Homework I3: Update

- Now due next week
- Still advise you to find a spot on your own
  - Any senior center would qualify
- Cambridge Senior Center plan

Homework I3: Ethnography

- You have been hired to use computer interface technology to improve the lives of older adults.
  - Use concepts from Ethnography reading to identify problems where HCI might make an impact
    - Find a location
      - Pick a location from Stephen's list, OR
      - Propose a location to Stephen where older adults spend significant time
    - You may have to travel to a different part of the city!
    - Schedule a time
      - No more than two students at a location at one time!
      - You must observe for a 2.5 hour chunk of time
      - This is NOT an assignment you do in pairs. Do NOT go with a friend
      - Be sure to "check in" with someone (e.g., receptionist, instructor) to avoid looking suspicious
      - Zeeshan will coordinate for the locations Stephen identified
Homework I3: Ethnography

- Assess the situation. Find your optimal location.
  - A place where there are multiple older adults (eating area, class, workspace, etc.)
  - A place where you will not be in the way
- Observe. Identify problems HCI might solve.
- Interview. Try to interview at least one person (and optimally 2-3), but
  - You must ask them if OK (say you're doing a class project)
  - You need to be VERY cognizant of the impression you make
  - Do not ask them to volunteer medical information
  - Read body language carefully
  - Do not hold someone hostage
  - Thank them for their generosity

Prior homework updates

- Zeeshan sending week1 grades

- Comment on notes
  - From now on...
    - Cutting and pasting -> hand written

Team Project Guidelines

- Your project MUST
  - Have a substantial UI
  - Be interactive
  - Work robustly
  - Contribute to health or health research
  - Solve a real-world problem
  - Be targeted for and tested with older adults

Why?
Team Project Guidelines

- Your project SHOULD
  - Be creative
  - Be original
  - Be non-obvious
  - Have a "wow" factor

- Allow you, at the end of this course, to leapfrog your peers with an amazing demo!

Team Project Constraints

- Team: 3-4 members, ideally multi-disciplinary
- Focus: Health Application for (or used by) older adult users
- Context: Senior center, home, etc.
- Platform: Your choosing
- Input/output/sensing: Your choosing

Team status?
**Requirements Analysis**

- What does the system/interface need to do?
  - Who is the user?
  - What does the user need to do?

**Lifecycle for UIs**

[Diagram showing the lifecycle phases: Requirements, Architectural design, Detailed design, Implementation and unit testing, Integration and testing, Operation and Maintenance]

**Not just the interface**

- Organizational issues (CSCW)
  - Who is impacted "outside" of the system?
  - Workflow

- Example: Meeting room notification system
Not just the interface

- Organizational issues (CSCW)
  - Power structures
- Example: Virtual work
  - Presence (increases perceived worth)
  - Informal interaction
  - Exercise authority
  - Existing social and org structures (asymmetry)
  - Management by objectives

Scenario-Based Design

Stakeholders

- Not just users, but anyone affected
- People often have conflicting goals
- Symmetry (benefits ≠ those who work)
- Free rider problem
  - Visibility
  - Social pressure
- Critical mass
  - Web 2.0 challenge
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

Classes of Stakeholders

- Primary
  - End users
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Example: Course Reg

T2-1 User Analysis

- Practically speaking (for the homework)
  - Age, gender, ethnicity
  - Education
  - Physical abilities
  - General computer experience
  - Skills (typing? Reading?)
  - Domain experience
  - Application experience
  - Work environment and other social context
  - Relationships and communication patterns
- Identify major kinds/classes of users
- By interview, observation & questionnaire
Socio-technical modeling

- Work systems are composed of both people and technology
- Documents the impact of a specific technology into an organization
- Done via interviews, focus groups, observation

Key elements to capture

- Problem (hopefully a real one)
- Stakeholders
- Workgroups (informal, formal)
- Changes supported
- Technology within organization
- External constraints and performance measures

Socio-technical Modeling

- CUSTOM
  - Focus on stakeholders
- OSTA
  - Focus on tasks
- Soft systems methodology
  - Independent of technology
CUSTOM

