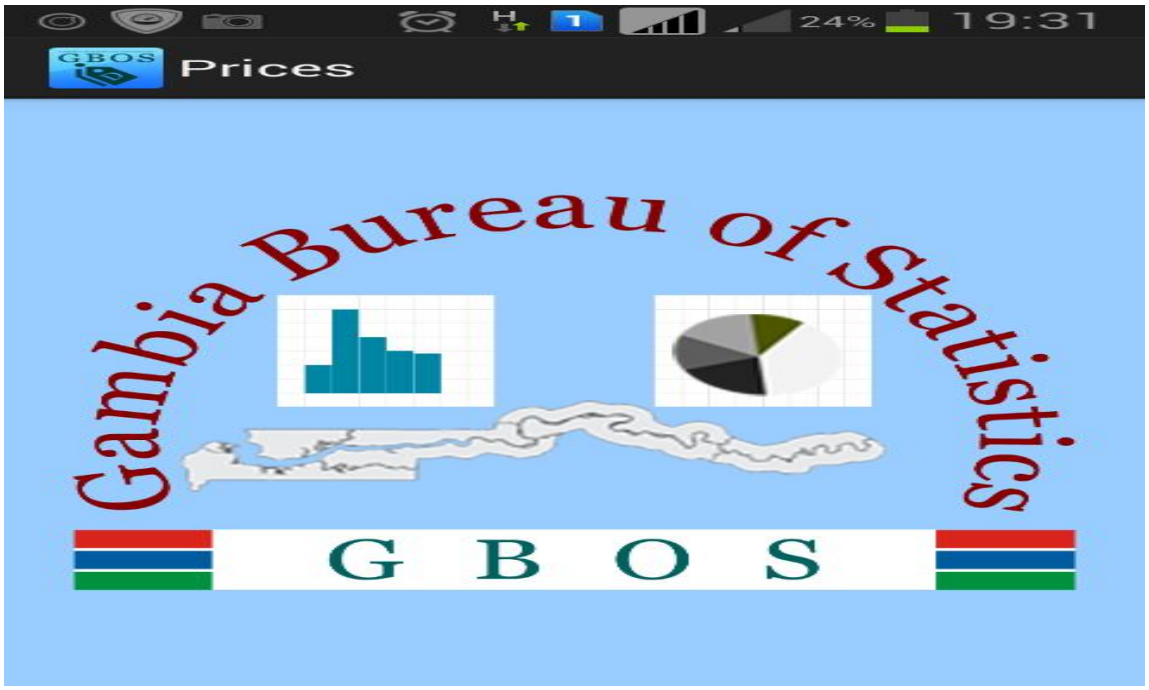

Training Workshop Proceedings

Presentation and Training of Price Mobile Data Collection for Statistical Analysis

VENUE:	**Baobab Holiday Resort, The Gambia**
HOST:	**Gambia Bureau of Statistics & I.T.C. – U.T,G**
FUNDED BY:	**United Nations Economic Commission for Africa**

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THEME:

Use of Mobile technologies for Price Data Collection in The Gambia

PROGRAM SCHEDULE:

SN	Time	Topic	Facilitator
1	08:30 – 09:00	Registration	-
2	09:00 – 09:25	Welcoming and opening remarks	Statistician General, GBoS Mr. Nyakassi Sanyang
3	09:25 – 10:00	Remarks by Ag. Head of School of Science and Technology, University of The Gambia: Objectives of the Project	Dr. Momodou Jane
4	10:00 – 11:00	Morning Coffee Break	
5	10:45 – 11:00	Remarks by Director of ITC, GBoS	Mr. Momodou Lamin Fadia
6	11:00 – 11:20	Price data, its importance and the need for better data collection method	Director of Prices, Mr. Ousman Dibba
7	11:20 – 12:00	The project framework and activities. Mobile Technologies in Statistical Production and Demonstration of the developed Android App	Focal Point of the Project, Mr. Sheriffo Ceesay
8	12:00 – 13:00	Project Approach, Methodology, Accomplishment, Challenges and the way forward	Mr. Mbemba Hydara
9	13:00 – 13:30	Roles of Enumerators and Supervisors	Mrs. Fatou Darboe
10	13:30 – 14:45	LUNCH BREAK	-
11	14:45 – 15:20	The Technology Configuration, Connectivity and Platform:	Mr. Pa Saffiong Kebbeh, UTG
12	15:20 – 15:40	Interactive Session. Q & A	-
13	15:40 – 16:00	Statement and Remark by UNECA Rep	-
14	16:00 – 16:40	Afternoon Tea Break & Closing	

KEY SPEAKERS AND PRESENTERS

Moderator Dr. Momodou Jain, Acting Head of School of Science and Technology, University of The Gambia.

