

4002-765

User Centered Design Methods

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Project 2

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Project 2 Steps 3+

To observe the problems faced by customers while using credit/debit cards for payment, I did 7 observations on different grocery. I made my observations at Walmart (which uses a horizontal card swiping machine), Tops (uses a vertical card swiping machine) and Wegmans (uses both, but I made my observation on vertical card swiping machine)

Part 1 – Contextual Inquiry

After the shopping the items, customers stand in the queue to make the payments. Customers with several items stand in the queue for cashier and customers with few numbers of items prefer self checkout lanes. Customers using self checkout lanes behave different from customers using cashiers lane. In both the cases, the mode of payment is credit/debit card.

To make payments, customers use a piece of rectangular plastic which they swipe through the machine. After sliding the plastic card through the machine, they use the digital pen to make their transactions complete. During the whole process, the customers focus his attention to the card swiping machine. Many customers take their time before sliding the cards through the machine. During my observations to the three grocery stores, I noticed two different types of card swiping machines, horizontal and vertical. They both serve the same purpose of making payments.

- When does the person produce their card for their transaction?

4 out of 5 in the cashier's lane presented the card after the cashier completed scanning their items. 1 out of 5 in the cashier's lane swiped the card while the cashier was still scanning the products. 2 users using the self checkout lane presented their card after they finished scanning their items.

- Is it hard to extract their card from wherever it is stored?

In my observations, women took more time to extract their cards than men. The reason is that women carried large bags and their cards were just thrown in the purse whereas it seems that men have a proper pocket for credit/debit cards in their wallet.

- Can the customer easily swipe the card?

The answer to this question is really confusing. It is being observed that customers are more comfortable using horizontal card swiping machines than vertical card swiping machine. The image showing 'In which direction the card should be swiped' is more prominently displayed in the horizontal card swiping machines than in the vertical machines.

- Do they swipe it the correct way?

2 out of 7 customers swiped the card in a wrong way. One customer got baffled while swiping on a horizontal machine and the other on the vertical machine. The customer using the horizontal machine was not alert while sliding the card; therefore he was able to get it correctly the second time. The customer using the vertical card sliding machine took the help of the cashier to make his payment.

- Could different designs improve any of the above behaviors?

Yes, different designs can definitely improve the behavior of customers. According to my observations, customers using the vertical machines took longer time than customers using horizontal machines. Thus, there is a need of making the entire credit/debit card swiping machines standardized. Also instructions should be written in natural language. In one of my observation, a customer used her own ink pen for signature on the card swiping machine. She soon realized her mistake, and then used the digital pen (as there were no instructions written). Also the sensitivity of the credit card machine should be good. One of the customers was facing difficulty in entering the pin number, because the number would enter twice when she clicks. Thus, she had proceeded carefully to enter the pin correctly.

Thus, standard credit/debit machines should be used in all grocery stores. Complete instructions should be given in natural language. The interface should be bright and the sensitivity should be good. I would prefer using different colors than grey and blue which are commonly used. The combination of grey and blue should be changed as they give a dull interface.

- Who swipes the card? The cashier or the customer?

Every time it was the customer who swiped the card.

- Does the cashier need to assist the customer?

Yes, in one of the transaction customer made the payment using the vertical credit swiping machine. The customer swiped the credit card and noticed that it gave the instruction to enter pin number. The customer got confused and informed the cashier that it's a credit card. The cashier asked the customer to use a large green button on the bottom left of the num pad. This machine was difficult to use with a very small interface and no instructions.

- How adept is the customer in typing in information?

The customer took an average of 20 seconds to type in the information.

- Do they guard the entry of their PIN?

No

- Do people make errors during the transaction? What happens when an error occurs?

Yes, customers sometime slide the cards in wrong way, sometimes they press unwanted buttons during the transaction. When an error occurs, usually cashier gives them the correct instructions and sometimes they have to restart the whole transaction.

- Do people have to juggle bags/purses/groceries/children during the transaction?

No, usually the carts are well designed to handle both the items and children. I observed that children are made to sit in the cart (forcefully or willingly) during the whole shopping trip.

- When do customers put the card away?

Just after sliding the card, customers usually put their cards back in wallet/purse. They are cautious to not lose their card.

- Visual impairments. Does the screen have enough contrast to be able to make out the characters if you have limited sight? Are the characters large enough?

No, I believe that this interface is not designed for people with visual impairments. The interface is dull in color and the fonts are not large enough to be easily read by people suffering from visual improvement. They have to get too close to the screen to figure out the things. Currently, cashiers usually assist people with visual impairments. They swipe the customer's card and give them the paper receipt to sign rather than make them sign on the card swiping machine. The screen is not much wide and fonts are not also large enough for the visually impaired person.

- A wheelchair. Could access the terminal if you were in a wheelchair? Could you see the digits? Could you operate the buttons? If not, ask the cashier what they do when someone is wheelchair-bound.

Yes, a person on the wheel chair could access the terminal. The terminal is based on a rotating disc which could be lowered down to the height of the person on the wheelchair. The person could access the screen and operate the buttons; it also gives a beep sound whenever a button is hit.

- Crutches, a cast, or some other temporary medical device. Could you still operate the terminal?

Yes, you could still operate the terminal. The terminal could be rotated according to the user's comfort level. They may take a little longer to complete the payment than the normal users, but they can make the payment successful.

- Arthritis. Are the buttons easy to press? Do they have appropriate tactile feedback? That is, could you tell if you pressed a button without actually looking at it?

Yes, the buttons are easy to press. A single beep sound is heard whenever a single button is hit. They can use the digital pens available to complete the transaction. Thus, it gives them the flexibility to complete the work successfully. But they have to be careful while pressing the buttons because the spacing between the buttons is not too wide.

- Young kids to take care of as you check out. Could you manage them as you finish the transaction?