- Stages
  1. Describe organizational context
  2. ID & describe stakeholders (current & proposed)
  3. ID & describe workgroups (current & proposed)
  4. ID & describe task-object pairs (current & proposed)
  5. ID stakeholder needs (proposed – current)
  6. Consolidate stakeholder requirements
    - Focus on stakeholder perspectives
    - cf. OSTA – focus on tasks

Open System Task Analysis (OSTA)

- Focus on aspects of system framed in terms of tasks
  - User’s goals
  - Task inputs
  - External environment
  - Transformation processes
  - Social system
  - Technical system
  - Performance satisfaction
  - New technical system

SSM – Soft Systems Modeling

- Understanding situation & problem
  - Independent of technology
- Helps designer understand broader context
Socio-technical modeling
Soft Systems Modeling “rich picture” example

What’s the answer?
- There is no right/wrong answer
- *SSM useful if it aids designer’s understanding of the problem and design of the solution*
- True of many of the techniques in HCI!

Participatory Design
- Include users throughout design process
  - Brainstorming
  - Storyboarding
  - Pencil and Paper Exercises (paper prototyping)
PICTIV

- Paper prototyping +
- Video

Example: http://www.youtube.com/watch?v=CHj6qcD6iIQ

Participatory Design

- e.g. ETHICS
  - Process of development = managing change
  - Design groups include representative stakeholders – make all design decision.
  - Explicit list of questions to answer
Participatory Design

- ETHICS
  - Make the case for change
  - Identify system boundaries
  - Describe the existing system
  - Define key objectives
  - Define key tasks
  - Define key information needs
  - Diagnose efficiency needs
  - Diagnose job satisfaction needs
  - Analyze likely future changes
  - Specify and prioritize objectives based on efficiency
- Concerns: expense and time

Contextual Inquiry

- cf ethnography
  - More focused (assumes technology)
  - More brief (usually one or a few interviews)
  - Focuses on interview (vs. observation)
  - Uses specific techniques & models
    - Sequence
    - Physical
    - etc.
  - But, done in the workplace (in context)

Why is contextual inquiry important?

- You better know the constraints on behavior!
- Example: communication and plausible deniability
Task Analysis

- Analysis of how people do their jobs
  - Task decomposition
  - Knowledge-based techniques
    - Objects, tasks, and knowledge
  - Entity-relation-based analysis
    - Actors and objects and relationships

Task Analysis

- Clarify what you know
- Organize what you know
- Understand transitions/danger points
- Fill in gaps

Hierarchical Task Analysis

- Hierarchy of tasks & subtasks
  - Plans
    - Express partial ordering on subtasks (possible parallelism)
    - Options on subtasks
    - Conditions on subtasks
    - Temporal constraints on subtasks (wait)
    - Cycles
Knowledge-Based Analysis

- **Goal:** understand knowledge needed to perform a task
- **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

- **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
  - Describe sequencing
T2-2 Task Analysis

- Practically speaking (for the homework)
  - 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?”

T2-2 Task Analysis

- 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?

Exercise

- Do a task analysis for “brushing teeth”
Example Problem Scenario

Sally Harris is a high school sophomore who has been researching black holes for the past 3 months...

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...
Problem Scenarios

- Narratives of activities in the current situation (prior to technology introduction) that reflect needs and opportunities for redesign.
  - Tells a story of a current practice.
  - Carefully constructed to reveal aspects of the stakeholders & activities that have implications for design. (*fictional!*)

Essential Elements of a Scenario

- Setting – situational details that motivate goals, actions, reactions
- Actors
- Task goals-
- Plans – Converting goal to behavior
- Evaluation – Interpreting situation
- Actions – observable behavior
- Events -

Essential Elements of a Scenario – Registrar system

- Setting – situational details that motivate goals, actions, reactions
- Actors
- Task goals-
- Plans – Converting goal to behavior
- Evaluation – Interpreting situation
- Actions – observable behavior
- Events -
T2-3 Problem Scenarios

- Invent hypothetical stakeholders
- Write about 3 tasks
- Be as concrete as possible to show actors’ motives

T2 - Team Project

- Perform User Analysis & Task Analysis
- Write up
  - Description of users / user classes
  - Task Analysis
    - Six or more tasks, including goal, preconditions, subtasks, and exceptions
  - Problem Scenarios
    - For 3 most important tasks

