Human-Computer Interaction
IS4300

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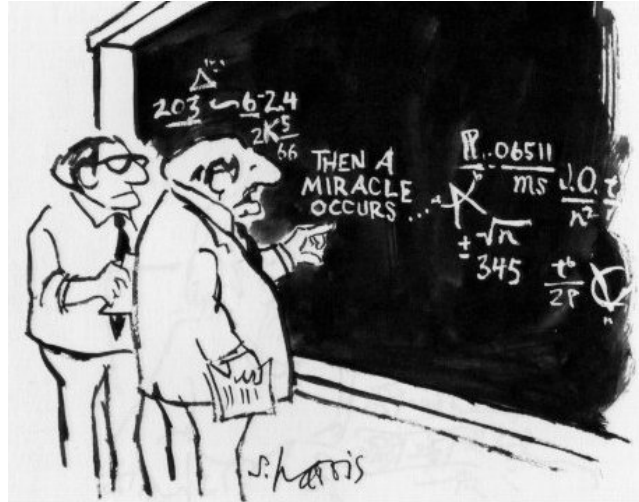# Projects   P2

- User analysis.
  - Identify stakeholders (primary, secondary, tertiary, facilitating)
- Task analysis
  - 3+ representative tasks
  - For each
    - Hierarchical Task Analysis
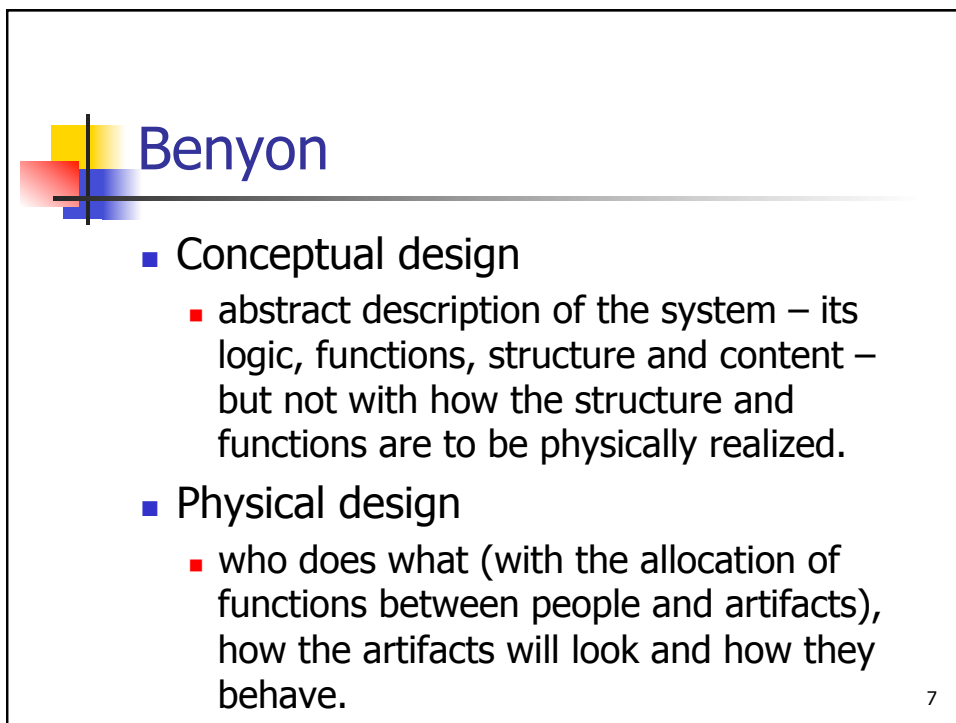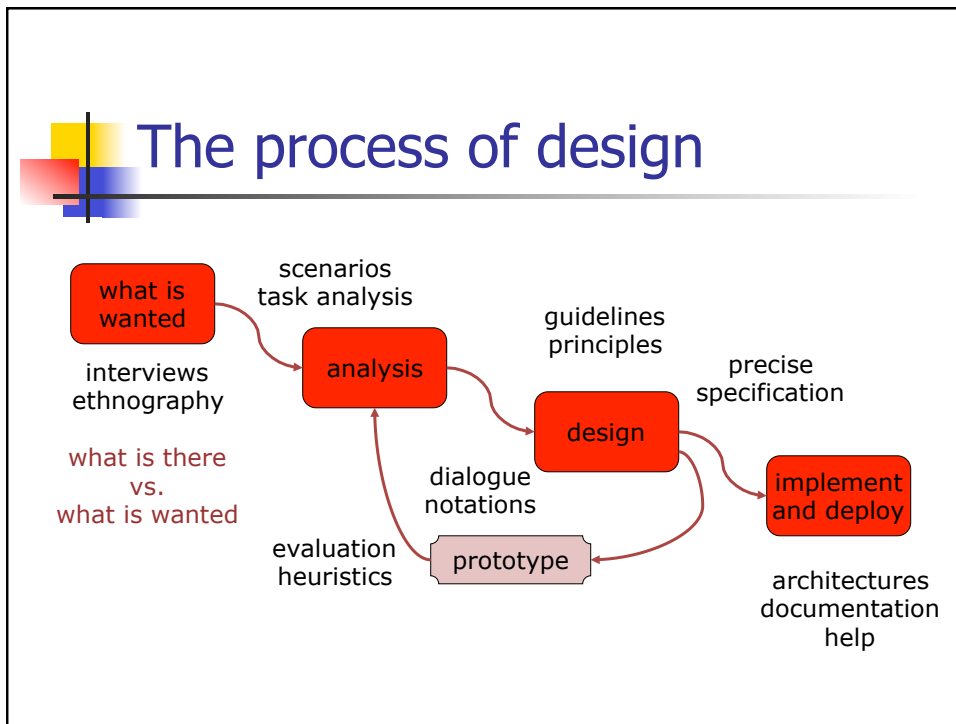- Problem scenarios
- Usability criteria

