



# Human-Computer Interaction IS4300

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## Human error - slips and mistakes

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### slip

- 😊 understand system and goal
- 😊 correct formulation of action
- 😞 incorrect action

### mistake

- 😞 may not even have right goal!

How to fix these?

- slip – better interface design
- mistake – better understanding of system



## Quiz

### Slip or Mistake?

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1. A user playing your new Virtual Autopsy game wants to make an incision but clicks on the MagicMarker tool, thinking it is a scalpel.
2. She finally selects the scalpel but while making the incision (using mouse click-and-drag) her pet cat startles awake and yelps, causing the distracted user to make the cut in the wrong place.
3. The user wants to amputate a limb. Not knowing what tool to use, she randomly selects the scalpel.



## Ethnography homework?


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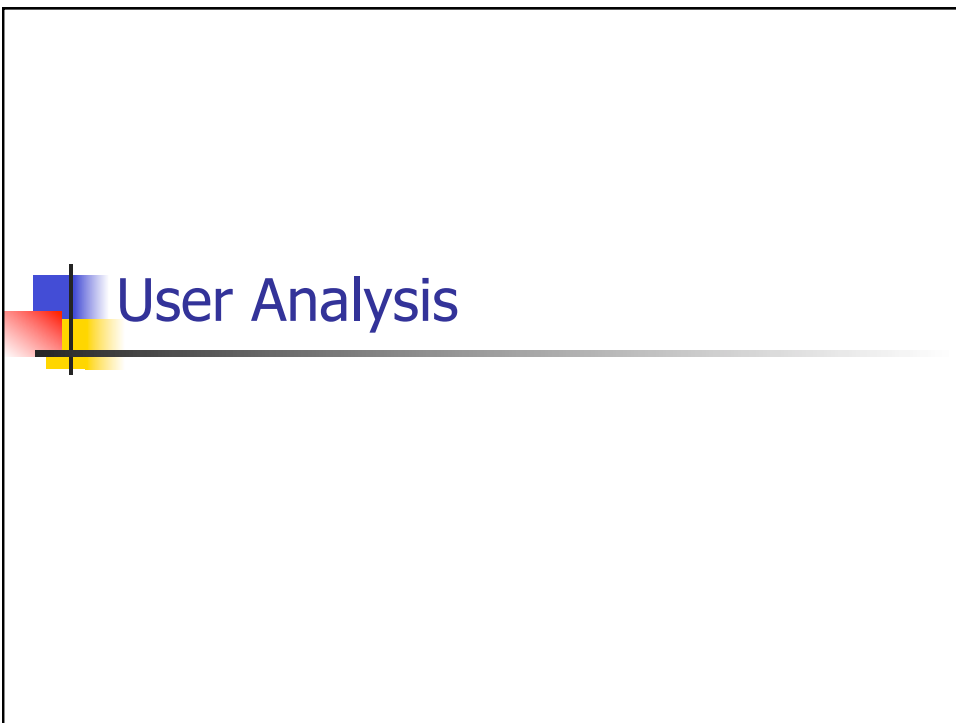
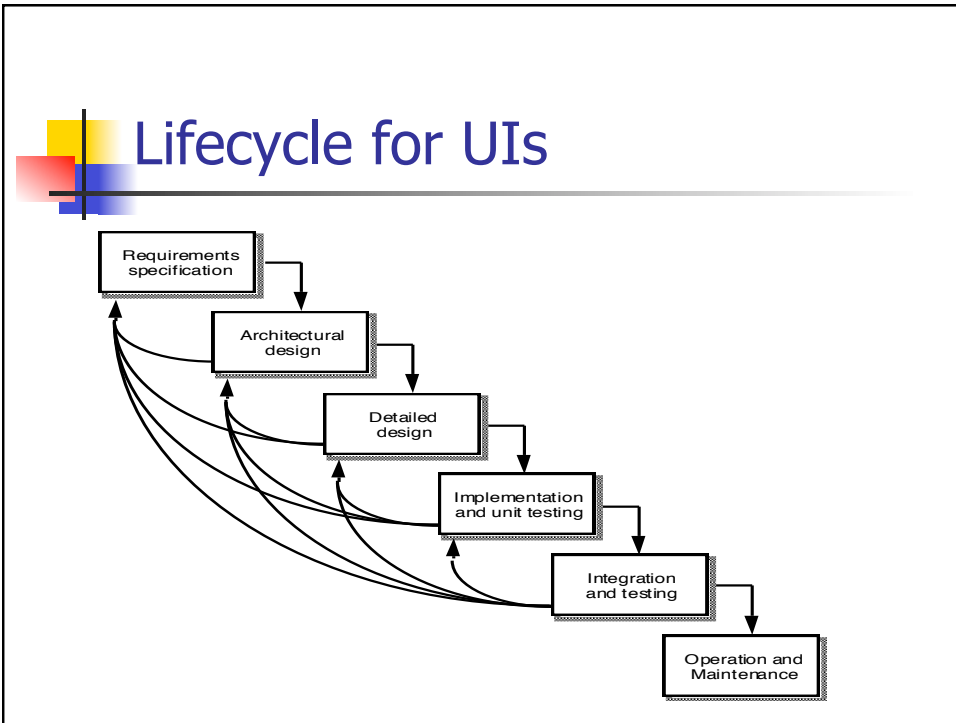
Due next class



