



Requirements Analysis

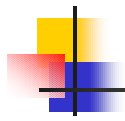
Goal: understand users' current activities well enough to reason about technology-based enhancements



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



Iterative Requirements Specification

- UCSD recognizes
 - It is impossible to fully specify requirements in advance
 - Options reveal real needs
 - Work processes evolve
- Thus
 - Requirements analysis is an on-going process

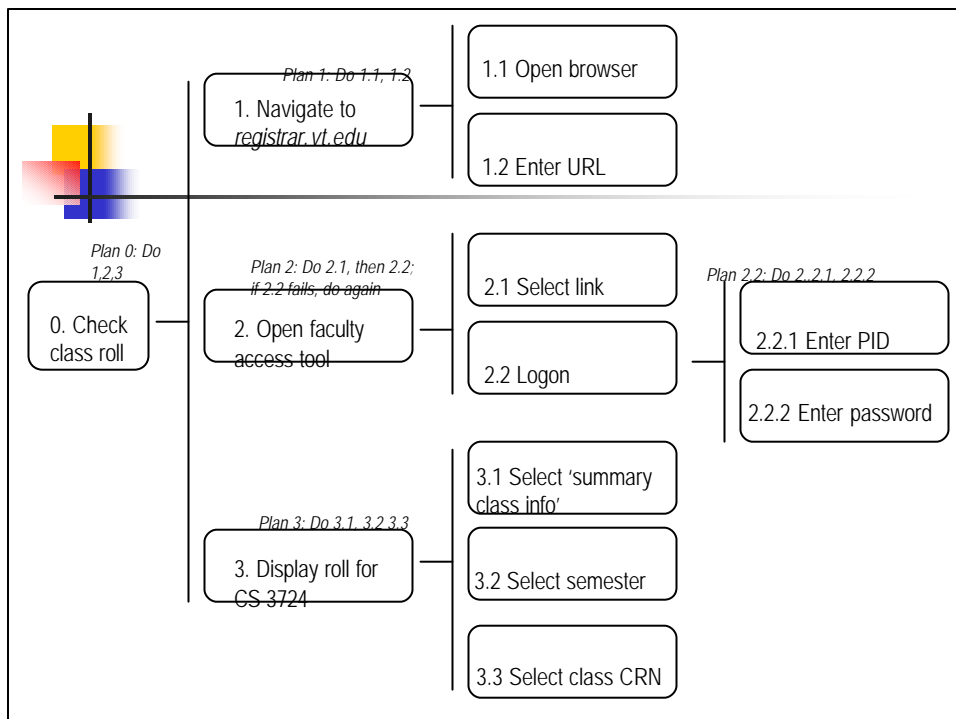


Analyzing Work

- 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?





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 Support Tasks?



Artifact – Pencils

- Shape suggests information about human hands (size, grasping)
- Importance of real-world use
 - School pencils – good erasers
 - Artists / Engineers – sharp points
 - Social aspects – brand?



Appointment Books and PDAs

- Apple Newton
 - Do-it-all product tries to do lots of things
 - 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



