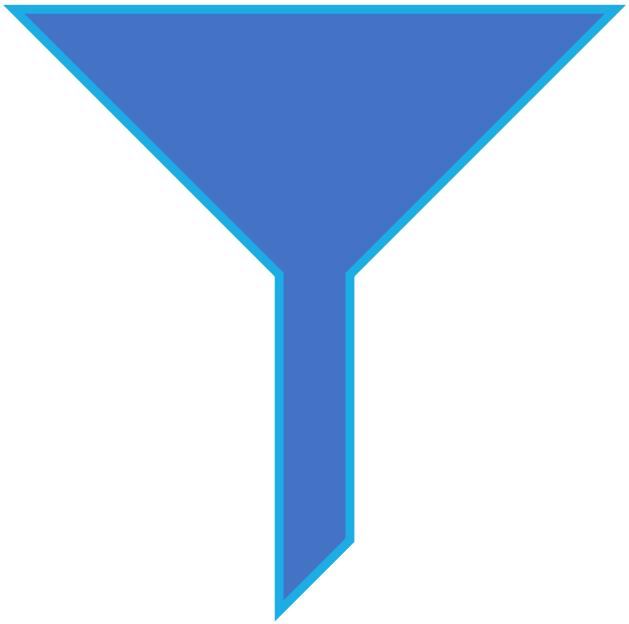
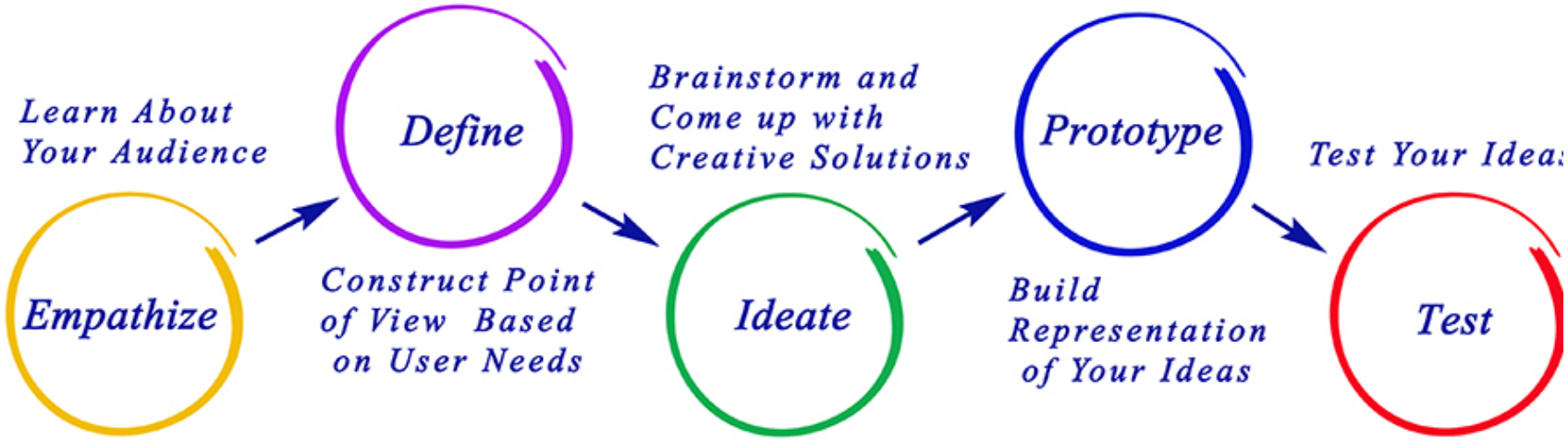
HCI: LECTURE 6 OVERVIEW

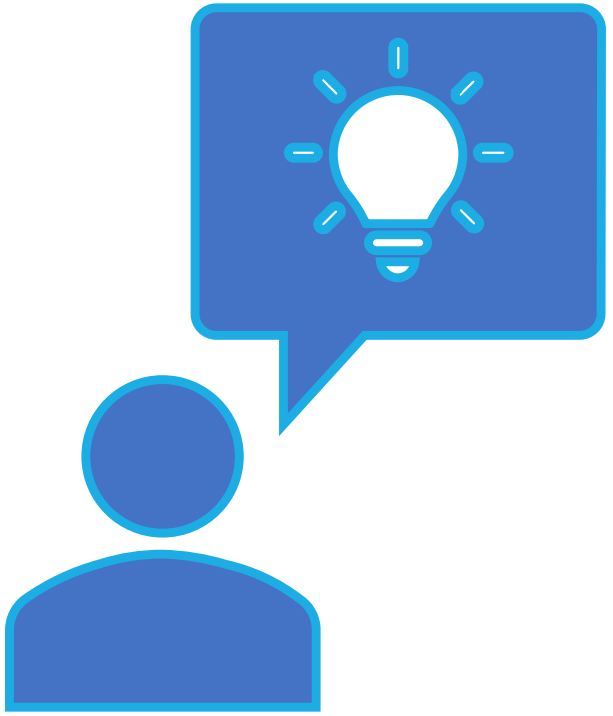
- **Design Thinking 3: Ideation**
  - Ideation
  - Design Funnel (Laseau)
  - Functional Fixedness
  - Conceptual Design



Design Thinking Process



DESIGN THINKING: IDEATION



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IDEATION

- Starting point: understanding users' needs: ground ideas in these needs, not in novel design trends or convenient technical solutions
- The focus of ideation is improving the user experience, without any real-world constraints (e.g. technical feasibility or business viability)
- Open minds to generate innovation & insights
- Generate Alternatives: precedes any design creations
- Parallel design activities: explore more of design space; not satisficing
- No idea is too farfetched: "*much easier to scale back a crazy idea that addresses a true user need, than to try to make a mundane idea desirable.*" (NNG)

IDEATION

- Quantity instead of quality; the more ideas the better:

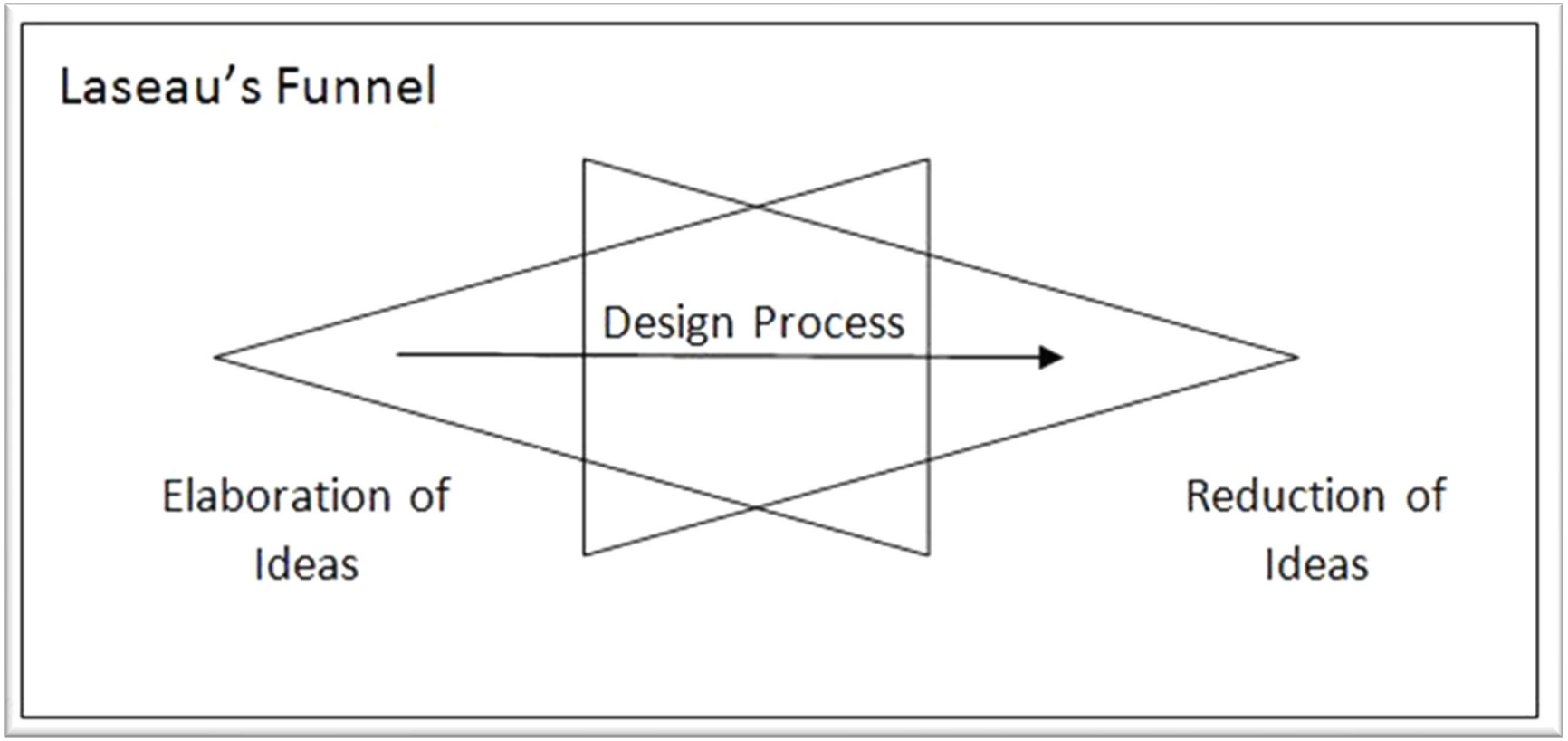
"The best way to have a good idea is to have a lot of ideas. Most of them will be wrong, and what you have to learn is which ones to throw away."

Linus Pauling (1995)

- Three Characteristics:
  - Ideas are not evaluated
  - Ideas are recorded and documented
  - Collaboration spurs diverse ideas: "Yes and…."

IDEATION: HOW?

- Problem abstraction: related sources of inspiration
- Looking at different domains entirely: cross-fertilization of ideas
- Designer flair and creativity: envisionment
- Design Alternatives
- Involving different stakeholders in the design process
- How Might We?
- Sketching

