E-RECEIPT AND PRODUCT RECALL NOTIFICATION SYSTEM

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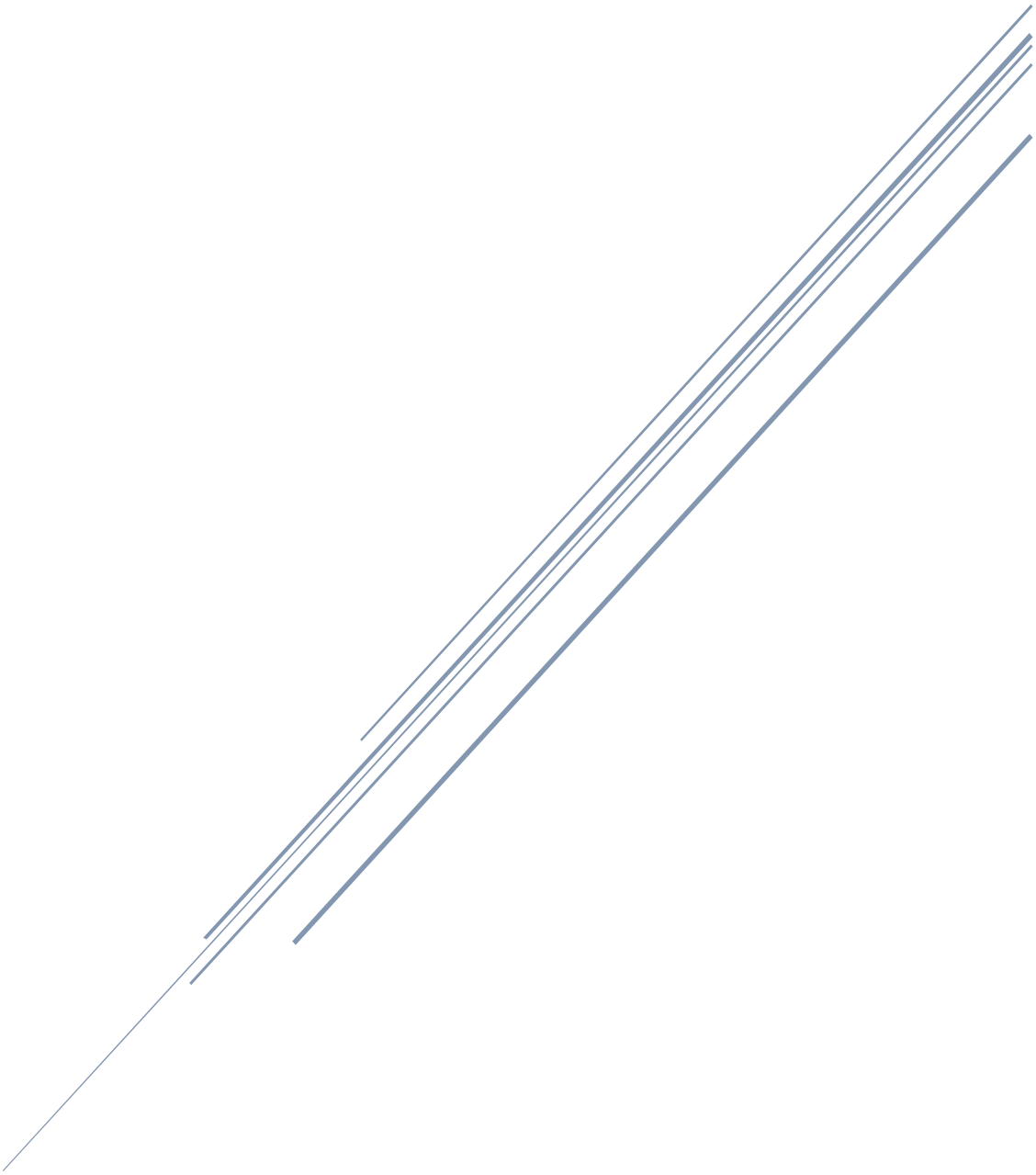

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Executive Summary

The following document is a requirements specification created for HRS (Hibernia Retail Systems), an EPOS (Electronic Point of Sale) development company. It details the application of techniques used to determine the needs and requirements from a variety of key stakeholders. The results of these elicitations have been transformed into IEEE specification standards detailing the requirements to develop the E-Receipt and Product Recall Notification System, a system that connects EPOS, mobile, and cloud centred database technologies to eliminate the need for paper receipts in retail transactions and also inform consumers if any of their purchases have been recalled due to defects.

Business Need

HRS is a reliable provider of EPOS systems based in the Republic of Ireland. While the software that has been developed by the organisation has been customised to the needs of each client, HRS has not yet succeeded in developing a product that has the capacity to compete with the EPOS systems offered by larger solution providers. The CEO of the company, David Byrne, has identified a business opportunity to develop an EPOS system that can capitalise on the growing demand for "E-receipts" (a digital alternative to the paper receipt produced at the end of a retail transaction), but also informs customers if a product has been recalled by a manufacturer.

Business Case

The project sponsor, Mr. Byrne, has conducted research and ascertained that there is a high demand for this solution, particularly noting the paper receipts health risks to workers and how they are an expense that retailers would prefer to reduce. He also notes that they are cumbersome to customers who often scrap the receipts unless it is a highly expensive item. Having the receipts in a digital format would save on paper receipt expenses for the retail store, while also leaving the customer without the responsibility of looking after every receipt themselves in case they need to return an item.

The sponsor has also determined that combining the product recall notification functionality with the E-receipt capability would make his company the first to market this type of augmented product, as currently the most common technique of informing customers that a product has been recalled is to position a sign next to the EPOS in shops where the product has been recalled, and hope that the customer comes into the shop again and notices the sign. He feels that this is an inadequate means of communication, especially if it is a serious safety concern, such as a food product being incorrectly labelled as not containing any allergens and the risk that it is consumed by someone with that allergy.

The Sponsor has concluded that combining the capability of digital receipts with a product recall notification system will result in a highly marketable product and industry wide recognition for his organisation, and so he is allocating a sizable amount of his company's resources as well as hiring cloud database and mobile developers to develop the system.

Constraints

Budget

The project sponsor, Mr. Byrne, has limited the project budget to 240,000 euro. (set out by sponsor in an initial, undocumented interview)

Retail Store Co-Operation

Requires a retail outlet to perform several requirement elicitation techniques to gather requirements for the creation of an EPOS system that matches he sponsors criteria (see Sponsor interview), so co-operation with an outlet of relevant size needed.

Collaborative/Creative developers

As the technology constraints aren't being specified to developers (see Sponsor interview), it will be up to them to work with one another to deliver the technical solution.

Database Administrator

A competent and trusted database administrator with sound judgment is required to maintain the database, test for the correct receipts, and inform the relevant customers. (see Sponsor Interview)

Release Date

System must be fully developed and ready for commercial use by early 2018, as several competitors typically release new software in the 2nd quarter of 2018. (see Sponsor Interview)

Mobile Users

Because of the shear amount of potential mobile users, their requirements are not being gathered directly but instead a simplistic mobile app has been envisioned by the sponsor to keep it accessible by most demographics. The sponsor theorises that exploiting even a small percentage of the potential adopters would be enough to cover the expense of the project. (set out by sponsor in an initial, undocumented interview)

Stakeholder List

Retail Customers

Role

The role of the customer is to use the mobile app after it has been developed and to purchase items in the retail shops.

Responsibility

While these users take no responsibility for the project outcomes, they will have to make an account and pay attention to notifications for the system to deliver the business need.

General Retail Workers

Role

The role of the general worker is to use the EPOS system on a day to day basis after the product has been developed, so the product will have to have a similar style to existing EPOS systems.

Responsibility

As the primary user of the EPOS system, the staff of retail shops will have to correctly inform the Business Analysis what design makes it as easy and functional to use as possible.

Retail Supervisor

Role

The Supervisor is a step above the usual retail worker in that they have more duties. They are trusted by the manager to run the shop on the manager's days off and are empowered to use their own judgment.

Responsibility

The Supervisors will have to give accurate accounts of their experience and needs to develop the EPOS system

Store Manager

Role

The role of the retail manger is to purchase the EPOS after they have been developed. They will use the EPOS system less than supervisors and general workers.

Responsibility

The manager will have to make sure there are facilities onsite capable of running the software and that their staff have been appropriately trained to use the new system. They will also have to supply their functions that they need the EPOS system to perform that general workers won't be able to.

Project Sponsor

Role

Mr. Byrne's role as project sponsor will be to fund the project and allocate the resources to ensure the system is successfully developed. As this was his idea and he will bear the consequences of the success or failure of this project, he has chosen to be hands on in deciding the final requirements.

Responsibility

David decisions and experience working with EPOS systems will be key in delivering a solution that matches the business need, making him a major stakeholder in this project.

Database Administrator

Role

The role of the database administrator is to provide a space for the e-receipts that are uploaded by the retail shops that is also accessible by the retail customers on their mobiles. They will be an outside hire, as HRS doesn't have prior experience working with cloud storage or databases. The database administrator will also maintain the database and compare the e-receipts provided by the stores with product recalls and inform the customers of any recalls.

Responsibility

The database administrators are important to the success of the project, as a failure on their part to deliver will mean the E-receipts have nowhere to be delivered and stored, meaning the customers won't be able to access their receipts or be informed of recalls.

EPOS Software developers

Role

It is the EPOS developer's role to create the software that will be used by the retail staff. These will be internal staff from HRS.

Responsibility

It is critical that these developers deliver an EPOS system to the standards expected by all members of the Retail organisation.

Mobile Software developers

Role

It will be the mobile developers job to develop the mobile application used by the retail customers.

Responsibility

The mobile developers will play a vital part in the project, as the delivery of a functional and easy to use application is needed to ensure the uptake of the product by as many customers as possible.

Product recall websites

Role

The operators of these sites must continue their work in updating the site with products that have been recalled so the database administrator will have a place to source the information to inform customers of any recalls.

Responsibility

They will be indirectly responsible for informing the customers of the products that have been recalled, but are likely to assist and help in the development of the project as it is their obligation to protect the public.

Requirement Elicitation

The following section contains the details of the requirement elicitation techniques that I chose to conduct.

Interviews

Prior to engaging with stakeholder's I familiarised myself with good conduct practices such asking open questions, verifying results, and having a more conversational and informal air during questioning. (Greenconsulting, 2017). I also concluded that a top down approach would be the best method to decide who to interview first, as a high-level interview can make it easier to know what to look for as you move down to gather more specific requirements of a system. (Blais, 2012, p214)

Sponsor Interview

The sponsor interview was the first documented interaction and elicitation technique. It set the guidelines and objectives for the rest of the elicitation techniques I chose and also why the rest of the requirements gathered were primarily for the EPOS system. I opted to conduct a structured interview because I wanted to leave no margin for error due to any potential miscommunication between us.

I intentionally kept the questions mostly open ended due to unfamiliarity at this stage as to what the sponsor wanted delivered, and tried to limit paraphrasing answers too much so that I would be able revise over the notes as needed. (The Business Analysis Book of Knowledge, 2009, p177-180)

Medium

Phone

Date

28/03/17 2:00pm

Interviewee

Project Sponsor

Purpose

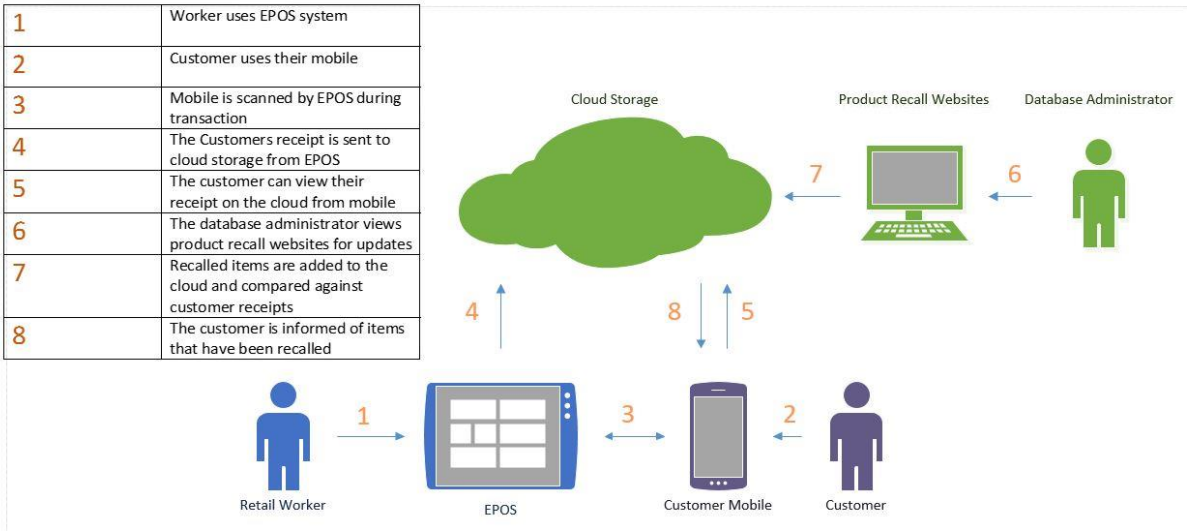
The purpose of this interview is to receive a high-level overview of how the entire system will interact, and the base requirements for the mobile and database developers.

Results

How do the systems interact with one another?

I will draw up a simple context level dataflow diagram and send it on to you later. The specifics of how the information is stored and interacts with each other, and the technology used isn't important, I'm leaving that to the mobile and database developers I've hired who have more experience in those areas.

1	Worker uses EPOS system
2	Customer uses their mobile
3	Mobile is scanned by EPOS during transaction
4	The Customers receipt is sent to cloud storage from EPOS
5	The customer can view their receipt on the cloud from mobile
6	The database administrator views product recall websites for updates
7	Recalled items are added to the cloud and compared against customer receipts
8	The customer is informed of items that have been recalled



The focus for my developers is on developing an improved EPOS system compared to our previous versions by early 2018. I want the requirements from staff and mangers perspective primarily since I want an EPOS built with usability focus rather than have it influenced by a technical approach first, either from the developers or my own knowledge of EPOS systems.

As long as the requirements are noted that allow for the components in the diagram to interact, it should match the business need I've set out.

Can you describe to me what features you are looking for in the cloud database?

Development of the database will be performed by the database developers we've hired. In addition to providing a cloud database accessible to both customers and the EPOS users (for customers to check personal receipts, and for Staff to send the customers receipts and to check the store receipts), they will act as database administrators, updating the list of recalled items by regularly checking the following sites for recalled items:

http://www.hsa.ie/eng/Safety_Alerts

https://www.fsai.ie/news_centre/food_alerts.html

https://webgate.ec.europa.eu/rasff-window/consumers/

http://ec.europa.eu/consumers/consumers_safety/safety_products/rapex/alerts/main/index.cfm?event=main.listNotifications

http://www.consumerhelp.ie/product-recalls

https://www.hpra.ie/

After items are added to the database, they should be compared with all of the receipts in the database. If there is a match found, a notification should be sent to the person that purchased the item with advice on what to do next.

Can you describe the base features you want from the mobile app?

Since this is to be used by a wide range of demographics, I want it to be just informative enough that it isn't daunting, and for it to be quite simplistic to read. The customer will have to make an account with us first, which can be made through the app. It will just ask for their name and then assign an account number. The account number will be translated into a barcode. This is what is scanned during a transaction to link the correct person with the correct receipt. It should load fast and have the barcode on the front screen, ready to be scanned, since it must be faster than dealing with receipts. A barcode widget could also be good for android so you don't even have to open the app.

Are there any security concerns I should be aware of?

The data should be encrypted from one end to the next at each stage of the process, since customers won't like the idea of their shopping habits being accessed. The database where all the receipts are stored should also have very strong security measures.

Requirements

After I received the diagram from Mr.Byrne, I wrote out two use cases which between them performed the steps he laid out in the diagram, as well as expanded on them based on my understanding of this interview. Those requirements are documented under their respective use cases. There was some overlap of requirements so they have been only been noted once.

I rang him the next day to tell him what requirements I had gathered from this interview and he verified that the following were correct:

1) The EPOS bar scanner must be able to scan the code displayed on the mobile
2) The EPOS can send customer receipts to be stored in a cloud storage database
3) A Database Administrator can add recalled products from product recall websites to the cloud storage database
4) Customer can make an account through the mobile app, only needs customer name to keep it simple
5) There is a code that can transform the account number into a unique barcode that can be read by the EPOS bar scanners to match the customer's account with receipts
6) The barcode should be displayed first when you open the app.
7) The receipt data should be encrypted end to end, from EPOS to database
8) The database will require strong security measures as it will contain all the receipts from all the stores that use its system

9) Simple user interface on the mobile app
10) The application should load very fast
11) There is a widget for android that displays your unique barcode so you don't have to open the app during a transaction

Manager Interview

The manager I Interviewed was one I was previously employed by and so I had a good relationship with them. I contacted that them several days before hand and explained what the purpose of the interview was. I interviewed them at their pharmacy so as not to inconvenience them anymore than necessary.

The good rapport we had when conducting the interview made the interview a lot easier, and my familiarity with EPOS systems meant that I could keep much more concise notes and still understand the requirements that the manger wanted from an improved EPOS system. I still made sure to follow up after the interview was concluded with the notes I had made to ensure they were the correct requirements. (The Business Analysis Book of Knowledge, 2009, p177-180)

Location:

Pharmacy in Blanchardstown

Date:

31/03/2017 9:00am

Interviewee

Manager of Pharmacy in Blanchardstown

Purpose

Prior to the focus group that would occur in the evening with staff, I wanted to ask the same questions of the shop manager to see if they would have any different or extra requirements than staff members. I also wanted to interview the manager separately so that staff wouldn't feel intimidated or like their contributions were being judged by a superior if the manager was included in the focus group.

