How to display multiple locations?

Halo – A Virtual Periphery for Mobile Devices

What are its limitations?
Can it be improved?
Due Today (Now)

Individual Programming Assignment 2
(Source code, executable and video on wiki)

Group Brainstorm
(Wiki and printout handed in now)

Review: Task Analysis

Find some real users

Talk to them
Find out what they do now
How would your system fit in?
More on this a bit later

Are they too busy?
Buy their time
t-shirts, coffee mugs, etc.

Review: Task Analysis Questions

1. Who is going to use system?
2. What tasks do they now perform?
3. What tasks are desired?
4. How are the tasks learned?
5. Where are the tasks performed?
6. What’s the relationship between user & data?
7. What other tools does the user have?
8. How do users communicate with each other?
9. How often are the tasks performed?
10. What are the time constraints on the tasks?
11. What happens when things go wrong?
**Review: Master-Apprentice Model**

Allows user to teach us what they do
- Skill knowledge is usually tacit (can’t put it in books)
- Sometimes literal apprenticeship is best

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**Review: Personas (from Cooper)**

“Hypothetical Archetypes”
Archetype: (American Heritage)
An original model or type after which other similar things are patterned; a prototype
An ideal example of a type; quintessence

A precise description of user in terms
Capabilities, inclinations, background
Goals (not tasks)

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**AMANDA**

Age: 7  
Occupation: Second grade student
Home Life: Lives with her mother, father, and younger sister in the suburbs of a large city.
Education: In elementary school
Activities: Plays soccer, reads, and takes piano lessons; saves her birthday money and allowance to spend at the mall.
Future Goal: Goal is to turn 10 so that

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**GLORIA**

Age: 34  
Occupation: Part-time office administrator
Home Life: Lives with her husband and two children in a mid-sized city.
Education: Has a bachelor degree
Activities: Enjoys crossword puzzles and reading mystery novels; spends a lot of time driving her children to activities.
Future Goal: Goal is to move away from her

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**CHARLES**

Age: 66  
Occupation: Retired accountant
Home Life: Lives with his wife, four children, and six grandchildren.
Education: Has an MBA
Activities: Likes to work in the garden and cook Asian food.
Activities: Enjoys traveling with his wife and investing in the stock market.
Future Goal: Goal is to change a pet

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**Due Wed Feb 17**

- Contextual Inquiry and Task Analysis
- Individual Programming Assignment 3
- Individual Competitive Analysis
Contextual Inquiry and Task Analysis

Due Feb 17
Find and interview 3 target users (not from class)
Analyze their tasks
Explain how your application addresses their needs
See wiki for details

Start early – there is a lot to do
Finding participants will take time
We will not accept late group project assignments

Individual Programming Assignment 3

Individual Competitive Analysis

Compile a list of at least 10 related applications
Be thorough
Check other sources like Android Marketplace

Analysis
Briefly review each application
  - target users
  - functionality
  - usability

Summary
What is unique about your application?

Topics
Affordances
Conceptual Models
Design Principles
The Action Cycle
“... the term *affordance* refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.

Some affordances obvious
Knobs afford turning
Buttons afford pushing
Glass can be seen through

Some affordances learned
Glass breaks easily
Affordances
Clues about how object/interface works

Affordances
holes for insertion of fingers
blades for cutting
Implications clear for how operating parts work

Door Handles
Affordances suggest how to use the object

Door Handles
Affordances suggest how to use the object
Door Handles

Affordances suggest how to use the object

Dependencies

Affordances suggest how to use the object

Can be dependent on the Experience
Knowledge
Culture

Cultural Dependencies

Affordances suggest how to use the object

Can be dependent on the Experience
Knowledge
Culture
Switches (US down=off, UK down=on)
red = danger, green = go

Can make an action easy/difficult

Perceived Affordances

Affordances suggest how to use the object

Can be dependent on the Experience
Knowledge
Culture of the actor

Can make an action easy/difficult

Affordances may be perceived without actually existing
Screen-Based Interfaces

**Physical affordances**
Screen, pointing device, physical buttons, keyboard
These afford touching, pointing, clicking on every pixel

**Physical affordances of screens often unused**
Screen affords touching, but most screens are not touch sensitive

Designer Controls Perceived Affordances

What are the affordances of these graphical objects?

Designer Controls Perceived Affordances

What are the affordances of these graphical objects?
Do Graphical Objects Afford Clicking?