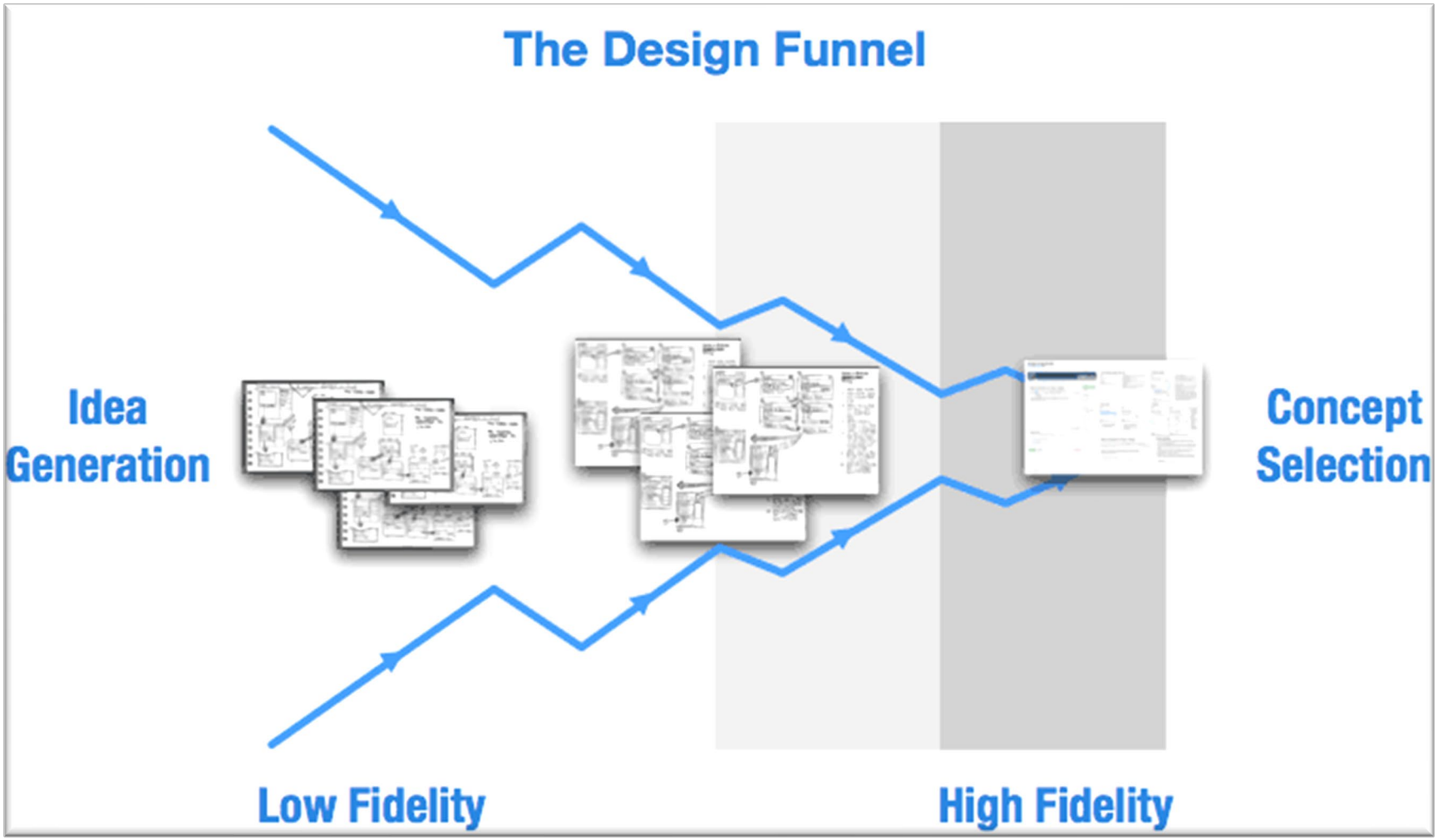


DESIGN FUNNEL

CONVERGENT & DIVERGENT DESIGN

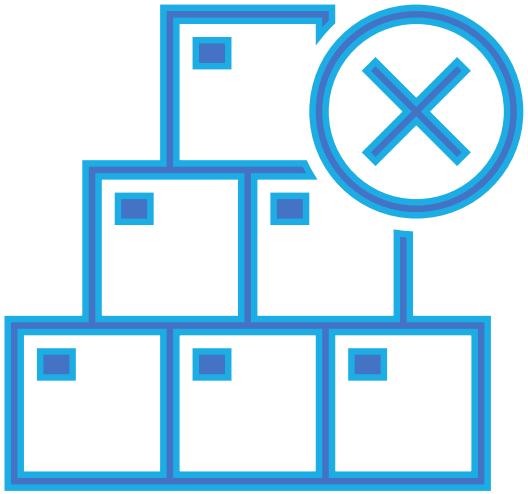
- Convergent Vs. Divergent Design Thinking: Harvard Professional Development https://www.youtube.com/watch?v=xjE2RV6lQzo

- The companies that want to see the most models in the least time are the most design-sensitive (*divergent*); the companies that want that one perfect model are the least design sensitive (*convergent*)


The Design Funnel
Idea Generation
Concept Selection
Low Fidelity
High Fidelity

FUNCTIONAL FIXEDNESS

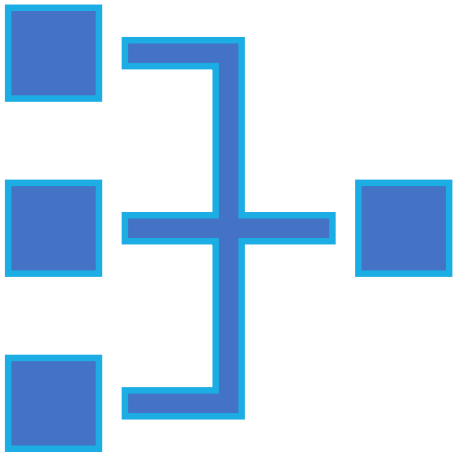
- Functional fixedness is a cognitive bias that drives people to use objects in traditional, standard ways
- "Stuck in a box / rut" thinking: strengthens over time
- Candle, box of tacks, matches
- Overlooking alternate approaches and functions hinders problem-solving
- Different perspectives: group ideating
- Abstract the problem & identify potential sources of inspiration
- How else might this work? How might we?



FUNCTIONAL FIXEDNESS

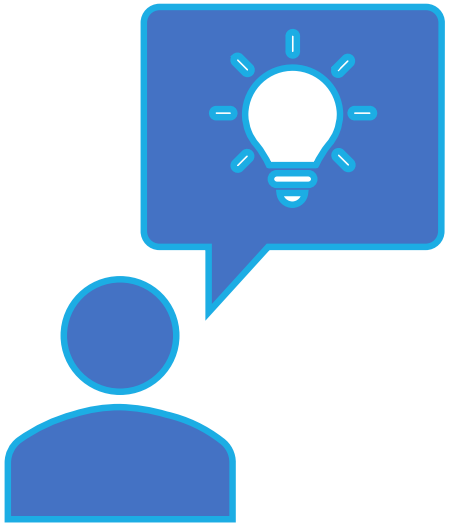
Three steps to avoid functional fixedness:

1. Abstract the problem: distill the problem down to the basics
2. Identify alternative fields of expertise that could help solve the problem
3. Draw inspiration from these distant domains, no concept is too crazy: delay judgment and branch out as far as possible to generate creative potential solutions



IDEATION: ENVISIONMENT

- Envisionment is a visual exploration & presentation of key features of design
- Aids generation, communication and evaluation of ideas for different people at different stages of development
- Allows for feedback from users and clients
- All aspects can & should be envisioned: **concepts, functions, structure, interaction** methods go from sketches ('back of the envelope') to full computer prototypes

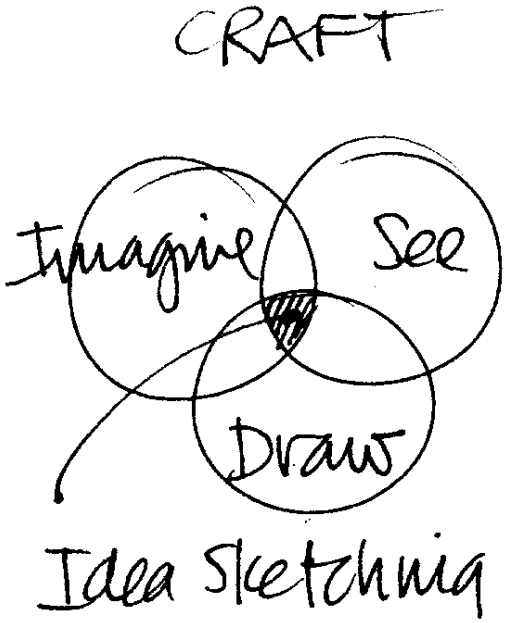


DESIGN: PROTOTYPING & IDEATION

"*Sketches* and *prototypes* are both instantiations of the design concept. However they serve different purposes, and therefore are concentrated at different stages of the design process. Sketches dominate the early ideation stages, whereas prototypes are more concentrated at the later stages where things are converging within the design funnel."
Bill buxton, *sketching user experiences*