Results

1) Tell me some of the daily tasks you use the EPOS for.

Refunds when a customer brings back items. A "no sale" to check the float of the till (specifically, to see if the number of coins or notes is unbalanced. Goes through like a transaction, but without an item). Manager would spend less time on the till than sales staff.

General daily tasks that would be good if it could be done at the till: check stock in, see stock history, email notification, Adding new customers to loyalty scheme. Currently all of these tasks are done at a computer in the backroom.

2) Tell me what is easy to do and what is difficult to do on the EPOS.

The interface is pretty intuitive for standard actions, but the touchscreen can sometimes not be sensitive enough to register what is being selected. Also, each till isn't customised for each department, and there is a default screen that it reverts to after each transaction, so it takes a bit longer to get started on next transaction. Not very long, but it is a minor annoyance.

3) **What are some features missing from your current EPOS that other ones you've worked with had?**

Can only check your personal sales targets for the day, but to check other staff members requires going into back office and checking computer. In previous jobs, managers had access to real live data of staff sales on the EPOS, speeding up the process.

4) **Can you take me though any unusual interactions you have had with customers, even on a one-off basis?**

On occasion would receive cheques as payment, and only the manager can process it. Not performed though the system, time consuming task.

5) **Are there any features you would want access to but no other staff?**

Refunds can only be performed by a manager to ensure it is a genuine reason for an item being returned, and to find out why it is being returned. Handling cheques is also a manager only task.

After I had noted potential requirements from the questioning, I informed the manager about the requirements that I had inferred for the new system, and she corrected them as necessary.

Requirements:

As a result of the interview I had with Nicole, I elicited the following verified requirements for the EPOS system:

1) Supervisor section function: **Product return**. An item is brought back to shop, the receipt number is looked up if customer doesn't have it (Requires searching by date, time, and the other items that the person purchased), the item is selected from the onscreen receipt, item gets scanned by bar gun, its selected for either return to inventory or scrap, the till opens, money/updated receipt is given to customer.
2) Supervisor section function: **Stock check in.** Button selected, "Piccolink" (handheld tool to register stock on system) transfers data to epos instead of computer in the back, updates inventory with new figures. Current system means they must be individually committed on the computer and then committed again to epos, time consuming task.
3) Supervisor section function: **Stock history:** button selected, displays info on where stock has been since it has come into the shop and time at each section (e.g. storeroom, waiting to be put out, on floor)
4) Supervisor section function: **Add new member:** select button, input new members (name, email, house address), scan a new loyalty card to link them up, give card to customer. EPOS needs loyal customer database so that the manager can send them info on promotions.
5) Supervisor section function: **Display staff sales:** button pressed, displays the daily and weekly sales of each staff member in the shop and how close they are to reaching their targets. Staff sales must be tracked on EPOS
6) An Email notification should come into the message section of the EPOS for supervisors/managers so that they don't have to manually check it in the backroom
7) Very sensitive interface to prevent users having to apply a lot of pressure when selecting options
8) There should be a simple log on screen which requires you to input your staff no. and password. This should only have to be done once, until you log out (Current system requires you to log in again after each transaction)

Focus Group Session

I felt some form of group session would lend its self well as a means of eliciting the majority of the EPOS features since I knew I had access to experienced staff members who worked well together in the same location and knew the kinds of requirements needed to make an EPOS function well, and determined that with these resources a focus group would likely be the most appropriate (Erzah, 2017)

This was also backed up by the criteria for focus groups in BABOK as a means to "elicit ideas on a specific product, service, or opportunity in an interactive group environment". (The Business Analysis Book of Knowledge, 2009, p172-174)

Previous Experience on my work placement of chairing a weekly meeting with a group of 10+ people made me feel confident that I would be able to host and moderate the focus group effectively, a core process to the success of the session.

Location

Pharmacy in Blanchardstown

Date

31/3/17 6:30pm

Participants

Six participants. Homogenous group as all participants worked in retail for multiple years and know each other very well, so all comfortable sharing their experienced opinions.

Purpose

To elicit the requirements for an EPOS system that would be as functional and easy to use as possible for the primary users of the till.

Preparation

Several guiding questions were developed to keep the ideas relevant and identify the most prominent features that would be required for the staff. These questions were as follows:

1) Tell me some of the daily tasks you use the EPOS for.
2) Tell me what is easy to do and what is difficult to do on the EPOS.
3) What are some features missing from your current EPOS that other ones you've worked with had?
4) Can you take me though any unusual interactions you have had with customers?

Another goal for the focus group was to come up with a design for the new EPOS interface.

Result

While the questions were generally adhered to and answered, there was still the odd time when people jumped back to the different guiding questions as they had ideas, despite us having moved onto the next one.

Because it would feel unnatural and slow down the flow of ideas to do otherwise, I took notes and encouraged the group to talk, focusing on getting key words and ideas down on paper instead of writing detailed notes on every specific one, but remembering what was meant and wanted by the group.

To verify what I had written down as correct I reread out to them what I had interpreted and noted at the end of the session, and got them to confirm the features they wanted and crossed out what they didn't want.

The notes from the session are attached in the appendix.

Requirements

Shortly after the session ended I typed out the requirements while they were still fresh in my head. The requirements were as follows:

1) In the top left of the EPOS screen, there would be a message/notes section, where staff can leave notes for one another. This could be reminders of items to upsell or any duties the next person will have to pick up because the current member is coming off their shift. This should remain there even if users change
2) To the right of message section should be an area with current user details such as name and current sales for the day and week. It is a job requirement to meet sales, needs to be seen.
3) Below the message segment, there would be a list of all the items that had been scanned for that transaction. This is so the staff can see the item has been registered by the scanner. The item details will include its serial code, the item name, the quantity, and its price
4) Below the item list there would be a total transaction cost that updates as each item is added and takes note of any promotional discounts (2 for 1 items). The current system doesn't inform total price until the end of the transaction, which can lead to confusion because some items the discount must be added manually by the staff (requires a calculator on hand) while others are already premade on the system. (This is also a button that finalises the "Customer Transaction" use case)
5) In the centre of the screen and there should be a vertical block, which is a supervisor section. This should only be accessible by a supervisor
6) To the right of the screen there should be a general section for staff, that has buttons for functions they can perform. The most common functions should be easily visible
7) There should be a scroll bar so that you can look though buttons, and get to the lesser used ones when necessary
8) Below the general section there should be buttons with images and names of common items that can't be scanned. This is because not all items in the shop use a barcode (such as medicine) and requires the staff to look up the item to add it to the transaction, and the technical names can easily lead to a misspelling and wrong product being selected
9) Card machine integration capability for accepting payments via bank card
10) On screen keyboard that appears when certain tasks are performed
11) Supervisor can update interface by creating their own item buttons
12) Supervisor function: **Department sales**: button selection, shows the total sales of each till in each department. Till cash amounts to be tracked
13) Worker function: **Price check**. Button selected, item is scanned, and price is returned for the item. Useful when using sticker gun to price items, as they are brought in from back room with no prices attached before being stickered and put out on the floor
14) Worker function: **Item look up.** Button is selected, and a query box and keyboard appear on screen. The product name is inputted and results are displayed along with the quantity and location. Purpose is to see if there is a certain product on the floor or in the backroom, or in another store

15) Worker function: **Float change**: Button selected, worker inputs how much they want to take out. Worker decides which ones they want to take out, and till opens (these are then brought to a safe in the backroom to either deposit or change for preferred denomination).
16) Worker function: **Clear:** Button selected and clears all scanned items from the list. Can select individual items and clear them from list. Used if customer doesn't want to go through with transaction or decides they don't want an item
17) Worker function: **Loyalty card:** Button selected, message displays asking customer to display their card on outward facing screen. Worker scans card. Message confirms card is registered. Discount applied to end of transaction
18) Worker function: **Employee Discount**: Button selected, the employee who is buying items gets asked for their employee number, that is inputted, discount then applied. Workers can't input their own employee number if they are logged into till
19) The supervisor section should only be in shown if a manager or supervisor is logged in. If it is regular staff, there should be more functions and general items displayed
20) The system should have an option for auto-rounding transactions to the nearest 5c interval, as this has been widely accepted in Ireland
21) Auto rounding shouldn't happen if a customer pays by card
22) If an item is being purchased that requires an age check or proof of identity (such as medicine), a warning message should appear to remind staff to ask for proof of age and identity
23) A message should display advising till users to perform a "float change" function if a certain amount of cash goes through the till
24) Supervisors determines at what till amount the "float change" message is displayed
25) Receipts printed with barcode so they can be scanned, quicker than supervisor searching for receipt during product return procedure.
26) Worker function: **Calculator**: button pressed, on screen a basic calculator appears. (Used for photo section when customer wants to know price of a certain number of photos which aren't logged on system.)
27) There should be a small secondary screen facing the customer which tells them the total price and price of each item as they are added.
28) Current card machine doesn't allow customer to use cards with "tap" functionality, would be a useful feature.
29) Some degree of customisation by staff for their account, such as change colour schemes, password, and ability to move the location of the function buttons (eg. Item look up since different departments use different tasks more than others)
30) There is an option to display the live feed from the video cameras in the EPOS screen, as currently only displays in the back. Means one person can look over whole shop at any point

Observation

I decided to do an observation as a safety measure, to ensure that the requirements elicited from the focus group and manager interview were documented correctly. The reoccurring interactions with customers also made observation an ideal technique (Famuyide, 2017) and it allowed me to see some techniques that could be incorporated into the EPOS that were difficult to explain, such as ordering items.

I focused on taking detailed notes of the processes that had not been previously identified as well as areas for improvement, but the focus group and interview turned out to be quite comprehensive

and so there wasn't a great deal of extra requirements identified by performing this technique, although I did feel reassured that my other requirements were now correct. (The Business Analysis Book of Knowledge, 2009, p186-188)

Date
24/04/17

Location
Pharmacy in Blanchardstown

Purpose
The purpose of this observation was to document any other customer interactions, potential requirements, and see the current EPOS in action.

Preparation
For most of the day I maintained a passive approach unless I was engaged by the staff. On occasion, I would ask questions assuming it didn't interfere too much, such as in the middle of a transaction. I didn't prepare any specific questions to ask as I had already derived the main functions during the focus group session. I instead wanted to keep an open mind and observe any processes that hadn't been noted, and potential ways they could be improved, as this would be in keeping with the sponsors theme of delivering an EPOS system that could deliver more value for both worker and customer than other systems.

Result
Before the day started I took some photos of the EPOS user interface and familiarised myself with the layout and some of the key functions that had been identified by the focus group session.

I was primarily situated behind the main counter observing two sales assistants and how they interacted with customers and performed other duties with the EPOS. While I was mainly focused on these two tills, I could also see 2 other workers at 2 different tills in the shop and was free to move between all places as required.

While situations unfolded that had already been identified in the focus group, such as looking up items and a product return, there were some actions that had been overlooked.

One of these was when a customer ordered an item that wasn't sold in the shop or the shop had sold all its stock of the item. This wasn't recorded on the EPOS system and instead was recorded in a book. If the shop had run out of stock, the customer was told they could come back at midday the following day and it would be in stock. The item was then ordered at the end of the day by priority shipping (ideally from a fellow store or from a supplier as a last resort) so that it would arrive the next morning as opposed to the 2 days of the week general items normally come in, Tuesday and Saturday (pharmacy goods come in daily). This is an uncommon event however as the stock needs are generally correctly forecasted. I offered a potential solution to the staff so this could be done through the EPOS instead which they liked the idea of.

I noticed around midday that the ques were getting quite long and seemed to stay long despite customers generally only buying a few items. The main cause of this appeared to be customers giving change to the cashiers and then the cashier having to count it. After the ques quieted down I asked the staff if this kind of delay was common, and they confirmed it was. I noted that this could possibly be avoided if there was a coin counting facility with the EPOS/till. It would also make

cashing up at the end of the day quicker as managers wouldn't need to add up the expected amounts and then count the tills again to ensure they matched.

The procedure for checking if there was enough of a certain coin type for floats could also be streamlined if there was live data on the screen. I offered the idea up to the staff and they thought it would be a useful feature.

After midday, I had the idea of noting the number of transactions that occurred at one of the tills, as I thought the data might be deemed useful by the project sponsor. Over a one hour period, when the till received a steady amount of transactions (afterwards determined by a supervisor as about average), I noted that the till performed 19 transactions. While I couldn't keep a direct number, two of the other tills seemed to get around the same amount of attention as the one I observed, while the 4th seemed to receive less.

I asked one of the supervisors the cost of the thermal paper used for the receipts, and they told me that the manager had worked it out once as about 0.8 cent per receipt. If you were to be conservative and suggest 60 receipts issued per hour, that would work out as 480 receipts over an average 8-hour day, and multiplied by 0.8 cent equals 3.84 euro per day, 26.88 euro per week, and around 107.52 euro per month.

Since that data is only estimated from one shop, it is clear that an E-receipt solution could offer considerable cost savings to a business, and if the sponsor could market the solution correctly it could be a lucrative venture for HRS, strengthening the business case.

A suggestion from one of the staff came up after a security tag went off because they were accidently put out on the shop floor inactivated, so it was activated instead of deactivated at the till when it was sold. This is a regular occurrence because there is no way for the human eye to differentiate between active and inactive RFID tags.

The idea was that the bargun could activate/deactivate the tags instead of the magnetic slab that currently does it. That would provide an on-screen confirmation as opposed to the customer walking out of the shop with the item setting off alarms at the entrance, and it would also set off alarms in other shops.

Requirements

Based on what I observed in the shop throughout the day, the following requirements were gathered that could add value to the new EPOS system. I verified that these would be useful by running them past the supervisor and workers that were in the shop that day:

1) Supervisor Function: **Order item**: Button pressed, asked to input the item name. If in another store, sends request for shipping to the tills in a different store, which displays in supervisor/manager message section. If item not in product range/any stores stock, email sent to relevant supplier requesting it for next day delivery.
2) Worker function: **Security tags:** Button pressed, message asks for worker to scan tag, worker scans tag which activates/deactivates it, onscreen message states weather tag is active or not now.
3) Some form of weighing scale in the money drawer, so that it can calculate the total number and value of coins of each type, which would be displayed on screen. The no. of each type of note would have to be added manually by the staff during a transaction if paper too light.

4) A machine attached at front of till that customer put their cash into, which transferred the correct amount into the till and returned the remainder to the customer, with info being translated live to the screen.

Use Cases

Database administrator adding recalled items to database

Since BABOKs usage considerations for "use cases" are as a means to attain "a high-level understanding of user behavioural goals, normal situations, alternatives or exception paths" (The Business Analysis Book of Knowledge, 2009, p205) I decided that these would the most appropriate technique to gather the minimum requirements that would be needed for the database and mobile developers.

I principally use 2 resources recommended to me by my supervisor to develop the use cases, and this was a template document (see appendix) describing the flow of events sent by email (Elliot, 2017), and the other was a YouTube tutorial on creating use cases (YouTube, 2012). I used Microsoft Visio to develop the wireframes after I had written out the flow of events.

Name

Database administrator adding recalled items to the database

Actors

Database Administrator, Customer

Preconditions

The product recall websites are being regularly updated by their organisations. The customer has their phone connected to the internet.

Trigger

The database administrator checks the product recall websites

Basic Flow of Events

The database administrator checks the list of product recall websites. If there are any new items that have been added that are to be recalled, the administrator takes note of the product name, the product serial number, the reason it is being recalled, and what the customer should do. The administrator then adds the product to a list of recalled items on the database. The database administrator should then use a command to scan all of the receipts on the system against the recalled product.

After the scan is complete, and there is a match found between a recalled item and the customer receipt, all the receipts which have recalled items should be compiled in a list. Some receipts should be checked by the database administrator to determine that it is the correct recalled product. After it is determined it is the correct product, a notification should be sent to all of the customer's mobiles via their app, informing them of the details gathered by the database administrator (product name, serial code, reason it's being recalled, and what to do next).

Alternative paths

There is the possibility that no new items have been recalled, in which case the database administrator does nothing to the database.

If there are additional details about the recalled item that can speed up the matching process they should be included in the search parameters, for example if the item was only sold between a certain time period or in particular shops.