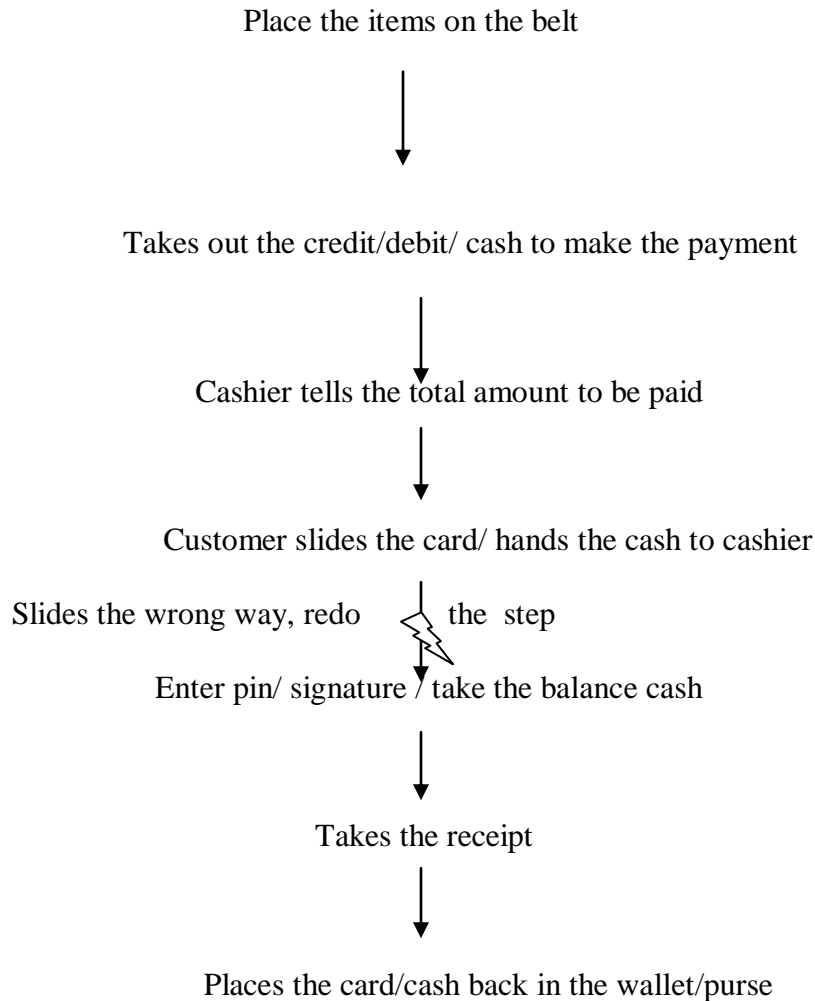
I don't think that there is any problem with children in finishing the transaction. The carts in the grocery stores are well designed. These carts enable children to be seated in the cart safely and make the shopping easier for customer.

- A date you are trying to look your best in front of. How smooth can you be as you check out?

It could not be perfectly smooth for me. I usually make the mistake of sliding the card in the wrong way. But usually, second time I am able to slide it properly.

2. **Work models:** "Draw models from the observation data representing the work of the customers."

- Flow Model: Depicts people's responsibilities and the communication and coordination required to do a job. It represents the players in the user population to target and support.



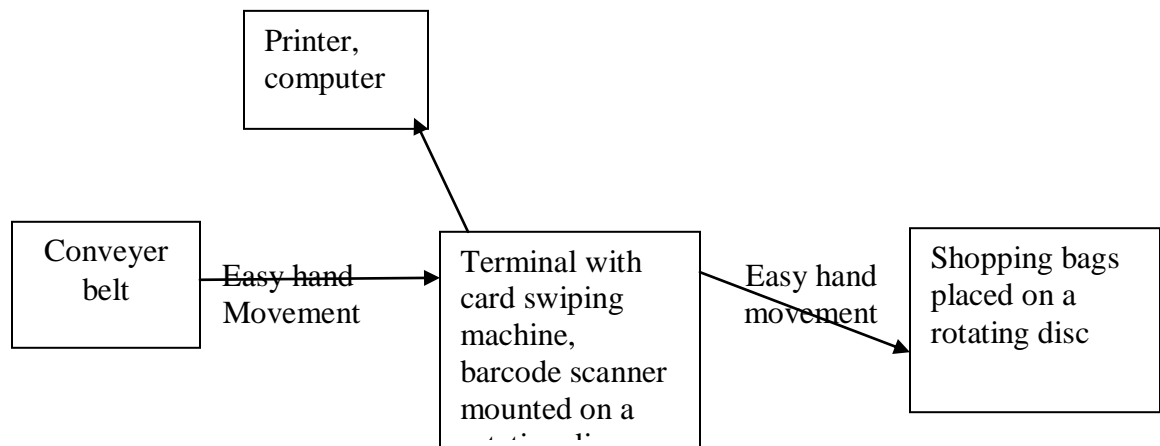
- **Artifact Model:** Looks at how actual objects are used in the work process. Copies or representations of physical or electronic “things” the user creates, passes, or references to do a task. It reveals the distinction in the structure and content of an artifact.

Terminal: is mounted on a rotating disc. It has a touch screen interface which is 5” X 5” in size and is mostly blue and grey in color. It has a stylus pen attached to it which could be used to imprint signatures and press buttons. The screen can be adjusted according to the height. The customer had to interact with this screen for the successful payment.

Credit Card: is one of the most widely used modes of payment. They have a magnetic strip at the back which has all the information about the card such as card number, card holders name, pin etc. Swiping it just through the machine makes the transaction easier and save a lot of time and also avoid human errors while entering data.

Receipt: is a document which provides the list of items purchased with the cost on a particular date. It is actually a proof of purchase. It is computer generated and is handed by the cashier to the customer.

- Physical Model: Shows the physical environment to support the work.



Contextual Inquiry:

Contextual inquiries are used in the process of Contextual Design as a first step in a sequence to better a system or process that people interact with on a daily basis. We have chosen to work on the Credit/Debit Card machines in constant daily use. There are few usability issues with the machines, for everyday users as well as for those with special needs. Overall the transaction is pretty simple, the customer comes in the store, retrieve the products he wants to purchase, bring them to the counter and present their method of payment to the cashier, who then rings the products and when everything is said and done, the customer leaves.

Problems arise though due to the smallness of the card, it's indefinable characteristics from other plastic cards in the same case as it is kept, which way the card should be swiped from horizontally or vertically to where the bar is matched up, whether or not buttons need to be pushed for what kind of transaction it will be (debit or credit), how many steps there will be, responsibility of The Customer, and that of The Cashier, among other things.

These are areas where improvement could be appreciated by both The Customer and The Cashier, as it would make the interactions run more smoothly and with less emphasis on the machine and more about the customer service as well as getting through the procedure as quickly and efficiently as possible. Errors can occur from misunderstandings between the machine and the persons using it, on both sides of the

register. When it happens to The Customer, The Cashier is supposed to be there to help. Usually the cashier knows the error that was made by the customer, either a button mistake or a problem while swiping is easily managed by the cashier.

There are components that are on the customer's ends that could be improved upon, but which are outside the scope of this project. For instance, the size of the card can sometimes be a burden, as well as the container that holds more than one of the same kinds of card. This can cause issues to arise when attempting to retrieve the card as well as locate it among the many others of its kind. There are also possible issues with putting the card back, or with juggling all the merchandise after the end of the sale.