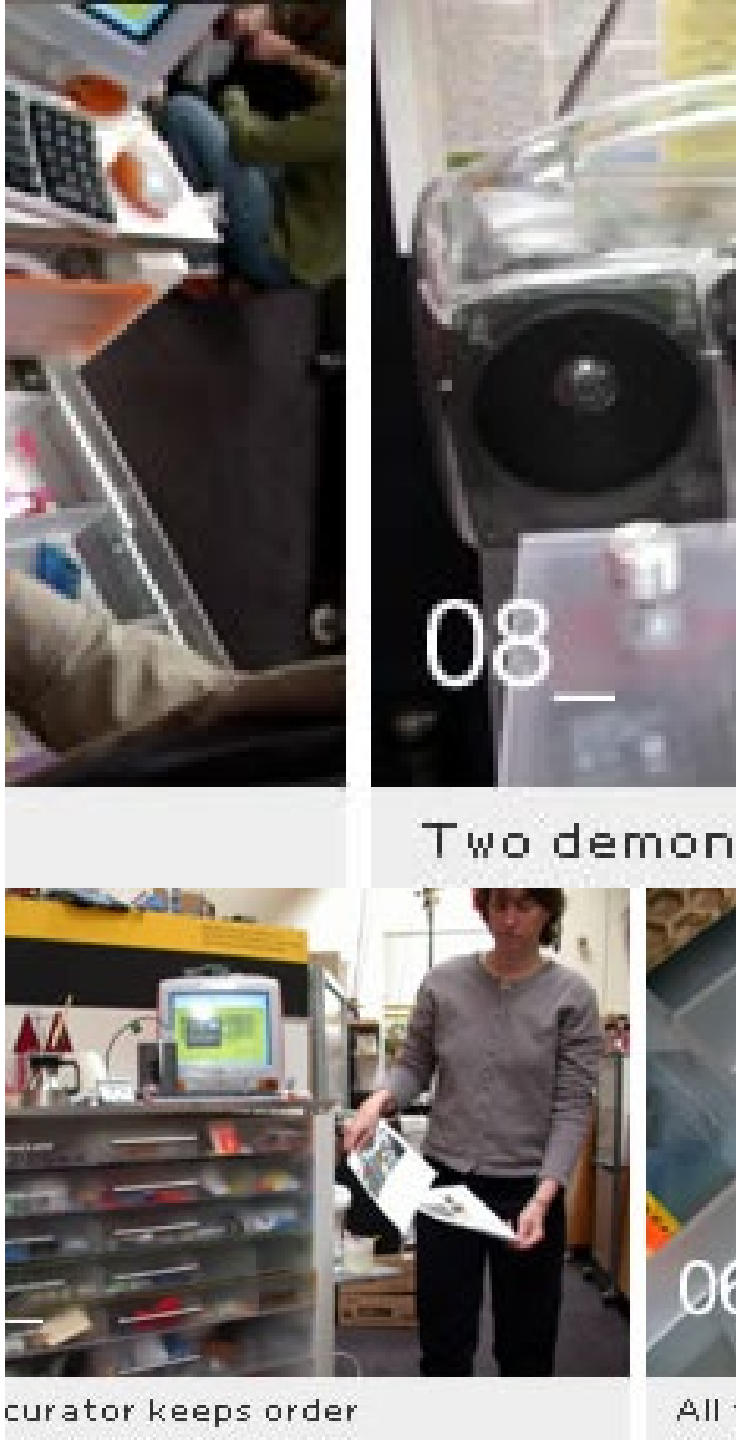
SKETCHING: VISUAL THINKING

- Robert McKim: *Experiences in Visual Thinking*: seeing feeds drawing which improves seeing
- Rapid visualisation (idea sketching) is the craft of imagining, seeing, and drawing at the same time
- Sketches: essential designer's tool for capturing preliminary observations and ideas
- Can be concrete or abstract, representational or Symbolic



DESIGN ALTERNATIVES?

- Humans stick to what they know works
- Considering alternatives is important to 'break out of the box'
- Designers are trained to consider alternatives, software people generally are not
- How do you generate alternatives?
  - 'Flair and creativity': research & synthesis
  - Seek inspiration: look at similar products or look at very different products



HOW MIGHT WE?

- "*A challenge well framed is half solved*" Dam & Siang, IDF
- Meaningful actionable problem statements focus on users' needs for ideation sessions
- Reframe problem statement as a question instead of "we need to design X or Y"
- How Might We (HMW)? Questions are the best way to open up to new ideas & innovations in a collaborative way
- HMW: not prescriptive - don't have answer; all possibilities are valid; collaborative
- *Embrace Warmer* for neonatal hypothermia

HOW MIGHT WE?

Problem: Users aren't aware of full product offerings

- **HMW:** How might we increase awareness of the full product offerings?

Problem: Users often call us because they're unsure about the application process.

- **HMW:** How might we stop users from calling us?
- **HMW:** How might we make users feel confident they have all the information they need?

HOW MIGHT WE?

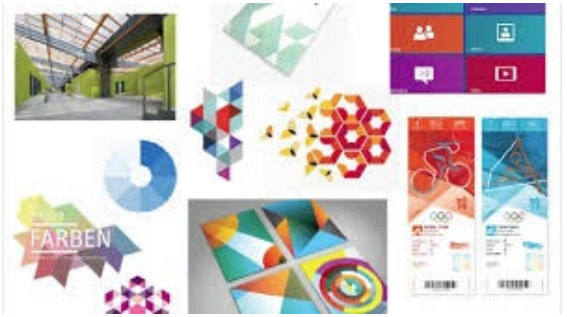
Problem: "Teenagers need… to eat nutritious food… in order to thrive and grow in a healthy way."

- **HMW**: How Might We make healthy eating appealing to young people?
- **HMW**: How Might We inspire teenagers towards healthier eating options?
- **HMW**: How Might We make healthy eating something, which teenagers aspire towards?
- **HMW**: How Might We make nutritious food more affordable?

HOW MIGHT WE?