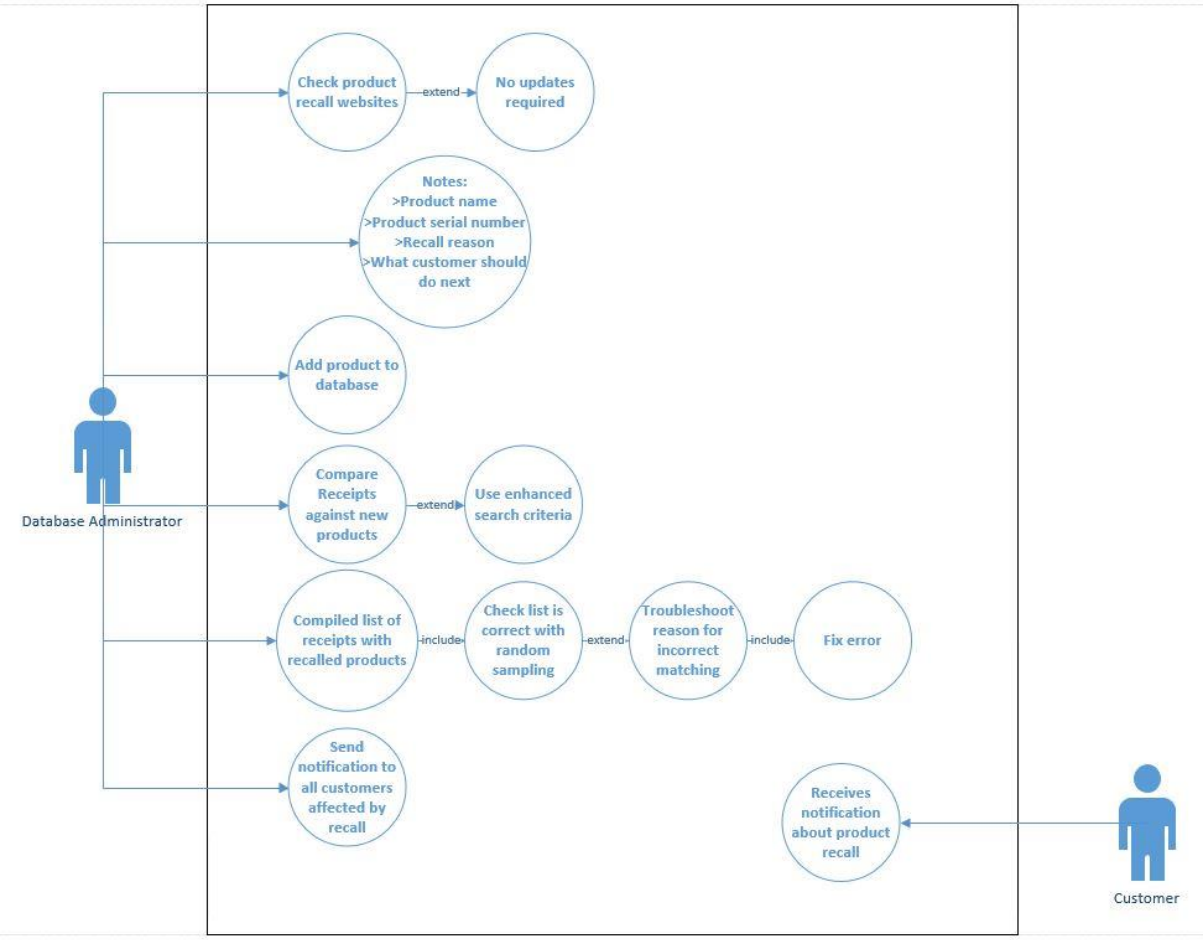
Exceptions

(*more of a note*) As the receipt only gives the product name and not the batch code (it would be a very time intensive task to do with all items in a shop), the item should be removed from the database after 1 month. This should be enough time for shops to stop selling the item so customers buying the same named item after that date will have a safe product and not one that has been recalled, so the customer will not receive an unnecessary notification.

If the list of recalled items does not match the items on the receipts, it is possible that the incorrect criteria was put in by the database administrator. If the correct criteria were put in, it's possible that shop have mislabelled an item on their system and that is why its incorrectly titled on the receipt. Database administrator should identity and fix error if needed.

Post Conditions

The list of recalled has been updated. The customer does/doesn't receive a notification informing them of an item that has been recalled.



Requirements

Based on this use case, the following requirements have been identified which were verified by the project sponsor, though a phone call. They are as follows:

1. There is a list for recalled items on a cloud database that can be updated by the database administrator, sourced from product recall websites.
2. The system automatically removes products from the recall list after they have been there for 1 month.
3. The system should be able to compare recalled items with every receipt it receives from shops.
4. There is a list for receipts that have been selected for product recall that can be reviewed and tested by the database administrator.
5. The system should be able to send notifications to customers via their mobile app to inform them of product recalls.
6. There should be the capability of using refined parameters for searching though receipts for recalls based on store/dates.

Customer Transaction Use Case

This was developed with the same rationale as the previous use case, and that it would provide a good overview for the developers and not limit them to any particular technology. The same sources were used to guide its development.

Name

Customer Transaction

Actors

Retail worker, Customer

Preconditions

Customer has app downloaded and phone with them in shop.

Trigger

Customer approaches the till with items to purchase.

Basic flow of events

Customer brings items they want to purchase to till. Worker scans items. Worker asks if customer wants a paper receipt or has a code. Customer selects code option and then displays their barcode by opening app on phone or showing their widget/screensaver of the code. The worker scans the code with the bar gun. System accepts the code. The customer hands over cash for transaction. Worker selects option to finalise transaction. The receipt is sent to the cloud storage. The items are now the customers.

Alternative paths

Customer states they have code at start of transaction. Worker doesn't have to ask question and can assume they will use code.

Customer does not have code, normal receipt given instead.

Exceptions

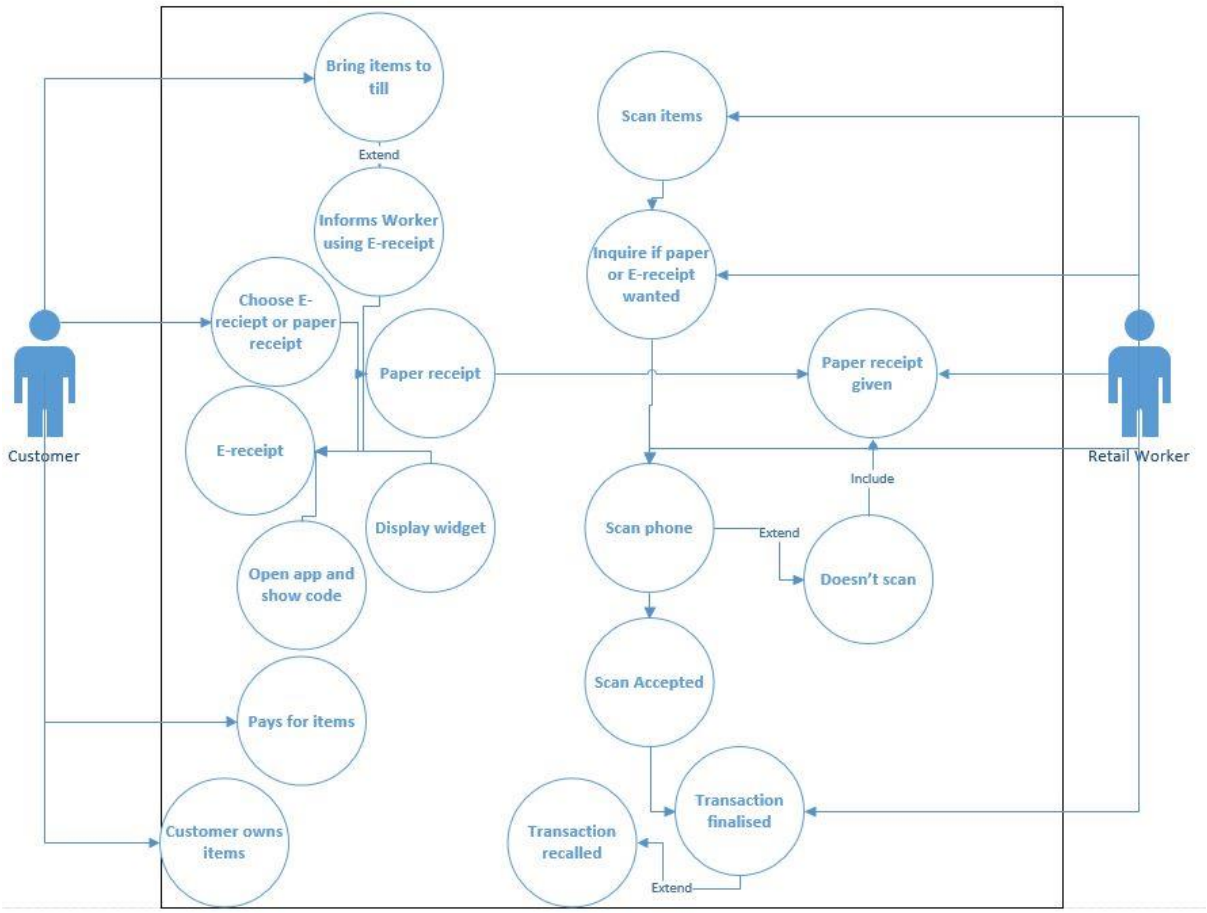
Bargun cannot read the customer code. Possibly due to smudges, low brightness, or a cracked screen. Paper receipt is issued if screen cannot be scanned.

Customer does not have/want to use code, normal receipt given instead. (If it was a gift for someone for example)

Worker accidently finalises the transaction before accepting the cash, and then customer doesn't have enough money. (solution: have a 15-minute delay on a receipt before the receipt is sent so that it can be recalled if necessary)

Post-conditions

Customer owns items. Receipt has been received by the database. Customer can view their receipts on the database. Manager/supervisors can view all of the shop receipts.



Requirements

Based on this use case, new requirements that have been identified and were subsequently verified by David are as follows:

1. Receipts are sent to the cloud storage database by the EPOS at the end of a transaction
2. Customer can view their receipts on the database from their mobile app.
3. Supervisor function: **Store Receipts:** Button selected, Manger/Supervisor can view a list of all store receipts.
4. Customer can manipulate the default placement/size of their identifier code so that they can move It around a crack on their screen in case it interferes with the bargun.
5. 15-minute delay for the receipt to be sent so that it can be recalled if necessary.

MoSCoW Analysis

The MoSCoW analysis was performed to decide which requirements would be selected for further development. It was conducted by sitting down with the project sponsor and showing him all the requirements I had gathered, with the criteria for what would be a Must, Should, Could, and Wont purely based on what the Project Sponsor decided were the most crucial to the systems success. Due to the time and budget constraints, only the "Must" and "Should" requirements are being selected to be refined for the IEEE specification.

Must Requirements

Source	Requirement
Focus Group	In the top left of the EPOS screen, there would be a message/notes section, where staff can leave notes for one another. This could be reminders of items to upsell or any duties the next person will have to pick up because the current member is coming off their shift. This should remain there even if users change.
Focus Group	To the right of message section should be an area with current user details such as name and current sales for the day and week. It is a job requirement to meet sales, needs to be seen.
Focus Group	Below the message segment, there would be a list of all the items that had been scanned for that transaction. This is so the staff can see the item has been registered by the scanner. The item details will include its serial code, the item name, the quantity, and its price.
Focus Group	Below the item list there would be a total transaction cost that updates as each item is added and takes note of any promotional discounts (2 for 1 items). The current system doesn't inform total price until the end of the transaction, which can lead to confusion because some items the discount must be added manually by the staff (requires a calculator on hand) while others are already premade on the system. This is also a button that finalises the "Customer Transaction" use case.
Focus Group	In the centre of the screen and there should be a vertical block, which is a supervisor section. This should only be accessible by a supervisor.
Focus Group	To the right of the screen there should be a general section for staff, that has buttons for functions they can perform. The most common functions should be easily visible.
Focus Group	There should be a scroll bar so that you can look though buttons, and get to the lesser used ones when necessary.
Focus Group	Below the general section there should be buttons with images and names of common items that can't be scanned. This is because not all items in the shop use a barcode (such as medicine) and requires the staff to look up the item to add it to the transaction, and the technical names can easily lead to a misspelling and wrong product being selected.
Focus Group	Card machine integration capability for accepting payments via bank card.
Focus Group	On screen keyboard that appears when certain tasks are performed.
Focus Group	Supervisor can update interface by creating their own item buttons
Focus Group	Supervisor function: **Department sales**: button selection, shows the total sales of each till in each department. Till cash amounts to be tracked.

Focus Group	Worker function: **Price check**. Button selected, item is scanned, and price is returned for the item. Useful when using sticker gun to price items, as they are brought in from back room with no prices attached before being stickered and put out on the floor.
Focus Group	Worker function: **Item look up.** Button is selected, and a query box and keyboard appear on screen. The product name is inputted and results are displayed along with the quantity and location. Purpose is to see if there is a certain product on the floor or in the backroom, or in another store.
Focus Group	Worker function: **Float change**: Button selected, worker inputs how much they want to take out. Worker decides which ones they want to take out, and till opens (these are then brought to a safe in the backroom to either deposit or change for preferred denomination).
Focus Group	Worker function: **Clear:** Button selected and clears all scanned items from the list. Can select individual items and clear them from list. Used if customer doesn't want to go through with transaction or decides they don't want an item.
Focus Group	Worker function: **Loyalty card:** Button selected, message displays asking customer to display their card on outward facing screen. Worker scans card. Message confirms card is registered. Discount applied to end of transaction.
Focus Group	Worker function: **Employee Discount**: Button selected, the employee who is buying items gets asked for their employee number, that is inputted, discount then applied. Workers can't input their own employee number if they are logged into till.
Manager Interview	Supervisor section function: **Product return**. An item is brought back to shop, the receipt number is looked up if customer doesn't have it (Requires searching by date, time, and the other items that the person purchased), the item is selected from the onscreen receipt, item gets scanned by bar gun, its selected for either return to inventory or scrap, the till opens, money/updated receipt is given to customer.
Manager Interview	Supervisor section function: **Stock check in.** Button selected, "Piccolink" (handheld tool to register stock on system) transfers data to epos instead of computer in the back, updates inventory with new figures. Current system means they must be individually committed on the computer and then committed again to epos, time consuming task.
Manager Interview	Supervisor section function: **Stock history:** button selected, displays info on where stock has been since it has come into the shop and time at each section (e.g storeroom, waiting to be put out, on floor)
Manager Interview	Supervisor section function: **Add new member:** select button, input new members (name, email, house address), scan a new loyalty card to link them up, give card to customer. EPOS needs loyal customer database so that the manager can send them info on promotions.
Manager Interview	Supervisor section function: **Display staff sales:** button pressed, displays the daily and weekly sales of each staff member in the shop and how close they are to reaching their targets. Staff sales must be tracked on EPOS.
Sponsor Interview	The EPOS bar scanner must be able to scan the code displayed on the mobile.
Sponsor Interview	The EPOS can send customer receipts to be stored in a cloud storage database.
Sponsor Interview	A Database Administrator can add recalled products from product recall websites to the cloud storage database.

Sponsor Interview	Customer can make an account through the mobile app, only needs customer name to keep it simple.
Sponsor Interview	There is a code that can transform the account number into a unique barcode that can be read by the EPOS bar scanners to match the customer's account with receipts.
Sponsor Interview	The barcode should be displayed first when you open the app.
Sponsor Interview	The receipt data should be encrypted end to end, from EPOS to database.
Sponsor Interview	The database will require strong security measures as it will contain all the receipts from all the stores that use its system.
Observation	Supervisor Function: **Order item**: Button pressed, asked to input the item name. If in another store, sends request for shipping to the tills in a different store, which displays in supervisor/manager message section. If item not in product range/any stores stock, email sent to relevant supplier requesting it for next day delivery.
Customer Transaction Use Case	Receipts are sent to the cloud storage database by the EPOS at the end of a transaction.
Customer Transaction Use Case	Customer can view their receipts on the database from their mobile app.
Customer Transaction Use Case	Supervisor function: **Store Receipts:** Button selected, Manger/Supervisor can view a list of all store receipts.
Database Administrator adds items User Case	There is a list for recalled items on a cloud database that can be updated by the database administrator, sourced from product recall websites.
Database Administrator adds items User Case	The system automatically removes products from the recall list after they have been there for 1 month.
Database Administrator adds items User Case	The system should be able to compare recalled items with every receipt it receives from shops.
Database Administrator adds items User Case	There is a list for receipts that have been selected for product recall that can be reviewed and tested by the database administrator.
Database Administrator adds items User Case	The system should be able to send notifications to customers via their mobile app to inform them of product recalls.

Should Requirements

Source	Requirement

Focus Group	The supervisor section should only be in shown if a manager or supervisor is logged in. If it is regular staff, there should be more functions and general items displayed.
Focus Group	The system should have an option for auto-rounding transactions to the nearest 5c interval, as this has been widely accepted in Ireland.
Focus Group	Auto rounding shouldn't happen if a customer pays by card.
Focus Group	If an item is being purchased that requires an age check or proof of identity (such as medicine), a warning message should appear to remind staff to ask for proof of age and identity.
Focus Group	A message should display advising till users to perform a "float change" function if a certain amount of cash goes through the till.
Focus Group	Supervisors determines at what till amount the "float change" message is displayed.
Focus Group	Receipts printed with barcode so they can be scanned, quicker than supervisor searching for receipt during product return procedure.
Focus Group	Worker function: **Calculator**: button pressed, on screen a basic calculator appears. (Used for photo section when customer wants to know price of a certain number of photos which aren't logged on system.)
Manager Interview	An Email notification should come into the message section of the EPOS for supervisors/managers so that they don't have to manually check it in the backroom.
Manager Interview	Very sensitive interface to prevent users having to apply a lot of pressure when selecting options.
Manager Interview	There should be a simple log on screen which requires you to input your staff no. and password. This should only have to be done once, until you log out (Current system requires you to log in again after each transaction)
Sponsor Interview	Simple user interface on the mobile app
Sponsor Interview	The application should load very fast.
Database Administrator adds items User Case	There should be the capability of using refined parameters for searching though receipts for recalls based on store/dates.

Could Requirements

Source	Requirement
Focus Group	There should be a small secondary screen facing the customer which tells them the total price and price of each item as they are added.
Focus Group	Current card machine doesn't allow customer to use cards with "tap" functionality, would be a useful feature.
Focus Group	Some degree of customisation by staff for their account, such as change colour schemes, password, and ability to move the location of the function buttons (e.g. Item look up since different departments use different tasks more than others)
Manager Interview	Manager can create different default EPOS displays for each department, optimising the most used functions per department.
Sponsor Interview	There is a widget for android that displays your unique barcode so you don't have to open the app during a transaction

Observation	Worker function: **Security tags:** Button pressed, message asks for worker to scan tag, worker scans tag which activates/deactivates it, onscreen message states weather tag is active or not now.
Customer Transaction Use Case	Customer can manipulate the default placement/size of their identifier code so that they can move It around a crack on their screen in case it interferes with the bargun.
Customer Transaction Use Case	15-minute delay for the receipt to be sent so that it can be recalled if necessary.

