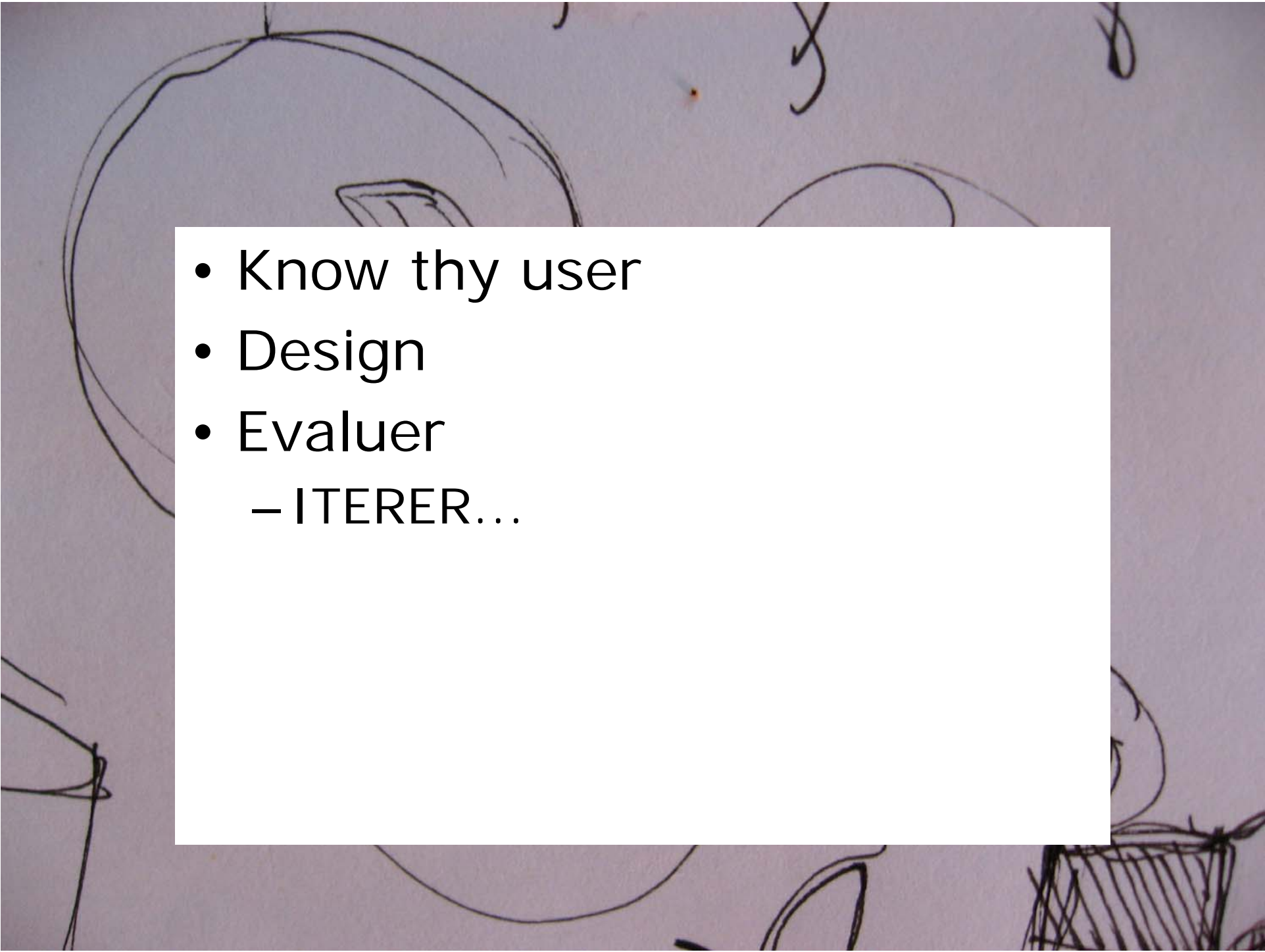


A faint, hand-drawn sketch of a human face in pencil or light ink, serving as the background for the slide. The sketch includes the outline of the head, eyes, nose, and mouth, with some additional lines suggesting hair or facial features.

Web-usability og human-computer interaction

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- 
- The background of the slide features several hand-drawn sketches in black ink on a light-colored surface. On the left, there is a large, roughly circular shape with a smaller, rectangular shape inside it, possibly representing a face or a container. To the right, there are more abstract sketches, including a curved line and a rectangular shape with diagonal hatching. The overall style is sketchy and informal.
- Know thy user
 - Design
 - Evaluator
 - ITERER...