Sometimes there are customers with special needs, such as being on a wheel chair, or having impairments of the eyes or if there is a cast of some sort keeping the dexterity of the fingers from doing their jobs on the machine. The screens used can sometimes have contrast issues for those with poor vision, as well as the glare that comes off the screen. The angle of the machine may also have an effect on this for those that are low to the ground.

Affinity Diagram:

Make successful payment transactions in a grocery store.

Sliding the card is an issue with the customers.

Security while entering the PIN for the debit card is an issue.

Credit/Debit?

People with special needs

It takes time for me to figure out which way to slide the card.

Entering PIN requires a lot of attention.

There are no proper instructions when I use credit cards for payment.

Visual Impairment hinders me to put the correct PIN first time.

I get confused with different machines having different ways to slide card.

Cashier never asks for my ID when I use debit/credit card.

How do I know that I had to press CANCEL on PIN pad for the credit payment?

The color of the interface is very dull, takes time to follow written instructions.

I wish that the card could slide from either side.

I have this habit of forgetting my PIN.

Should have a separate credit button when I wish to make payment through credit card.

I am in old age, my fingers ache when I press buttons on swiping machine

I wish that there could be just one type of card swiping machine in all the grocery stores which have standard way of swiping card.

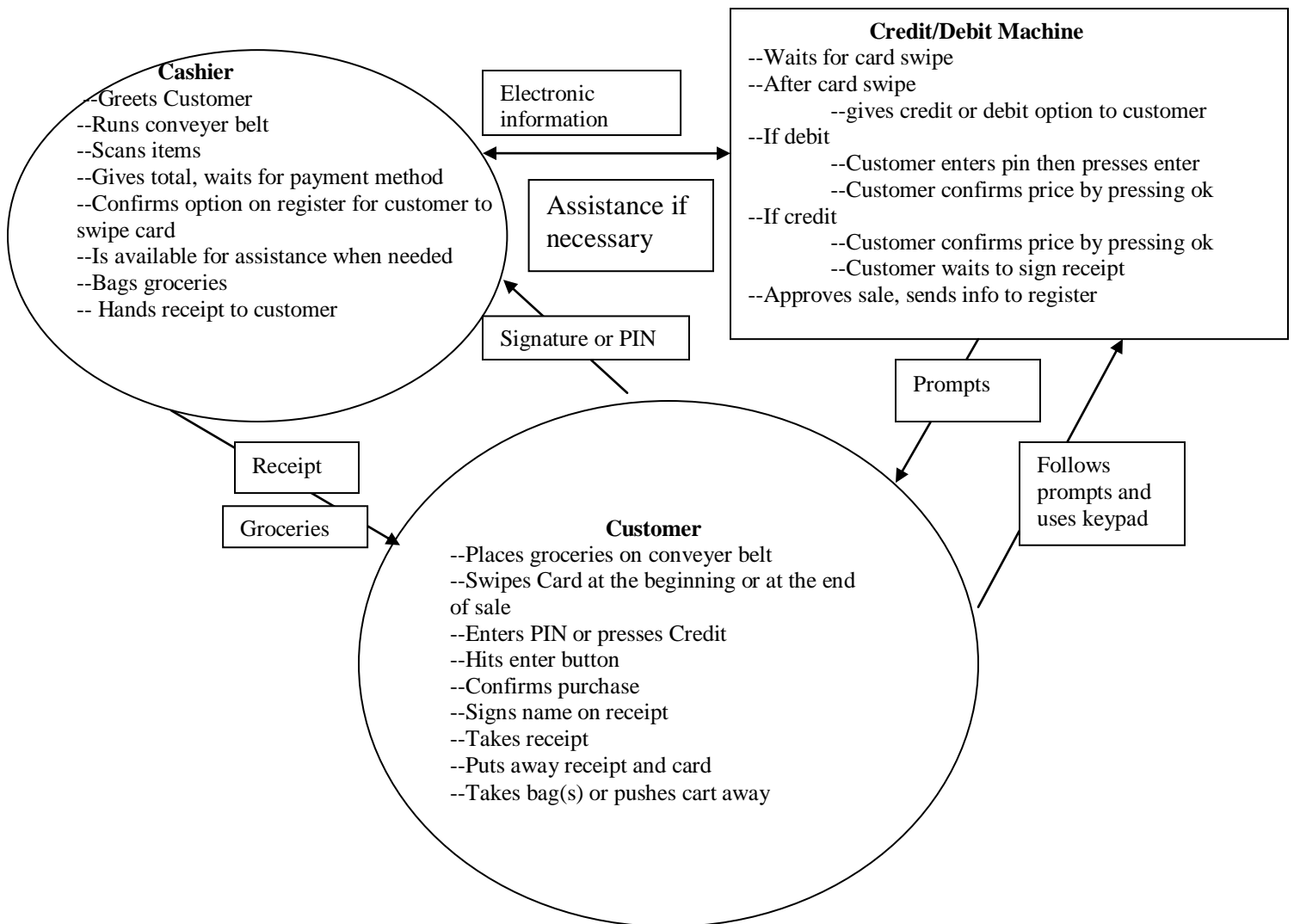
I don't feel safe putting my PIN in the grocery stores with people standing right behind me.

I prefer to use credit card but found it difficult to use in the grocery store card swiping machines

Different grocery stores have different machines with different colors and contrast making my task difficult.

These are simple observations from grocery store interactions between real people and their issues with the machines. Here is an overall synopsis of the kinds of scenarios we saw, and what follows are the next steps in Contextual Design, the models that help depict the processes of the customers in a more extended fashion. Detail for the overall flow of the interactions, the culture, the sequence and the physical models for both the machine and the other artifacts used.

Flow model:



Workflow models are basic schematics of the interactions between the three main players in this equation: The Customer, The Cashier and The Credit/Debit Card Machine. There is a typical format for the exchange of information between The Cashier and The Customer as well as one for The Credit/Debit Card Machine and each of the human

components. The model depicts these interactions using arrows. Sometimes though, under certain circumstances there are breakdowns in the system such as a user will be too short i.e. in a wheelchair, or may have a hard time with English, or has terrible vision and can't make out the total or the words. There are also situations where the patron doesn't know which way to slide the card. By way I mean direction (up or down) or where the strip at the back of the card should be lined up with the machine. Fortunately there are pictures on the machines giving The Customer an idea of how to use the machine, but some people miss this if they are in a hurry or just plainly not paying attention. If this breakdown occurs then The Cashier is there to aid The Customer in their time of need.

