

## **1) Heuristic Evaluation:**

I have chosen the ATM interface for further evaluation and improvement. The ATM machine enables the user to perform diverse tasks such as withdraw cash, deposit checks and view the balances in different accounts. The availability of such machines at various places makes it convenient to accomplish the tasks without having to go to a bank. The interface also provides the list of all accounts that the user currently holds, thus shifts the cognitive load from the user to the interface because they don't have to remember the specific account name and number.

### **Gulf of Execution:**

Let's say a user's goal is to deposit a check and withdraw cash. Though the user might know what to do executing those actions takes time using the current interface. The reason is an ATM permits only one action at a time and thus creates a wide gulf of execution.

### **Gulf of Evaluation:**

Once an action is completed, the system doesn't provide any feedback right away. For example, once the user deposits a check they can't see the ending balance in that account to make sure that the check was indeed debited to that account. The user has to either perform another transaction to view the balance in the account or wait until the end of all transactions to be able to print a receipt. This is a poor feedback mechanism because the user should be provided instant feedback for every action.

### **Direct Manipulation:**

The ATM interface does a poor job in making the user feel that they are undertaking the task directly. The interface is a huge presence in between the user and their goals. Also, the interface is not something that's easy to work with for a novice. For example, the user has to go through multiple screens and options to execute a transaction from start to finish. If the user makes a mistake or need to start another transaction they have to resort to the initial screen and repeat the steps all over. Therefore, the focus of users is more on how to use the interface rather than on the end goal.

### **Design Principles:**

In terms of the design principles the interface does incorporate the affordances well. As soon as someone inserts their debit card, the interface asks them to enter their password in the input box. Also, the interface is organized throughout with push buttons that clearly signify what actions are possible. In addition, each action is clearly displayed in big bold font on the corresponding button which helps map the action to the result. The design is equitable in the sense that it enables even visually impaired users to use it with braille embossed keys and other audio feedback. However, the interface does not offer any flexibility – there are no short cut keys that an expert user can master, there is just only one way of executing the transactions. Moreover, the interface offers very little tolerance to any mistakes that the user might commit. For example, when specifying the withdrawal amount if the user pushes the \$200 button instead of the \$20 button there is no way to go back and cancel the transaction. However, the ATM interface does offer comfort to the user by being available at multiple locations. In addition, the user can also use the interface sitting in a car on a drive-through path.

## Distributed Cognition:

The interface does a poor job of transferring the cognitive load from the user to the interface. If someone deposits three checks the interface might not read the amounts correctly. Hence, the total amount might be incorrect. This requires the user to manually add the total and make sure that it matches with the total displayed in the interface. Though, eventually all the checks might be deposited appropriately the user often might walk away with confusion or concern if the total amount that was displayed didn't match their goals. The user shouldn't be using their cognitive bandwidth to add the total as the interface is expected to provide that feature.

## 2) Updated Interface:

The updated interface is organized into a grid of functional areas. On the left, a vertical column of five blue buttons lists the main actions: Deposit, Get \$200, Get Cash, View Balance, and Donate to Charity. To the right of these are three rows of light green buttons, each containing three options: PMA, Checking, and Savings. Further right, there are two sets of blue buttons for cash transactions: one for 'Get Cash' with values from \$20 to \$200 in increments of \$20, and another for 'Donate to Charity' with values of \$5, \$10, \$25, \$50, \$100, and a \$0.00 button. In the top right corner, there is a small digital display showing '12345678' and a standard numeric keypad with mathematical symbols.

Deposit	PMA	Checking	Savings	
	Checking			
Get \$200	PMA	Checking	Savings	
	Checking			
Get Cash	PMA	Checking	Savings	\$20 \$40 \$60 \$80 \$100 \$120 \$140 \$160 \$180 \$200
	Checking			
View Balance	PMA	Checking	Savings	
	Checking			
Donate to Charity	PMA	Checking	Savings	\$5 \$10 \$25 \$50 \$100 \$0.00
	Checking			

### Feedback after executing the transactions:

**Check 825 in the amount of \$245.00 deposited to Savings. Remaining Balance is \$12,250.00**

**\$200 Withdrawn from PMA Checking. Remaining Balance is \$23,456.89**

**PMA Checking balance is \$23,456.89, monthly spend \$2500.00 over last 12 months  
Savings balance is \$12,250.00, monthly spend is \$0.00 over last 12 months  
Checking balance is \$50,000.00, monthly spend \$4500.00 over last 12 months**

### **3) Interface Justification:**

The primary modification is to enable the user select all the transactions that they intend to pursue in one screen. This will reduce the gulf of execution as the user don't have to perform one task at a time, should they want to execute multiple transactions. Thus, the amount of time required to accomplish the user's goal is significantly reduced in the new interface. The gulf of evaluation is also reduced because the interface will provide the feedback on all transactions in one screen. The redesigned interface is based on the participant point of view. This is because many users could be waiting behind a user executing multiple transactions at the ATM. Therefore, the user might feel pressured or even nervous if the transactions take a long time. In addition, if a user spends a long time at the ATM it would attract the attention of thieves who might perceive that the user is withdrawing a lot of cash from the machine. Furthermore, users usually go to an ATM in the middle of pursuing a bigger task such as going to work, home or visiting a doctor's office. Thus, reducing the time spent at the ATM is very helpful in the broader context of things.

The redesigned interface will also enable the user engage in direct manipulation as they would be able to translate their goals into actions using fewer screens and actions than before. This interface will also preserve the excellent affordances exhibited in the original design. The push buttons will continue to exist and clearly indicate that the user needs to push the same, the text boxes will also intuitively let the user know to enter their password or dollar amount accordingly. In addition, none of the design changes proposed will compromise on the equitability offered by the old interface. The new interface is designed to be easier for everyone including the visually challenged, thereby enhancing the equitability, if anything.

The redesigned interface will be flexible because if a user wants to deposit three checks all they have to do is insert them into the machine. Once inserted the interface will display all of them and enable the user to select which check should be deposited to which account. Furthermore, there will be a calculator that the user can use to add all the amounts and check if the interface displays the

same. This will take the cognitive load off the user because they don't have to calculate the amounts in their head or be prepared with that information ahead of time. Also, the balances in each account will be provided after each transaction whereas in the old design the user had to pursue a new transaction just to check the balances in one account.

In addition, the new design also address two other design principles effectively – discoverability and simplicity. The redesigned interface enables the user to easily see all the options available to them in one screen. In the old design, they had to discover the actions possible one at a time. Also, this design is simple and compact and doesn't require any prior training for the users.

The redesigned interface will also be more tolerant to errors. If the user hovers their finger over the \$20 button then it will highlight and glow in a specific color which will help the user make sure that it was indeed their desired choice before pushing that button.

A cognitive task analysis of the old interface reveals that a user while executing a task might be thinking about their financial status as reflected in their account balances. Also, they would be interested in knowing how much they spend every month in each account. The redesigned interface not only displays the balances in each account but also apprises the users with the average amount they spend every month in each account. Enabling the users to access this information addresses the cognitive thoughts that would be going through their minds as they interact with the interface. In the old interface not only was this information not provided but also accessing the balances in each account had to be executed as one transaction at a time.