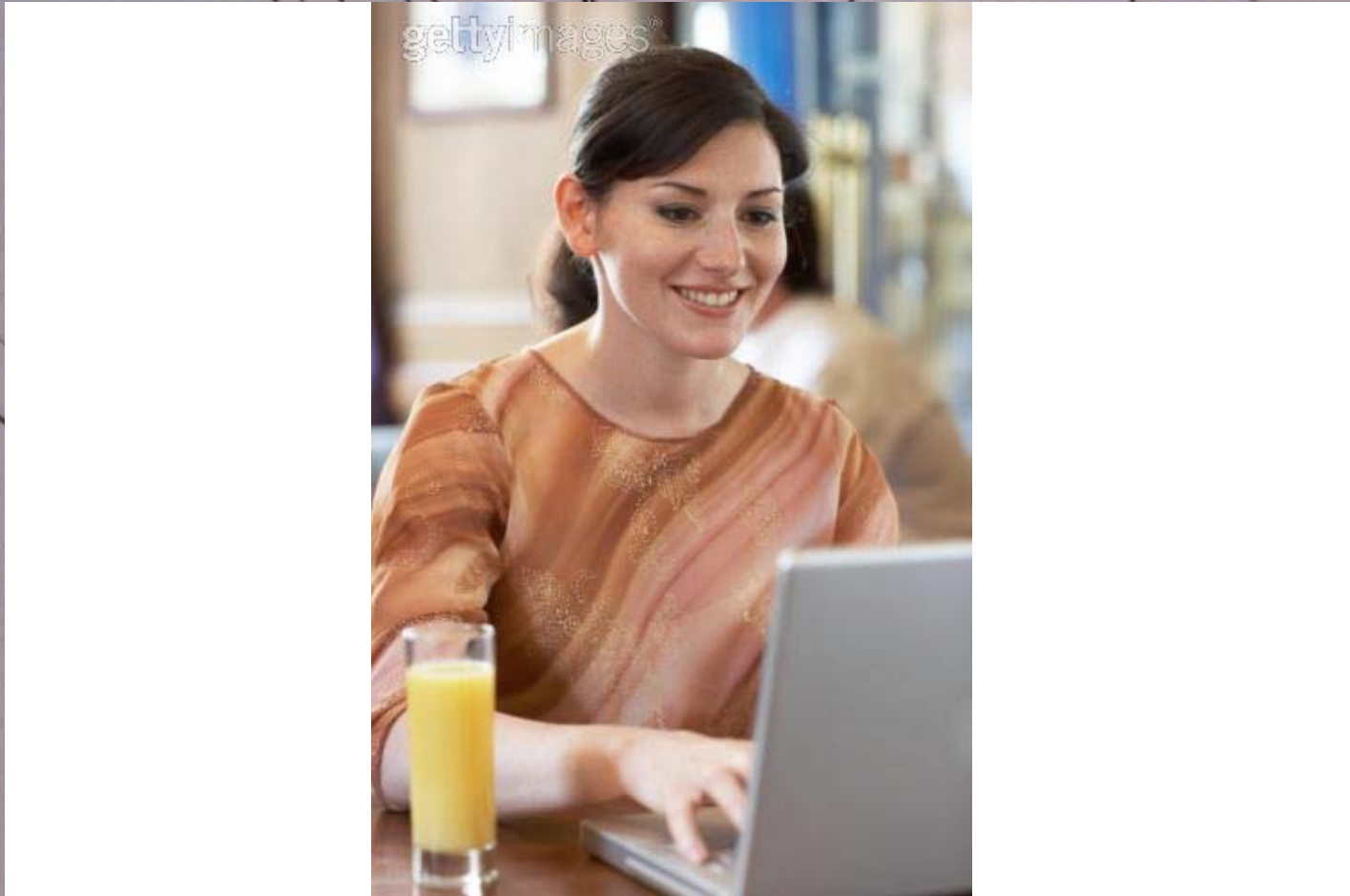


HCI Teori

- Motion Study (Gilbreth 1911) og Scientific Management (Taylor 1911)
- Udvælgelse af egnet personel (WW1)
- Human Factors Engineering (e.g. Chapanis)
- Første generations HCI: *cognitive science*
 - MHP, GOMS, Keystroke Level analyse
- Revisionistisk mellemgeneration
 - Væk fra dogmatiske "hard science" mod direkte fornemmelse for den virkelige verden.
 - Forbedret design praksis -*Mangler en konsistent teoribasis.*
- Anden generations HCI : brugsorienteret
 - Participatory design, CSCW, "Etnografi", Virksomhedsteori
 - "i kontekst" — ikke i laboratoriet
- Tredie generations HCI: oplevelsesorienteret
 - Designere