## Project Proposals

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- ## Requirements Analysis
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- What does the system/interface need to do?
  - Who is the user?
  - What does the user need to do?
  - What is an example of system use?
  - How well does it need to perform?



## Who are the users?

### Stakeholders

- Not just users, but anyone affected
- Be aware of lines of power and communication and be clear with everyone if you are breaking them
- Symmetry
- Free rider problem
- Critical mass

## Classes of Stakeholders

- Primary
  - End users
- Secondary
  - Receive output or provide input
- Tertiary
  - Directly affected by success or failure
- Facilitating
  - Involved with design, development, maintenance



**Example: EMR**



## Personas

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### Sally Harris

is a Blacksburg High School sophomore who has participated in the science fair for the past three years. She is very interested in science and often spends time looking into science phenomena on her own initiative. She is a good student in general, poised and articulate. She has extensive experience with computers, both at school and with her own Windows PC at home. She has been using word processors and graphics editors for many years, and in the past two years has started using spreadsheets and a few simple programming packages. She spends time on the Web almost every day, sending email to friends or just surfing around.



## P2-1 User Analysis

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- Identify your users (primary, secondary, etc.) and their backgrounds
- Create a brief persona for each type of primary stakeholder.



## Exercise

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- Project teams
- Identify stakeholders
- Outline a persona for one primary stakeholder



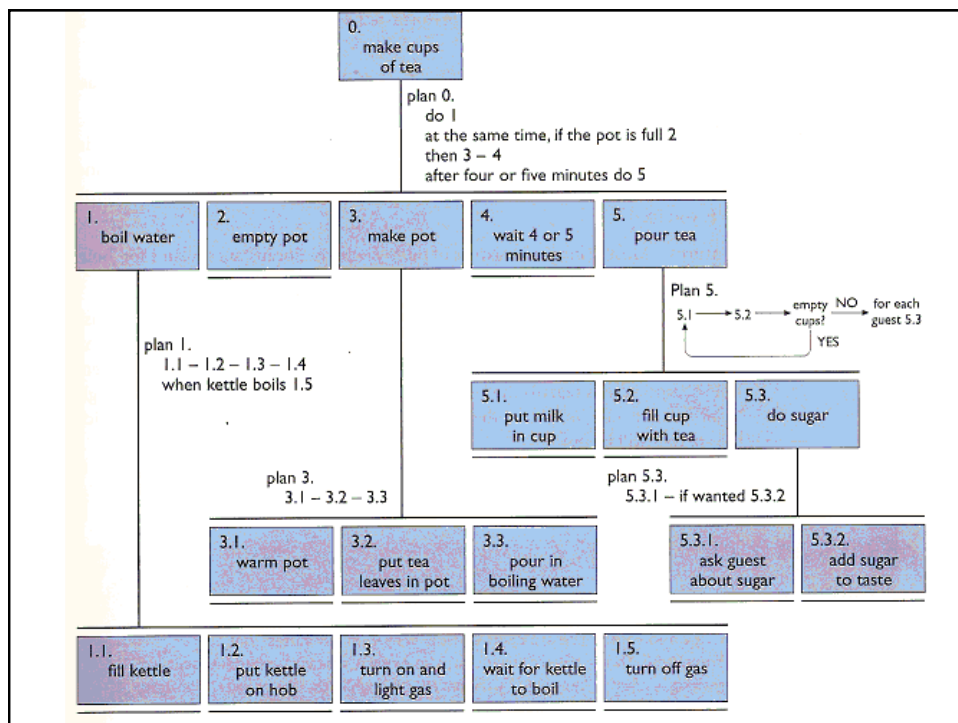
## Task Analysis

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- Analysis of how people do their jobs
- Task decomposition (HTA)
- Knowledge-based Techniques (GOMS)
- Structural Analysis (Entity-relations)