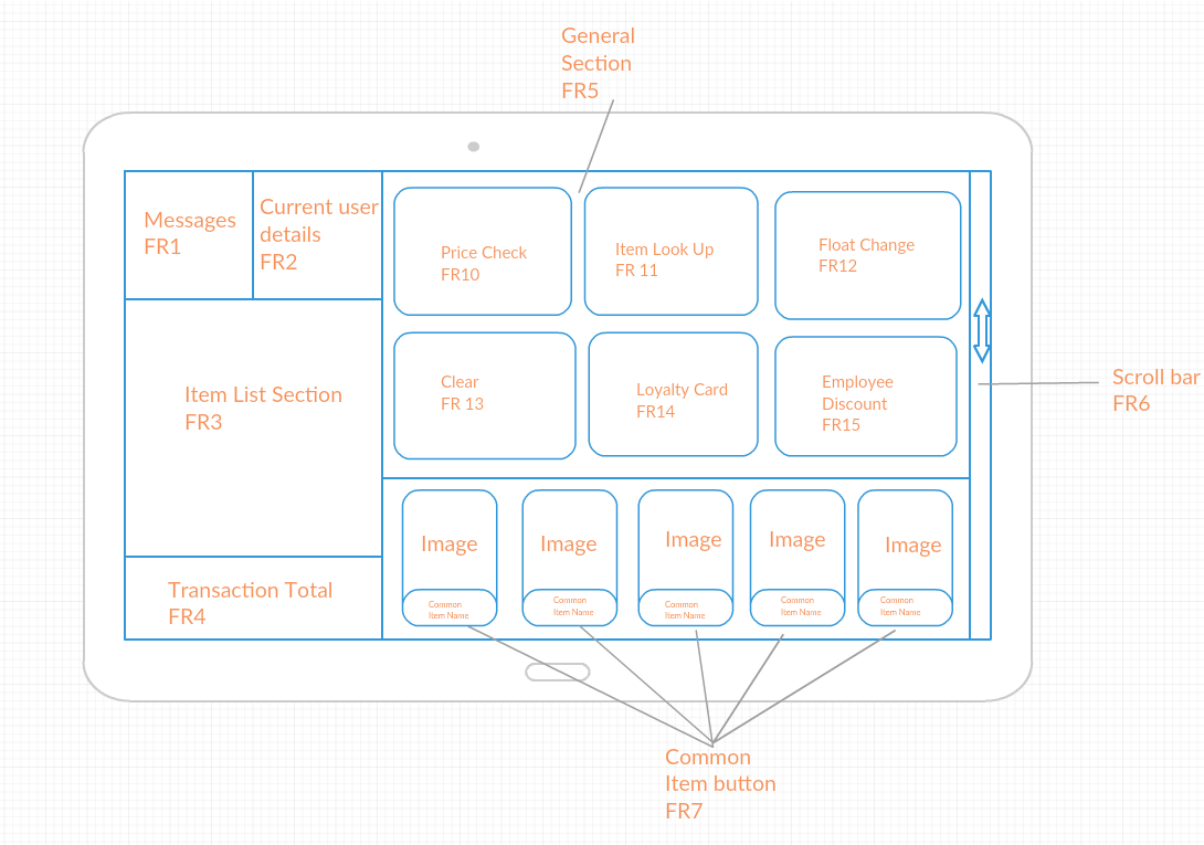
Wont requirements

Source	Requirement
Focus Group	There is an option to display the live feed from the video cameras in the EPOS screen, as currently only displays in the back. Means one person can look over whole shop at any point.
Observation	Some form of weighing scale in the money drawer, so that it can calculate the total number and value of coins of each type, which would be displayed on screen. The no. of each type of note would have to be added manually by the staff during a transaction if paper too light.
Observation	A machine attached at front of till that customer put their cash into, which transferred the correct amount into the till and returned the remainder to the customer, with info being translated live to the screen.

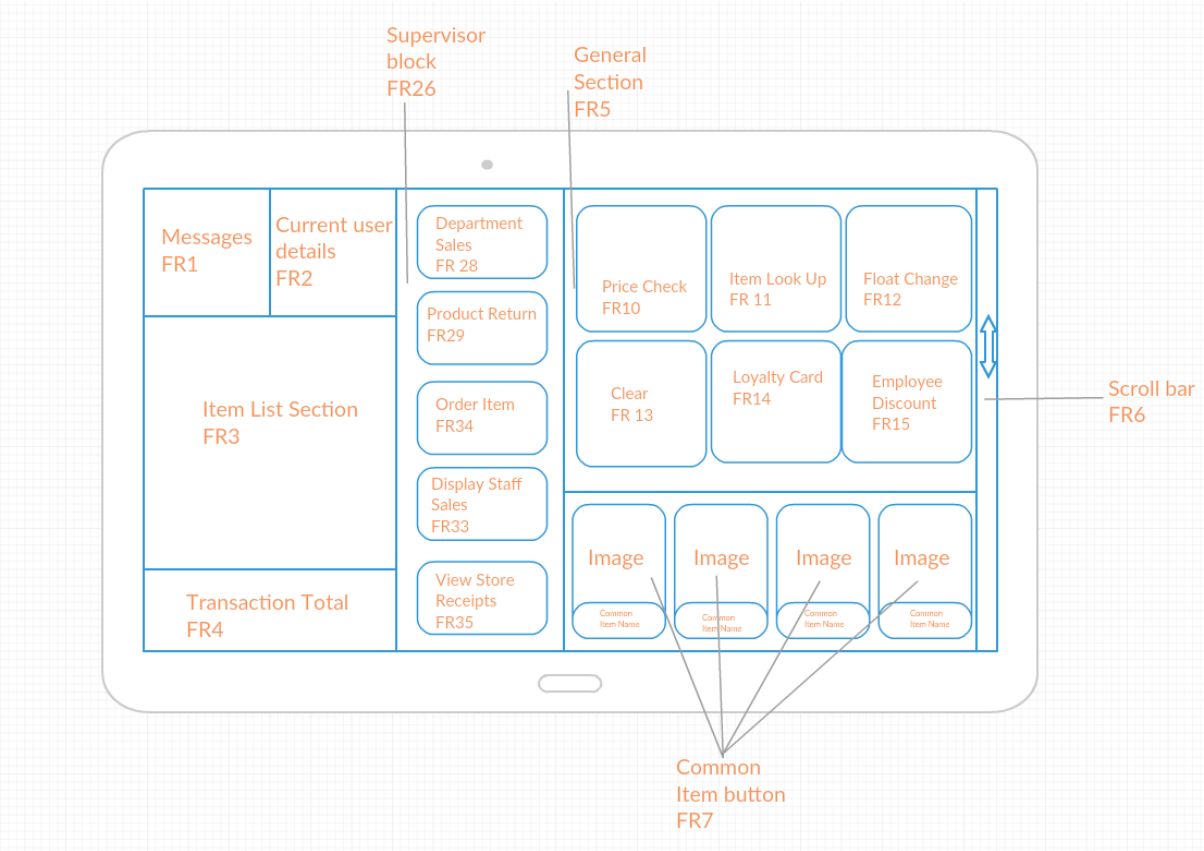
Wireframes

The wireframes were developed after the MoSCoW analysis and the functional requirement numbers were added after the IEEE document had been completed. They were drawn up alongside the project sponsor to help the developers see what the layout of the EPOS and Mobile app should look like. “Creately” (Creately.com, 2017), an online tool for creating wireframes, was used as the project sponsor was more familiar with this tool.

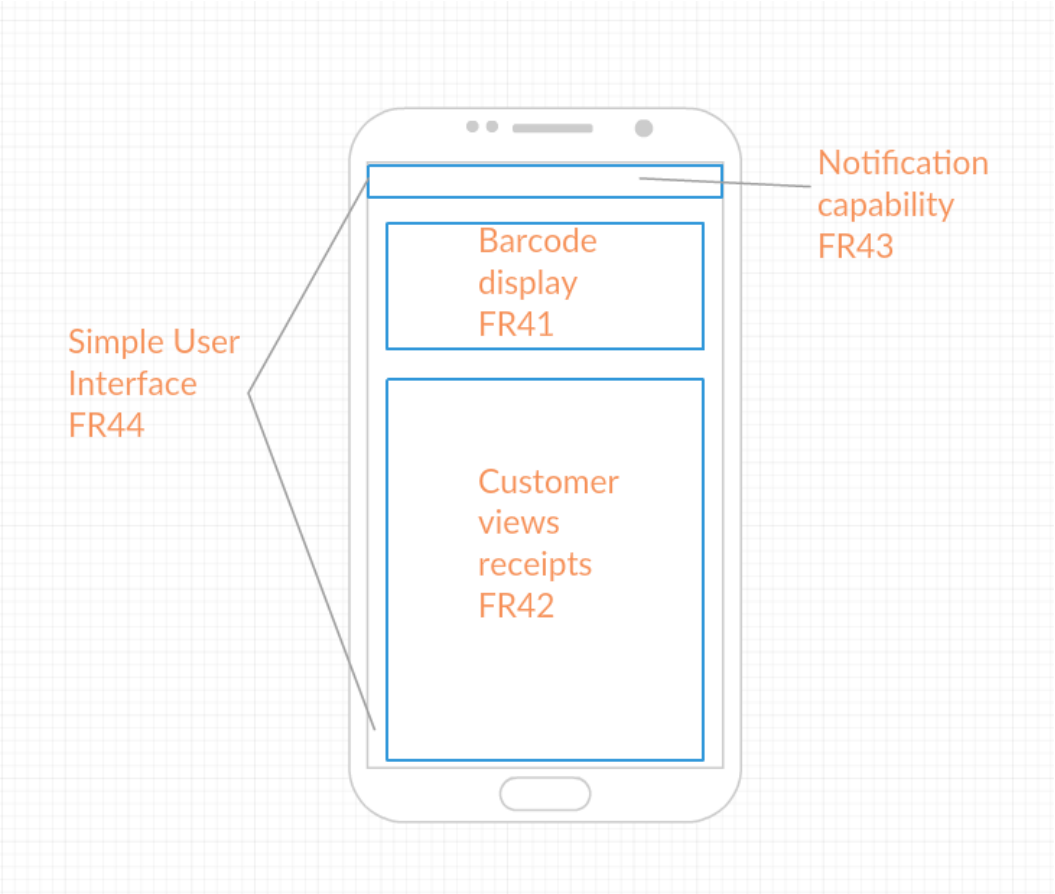
EPOS Worker screen



EPOS Manger/Supervisor screen



Customer mobile main screen



IEEE requirements specification

Purpose

The IEEE requirements specification is being developed for the various developers of the E-Receipt and Product Recall Notification System. The requirements have been sourced using a variety of elicitation techniques and with a focus on the EPOS system, as per the project sponsors instructions.

The following requirements were selected and prioritised by the project sponsor, CEO David Byrne of Hibernia Retail Systems. They structure of each requirement is in keeping with the house style of HRS, and has been agreed upon with the Database and Mobile developers, therefore ensuring the developed system will have the best chance of meeting the business need.

Scope

For a system of this size, there are four primary areas that must be addressed to meet the business need set out by the sponsor.

The first is to have cloud storage that will receive the E-receipts from the retail shop and be accessible by the customer. On this is also a regularly maintained database of all the products that have been supplied by product recall websites, and this list will be compared against the E-receipts of the customers and be used to inform customers if any of their products have been recalled.

The second area to the project already exists but requires monitoring, and that is the product recall lists that are maintained by their respective bodies, and this is where the recalled items are sourced from.

The third area is a new EPOS system with the capability of sending E-receipts to cloud storage, which will be used by the retail shop.

The fourth area is a mobile application that will be used by the customers. This will be used to display a unique tag at the end of a transaction in a shop which is scanned by the bar code scanner that is attached to the EPOS system. The cloud storage database can then be accessed by the customer on their mobile application so they can view their receipts after they have been sent by the EPOS.

A combination of these four technologies will create a system that match the need of HRS to create an E-Receipt and Product Recall Notification System.

Definitions

EPOS

Electronic Point of Sale

Piccolink

Electronic handheld tool that transfers stock info to the EPOS

Worker

Regular staff who use the EPOS system. They do not have access to “Manger/Supervisor” requirements.

Manger/Supervisor

Both have access to same functions. Names and authority level can be used interchangeably for developer purposes. They can perform worker functions, but also have access to more functions than workers.

Bargun/Bar Scanner

Names used interchangeably for a device that can scan barcodes.

Customer

User of the mobile app, purchases item in the retail shop.

Database Administrator

User who maintains and updates the cloud database and storage system.

EPOS Requirements – Worker

FR Code 1

Title	Message section
Description	In the top left of the EPOS screen, there is be a message/notes section, where staff can leave notes for one another. This will remain there even if users change.
Priority	Must
Source	Focus group

FR Code 2

Title	Current user details
Description	Beside message section there is an area with current user details such as name and current sales for the day and week.

Priority	Must
Source	Focus group

FR Code 3

Title	All items list
Description	Below the message segment, there is a list of all of the items that had been scanned for that transaction. The item details should include its serial code, the item name, the quantity, the price
Priority	Must
Source	Focus group

FR Code 4

Title	Transaction Total
Description	Total transaction cost that updates as each item is added and takes note of any promotional discounts. This is also a button that finalises the “Customer Transaction” use case.
Priority	Must
Source	Focus group

FR Code 5

Title	General section
Description	To the right of the screen there is a general section for staff, that has buttons for functions they can perform. The most common functions are easily visible.
Priority	Must
Source	Focus group

FR Code 6

Title	Scroll bar
Description	There is a scroll bar so that you can look though buttons, and get to the lesser used ones when necessary.
Priority	Must
Source	Focus group

FR Code 7

Title	Common item buttons
Description	Below the “General Section” there are buttons with images and names of common items that can’t be scanned.
Priority	Must
Source	Focus group

FR Code 8

Title	Card machine capability
Description	Card machine integration capability for accepting payments via bank card.
Priority	Must
Source	Focus group

FR Code 9

Title	On screen keyboard
Description	On screen keyboard that appears when users are asked for input.
Priority	Must
Source	Focus group

FR Code 10

Title	Price check
Description	Button is selected, item is scanned, and price of item is returned.
Priority	Must
Source	Focus group

FR Code 11

Title	Item look up
Description	Button is selected, and a query box and keyboard appear on screen. The product name is inputted and results are displayed along with the quantity and location.
Priority	Must
Source	Focus group

FR Code 12

Title	Float change
Description	Button selected, worker inputs how much they want to take out, and till opens.
Priority	Must
Source	Focus group

FR Code 13

Title	Clear
Description	Button selected and clears all scanned items from the list. Can select individual items and clear them from list.
Priority	Must
Source	Focus group

FR Code 14

Title	Loyalty card
Description	Button selected, card input requests scan, worker asks for customer card. Worker scans card. Message confirms card is registered. Discount applied to end of transaction.
Priority	Must
Source	Focus group

FR Code 15

Title	Employee discount
Description	Button selected, the employee who is buying items gets asked for their employee number, that is inputted, discount then applied. Workers can't input their own employee number if they are logged into till.
Priority	Must
Source	Focus group

FR Code 16

Title	Scan mobile code
Description	The EPOS bar scanner must be able to scan the code displayed on the mobile.
Priority	Must
Source	Sponsor Interview

FR Code 17

Title	Send customer receipts
Description	The EPOS can send customer receipts to be stored in a cloud storage database.
Priority	Must
Source	Sponsor interview

FR Code 18

Title	Transaction finalised
Description	Receipts are sent to the cloud storage database by the EPOS at the end of a transaction.
Priority	Must
Source	Customer transaction use case

FR Code 19

Title	More worker options displayed
Description	The supervisor section should only be in shown if a manager or supervisor is logged in, so if it is regular staff, there are more functions and general items displayed.
Priority	Should
Source	Focus group

FR Code 20

Title	5c round up
Description	The system should have an option for auto-rounding transactions to the nearest 5c interval.
Priority	Should
Source	Focus group

FR Code 21

Title	Card transaction full price
Description	Auto rounding shouldn't happen if a customer pays by card.
Priority	Should
Source	Focus group

FR Code 22

Title	Identity check
Description	If an item is being purchased that requires an age check or proof of identity, a warning message should appear to remind staff to ask for proof of age and identity.
Priority	Should
Source	Focus group

FR Code 23

Title	"Float change" warning
Description	A message should display advising till users to perform a "Float change" function if a certain amount of cash goes through the till.
Priority	Should
Source	Focus group

FR Code 24

Title	Calculator
Description	Button pressed, on screen a basic calculator appears.
Priority	Should
Source	Focus group

FR Code 25

Title	Log on screen
Description	Simple log on screen which requires you to input your staff no. and password. This will only have to be done once, until you log out.
Priority	Should
Source	Manager interview

EPOS Requirements – Manager/Supervisor

FR Code 26

Title	Supervisor section
Description	In the centre of the screen and there is a vertical block, which is a supervisor section containing function buttons.
Priority	Must
Source	Focus group

FR Code 27

Title	Button update
Description	Supervisor can update interface by creating their own item buttons.
Priority	Must
Source	Focus group

FR Code 28

Title	Department sales
Description	Button selection, shows the total sales of each till in each department. Data of cash in a till at each time must be tracked.
Priority	Must
Source	Focus group

FR Code 29

Title	Product return
Description	Item is brought back to shop, the receipt number is looked up if customer doesn't have it (requires searching by date, time, and the other items that the person purchased). The item is selected from the onscreen receipt, item gets scanned by bar gun, its selected for either return to inventory or scrap, the till opens, money/updated receipt is given to customer.
Priority	Must
Source	Manager interview

FR Code 30

Title	Stock check in
Description	Button selected, "Pikolink" (handheld tool to register stock on system) transfers data to EPOS, updates inventory with new figures. EPOS must be compatible with "Piccolink" technology.
Priority	Must
Source	Manager interview

FR Code 31

Title	Stock history
Description	Button selected, displays info on where stock has been since it has come into the shop and time at each section: Storeroom, "waiting to be put out", and on the shop floor.
Priority	Must
Source	Manager interview