- 
- The background of the slide features several hand-drawn sketches in black ink on a light-colored surface. On the left, there is a large, roughly circular shape with a smaller, rectangular shape inside it, possibly representing a face or a container. To the right, there are more abstract sketches, including a curved line and a rectangular shape with diagonal hatching. The overall style is informal and sketchy.
- Om at spørge eksperter
 - Om at spørge brugere

Expert evalueringer



A faint, hand-drawn sketch of a human face in the background, showing the outline of the head, eyes, nose, and mouth. The sketch is done in a simple, gestural style with dark lines on a light background.

Expert evaluering / design

- Heuristiker / guidelines
- Walkthroughs
- Keystroke level analyse

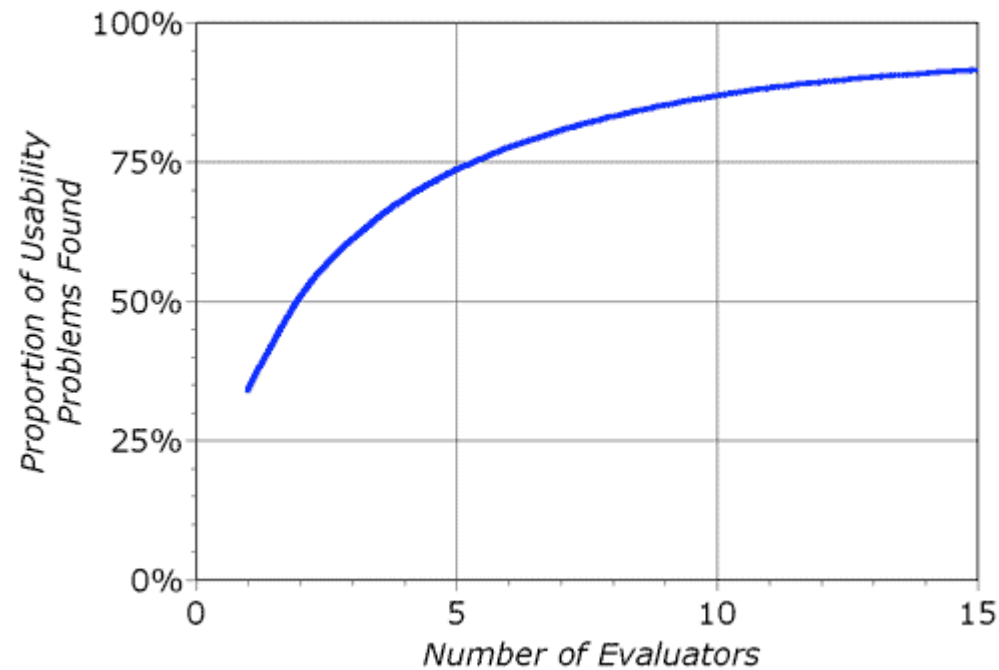
Heuristisk evaluering

- Ekspert review af grænseflade guidet en samling brugbarheds principper, kaldet heuristikker
 - Uformel inspektion
 - Jakob Nielsen
-
- In education: relating to or using a method of teaching that encourages learners to discover solutions for themselves

Evaluering: heuristisk analyse

- Ekspertvurdering af grænseflader vha. følgende heuristikker:
 - Simple and natural dialogue
 - Speak the user's language
 - Minimize user memory load
 - Be consistent
 - Provide feedback
 - Provide clearly marked exits
 - Provide short cuts
 - Good error messages
 - Prevent errors

Discount usability evaluation



- Jakob Nielsen, useit.com average over 6 projects

Heuristisk analyse

- Discount usability engineering
- Evalueret på baggrund af # usability problems: 5 evaluatører finder 2/3 af problemerne
- Anbefaler 3-5 evaluatører, der arbejder uafhængigt

Kilde: Nielsen & Molich. Heuristic evaluation of user interfaces

Grafiske guidelines

- Stil – gerne markant, så siden bliver bemærket
- Skærmstørrelse/opløsning
 - Mindre plads – mere scrolling
- Plads til navigation/plads til indhold
- Fontstørrelse
- Sprog
- Brug af tekst, billeder, animationer, lyd...
- Brug af farve
- Konsistens i designet!
- Mange af disse er afhængige af hvem brugergruppen er og hvad formålet med websiden er