Graphic design emphasizes affordances
Helps user recognize objects as buttons

Scrollbar Affordances?

Widget Affordances

Well-designed widgets have clear affordances
e.g. resize handles:
crop handles:
motion arrows

Conceptual Models
Mental Representations

Users’ understanding of how interface works

People have preconceived models

1 + 5 * 7 =

Changing mental models can be difficult

For more on visual grouping and math eqns see work of Landy and Goldstone.

Interfaces Must Communicate Model

Online help / documentation useful (but shouldn’t be necessary)

Refrigerator

Problem: freezer too cold, but fresh food just right
### Refrigerator Controls

<table>
<thead>
<tr>
<th>Setting</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Settings</td>
<td>C and 4</td>
</tr>
<tr>
<td>Colder Fresh Food</td>
<td>C and 5-6</td>
</tr>
<tr>
<td>Coldest Fresh Food</td>
<td>B and 7</td>
</tr>
<tr>
<td>Colder Freezer</td>
<td>D and 6-7</td>
</tr>
<tr>
<td>Warmer Fresh Food</td>
<td>C and 3-1</td>
</tr>
<tr>
<td>OFF (both)</td>
<td>0</td>
</tr>
</tbody>
</table>

**What is your conceptual model?**

### Most Likely Conceptual Model

![Diagram of a refrigerator with labels for A, B, C, D, E and 7, 6, 5, 4, 3, with cooling units and arrows indicating connections.]

### Correct Conceptual Model

![Diagram showing a conceptual model with A, B, C, D, E and 7, 6, 5, 4, 3, and cooling units, with connections indicating the system image.]

**Possible solutions:**
- Make controls map to user’s model
- Make controls map to actual system
Conceptual Models

Designers model may not match user's model
Users get model from experience & usage
Users only work with system image, not with designer

What if the two models don't match?

Preconceived Models

People have preconceived models of how things work
how does your car start?
how does an ATM machine work?
how does your computer boot?

Allow us to predict how things will work or not work

Preconceived Models Often Wrong!

Extracted from fragmentary evidence

People find ways to explain things
Computer terminal breaks when accessing the library catalog
Certain you're driving on the correct road
Design Principles

1. Make Controls Visible

Poor Visibility (BMW's iDrive)

How do you put someone on hold?
How do you set the alarm?

Primary controls are visible
But how to set a radio station preset?

Too Much Visibility?

6 remote controls for "modest" home theater
2. Make Sure Mapping is Clear

Mapping: Relationship between controls and their result

Mercedes S500 Car Seat Controller

Does it control moving sound left/right or front/back?
### Stovetop Controls

<table>
<thead>
<tr>
<th>Pairing Type</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arbitrary</td>
<td>![Arbitrary Diagram]</td>
</tr>
<tr>
<td>Paired</td>
<td>![Paired Diagram]</td>
</tr>
<tr>
<td>Full Mapping</td>
<td>![Full Mapping Diagram]</td>
</tr>
</tbody>
</table>

- **Arbitrary**: 24 possibilities, requires visible labels and memory.
- **Paired**: 2 possibilities per side, 4 total possibilities.

### Transfer Expectations

**From known objects to similar new ones**

- **Positive**: previous experience applies to new situation
- **Negative**: previous experience conflicts with new situation

### 3. Provide Feedback

**People press >> 1 time**

Unclear if system has registered the button press

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What happens when disk is dragged onto trash can?
Elevator buttons light up → reducing multiple presses

Poor Feedback

A   B   C   D   E

cooling unit

1  6  5  4  3

Took a day for refrigerator to adjust to new settings

The Action Cycle

Conceptual Models

Design Model

User’s Model

System Image
Gulfs of Execution & Evaluation

Gulf of Evaluation

Real world: Mental model: x,y correlated?

ρ = -.29
Gulf of Execution

Real world

Move 90 30
Rotate 35
Pen down
...

Mental model:
Draw a rectangle

Execution

Gulf

Gulf of Execution

Real world

1. Draw a rectangle

2. Rotate the shape

Mental model:
Draw a rectangle

Execution

Gulf

Conceptual Models

Design Model

System Image

User's Model
The World

Action Cycle

Goals

Execution

Evaluation

Execution

Intention to act
Sequence of actions
Execution of actions

Evaluation

Evaluation of interpretations
Interpreting the perception
Perceiving the state of the world

The World

start here

start here