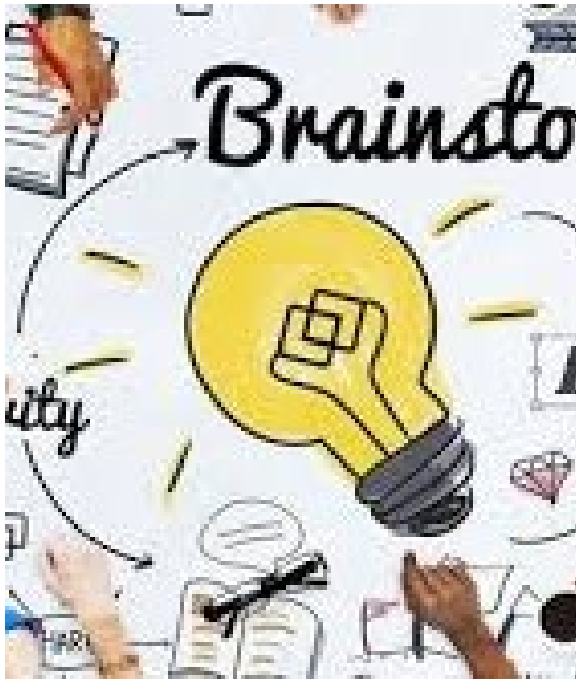
To frame the design challenge on the right design problems:

1. Start with problems / insights
2. Avoid suggesting solutions
3. Keep HMW's as broad as possible
4. Focus on desired outcome: focus on root problem not symptoms
5. Phrase questions positively



MOODBOARDS

REMOTE IDEATION



Multidisciplinary engagement

Synchronous: remote meetings at a shared time

- Suits quick idea generation & complex problems
- Fast exchange of ideas; Focused attention; Teambuilding
- Scheduling difficulties; Tools selection; Awkward

Asynchronous: message thread (slack channel), shared document; physical bulletin board

- Longer timeline, multiple timezones, busy schedules
- Freedom to contribute; Time for ideas to incubate
- Lacks: teambuilding, focus;
- Time to catch up

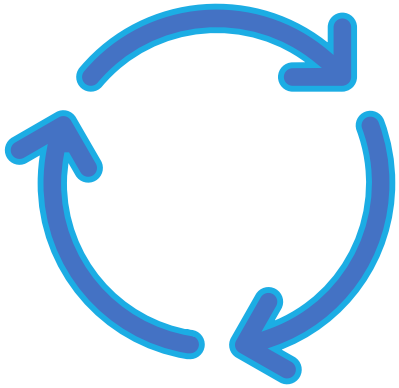
IDEATION: EVALUATING OUTCOMES

- Step away after generating alternatives, take a break
- Break up ideation session and signal move to next phase
- All ideas must be “heard”
- Prioritization of ideas: critique, voting
- Top Three: which concepts resonate with group

IDEATION TO DESIGN?

- After ideation? - Design
- Design activity follows a progression from divergent (conceptual) to convergent (physical) activity:
  - **Conceptual**: what the product will do & how it will behave, how users will ***understand*** it: knowledge about system
  - **Physical**: details such as screen structure, icons, graphics: how users will ***use*** it

CONCEPTUAL DESIGN



- The development of a **conceptual model** precedes all other design space activity
- A conceptual model is:

  "a high-level description of how a system is organized and operates"

  (Johnson and Henderson, 2002, p. 26)

CONCEPTUAL MODEL

"The result of an interaction design is displays and controls and the behaviours that connect them (mappings). In order to create a coherent implementation, there must be both a task analysis of the step-by-step interactions as well as an over-all conceptual model that organizes the behaviour (modes) both for implementers and for users. The invention of an interaction involves not only one compelling scenario and a unifying metaphor but consideration of a variety of scenarios and a wide exploration of alternative and mixed metaphors."

- Bill Verplank

MENTAL MODELS

- Mental model: internal representation of how users understand a system: based on belief rather than facts, what users know or think they know about a system

- Ovens?

MENTAL MODELS

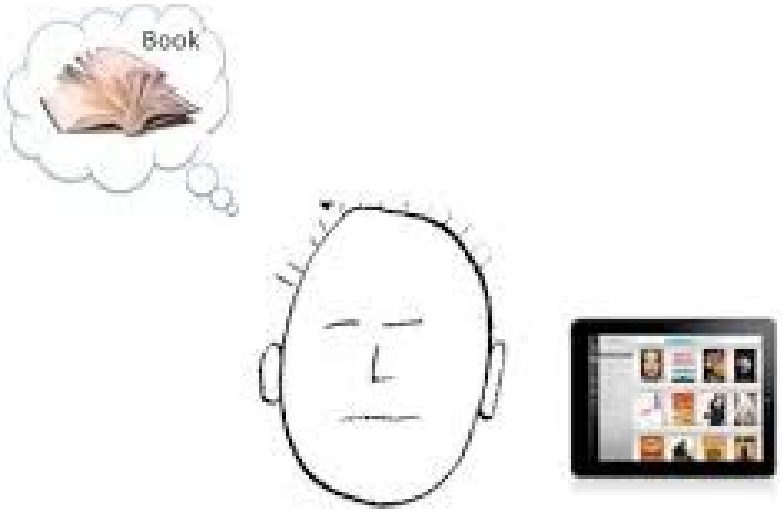
"A mental model represents a person's thought process for how something works (i.e., a person's understanding of the surrounding world). Mental models are based on incomplete facts, past experiences, and even intuitive perceptions. They help shape actions and behavior, influence what people pay attention to in complicated situations, and define how people approach and solve problems."

Susan Carey (1986): *Cognitive Science and Science Education*

MENTAL & CONCEPTUAL MODELS

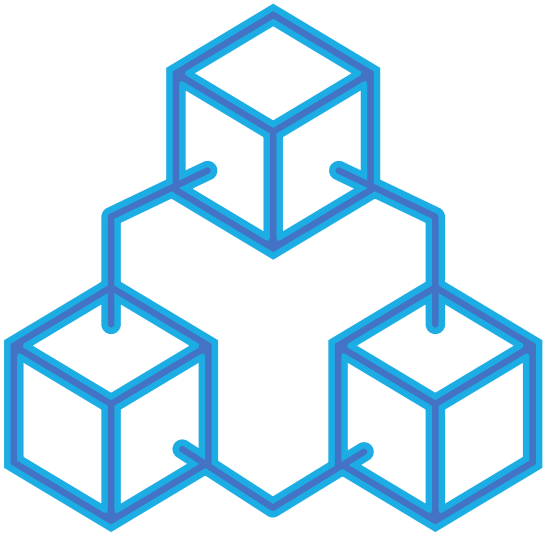
"Everything we do in the field of user experience is, ultimately, about the match, or mismatch, between the users' mental models and the product's conceptual model."

