

Chapter 2

Understanding and Conceptualizing Interaction

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Problem space

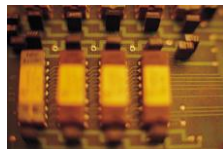
- Concepts and facts relevant to the problem



Users



Current UX



Technology



Improvements

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Problem space

- Think about

- Usability goals
 - Ex: Learnability



- User experience goals
 - Ex: Exciting



- Assumptions and claims

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What is an assumption?

- Take for granted when shouldn't
 - e.g. TV while driving



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What is a claim?

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



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<http://www.imdb.com/media/rm1640146944/nm0000115>, <http://www.gpsmagazine.com/comments/000259.php>

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?



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Example

- Radio newspaper



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<http://www.brandwatch.com/2012/11/8-tech-inventions-and-gadgets-that-never-took-off/>

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



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Conceptual model

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



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

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<http://www.toysrus.com/product/index.jsp?productId=2267249>

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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

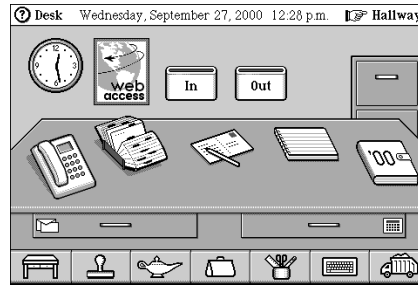
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Interface metaphors

- 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

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<http://x7.fi/2010/01/18/lost-tech-put-on-your-magic-cap/>

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Interface metaphors

- Conceptualize activity
 - Ex: Surfing the web
- Conceptual model instantiated at interface
 - Ex: Desktop metaphor
- Visualising an operation
 - Ex: Shopping cart icon



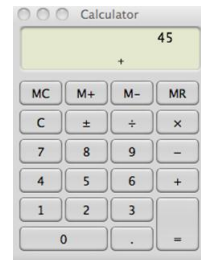
www.id-book.com,
<http://x7.fi/2010/01/18/lost-tech-put-on-your-magic-cap/>

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The Good

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



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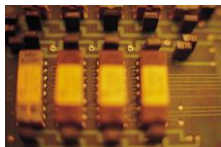
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Problem space

- Concepts and facts relevant to the problem



Users



Technology



Current UX



Improvements

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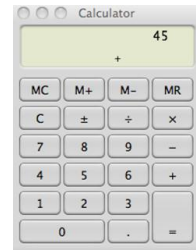
The Bad

- 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



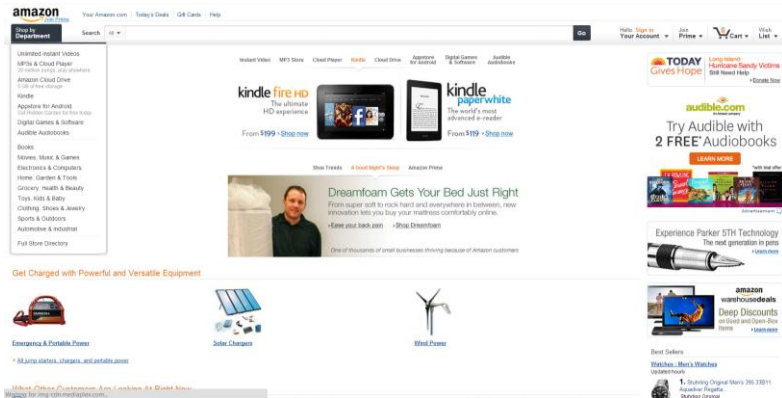
Components

- 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



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http://www.amazon.com

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How to formulate

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

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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

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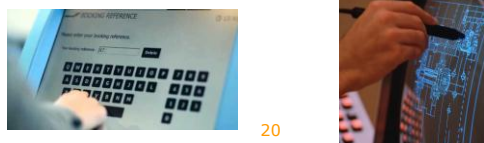
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Interaction vs. interface type

