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Software Requirements Specification:
Group 4

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1 Introduction

In the modern banking industry a continuous source of inconvenience for clients are the outdated ATM systems used on a day-to-day basis. In light of this the goal of this project is to design a new ATM system that greatly reduces the inconvenience of using ATM's by taking advantage of the prevalence of mobile devices in the modern world. In order to do this we will shift the processing from the ATM itself to a mobile application, detailed below.

2 Architectural Design

Our system architectural design will be a three tiered system, with each layer being a subsystem with an architecture unto itself. Having three layers, namely: the application server layer, the business server layer, lastly the database layer.

The application server layer will have within it, two subsystems: one being the presentation (and presentation logic) subsystem which will use an MVC architecture, and the other being the integration logic which will be using a SOA-Service Oriented Architecture. The latter is meant to interact with both the ATMs, POS devices, and even smart-phones.

The business logic layer consists of a component oriented architecture.

The dabatase layer is meant to be a persistence framework.

2.1 Deployment Diagram

3 Non functional Requirements

3.1 Quality attributes

1. Availability
   (a) -the app shall show users the closest atm with enough cash for request withdrawal
   (b) -the app shall show users the ATM with the least traffic for a requested transaction -user will avoid going to locations with unavailable ATMs to us.
   (c) -the system shall be available for 99% of the time.
2. Security
   (a) -since taking out cash is a tap interface the app shall verify transactions using OTP to ensure security
   (b) -atm that are being tempered with will alert the police since transactions last a few seconds
   (c) -access permissions for particular system information shall only be changed by the system administrator

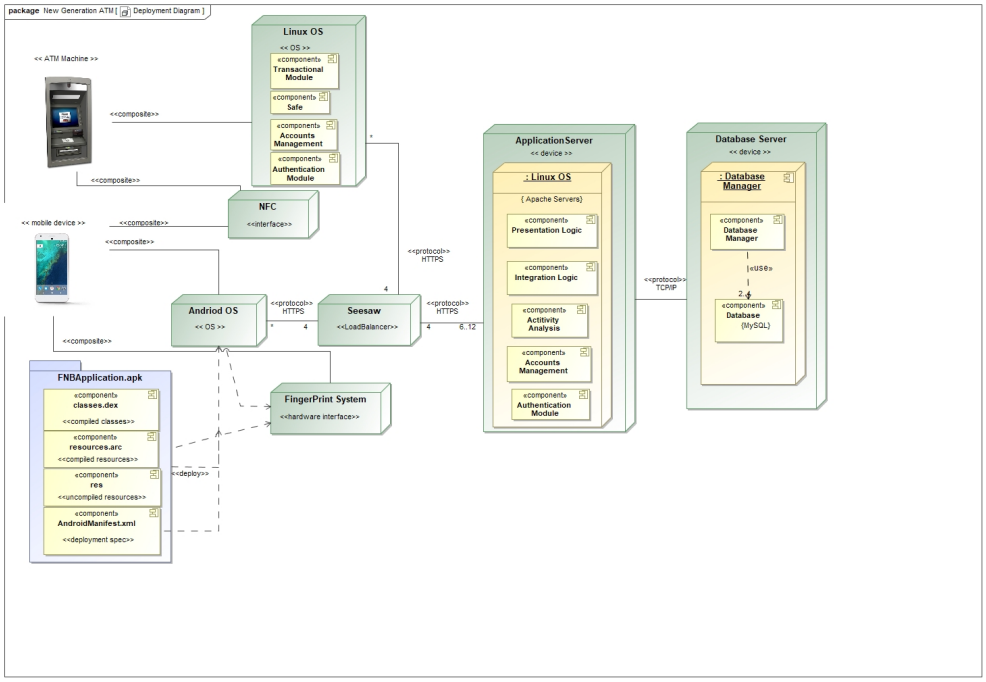

Figure 1: System Deployment Diagram

3. Performance

   (a) -the app shall check how many customers are trying to access a particular atm. This allows the user of the app to determine id they would like to go to that atm or be directed to a less congested one

   (b) -the ATM shall process transactions on less than 30 seconds

   (c) -when there is a lot of traffic in an area the app shall direct customers to an ATM with less traffic

4. Usability

   (a) -app users who want to perform transactions shall be able quickly and easily to to accomplish any task. -the app shall process transactions on less than 30 seconds

5. Reliability

   (a) -the database shall keep transaction logs for every transaction made in case of a system failure.