# Hierarchical Task Analysis

- Hierarchy of tasks & subtasks
  - +
- Plans
  - Express partial ordering on subtasks (possible parallelism)
  - Conditions on subtasks
  - Temporal constraints on subtasks
  - Cycles







## Class Exercise

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- HTA for tooth brushing



## Knowledge-Based Analysis

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- Goal: understand knowledge needed to perform a task
- GOMS, KLM
- Taxonomies
  - Ask the expert
  - Card sorting
  - Use for objects & tasks
  - Usually many different ways to do
    - Addressed by task descriptive hierarchy (AND/OR/XOR)



## Entity-Relationship Analysis

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- Objects
  - Concrete, Actors (roles), Composites
  - Attributes
- Actions
  - Agent, Patient (changes state), Instrument
- Events
  - Performing of an action, spontaneous
- Relationships
  - Object-object, Action-patient, Action-instrument



## P2-2 Task Analysis

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- Identify 3+ tasks your users perform now that they will be performing in your system, or are close analogs
- For each:
  - Hierarchical task decomposition
    - Task = Goal (what, not how)
    - Top-level = problem you're solving
    - Decompose into subtasks/subgoals
  - For each task
    - Goal – “Why do you do this?”
    - Preconditions (other tasks, information)
    - Decompose if nontrivial – “How do you do it?”
- “Understand the essential nature of the work” – not how your system will be used.



## Exercise

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- Project teams
- Identify one primary task for your system that users do now
- Do a HTA



## P2-2 Task Analysis


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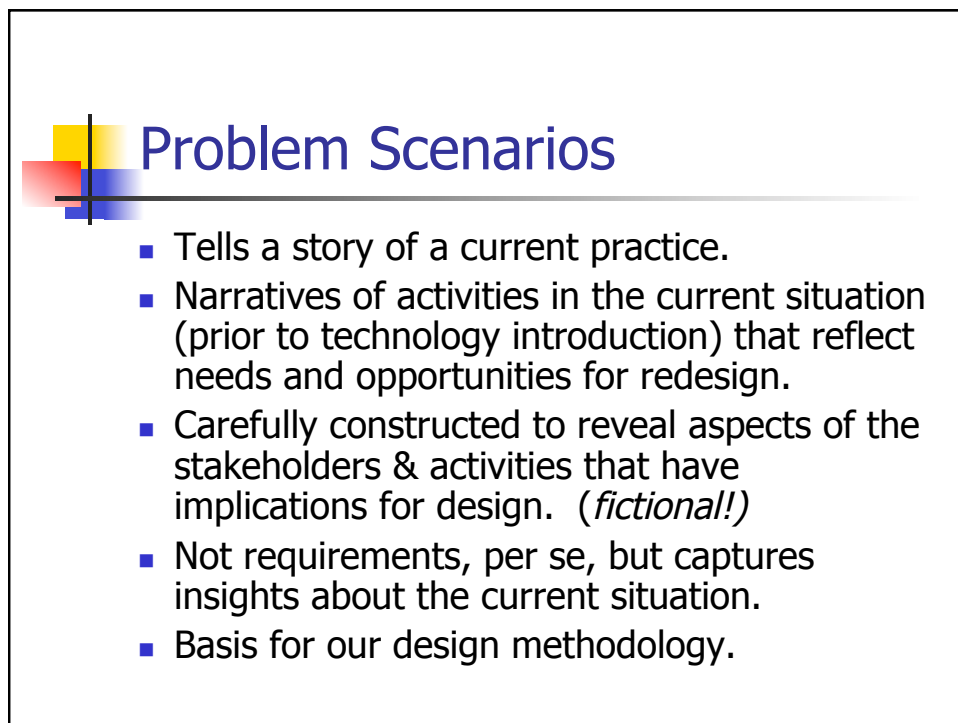
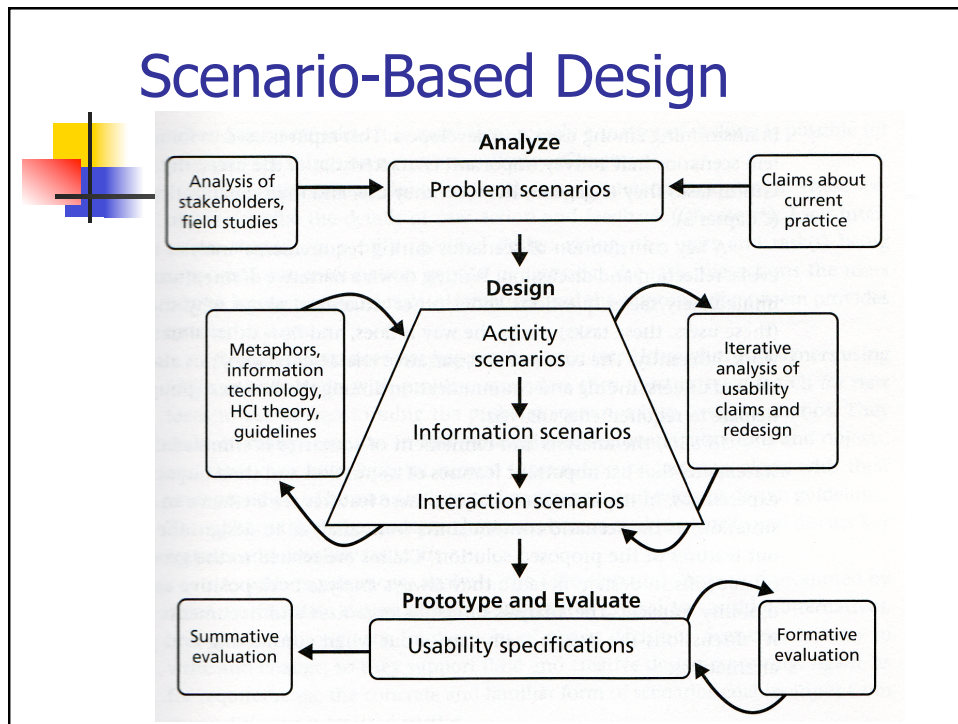
- Other information about tasks that may be useful
  - Where is the task performed?
  - How often is the task performed?
  - What are its time or resource constraints?
  - How is the task learned?
  - What can go wrong? (errors, exceptions)
  - Who else is involved in the task?

