Observing Users

(does not include usability testing)

What and when to observe

• Goals & questions determine the paradigms and techniques used.
• Observation is valuable any time during design.
• Quick & dirty observations early in design
• Observation can be done in the field or in controlled environments
• Observers can be:
  - outsiders looking on
  - participants, i.e., participant observers
  - ethnographers
Direct Observation

- Researcher watches use, takes notes
- Hawthorne Effect (users act differently under observation) may contaminate results
- Record may be incomplete
- Only one chance
- Helpful to have shorthand and/or forms which which you are fluent

Indirect Observation

Video logging
- User(s) body language, gestures
- Screen activity
- Two uses:
  - Exploratory evaluation: review tapes carefully and repeatedly to discover issues
  - Formal studies: know what you are looking for!

Interaction logging (software)
- Often use two or more together
- Must synchronize all data streams
- High volume of data can be overwhelming

Frameworks to guide observation

- The Goetz and LeCompte (1984) framework:
  - Who is present?
  - What is their role?
  - What is happening?
  - When does the activity occur?
  - Where is it happening?
  - Why is it happening?
  - How is the activity organized?
The Robinson (1993) framework

- **Space.** What is the physical space like?
- **Actors.** Who is involved?
- **Activities.** What are they doing?
- **Objects.** What objects are present?
- **Acts.** What are individuals doing?
- **Events.** What kind of event is it?
- **Goals.** What do they want to accomplish?
- **Feelings.** What is the mood of the group and of individuals?

Planning observations

- **Goals & questions**
- Which framework & techniques
- How to collect data
- Which equipment to use
- How to gain acceptance
- How to handle sensitive issues
- Whether and how to involve informants
- How to analyze the data
- Whether to triangulate

Data Collection Techniques

- **Notes**
- **Audio**
- **Still Camera**
- **Video**
- **Tracking users:**
  - diaries
  - interaction logging
### Verbal Protocols

- Audio record of spoken language
  - Spontaneous utterances
  - Conversation between multiple users
  - Think-aloud protocol
  - Post-event protocols
- Dangers of introspection, rationalization
- Analyze along with video

### Video/Verbal Analysis

- Diversity of approaches
- Task-based
  - how do users approach the problem
  - difficulties in using the software
  - need not be exhaustive: identify interesting cases
- Performance-based
  - frequency and timing of categories of actions, errors, task completion
- Again, time consuming: usability studies often try to do this in real time, use video as backup

### Software Instrumentation/Logging

- Time-stamped logs
  - key-presses or higher level actions
  - record what happened but not replayable
- Interaction logging
  - replayable
- Synchronize with video data for rich but overwhelming data
- Analysis issues are similar
Interpretive Evaluation

- Recent trend away from experiments ...
  - Laboratory too artificial
  - Experimental tasks too artificial
  - Cannot control all variables
  - Not valuing user's ideas
- ... towards subjective evaluation
  - Researcher immerses in work context
  - Users participate in setting objectives, carrying out and interpreting evaluation
- ... accompanied by shift in world view
  - Reality is subjective

There's a lot of methods described in the text.

Evaluation in Contextual Inquiry

- Evaluate in the user's normal working environment
  - Genuine work materials, e.g. documents
  - Realistic time frame and organization of work in time
  - Typical population members
  - Representative tasks
  - Shared control of situation

Participative Evaluation

- A natural extension of participatory design
- Users participate in and guide the evaluation
- Establish groups with representatives from the whole range of users who collaborate on the design (which is viewed as a mutual learning process)
- Provide prototypes that are sufficiently robust for users to evaluate
- Encourage focus on coupling between technical questions and social and political issues in the workplace
Ethnography

- From Anthropology and Sociology
- Researcher immerses in situation
- Role is to learn about participants from their point of view
- Must get co-operation of people observed
- Wide range of methods and data sources
- Video plays an important role
- Participants may assist in interpretation
- Questions get refined as understanding grows
- Informants are useful
- Data analysis is continuous
- Interpretivist technique
- Reports usually contain examples

Data Analysis

- **Qualitative data** - interpreted & used to tell the 'story' about what was observed.
- **Qualitative data** - categorized using techniques such as content analysis.
- **Quantitative data** - collected from interaction & video logs. Presented as values, tables, charts, graphs and treated statistically.

Interpretive Data Analysis

- Look for
  - key events that drive the group's activity
  - patterns of behavior
- Triangulate data sources against each other
- Report findings in a convincing and honest way
- Produce 'rich' or 'thick descriptions'
- Include quotes, pictures, and anecdotes
- Software tools can be useful e.g., NUDIST, Ethnograph
Asking Users

Subjective Methods

Caveat: “First rule of usability: don’t listen to users!” (Watch what they do)
Two major methods
• Interviews - qualitative analysis
• Surveys - quantitative analysis

Interviews

• Unstructured
  - No set questions or sequence
  - Rich results
  - May miss information you need; not replicable
• Structured
  - Scripted (fixed questions in sequence)
  - Easier to conduct and analyze; replicable
  - May miss opportunistic information
• Semi-structured
  - Specific and open ended questions (will discuss two ways to do this)
Basic of Interviewing

- Goals and questions guide all interviews
- Preparation should include
  - Informed consent and procedure for anonymity
  - Checking recording equipment in advance
  - Questions!
  - Two types of questions:
    - Closed: predetermined answer format, e.g., ‘yes’ or ‘no’
    - Open
    - Closed questions are quicker and easier to analyze
  - Avoid
    - Long or complex questions
    - Jargon
    - Leading questions

Organization of an Interview

- Introduction - introduce yourself, explain the goals of the interview, reassure about the ethical issues, ask to record, present an informed consent form.
- Warm-up - make first questions easy & non-threatening.
- Main body - present questions in a logical order
- A cool-off period - include a few easy questions to defuse tension at the end
- Closure - thank interviewee, signal the end, e.g., switch recorder off.

