
Human-Computer Interaction

Time allowed : 2 hours. Exam is open book.

Instructions to candidates: Please answer all the questions. All the questions are independent. For each question, the carried marks are indicated. In case of ambiguity, explain your hypotheses.

HUMAN FACTORS 6 marks

Question 1 (1 mark)

Explain (five lines maximum) using the ICS model (schema) the effect of the cognitive filter on the visual perceptual system ("cognitive filter" as defined in the Model Human Processor).

Question 2 (2 marks)

Explain (four lines maximum) what are a structure diagram and a transition path diagram of the method "Structuring Displays" that is based on the ICS model.

Explain (three lines maximum) what the method "Structuring Displays" is useful for and when the method can be used in the software life-cycle.

Question 3 (3 marks)

Rasmussen identified three levels of user's expertise (novice, occasional, expert). In his terms, Rasmussen respectively depicts them as (Knowledge-based, Rule-based, Skill-based) behaviors.

-a- Model the three levels of expertise using schemas that apply the Theory of Action of D. Norman. Justify your answer.

-b- Model the three levels of expertise using schemas that apply the ICS model. Justify your answer.

INTERACTION TECHNIQUES AND ERGONOMIC DESIGN 8,5 marks

Question 4 (1 mark)

Explain (five lines maximum) the main difference between the interaction paradigm called "Augmented Reality" (AR) and the one called "Augmented Virtuality" (AV). Give an example of a developed or envisioned system that illustrates each case (AR and AV) in order to reinforce your argumentation.

Question 5 (1 mark)

Why do iterations play a central role in HCI design? Which activity guides these iterations?

Question 6 (3 marks)

As screens grow larger, some designers are tempted to increase the number of menu items displayed at once.

For example, with 100 departments in France, give three strategies for organizing the layout and justify them briefly based on user tasks and knowledge.

Question 7 (1,5 mark)

Create rectangles using a drawing editor.

The user interface of the drawing editor contains two parts: a palette of tools and a drawing area. The palette of tools contains two push buttons “rectangle” and “circle”. The user selects the button “rectangle” in the palette of tools. S/he then clicks (mouse button pressed) in the drawing area and while maintaining the mouse button pressed s/he moves the mouse (rubber banding is on), and finally releases the mouse button. The rectangle is thus created. By clicking again in the drawing area, the user can create another rectangle.

Describe using the UAN notation the creation of rectangles by two UAN tables. The first UAN table describes the user’s events in the palette of tools (rectangle or circle mode), while the second UAN table describes the creation of a rectangle.

Question 8 (2 marks)

Ergonomic criteria

-a- Which criterion is not verified by the design in Figure 1?

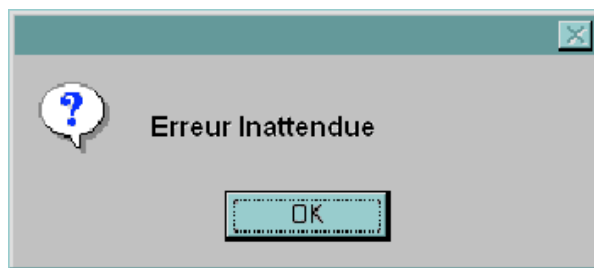


Figure 1

-b- Which criterion is not verified by the design in Figure 2? Describe a solution to fix the problem.