Design: indholdsmæssige guidelines

- Formål
 - For den besøgende
 - Browse, handle, søge nyheder, kommunikere
 - For den handlende
 - Sælge, informere, skabe kontakt
- Brugergruppe
- At vide disse ting er vigtige fordi:
 - Det vigtigste skal have den mest prominente position
 - Den besøgende skal gives nok information til at opfylde formålet med sit besøg

Design generelt

- Gør anstrengelserne for den besøgende minimale
 - Fysisk
 - Scrolling, klik, indtastning, flytning af mus
 - Mentalt
 - Klart sprog, klar visning af hvad man kan forvente
 - Konsistens på tværs af skærme
 - Genkende fremfor huske

Kilde: Cato- User Centred Web Design: Visual Design

HOMERUN (Nielsen 1999)

Commercielle websites

- High quality content
- Often Updated
- Minimal download time
- Ease of use
- Relevant to users' needs
- Unique to the online medium
- Netcentric corporate culture

Playability Heuristics for Mobile Games

Korhonen, H. and Koivisto, E. M. 2006 Nokia research,

- H1: Don't waste the player's time
- H2: Prepare for interruptions
- H3: Take other persons into account
- H4: Follow standard conventions
- H5: Provide gameplay help
- H6: Differentiation between device UI and the game UI should be evident
- H7: Use terms that are familiar to the player
- H8: Status of the characters and the game should be clearly visible
- H9: The Player should have clear goals
- H10: Support a wide range of players and playing styles
- H11: Don't encourage repetitive and boring tasks

Korhonen, H. and Koivisto, E. M. 2006. Playability heuristics for mobile games. In *Proceedings of the 8th Conference on Human-Computer interaction with Mobile Devices and Services* (Helsinki, Finland, September 12 - 15, 2006). MobileHCI '06, vol. 159. ACM Press, New York, NY, 9-16

Heuristikker: trade-offs

- 'bred' evaluering
- Let at gå til
- Flexibel
- Discount usability metode
- False alarms
 - (43 % false alarms)
- Afhængig af evaluators ekspertise og erfaring

Cognitive Walkthrough

- Ekspertvurdering af 'walk up and use' interfaces
 - Metode til analytisk evaluering af grænseflader
 - Hvor godt guider designet novice brugeren?
- Baseret på teori om exploratory learning

Kilde: Lewis & Wharton: Cognitive Walkthroughs

CW - Oversigt

- Forberedelse:
 - Definér brugerens forventede baggrund
 - Udvælg opgaver
 - Specificér den korrekte handlingssekvens for opgaverne
 - Beskriv grænsefladens skiftende tilstande for den korrekt gennemførte handlingssekvens

De fire centrale spørgsmål

Q1: Will the user be trying to achieve the right effect?

Q2: Will the user notice that the correct action is available?

Q3: Will the user associate the correct action with the desired effect?

Q4: If the correct action is performed, will the user see that progress is being made?

CW - Oversigt

- Analyse
 - For hver korrekt handling – stil spørgsmål Q2 – Q4 og:
 - Konstruer en succeshistorie der forklarer hvorfor brugeren udførte den korrekte handling
 - ELLER
 - Brug en 'failure story' til at indikere hvorfor brugeren ikke udfører handlingerne korrekt.
 - Beskriv problemer, forklaringer og antagelser
 - Vurdér design alternativer

CW - Oversigt

- Opfølgning
 - Modifier grænsefladen så problemerne elimineres

Evaluering: Web activity walkthrough

- Et analytisk værktøj til at vurdere websider – også før der findes et egentligt design
- Designmetode, som ikke involverer brugere

