Project title:

Human factors in web design

Academic course:

Fundamentals of Human Factors Engineering

Overview:

- This project involves analyzing a webpage and provide design recommendations to improve the user experience.
- The webpage that analyzed was wright.edu

Duration:

August 2015 – December 2015

Techniques used:

GOMS, KLM-GOMS

Analysis #1:

Analyzed the login operation in that website with GOMS analysis before and after resizing the page.

Technique used: GOMS

Findings:

- I found that the same GOMS analysis involves additional steps to reach the login fields to perform the same login operation after resizing the page to a smaller size
- From this, I concluded that it causes motor workload on the user

GOMS (Goals, Operator, Methods, Selection) Method of Analysis

Before resizing:

GOAL OPEN-WEBPAGE-AND-LOGIN
        GOAL OPEN-WEBPAGE
                Operator SELECT-BROWSER-WITH-MOUSE
                Operator DOUBLE-CLICK-MOUSE-BUTTON
                Operator MOVE-CURSOR

Operator TYPE-WEB-ADDRESS
Select*:
GOAL USE-MOUSE
Operator PRESS-LOAD-ICON-ON-SCREEN
GOAL USE-KEYBOARD
Operator PRESS-ENTER-BUTTON
GOAL LOGIN
Operator MOVE-THE-CURSOR-TO-LOGIN-BUTTON
Operator CLICK-ON-LOGIN-BUTTON

Selection rule for GOAL OPEN-WEBPAGE*
if HANDS-ARE-ON-KEYBOARD **then**
select **GOAL** USE-KEYBOARD
else
select **GOAL** USE-MOUSE

After resizing:

GOAL RESIZE-WEBPAGE-AND-LOGIN
GOAL RESIZE-WEBPAGE
Operator MOVE-CURSOR-TO-PAGE-BORDER
Operator PRESS-AND-HOLD-MOUSE
Operator DRAG-AND-RESIZE-SCREEN.
GOAL-LOGIN
Operator PRESS-AND-HOLD-MOUSE
Operator SCROLL-THE-SCREEN-TO-RIGHT
Operator MOVE-THE-CURSOR-TO-LOGIN-BUTTON
Operator CLICK-ON-LOGIN-BUTTON

Design recommendation:

Responsive webpage

- A responsive page could help users scan the items and reach their target place quickly
- It also makes a page flexible and compatible with all the devices

Analysis #2:

- The login operation was tested with three different users: expert, novice and aged users
- With a passive observation, I identified the sequence of steps that was performed to login and the time associated with it
- With an active observation, I found the most frequently used elements of the webpage among the users and the tedious tasks involved in it

Technique used: KLM-GOMS

Findings:

- Experts took less time to complete the task compared to novice and aged users
- While novice and other users experience a cognitive workload in doing the task, frequent users or experts expect a faster interaction

KLM-GOMS:

GOAL LOGIN-TO-WINGS-ACCOUNT-AND-OPEN-OFFICE 365/EMAIL
        GOAL OPEN-WEBPAGE
                Operator SELECT-BROWSER-WITH-MOUSE
                Operator CLICK-MOUSE-BUTTON
                Operator MOVE-CURSOR
                Operator TYPE-WEB-ADDRESS (www.wings.wright.edu)
                        Select*:
                                GOAL USE-MOUSE
                                        Operator PRESS-LOAD-ICON-ON-SCREEN
                                GOAL USE-KEYBOARD
                                        Operator PRESS-ENTER-BUTTON
        GOAL LOGIN
                Operator MOVE-THE-CURSOR-TO-USERNAME-FIELD
                Operator TYPE-USERNAME
                Operator MOVE-THE-CURSOR-TO-PASSWORD-FIELD
                Operator TYPE-PASSWORD
                Operator MOVE-THE-CURSOR-TO-LOGIN-BUTTON
                Operator CLICK-ON-LOGIN-BUTTON