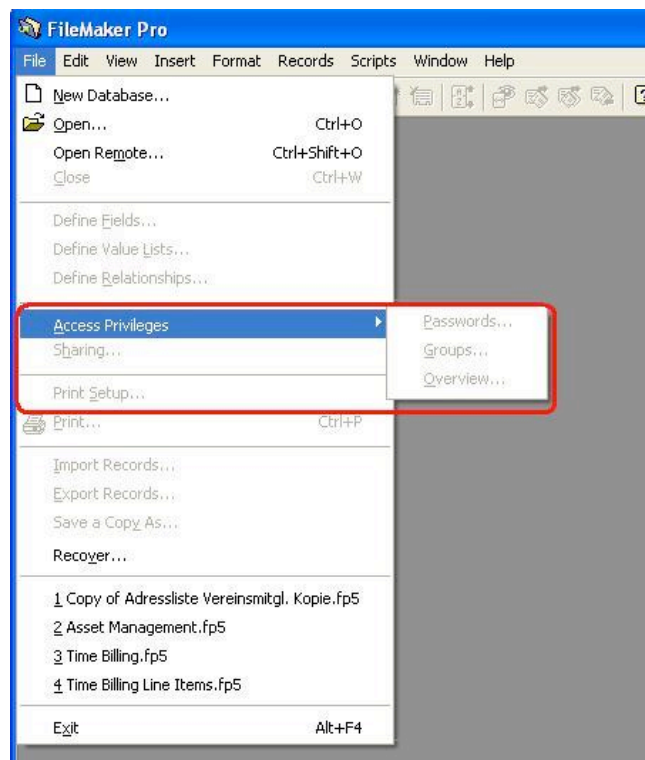


Figure 2

-c- WordPad software: The user is just starting to write a new document. While trying to open a second document for obtaining useful information for her/his new document, the user obtains the message shown in Figure 3. Which criterion is not verified by this design (Figure 3)? Describe a solution to fix the problem.

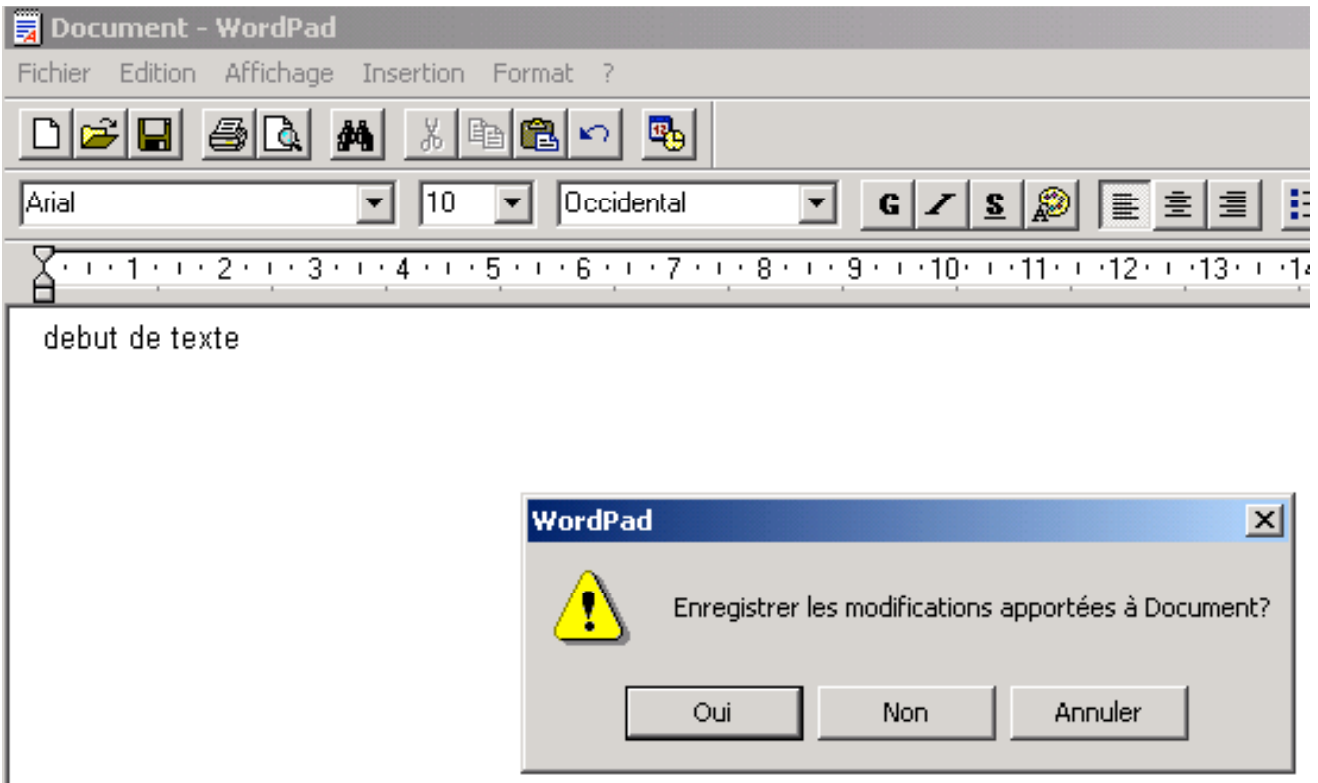


Figure 3

-d- Which criterion is illustrated by the window in Figure 4?

