DEPARTMENT OF COMPUTER SCIENCE
UNIVERSITY OF TORONTO

CSC318S

THE DESIGN OF INTERACTIVE COMPUTATIONAL MEDIA

Lecture 6 — 28 January 1998

UNDERSTANDING USERS AND THEIR NEEDS

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6.1 Information gathering

Specific aspects of “Information Gathering” phase of design:
- Goals and requirements
- Understanding users and their characteristics
- Methods for understanding users: Questionnaires, interviews, ethnography and interaction analysis
- Task analysis

6.2 Goals and requirements

Goals
- Economics
- Productivity
- Satisfaction for users and/or clients
- Safety, reliability

Functional requirements
- Based on a task analysis: what the users do, how they do it
- What the new system is to do in general terms
- What specific capabilities are therefore required

Technical requirements and constraints
- Price
- Size
- Weight
- Compatibility with other technologies
- Adherence to standards

Measures of success
- *Absolute*, *objective*, quantifiable, measurable, e.g.,
  - “Productivity” improvement of 10% within 1 year
  - Error-free performance in 1 hour without a manual

Subjective
Satisfaction with system expressed by 95% of operators after 6 months of use
Relative to current method, e.g., alternative technology

Priorities and tradeoffs (think of cars, stereos, etc.)
General-purpose vs. special-purpose
Ease of use vs. ease of learning
Power vs. simplicity
High-speed vs. error-free performance
High-end in functionality and price vs. low-end

6.3 Characteristics of users

Physical characteristics
Age
Gender
“Handicaps”, e.g., left-handed, glasses, colour-blind

Knowledge and experience
Computer literacy
Task literacy
Education
Native language, reading level
Typing skill
System experience: expert, experienced, novice
Application experience

Psychological characteristics
Attitude and motivation, e.g., committed, alienated
Cognitive style: verbal-analytic, spatial-intuitive

Job and task characteristics
Mandatory use, discretionary use

Regular use, casual use
Turnover rate
Level of training
Task importance
Task structure (see below)

Characteristics aren't enough
Need for interviews
Need for observation
Need for reflection

6.4 Sample user profiles

Sample systems

Videotex system or park information system	Airline reservations or phone order system

User profiles

All job types	Clerical
All education levels	High school, comm. coll.
Male and female	Mostly female
Many languages	English
Age 8 and up	Age 20 and up
Many levels comput. literacy	Moderate comput. literacy
Low frequency of use	High frequency of use
No training, no manual	Mandatory training
Discretionary use	Mandatory use

Possible resulting design choices

Touch screen	Keyboard
Menus, icons	Typed command language
Easy to learn (prompts, structure, ...)	Easy to use (optimizations, flexibility)
.....	.....

6.5 Understanding users

Talking to and/or observing users as a means to understanding them

Questionnaires about user characteristics, attitudes, skills, tasks, and work practices (6.6)

Interviews about these issues, talking to users as a means of understanding who they are and what they do (6.7)

Observation of users in their work or social environment, paying particular attention to the users, their interactions, their tools, the artifacts they create, and the space in which they work (6.8)

Contextual inquiry, a process involving aspects of both interview and observation (CSC428)

Interpretation of results and synthesis into a description of the users and of the tasks that they do (6.9)

6.6 Questionnaires

Can be administered in person, via phone, or via mail

Must be designed and pre-tested with small samples

Importance of avoiding bias in question design

Open-ended versus closed-ended questions

Advantage: “Precise,” allowing good control and comparability over a set of users

Disadvantage: Therefore not as adaptable to individual characteristics or specific situations

6.7 Interviews

Characteristics
- Best done face-to-face
- Adaptable to individual characteristics or specific situations
- But still require careful planning and pre-testing

Who to interview
- Think about social categories — Age, education, socio-economic class, job skills, etc.
- Sampling broadly or focusing narrowly on a subset of individuals defined in terms of these categories