Cultural Model:

Cultural Models depict the general arena that Customers and Cashiers are in. It is the main function is to show the overall environment that both people are in, respective to one another. Their interaction is necessary, and this is well understood between the two; The Customer needs The Cashier to validate their purchases-a witness of sorts-as well as provide assistance to a machine that they are more familiar with based on the hours of interaction The Cashier clocks in with The Credit/Debit Card Machine as opposed to The Customer. In reality though, The Cashier may have little to no further information than The Customer on the subject, regardless of time spent with the machine.

Grocery Store

- *Centralized Location
- *Easy to use artifacts
- *Easy to follow aisles
- *Credit card accessible
- *Easy Layout to find what is needed
- *Debit/Credit card accessible
- *Well lit, lots of color

Manager

- *Can be called if necessary to help aid in transactional problems should they arise

Cashier

- *Uses credit/debit card machines on a regular basis, is very comfortable
- *Interact with many customers, lots of varieties of people
- *Can be taxing on mind and body

Customer

- *Goes to the store to grab food and everyday products such as toiletries and kitchen accessories
- *Usually go with a list in mind, can go without one to just wander
- *Pays with either cash or credit/debit card or sometimes checks or food stamps
- *Is familiar with the check out process, putting food and products on a conveyer belt
- *Familiar with interacting with the cashier

Credit/Debit Machine

- *Widely used for purchases

Sequence Model:

Activity	Intent	Abstract Idea
<p>In store, pre-check-out:</p> <ul style="list-style-type: none">• Walk around store• Choose items• Proceed to check-out	<ul style="list-style-type: none">• Get the products that are needed	<p>Trigger:</p> <ul style="list-style-type: none">• Need for groceries or products available at a grocery store.
<p>In store, check-out:</p> <ul style="list-style-type: none">• Place items on conveyer belt• Extract card from container• Run card through Credit/Debit machine for payment• Follow instructions on screen for Credit/Debit payment options• Successfully complete transaction	<ul style="list-style-type: none">• Pay for items chosen during the course of shopping• Open a connection between your money and the place of business• Get through the process to pay without problems• If there is error assistance is available, ask or follow instructions	<ul style="list-style-type: none">• Use the money represented in accounts and on the screens to pay for the products desired
<p>In store, post-check out:</p> <ul style="list-style-type: none">• Replace card in container• Take receipt• Claim bags• Exit the store with purchases	<ul style="list-style-type: none">• Get things that were just purchased home to unload and use	<ul style="list-style-type: none">• Go home and eat!

Intent: Go to Grocery Store for food or products available there

Trigger: Need for food or products

Go to Grocery Store



Walk around grocery store collecting items to buy



Collected all the items wished to be purchased

Proceed to checkout



Find checkout lane that is the least busy



Place items on conveyer belt for cashier to scan



Cashier scans and bags the items



Cashier states total amount



Take out credit/debit card, prepare for swiping



Swipe credit/debit card in machine



Swiped card the wrong way



Reevaluate and re-swipe card ~~the~~ a different way



Prompted by machine to press credit or debit-



Press debit or credit



Prompted by machine to enter PIN and then press enter.



Enter PIN and press enter.



Prompted by machine to choose cash back; yes or no



Prompted by machine to confirm purchase and price and press OK



Press OK button.



Wait for cashier to give receipt.



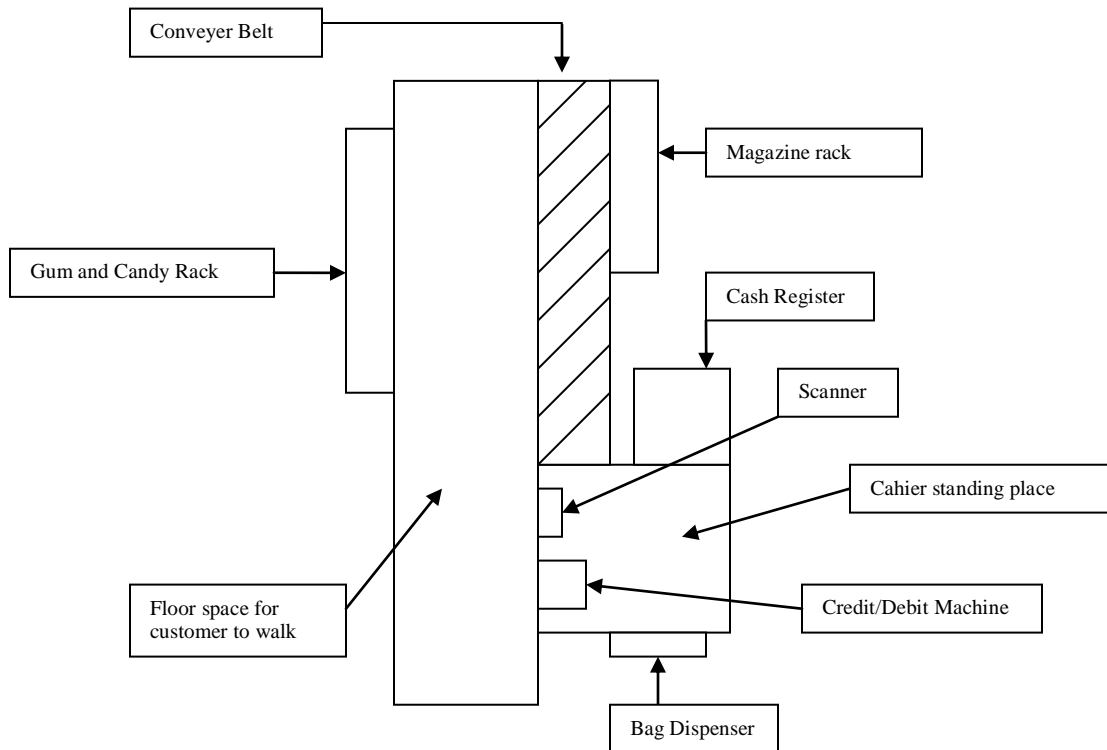
Take receipt and place that as well as credit/debit card in wallet



Take bags or push cart with groceries to vehicle.

The Sequence Model uses steps to depict the progression of The Customer through the entire process from coming in to leaving. It is a literal step by step sequence that goes from one point to the next. It helps to write it all out so that the places where breakdowns can occur are mapped out and easily identified, that way it may be easier to fix the problem.