- Interaction type:
 - What doing when interacting with a system



- Interface type:
 - the kind of interface used to support the mode



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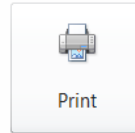
http://article.wn.com/view/2007/10/01/Jetstar_plans_web_checkins_airport_kiosks/

1. Instructing

- Users tell system what to do

- Ex:

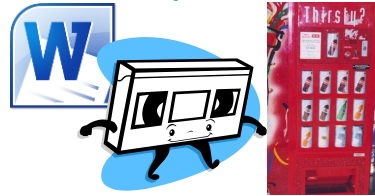
- Tell the time (date + "%T")
 - Print a file (press button)
 - Save a file (ctrl+s)



- Used in lots of devices and systems

- Ex:

- Word processors
 - VCRs
 - Vending machines



- The Good

- Supports quick and efficient interaction

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<http://www.rightnowintech.com/2012/02/5-underused-but-very-useful-microsoft.html>

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Which is easiest and why?



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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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<http://www.pha-media.com/entrepreneur-business-blog/2012/11/07/dear-santa-ive-been-a-very-good-girl/>

Pros and Cons

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



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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:



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Hybrid

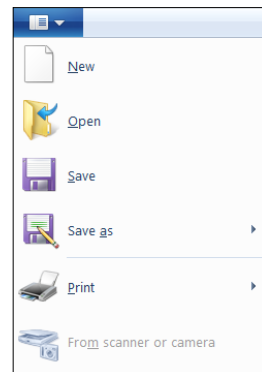
- Support different ways of doing same actions
 - Ex:



VS.



VS.



- The Bad
 - Takes longer to learn

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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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<http://www.badsience.net/2007/10/oooooh-im-in-the-minority-report/>

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Best interaction type

- Determine requirements and user needs
- Take budget and other constraints
- Suitability of technology



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Inspirations for Conceptual Models

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Paradigm

- General approach adopted by a community for carrying out research
 - Assumptions
 - Concepts
 - Values
 - Practices
- Ex:
 - Desktop
 - Ubiquitous computing



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<http://www.appliancist.com/refrigerators/electrolux-screen-fridge.html>

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Examples of new paradigms

- Wearable computing
- Tangible
- Augmented reality



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Theory

- Explanation of a phenomenon
 - Ex: Information processing
- Can analyse and predict user performance
- Can help identify factors
 - Cognitive
 - Social
 - Emotional



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Models

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



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Framework

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



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Examples

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



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Norman

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



Designer

Designer's Model



System

System Image



User

User's Model

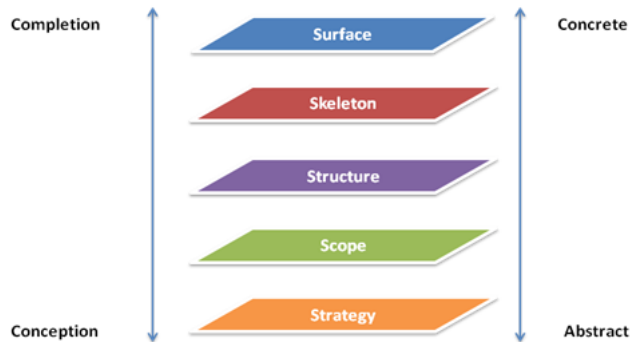
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Garrett

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



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Who should be in control?

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

```
Windows PowerShell
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PS C:\Users\Anna> dir

Directory: C:\Users\Anna

Mode                LastWriteTime         Length Name
----                -
d-----         10/24/2012    7:52 PM            eclipse
d-----         1/15/2013    3:10 PM            gimp-2.8
d-----         8/25/2012   11:35 PM            thumbnails
d-----         8/16/2012    1:55 PM            Contacts
d-----         7/21/2013    4:58 PM            Desktop
d-----         7/21/2013    10:45 PM            Downloads
```



www.id-book.com, <http://www.gpsmagazine.com/comments/000259.php>, <http://sites.psu.edu/seanhanlon23/2012/10/16/all-senior-citizens-should-have-life-alert/>

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