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Design

what is design?

achieving goals within constraints

- goals - purpose
  - who is it for, why do they want it
- constraints
  - materials, platforms
- trade-offs

The process of design

scenarios
task analysis

what is
wanted

guidelines
principles

interviews
ethnography

analysis

precise
specification

what is there
vs.
what is wanted

design

dialogue
notations

implement
and deploy

evaluation
heuristics

prototype

architectures
documentation
help

Benyon

- Conceptual design
  - abstract description of the system – its logic, functions, structure and content – but not with how the structure and functions are to be physically realized.
- Physical design
  - who does what (with the allocation of functions between people and artifacts), how the artifacts will look and how they behave.

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Design: The Plan

- Today
    - Activity Scenarios & Metaphors
- Wednesday
    - Information Scenarios
    - Interaction Scenarios
    - Design Methodology Research
    - (Swing Events)
- Next Monday
    - Holiday
- 10/14
    - UI Visual Design & Design Guidelines

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Conceptual Design (Benyon)

- User conception of the system is easily learned and fits with their expectations and preferences.
- Support user developing a clear 'mental model' of the system.
- A good conceptual model will come from considering the underlying metaphor that is being used to provide the structure for the design
- Must explore the design space in the abstract; to think about what the design is trying to be

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Benyon

- Conceptual Design
  - Metaphors
  - Scenarios
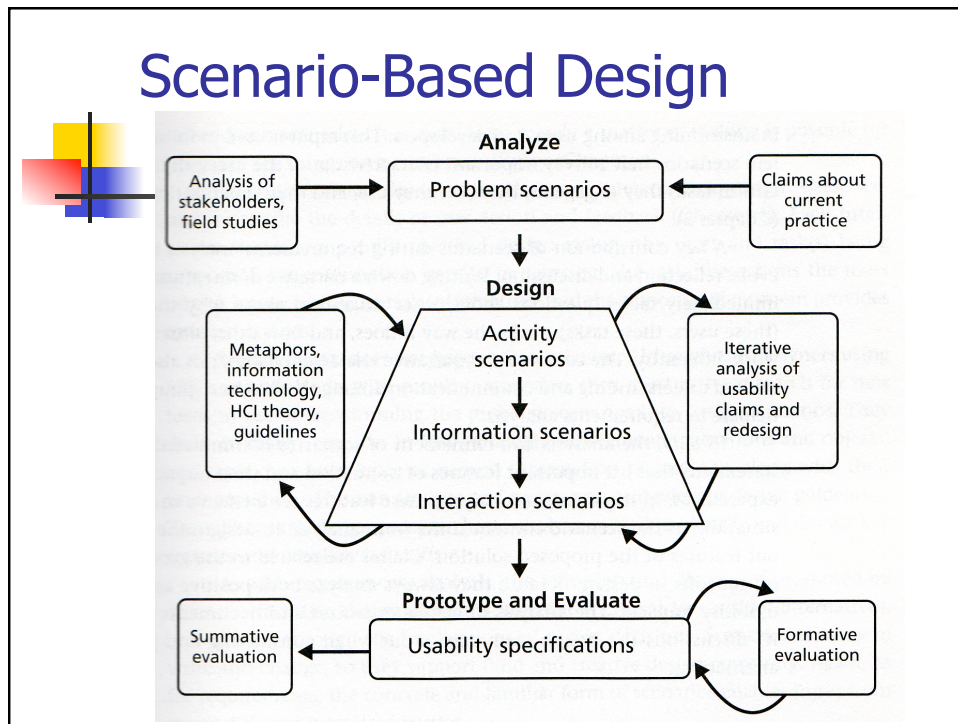 - Diagrammatic Techniques
    - E-R diagrams
  - Physical design

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Activity Design
Rosson & Carrol Ch 3

- aka "conceptual design"
- First phase of design reasoning

- Current practice is transformed into new ways of behavior
- Focus on *what* the system will do, without the complexity of UI concerns
- Goal: specify system functionality

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Scenario-Based Design

Analyze

Analysis of stakeholders, field studies → Problem scenarios ← Claims about current practice

Design

Activity scenarios

Metaphors, information technology, HCI theory, guidelines

Information scenarios

Interaction scenarios

Iterative analysis of usability claims and redesign

Prototype and Evaluate

Summative evaluation ← Usability specifications

Formative evaluation

Activity Design

- How do we design activities that users can readily understand?