Physical Model: Overhead view of cashier lane

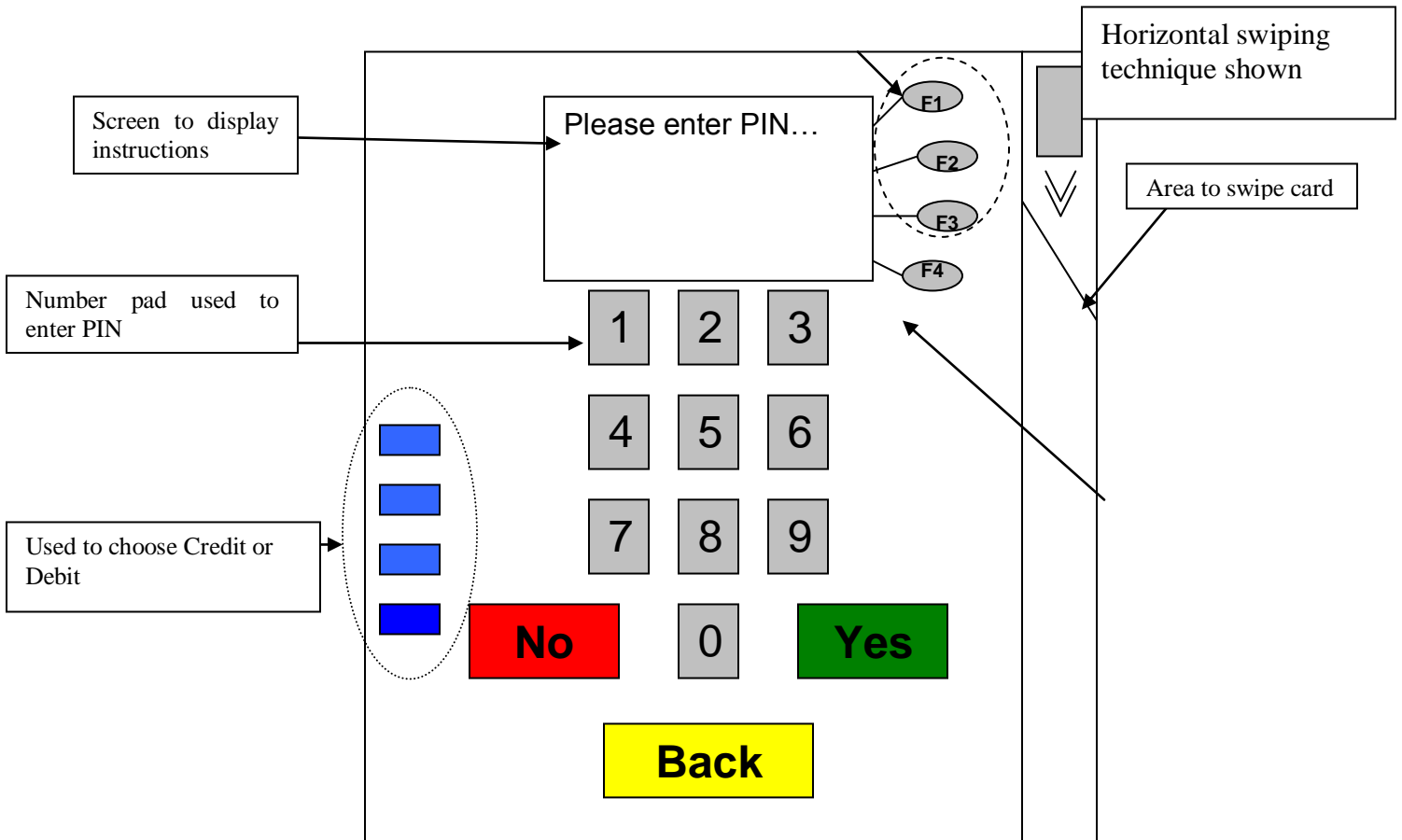


The physical environment to support the work is that of a counter, a computer and credit card machine that has a LCD screen that shows writing of the persons account and account and the total for the charges incurred. Pens are used to sign slips of paper,

pointers are used to help aid in the virtual buttons used to agree or decline the purchase. The conveyer belt is provided for the easy hand movement and to save time. Each checkout lane is separated by the gum and candy racks. The bag dispenser is located at an appropriate position to allow easy hand movements.

Artifact Model: Credit/Debit Machine

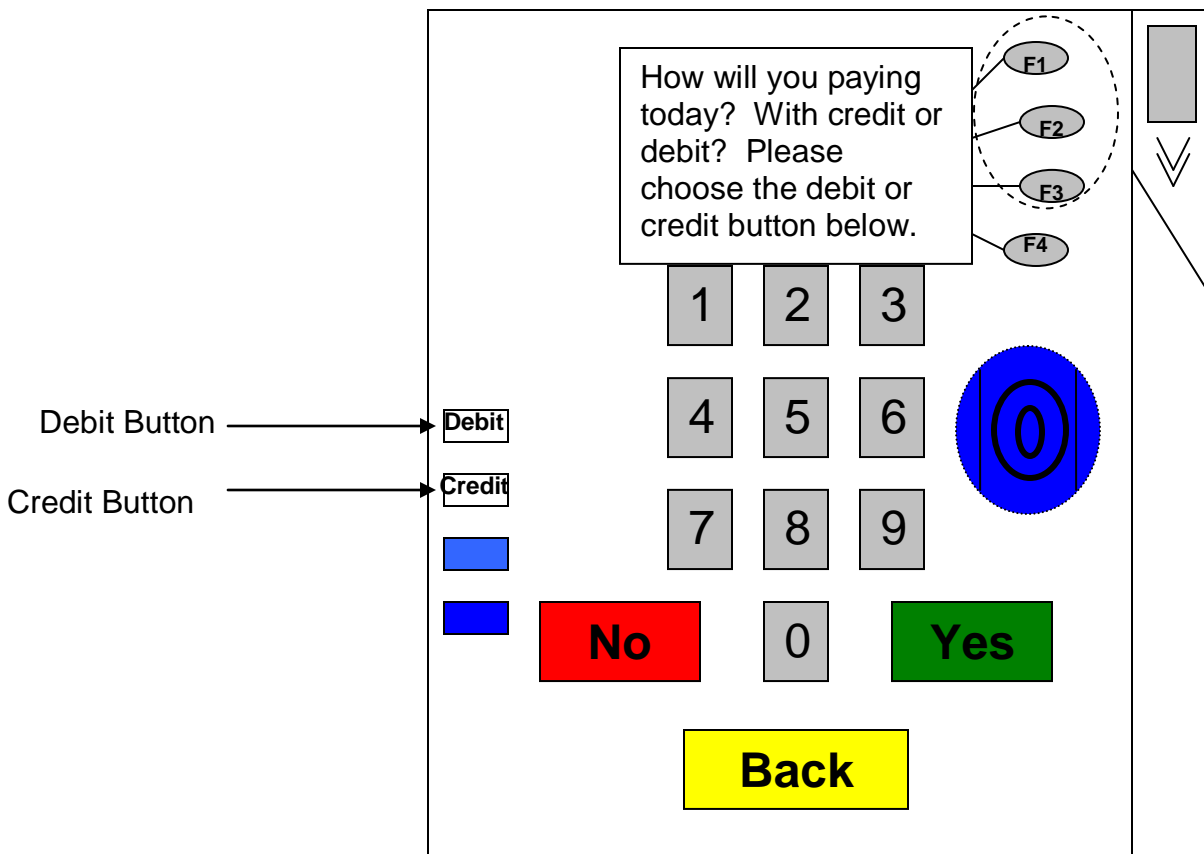
Looks at how actual objects are used in the work process. Copies or representations of physical or electronic “things” the user creates, passes, or references to do a task. It reveals the distinction in the structure and content of an artifact.



