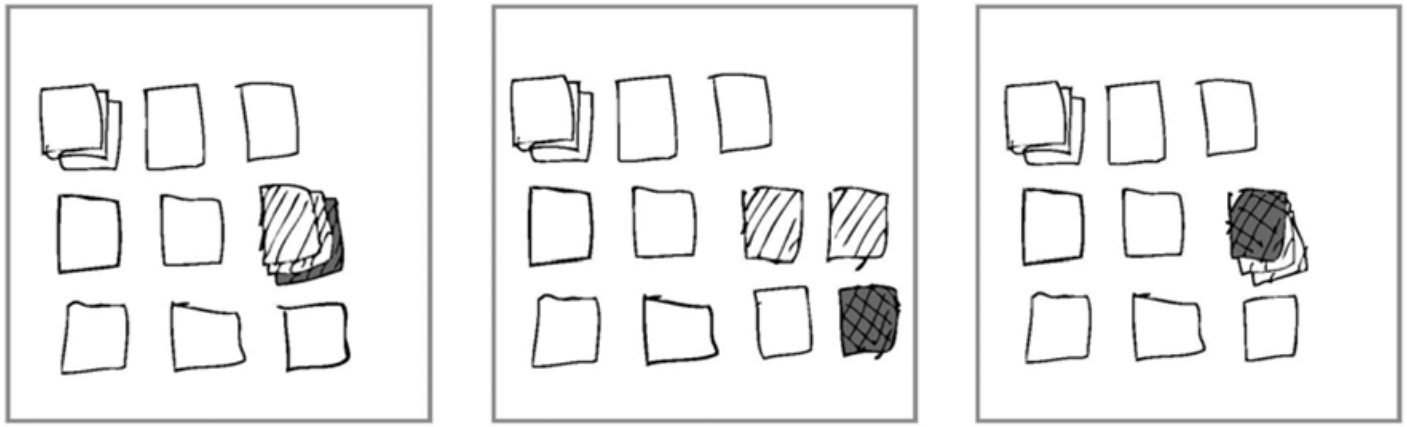
Multiple Ideas; Annotations



Storyboards

- Multiple sketches of a behavior = “storyboards”
- flexible methods to communicate conceptual design in a visual way
- A storyboard is a sequence of visual “frames” illustrating the interplay between a
- user and an envisioned system.
- Storyboards bring the design to life in graphical “clips,” freeze-frame sketches of stories of how people will work with the system.

8. Selecting Photo for Newspaper Article



Tricia needs to select some of her recent photos to add to an article in the college newspaper.

Tricia sees a stack of photos that look like the kind she wants. In order to look at them carefully, she spreads out the photos that were stacked together.

After choosing the photo that she wants to use, she re-stacks the photos with that photo on top.

Start Storyboarding Today!

Prototypes

Sketches vs. Prototypes

- Different purposes:
  - Sketch for ideation
  - Prototypes for evaluation
- Prototypes: more investment, more “weight”
  - More difficult to change, but still much easier than real system

Sketch	Prototype
Evocative	Didactic
Suggest	Describe
Explore	Refine
Question	Answer
Propose	Test
Provoke	Resolve
Tentative	Specific
Noncommittal	Depiction