3.2 Constraints

1. Due to the expensive nature of smart phones many user of the system will not be able to use the NFC technology. Although QR code can be generated. Since this is a new technology the general public may not be as welcoming of it as wished.

2. Since cellphones use battery they may run out of power. Even though the customer has an NFC card. If they want to change the transaction details they will not be able to. This be comes a problem if they want o change details hence the old interface will be required.

3. Hardware and simulation tools that would be necessary for the development and testing purposes of some use are not available for use. The design of the solution will not cater for some scenarios which can at time only be discovered from system interaction.

3.3 Technical requirements (technology)

1. USSD (Unstructured Supplementary Service Data)
2. Biometric systems (fingerprint sensors)
3. Android (OS) for mobile devices
4. Linux (OS) for application server and ATMs
5. Apache Servers
6. MySQL
7. NFC (Near-field Communication)
8. QR Codes
9. Seesaw (Load balancer for servers)
10. Network Protocols (HTTPS, TCP/IP)
11. GPS (Global Positioning System)

4 System Components (subsystems)

4.1 Account Management

4.1.1 Functional Requirements

1. R1 The system shall allow a client to create a bank account, manage and close accounts. – The system shall allow a client to deactivate their bank card. (edit withdrawal limits, etc)

2. R3.3 The system shall allow a client to view a statement and balance of their bank account. – The system shall remove the need for plastic cards. Instead, a smart phone application with a two factor authentication system consisting of [fingerprint and facial recognition].

3. R6 The system shall allow support staff non-editorial access to user's accounts, for the purpose of assisting clients only. – The system shall allow support staff to assist clients upon requests for help.