Kilde: Bertelsen & Godsk

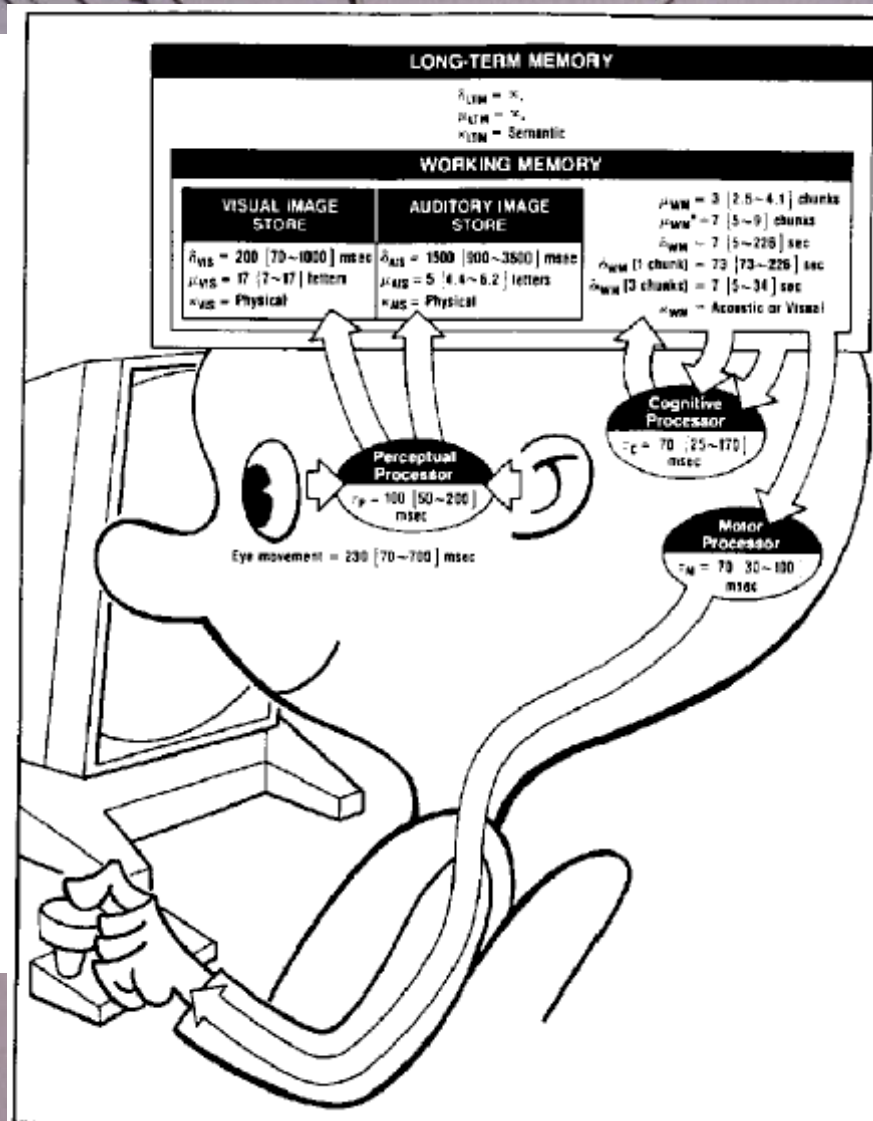
Web activity walkthrough – hvordan?

- **Beskriv websitet og brugen af det (i kontekst)**
 - **Identificér hvilke opgaver/brugssituationer websitet skal understøtte**
 - Nødvendige, hyppige, specielle og andre
 - **Kontekstualisering**
 - Specificer formålet med websitet
 - Specificer de(n) primære brugergruppe(r)
 - Findes der lignende websites? Hvad er erfaringerne med dem?
 - **Identificer mulige brugssituationer**
 - Hvad bruger brugerne websitet til?
Hvorfor bruger de websitet?

GOMS model

- Modellere hvorledes brugeres viden og kognitive processer kommer i spil når et menneske interagerer med en computer

The Model Human Processor



GOMS analyse

- GOMS
 - Goals: den opgave/task der skal udføres
 - Operators: "adfærds atomer"
 - Methods: en bestemt sekvens af operatorer (kan være på mange niveauer)
 - Selection rules: valg mellem metoder
- Eksempel slet et ord i en tekst
- Brugbarhed er et **interessant** emne
- Goal – slet et ord i en tekst
- Method – huske positionering af cursor, deletekey..
- Operators – klick og drag med mus, tryk på delete tast
- Selection rules – brug af mus vs. Brug af piletaster

GOMS

- Goals Operators Methods Selection rules
- Performance tid er vigtig (men selvfølgelig ikke alt)
- Ekspert (der er forskel på brugere)
- Fejlfri gennemførelse (og altså ikke eksplorativ adfærd heller hvad angår selve opgaven)
- Mange typer af mere eller mindre avancerede GOMS-modeller

Keystroke level model

- Forudsigelse af den tid, det tager en ekspert, fejlfrit at udføre en kendt opgave
- Gennemsnitstider baseret på stort empirisk materiale
- Sammenligning mellem alternative muligheder
- Antagelser om brug: additiv, sekventiel