Focus Groups

- Group interviews
- Typically 3-10 participants
- Provide a diverse range of opinions
- Can get synergy between participants
- Need to be managed to:
  - ensure everyone contributes
  - discussion isn’t dominated by one person
  - the agenda of topics is covered
Analyzing interview data

• Depends on the type of interview
• Structured interviews can be analyzed like questionnaires
• Unstructured interviews generate data like that from participant observation
• It is best to analyze unstructured interviews as soon as possible to identify topics and themes from the data

Questionnaires and Surveys

• Can reach large populations (paper, email, web)
• Results can go direct to database
• Usually analyzed quantitatively
  - Open questions are hard to analyze
  - Closed questions can be automated but limit responses
• Design with your analysis in mind
• Piloting important
• Some types of closed questions and their uses
  - Checklists: categorical or background information
  - Likert scales: range of agreement or disagreement with a statement
  - Ranked order: e.g., rank in order of usefulness
  - Semantic Differential: e.g., “Attractive … Ugly”

Developing a questionnaire

• Clear statement of purpose & guarantee participants anonymity
• Decide on whether phrases will all be positive, all negative or mixed
• Pilot test questions - are they clear; is there sufficient space for responses
• Decide how data will be analyzed & consult a statistician if necessary
Encouraging responses

- Offer a short version for those who do not have time to complete a long questionnaire
- If mailed, include a s.a.e.
- Follow-up with emails, phone calls, letters
- Provide an incentive
- 40% response rate is high, 20% is often acceptable

Online Questionnaires

- Responses are usually received quickly
- No copying and postage costs
- Data can be collected in database for analysis
- Time required for data analysis is reduced
- Errors can be corrected easily
- Sampling problematic if population size unknown
- Preventing individuals from responding more than once
- May change questions in email

Asking Experts

Heuristic Evaluation and Walkthroughs
Strategies for Expert Evaluation

• Studied Ignorance
  – Pretend you are a novice user; identify usability problems
• Stress testing
  – Violate task sequence, click and type a lot, etc.
• Exhaustive Exploration
  – Examine the entire interface, looking for consistency, things that don’t work
• Can be fast and cost effective

Heuristic Evaluation (Nielsen)

• Conducted by experts
  – Expertise in both usability and domain
• Inspection guided by usability heuristics
  – Based on Design Guidelines
• Two passes
  – Inspect flow of interface from screen
  – Inspect each screen one at a time against heuristics
• 50% of the problems with two evaluators
• 75% of the problems with 5 evaluators

Nielsen’s heuristics

• Visibility of system status
• Match between system and real world
• User control and freedom
• Consistency and standards
• Help users recognize, diagnose, recover from errors
• Error prevention
• Recognition rather than recall
• Flexibility and efficiency of use
• Aesthetic and minimalist design
• Help and documentation
Doing Heuristic Evaluation

- Briefing session to tell experts what to do
- Evaluation period of 1-2 hours in which:
  - Each expert works separately
  - Take one pass to get a feel for the product
  - Take a second pass to focus on specific features
- Debriefing session in which experts work together to prioritize problems

Walkthroughs

- Structured form of usage simulation
  - Identify task, context, and user population
  - Walk through task, predicting user behavior
- Variations:
  - Cognitive walkthrough:
    - simulate cognitive processing of user .. tedious!
  - Pluralistic walkthrough:
    - multiple types of experts (designers, users, usability experts)
    - Each decides on action and assessment at each step, and then discuss

Cognitive Walkthroughs

- Designer presents an aspect of the design and usage scenarios
- One of more experts walk through the design prototype with the scenario
- Expert is told the assumptions about user population, context of use, task details
- Experts are guided by 3 questions
  - Will the correct action be sufficiently evident?
  - Will the user notice that the correct action is available?
  - Will the user associate and interpret the response from the action correctly?
Pluralistic walkthrough

- Variation on the cognitive walkthrough
- Performed by a carefully managed team that includes developers and users
- For each screen
  - Each panelist writes down what they would do
  - They compare their responses (users going first) and discuss
  - Then there is managed discussion that leads to agreed decisions
- Works well for participatory design

Collaborative Usability Inspection

- Constantine & Lockwood’s hybrid of Pluralistic and Heuristic
- Team of developers, end users, domain experts, usability experts
- Allows transfer of expertise
- Focus on finding defects: no other debate allowed
- Roles: Lead reviewer, inspection recorder, continuity reviewer

Expert Evaluation: Issues

- Requires
  - Expertise in HCI
  - Expertise in the application area
  - Ability to role play the novice
  - Objectivity (not a developer)
- Problems
  - Experts are biased
  - Hard to find experts
  - Does not increase skill of development team
  - Novices do the weirdest things! (which experts may not anticipate)