“Its (the computer’s) interesting potential lay not in its ability to perform calculations but in its capacity to represent action in which humans could participate.”

Overview
- Problems
- Goals
- Motivation
- Context
- Models
- Principles

Problems
- Lack of consideration of user issues
- Hardware development (devices, speed, resolution, etc.)
- Conformance with earlier (poorer) software (qwerty)
- Feature-ism
- Matching interface to task
- Lack of understanding of the user
- Poor layout

Problems (2)
The following are windows taken from various HCl's. What problems do you see?

Xspread initial window
**Goals**

- Decrease users’ time to learn
- Increase users’ performance speed
- Decrease users’ rate of errors
- Improve users’ retention over time
- Improve users’ “satisfaction”

**Motivation**

- **Life-critical systems**
- **Industrial/Commercial use**
  - An early study at ATT indicated that a 0.8 second reduction in the 15 second average time per call would save the company $40 million per year.
- **Home and entertainment applications**
- **Exploratory systems**
- **Cooperative systems**
Models

- Norman’s model of man-device interaction
- Foley & van Dam, Four levels of interaction
- Card, Moran, & Newel, GOMS
- Card, Moran, & Newel, Keystroke
- Object Model
- Theatrical Model

Norman’s model of man-device interaction

- Goal
- Intention
- Evaluation
- Action Sequence
- Interpretation
- Execution
- Perception
- Device

Foley & van Dam, Four levels of interaction

- Conceptual Level
  - user’s mental model of the system
- Semantic Level
  - meanings conveyed by commands and display
- Syntactic Level
  - defines how units (words) are assembled into meaning sequences
- Lexical Level
  - devices and mechanisms by which the user specifies action

Card, Moran, & Newel, GOMS

- Goals and subgoals
  - tasks the user wants to accomplish
- Operators
  - elementary perceptual, motor, or cognitive acts
- Methods
  - scripts or procedures by which the user accomplishes goals
- Selection rules
  - specify controls structures for choosing among several methods

Object Model

- An object is a entity represented by a collection of data that is manipulated using a collection of operations.
- Examples
  - Document
  - Paragraph
Theatrical Model

Audience

\[ \text{Backstage} \]

\[ \text{Stage} \]

Theatrical Model Characteristics

- The “stage” is all the user sees.
- The production doesn’t “work” if the audience sees what is going on backstage.
- The “reality” is the imaginary world on the stage (the representation).
- Unlike most theatre, the users are active participants.

Theatrical Model Characteristics

- The stage is a virtual world, populated by agents (human and computer generated) and other elements in the representational context (windows, desktops, etc.).
- Technical magic is produced backstage.
- Allows representation of parallel activity.

Principles (Shneiderman’s HCI Principles)

- Shneiderman’s 8 Golden Rules
  - Be consistent
  - Enable frequent users to use shortcuts
  - Offer informative feedback
  - Design dialogs to yield closure
  - Offer error prevention and simple error handling
  - Permit easy reversal of actions
  - Support user locus of control
  - Reduce short-term memory load

Principles (Shneiderman’s HCI Principles)

- Recognize diversity
  - usage profiles
  - Novice user
  - Knowledgeable intermittent user
  - Expert frequent user

Principles (Norman’s Golden Rules)

- Good Conceptual Model
- Visibility
- Mappings
- Feedback