Requirements Gathering & Understanding Users

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Agenda

- Requirements Gathering
  - Why, what, how
- Observational/Interpretive Analysis
  - Motivation
  - Methods
    - Ethnography
- Implications
Project Part 1

- Requirements?

Why

- To understand what we are going to be doing
- We build systems for others, not for ourselves
What

• Overall goal - Build a system that does X
• How is success defined?
• Real-world constraints
• Environment in which system will be used
• User characteristics
• User tasks to achieve the goal
  – Task decomposition

Typical Real-World Constraints

• Elapsed time to market
• Cost/effort to design and implement
• Size/footprint/weight/power/price
• Computer power/memory (related to cost and power
• Consistency with overall product line
• Backward compatibility
• Differentiation from competitive products
How: Gather, Organize, Represent

- Gather data
  - Interviews, observation, surveys/questionnaires, documentation, immersion
- Organize data
  - Notes, cards, brainstorming, computer tools
- Represent data
  - Lists, outlines, matrices
  - Narratives
  - Hierarchies, Networks, Flow charts

What Gather: Components

- Three key components in considering how people work
  - Activities
  - Artifacts
  - Relations
- NOT JUST computer system oriented
- Study related processes and objects in the environment that people may use
  - Office environment - papers, whiteboards, ...
  - Phone calling - phone book, note pad, dial, ...
What Gather: Task Analysis Focus

- Focus on *observable behaviors*
  - What are the practices, methods, steps, objects, ..., used?
- Learn *what* users do, *why* they do it, *how* they do it, *when* they do it, with what *tools* or *people* they do it
  - Your new system / UI may change some of this, especially the *how*
  - Understanding *how* can lead to deeper knowledge and insights

What Gather: cont’d ...

- Tasks & Subtasks
  - Physical
  - Cognitive
  - Communication
- Conditions under which these tasks are done
- Results/outcomes of tasks
- Requirements to perform task
  - Information
  - Communication with others
  - Equipment

**Must include**
**Should include**
**Could include**
**Exclude**
How – Some (Not All) User & Task Analysis Methods

1. Ethnography - learn by immersion/doing
2. Observation - thinking out loud
3. Cooperative Evaluation
4. Interviews
5. Questionnaires
6. Focus groups
7. Study Documentation
8. Look at competitive products

Interpretive Analysis

- Experiments: Formal and objective
- Interpretive analysis: More subjective
  - Concerned with humans, so no objective reality
  - Sociological, anthropological approach

- Users involved, as opposed to predictive approaches
Beliefs

- Sees limitations in scientific hypothesis testing in closed environment
  - Lab is not real world
  - Can’t control all variables
  - Context is neglected
  - Artificial, short tasks

IA Methods

- A number of different methods or techniques in this area exist
  - Ethnography
    - Our main focus
  - Contextual inquiry
    - More specific form of ethnography with a focus on asking questions
  - Field study
    - Common notion, often equated with ethnography
  - Observational study
    - Much more informal, just watching users
  - ...
**Ethnography**

- Deeply contextual study
- Immerse oneself in situation you want to learn about (anthropological and sociological roots)
  - Observing people in their cultural context
- Interpretation of data is primary
- Behavior is meaningful only in context

**Philosophy**

- Argues that formal environment of controlled study is artificial --- Experimenter wields “power” over subject
- So ... get into working environment of user
- --> Interpretation is primary, rather than data
Objectives

- Understanding the user
  - Understand goals and values
  - Understand individual’s or group’s interactions within a culture
  - Try to make tacit domain knowledge explicit
  - Do this in an unbiased fashion
  - For UI designers: Improve system by finding problems in way it is currently being used

Techniques

- In person observation
- Audio/video recording
- Interviews

- “Wallow in the data”
Observation is Key

- Carefully observe everything about users and their environment
- Think of describing it to someone who has never seen this activity before
- What users say is important, but also non-verbal details

Observations

- Things of interest to evaluator
  - Structure and language used in work
  - Individual and group actions
  - Culture affecting work
  - Explicit and implicit aspects of work
- Example: Office work environment
  - Business practices, rooms, artifacts, work standards, relationships between workers, managers, ...
Interviews Important

- Have a question plan, but keep interview open to different directions
- Be specific
- Create interpretations together with users
  - Be sure to use their terminology
- At end, query “What should I have asked?”
- Record interviews

Steps

- 1. Preparation
  - Understand organization policies and work culture
  - Familiarize yourself with system and its history
  - Set initial goals and prepare questions
  - Gain access and permission to observe & interview
- 2. Field study
  - Establish rapport with users
  - Observe/interview users in workplace and collect all different forms of data
  - Follow any leads that emerge from visits
  - Record the visits

Rose et al '95
Steps

• 3. Analysis
  – Compile collected data in numerical, textual and multimedia databases
  – Quantify data and compile statistics
  – Reduce and interpret data
  – Refine goals and process used

• 4. Reporting
  – Consider multiple audiences and goals
  – Prepare a report and present findings

One Technique: Affinity Diagram

• Write down each quote/observation on a slip of paper
• Put up on board
• Coalesce items that have affinity
  – If they are saying similar things about an issue
• Give names to different groups (colors too)
• Continue grouping subgroups
• A hierarchy will be formed
Why Useful?

- Can help designer gain a rich and true assessment of user needs
  - Help to define requirements
- Uncovers true nature of user’s job
  - Discovers things that are outside of job description or documentation
- Allows you to play role of end-user
  - Can sit in when real users not available
- Open-ended and unbiased nature promotes discovery
  - Empirical study and task analysis are more formal – ethnography may yield more unexpected revelations
Types of Findings

• Can be both
  – Qualitative
    • Observe trends, habits, patterns, ...
  – Quantitative
    • How often was something done, what percent of the time did something occur, how many different ...