  - Maximize visibility, affordances
  - Allow easy construction of valid conceptual models
  - Interaction Metaphors!

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Interaction metaphors

- Making the interaction seem like something the user is already familiar with
  - Desktop, Trash can, etc.
  - Shopping Mall
  - Direct Manipulation
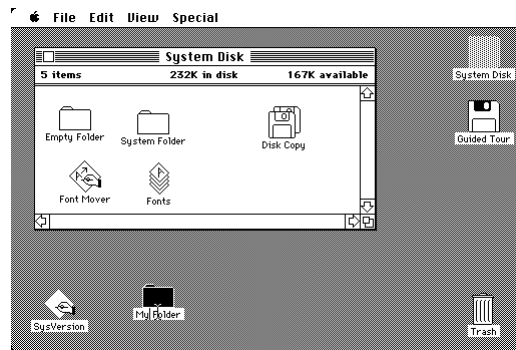
Interaction metaphors

- Interface metaphors evoke an *initial* mental model in users of the system's structure and operation.
- Metaphors should relate to users' past experiences and should be consistent.

- Q: What dimension of usability do metaphors most help with?

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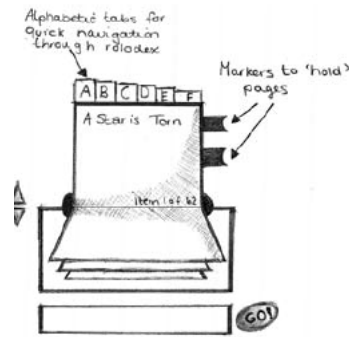| VSF Activity	Real-World Metaphor	Implications for VSF Activities
Constructing an exhibit is like writing a . . .	Lab journal	Informal and personal notes, raw data, work in progress
	Documentary	Carefully constructed "story" of how the project happened
Coaching a student is like being a . . .	Peer (colleague)	Social support, reactions to ideas, suggestions
	Director	Specific directions about exhibit content or layout
Visiting the fair is like going to a . . .	Study room	Quiet and focused attention to pieces of information
	Public lecture	Receiving preorganized information as part of a group
	Cocktail party	Informal discussions, moving from one group to another
Judging exhibits is like making a . . .	Balance sheet	Mathematical model of data, equations, results
	Discussion	Extended conversations about reactions, values, criteria
Summarizing the fair is like creating a . . .	Report card	Assessment on well-established categories of achievement
	Guided tour	Interactive visit of best sites with helpful commentary
	Thank-you note	Personal recognition of participants, mentors, judges, etc.

Metaphor (Benyon)

- Metaphor is taking concepts from one domain and applying them to another
- In HCI we are trying to describe something new to people. So we have to use metaphor to describe this new domain in terms of something that is more familiar.

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Example Use of Design Metaphor (Benyon)

Alphabetic tabs for quick navigation through rolodex

A B C D E F

Markers to 'hold' pages

A Star is Torn

item 1 of 62

GO!

Information Visualisation Design IV

There were 25 results found

Search Result 1
Sub Title 1

View Previous   View Next

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Example Metaphor

Shop by Department   Timothy's Amazon.com   Today's Deals   Gift Cards   Sell   Hello, Timothy Your Account   Your Prime   Wish List   0 Cart

Toys & Games   Preschool Toys   Boys' Toys   Best Sellers   New Releases   Girls' Toys   Games   Outdoor   Hobby, Models & Trains   STEM Toys   Deals

‹ Back to search results for "fresh whole rabbit"

Think G
by Think Ge

| 69 answ

Price: $13

In Stock.
Sold by Tru
available.

Want it Tue
choose One

• Okay, fo
  stuffed u

Radiant Farms UNICORN MEAT

Agent Metaphor

- A natural UI metaphor for an intelligent agent may be an anthropomorphic character
- Advantages?
- Are there downsides to this?

Metaphors

- Multiple metaphors can be mixed (e.g., windows and desktops)
- One metaphor is better than another if it leads to more correct predictions about a system's behavior.
- You don't *have* to use metaphors.