Work redesign

Specific task to be improved: choosing credit or debit to purchase

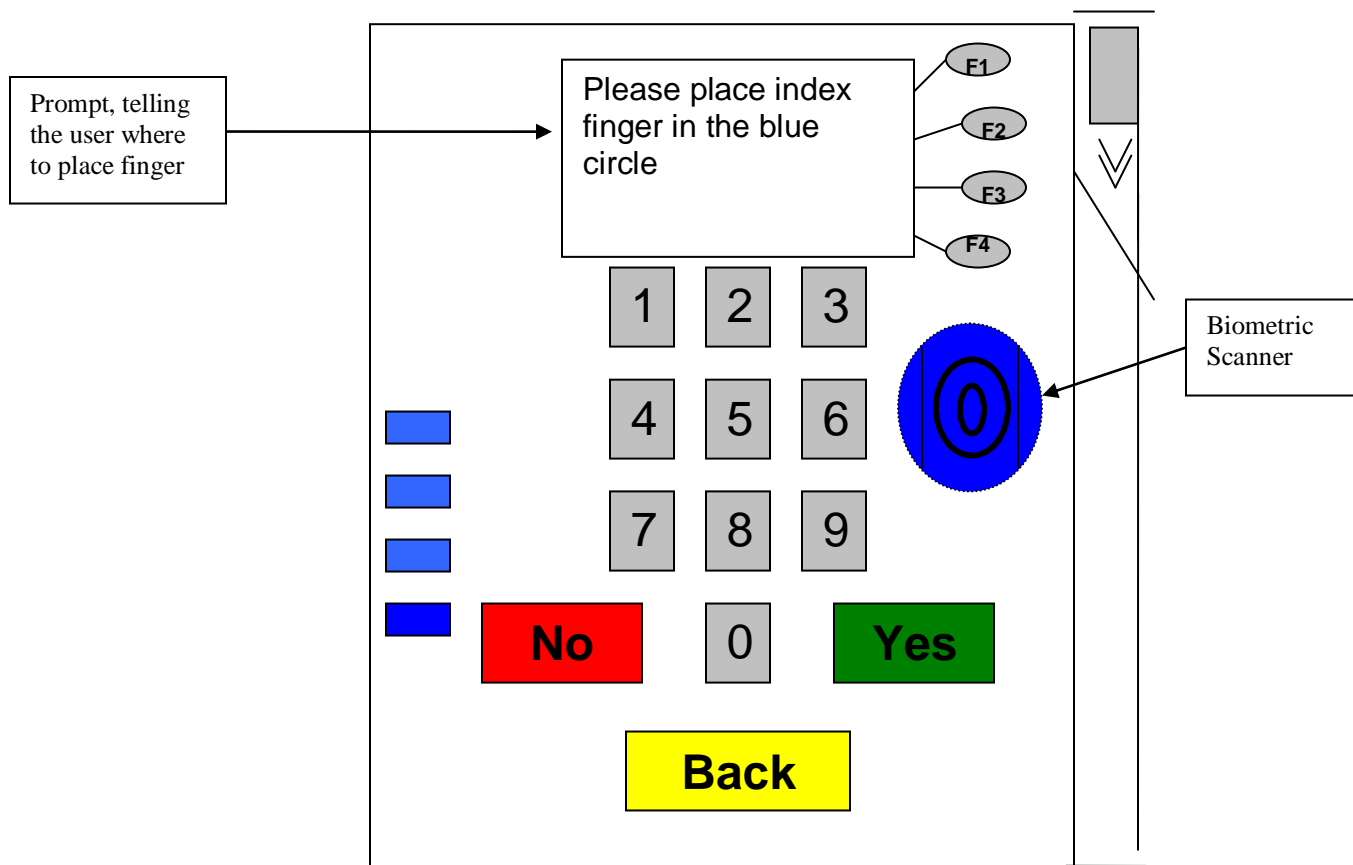
From the user observations, when a customer swipes their credit/debit card he/she needs to hit the cancel button in order to make a credit purchase. A new work practice would be to have the credit/debit machine to ask the customer if he/she would like to make a credit or a debit purchase before they swipe their card. The user would be able to press a credit or debit button on the credit/debit machine in order to make their choice. Allowing the customer to make this decision before they swipe will get them ready to enter a PIN and place their fingerprint in the reader. This new work practice is a behavioral improvement that will make using a credit/debit machine much easier.



