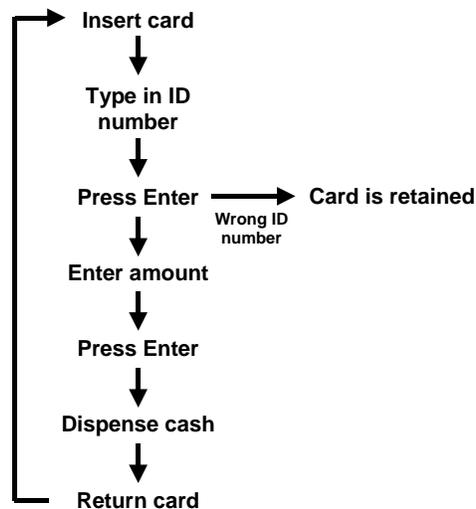


## Unit 1

### Section A

The following is a schematic, which describes the operation of a very simple automated teller machine (ATM) for withdrawing money.



The user inserts their bankcard and then their four-figure identification number and presses enter. If the wrong number is entered then the card is retained. Assuming the user has entered the right number they then enter the amount they want to withdraw and press enter. The machine then dispenses that amount of money and returns the user's card.

Below is a list of usability problems with the machine (labelled A – D) and a list of justifications (labelled 1 – 4). Match up the problems with the justifications.

#### Problems

- A. The interaction is error prone.
- B. The interaction is inefficient.
- C. The interaction is system driven.
- D. The interaction is not error tolerant.

#### Justifications

1. ...because users often type in the wrong identification number by mistake. Retaining the card after one mistake has been made means the users cannot make a single mistake without losing their card.
2. ...because the user has no control over the order in which the interaction is performed. Why does the card have to be put in the machine first? Why can the user not be asked for some money first and then put their card in next?

3. ...because it is not necessary to press Enter after the identification number. All identification numbers are four figures long and therefore the machine can simply assume that the identification number has been typed in after four keys have been pressed.
4. ...because the user is likely to make the error of leaving their card behind. The card is returned after the money, and the user is therefore likely to collect their money and then walk away from the machine without collecting their card.

## Section B

Below is a list of solutions to the problems identified in part 1. Match up the solutions to the problems.

### Problems

- E. The interaction is error prone.
- F. The interaction is inefficient.
- G. The interaction is system driven.
- H. The interaction is not error tolerant.

### Solutions

1. Do not require the user to press Enter after the identification number has been entered. This solves the problem because only necessary key-presses are required from the user.
2. Return the card before dispensing the money. This solves the problem because the user is unlikely to walk away from the ATM without collecting their money, so if the user must take their card before the money they will not forget to take their card.
3. Allow the user to make (for example) three mistakes entering their identification number before their card is retained. This solves the problem by tolerating a few user errors, but does not make the machine insecure: fraudulent users will not be able to guess an identification number in three attempts.
4. Allow the user to enter their card, identification number and amount required in any order. This solves the problem because it puts the user in charge of the interaction and allows them to perform the task the way they want to do it, not the way the machine dictates.