Choosing the right metaphor

- Understand how the system works / is supposed to work.
- Figure out what kinds of problems users have.
  (watch them use similar systems)
  (create prototypes and watch users)
- Generate metaphors and examine their properties.
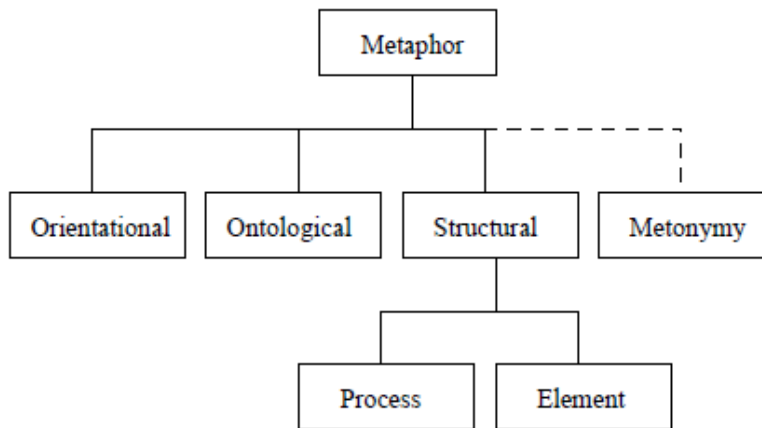- Key question: will users "get it"? How do you tell?

Problems with metaphors?

- Sometimes they break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can overly constrain designers in the way they conceptualize a problem space
- Forces users to understand the system in terms of the metaphor
- Use of metaphor – as with any aspect of design – should be tentative and subject to change if it tests poorly.

A Taxonomy of User-Interface Metaphors, Barr et al, '02, '05

```
                    ┌──────────┐
                    │ Metaphor │
                    └──────────┘
   ┌────────────┬────────────┼────────────┐
┌───────────┐┌───────────┐┌──────────┐┌──────────┐
│Orientational││Ontological││ Structural ││ Metonymy │
└───────────┘└───────────┘└──────────┘└──────────┘
                      ┌──────┴──────┐
                 ┌─────────┐   ┌─────────┐
                 │ Process │   │ Element │
                 └─────────┘   └─────────┘
```

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Structural Metaphor

- Identifies an abstract system concept with a detailed real world concept or object.
- E.g., "File deletion is using a trashcan."

Trash

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Orientational Metaphor

- Gives a concept a spatial orientation
  - E.g., "Happiness is Up", "Up is More", "Progress is to the Right"

Number of apples to buy? 42

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Ontological Metaphor

- Identifies a system concept with a basic category of existence in the physical world, such as substance, object, container or entity.
- E.g., "The Frontpage Application is an Entity"

Add FrontPage Information to the Folder

FrontPage needs to add information to your folder in order to help manage your Hyperlinks and other site content.

Do you want to add FrontPage information to "H:\inetpub" ?

☐ Don't ask me this again

Yes   No
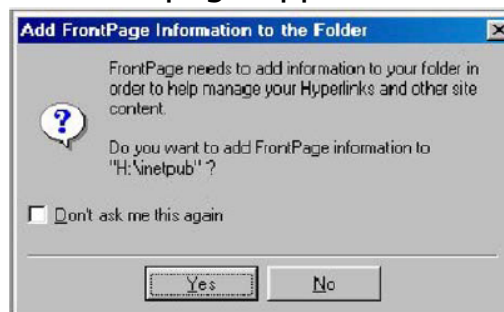
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Metaphorical Entailments
some useful, some not

- **<u>the interface is a wizard</u>**,
  - "the interface knows more than I do"
  - "the interface uses a wand."
- **<u>the data is a document</u>**
  - The data is made of paper with ink on it.
  - The data can be crumpled into a ball and thrown into the trash.
  - The data consists of words, figures, and images.
  - The data contains information.
  - The data can be torn, or have coffee spilled on it.
  - The data has a title.
  - The data can have footnotes, a bibliography, etc

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Case Study: MS Office Project Gallery
- the collection of templates and wizards is a gallery
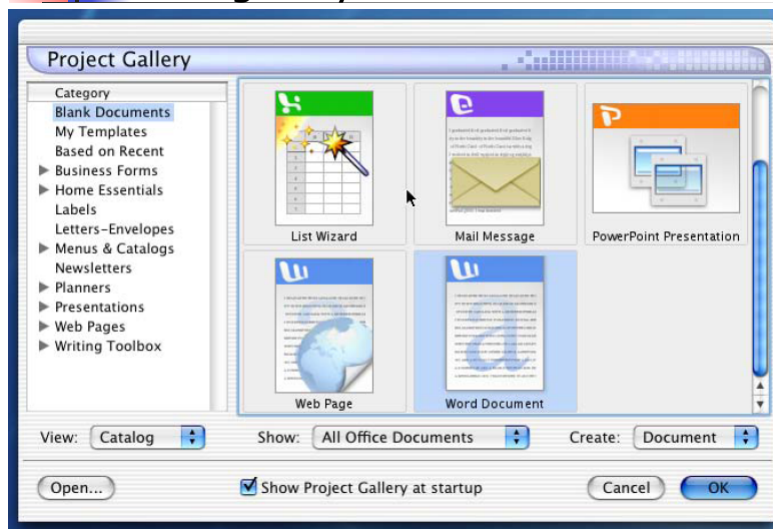
What cues the user?