4.1.2 Domain Model

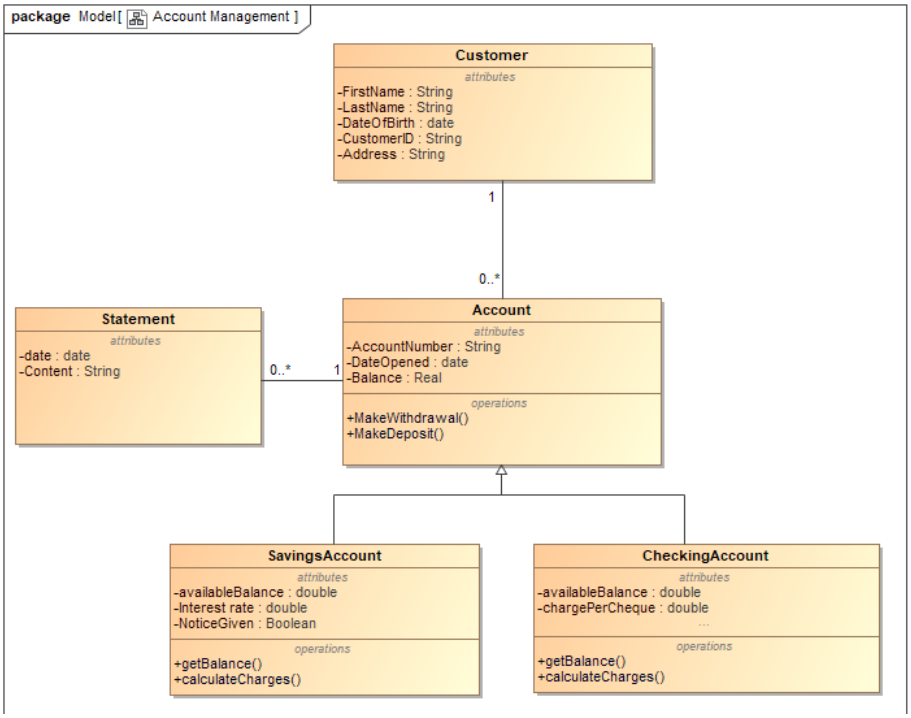

Figure 2: Domain Model for Account Management

4.1.3 Subsystem Trace-ability Matrix

Use Cases

1. Client creates an account.
2. Client closes an account.
3. Client views statement.
4. Client checks balance.
5. Client calculates charges.

Requirements	Create	Close	Statement	Balance	Charges
R1	x	x			x
R3			x	x	
R6					

4.2 Transaction Management

4.2.1 Functional Requirements

1. R3 The system shall allow clients to withdraw and deposit cash, and will also allow them to view bank statements. The system shall also remove the need for physical cards, which will be replaced by a mobile application with two-factor authentication.
2. R9 The system shall allow the clients to directly purchase electricity or data.
3. R10 The system shall allow two clients to directly transfer money through the mobile application.
4. R11 The system shall allow clients to use NFC for cashless payments.

4.2.2 Domain Model

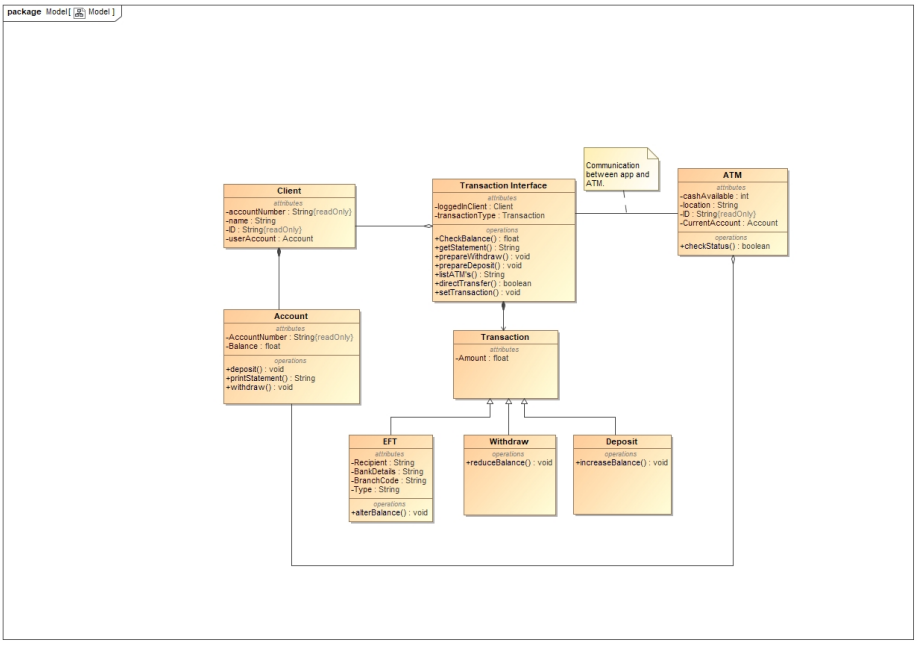

Figure 3: Domain Model

4.2.3 Subsystem Trace-ability Matrix

use Cases

1. Client makes a withdrawal.
2. Client makes a deposit.
3. Client pays over EFT.
4. Client prints a bank statement.
5. Client prepurchases electricity/data

Requirement	Withdrawal	Deposit	EFT	Statement	Prepurchase
R3	x	x		x	
R9					x
R10			x		
R11			x		

4.3 Maintenance

4.3.1 Functional Requirements

1. R4 The system shall allow an administrator to add and remove ATM machines from the system.

2. R6 The system shall allow support staff non-editorial access to user's accounts, for the purpose of assisting clients only. - The system shall allow support staff to assist clients upon requests for help.