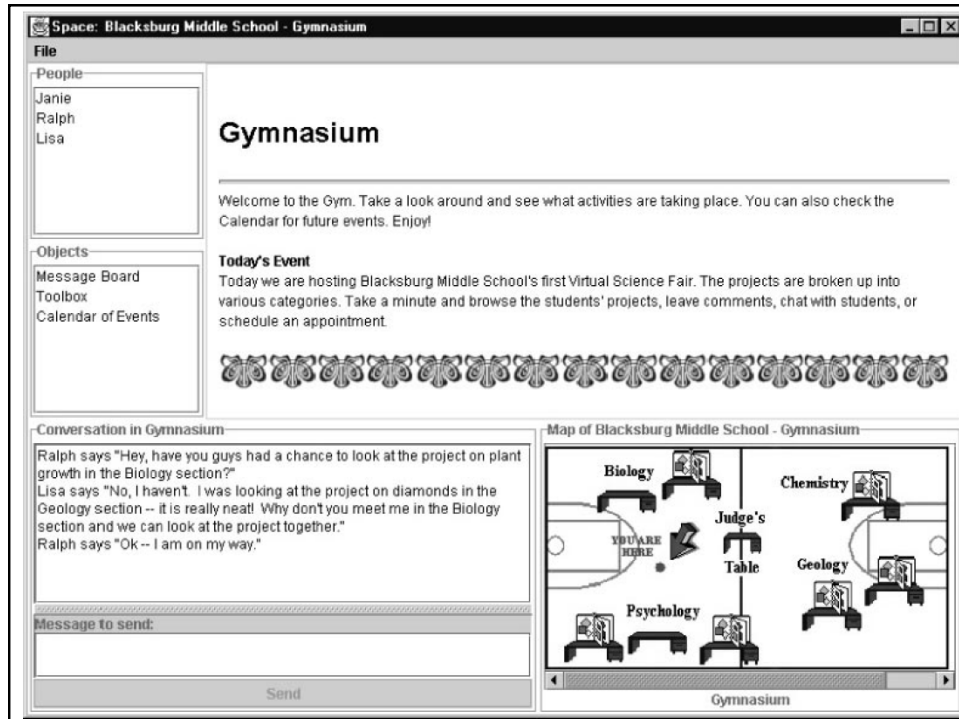


## Scenario-Based Design

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- ### What is a Scenario?
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- A concrete narrative about specific people, in specific contexts, performing very specific tasks.
  - A story.