How many people to interview
- Minimum of 3-4 interviews, ideally more
- More (at least 2 per category) if sampling broadly

What questions to ask the interviewees
- Questions about user characteristics, attitudes, skills, tasks, work practices, preferences, problems

How to record the interview
- Notetaking is good, but...
  - Difficult to talk and write, consider a two person team
- Audio recording is better, but beware of...
  - Poor audio quality
  - Hesitation — allow turning off of the tape recorder

Video recording is even better, but beware of...
Technical complexity
Intrusiveness, possible impact on interviewee

What techniques to use in conducting the interview
Make the interviewee feel comfortable and relaxed (e.g., start with innocent subject)
Make the interviewee feel important
Make the interviewee feel safe (e.g., confidentiality)
Help the interviewee understand what the interview is about (e.g., context, motivation, importance)
If discussing a system under design, show a prototype
Keep the interview on track
Follow leads given by the interviewee
At end, ask if there is anything else interviewee would like to add
Be gracious, respectful, and thankful

How to interpret interview data for design
Functionality
Market potential
Use scenarios
Design approaches, metaphors

6.8 Ethnography and interaction analysis

Ethnography (Suchman and Trygg, 1991, p. 75))

> "Ethnography, the traditional method of social and cultural anthropology, involves the careful study of activities and relations between them in a social setting. Such studies require extended participant observation of the internal life of a setting, in order to understand what participants themselves take to be relevant aspects of their activity. Importantly, this may include things that are so familiar to them as to be unremarkable (and therefore missing from their accounts of how they work), although being evident in what they can actually be seen to do."

Interaction analysis (Suchman and Trygg, 1991, p. 75)

> "Interaction analysis is concerned with detailed investigation of the interaction of people with each other and with the material environment. Our use of interaction analysis is inspired by prior work in anthropology and sociology, particularly ethnomethodology and conversation analysis... In work settings, where our studies have been centered, our analysis focus on the joint definition and accomplishment of the work at hand, through the organization of interaction and the use of supporting technologies and artifacts."

Key concepts

- Participant observation
- Focus on observing user behaviour
- Focus on non-verbal behaviour
- How one works is as important as what one accomplishes
- Focus on the use of artifacts
- The need for tools for video markup and analysis

An example — The PARC Workplace Project Video

- A study of airline flight operations at an airport
- Key themes :
  - Spaces
  - Centers of coordination
  - Technologies
  - Artifacts

6.9 Task analysis

A user/task analysis seeks to uncover:

- What the user skill sets are
- What the user's work environment is like
- How users perform their tasks now
- What language, mental models users employ in their work
- What objectives they might have for a product
- How users might actually use a product

We seek to learn about user characteristics
- Task experience and domain knowledge, e.g., by
  - radiologists, telephone switchboard operators
- Computer literacy, e.g., systems & application experience

We seek to understand the users' conceptual model
- Task structures and organizational patterns,
  - e.g., order taking, order entry, shipping, billing
- Artifacts or objects used in tasks, e.g., files, forms
- Organization of artifacts,
  - e.g., page->section->chapter->book->library

We seek to understand work flow patterns
- Who performs which tasks and how often
- Communication patterns among workers

We seek to understand relationships between tasks & artifacts
- How specific forms and files are used in order entry

We seek to understand use of information in the environment in carrying out a task
- Things perceived visually, e.g., materials on hand
- Things perceived acoustically, e.g., conversations
  - of co-workers, opening of door

We seek to understand the use of other technologies, e.g., phones, voice mail, fax

We use the observational methods mentioned above
- Notetaking
- Audio recording
- Video recording
- Think-aloud protocols
- Participant observation

in order to

Observe, describe, and understand current work practice
Observe, describe, and understand system usage
Listen to users thinking and talking about their work
Collect qualitative data, e.g., mental models, emotions
Collect quantitative data, e.g.,
    How many?
    How often?
    How long?

CSC428 presents more material about task analysis