What kind of metaphor?

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Metaphors used within MS Office Project Gallery

Metaphor
THE COLLECTION OF TEMPLATES AND WIZARDS IS A GALLERY
THE VIEW OF THE COLLECTION OF PROJECTS IS A CATALOG
THE COLLECTION OF TEMPLATES IS A TOOLBOX
THE TEMPLATE IS A TOOL
THE PRE-FORMATTED DOCUMENT IS A TEMPLATE
THE INTERACTION PROCESS IS A DIALOG
THE DELIMITED AREA ON THE SCREEN IS A BOX
THE COLLECTION OF DATA IS A DOCUMENT
THE DIALOG BOX(ES) IS A WIZARD
THE COLLECTION OF SOFTWARE IS AN OFFICE
THE INTERNET IS A WEB
THE COLLECTION OF DATA IS A PAGE
THE RECTANGULAR AREA ON THE SCREEN IS A WINDOW
THE SUBSECTION OF THE WINDOW IS A PANE
THE INFORMATION TRANSFER IS MAIL
THE SOFTWARE IS AN ENTOURAGE
THE AREA OF THE WINDOW IS A SCROLL

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Using Metaphors to Create a Natural User Interface for Microsoft Surface

Hofmeester, et al, 2010

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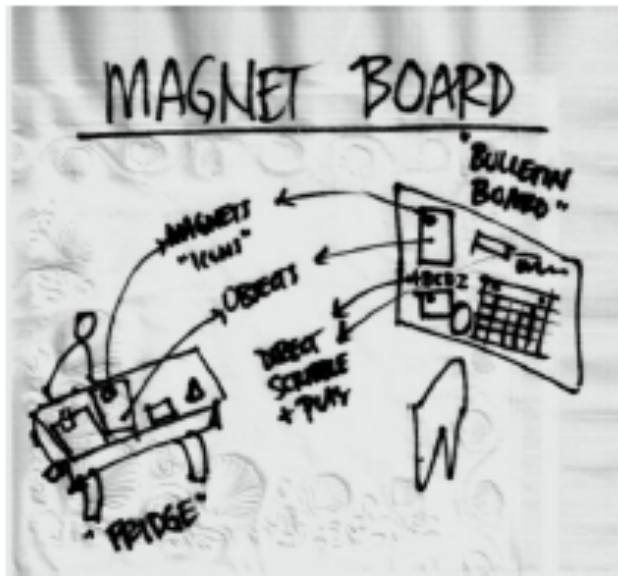