FR Code 32

Title	Add new member
Description	Button selected, inputs new members name, email, house address and adds it to a database on the EPOS, scans new loyalty card to link the info up, gives card to customer.
Priority	Must
Source	Manager interview

FR Code 33

Title	Display Staff Sales
Description	Button pressed, displays the daily and weekly sales of each staff member in the shop and how close they are to reaching their targets.
Priority	Must
Source	Manager interview

FR Code 34

Title	Order Item
Description	Button pressed, asked to input the item name. If in another store, send request for shipping to the tills in a different store, which displays in Manager message section. If item not in product range/any stores stock, email sent to relevant supplier requesting it for next day delivery.
Priority	Must
Source	Observation

FR Code 35

Title	View store receipts
Description	Button selected, Manger/Supervisor can view a list of all store receipts.
Priority	Must
Source	Customer transaction use case

FR Code 36

Title	Alter “Float change” warning amount
Description	Supervisors determines at what till amount this message is displayed.
Priority	Should
Source	Focus group

FR Code 37

Title	Receipts printed with barcode
Description	Receipts printed with barcode so they can be scanned
Priority	Should
Source	Focus group

FR Code 38

Title	Email notification
Description	Email notifications should come into the message section of the EPOS for supervisors/managers.
Priority	Should
Source	Manger interview

Mobile Requirements

FR Code 39

Title	Account creation
Description	Customer can make an account through the mobile app, requires customer name.
Priority	Must
Source	Sponsor interview

FR Code 40

Title	Barcode creator
Description	The Account number can be transformed into a unique barcode that can be read by the EPOS bar scanners to match the customer's account with receipts.
Priority	Must
Source	Sponsor interview

FR Code 41

Title	Barcode display
Description	The barcode is displayed first when you open the app.
Priority	Must
Source	Sponsor interview

FR Code 42

Title	Customer views receipts
Description	Customer can view their receipts on the database from their mobile app.
Priority	Must
Source	Customer transaction use case

FR Code 43

Title	Notification capability
Description	The system can send notifications to customers via their mobile app to inform them of product recalls.
Priority	Must
Source	Database administrator adds Items use case

FR Code 44

Title	Simple user interface
Description	Simple user interface on the mobile app
Priority	Should
Source	Sponsor interview

Database Requirements

FR Code 45

Title	Add recalled products
Description	A Database Administrator can add recalled products from product recall websites to the cloud storage database.
Priority	Must
Source	Sponsor interview

FR Code 46

Title	Recalled item list
Description	There is a list for recalled items on a cloud database that can be updated by the database administrator.
Priority	Must
Source	Database administrator use case

FR Code 47

Title	Automatic product removal
Description	The system automatically removes products from the recall list after they have been there for 1 month.
Priority	Must
Source	Database administrator adds items use case

FR Code 48

Title	Item and receipt comparison
Description	The system is able to compare recalled items with every receipt it receives from shops.
Priority	Must
Source	Database administrator adds items use case

FR Code 49

Title	List for review
Description	There is a list for receipts that have been selected for product recall that can be reviewed and tested by the database administrator.
Priority	Must
Source	Database administrator adds items use case

FR Code 50

Title	Refined parameters
Description	There should be the capability of using refined parameters for searching though receipts for recalls based on store/dates.
Priority	Should
Source	Database administrator adds items use case

Non-Functional Requirements

NFR Code 1

Title	End to end encryption
Description	The receipt data is to be encrypted end to end, from EPOS to database.
Priority	Must
Source	Sponsor interview

NFR Code 2

Title	Cloud database security
Description	The database will require strong security measures as it will contain all of the receipts from all the stores that use the system.
Priority	Must
Source	Sponsor interview

NFR Code 3

Title	Sensitive EPOS Screen
Description	Very sensitive interface to prevent users having to apply a lot of pressure when selecting options.
Priority	Should
Source	Manager Interview

NFR Code 4

Title	Quick loading mobile app
Description	The application should load very fast.
Priority	Should
Source	Sponsor interview

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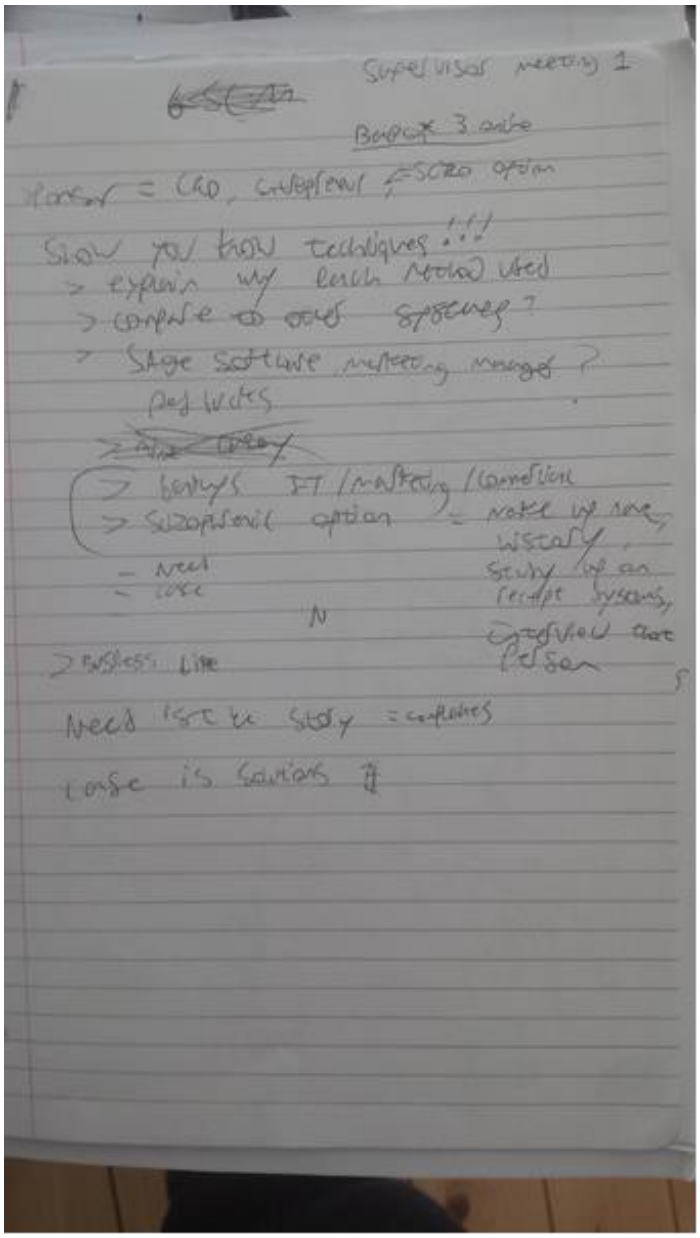
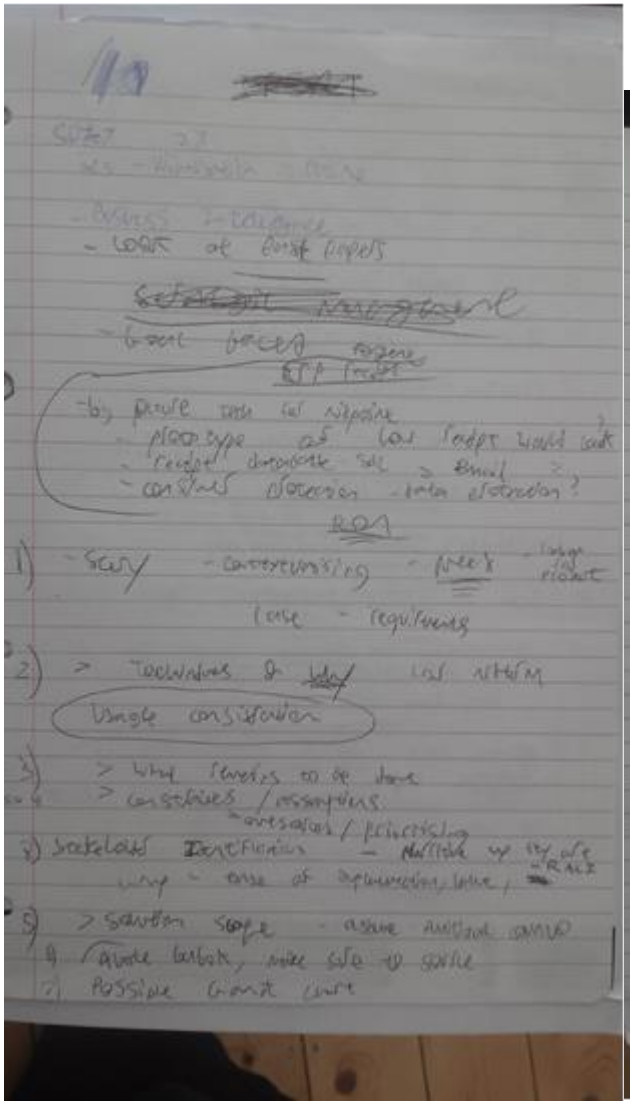
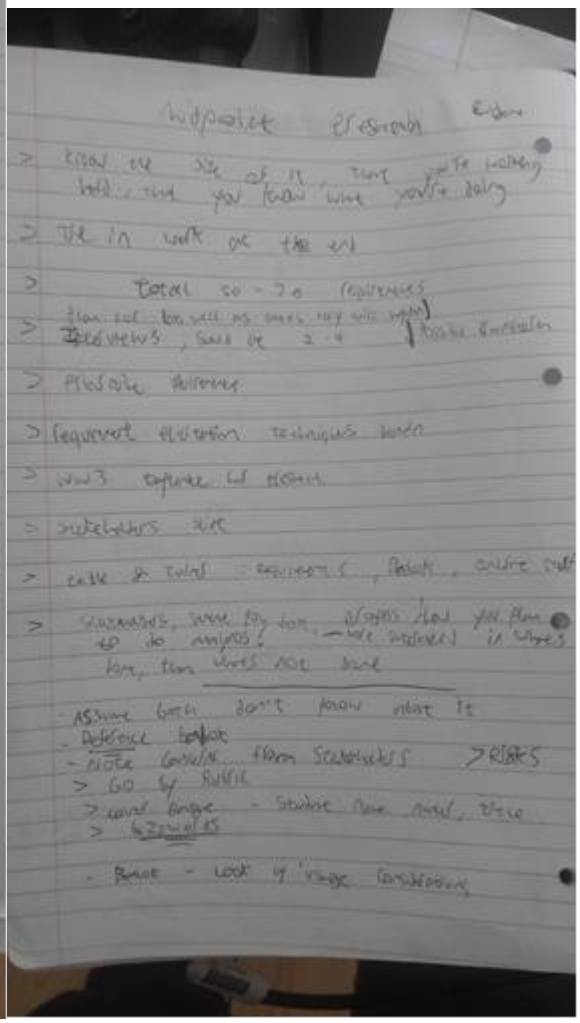
8. Creately.com. (2017). Online Diagram Software to draw Flowcharts, UML & more | Creately. [online] Available at: https://creately.com/ [Accessed 9 May 2017].

