Requirements Analysis

Analyzing requirements
- **Goal:** understand users’ current activities well enough to reason about technology-based enhancements
  - Understanding the work being done now
    - Offer function that meets real needs
  - Learn about the people themselves
    - Offer function in a way that is convenient and satisfying

Analyzing Work
- Observe and describe people’s activities
  - What goals do they pursue, how?
- Collect and study artifacts used in these activities
  - Tools, documents, features of the work setting
- Capture the social context of the work
  - Groups and organizations, roles and relationships
Appointment Books and PDAs

- How not to do it: Apple Newton
  - Do-it-all product does lots of things poorly
  - Unfocused market -- who wants a $700 personal organizer
  - Smaller than previous PDAs but still too large for a pocket
  - Did not consider why people use handheld artifacts and how technology could help

The Doonesbury Effect

Time Tradeoffs

A Successful Design: Palm

- Evolution helped by requirements analysis
- Developer “used” wood block as a PDA
- Each meeting centered around a prototype
- Well-targeted audience
  - Four basic applications
  - Inexpensive
  - Data synchronization led to multiplatform
Summaries:
- stakeholder, task, and artifact analyses, general themes

Root concept:
- vision, rationale, assumptions, stakeholders

Problem scenarios:
- illustrate and put into context the tasks and themes discovered in the field studies

Claims analysis:
- find and incorporate features of practice that have key implications for use

Field studies:
- workplace observations, recordings, interviews, artifacts

Getting Users Involved:
- Usually there will be multiple “stakeholders”
  - e.g., workers, but also support staff, management
  - Each with knowledge, preferences, perspectives
- Observe and/or interview representatives from all relevant groups
  - Discuss their typical tasks, their role in the organization
  - As well as technology background and expectations
- Participatory analysis: videotapes or other records of activities that participants view and discuss

Field studies:
- Based on:
  - Observation
  - Interviews
  - Questionnaires
- Tools:
  - Interviewing guides
  - Recordings (photos, audio, video)
- Methods:
  - Ethnography
  - Participatory analysis
  - Contextual inquiry
Observation

- used to study user in the real world
- instead of asking, watch what user does
- can be very time-consuming
- information may be very hard to organize or understand
- may get info about complex processes, dependencies, or culture that you couldn’t get any other way

Data from observation

- “transcripts” of user’s interaction with system
- timelines of user’s work flow
- artifacts produced
- problems, errors, sources of frustration

Passive or active observation?

- how should you act during observation?
- passive: make yourself inconspicuous and just watch and record
- active: ask questions, request verbal protocol, etc.
- tradeoff of uninterrupted work vs. more/better information
- can you be completely invisible?

Interviews

- used to gain user’s perspective
- NOT used to convince user of what you’ve already decided!
- usually one-on-one
- structured or free-form?
- how do you gather and store information?
Questionnaires

- used when questions are more specific
- can gather statistical / quantitative info
- can get feedback from many more users
- not as personal or in-depth as interviews

Questionnaire topics

- demographics (age, gender, handedness, eyesight, technical training)
- special skills (computer usage, domain familiarity)
- attitudes (what do you think of the current system? how would you like X?)
- domain information (what’s the most frustrating thing about X? how long does it take you to do X?)

Summarizing / synthesizing

- Stakeholder profiles
- Stakeholder diagram
- Task analysis
- Artifact analysis
- Workplace themes

Hierarchical Task Analysis (HTA)

- Decomposition of complex activity
  - Goals and subgoals, with control logic
  - Documents how things are ‘supposed’ to work
  - Much like an algorithm or program for the task
- Then can carefully study the implications
  - Does task really happen this way? If not, why?
  - Are there sources of complexity, bottlenecks? Why?
1. Navigate to registrar.vt.edu
2. Open faculty access tool
3. Display roll for CS 3724

Plan 0: Do 1,2,3
Plan 1: Do 1.1, 1.2
Plan 2: Do 2.1, then 2.2; if 2.2 fails, do again
Plan 3: Do 3.1, 3.2, 3.3

Plan 2.2: Do 2.2.1, 2.2.2

Using HTA in design
- More focused design
  - Analyze where time (for example) is spent
  - Focus redesign on interface for that sub-task
- Automation
  - Look for sub-tasks that require lots of user resources (cognitive, memory, motor)
  - Think of ways to move those tasks to the computer

Taxonomic analysis
- Classifying tasks
- Gain a better understanding of similarities between tasks and how users think about tasks
- Informs organization of newly designed system (e.g. menus)

Examining an Artifact
- What does it tell you about the task it supports?
  - If at all possible, observe it in use
  - Objects are not always used as intended!
- Try to extract task information and procedures
  - What task attributes are apparent or can be inferred?
  - What action sequences are required or possible?
  - What seems likely to be simple or difficult to do?
- Practice on some familiar examples:
  - Ex: wristwatch, phone, appointment book, badge
Artifacts and Use

- Ethnographic observation of a control room
- Status slips served as rich "work sites"
- Critical attribute is that they were shared objects

Problem scenarios

- Hypothetical stakeholders
- Based on important tasks
- Include information from themes
- Highlight critical problems with current situation
- Multiple scenarios can reuse actors and artifacts

Problem scenario example

Marissa was not satisfied with her class today on gravitation and planetary motion. She is not certain whether smaller planets always move faster or how a larger or denser sun would alter the possibilities for solar systems.

She stays after class to speak with Ms. Gould, but she isn’t able to pose these questions clearly, so Ms. Gould suggests that she re-read the text and promises more discussion tomorrow.
Claims analysis

- Analyze features of a situation that have important effects on actors
- Upsides and downsides - tradeoffs
- Tied to specific artifacts and activities
- Elaborate and extend scenarios
- Highlight critical features of scenarios
- Promotes balanced view
- Supports design - increase or maintain upsides; decrease or eliminate downsides

Claims (see pgs 73-4)

| Repeated involvement by same students | + increases competence  
|                                      | + encourages community  
|                                      | - hard to break in |
| Competition among students for prizes | + rewards time/effort  
|                                      | - increases frustration  
|                                      | - hard to compare diversity |

Case study: garden.com

Looking Ahead

- Activity design
  - Designing effective activities
  - Designing comprehensible activities
  - Designing satisfying activities
- Information design (make things visible)
  - Perceiving information
  - Interpreting information
  - Making sense of information
- Interaction design (the principle of mapping)
  - Selecting a goal
  - Planning and executing an action sequence