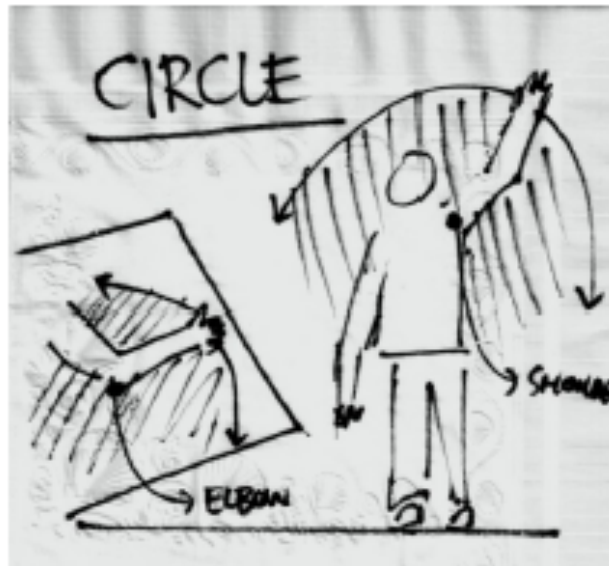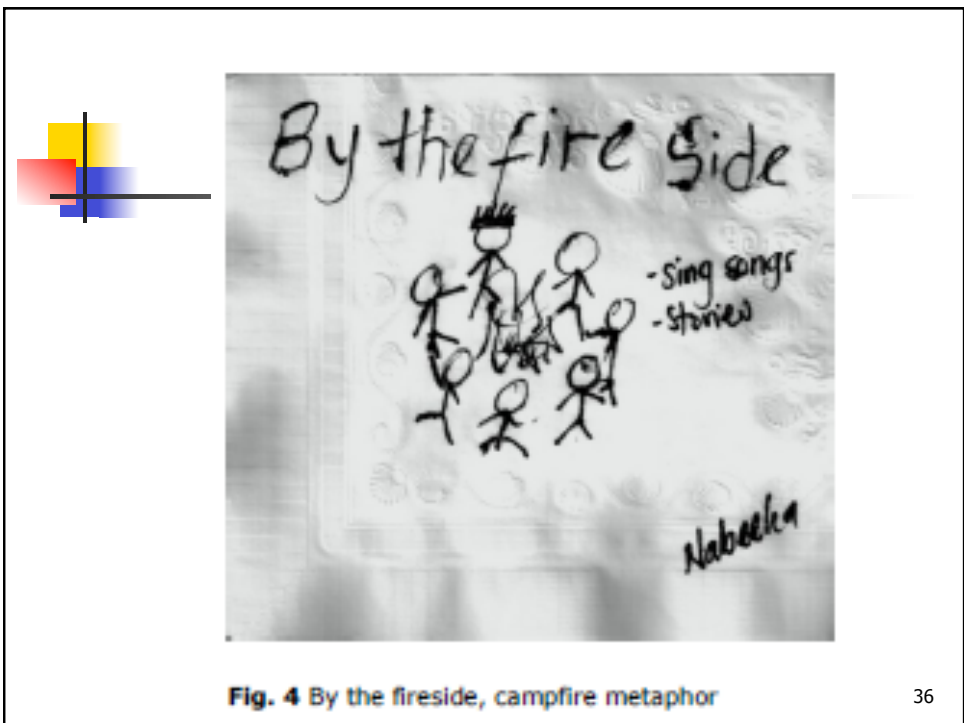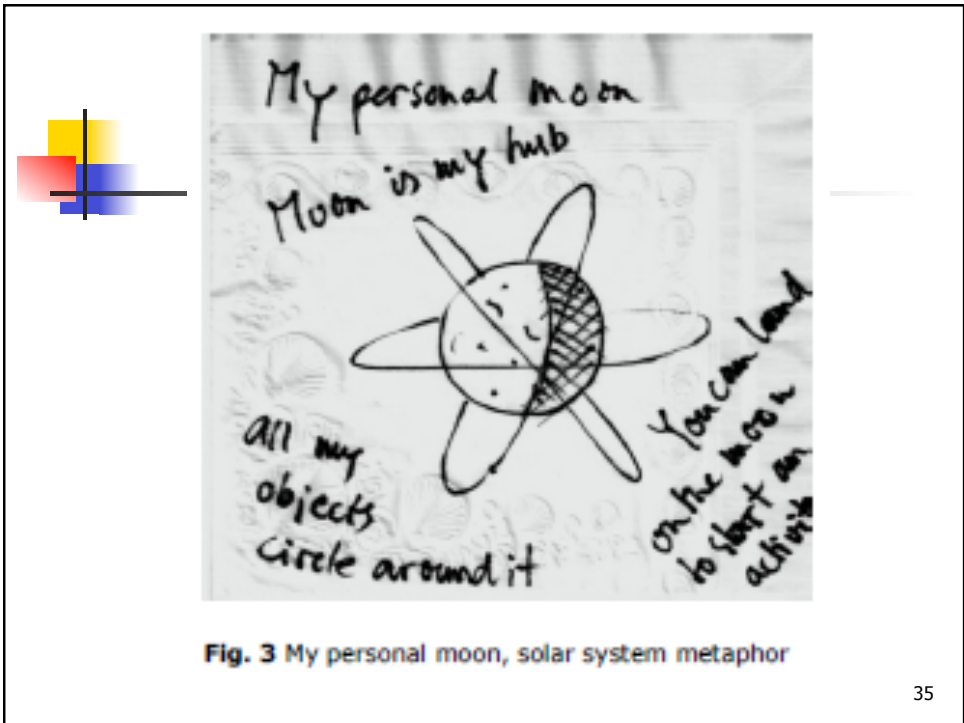Generated
~100 ideas

Fig. 1 Magnet board metaphor

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Fig. 2 Circle, personal space metaphor

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Fig. 3 My personal moon, solar system metaphor

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Fig. 4 By the fireside, campfire metaphor

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Additional Ideas

- Canvas, based on the blank canvas, drawing, and creating things together
- Garden, a metaphor of seeding, growing, tending, and community gardens
- Magazine, a book metaphor of beautiful typographic design, page-based content, and bookshelves
- Memory chest, a magic place of memories and discoveries
- Sphere, based around the idea of personal space
- Unfold, a paper and packaging metaphor of unfolding content
- Water, focused on the surface of the water, what is above and below, and the concept of sedimentation.