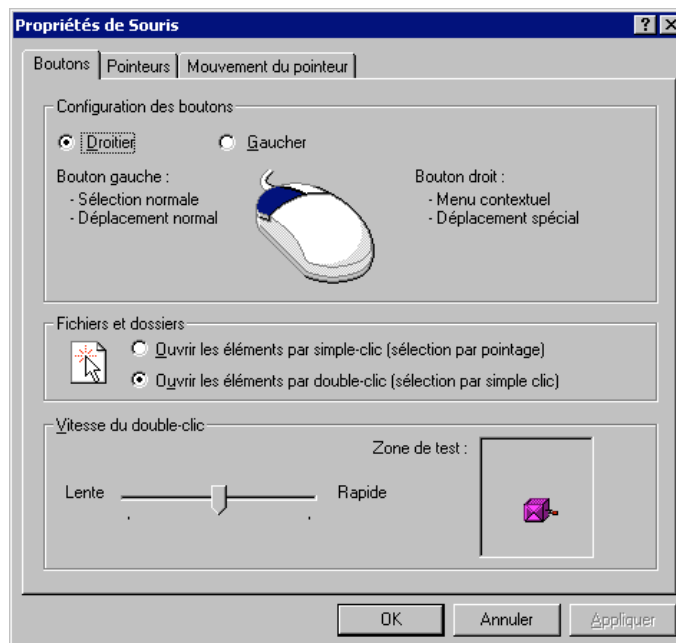


Figure 4

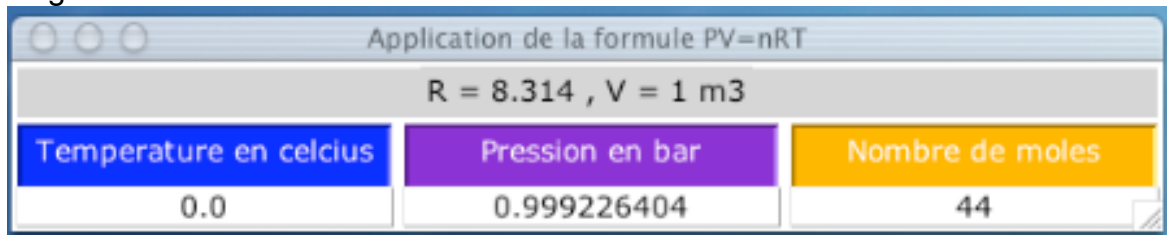
PAC-AMODEUS SOFTWARE ARCHITECTURE 5,5 marks

Question 9 (2,5 marks)

We consider an extension of the first part of the project (i.e., $PV=nRT$) step 6. While launching the application, only the following window is displayed on screen.



By selecting the push button "Creer Fenetre" (*create window*) the user obtains the following window.



The user can open as many windows as s/he wants by selecting the push button "Creer Fenetre". The visual consistency must be guaranteed when several windows are opened. By selecting the push button "Fermer Fenetre" (*close window*), the user destroyed the last created window.

- a- Which solution do you propose in order to verify the criterion "pro-active feedback" that is not verified by the design above?
- b- Describe (schema and explanations) the hierarchy of PAC agents of the Dialog Controller.
- c- Show the information flow within the architecture when the user modifies the pressure for the case of two opened windows. (Reminder: Modifying the pressure implies modification of the temperature.)

Question 10 (3 marks)

We consider an extension of the second part of the project (i.e., PACCraft). We simplify the game by considering that the user can only build/destroy castles without the need for resources. The user interface is simplified and only contains the game area (green area). We consider that the game is now collaborative, with several users. At any time, all the users have the same view of the game area. Each user can:

- create a castle by clicking on the game area (green area)
- destroy a castle of another user by selecting it (a selection of her/his own castle does nothing).

- a- Locate this new version of the game in the time-space classification of groupware.
- b- Describe the overall architecture (schema and explanations), by applying the PAC-Amodeus software architecture model, of the collaborative game for the case of two players A and B.
- c- Show the information flow within the architecture when player A selects a castle belonging to player B (i.e., destroy the castle).