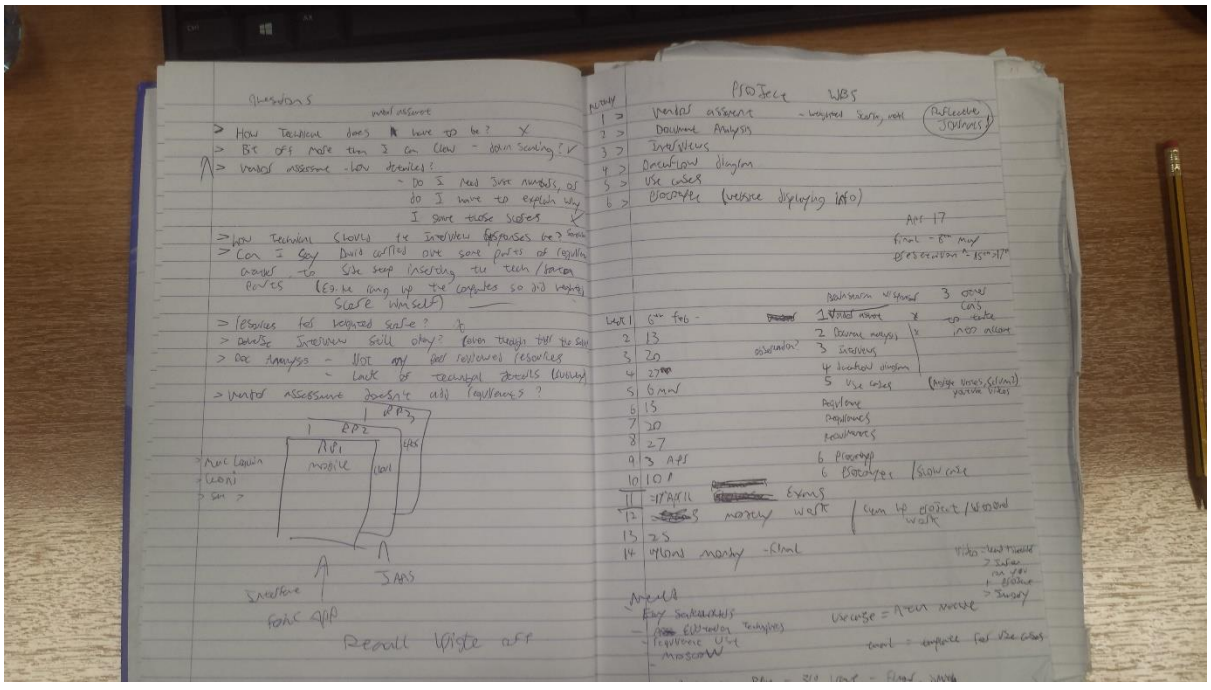
Appendix

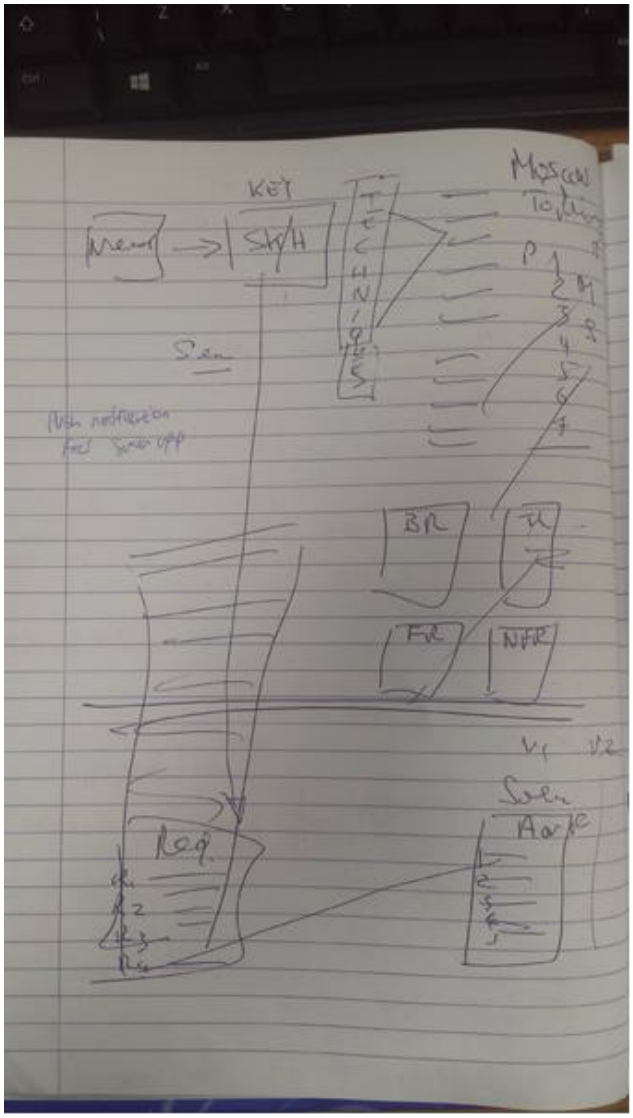
Supervisor meeting notes







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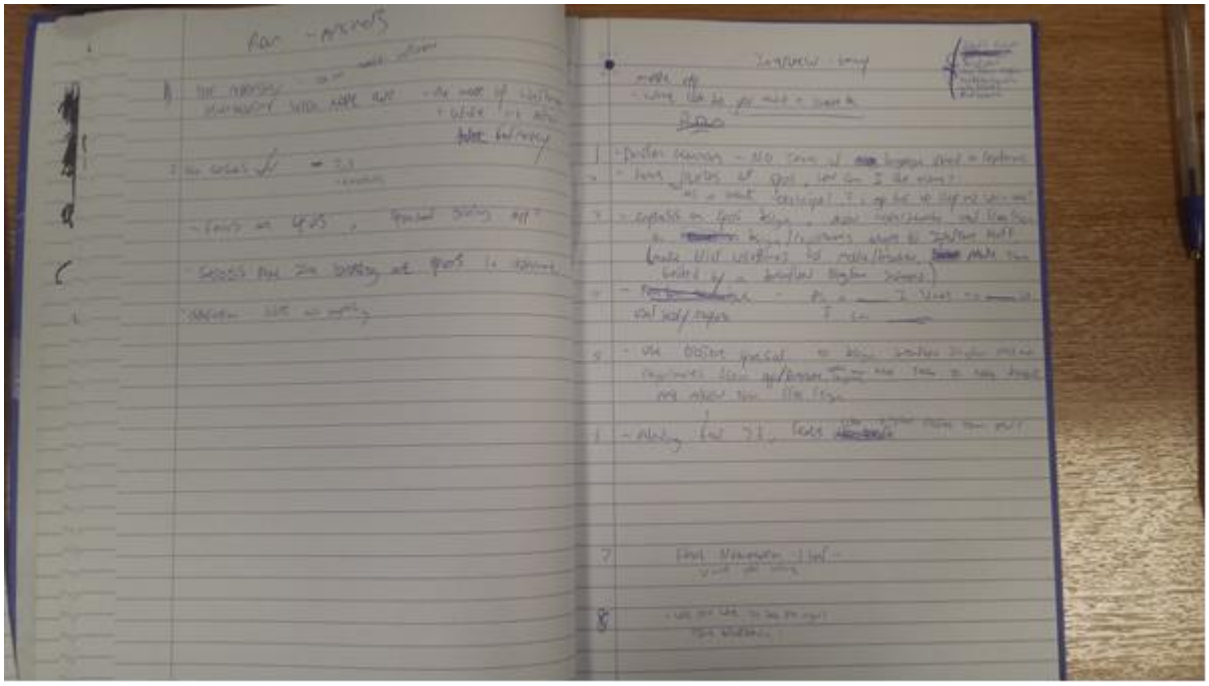
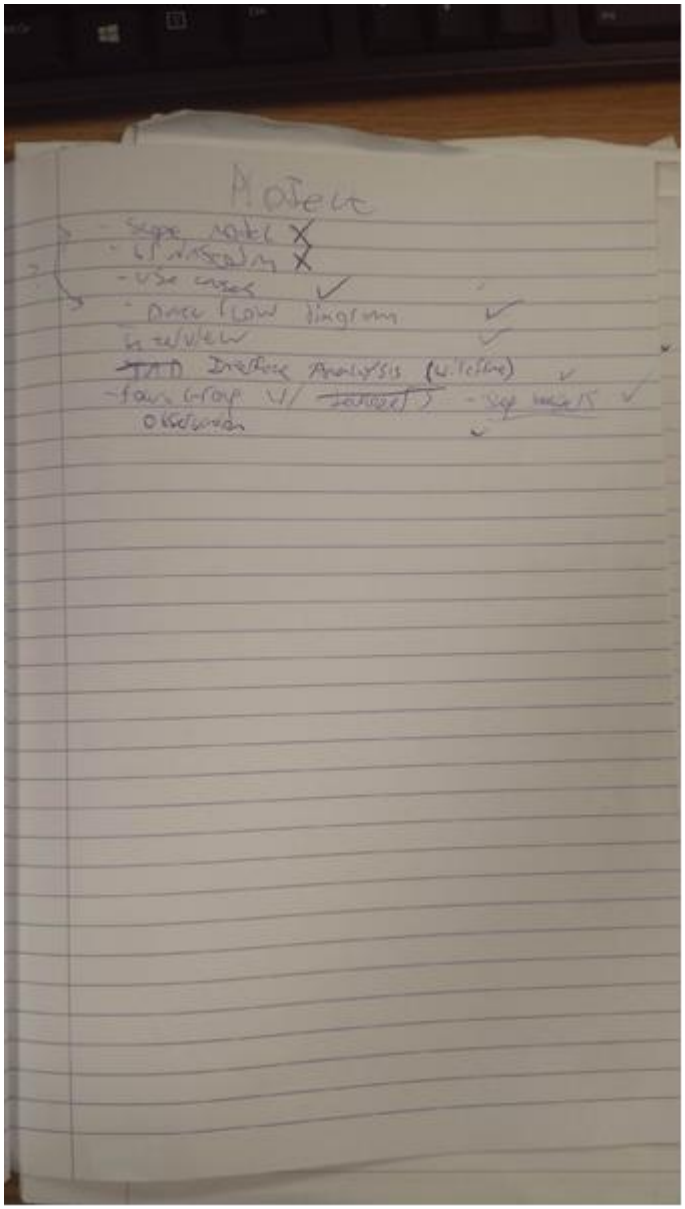
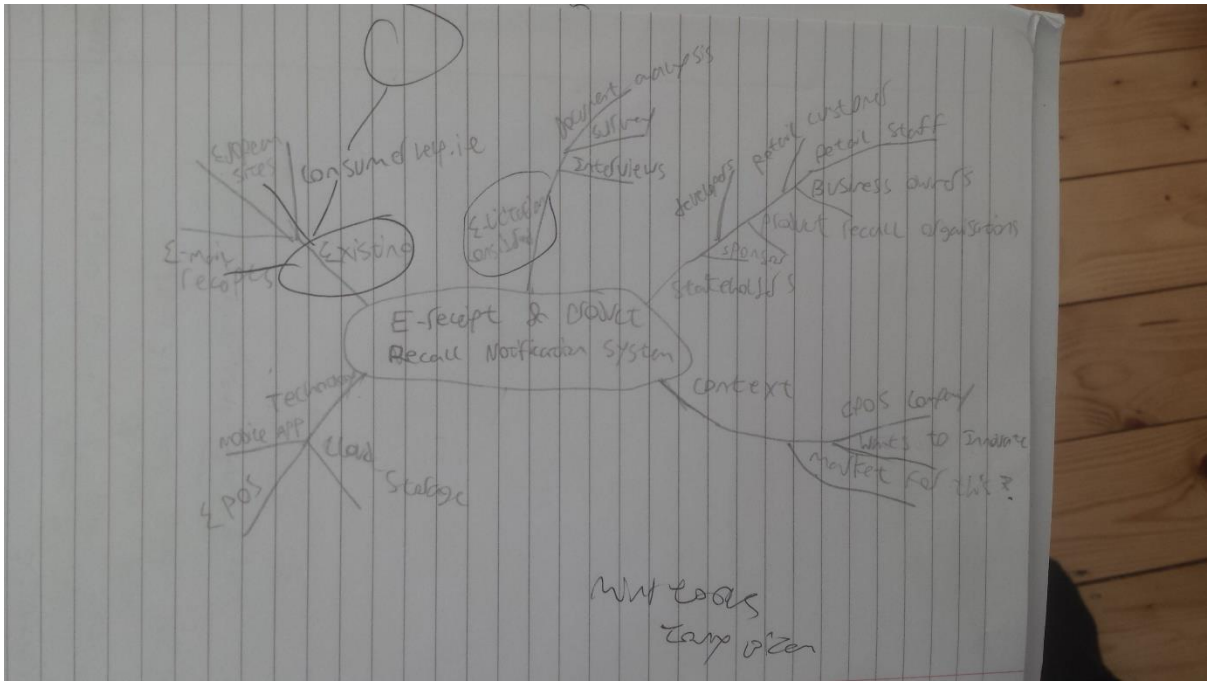
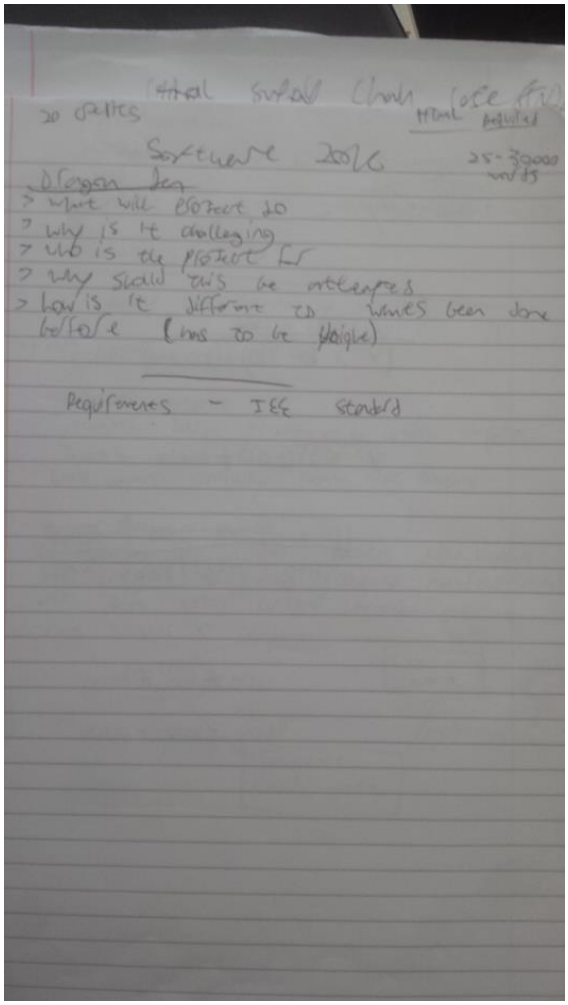


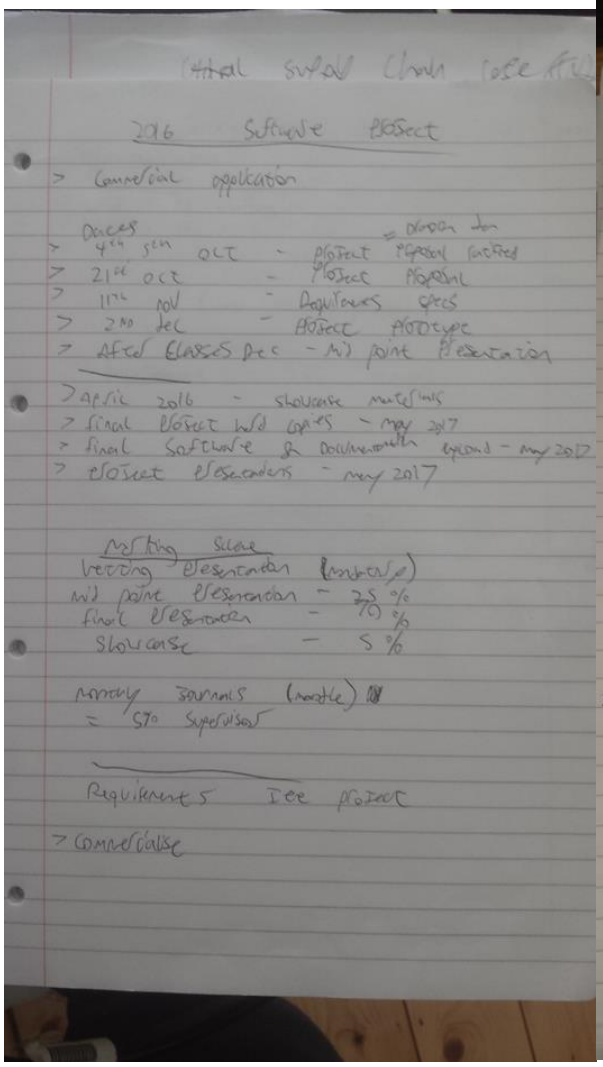


Draft Mind Map



Non Supervisor Notes





2016 Software Project

> Commercial application

Dates
> 4th sem OCT - project proposal finished
> 21st oct - Project Proposal
> 11th nov - Requirements spec
> 2nd dec - Project Prototype
> After Classes Dec - Mid point Presentation

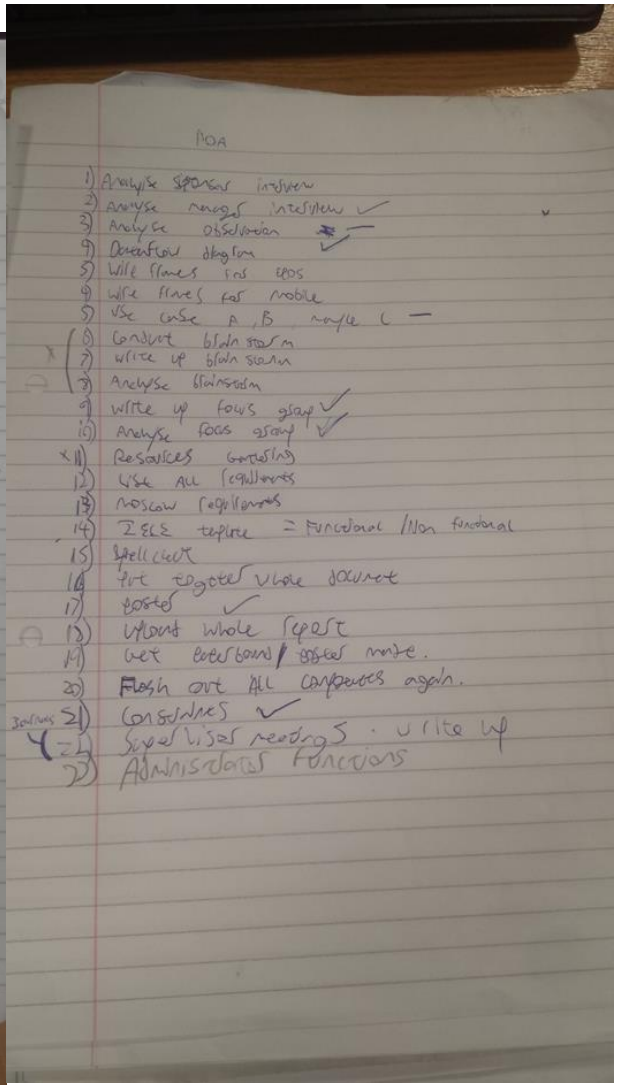
> April 2016 - showcase materials
> final Project hard copies - may 2017
> final Software & Documentation upload - may 2017
> Project Presenters - may 2017

Marking Scheme
Mid point Presentation (individual)
Mid point Presentation - 25 %
final Presentation - 70 %
Showcase - 5 %

Monthly Journals (Monthly)
= 5% Supervisor

Requirements Ieee project

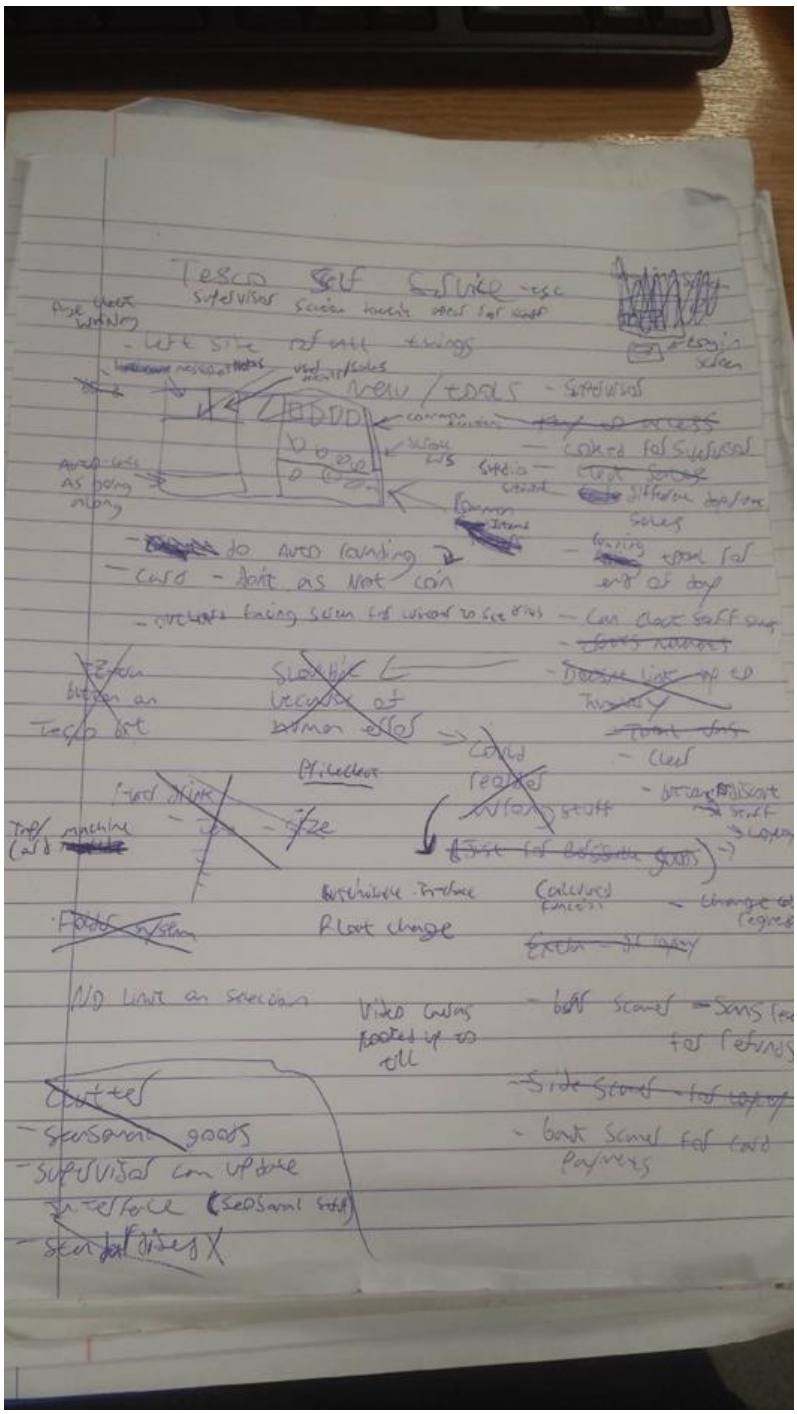
> Commercialise



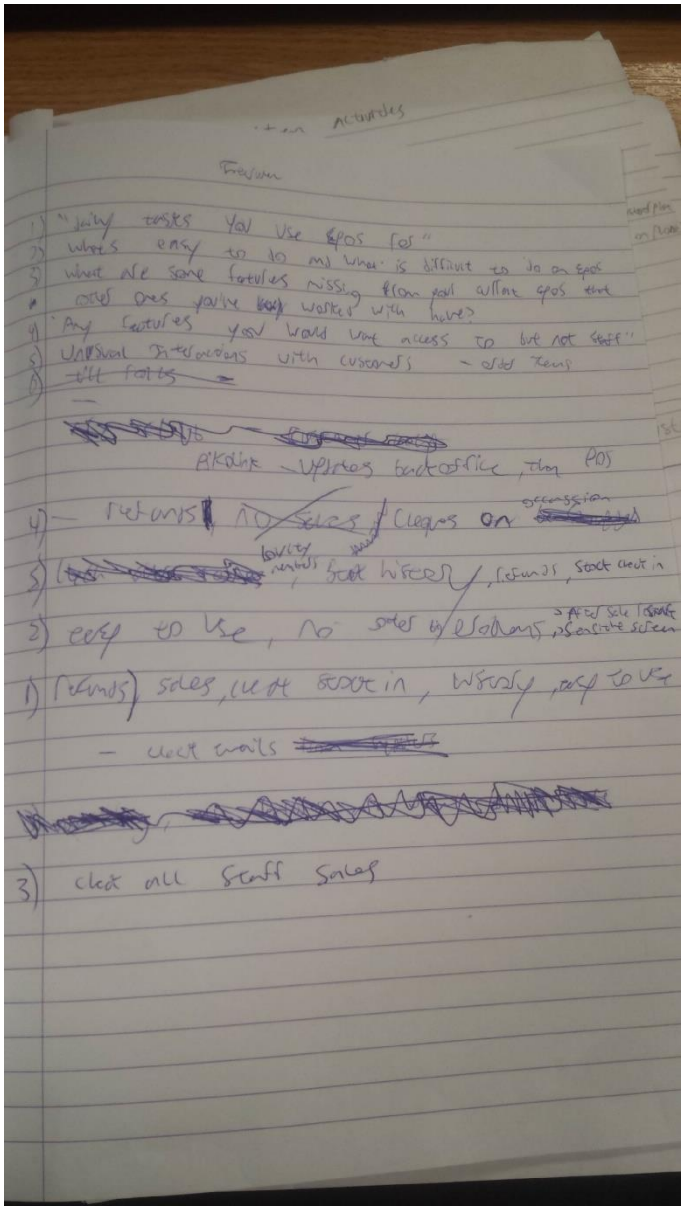
POA

1) Analyse Sponsor interview
2) Analyse manager interview ✓
3) Analyse observation ✓
4) Dataflow diagram
5) Wire frames for EPOS
6) wire frames for mobile
7) Use case A, B, maybe C
8) Conduct brain storm
9) write up brain storm
10) Analyse brainstorm
11) write up focus group ✓
12) Analyse focus group ✓
13) Resources Gathering
14) Use All requirements
15) Moscow requirements
16) IEEE template = Functional / Non functional
17) Spell check
18) Put together whole document
19) posted ✓
20) Submit whole report
21) Get feedback / posted note.
22) Flesh out ALL components again.
23) Consultations ✓
24) Supervisor readings . write up
25) Administrators Functions