Speakers

Momodou Lamin Fadia,	Director of ITC, GBoS
Mr. Sheriffo Ceesay,	Project Focal Point
Mr. Mbemba Hydara,	I.T.C. - .UTG Research
Mr. Pa Saffiong Kebbeh, ,	I.T.C. - .UTG Research

Report written by ITC-UTG Research Team

ABSTRACT

This second workshop was centered on presenting the GBoS Price Data Collection Software that has been developed by I.T.C. – U.T.G. as well as training sessions for the enumerators, supervisors, and other key resource persons. The workshop was well attended by all stakeholder sectors, including GBoS staff, UTG research team, market traders, enumerators, government representatives, the general public and the private sector. The deliberations highlighted the project's achievements, and the way-forward. The key presenters gave detailed presentations in different areas, and fielded questions from the workshop attendees.

WELCOME AND OPENING - THE PANELLISTS

Statistician General. GBoS

Mr. Momodou Lamin Fadia, Director ITC at GBoS, welcomed the attendees on behalf of the GBoS Statistician General who extended apologies for not being at the opening, due to prior engagements. He introduced the panelists and thanked all attendees for their turnout.

Mr. Fadia explained that this session will be different from the previous workshop, in that the presentations will be held in the morning session, then only the enumerators and supervisors will remain in the afternoon, to start their training on the GBoS Prices App and the equipment to be used (tablets).

Mr. Fadia handed over to the Moderator / Chairman of the meeting to proceed.

Dr. Jain, UTG - Chairman/Moderator

Dr. Jain started by welcoming all attendees and thanked them once again for returning to the second workshop in the series.

Dr. Jain proceeded to allay the general fear from the public and attendees about technology, particularly on jobs.

He also stated that some of the responsibilities of the University (UTG) to society include:

- Teaching
- Research
- And service to the community.

He emphasized that this is a pilot project, which has been well tested and the team is confident that it will work well. He stated that capacity will be developed for new systems, and we should all embrace these developments. He expressed his hopes that the same project can be replicated elsewhere in the sub-region once the rollout is completed.

Dr. Jain reiterate the need to focus more on local application development to solve local ICT needs, as these apps for use by local businesses and institutions can go a long way in alleviating many issues as well as generate fitting solutions.

Mr. Momodou Lamin Fadia - Director of IT, GBoS

Mr. Fadia encouraged the attendees to be more involved in learning, especially with regards to technology and new skills.

He stated that UNECA are the main sponsors of the project. A representative from the commission was supposed to be with us but due to flight delay he will be joining the workshop later.

He explained that GBoS collaborated with ITC-UTG to develop an Anroid Software application to enable mobile price data collection for GBoS consumer and producer price index. He said that all participants will be able to get a physical feel of the tablets that the software will be running on.

Mrs. Loli Jallow - GBoS

Mrs. Jallow thanked attendees, and reiterated the institution's support for this laudable project. She said they will encourage the users to dedicate themselves to learning the anroid app very well, and properly apply their learned skills in their active work roles.

At this point, the microphone was passed around, and all attendees introduced themselves by name, designation and institution represented.

Dr. Jain once again stated his satisfaction with the cross-section of society represented.

He introduced Ms. Asifa, Senior Economist from UNDP, who was also in attendance.

Ms. Asifa - UNDP (Gambia)

Ms. Asifa expressed her gratification to be at the workshop. She congratulated the organizers. She stated that UNDP and GBoS are partners in development, and thus have collaborations. They want GBoS to have cutting edge technology tools to collect, analyze and report on statistical data countrywide.

Mr. Fadia - GBoS

Mr. Fadia acknowledged the presence of two representatives from **World Food Program** (WFP).

Dr. Jain - Chairman/Moderator

Dr. Jain said he appreciates the UNDP's presence and their willingness to sponsor capacity building at all levels. He reiterated the importance of statistics for social planning and policy decisions by government, for example, in education, health, infrastructure, etc.

Mr. Fadia - GBoS

Mr. Fadia said that he has seen the output of the project efforts and can confirm that a good job was done. He stated that The Gambia is far ahead of other West African countries, in the implementation.