3. R7 The system shall allow analysts to gather data from ATM's regarding the manner in which they are used (such as average amounts withdrawn, and average number of customers serviced per day).

4. R15 The system shall allow for system software installations and updates. (security, database, software)

5. R17 The system shall allow for the addition and management of auxiliary cash deposit points (shops, trusted retailers)

4.3.2 Domain Model

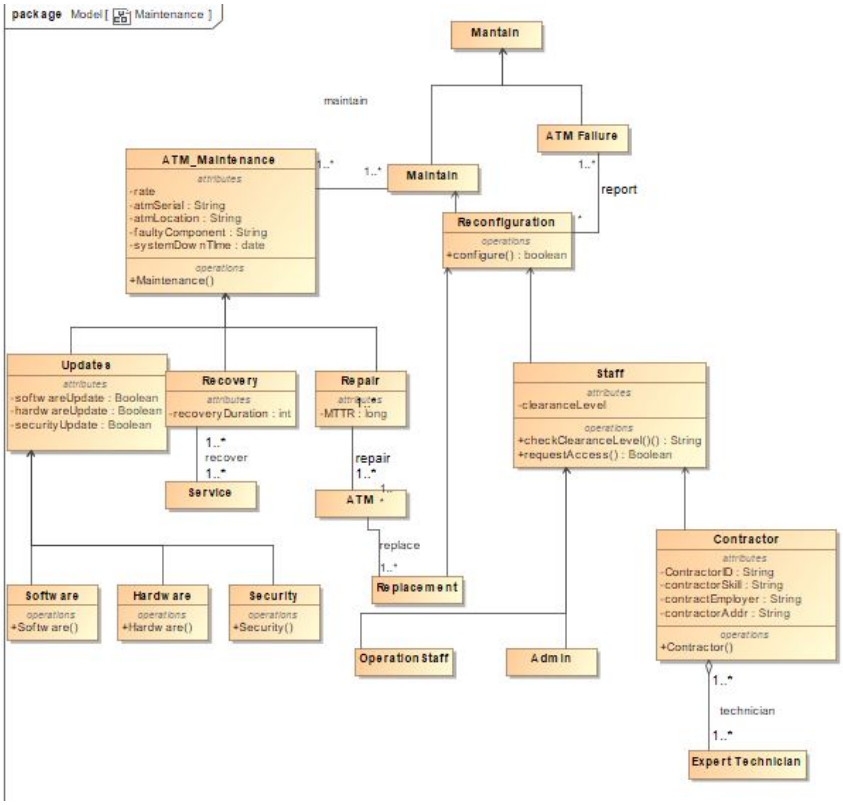

Figure 4: Domain Model for Maintenance

4.3.3 Subsystem Trace-ability Matrix

Use case list:

1. Admin adds an ATM
2. Admin removes an ATM
3. System assists clients with help
4. System allows software installations
5. System allows software updates
6. System allows auxiliary cash deposits

Requirement	ATM	STAFF	SYSTEM
R4	x		
R6		x	
R7			x
R15			x
R17	x		

4.4 Authentication

4.4.1 Functional Requirements

1. R16 The system shall make use of two-factor authentication in order to verify the user. The user will be required to enter their online banking password.
2. R8 The system shall then prompt the user to complete the authentication process by choosing an option to either receive an OTP (which will be sent to the user's registered cellphone number) or a fingerprint scan.
3. R13 The system shall grant access to user after he/she has been authenticated.