Keystroke-level analyse

- Unit task $T_{\text{task}} = T_{\text{acquire}} + T_{\text{execute}}$
- Operatorer: 4 slags - Keystroking, Pointing, Homing, Drawing
M (den mentale operator) og R systemets svar.

$$T_{\text{execute}} = T_K + T_P + T_H + T_D + T_M + T_R$$

| Operator | Description and Remarks | Time (sec) |
|---------------|--|--------------------|
| K | Keystroke or button press. Pressing the SHIFT or CONTROL key counts as a separate K operation. Time varies with the typing skill of the user; the following shows the range of typical values: | |
| | Best typist (135 wpm) | .08 ^a |
| | Good typist (80 wpm) | .12 ^a |
| | Average skilled typist (55 wpm) | .20 ^a |
| | Average non-secretary typist (40 wpm) | .28 ^a |
| | Typing random letters | .50 ^a |
| | Typing complex codes | .75 ^a |
| | Worst typist (unfamiliar with keyboard) | 1.20 ^a |
| P | Pointing to a target on a display with a mouse. The time to point varies with distance and target size according to Fitts's Law. The time ranges from .8 to 1.5 sec, with 1.1 being an average time. This operator does not include the button press that often follows (.2 sec). | 1.10 ^c |
| H | Homing the hand(s) on the keyboard or other device. | .40 ^d |
| $D(n_D, l_D)$ | Drawing (manually) n_D straight-line segments having a total length of l_D cm. This is a very restricted operator; it assumes that drawing is done with the mouse on a system that constrains all lines to fall on a square .56-cm grid. Users vary in their drawing skill; the time given is an average value. | $.9n_D + .16l_D^e$ |
| M | Mentally preparing for executing physical actions. | 1.35 ^f |
| $R(r)$ | Response of msec by the system. This takes different times for different commands in the system. These times must be input to the model. The response time counts only if it causes the user to wait. | r |

^a See [8].

^b This is the average typing rate of the nonsecretary subjects in the experiment described in Section 4.1.

^c See [2].

^d See [2, 4].

^e The drawing time function and the coefficients were derived from least squares fits on the drawing test data from the four MARKUP subjects. See Sections 3.1 and 4.1.

^f The time for M was estimated from the data from experiment described in Section 4.1. See Section 4.2.1.

Keystroke level modellen

$$T_{execute} = T_K + T_P + T_H + T_D + T_R$$

- Find tastesequens (metode)
- Indsæt M-operator
- Læg tallene sammen
- Sammenlign fx. brugen af menu med tastaturshortcuts

Fig. 2. Heuristic rules for placing the M operations.

Begin with a method encoding that includes all physical operations and response operations. Use Rule 0 to place candidate Ms, and then cycle through Rules 1 to 4 for each M to see whether it should be deleted.

Rule 0. Insert Ms in front of all Ks that are not part of argument strings proper (e.g., text strings or numbers). Place Ms in front of all Ps that select commands (not arguments).

Rule 1. If an operator following an M is *fully anticipated* in the operator just previous to M, then delete the M (e.g., PMK \rightarrow PK).

Rule 2. If a string of MKs *belong to a cognitive unit* (e.g., the name of a command), then delete all Ms but the first.