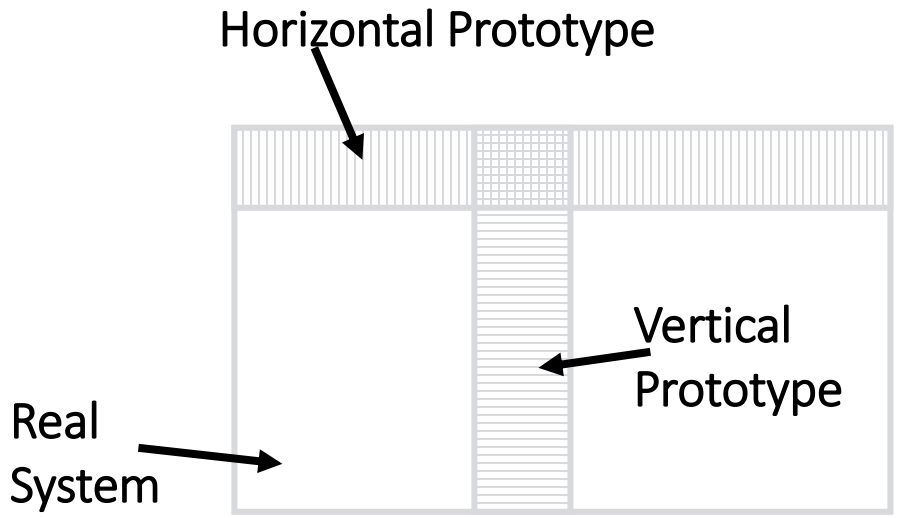
Uses of Prototypes

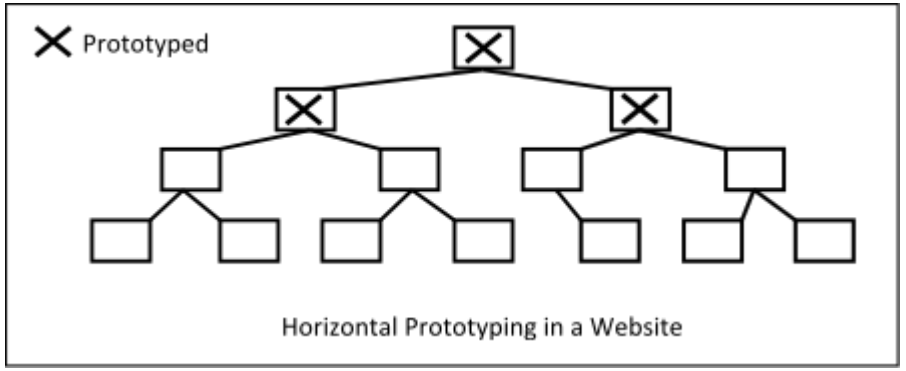
- **What questions will the prototype help you answer?**
- Is this approach a good idea?
  - Usually only need to test a few people for test:
  - Most results with first 3 people
  - Can refine interface after each test
- Look what a cool design we have!
- Transfer design from UI specialists to programmers
  - Often better than written specifications
- Design A versus Design B
  - Rare, except in academic environments
- What are the real requirements and specifications?
- As a basis for “Participatory Design”
  - Involve users in the *design* process, not just the evaluation

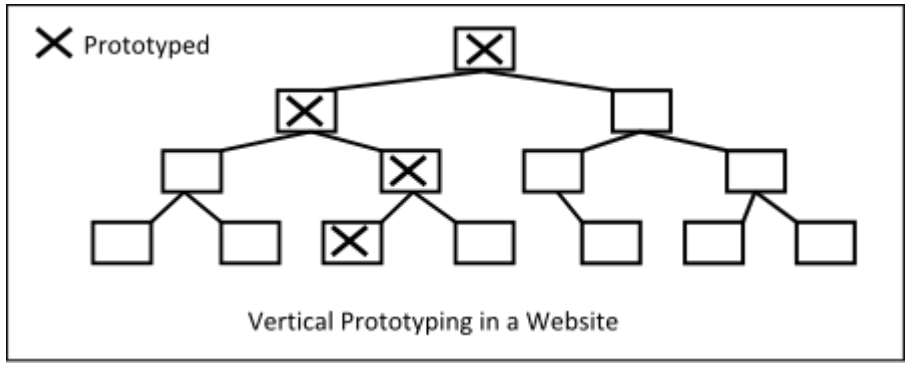
Types of Prototypes

- Fewer features = Vertical
  - Realistic on part
- Less Level of functionality = Horizontal
  - Overview of all

- Paper Prototyping
  Paper Prototype Demonstration - Pinterest Mobile App Redesign - YouTube
- Digital Prototyping