4.4.2 Domain Model

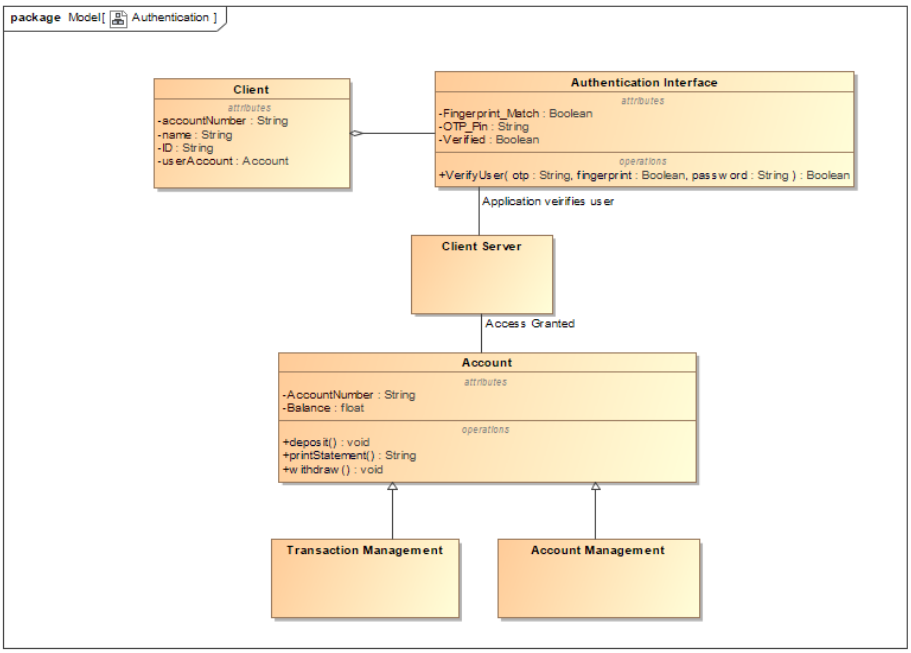

Figure 5: Domain Model

4.4.3 Subsystem Trace-ability Matrix

Use case list:

1. User enters passwords
2. System prompts to enter OTP PIN or scan fingerprint
3. System allows data transmission from client server
4. System allows access to the Transaction and Account management interfaces
5. System allows password changes
6. System allows secondary factor changes

Requirement	Data Transmission	User Verification	Interface Access
R16		x	
R8	x	x	
R13			x

4.5 Activity Analysis

4.5.1 Functional Requirements

1. R5 The system shall allow an auditor to generate and save audit logs.
2. R7 The system shall allow analysts to gather data from ATM's regarding the manner in which they are used (such as average amounts withdrawn, and average number of customers serviced per day).