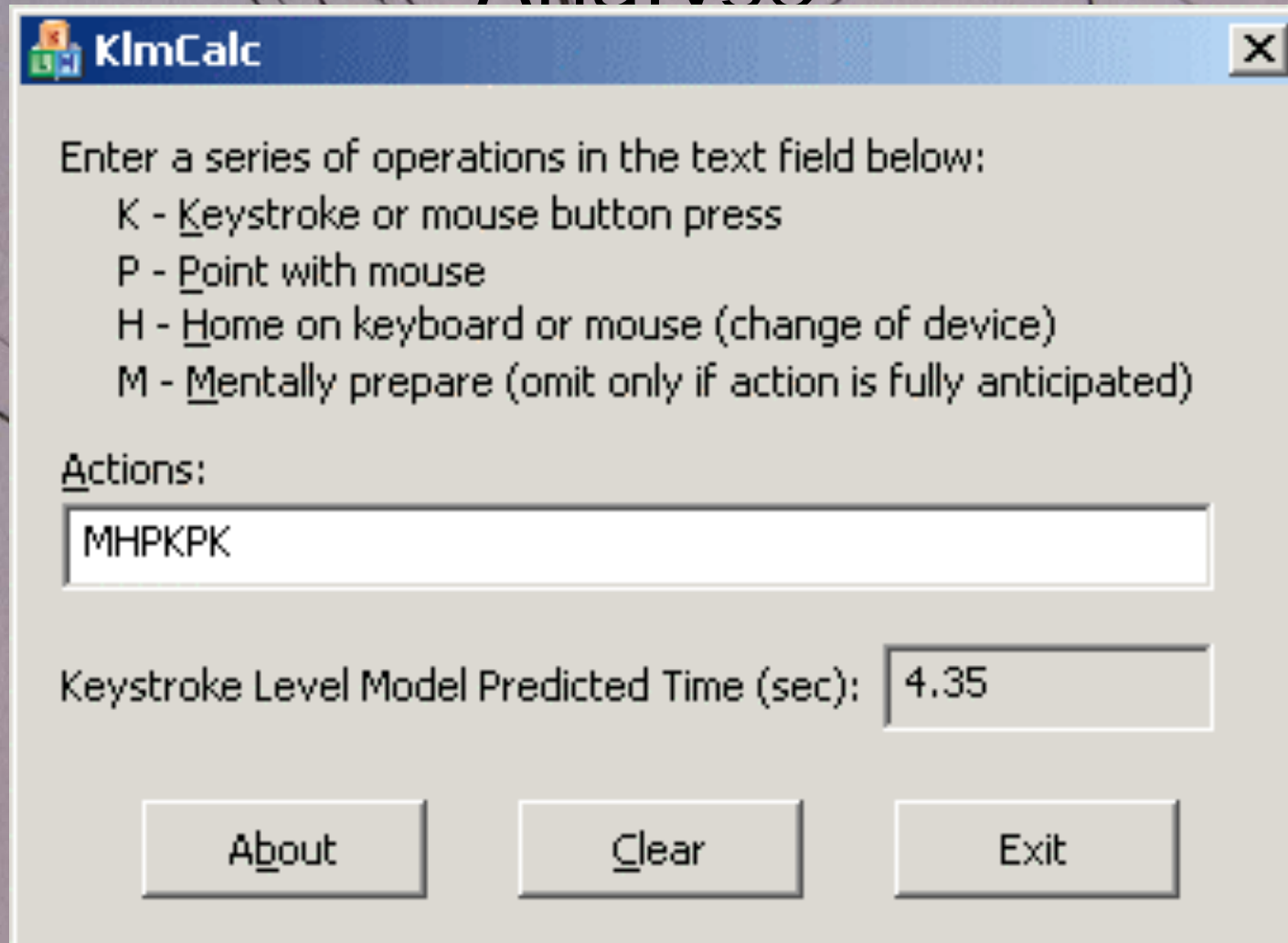
Rule 3. If a K is a *redundant terminator* (e.g., the terminator of a command immediately following the terminator of its argument), then delete the M in front of the K.

Rule 4. If a K *terminates a constant string* (e.g., a command name), then delete the M in front of the K; but if the K terminates a variable string (e.g., an argument string), then keep the M.

Et eksempel ...

- Erstat "Bent" med "Gitte" i en tekst ved brug af mus og tastatur:
 - Flyt hånden fra keyboard til mus H
 - Placer cursoren lige efter ordet "Bent" P (regel 0)
 - Flyt hånden fra mus til keyboard H
 - Slet ordet med backspace M4K (regel 2)
 - Skriv "Gitte" i stedet M5K (regel 2)
- $T_{exec} = 2t_h + t_p + 2t_m + 9t_k = 6,4$ S.

Syntagm – designing for usability GOMS & Keystroke Level Analyse



The screenshot shows a window titled "KlmCalc" with a standard Windows-style title bar. Inside the window, there is a text area for entering operations, a list of operation codes with their meanings, a text field for the entered sequence, and a display for the predicted time. At the bottom are three buttons: "About", "Clear", and "Exit".