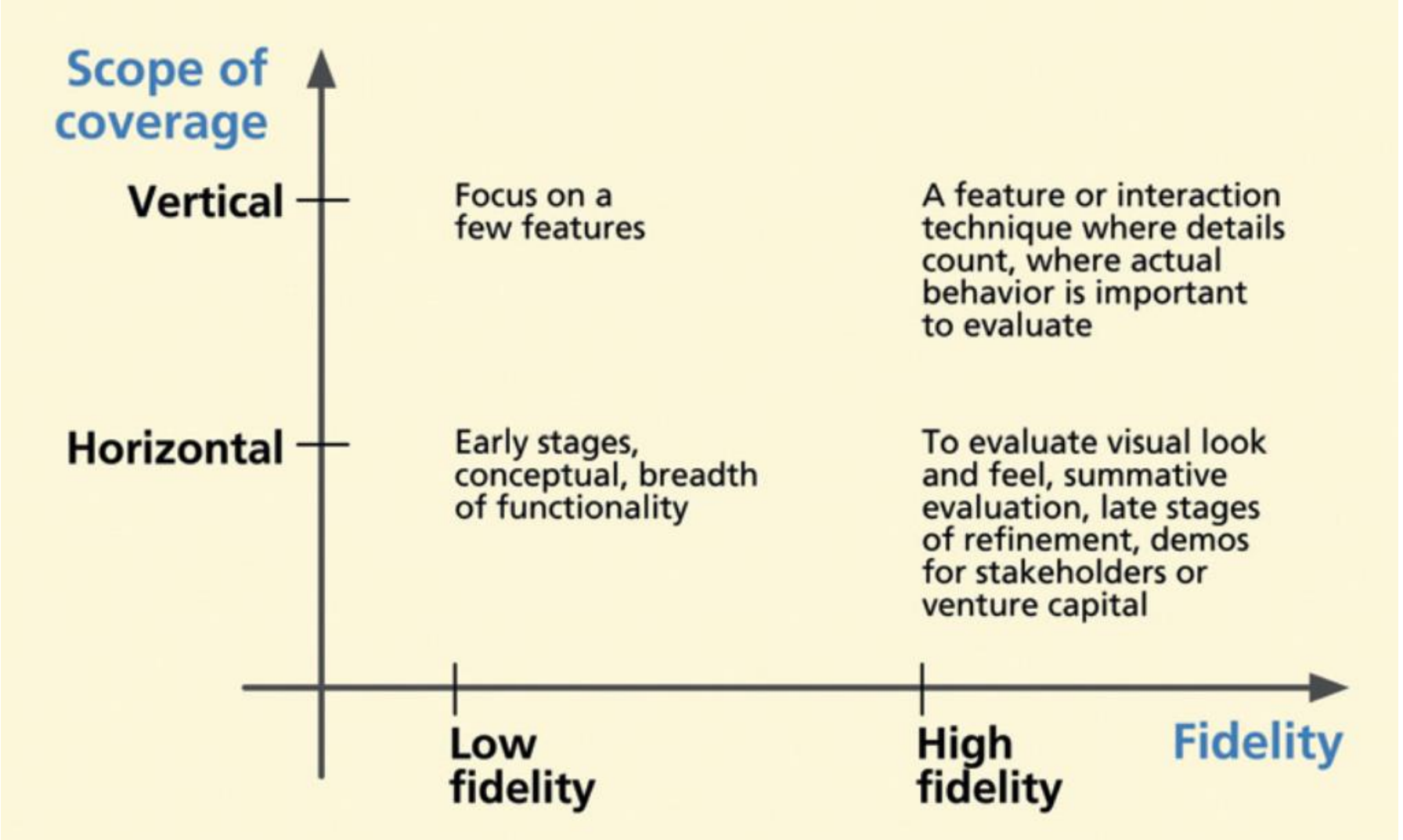
http://cs4760.csl.mtu.edu/2017/lectures/prototypes-and-concept-design/

Prototype fidelity

- A **lo-fi digital prototype** (which could be as simple as an interactive wireframe built in a digital tool) tests crucial elements like navigation and IA early on.
- The **hi-fi digital prototype** provides detailed feedback on something more closely resembling the final product, so that everything's already in place when it's time to code

