Requirements Analysis

Goal: understand users’ current activities well enough to reason about technology-based enhancements

SBD and Requirements Analysis

Root concept: vision, rationale, assumptions, stakeholders

Field studies: workplace observations, recordings, interviews, artifacts

Summaries: stakeholder, task, and artifact analyses, general themes

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
Analyzing Users’ Requirements

- 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
- Study the artifacts they use
  - Explore artifacts currently used to do work to understand how work can occur better

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
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?

Plan 0: Do 1, 2, 3

0. Check class roll

Plan 1: Do 1.1, 1.2

1. Navigate to registrar.vt.edu

Plan 2: Do 2.1, then 2.2; if 2.2 fails, do again

2. Open faculty access tool

Plan 3: Do 3.1, 3.2 3.3

3. Display roll for CS 3724

Plan 2.2: Do 2.2.1, 2.2.2

2.2.1 Enter PID

2.2.2 Enter password

Plan 2: Do 2.2.1, 2.2.2

2.2 Select semester

2.1 Select link

1. Open browser

1.2 Enter URL

2. Logon

3.1 Select ‘summary class info’

3.2 Select semester

3.3 Select class CRN
Conceptual Models

- Internal model of how a device will work
- Includes both design model and user’s model
- Informs us of why a design will (or will not) work

Design Model

- The conceptual model of the system to be built, held by the designer based on expected:
  - User goals & intentions
  - User background & experience
  - User limitations (cognitive or system resources)
User’s Model

- Mental model held by the user about the system resulting from:
  - Interpretation of the System Image of the physical implementation
  - Actual goals, experience, limitations

Understanding Stakeholders

- Contextual inquiry: people are observed as they carry out tasks in their normal work environment
- Participatory analysis: people are observed, then engaged in discussion about these activities as part of development
Examining an Artifact

- What does it tell you about the task it supports?
  - If at all possible, observe it \textit{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 Support Tasks?
Artifacts and Use

• Ethnographic observation of a control room
  – status slips served as rich “work sites”
  – critical attribute is that they were *shared* objects
Analyzing the Larger Context

Using an approach like activity theory to examine relations among tasks, artifacts, conventions, and shared goals of a community

- **Artifacts**: Flyers, calculator, coupons, shelves, etc.
- **Activity goal**: Satisfied customer
- **Actor**: Me
- **Task**: Purchase groceries
- **Rules**: Sale dates, payment, item limits, etc.
- **Community**: Kroger and its customers
- **Division of labor**: I browse, cashier rings up, manager oversees, bagger bags, etc.

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
Affordances

- “Perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used” -- DOET
- Chair affords sitting
- Glass affords seeing thru (and breaking)
- Wood affords support (and carving)

Poor Affordances
Non-Obvious Affordances?

Affordances in User Interfaces
An Example: Virtual Science Fair

- **Root concept**
  - Vision: online student exhibition of projects
  - Rationale: quality impact, community involvement
  - Stakeholders: students, teachers, administrators
  - Assumptions: platform, time constraints, etc

- **Field studies**
  - Identify questions, survey stakeholders, examine artifacts (posters)

- **Summaries**
  - Make stakeholder profiles
  - Perform HTA and artifact analysis

- **Problem scenarios**
  - Describe current practice (how does science fair work now) – at least 1 per stakeholder

- **Claims analysis**
  - Identify key claims from each scenario – at least 1-2 per scenario
Another Example: 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
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