4.5.2 Domain Model

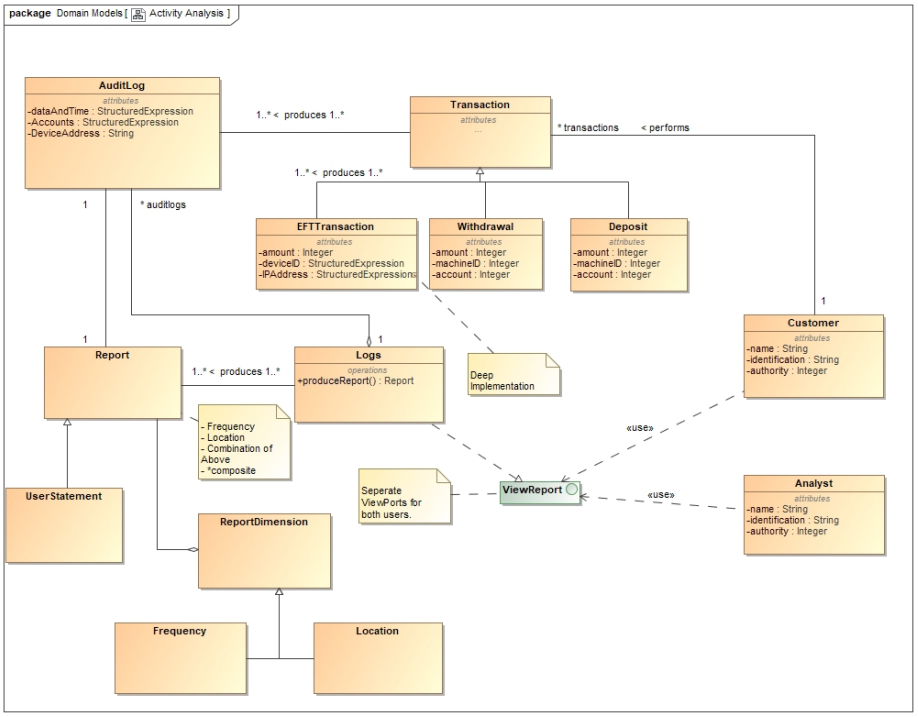

Figure 6: Activity Analysis Domain Model

4.5.3 Subsystem Trace-ability Matrix

Uses Cases list:

1. customer gets a bank statement - extend: create an audit log
2. customer performs a transaction
   (a) customer performs a withdrawal - extend: create an audit log
   (b) customer performs a deposit - extend: create an audit log
   (c) customer performs an electronic funds transfer - extend: create an audit log
3. activity analysis creates an audit-log
4. analyst views a report

Table:

Trace-ability Matrix	
Requirement Numbers	Use Case Numbers
R5	3, 4
R7	1, 2

5 User Characteristics

Open to all authorized user characteristics and it is dependent upon functionality.

- Customer A: Customer A is a members of the public with no experience or special training. Customer A is not familiar with managing their account and does not use the ATM frequently. Customer A must find the ATM easy to use through the simple interface and functions.

  - Subsystem: Account management and Transactions

- Customer B is an experienced customer. This is someone who is familiar with using the ATM system. This particular customer does most of his/her account management through the machine.

  - Subsystem: Account management and Transactions

- Analysts: analysts are the users that are going to gather data from ATM's regarding the manner in which they are used.

  - Subsystem: Activity Analysis

- Support staff: non-editorial access to user's accounts, for the purpose of assisting clients only. The system shall allow support staff to assist clients upon requests for help.

  - Subsystem: Account Management

- Maintenance Personnel: These are the bank employees. They must be experienced network administrators to be able to install updates, do recovery and repair the system.

  - Subsystem: Maintenance subsystem.

6 Actor System Interaction Model

Authentication Subsystem (Actor-System Interaction):

7 System Trace-ability Matrix

Use Cases:

1. Client makes a withdrawal
2. Client makes a deposit
3. Client pays over EFT/NFC
4. Client prints bank statement
5. Client prepurchases electricity/data
6. Client creates/closes/edits bank account
7. Administrator adds/removes ATM's and performs system maintenance
8. Support staff accesses account information
9. Auditor generates audit logs
10. Analysts generate analytical reports based on usage data

Functional Requirements:

1. R1 The system shall allow a client to create a bank account, manage and close accounts. – The system shall allow a client to deactivate their bank card. (edit withdrawal limits, etc)
2. R2 The system shall allow clients to use a smart phone application or communicate using the USSD system for unsupported devices. (web? simple mobile sites?)

