Lecture 5 Human Performance Modeling - 4

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GOMS

Question?

- How much time will it take to replace all instances of a 4-letter word in MS Word?

What is GOMS?

- A family of user interface modeling techniques

- Goals, Operators, Methods, and Selection rules
  - Input: detailed description of UI and task(s)
  - Output: various qualitative and quantitative measures

What can GOMS model?

- Task must be goal-directed
  - Not problem solving or creative tasks (e.g. design)

- Can include serial and parallel tasks

How to Do GOMS Analysis

- Generate task description
  - Pick high-level user Goal
  - Write Method for accomplishing Goal - may invoke subgoals
  - Write Methods for subgoals
    - This is recursive
    - Stops when Operators are reached
- Evaluate description of task
- Apply results to UI

Operators vs. Methods

- Operator: the most primitive action

- Method: requires several Operators or subgoal invocations to accomplish

GOMS Output

- Execution Time
- Functionality coverage and consistency
  - Does UI contain needed functions?
- Operator sequence
  - In what order are individual operations done?
  - Abstraction of operations may vary among models

An Example: Keystroke-Level Model

- How to make a KLM
  - List specific actions user does to perform task
    - Keystrokes and button presses
    - Mouse movements
    - Hand movements between keyboard & mouse
    - System response time (if it makes user wait)
  - Add Mental operators
  - Assign execution times to steps
  - Add up execution times
- Only provides execution time and operator sequence

KLM Example

- Replace all instances of a 4-letter word.

(example from Hochstein)

Description	Operation	Time (sec)
Reach for mouse	H[mouse]	0.40
Move pointer to "Replace" button	P[menu item]	1.10
Click on "Replace" command	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Specify word to be replaced	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Point to correct field	P[field]	1.10
Click on field	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Type new word	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Move pointer on Replace-all	P[replace-all]	1.10
Click on field	K[mouse]	0.20
Total		**10.2**

According to this KLM model, it takes 10.2 seconds to accomplish this task.

Advantages of GOMS

- Gives several qualitative and quantitative measures
- Model explains **why** the results are what they are
- Less work than usability study
- Easy to modify when interface is revised
- Research ongoing for tools to aid modeling process

Disadvantages of GOMS

- Only works for goal-directed tasks
- Assumes tasks are performed by expert users
- Evaluator must pick users' tasks/goals
- Does not address several important UI issues, such as
  - readability of text
  - memorability of icons, commands