- Grouped concepts -> developed most promising

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Magnet board design
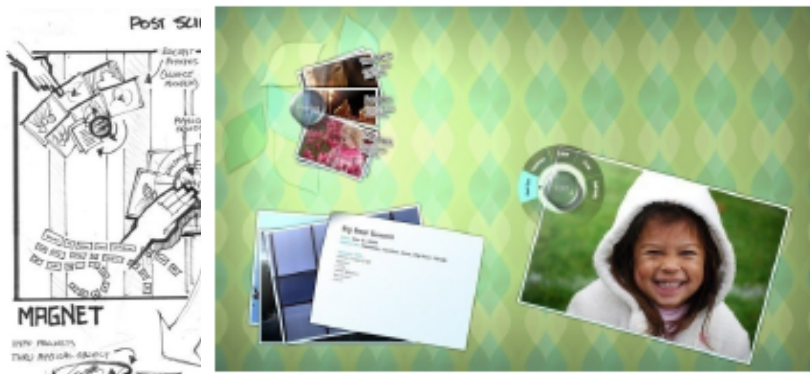
Fig. 5 Magnet interaction **Fig. 8** Magnet prototype screenshot

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Exercise

- List some metaphors for the optometrist web site.
- Representative Tasks:
  - T1. Find the cost of these:
  - T2. Find the standard warranty on Ray Ban frames.
  - T3. Order 3 red, 3 green of these: given the following payment info …

Group Exercise

- Project Groups

- Identify 3 metaphors you could use
  - Pros & Cons of each
  - Correct metaphoric entailments?
  - Incorrect metaphoric entailments?
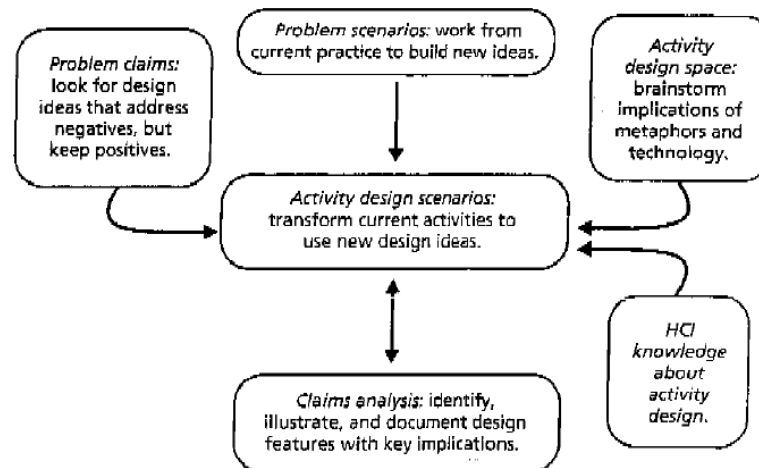 - In what ways do they lack metaphoric consistency (when do they break)?

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SBD Activity Design Process

1. Consider a problem scenario
2. Use ideas from metaphors and technology to propose possible changes
3. Try out changes in scenario
   - How do they help?
   - How would actors react?
   - What do they do next?

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Activity Design
Problem Scenarios -> Activity Scenarios

Problem scenarios: work from current practice to build new ideas.

Problem claims: look for design ideas that address negatives, but keep positives.

Activity design space: brainstorm implications of metaphors and technology.

Activity design scenarios: transform current activities to use new design ideas.

HCI knowledge about activity design.

Claims analysis: identify, illustrate, and document design features with key implications.

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Activity Scenarios

- For each Problem Scenario
  - Think how your interaction metaphors & technology can be introduced to address the problem
  - Think through how the user will use them
  - Document the new story as an Activity Scenario
- Don't discuss interface design yet!

| Example Problem Scenario ⇨	Transformed into Activity Design Scenario
1) Sally plans her exhibit on black holes.	1) Sally plans her exhibit on black holes.
Background on Sally, her motivations, . . .	Background on Sally, her motivations, . . .
Sally is a bit worried about the space and materials that are provided to everyone—a standard 4'×6' posterboard, with a two-foot shelf underneath for supporting physical materials or models. This year she has explored some new methods, for example, an Authorware simulation that illustrates her theory of black hole formation. But she knows from past years that there are few electrical outlets in the gym, and she doesn't have a laptop to use in the exhibit anyway. She checks with the organizer, Rachel Berris, just in case, but Rachel confirms that the school district has no money for special resources such as laptops, and that she will be able to use only battery-powered equipment.	Sally is curious about how creating a virtual exhibit will be different from the ones she has created in the past. She hopes that she will have more flexibility in presenting her ideas, and thinks she might be able to come up with some interactive elements that she knows the judges will like. In fact, she has already developed an Authorware simulation that illustrates her theory of black hole formation, and she wants to include this in her virtual exhibit.
As she studies her simulation, Sally thinks of	When Sally goes to the exhibit construction area, she finds a template with a suggested layout—title page, abstract, slide show, detailed results, project report, and bibliography. At first she is worried that this will not fit the materials she has already created. But when she starts adding material,