(Susan Weinschenk)



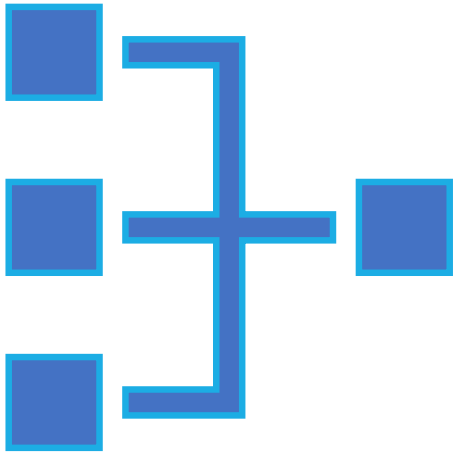
MENTAL MODELS

"*Design is a quest to find the best possible match between the user's **mental** model that they have in their mind, and the **conceptual** model that you're presenting to them with your product.*
These two models run through all resolutions of design — everything from developing a product system to crafting a single button. Understanding how they work together will help you design products that users can easily understand."
Brajdic, 2019 (UX Collective)



MENTAL MODELS

- Software development incorporates three different models:
  - *Implementation* (or System) Model
  - User's *Mental* Model
  - *Represented* (or Designer's) Model
- Close alignment between the *Represented* and *Mental* models leads to more usable systems
- Close alignment between *Represented* and *Implementation* models reduces usability of system: leads to errors



MENTAL MODELS

- Main advantage of computers: putting a simple face on complex processes and situations
- EG: Adobe photoshop *Variations* feature
- Much easier to design software that reflects its implementation model: ***component home theatre system***
- EG: Windows UI *Move* and *Copy*

Cognitive Dissonance: inconsistency of computer response to two similar user actions

MENTAL MODELS: COGNITIVE DISSONANCE

"*Inconsistency of computer response to two seemingly similar user actions has the potential to create* ***cognitive dissonance*** *(confusion resulting from two contradictory images of reality), for users, making even a simple interaction difficult to learn. If you drag a file between dirs on the same hard drive, the programme interprets this as a MOVE (moving the file from old dir and adding it to the new dir – following the mental model. However, if you drag a file from hard drive C to hard drive D, the action is interpreted as a COPY. This behaviour is rooted in the implementation model: the way the file system actually works: when the OS moves a file on the same drive, it merely relocates the file's entry in the disk's toc. It never erases and rewrites the file. But when moving it to another physical drive, it physically copies the data onto the new drive. To match the user's MM, it should then erase the original (thus "moving" the file, even though this contradicts the implementation model).*"
(About Face 3: Cooper at al, 2012)

MENTAL MODELS

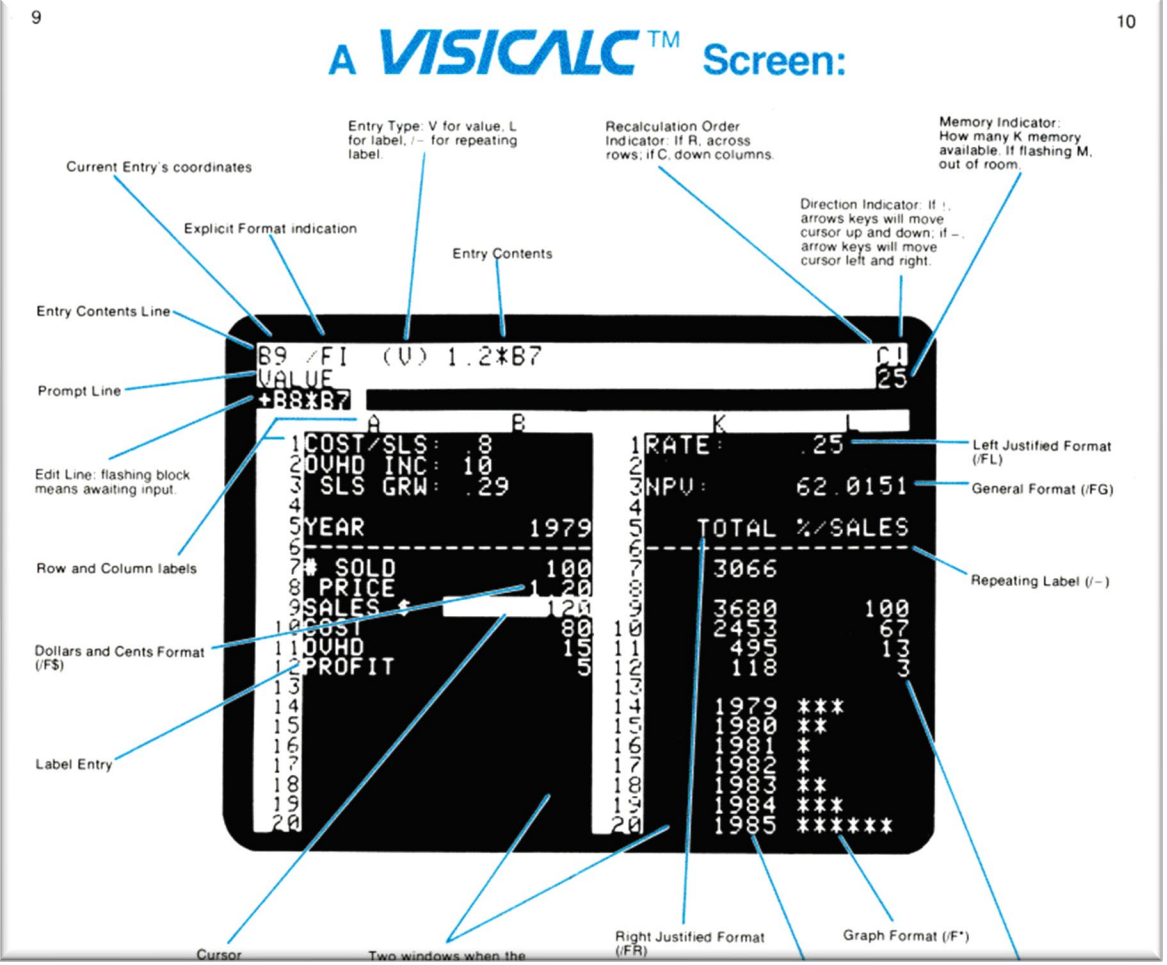
- Mental Models in Design: create a beacon
- Users transfer knowledge of world around them to their use of computers
- Successful system: enables users to readily learn and use it effectively
- How to find MM: task analysis, observation, user feedback, usability testing

