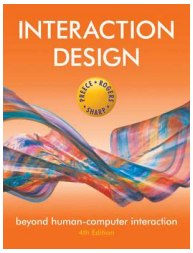
BIRZEIT UNIVERSITY

Chapter 2

Understanding and Conceptualizing Interaction



By: Mamoun Nawahdah (PhD)
2018

Recap

- **HCI** has moved beyond designing interfaces for desktop machines.
- About extending and supporting all manner of human activities in all manner of places.
- Facilitating user experiences through designing interactions:
  - Make work **effective**, **efficient** and **safer**.
  - Improve and enhance **learning** and **training**.
  - Provide **enjoyable** and **exciting** entertainment.
  - Enhance **communication** and understanding.
  - Support new forms of **creativity** and expression.

2

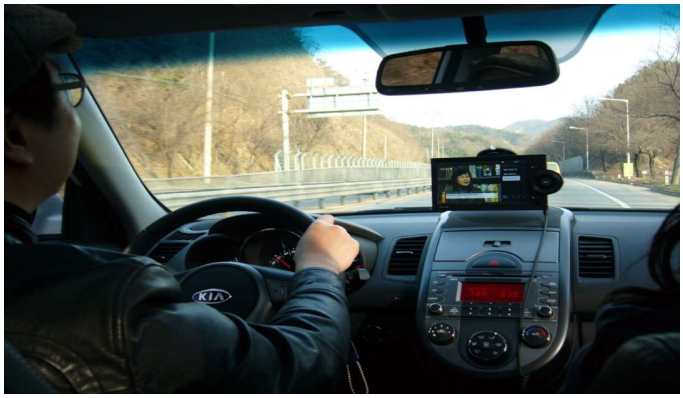
Understanding the Problem Space

- What do you want to create?
- What are your **assumptions**?
- Will it achieve what you hope it will?

3

What is an Assumption?

- Taking something for granted when it needs further investigation.
  - e.g. people will want to watch TV while driving.



4

What is a Claim?

- Stating something to be true when it is still open to question.
  - e.g. a multimodal style of interaction for controlling GPS — one that involves speaking while driving — is safe.

5

A Framework for Analysing the Problem Space

1. Are there problems with an existing product or UX? If so, what are they?
2. Why do you think there are problems?
3. How do you think your proposed design ideas might overcome these?
4. If you are designing for a new UX how do you think your proposed design ideas support, change, or extend current ways of doing things?

6

Activity

- What are the **assumptions**/**claims** made about 3D TV?

7

Assumptions: realistic or wish-list?

- People would not mind wearing the glasses that are needed to see in 3D in their living rooms **- reasonable.**
- People would not mind paying a lot more for a new 3D-enabled TV screen **-not reasonable.**
- People would really enjoy the enhanced clarity and color detail provided by 3D **-reasonable.**
- People will be happy carrying around their own special glasses **-reasonable only for a very select bunch of users.**

8

From Problem Space to Design Space

- Having a good understanding of the problem space can help inform the design space.
  - e.g. what kind of interface, behavior, functionality to provide.
- But before deciding upon these it is important to develop a **conceptual model**.

9

Conceptual Model (CM)

- A conceptual model is:
  - "***A high-level description of how a system is organized and operates***".
- Enables:
  - "*Designers to straighten out their thinking before they start laying out their widgets*".

10

CM Components

- **Metaphors** and **analogies**:
  - Understand what a product is for and how to use it for an activity.
- **Concepts** that people are exposed to through the product:
  - task–domain objects, their attributes, and operations (e.g. saving, revisiting, organizing).
- **Relationship** and **mappings** between these concepts .

11

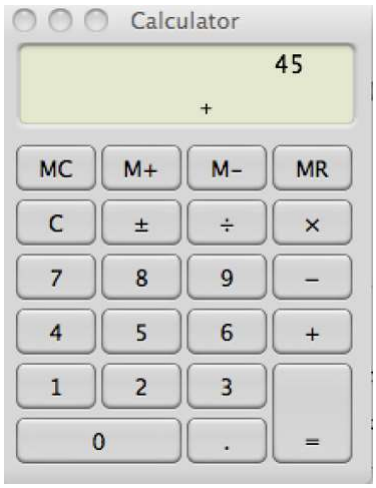
First Steps in Formulating a CM

- What will the users be doing when carrying out their tasks?
- How will the system support these?
- What kind of **interface metaphor**, if any, will be appropriate?
- What kinds of interaction modes and styles to use?

Always keep in mind when making design decisions how the user will understand the underlying conceptual model

12

Interface Metaphors



13

Interface Metaphors

- Conceptualizing what we are doing.
  - e.g. surfing the web.
- A conceptual model instantiated at the interface.
  - e.g. the desktop metaphor.
- Visualizing an operation,
  - e.g. an icon of a shopping cart for placing items into.

14

Activity

- Describe the components of the conceptual model underlying most online shopping websites, e.g.
  - Shopping cart.
  - Proceeding to check-out.
  - 1-click.
  - Gift wrapping.
  - Cash till?