Specific task to be improved: authorizing the transaction

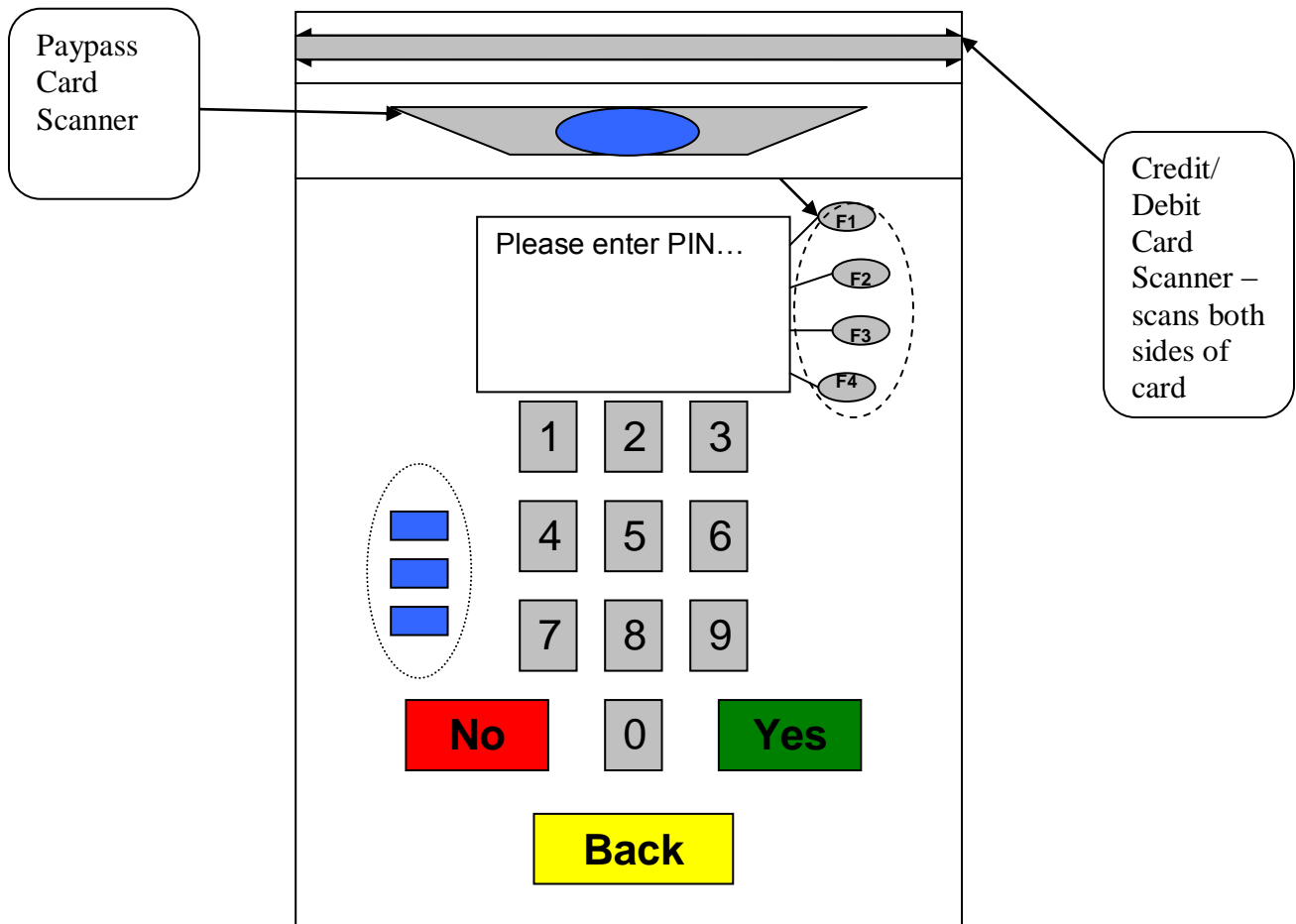
When a user goes to input their PIN into a credit/debit machine they usually enter a 4 digit number. This is not a secure process. Someone could be looking over the users shoulder and obtain their PIN. Another way entering your PIN in the credit machines is unsecure is that the cashier does not ask the user to provide identification. So a person could have someone else's debit card and PIN and purchase goods without much hassle. A new work practice with authorizing a transaction could be to combine a PIN with a fingerprint. The credit/debit machines can be equipped with a biometric fingerprint scanner making their authorization process more secure. This is not a redesign of technology rather a technology addition to the credit/debit machine. When a user goes to authorize their transaction the credit/debit machine will ask them to place their index finger on the scanner for proof of their identity. Unbeknownst to the user, after the scanner ingests the fingerprint it verifies it with the credit/debit card that was provided in the beginning of the transaction. The addition of a fingerprint scanner to the credit/debit machine makes authorizing the transaction a secure process for the user.

Storyboard:



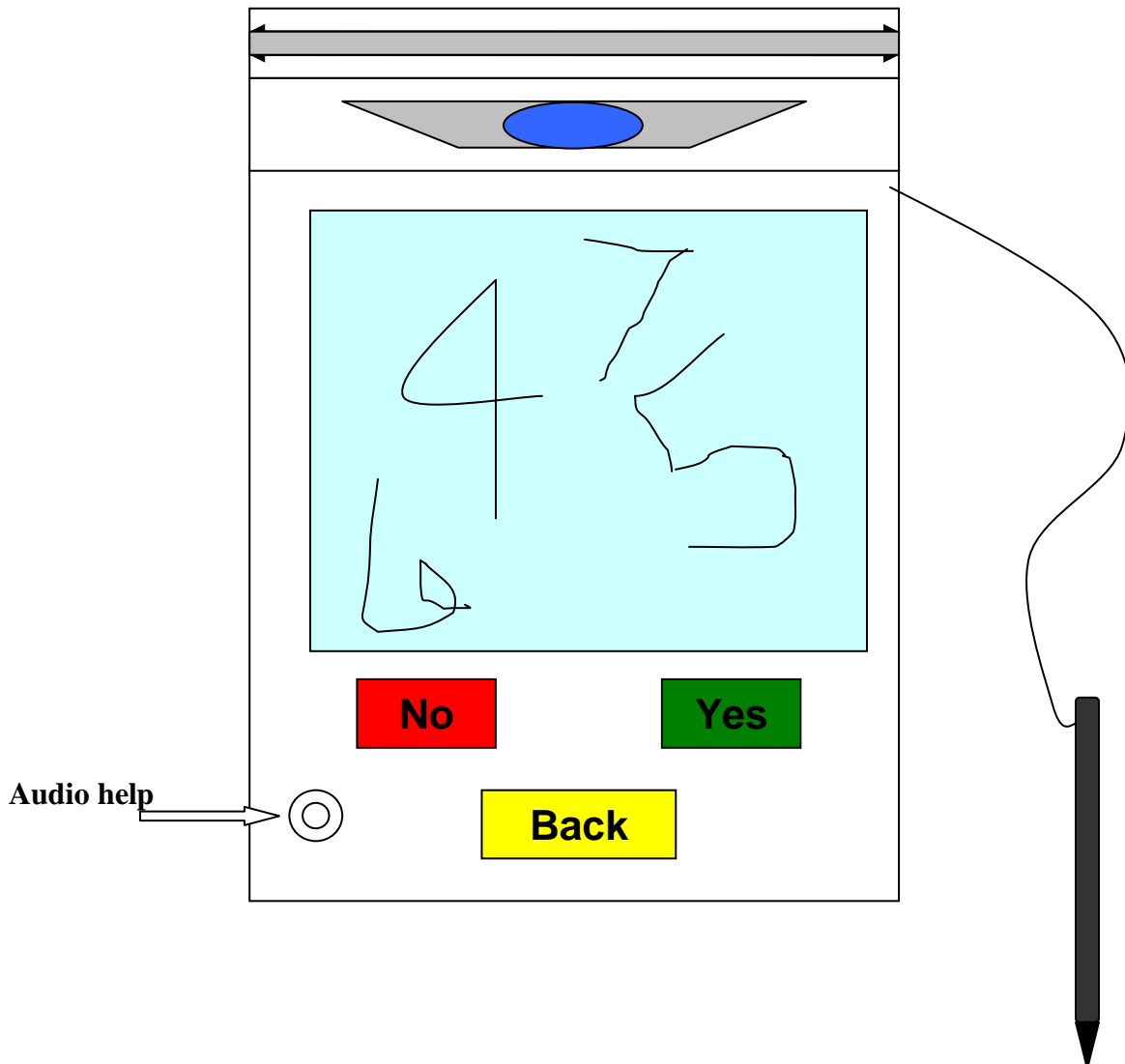
Work Redesign (Swiping the card)