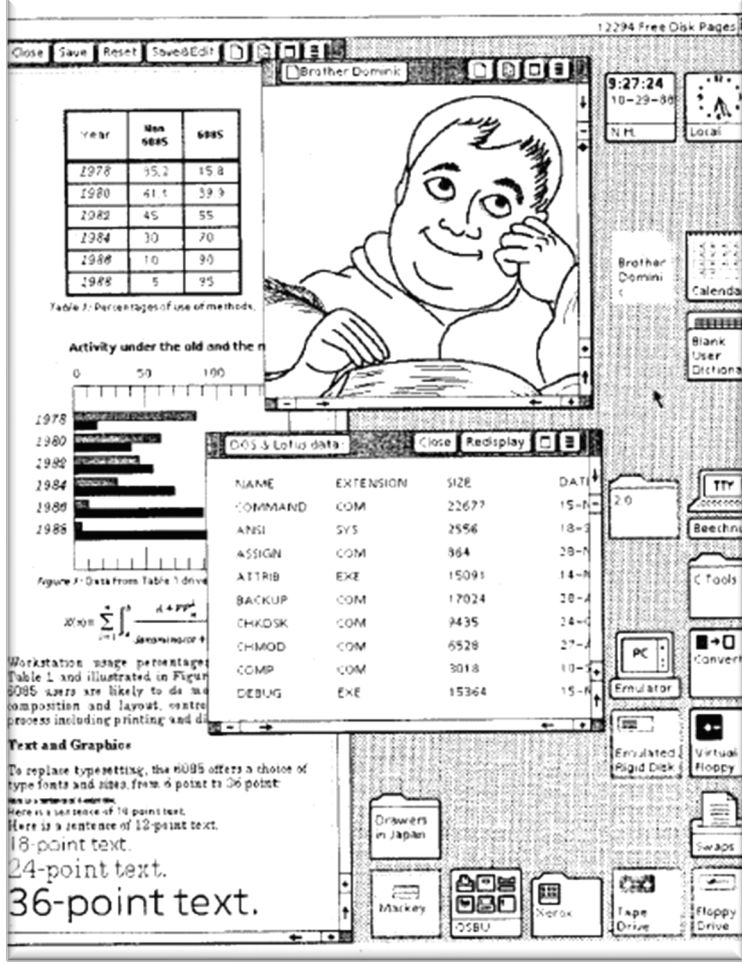
CONCEPTUAL MODEL

- Software products are based on conceptual models, often ones that are well-established (e.g., shopping websites)
- Abstraction outlining what people can do with a product and what concepts are needed to interact with it
- Core components:
  - *Metaphors and analogies to illustrate what a product is used for and how it is used (e.g., browsing, bookmarking)*
  - *Concepts people are exposed to through use, including domain objects, attributes and operations (e.g., saving, organizing)*
  - *Relationships between concepts*
  - *Mappings between concepts and intended user experience*

INTERACTION DESIGN FRAMEWORK

Do	Feel	Know
How do you do? What sort of ways do you affect the world: poke it, manipulate it, sit on it? (Buttons – discrete, automatic vs Handles – continuous)	How do you feel? What do you sense of the world and what are the sensory qualities that shape media? (Print - exact vs Cartoon - fuzzy, more participation)	How do you know? What are the ways that you learn and plan (or perhaps, how we want you to think)? (Paths vs Maps)





CLASSIC CONCEPTUAL MODELS

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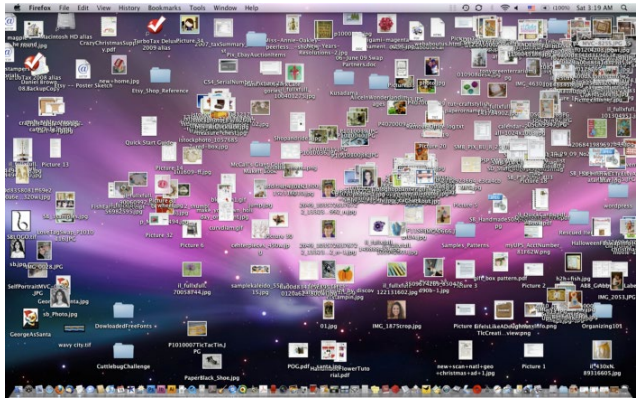
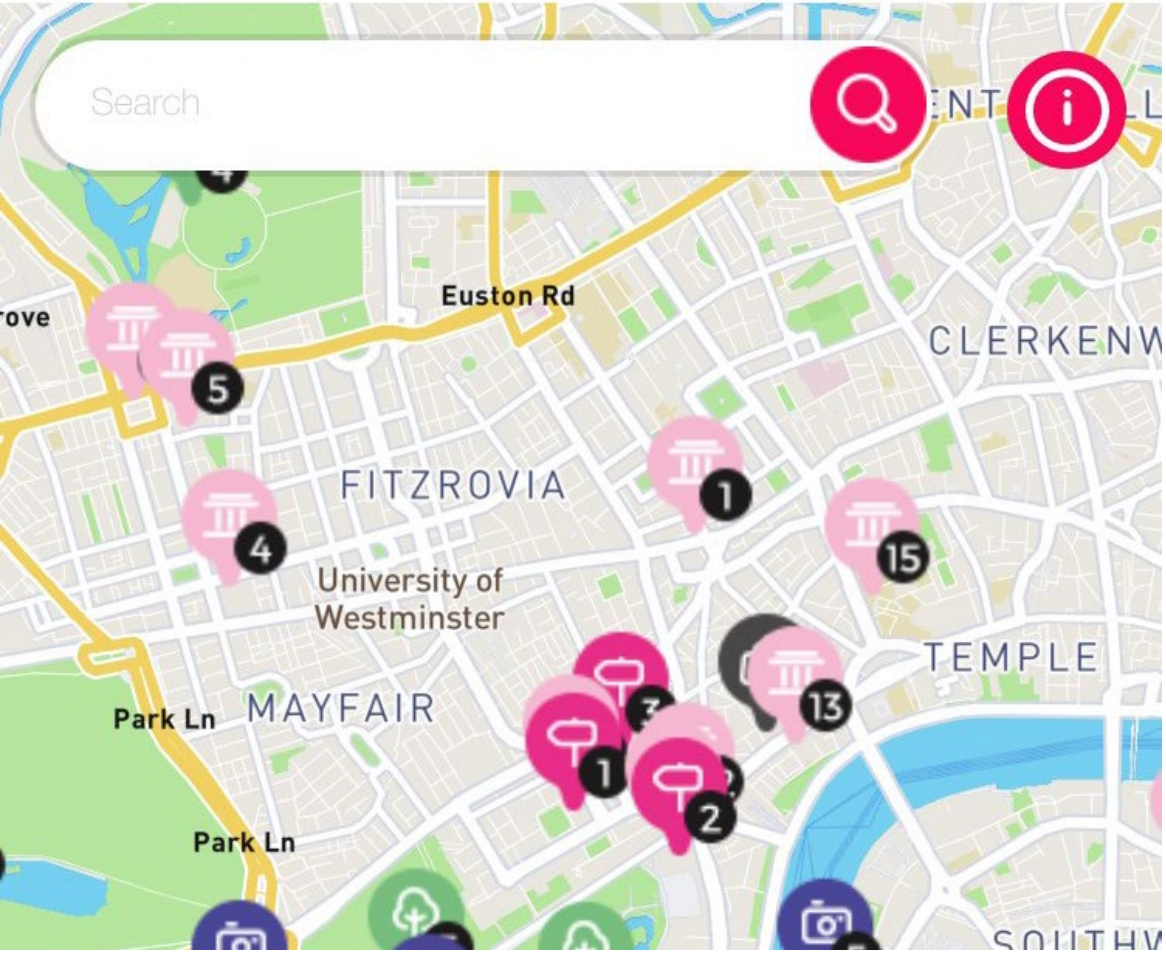
INTERFACE METAPHORS