Drawbacks

• Time required
  – Can take weeks or months
• Scale
  – Most use small numbers of participants just to keep somewhat manageable
• Type of results
  – Highly qualitative, may be difficult to present and use
• Acquired skill
  – Identifying and extracting “interesting” things is challenging
Ethnomethodology

- Concurrent/informed ethnography
  - Study is being done in conjunction with a system being developed
  - + Helps keep focus on user throughout design
  - - Requires lots of time and coordination

To Learn More...

- CS 6455 – User Interface Design and Evaluation
- All about qualitative methods
2. Observation - Thinking Out Loud

- Sit with user doing activity of interest to you
- Encourage user to verbalize what they are thinking
- Video or audio record (with permission)
- Not everyone is good at this
- Hard to keep it up for long time while also doing something; need breaks

3. Cooperative Evaluation

- User is viewed as collaborator in evaluation, not a subject
  - “Friendly approach”

- Relaxed version of think-aloud
  - Evaluator and participant can ask each other questions
CE Methods

• Seeks to detect errors early in a prototype
• Experimenter uses tasks, also talks to participant throughout, asks questions...
• Have debriefing session at end

4. Interviews

• Structured – “Just the facts”
  – Efficient
  – Training - interview process
• Unstructured – A conversation
  – Inefficient
  – Training – process + domain knowledge
• Semi-structured – start with focused questions, move to open-ended discussion
  – Good balance, often appropriate
  – Training – process + domain knowledge
Semi-Structured Interviews

- Predetermine data of interest - know why you are asking questions - don’t waste time
- Plan for effective question types
  - How do you perform task x?
  - Why do you perform task x?
  - Under what conditions do you perform task x?
  - What do you do before you perform...?
  - What information do you need to...?
  - Whom do you need to communicate with ...?
  - What do you use to...?
  - What happens after you...?
  - What is the result or consequence of...?
  - What is the result or consequence of NOT...?
  - See Gordon & Gill, 1992; Graesser, Lang, & Elofson, 1987

Typical Open-Ended Questions

- Why do you do this (whatever the task is you are studying)

- How do you do this?
  - Gets at task-subtask structure
  - Then ask about each subtask

- Why do it this way rather than some other way?
  - Attempts to get user to explain method so you can assess importance of the particular way of doing task

- What has to be done before you can do this?
  - To understand sequencing requirements
Typical Open-Ended (cont’d)

- Please show me the results of doing this
- Do errors ever occur when doing this?
  - If answer is ‘yes,’ then learn why occur
- How do you discover the errors, and how do you correct them?
  (Adapted from Nielsen et al, CHI ’86)
- Encourage digressions; ask for elaborations
- What else should I have asked you?

Domain Expert Interviews

- Expert describes how it should be done
  (not necessarily how it is done)
5. Questionnaires

- General criteria
  - Make questions clear and specific
  - Ask some closed questions with range of answers
    - Sometimes also have a no opinion option, or other answer option
  - Do test run with one or two people

Questionnaires - Example

- Seven-point Likert Scale (use odd #)
  - Strongly agree, agree, neutral, disagree, strongly disagree

<table>
<thead>
<tr>
<th>Evaluation Questionnaire</th>
<th>1 2 3 4 5 6 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I felt that the computer agent's help was worthwhile.</td>
<td>Disagree</td>
</tr>
<tr>
<td>2. I found the computer agent to be intrusive.</td>
<td>Disagree</td>
</tr>
<tr>
<td>3. I found the computer agent's help to be distracting.</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

- Could also use just words
  - Strongly agree, agree, neutral, disagree, strongly disagree
Other Typical Questions

- Rank the importance of each of these tasks (give a list of tasks)
- List the four most important tasks that you perform (this is an open question)
- List the pieces of information you need to have before making a decision about X, in order of importance
- Are there any other points you would like to make? (open-ended opinion question; good way to end)
- Same questions can be used in interview and in questionnaire; difference is in follow-up opportunity

6. Focus Groups

- Group of individuals - 3 to 10
  - Use several different groups with different roles or perspectives
  - And to separate the powerful from those who are not
  - Careful about few people dominating discussion
- Use structured set of questions
  - More specific at beginning, more open as progresses
  - Allow digressions before coming back on track
- Relatively low cost, quick way to learn a lot
- Audio or video record, with permission
7. Study Documentation

- Similar in some ways to the expert interview
- Often describe how things should be done rather than how they are done
  - Try to understand why not done “by the book”

8. Look at Competitive Products

- Looking for both good and bad ideas
  - Functionality
  - UI style
- Do user task performance metrics to establish bounds on your system
Which Methods to Use?

- Depends on
  - Resources
  - Current knowledge of tasks and users
  - Context
    - Can't use talking out loud if tasks involve two people working together
  - Essential to use some methods
  - Not likely you will use all methods

Goal - Organize Information

- Organizing the information blends in with step 5, documenting the results
- Group process - compare notes
- Several tools can be used to facilitate
Tools for Making Sense

- Card Sorting - to create Affinity Diagrams
- Card sorting also useful for web site organization
  - Do it with multiple users

Affinity Diagram - from Card Sorting

- Cards are notes from interviews, focus groups, etc.

From *Interaction Design*, Preece Rogers and Sharp
More Tools for Making Sense

- Flow charts and work flow diagrams
- Software tools for
  - Card sorting
  - Flow charts
  - Task analysis diagramming

Project Part 1

- Let’s review the specs...
Design of Everyday Things

- Discuss next Thursday
- Be reading now...

Upcoming

- Task analysis & requirements definition
- Design of Everyday Things
- Design