15

Interface Metaphors

- Interface designed to be similar to a physical entity but also has own properties
  - e.g. desktop metaphor, web portals.
- Can be based on activity, object or a combination of both.
- Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'.
- Invokes up the essence of the unfamiliar activity, enabling users to leverage of this to understand more aspects of the unfamiliar functionality.

16

Benefits of Interface Metaphors

- Makes **learning** new systems **easier**.
- Helps users **understand** the underlying **conceptual model**.
- Can be very innovative and enable the **realm** of computers and their applications to be made more **accessible** to a greater diversity of users.

17

Problems with Interface Metaphors

- Break conventional and cultural rules:
  - e.g. recycle bin placed on desktop.
- Can constrain designers in the way they conceptualize a problem space.
- Forces users to only understand the system in terms of the metaphor.
- Limits designers' imagination in coming up with new conceptual models.

18

Interaction Types

- **Instructing**
  - issuing commands and selecting options.
- **Conversing**
  - interacting with a system as if having a conversation.
- **Manipulating**
  - interacting with objects in a virtual or physical space by manipulating them.
- **Exploring**
  - moving through a virtual environment or a physical space.

19

1. Instructing

- Where users **instruct** a system and tell it what to do:
  - e.g. tell the time, print a file, save a file.
- Very common conceptual model, underlying a diversity of devices and systems.
  - e.g. word processors, VCRs, vending machines.
- Main benefit is that instructing supports **quick** and **efficient** interaction:
  - good for repetitive kinds of actions performed on multiple objects.

20

Which is Easiest and Why?

21

2. Conversing

- Underlying model of having a **conversation** with another human.
- Range from simple voice recognition menu-driven systems to more complex 'natural language' dialogs.
- Examples include search engines, advice-giving systems, help systems.
- Also virtual agents, toys and pet robots designed to converse with you.

22

Siri.
Your wish is its command.

Siri lets you use your voice to send messages, schedule meetings, place phone calls, and more. Ask Siri to do things just by talking the way you talk. Siri understands what you say, knows what you mean, and even talks back. Siri is so easy to use and does so much, you'll keep finding more and more ways to use it.

Pros and Cons of Conversational Model

- Allows users, especially novices and technophobes, to interact with the system in a way that is familiar.
  - makes them feel comfortable, at ease and less scared.
- Misunderstandings can arise when the system does not know how to parse what the user says.

24

3. Manipulating (DM)

- Involves dragging, selecting, opening, closing and zooming actions on virtual objects.
- Exploit's users' knowledge of how they move and manipulate in the physical world.
- Can involve actions using physical controllers (e.g. **Wii**) or air gestures (e.g. **Kinect**) to control the movements of an on screen avatar.
- Tagged physical objects (e.g. balls) that are manipulated in a physical world result in physical/digital events (e.g. animation).

25

Wii

Kinect

Why are DM Interfaces so Enjoyable?

- Novices can learn the basic functionality quickly.
- Experienced users can work extremely rapidly to carry out a wide range of tasks, even defining new functions.
- Irregular users can hold operational concepts over time.
- Error messages rarely needed.
- Users can immediately see if their actions are furthering their goals and if not do something else.
- Users experience less worry.
- Users gain confidence and mastery and feel in control.

28

What are the disadvantages with DM?

- Some people take the metaphor of direct manipulation too literally.
- Not all tasks can be described by objects and not all actions can be done directly.
- Moving a mouse around the screen can be slower than pressing function keys to do same actions.

29

4. Exploring

- Involves users moving through virtual or physical environments.
- Physical environments with embedded sensor technologies.
  - Context aware.

Which Interaction Type is Best?

- Direct manipulation is good for 'doing' types of tasks, e.g. designing, drawing, flying, driving, sizing windows.
- Issuing instructions is good for repetitive tasks, e.g. spell-checking, file management.
- Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services).
- Hybrid conceptual models are often employed, where different ways of carrying out the same actions is supported at the interface - but can take longer to learn.

31

Conceptual models: interaction and interface

- **Interaction type:**
  - what the user is doing when interacting with a system, e.g. instructing, talking, browsing or other.
- **Interface type:**
  - the kind of interface used to support the mode, e.g. speech, menu-based, gesture.

32

Many Kinds of Interface Types Available

- Command
- Speech
- Data-entry
- Form fill-in
- Query
- Graphical
- Web
- Pen
- Augmented reality
- Gesture

(for more see chapter 6)

33

Which Interaction Type to Choose?

- Need to determine **requirements** and user needs.
- Take **budget** and other constraints into account.
- Also will depend on suitability of **technology** for activity being supported.
- This is covered in course when designing conceptual models.

34

Paradigm

- Inspiration for a conceptual model.
- General approach adopted by a community for carrying out research.
  - shared assumptions, concepts, values, and practices.
  - e.g. desktop, ubiquitous computing, in the wild.

35

Examples of New Paradigms

- Ubiquitous computing (mother of them all)
- Pervasive computing.
- Wearable computing.
- Tangible bits, augmented reality.
- Attentive environments.
- Transparent computing.
  - and many more….

36