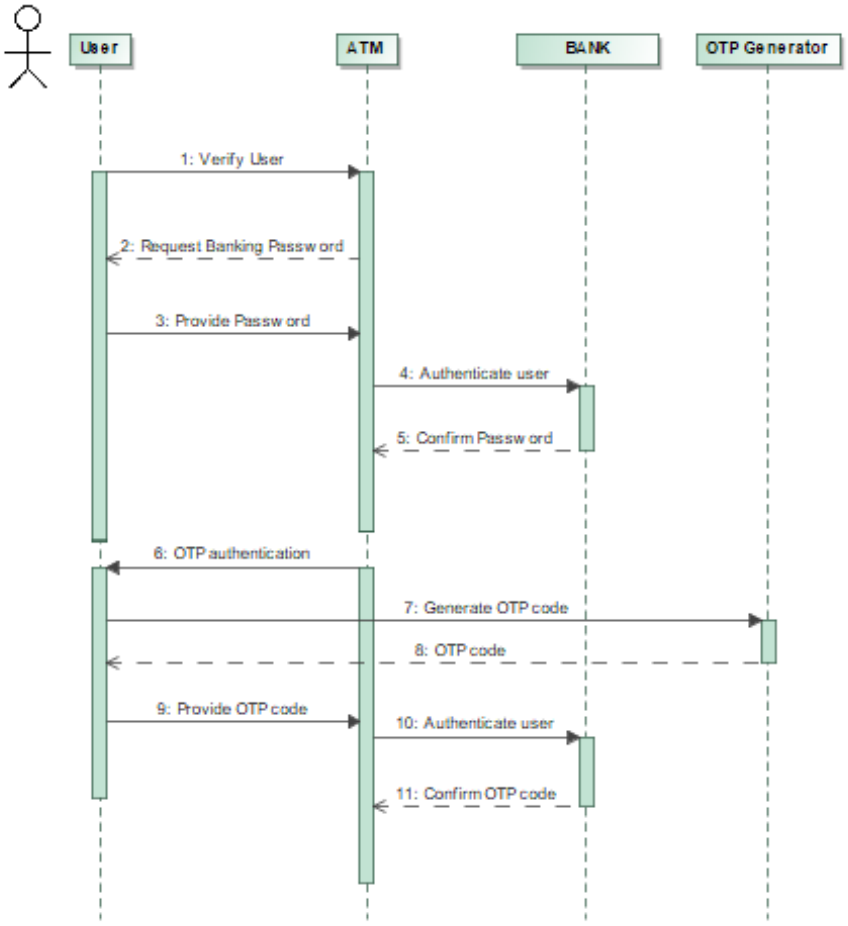

Figure 7: Authentication Actor-System Interaction

3. R3 The system shall allow a client to withdraw or deposit cash and in addition print a bank statement.

4. R4 The system shall allow an administrator to add and remove ATM machines from the system.

5. R5 The system shall allow an auditor to generate and save audit logs.

6. R6 The system shall allow support staff non-editorial access to user's accounts, for the purpose of assisting clients only. – The system shall allow support staff to assist clients upon requests for help.

7. R7 The system shall allow analysts to gather data from ATM's regarding

the manner in which they are used (such as average amounts withdrawn, and average number of customers serviced per day).

8. R8 The system shall provide the customer with information regarding the closest functional ATM or cash vendor. ATM redirection in the case of an error or relevant event.*
9. R9 The system shall allow the user to directly purchase electricity or mobile data.
10. R10 The system shall allow two users in personal contact to transfer money directly through the app.
11. R11 The system shall allow users to use NFC for cashless payments.
12. R12 The system shall use two factor authentication for security. (Fingerprint, Password or other combination, OTP)
13. R13 The system shall allow clients to pay bills.
14. R14 The system shall provide a system report. (status - up-time, no. of transactions, cash balances, receipt paper, power supply, network heartbeat).
15. R15 The system shall allow for system software installations and updates. (security, database, software)
16. R16 The system shall allow for cashless transactions at Points of Sale (via QR codes or NFCs).
17. R17 The system shall allow for the addition and management of auxiliary cash deposit points (shops, trusted retailers)
18. R18 The system shall have a personalized mobile user interface for the smart phone application.

	1	2	3	4	5	6	7	8	9	10
1						x				
2	x	x	x	x	x	x				
3	x	x	x	x						
4						x				
5									x	
6								x		
7										x
8	x	x		x						
9					x					
10			x							
11			x							
12	x	x	x	x	x	x				
13			x							
14									x	x
15							x			
16			x							
17							x			
18	x	x	x	x	x	x				