KlmCalc

Enter a series of operations in the text field below:

- K - Keystroke or mouse button press
- P - Point with mouse
- H - Home on keyboard or mouse (change of device)
- M - Mentally prepare (omit only if action is fully anticipated)

Actions:

MHPKPK

Keystroke Level Model Predicted Time (sec): 4.35

About Clear Exit

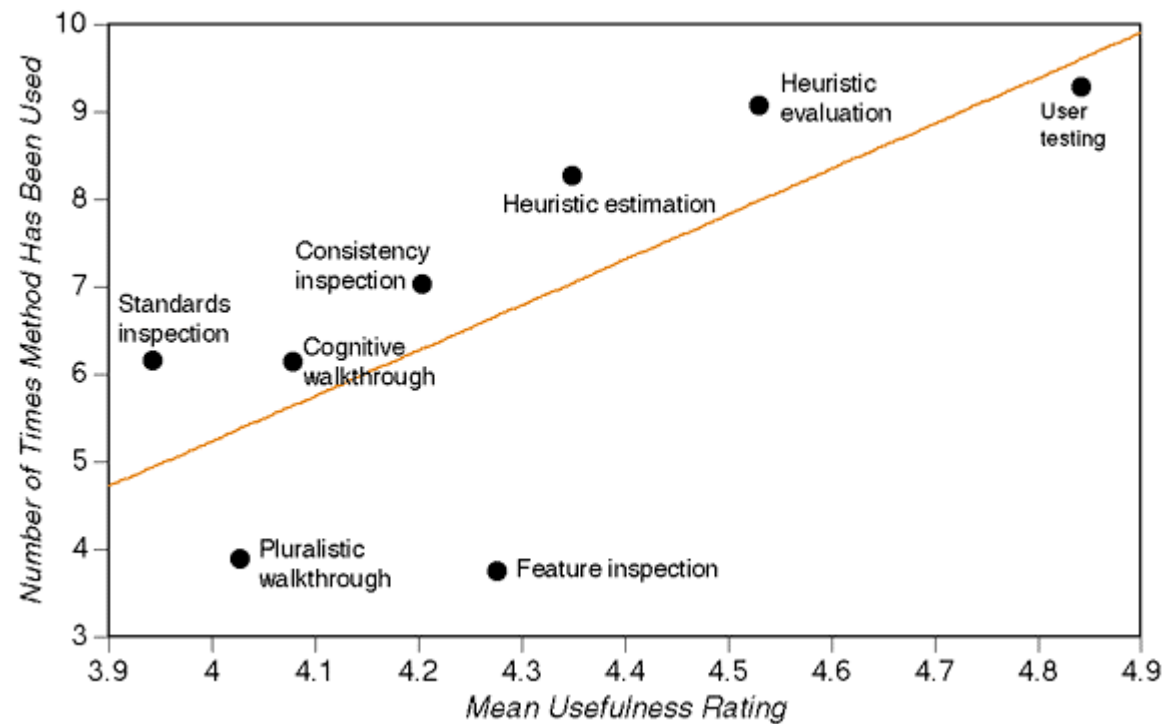
GOMS, keystroke level trade-offs

- Forudsigelser
- Sammenligninger
- Pre-implementering evaluering
- "ikke nødvendigt at se på faktisk brug"
- Ikke nødvendigt med specialiseret viden
- Fejlfri ekspertbetjening modelleret
- Vel-specificeret design nødvendigt
- Ignorerer betydningen af kontekst, andre brugere mv
- Ignorere læring, udvikling i brug
- Fokuserer på lav-niveau handlinger

Motivation

- The Prospects for Psychological Science in Human-Computer Interaction (Newell & Card 1985)
 - Hard sciences drive out softer sciences, even if softer sciences have important contributions to make.
 - Hardening the applicable psychological science
 - Critique: too low level, too limited in scope, too late to effect computer technology, too difficult to apply

Metoders Brugbarhed



- Jakob Nielsen, keynote speech, interact 1995

Afprøv metoderne...

- Vælg et gennemgående tema eller site at kigge på i dagens øvelser. Fokuser f.eks. På togrejser, e.g. www.amtrak.com, www.trenitalia.it, www.bahn.de, eller et andet område I er interesserede i.

Øvelse 1

- Udfør heuristisk evaluering af et website vha Nielsen og Molich's heuristikker.
- Reflektion over metoden
 - Hvilket tidspunkt i processen
 - Hvilke aspekter kan metode afdække
 - Hvor troværdige er resultaterne
 - Forankring af metode i teori
 - Hvilke antagelser bygger metoden på
 - Hvor tids-effektiv er metoden

Øvelse 2

- Udfør en Cognitive Walkthrough på en mindre og konkret opgave, det er muligt at udføre på det samme web site som I lavede heuristisk evaluering på
- Reflektion over metoden
 - Hvilket tidspunkt i processen
 - Hvilke aspekter kan metode afdække
 - Hvor troværdige er resultaterne
 - Forankring af metode i teori
 - Hvilke antagelser bygger metoden på
 - Hvor tids-effektiv er metoden