Basic GUI
AWT vs. Swing

- AWT used "heavy weight" components
  - Uses native widget & processes
- Swing uses "light weight" components
  - 1997, 1.1.5
  - Uses native window for top-level frame, but Swing provides its own windowing system within the frame
    - Even draws its own menus
- Thus,
  - Can have "pluggable look-and-feel"
  - Can be deployed on any device (with req'd libs)
  - Many more (non-native) widgets

Pluggable Look-and-Feel

Buttons
**Combo Box**

- Pig
- Bird
- Cat
- Dog
- Rabbit
- Pig

**Menus**

- A Menu
- Another Menu
- A text-only menu item
- A radio button menu item
- A check box menu item
- A submenu

**Text Field**

- Years: 30
Labels

Tool tips

Embedded Panels
Team Homework – Create a Restaurant Ordering App

- Two Labels, one with an icon.
- Two Buttons, one with an icon.
- One ButtonGroup with at least 3 RadioButton options (with toggling between buttons functional).
- Two CheckBoxes.
- One ComboBox with at least two items.
- One TextField
- One Panel with a titled border enclosing at least one other component.
- One tooltip on one component.
- One Menu with at least two options.

Possible Implications of Aging for Interface Designers

Hawthorn
Methodological Issues

- Studies of age as independent variable
  - Cross-sectional vs.
  - Longitudinal
  - Flynn effect (Fig 2. Hawthorne)
- Decline is non-linear

Vision & Aging

- Issues
  - Progressive impairment very common
  - Peripheral stimuli must be stronger
  - Slower processing
  - Wide variability
    - 10% of 80 yr olds are legally blind
    - 10% of 80 yr olds have 20/20 vision
- HCI impacts
  - Need to assist in maintaining focus & attention
  - Text: avoid colors, use large standard fonts, left justified
  - Use simple, relevant graphics
  - Keep screen objects together that must be compared

Speech/Hearing & Aging

- Issues
  - Hearing declines with age
    - 20% 45-54 => 75% 75-79
  - Particular problems with high frequencies
  - Difficulty with background noise
  - Speak less fluently
- HCI impacts
  - Need to use lower frequency alert sounds
  - Use lower frequency human speech for output
  - TTS may be less understandable
  - ASR less reliable
Psychomotor ability & Aging

- Issues
  - Longer response times for some tasks
  - Less control of fine movement & force
- HCI Impacts
  - Problems with mouse
    - Require less speed, larger targets

Attention & Aging

- Issues
  - Problems maintaining attention over long periods of time.
  - Ability to attend to relevant info in the face of distractors declines.
  - Possible decline in ability to divide attention.
- HCI impacts
  - Minimize distractions

Memory & Learning

- Issues
  - Slight decline in working memory
  - Some decline in episodic & procedural, but not semantic, memory
  - Recognition intact, but recall suffers
  - Decline on spatial memory tasks
- HCI impacts
  - Reduce working memory demands
  - Recognition vs. recall
  - Avoid command line languages
  - Learning new software may take significantly longer and require more practice
Intelligence

- Issues
  - Some decline
  - Individuals decline differently (verbal, reasoning, spatial, numeric, etc)
  - Crystallized vs. Fluid Intelligence
- HCI impacts
  - Reduce complexity
  - Minimize change

Cursor exercise

Next Week

- Read and take notes
  - Design I (Dix Ch 5, Dix Ch 7)
  - GUI architectures and tools (Dix Ch 8)
  - Research papers for Interface Design Tools & Toolkits (Week 5) (4 papers)
- Continue learning widgets for team’s programming language
- I3: Ethnography!
- I4: Design exercise
- T2: Task Analysis and Basic GUI
Research Papers:
Health Interfaces; Older adults

- Choe et al., Opportunities for Computing Technologies to Support Healthy Sleep Behaviors, CHI 2011 (Presenter: Ghanshyam Bhatt)
- Purpura et al., Fit4Life: The Design of a Persuasive Technology Promoting Healthy Behavior and Ideal Weight, CHI 2011 (Presenter: Xueming Wu)
- Chu Yew Yee et al., Investigating Narrative in Mobile Games for Seniors, CHI 2010 (Discuss)