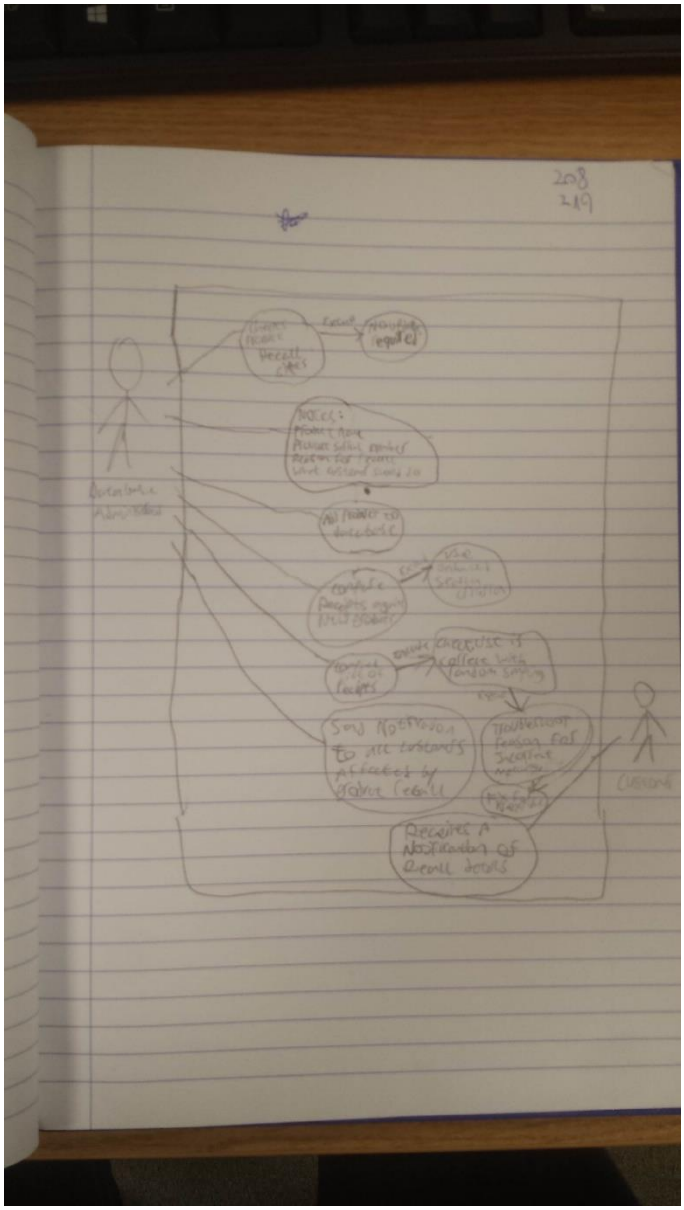
Focus Group Session



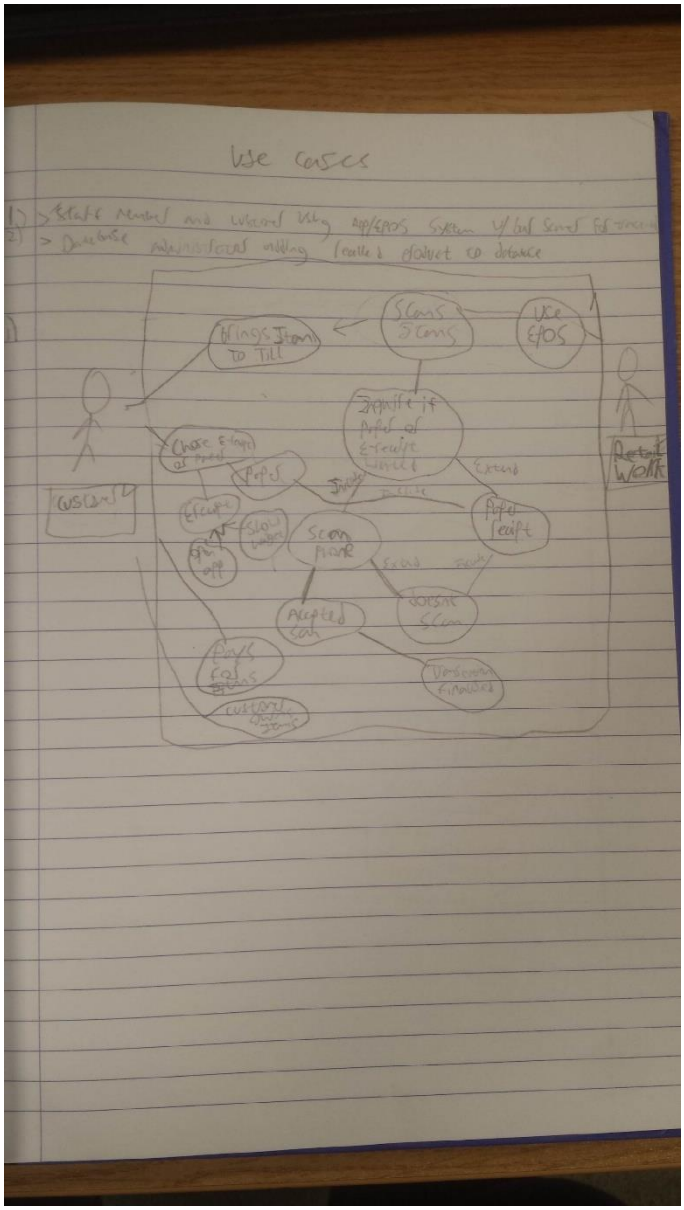
Manager Interview



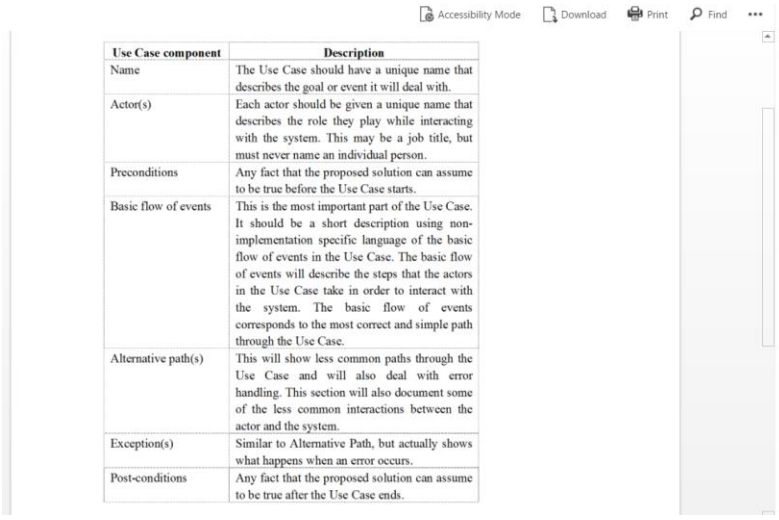
Database administrator adding items to database use case draft



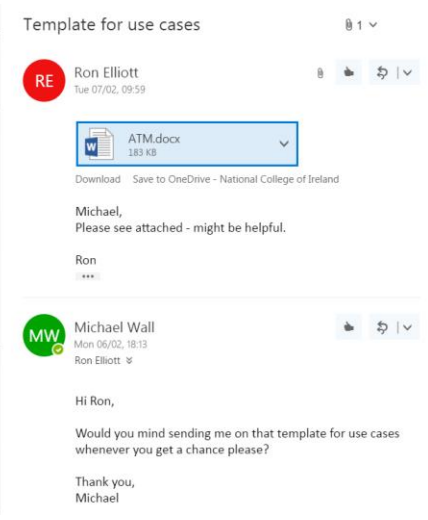
Retail transaction use case draft



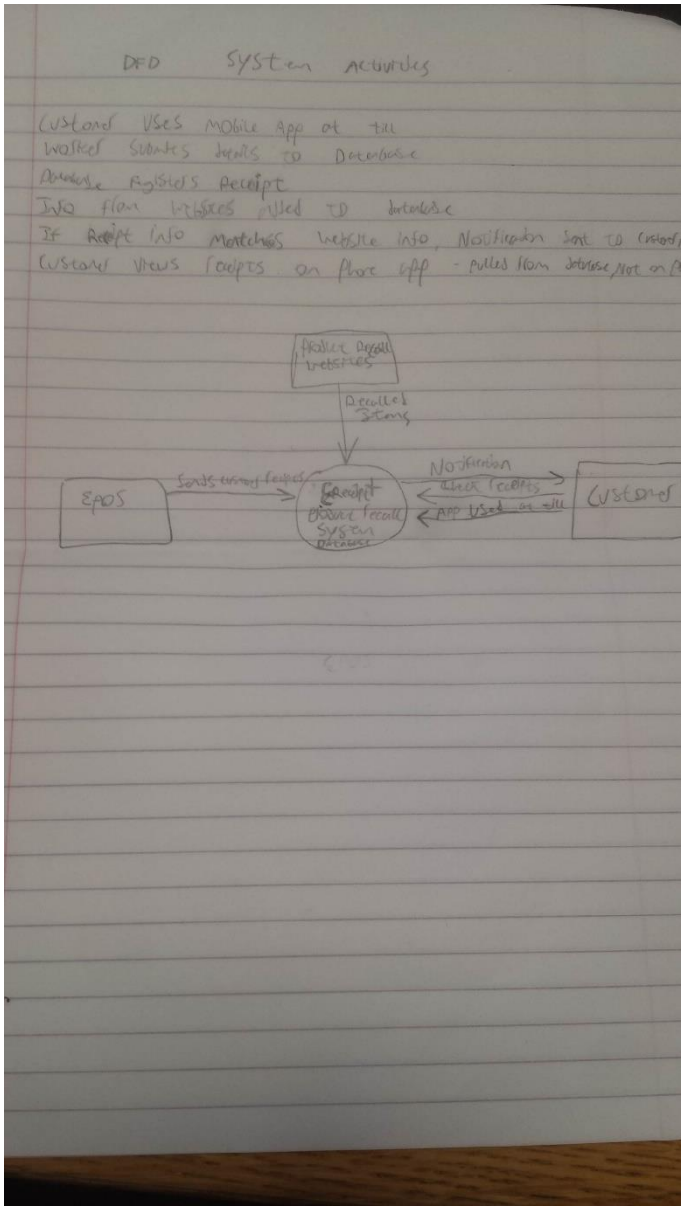
Use Case template



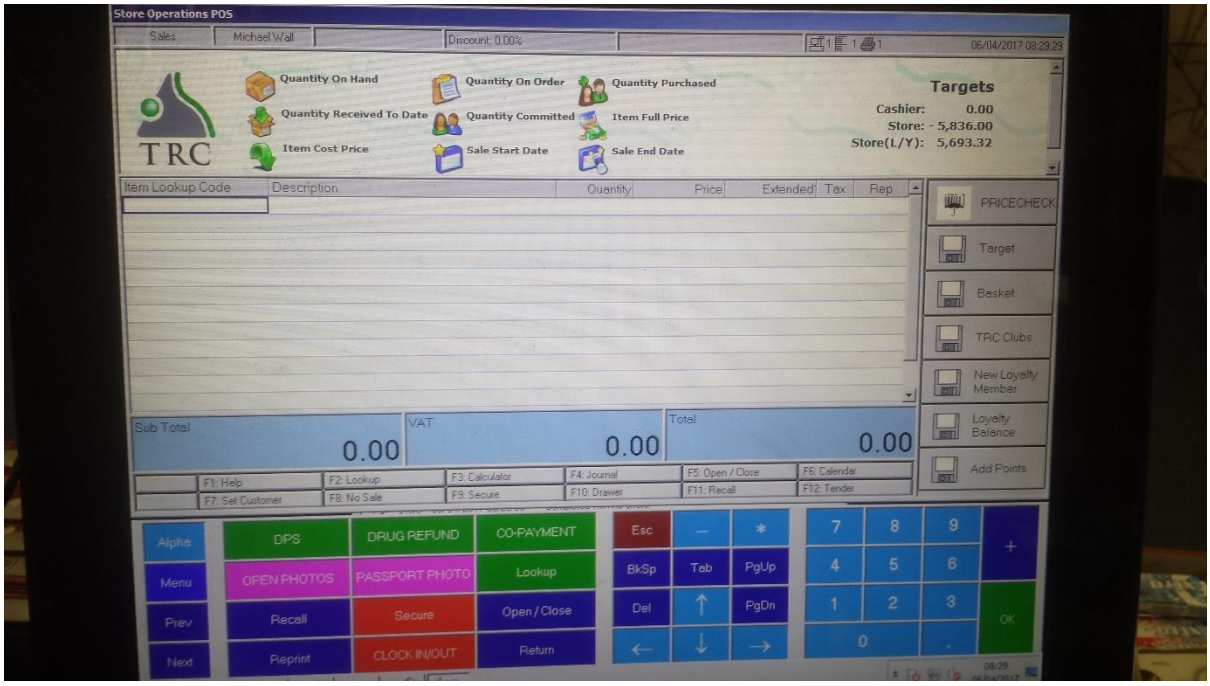
Use Case component	Description
Name	The Use Case should have a unique name that describes the goal or event it will deal with.
Actor(s)	Each actor should be given a unique name that describes the role they play while interacting with the system. This may be a job title, but must never name an individual person.
Preconditions	Any fact that the proposed solution can assume to be true before the Use Case starts.
Basic flow of events	This is the most important part of the Use Case. It should be a short description using non-implementation specific language of the basic flow of events in the Use Case. The basic flow of events will describe the steps that the actors in the Use Case take in order to interact with the system. The basic flow of events corresponds to the most correct and simple path through the Use Case.
Alternative path(s)	This will show less common paths through the Use Case and will also deal with error handling. This section will also document some of the less common interactions between the actor and the system.
Exception(s)	Similar to Alternative Path, but actually shows what happens when an error occurs.
Post-conditions	Any fact that the proposed solution can assume to be true after the Use Case ends.