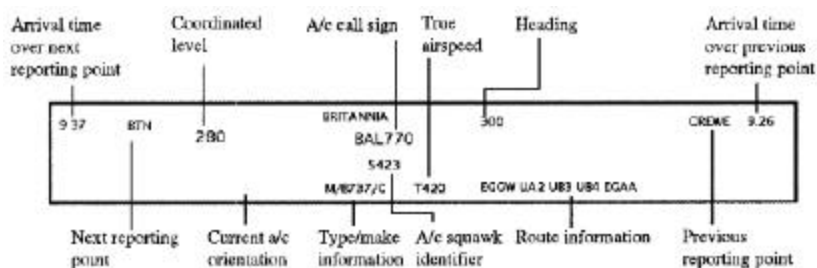
Time Tradeoffs

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

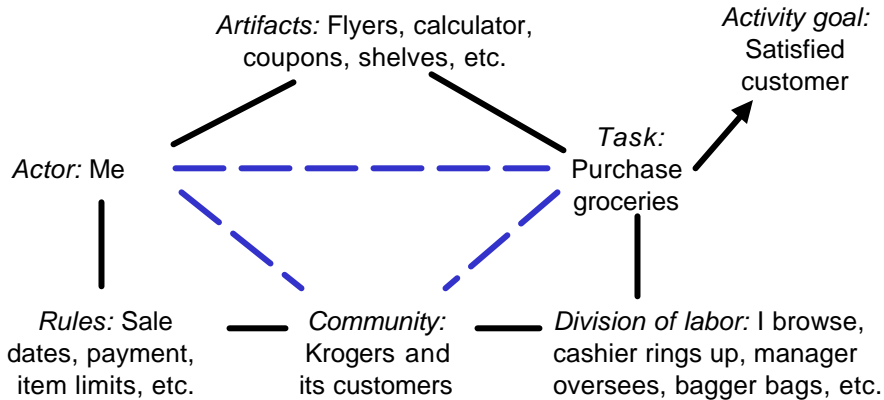
Artifacts and Use

- 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



Law firm example

- For each legal proceeding, thousands of documents identified by junior attorneys.
 - Online index is created by litigation support workers (date, sender, recipient, type)
 - Date encoding requires understanding of document role
 - "Document" definition required judgment
 - Some details were "invisible" to the attorneys



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



User knowledge

- People “rationalize” their own behaviors
- May describe “procedures manual” versions of behaviors
- Much expertise and process knowledge is held as tacit knowledge
- Users may not realize these behaviors until specific situations are presented



Tacit versus Explicit

Organizational Explicit View

- Training
- Tasks
- Position in hierarchy
- Procedures and techniques
- Work flow
- Methods and procedures
- Teams

Activity-Oriented Tacit View

- Learning
- Know-how
- Informal systems, contacts
- Conceptual understanding
- Work practices
- Rules of thumb, judgment
- Communities



Affordances

- “Perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used” – D. Norman, DOET, p.9
- Chair affords sitting
- Glass affords seeing thru (and breaking)
- Wood affords support (and carving)



More Affordances

- Plates → pushing
- Knobs → turning
- Slots → inserting
- Balls → throwing, bouncing

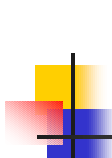
- “When affordances are taken advantage of, the user knows what to do just by looking... no instruction is required.” – D. Norman, DOET, p.9.



Poor Affordances



Non-Obvious Affordances?



Example: Fire Exits

- Push, not pull
 - Affordances
 - Visibility
- Which side?
 - Constraints
- Ease of use
 - No hands!

This slide is from a presentation by Miranda Capra



Window Affordances

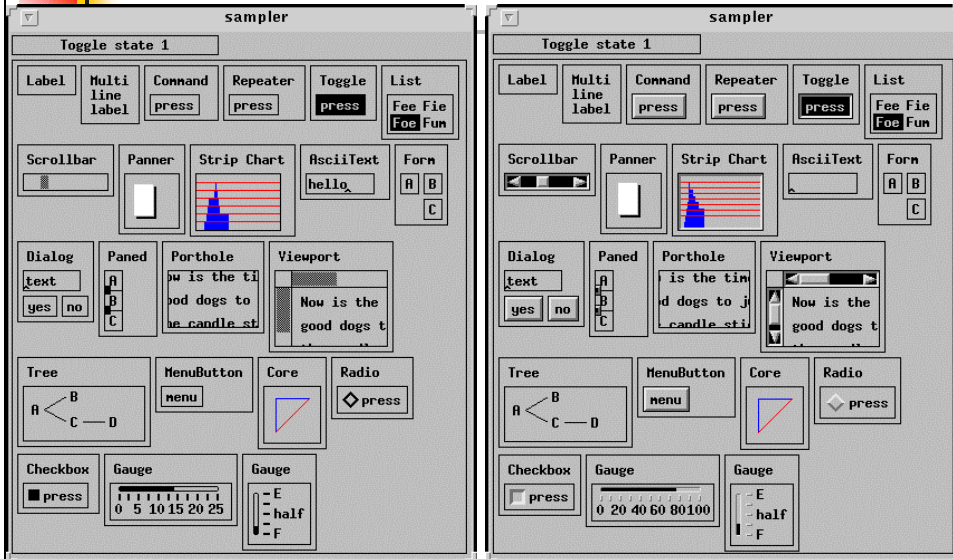
- Rolling down the window:
 - Up?
 - Down?
 - Automatic?



Wiper Affordances

- Turning on the windshield wipers
 - Front wipers?
 - Rear wipers?
 - Speed controls?

Affordances in User Interfaces



Conceptual Models

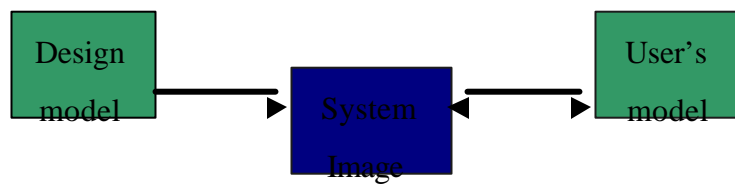
- Internal model of how a device will work
- Includes both design model and user's model
- Informs us of why a design will (or will not) work

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





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