The Ultimate Guide to Prototyping

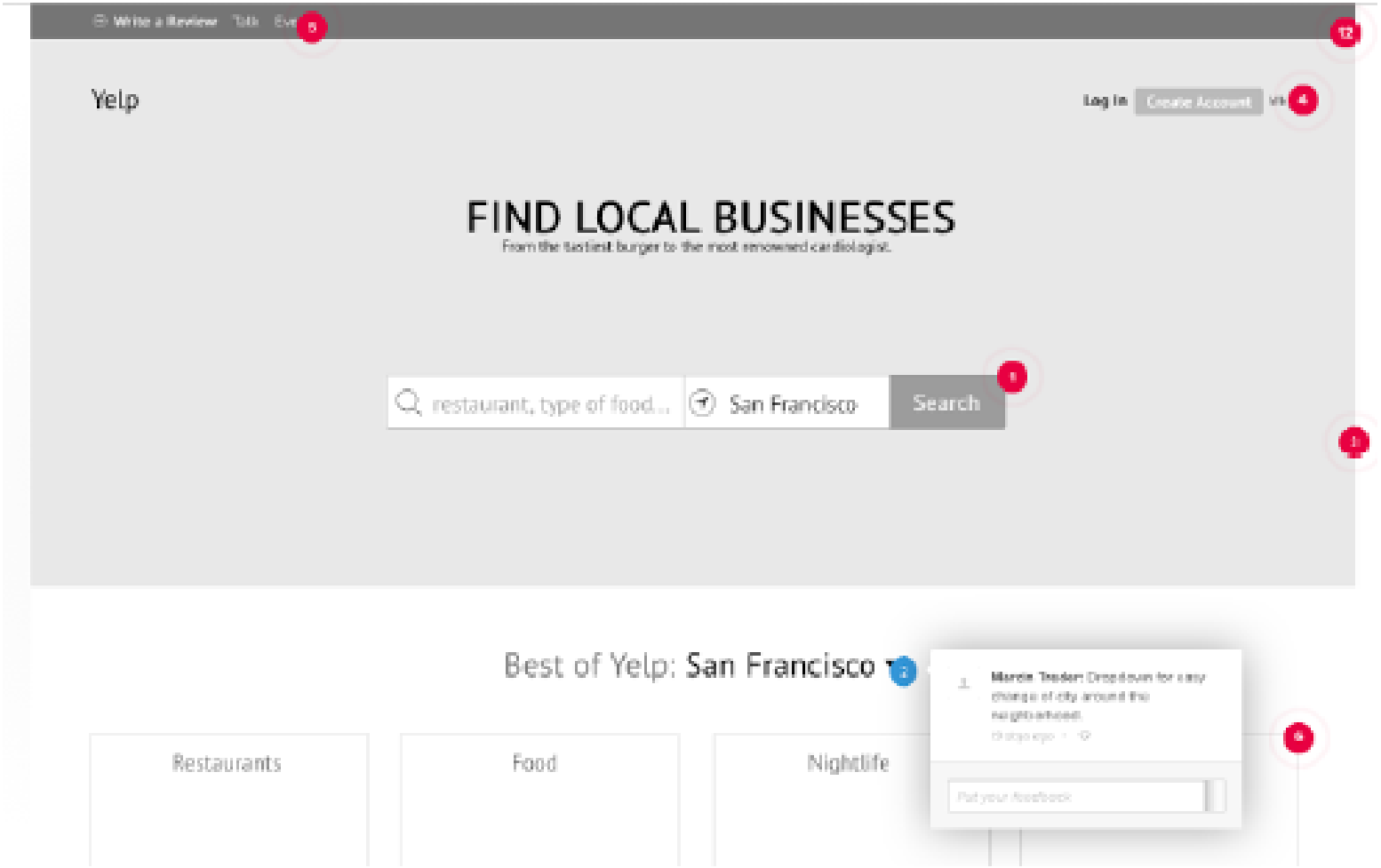
Types of Prototypes



UX design & fidelity of prototypes

- Don't worry about efficiency, robustness
- Fake data
- Might not need to implement anything – fake the system (no “back end”)
- May not use "real" widgets
- Just show what looks like
  - Storyboard of screens
  - Can be “wireframe” prototype
    - Just the outlines of the controls, not the “real look”
- Some support for behavior: typically changing screens
  - Like a movie of the interaction
- Goal: see some of interface very quickly (hours)

Wireframe



Source: UXPin Low-Fidelity Yelp Design

High fidelity prototype

Source: UXPin High-Fidelity Yelp Design

Lifecycle iterations in design