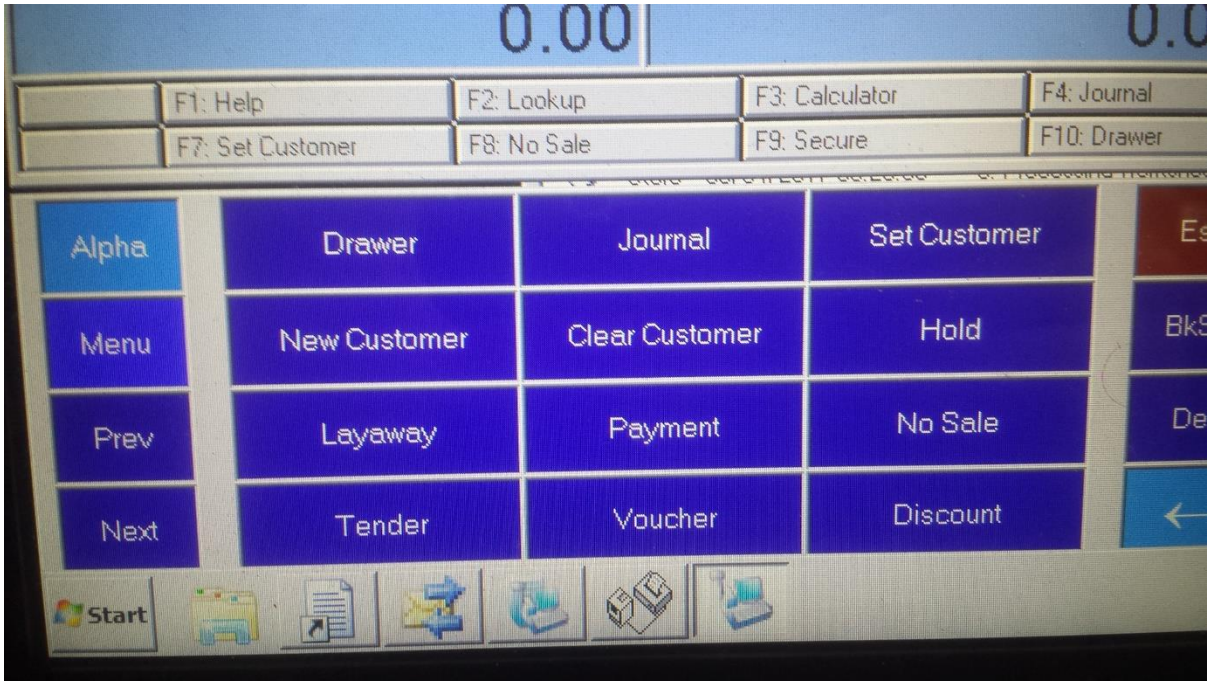


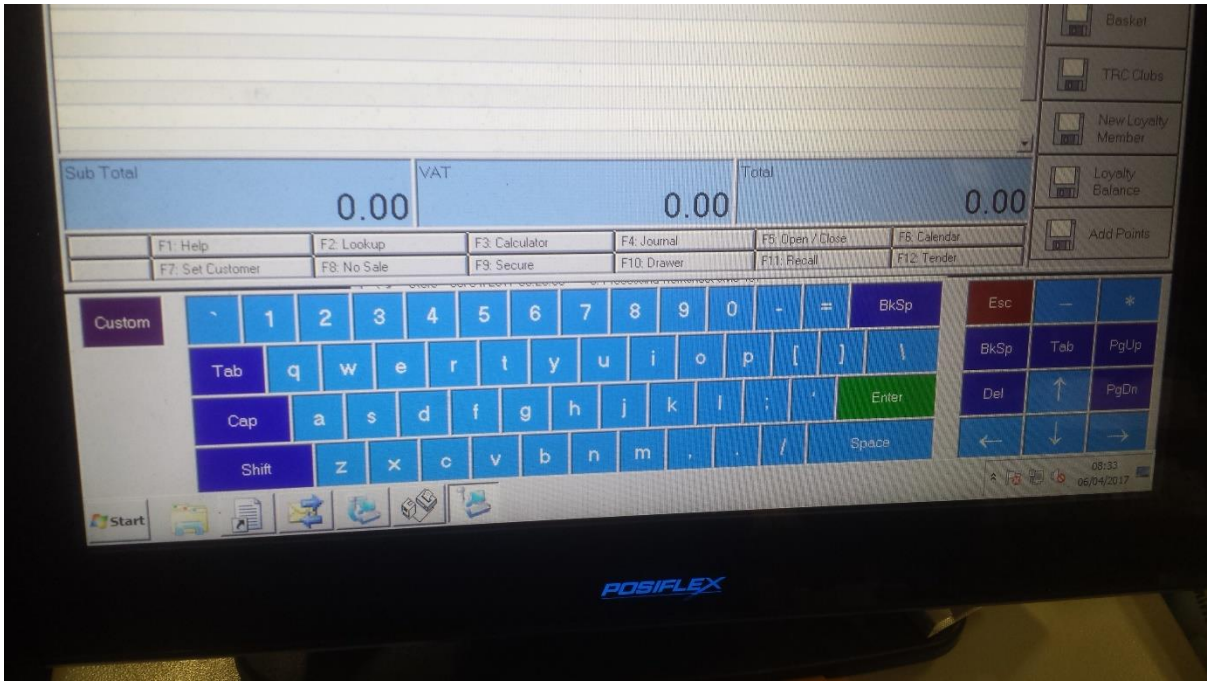
High level diagram draft



Pharmacy EPOS







Project Pitch

E-Receipt & Product recall notification system

>Point Of Sale software plug in that uses barcode scanner to read unique tag on smart phone app and then sends receipt of transaction to cloud which can be accessed and viewed from phone.

> Phone app to view E-receipts, and also receive a notification if a product that appears on one of your receipts has been recalled.

Project Proposal

E - Receipt and Product Recall Notification System

Michael Wall, x 13385841, michael@wall.ie

Degree program: B.SC. (Hons) in Technology Management

Specialisation: Business Analysis

Date 13/10/16

1 Objectives

The objective of this project is to develop a detailed requirements specification in compliance with the IEEE standards for an E-Receipt and Product Recall Notification System. The requirements will be gathered using techniques from BABOK, as well as online research as to why this product is not already currently in use. From that information, I will then be able the cover aspects such as the design and functionality of the EPOS system and the Smartphone app.

How I currently intend for the System to work is by first developing a mobile application that will be used to display the users unique account number in the form of a barcode that can be read by a bargun. The app will also allow the user to access their previous transactions.

Next there will be an EPOS application that initially displays 2 options. The first will progress the transaction along the standard, paper receipt way, using the existing system. The second will require the cashier to use the bargun and take a snap of the unique code that will be displayed on the customers app. This will send the receipt from the transaction in digital form to online storage associated with the customer account, thereby eliminating the need for the paper receipts.

The next stage of the system after that will be to gather a continuously refreshing list of products that have been recalled, which will be sourced from multiple Irish and EU sites, and compare them to the items on the E-Receipt and send a notification to the user advising them that they should return the product.

Although the Requirements Specification is the largest part of my 4th year project there are still other tasks I must complete in order to achieve the highest amount of credits, such as meetings with my supervisor, the monthly reflective journals, the midpoint presentation, as well as the project showcase.

2 Background

I came up with a part of the idea to this project when I was in first year of college, of an E-receipt system that would allow you to pay for transactions and then swipe a card at the end of the transaction which contained your email address, and then your receipt would be sent to the email address instead of having a paper copy handed to you then and there.

The second part of the idea came to me over the summer when I noticed in shops the only way they had of informing customers of products that were recalled was to print out and stick up a piece of paper beside the tills. I didn't think this was the best way to inform customers because it relies on

them on coming back to the shop and noticing the sign to be informed, instead of the shop contacting them.

So I figured if you combined and tweaked the two ideas so that you could have a system that both gives digital receipts for ease of use and storage, but also scan the receipts for products that have been recalled by manufacturers, you would get a unique and useful software solution to a common problem.

Since this idea has been on my mind for several years I am looking forward to the chance to explore the solution in detail, as previously when I explored the area I tended to hit roadblocks due to my lack of experience researching topics of that size and scope, and now that I also have experience having worked in retail I am much more familiar with the interface of the EPOS system so I can better picture how the process would work.

The structure of the requirements document templates will also hopefully provide assistance in helping me frame the information I intend to find out about, by focusing on the important aspects and stop me from going in a direction that is not as much of a core element to the project.

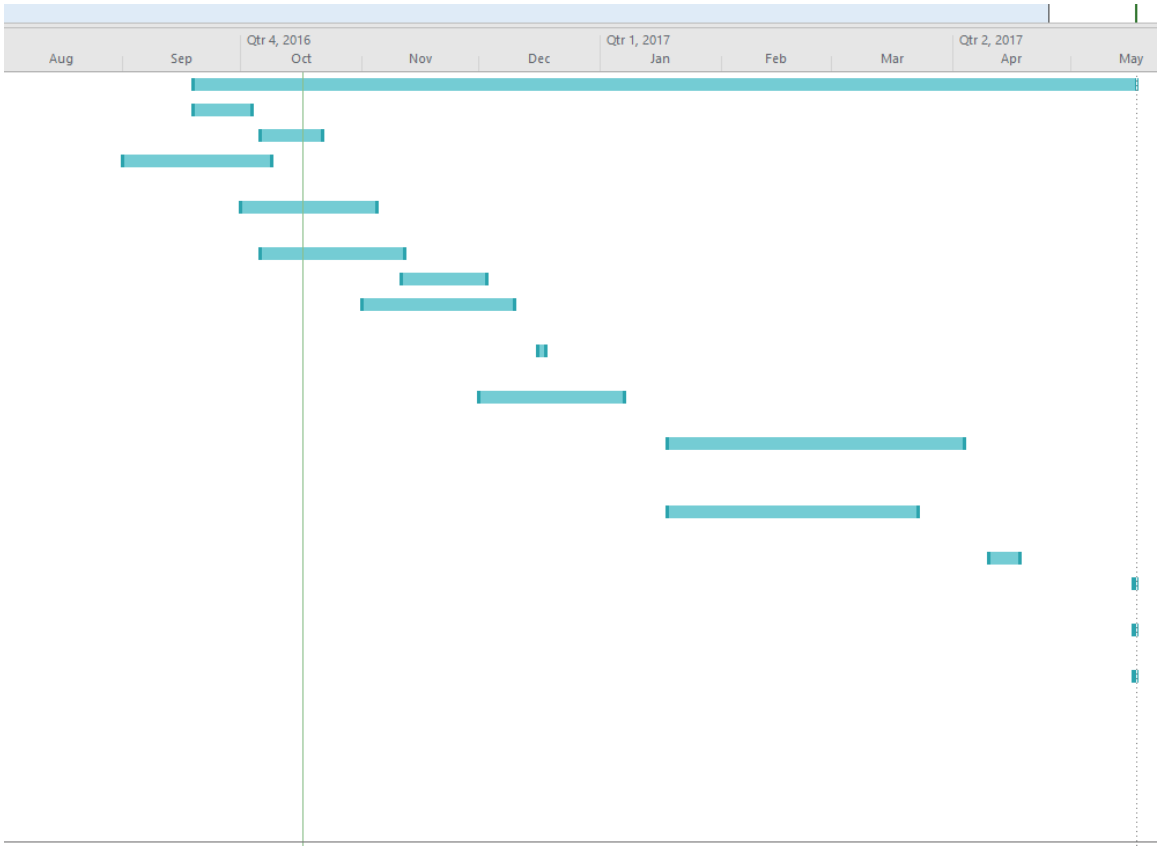
3 Technical Approach

My technical approach will start with a lot of online research for current systems that might exist as well as how current email receipt technology works, so to learn why this system or one very similar hasn't been widely implemented yet. From there I will conduct a variety of elicitation techniques to determine what will be required to make the software user friendly and useful to a wide audience. Based on what I discover I will write up a solution that connects the EPOS, mobile app and cloud storage software.

4 Special resources required

I will require access to an IEEE requirement document template as well as BABOK so that I can properly write up my requirements specification document.

5 Project Plan



The work break down structure for the Gannt Chart above is listed below:

Task Name	Duration	Start	Finish
E-Reciept and product recall system	173 days	Mon 19/09/16	Wed 17/05/17
Project pitch	11 days	Mon 19/09/16	Mon 03/10/16
Project Proposal	12 days	Thu 06/10/16	Fri 21/10/16
September Reflective Journal	28 days	Thu 01/09/16	Sat 08/10/16
October Reflective Journal	26 days	Sat 01/10/16	Fri 04/11/16
Requirements spec	27 days	Thu 06/10/16	Fri 11/11/16
Project Prototype	16 days	Fri 11/11/16	Fri 02/12/16

November Reflective Journal	29 days	Tue 01/11/16	Fri 09/12/16
Mid point presentation	2 days	Fri 16/12/16	Sat 17/12/16
December Reflective Journal	27 days	Thu 01/12/16	Fri 06/01/17
More detail added to Requirment Specification	54 days	Wed 18/01/17	Mon 03/04/17
development of prototype	46 days	Wed 18/01/17	Wed 22/03/17
Showcase materials	6 days	Mon 10/04/17	Mon 17/04/17
Project Hard copies due	1 day	Wed 17/05/17	Wed 17/05/17
Project Online copy to be uploaded	1 day	Wed 17/05/17	Wed 17/05/17
Project Presentation	1 day	Wed 17/05/17	Wed 17/05/17

The project plan was changed twice, so a less formal pen and paper system was used as it made it much easier to keep track of changes and tick off goals. There have been photos taken of these in the appendix.

6 Technical Details

More specific details about what languages should be used will become apparent after the requirements document has been completed, but from my experience using an EPOS system, it seems lily that there will be some element of SQL and java.

Project sponsor decided it would be best for the developers not to be cornered into using a specific technology so has given them permission to use whichever ones they deem fit.

7 Assessment

The majority of the work for this project will be completed after the midpoint presentation, after I get confirmations that the techniques I have chosen are useful to my case. I will run the requirements that I have gathered after the midpoint presentation by my supervisor to get guidance on its complexity and whether it is sufficient for the final presentation in May.

Signature of student and date

Reflective journals

September

I started back in NCI on the 19th September, and over the next two weeks it was explained to us exactly what was expected. I opted to develop on an idea that I had had in 1st year but never really looked into in too much detail, and I also combined it with another idea I had had over the summer. The original idea was an E-receipt system that used a card to swipe at the end of a cash transaction and it would send a digital copy of the receipt to your email address, therefore eliminating the need for a paper receipt that was prone to damage or being misplaced or simply a hassle.

The 2nd idea came to me when I noticed in shops that the only way people seemed to be informed about a product that had been recalled was an A4 piece of paper that was posted next to the cashier. I figured there should be some solution to target people who bought that product directly, instead of hoping they came back into the shop to buy something else.

The result of combining these two ideas was the "E-Receipt and Product Recall System". I developed this further by spending a few days researching it online and to see if there were any current products available, and I came up with what I believe to be a reasonably unique idea.

The Requirements specification will be on a mobile app that displays a unique code that can be scanned by a barcode reader and registered by a software plug in at a point of sale system in a retail environment. This would then send a digital version of your receipt to cloud based storage where it can be accessed by the same app on your phone.

This gives several benefits to the customer, the primary one being that they now have a digital record for every transaction that saves them having to look after paper receipts. Another is that they don't clog their email with receipts from every transaction, and the other is that they don't necessarily have to give their personal info to a company that will send them promotional emails or keep a track of their buying habits. The retailer will also benefit by no longer having to pay for paper and the time that is spent dealing with lost receipts, fixing machines etc.

The product recall comes into this project by comparing a list of recalled items to the items on the buyers' receipts. This list of recalled items is sourced from a variety of official EU and Irish websites, though the hope would also be that retailers would get in contact as soon as they hear of any problems with a product, to avoid any harm happening to their customers.

October

This month started by pitching my project on the 5th of October to the dragon's den of lecturers to determine if it was detailed enough to be used. I had misinterpreted what was expected of us in the pitch and so while my idea was accepted there was still uncertainty about how I was going to carry out the project.

For the next 2 weeks, I worked on the project proposal, where I put down in writing what I planned to achieve and how I would go about doing that. This was somewhat confusing to write up as the example that was online for us to base our work off was incredibly detailed and seemed to contain information that was far too specific for a proposal and could only have been included later, but I completed the proposal to the best of my ability and uploaded it on Friday 21st Oct.

We were informed that weekend who our supervisors were, and I was assigned to Ron Elliot. He spoke to us as a class later in the week and gave some direction about how to achieve a good grade in this project, by following BABOK to the letter, and recommended that we should individually organise a meeting with him after the reading week.

The next piece of work to be submitted is the preliminary requirements specifications on the 11th of November, so that is what I will be working on over the next 2 weeks.

November

Until the 11th of this month I had been working on the preliminary requirement specifications document, and I met with Ron, my supervisor, twice while I was doing it to find out what would be needed. After this was submitted, I still remained in contact with Ron as I have him for several classes, so during breaks or when I arrived early before the class began we would discuss what would be needed for the next deliverable on the 11th December on at least a weekly basis.

Throughout November I spent some of my time working on this deliverable but a lot of the work ran into December as well, as I had several large assignments due for other modules that took up most of my time during November.

January

Up until the 14th of January I was studying for and taking my exams. For the next week until I started college again on the 23rd I took some time off for rest and relaxation.

When I came back I reorganized my work break down structure to figure out when would be the best time to perform each of the elicitation techniques as well as taking time into account to write up the requirements before the project showcase, and I met with Ron to get his feedback on the plan.

We agreed to meet on a weekly basis and review where I was with my plan and the work I had done, as I find it easier to motivate myself to work when I have the pressure of deadlines.

February

The plan of meeting weekly and following the new work breakdown structure did not work as planned and I hit a bit of a wall this month resulting in a significant setback.

I spent the first 2/3 weeks of the month trying to do document analysis and a weighted scoring card for vendor selection, as this was supposed to get me prepared with some founding of knowledge in the subject areas for doing the interviews with stakeholders so we could have a more productive dialog, and also get us the ideal developers for creating the mobile app and hosts for the data we collect.

This turned out to be extremely difficult to perform as there seems to be a lack of useful information available to the public. Although I planned for each of these tasks to take a week each, I ended up coming away with nothing meaningful to show for my efforts after 2/3 weeks, eating into the time I allocated for interviews. I didn't meet with Ron during this time as I didn't think it would be worth one another's time meeting if I had nothing to present.

So after 2/3 weeks I figured it was time to meet to discuss a different way around those issues as I thought I had exhausted that approach, and Ron advised that I focus on my interviews and use cases instead as it was very difficult to acquire that information, especially as I was a student.

Demotivated to do project work over the next 2 weeks, I instead spent my time on other tasks that needed to be done such as working on other currents assessments and getting my CV and LinkedIn up to scratch and applying for jobs. More trivial stuff also got in the way of project work such as a new laptop and problems configuring that, a bad cold, and changing rooms at home, which all seemed to take up some time until I realised the month was over and already well into the next.

March

Ended up spending a lot more time than anticipated on 2 assignments, felt they were completed to a high standard in the end however meaning the Midterm wasn't as productive as it could have been for the project.

Conducted the sponsor interview and made start on use cases.

Conducted a focus group with previous co-workers who worked in retail to get an idea of what would make an ideal EPOS system and interface. With many of the having worked in many different shops over the years (and with different systems) they each had different preferences and ideas.

Also interviewed my old retail manager to see what features a manager would want from the EPOS system.