When swiping the card into the machine, customers have a tendency to swipe their card with the magnetic strip in the wrong place, so the reader cannot retrieve the information. The graphics on the card machine do not seem to yield appropriate responses each time. Also, the swipe seems to be intuitive to those who are right handed rather than left, seeing as the swipe is usually on the right side of the machine. This can cause slight hassles for some customers. Swiping the card incorrectly can slow those customers down who are in a rush. There are machines with the swipe on top of the machine, so there is no handedness bias. Designers can play off this set –up and have a reader/scanner on both sides of the swipe flaps. Hence, there is no “wrong” way when swiping, unless the customer is holding the magnetic strip...in that case, the new technology seen at Wegmans – Paypass – can be more of an assistance to that group of people.

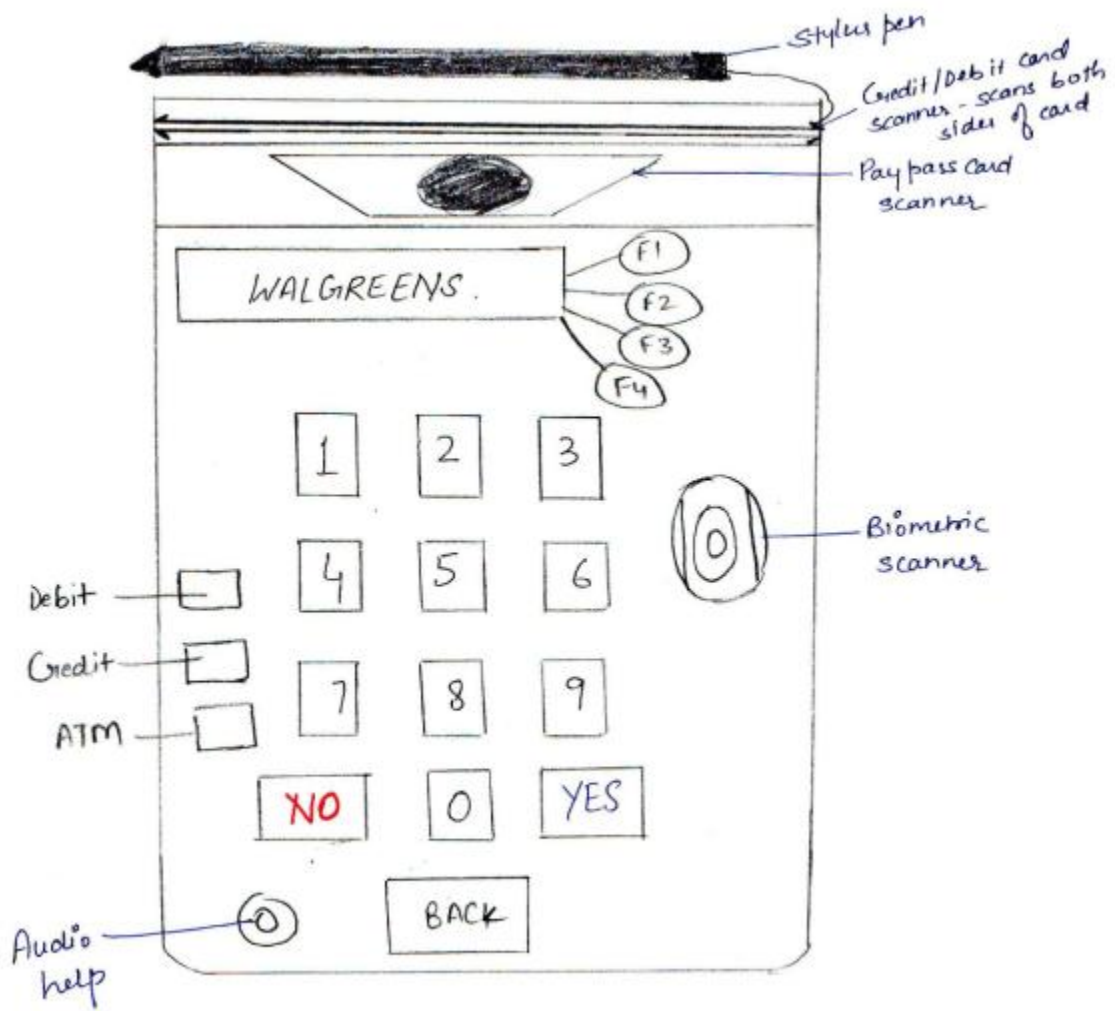


Work Redesign (Incorporating the Blind)

Many with vision take for granted what those who cannot see don't, and with the new credit card machines with the touch screens, those who rely on tactile feedback (the blind), may have a difficult time pressing the correct keys when inputting their pin or okaying a transaction. Hence, a goal here would be to incorporate those with visual disabilities into the technology that is being developed. Since the touch pads are beneficial, designers can further this design by also including a method for the blind to be able to input their information through tactile feedback. The plastic pen that is attached to the machine can be used as a tool, and those who are blind can write down their information on the touch screen, like a PDA. This way, there are no issues when trying to find the correct key to press, and technology can keep developing in the same direction as it involves more than one population. An audio jack is also provided for the help assistance of the visually impaired.



Paper Prototype:



Conclusion:

Contextual Design is a customer-centered process that supports finding out how people work, so the optimal redesign of work practice can be discovered. It provides help in designing the front-end design from initial discovery to system specifications. The best part with this project was the development of design ideas as a team. Everybody was given a chance to share their own observations and experiences. The work models gave us a better understanding of the environment, users and thus helped in planning. The affinity diagram allowed us to organize data across all customers to reveal the scope of the issues and identify holes in the data. The end result (the prototype) ensures a shared understanding of what customers find valuable. Paper prototype is easy to work on as it saves time and enables to be iterative in nature. In this redesigning of application, we have added some new functionality to the already existing application.

One of the limitations of contextual design in the project was lack of contextual inquiry. We observed the users while performing in their natural environment. Thus, we were not able to ask many questions from them. Some of the users simply refused from sharing any of their experiences.

Other limitation with the contextual design is that the resulting software does not always end up looking exactly as the prototype.

Overall, the contextual design was a good approach for the redesigning of this application.