Update Task Hierarchies

- As you design your interaction you may need to change the Task Hierarchies from Requirements Analysis to reflect a new way of doing things.
- Consider alternate representations if you feel these are important:
  - E-R diagrams
  - Dataflow diagrams
  - State diagrams
  - Network diagrams

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network diagrams
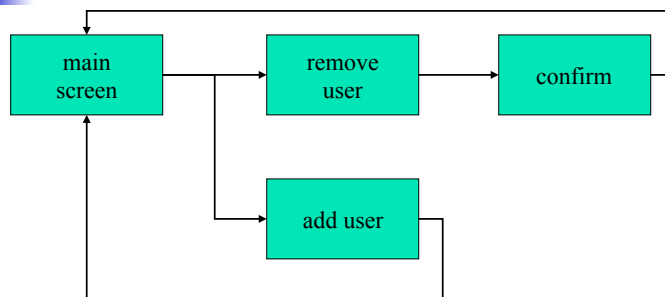
- show different paths through system

Exercise

- Same groups and task

- Pick your favorite overall metaphor and write an activity scenario
- Sketch a Task Hierarchy or Network Diagram

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Additional Methods to Help Conceptual Design (Benyon)

- Claims Analysis
  - Listing the Pros and Cons of each design feature, to enable explicit reasoning and comparison
- Point Of View Analysis
  - Work through scenario from the POV of different artifacts
  - Ask "how can I help?" at each point

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Proposed Activity Design Feature	Hypothesized Pros (+) or Cons (−) of the Feature
Putting exhibits online	+ remove many constraints regarding space and diversity in layout + facilitates an iterative process of design, construction, and editing + simplifies access to the exhibits by people separated in space and time − but may lead to a decreased emphasis or interest in physical components − but exhibitors may try to include too much, making exhibits complex
An exhibit template with traditional science project components	+ simplifies and guides the exhibit planning process + builds on prior exhibiting experience of fair participants + enhances consistency and comparability of exhibits for viewers and judges − but may discourage more inventive and creative exhibit structures

What do you do if you don't have access to users?

How to find out requirements?
How to do formative evaluation?

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Example: Antipsychotic Medication Adherence for Young Adults with Schizophrenia

I think I took them all.

I know I took AT LEAST ONE pill.

I know I took AT LEAST TWO pills.

I know I took AT LEAST THREE pills.

I really can't remember.

Could you repeat that please?

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Antipsychotic Medication Adherence for Young Adults with Schizophrenia

- Funded by Eli Lilly Pharmaceuticals – In collaboration with University of Pittsburgh School of Nursing
- 30 day, pre-post design study
- Pilot study: 20 subjects
- Intervening on three behaviors in parallel:
  - System use
  - Medication adherence
  - Physical activity

Maintaining Reality: Relational Agents for Antipsychotic Medication Adherence Interacting with Computers, 2010, 22(4) 276-288

Your progress so far. *(SAMPLE)*
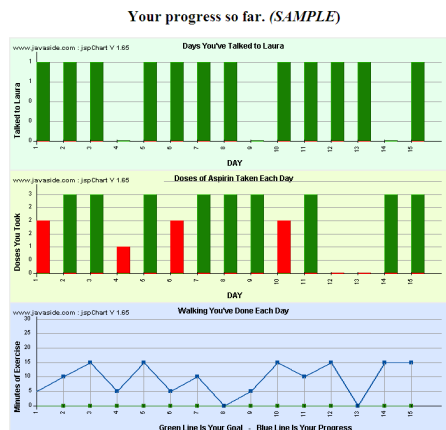
play acting

- role play
- mock up device
- pretend you are doing it

P3 – Conceptual Design (10/14)

- Convert task scenarios and hierarchical task analyses into a conceptual design.
- Metaphors.
  - Make a list of possible interaction metaphors for your interface (per the examples in class). For each of your task scenarios list at least two options for interaction metaphors and some of the implications of your choice.
- Activity Design Scenarios
  - Transform each of your problem scenarios into an activity design scenario, following the examples in Rosson & Carroll Ch 3, Figures 3.4 and 3.5.

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P3 – Conceptual Design (10/14)

- At this stage you should still be focused on the abstract steps of each task, including user input and system output actions, and should not be thinking about the details of your interface's appearance yet.
- What to Post. Your report should include three detailed activity scenarios and at least six metaphors. At this stage you should still be focused on the abstract steps of each task, including user input and system output actions, but should not be thinking about the details of your interface's appearance yet. If you have updated your task models during this exercise please provide them as well.

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To Do

- Read
  - 3 CHI papers + 1 HCIR paper
  - Rosson Ch 4
  - Swing events, read all except
    - *Implementing Listeners for Commonly Handled Events*
      - Only need to read *How to Write an Action Listener*
- Homework
  - I4 – Swing restaurant ordering UI – DUE NEXT CLASS
- Project
  - P3 – Conceptual design – due in 1.5 weeks (10/14)

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