## Example Problem Scenario

Sally Harris is a high school sophomore who has been researching black holes for the past 3 months... She has been in the science fair for the last 3 years, so she knows a lot about...

She is a bit worried about the space and materials provided to everyone... This year she has explored some new methods—for example, an Authorware simulation that illustrates her theory of black hole formation. ...

As she studies her simulation, Sally thinks of a way to turn the lack of computer support into a “feature”: She will create a sequence of visualizations that can be flipped like a deck of cards to show the animation. ...



## Why Use Scenarios?

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- Concrete
- Flexible
- Supports interdisciplinary design
- Supports participatory design
- Supports & promotes reflection and discussion



## How many scenarios? Rules of Thumb

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- You should have at least one scenario for each type of primary stakeholder
- For stakeholders with many tasks, or tasks that are complex, write multiple scenarios



## P2-3 Problem Scenarios

as in Rosson & Carroll Fig 2.13

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- Invent hypothetical stakeholders
- Write problem scenarios for your 3 tasks, for one or more primary stakeholders
- Be as concrete as possible to show actors' motives



## Exercise

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- Project teams
- Write a primary stakeholder problem scenario for the HTA task you did





## Usability Requirements

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- Nielsen's dimensions:
  - Learnability
  - Efficiency
  - Memorability
  - Error prevention
  - Satisfaction
  
- Examples?



## P2-4 Usability Requirements

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- Specify at least two measurable usability requirements for your system



## Exercise

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- Project teams
- Brainstorm on possible usability requirements for your project



## P2 - Project

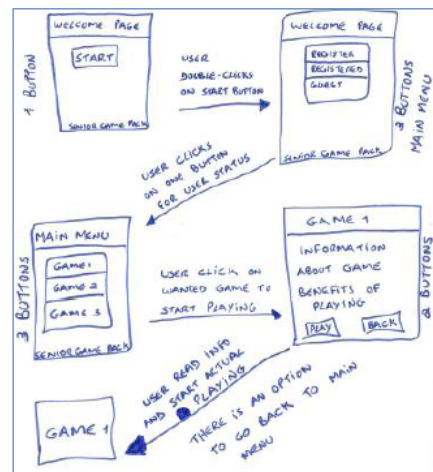
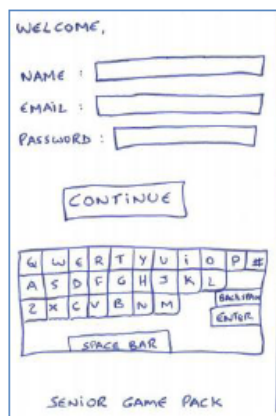
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- Description of users / user classes / personas
- Task Analysis
  - HTA for three or more tasks
- Problem Scenarios
  - For 3 most important tasks
- Specify at least two meaningful usability criteria
  
- Due in 1 week

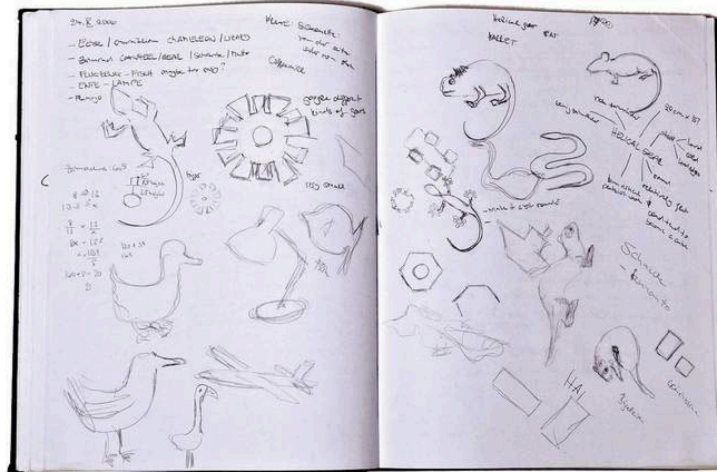
## Requirements Analysis Summary

- What's missing in these methods?
  - Interface Design!
  
- Task Analysis & Problem Scenarios intended to capture a current problem-solving activity.
  - If you are designing something totally new, with no current analog, treat these as hypotheticals

## Start sketching!



## Start sketching!



## To Do

- Read Myers chapter
- Work through Java Swing & Netbeans tutorials
- Play with NetBeans
- Finish I3, ethnography
- Start P2, requirements analysis