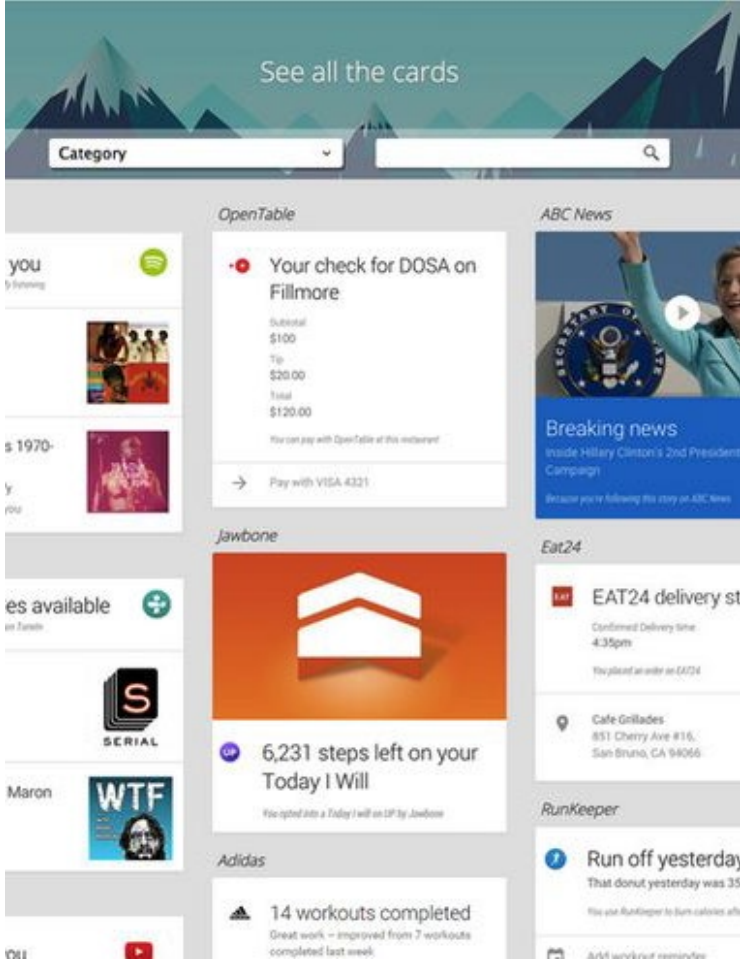
- Exploit users' familiar knowledge, helping them to understand 'the unfamiliar'
- People find it easier to learn and talk about what they are doing at the UI in terms familiar to them
- Direct Manipulation leverages real world metaphors: interface's physical form discloses its use, e.g. desktop, search engine

CLASSIC INTERFACE METAPHORS?

- Desktop Metaphor
- Map Metaphor
- Card Metaphor







INTERFACE METAPHORS

INTERFACE METAPHORS: PROBLEMS?

"If technology is to provide an advantage, the correspondence to the real world must break down at some point"

Jonathan Grudin.

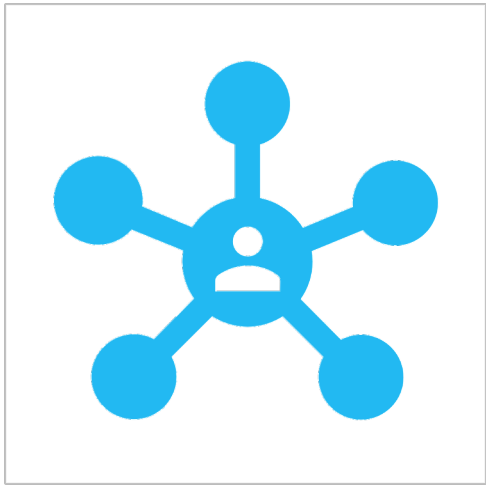
INTERFACE METAPHORS

- Can constrain designers in the way they conceptualise a problem space
- Over reliance on mechanical age representations over information age
- May limit designers' imagination in coming up with new conceptual models
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Can break conventional and cultural rules
  - e.g., recycle bin placed on desktop

CONCEPTUAL MODEL COMPONENTS

How to build a strong conceptual model?

- Iterate, Test
- Explain things better; make UI more transparent
- Anchor it in current experience: language, patterns
- New Conceptual Model: leverage existing knowledge, affordances, onboarding
- Unknown Conceptual Model (e.g. driverless cars): customer journey



CONCEPTUALISING INTERACTION

Why are conceptual models of interaction important?

- Abstract away from product details to product purpose
- Encourage thinking more broadly about potential solutions
- Focus on the user and user experience Supports collaboration through common understanding
- Support communication as a tool that can be shared

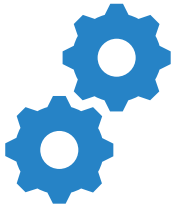
INTERACTION DESIGN

Conceptual Design:

Develop Product Concept

Define Interaction Paradigm

Design Alternative User Interfaces: Prototyping



Physical Design:

Detailed design of UI

Construct the user interface

Validate the user interface

Provide rollout support

HCI LECTURE 6 REVIEW

- **Design Thinking 3: Ideation**
  - Ideation
  - Design Funnel
  - Functional Fixedness
  - Conceptual Design

- **Lecture 7: Design Thinking 4: Prototyping**