1) a) The staff members are considered as **expert users** as they have received detailed training on how to operate the service robots. The hotel guest, on the other hand, are considered either **intermittent user** or a **novice**, meaning they can be familiar with computer technology or completely clueless about a computer.

For hotel staff, we need to make sure that the interface gives **brief feedback, shortcuts** and **rapid response time**. Hotel staff has a lot of customers to attend to hence we must make sure they understand all feedback quickly. We also have to make sure they can use the robot quickly, input of commands and orders must be quick to yield better service.

On the other hand, for hotel guests, we need to **restrict the vocabulary**, **provide help**, **use small number of actions** and **give protection from danger**. Restricting the vocabulary prevents confusion and when confusion happens we provide help (a help button that can guide them through the process). Small number of actions also prevent confusion and mistakes as less action means less error, and we must prevent the user from making any error (protection from danger).

b)
- The first internationalisation feature would be the presence of **multiple languages** in the robot. We must make sure that the robot operates in multiple languages so that multiple people can use it, not only English speaking one.
- The second internationalisation feature would be **cultural beliefs**. We need to make sure that the design of the robot or the interface does not offend anyone. For example, the number 4 is considered as a bad luck number in China, hence we must avoid using this in our design, etc.

Editor's note: It seems that the second internationalisation feature is a bit of a stretch. We can actually go back to the question and see which other aspect internationalisation can be applied. For instance, for the date and time, we can support different date and time formats based on what is typically used in each country (e.g. DD/MM/YYYY vs MM/DD/YYYY)

c)
- The first way is to let the user input their own feedback through a simple multiple-choice survey at the end of use. The user can then rate their satisfaction after using the robot and give suggestions on how to improve the robot.
- The second way is when an error occurred during the robot's operation, the robot's operating system must keep a record on the errors that occurred, and the errors could be checked directly from another system so that these errors could be solved continuously.

d) Although simple text boxes make the list seem short, it is not very user friendly as it is very hard to read. It's hard to see any mistakes in the list as everything Is written down horizontally, editing the list will be a harder job too, Rechecking the list for forgotten items hard as it's very hard to count the number of objects that has been inputted. Text boxes is not only error prone, but also tedious to do, which is bad for service as service will be slow.

2) a)
- Gulf of execution occurs when there is a mismatch between the user's intention and the allowable actions. Gulf of execution can happen from **forming the intention (step 2)** to **executing the action (step 4)**.
- Gulf of evaluation occurs when there is a mismatch between the system's representation and the user's expectation. Gulf of evaluation can happen from **perceiving the system state (step 5)** to **evaluating the outcome (step 7).**

b)
- First, it violates the **offer informative feedback** rule. Displaying error reference number does not give informative feedback, it does not tell the user easily how to resolve the error step by step and the interface does not guide the user to solve the error. Giving instruction book to user is not a good solution as it is tedious to do.
- Secondly, it violates the **prevent errors** rule. The interface and operating system does nothing to prevent errors, instead it lets the user perform an error and tells the user to solve the error.

c) Gulf of execution occurs as there is a mismatch between the user's intention and the allowable action. The hotel staff intends to deliver the car key to the basement parking lot but the robot does not allow this action to take place.

d) Gulf of evaluation occurred as there is a mismatch between the system's representation and the user's expectation. The system displays the 'tap room key card to open the robot delivery hatch' but when she clicked this feature she is not able to use it (her expectation is not met). The rule violated is the **permit easy reversal of action**. The user tried clicking the 'back' button on the screen to reverse her action but instead an error occurred.

3) a)
- Phi phenomenon is the phenomenon in which humans will perceive **apparent motion** from appropriate sequences of **discrete images**. It enables flipbook animation, cinema / television and computer animation.
- Judder is the perception of **jerky motion** due to insufficient frame rate. This is mediated by **basic motion interpolation** at display end or by applying **motion blur** to original frames.

b) i) State represents the status or mode of the program (for example: certain checkboxes are checked) while operator is a low-level action (for example: mouse click on a checkbox).

ii) A – state
B – operator
C – operator
D – state
E – state
F – operator

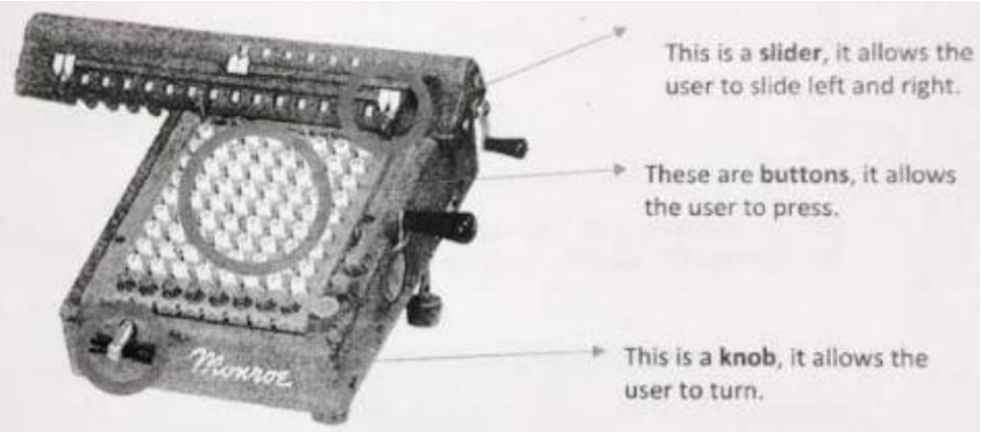
iii) States and operators can be **visualised** in the user's mind. A solution will typically consist of a **sequence of operators** to go from **initial state** to **goal state**.

c)
- Linguistic communication is a type of communication that uses language with **lexicons (symbols like words)** and **syntax/grammar.** Examples would be **speech/oral communication, sign language** and **written language**.
- Iconic communication is done through **visual imagery.** Examples would be **sketches, diagrams** and **icons**.

4) a) Affective computing is still fairly immature technology. Its goal is to recognise user's **affective state of mind** like **facial expressions**, **body postures**, **vocal indicators** and **physiological indicators** (like blood pressure and breathing rates). It will be useful in **lie detectors**.

b) i) Affordance is an attribute of an item, object or a structure that permits users to perform basic actions. An example is the affordance of a button is **push**.

ii)



Editor's note: It should be clear that the affordance is not about allowing the user to slide left/right. The affordance is **push**, **press** and **turn** respectively. Affordance refers to a basic action.

c) i) Idioms are widely-used actions as they often feel **natural** and users will quickly become **familiar**, like resizing windows by dragging on borders, etc. Metaphors, on

the other hand, are computer interactions that **maps** to **real-world interactions** that users are more familiar with, like dragging files into the 'bin' to erase it, etc.

ii) A – metaphor, in real life, you drag stuff to move them
B – idiom, in real life, you don't slide your finger up to scroll down a webpage, yet the action seems familiar and natural
C – idiom, in real life, you cannot just press the escape key to close anything, yet the action seems familiar and natural

Editor's note: For B, it can be argued that it is a metaphor. This is about 'natural' scrolling where we scroll in the reverse direction of the paper, and this maps to real life. In real life, we do pull a paper up to see the bottom part of a paper.

--End of Answers--