Chapter 2
Understanding and Conceptualizing Interaction

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Problem space

- Concepts and facts relevant to the problem

Users
Current UX
Technology
Improvements
Problem space

- **Think about**
  - Usability goals
    - Ex: Learnability
  - User experience goals
    - Ex: Exciting
  - Assumptions and claims

What is an assumption?

- **Take for granted when shouldn’t**
  - e.g. TV while driving
What is a claim?

• Say true when still unclear
  – Ex: Speech interface while driving is safe

Problem space

• Ask
  – Are there problems with existing system?
  – Why are there problems?
  – How will you overcome these?
  – If new experience: how support, change, or extend current ways of doing things?
Example

• Radio newspaper

Design space

• Concepts relevant to design
  – Variables
  – How they interact
  – Alternate designs

• Problem space can inform design space
  – Ex: Kind of
    • Interface
    • Behavior
    • Functionality

• Understand via conceptual model
Conceptual model

- High-level description
  - Organization
  - Operations
  - Concepts required for interaction

- In general, obvious models are best
- Designers “straighten out their thinking”

Pros of early conceptualization

- Orientation
  - Can ask questions about how conceptual model will be understood
- Open-minded
  - Prevents narrow focused early on
- Common ground
  - Can establish commonly agreed terms
Interface metaphors

• Designed to be similar to physical entity but has own properties
  – Ex: Desktop metaphor

• Based on
  – Activity
  – Object
  – Combo of both

• Exploit user’s familiar knowledge

Interface metaphors

• Conceptualize activity
  – Ex: Surfing the web

• Conceptual model instantiated at interface
  – Ex: Desktop metaphor

• Visualising an operation
  – Ex: Shopping cart icon
The Good

- Makes learning new systems easier
- Helps users understand conceptual model
- Enhance accessibility

Problem space

- Concepts and facts relevant to the problem

Users

Current UX

Technology

Improvements
The Bad

- Constrain conceptualization of problem space
- Break conventional and cultural rules
  - Ex: Recycle bin on desktop
- Limits designers’ imagination
- Inadvertently reuse bad existing designs
  - Conflict with design principles
- Users only understand in terms of metaphor

Components

- Metaphors and analogies
  - Understand what product for
  - Understand how to use
- Concepts people exposed to through product
  - Task–domain objects
  - Their attributes
  - Their operations
- Relationships between concepts
- Mappings between concepts and user experience
Activity

• Components of the conceptual model underlying online shopping websites

How to formulate

• How users perform tasks
• How system will support
• What metaphors, if any, appropriate?
• What interaction type to use?
Interaction types

• Way user interacts with product
  • Instructing
    – Issuing commands
    – Selecting options
  • Conversing
    – Interacting with system via “conversation”
  • Manipulating
    – Interacting with objects via manipulation
  • Exploring
    – Moving through environment

Interaction vs. interface type

• Interaction type:
  – What doing when interacting with a system

• Interface type:
  – the kind of interface used to support the mode
1. Instructing

- Users tell system what to do
  - Ex:
    - Tell the time (date +"%T")
    - Print a file (press button)
    - Save a file (ctrl+s)

- Used in lots of devices and systems
  - Ex:
    - Word processors
    - VCRs
    - Vending machines

- The Good
  - Supports quick and efficient interaction

Which is easiest and why?
2. Conversing

- User and computer have conversation
- Large range
  - Voice recognition menu-driven systems
  - 'Natural language' dialogs
- **Ex:**
  - Search engines
  - Advice-giving systems
  - Pet robots

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Pros and Cons

- **The Good**
  - Allows users to interact in familiar way
- **The Bad**
  - System does not always understand user
3. Manipulating

- Interact with virtual objects
  - Drag
  - Select
  - Open/Close
  - Zoom
- Exploit knowledge of physical world
- Virtual or both physical and virtual
- Interaction with physical objects results in physical/digital events

Direct Manipulation

- Shneiderman (1983) coined the term DM, came from his fascination with computer games at the time
  - Continuous representation of objects and actions of interest
  - Rapid reversible actions with immediate feedback on object of interest
  - Physical actions and button pressing instead of issuing commands with complex syntax
Pros

• Novices learn basic functionality quickly
• Experienced users have efficiency and breath
• Average users retain operational concepts
• Error messages rarely needed
• Immediate feedback
• Less anxiety
• Gain confidence and mastery
• Feel in control

Cons

• People take metaphor too literally
• Not all tasks can be described by objects
• Not all actions can be done directly
• Some tasks better done via delegating
  – Ex: spell checking
• Some tasks faster via other methods
  – Ex: mouse vs function key
• Screen space ‘gobblers’
4. Exploring

- Move through virtual/physical environments
- Physical environments + embedded sensors
  - Context aware
- Exploit how navigate in real world
- Ex:

Hybrid

- Support different ways of doing same actions
  - Ex:

  - The Bad
    - Takes longer to learn
Best interaction type

• **Instruction**
  - Repetitive actions on multiple objects
  - Ex: spell-checking, file management

• **Manipulation**
  - ‘doing’ types of tasks
  - Ex: drawing, flying, driving, sizing windows

• **Conversation**
  - Children
  - Computer-phobic
  - Disabled users
  - Specialised applications
    - Phone services

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Best interaction type

• Determine requirements and user needs
• Take budget and other constraints
• Suitability of technology
Inspirations for Conceptual Models

Paradigm

- General approach adopted by a community for carrying out research
  - Assumptions
  - Concepts
  - Values
  - Practices

- Ex:
  - Desktop
  - Ubiquitous computing
Examples of new paradigms

• Wearable computing

• Tangible

• Augmented reality

Theory

• Explanation of a phenomenon
  – Ex: Information processing

• Can analyse and predict user performance

• Can help identify factors
  – Cognitive
  – Social
  – Emotional
Models

- Simplification of an aspect of HCI
- Easier to predict and evaluate alt. designs
- Abstracted from a contributing discipline
- Ex: Psychology - keystroke model

Framework

- Set of interrelated concepts
- Advice in the form of
  - Steps
  - Challenges
  - Principles
  - Etc.
- Help constrain and scope
Examples

- How to conceptualize
  - Learning
  - Working
  - Socializing
  - Emotion
- How to evoke certain responses
- Show differences in perspective

Norman

- Relationship between design of conceptual model and user’s understanding

Designer
Designer’s Model

System
System Image

User
User’s Model
Garrett

- Software design life-cycle
- Intended to convey bigger picture

Who should be in control?

- User
  - Command-based interfaces
- System
  - Elderly movement detection
- When switch between
  - GPS


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