

Task Analysis

Learning about, analyzing and describing how people do their jobs/work.

Input & Output

- Gather data about what users need.
- Represent data.

Data to be Gathered.

- Information about users
- Description of environment
- Major goals of the job
- User preferences & needs
- Tasks & Subtasks:
 - – Physical
 - – Cognitive
 - – Communication
- Requirements to perform task:
 - Information
 - Communication with others
 - Equipment

Data Gathering Techniques

1. Observation
 - a. Watch users do what they do.
 - b. Record with videotape
 - c. Take lots of notes, sketches
2. Interviews & Contextual Inquiry
 - a. Engage the user more than just watching.
 - b. Structured interviews
 - i. Efficient, but requires training.
 - c. Unstructured
 - i. Inefficient, but requires no training.
 - d. Semi-structured
 - i. Good balance
3. Ethnography
 - a. Deeply contextual inquiry
 - b. "Live among" the users
 - c. Understanding the full complexity

also...
4. Surveys & Questionnaires
 - a. Subjective answers in a quantitative format
 - b. Questions:
 - i. – Exploratory vs. confirmatory

- ii. – Open-ended vs. categorical (exhaustive)
- 5. Focus Groups & Expert Debriefing
 - a. Structured Interview with groups of individuals.
 - b. Focus on preferences and views.
 - c. Relatively low cost.
 - d. Audio or video record
- 6. Competitive Product Review
 - a. Looking for both good and bad idea
 - b. Why are they successful or unsuccessful?
 - c. What does successful really mean?
- 7. Documentation mining
 - a. Standards docs
 - b. Manuals
 - c. Histories
 - d. Best Practices
- 8. Data logging
 - a. Keystroke/mouse clicks
 - b. Timers
 - c. Logs of transactions
 - d. Physical location/movement trackers
 - i. Cell phones
 - ii. Aware Home

Representing Data (OUTPUT)

- 1. Task Outlines
 - a. Examine lawn.
 - i. Check Make sure grass is dry.
 - ii. Look for objects laying in the grass.
 - b. Inspect lawnmower.
 - i. components for tightness
 - ii. Check engine oil level.
- 2. Narratives
 - a. More effective for communicating general idea.
 - b. Not effective for details
 - c. Not effective for branching tasks
 - d. Not effective for parallel tasks
- 3. Hierarchies & Network Diagrams
 - a. Hierarchical Task Analysis (HTA)
 - b. Entity-Relationship Diagrams
- 4. Flow Charts
 - a. includes actions, decisions, logic, by all elements of the system
 - b. Abstracted
 - c. Mature, well-known, good tools

Execution: What we do to the world

Evaluation: Comparing what happened with what we wanted to happen

Why Design is Hard?

- Number of things to control has increased dramatically.
- Displays are more virtual/artificial.
- Marketplace pressure
- Errors are becoming increasingly serious.

Ideas come from

- Imagination
- Analogy
- Observation of current practice
- Observation of current systems

Borrow from other fields.

- Animation
- Theatre
- Information displays
- Architecture

Idea Creation methods

- Consider new use for object.
- Add to object.
- Minimize.
- Change the point of view.

Overall Guidelines for Design

1. Provide a good conceptual model.
2. Make things visible.

Design Principles

1. Use simple and natural dialog in users' language.
2. Strive for consistency.
3. Provide informative feedback.
4. Minimize user's memory load.
5. Permit easy reversal of actions.
6. Provide clearly marked exits.
7. Provide shortcuts.
8. Support internal locus of control

9. Handle errors smoothly

10. Provide useful help.

Graphic Design Principles

- Metaphor
- Clarity
 - i. White space.
 - 1. Leads the eye.
 - 2. Strengthens impact of message
 - 3. Allows eye to rest between elements of activity
- Consistency
- Alignment
 - i. Allows eye to parse display more easily.
 - ii. GRIDS
 - 1. (Hidden) horizontal and vertical lines to help locate window components.
- Proximity
 - i. Items close together appear to have a relationship.
- Contrast
 - i. Guides your eyes around the interface.

White space Provides symmetry and balance through its use [T]

White space Used to promote simplicity, elegance, class, refinement [T]

Economy of Visual Elements

- Less is more.
- Minimize borders and heavy outlining,
- Reduce clutter.
- Minimize the number of controls.

Typography

- Readability
 - How easy it is to read a lot of text.
- Legibility
 - How easy it is to recognize a short burst.

Fonts

- Serif
 - Times
- Sans serif
 - Arial
- Onscreen font
 - Verdana
- Script

- Script

Typography Guidelines

1. Use serif for long, extended text; sans serif for “headlines”.
2. Use 1-2 fonts/typefaces.
3. Use 1-3 point sizes max.
4. Never use bold, italics, capitals for large sections of text.
5. Be careful of text to background color issues.