        GOAL OPEN OFFICE 365/EMAIL
                Operator MOVE-THE-CUSOR
                Operator CLICK-ON-OFFICE 365/EMAIL

Selection rule for GOAL OPEN-WEBPAGE*
        if HANDS-ARE-ON-KEYBOARD **then**

select **GOAL** USE-KEYBOARD

else

select **GOAL** USE-MOUSE

TABLE : Time associated with each task for different users:

GOAL:	Operators	Time t (sec)		
		Expert	**Novice**	**Other users**
OPEN WEBPAGE	SELECT-BROWSER-WITH-MOUSE	0.8 (P)	1.10 (P)	1.5 (P)
	CLICK-MOUSE-BUTTON	0.20 (K)	0.20 (K)	0.40 (K)
	MOVE-CURSOR	1.10 (P)	1.10 (P)	1.5 (P)
	TYPE-WEB-ADDRESS	2.8 (KH)	6 (KH)	24.4 (KH)
	PRESS-LOAD-ICON-ON-SCREEN / PRESS-ENTER-BUTTON	0.20 (K)	0.20 (K)	0.40 (K)
GOAL: LOGIN	MOVE-THE-CURSOR-TO-USERNAME-FIELD	1.5 (PH)	2.85 (MPH)	3.25 (MPH)
	TYPE-USERNAME	2.31 (KMH)	3.71 (KMH)	10.15 (KMH)
	MOVE-THE-CURSOR-TO-PASSWORD-FIELD	1.5 (PH)	2.85 (MPH)	3.25 (MPH)
	TYPE-PASSWORD	2.71 (KMH)	5.11 (KMH)	16.15 (KMH)
	MOVE-THE-CURSOR-TO-LOGIN-BUTTON	1.5 (PH)	2.85 (MPH)	3.25 (MPH)

	CLICK-ON-LOGIN-BUTTON	0.20 (K)	0.20 (K)	0.40 (K)
GOAL: OPEN OFFICE 365/EMAIL	MOVE-THE-CUSOR	1.10 (P)	2.45 (MP)	2.85 (MP)
	CLICK-ON-OFFICE 365/EMAIL	0.20 (K)	0.20 (K)	0.40 (K)
	PREDICTED TIME	**15.72**	**28.82**	**67.9**

K - keystroke or button press (Press key or button – 0.20s, Fast typist – 0.08 s/char, average typist – 0.28 s/char, slow typist – 1.2 s/char)
P - pointing to a target on a display with a mouse (1.10s)
M - mentally preparing for executing physical actions (1.35s)
H - homing the hand(s) on the keyboard or other device (0.40s)

Analysis after implementing Macros:

GOAL LOGIN-TO-WINGS-ACCOUNT-AND-OPEN-OFFICE 365/EMAIL
      Operator SELECT-BROWSER-WITH-MOUSE
      Operator CLICK-MOUSE-BUTTON
      Operator CLICK-ON-THE-MACRO-IN-THE-BROWSER

TABLE Time analysis after implementation of macro

GOAL:	Operators	Time t (sec)		
		Expert	**Novice**	**Other users**
LOGIN-TO-WINGS-ACCOUNT-AND-OPEN-	SELECT-BROWSER-WITH-MOUSE	0.8 (P)	1.10 (P)	1.5 (P)
	CLICK-MOUSE-BUTTON	0.20 (K)	0.20 (K)	0.40 (K)

OFFICE 365/EMAIL	CLICK-ON-THE-MACRO-IN-THE-BROWSER	0.20 (K)	0.20 (K)	0.40 (K)
	PREDICTED TIME	**1.2**	**1.5**	**2.3**

Design recommendation:

Automating the tasks using macros
- This can reduce both motor and cognitive workload
- Minimize the time taken to reach the goal

Analysis 3:

Design Recommendations for Threats:

- Open ID Connect
- One Time Password (OTP)

Design Recommendations for Weakness:

- Responsive web design
- Pop up on mouse over
- Macro