Color Attributes

1. Hue
 - a. native color
2. Saturation
 - a. Relative purity
3. Value
 - a. lightness or darkness of a color

Color Guidelines

- Design in b/w then add color.
- Avoid using color in non-task related ways.
- **Use color to draw attention**, communicate organization, to establish relationships.
- **Display color images on black background**
- Avoid brown and green as background colors.

CH6

An Essential Concept of UCD

Requirements for an interactive system cannot be fully specified at the beginning.

- Iterative design

Key notion of design artifact

- Make it fast.
- Allow lots of flexibility.
- Make it cheap.
- Promote valuable feedback.

Can't “simulate” non-functional features in prototype [T]

Prototyping Dimensions

1. Representation
 - a. Can be just textual or visual.

2. Scope
 - a. Is it just the interface.
3. Executability
 - a. A goal for later-state prototyping
4. Maturation
 - a. What are the stages of the product as it comes along.
 - i. Revolutionary - Throw out old one.
 - ii. Evolutionary - Keep changing previous design.

Terminology

- Early prototyping
- Late prototyping
- Low-fidelity prototype
- High-fidelity prototype
- Horizontal prototype
 - Very broad, does or shows much of the interface
- Vertical prototype
 - Fewer features or aspects of the interface simulated

Prototyping Methods

- Design description
- Flow chart
- Sketches
- Storyboarding
- Scenarios
- Tutorials

Prototyping Tools

- Draw/Paint programs
- Scripted simulations
- Interface Builders

Wizard of Oz

Method

- Behavior should be algorithmic.
- Good for voice recognition systems

Advantages

- Allows designer to immerse oneself in situation.
- See how people respond.

Build a model of how a user works, then predict how he or she will interact with the interface.

Human as a social actor

- A. Situated action.
- B. Activity theory.
- C. Distributed cognition.
- D. All the above

Cognitive Models

1. Model Human Processor
2. GOMS
3. Production Systems
4. Grammars

Components of Model Human Processor (MHP)

- Set of memories and processors
- Set of "principles of operation"
- Discrete, sequential model

MHP: Three Systems in Model

- Perceptual
- Cognitive
- motor systems

Perception & Cognition have memories [T]

GOMS: Components

- Goals
- Operators
- Methods
- Selection Rules

GOMS is not so well suited for:

- Tasks where steps are not well understood.
- Inexperienced users

Physical/Movement Models

- Power Law of Practice
- Hick's Law
- Fitts' Law
- Simulations

Models of human cognition

- Situation action
- Activity theory
- Distributed cognition

Activity theory components:

- Subjective
- Object
- Actions
- Operations

Attributes of User Profiles?

- Motivation
- reading level
- education

Experience

task system	Design goals
(Low-low)	Many syntactic
(High-high)	Efficient commands
(Low-high)	Semantic help
(High-Low)	Lots of syntactic

CH8

Formative (predictive) evaluation

As project is forming. All through the lifecycle. Early, continuous. Iterative

"Evaluating the design"

Summative evaluation

After the system has been finished. Make judgments about the final item.

"Evaluating the implementation"

Experimental Approach

- Lab studies
- + Replicable
- - Expensive

Naturalistic Approach

- Field studies
- + Ecologically valid
- + Cheap, quick, less training required.
- -Not quantitative

Predictive Evaluation **Methods**

- Heuristic Evaluation
- Discount Usability
- Cognitive Walkthrough
- **Model-based** Evaluation

Heuristic Evaluation (HE): **Procedure**

- Gather inputs.
- Evaluate system.
- Collection

Heuristic Evaluation (HE) Advantage:

- Cheap
- Good for small company

Cognitive Walkthrough (CW): **Requirements**

- Description of users and their backgrounds
- Description of task user
- **complete list** of the actions
- Prototype or description of system

Information gathered can be:

- objective or subjective

Information also can be:

- qualitative or quantitative

Conducting an Experiment

- Determine the TASK
- Determine the performance measures.
- IRB approval
- Collect the data.
- Inspect & analyze the data.

Types of Variables

- Independent
- Dependent

Experimental Designs

- Within Subjects Design
 - efficient
 - Every participant provides a score for all conditions.
- Between Subjects
 - Less efficient
 - Each participant provides results for only one condition.

CH9

Research Focus divided into two main areas:

- Systems / Groupware
- Social component

Classifying Groupware

- Time/Space matrix
- People-Artifact Framework

Meeting and Decision Support Systems

- Provides ways of rationalizing decisions.
- Concurrency control is important.
- Group discussion/design aid tools