The Project Technical Team presented as follows:

	Names	**Roles**	**Presentation**
1.	Sheriffo Ceesay	Focal Person	*Demonstration of the App*
2.	Mbemba Hydara	I.T.C. - Research	*Implementation approach, Methodology, challenges, accomplishments and the way forward.*
3.	Ps Saffiong Kebbeh-	I.T.C. – Research	*Technology and configuration of the platform, including the connecting architecture, security parameters, etc.*

Breakfast Break at 10:00 am

TECHNICAL PRESENTATIONS

PRESENTATION 1: SHERIFFO CEESAY – PROJECT FOCAL POINT, GBOS

Subject: The GBoS Prices App - Demo.

Mr. Ceesay's presentation covered the following:

- Step-by-step demonstration of the GBoS Prices App, showing screens from login to market selection, data entry and storage. The project is sponsored by UNECA
- Key items include:
  - Data is stored on the device using SQLite
  - Synchronizing of data is primarily to an online cloud server, which is in turn replicated to the GBoS hosted servers.
- Demonstration of the web interface

A copy of the presentation is attached as **Appendix 1**

COMMENTS, QUESTIONS AND ANSWERS:

Question: Security and Data Validation.

Using tablets to collect, store and upload information leaves a few security issues to be covered. How secure is the collection, storage and transmission of the data, from prying eyes as well as interception, as well as validation of correct information being handled?

Answer

Appropriate security controls have been embedded into the App, including the back-end and transmission mechanisms.

- User input is inserted- and parameter-validated
- Supervisor also reviews and validates all data.
- Only supervisor can synchronize / upload data.

Question: WFP Rep - Availability of App on Google's Play Store

Is the application available for download from Google's Play Store?

Answer

Not yet. This is still in a pilot stage. The app is only made available to GBoS staff, as it is proprietary. It will not however be made public; only GBoS staff and the enumerators can and should have access to the app to use it.

Question:

What happens if the tablets run out of charge, especially in areas where electricity is still not available? Smart phones use up their batteries quickly, especially while online. In case batteries run out, what will enumerators do? Can data be uploaded using dumb-phones?

Answer

Enumerators are provided with additional charging banks. The systems will normally be capable of operating until charging can be done again, on average at least 24 hours.

The system is not designed to interact with anything else, but GBoS Prices App, so data cannot be sent from a dumb-phone or any other smartphone that does not have the App.

Comment – Mr. Kebbeh

We chose an external cloud server as an initial storage point for security, redundancy and availability at all times. Note that there is live replication between the cloud server and the local GBoS server infrastructure. This means that enumerators can always upload data anytime irrespective of their location even when the GBoS systems are offline. Synchronization can always take effect between the cloud and GBoS servers.

Question: Mrs. Jallow –

Who resolves locked-out users when they are out in the markets?

Answer

The individual supervisors of the enumerators have access rights to resolve locked - out enumerators while in the market. The Supervisors have administrative ID, and one of their functions is user id management. This includes creating users, unlocking blocked users and password management.

Question: Market and item categorization.

How are markets categorized? Also the different items that price data are collected on?

Answer

There are 28 markets country wide. Once the user is in a particular market, he/she can skip to any category of items for data input. The categories are uniform across all markets.

Question:

Mr. Jobe – Director of ICT, Ministry of Information, Communication and Infrastructure (MOICI)

Are the developers of these Anroid App students at the University of The Gambia?

Answer

No, they are members of the school of I.T.C. – U.TG. Research Team and their teaching assisting teams.

PRESENTATION 2: BUBA BOJANG – DEVELOPER (PORTAL SIDE)

Subject: ***The Backend or the Database Portal Side.***

Mr. Bojang's presentation centered on the backend / office systems of the project and included a live demonstration covering:

- Login (based on assigned rights – supervisor or enumerator)
- Dashboard (Managing: editing, adding, deleting etc)
    - Markets
    - Groups
    - Subgroups
    - Products
    - CPI Prices
    - PPI Prices

- Processed reports are posted to the GBoS website for public access/download. These are stored in PDF format for security.

Mr. Bojang's performed a live demonstration of the backend system, thus no presentation material is attached.

COMMENTS, QUESTIONS AND ANSWERS:

Question: Mr. Tunkara – WFP: Security and Data Validation.

The Word Food Program (WFP) has been collecting data using cellular phones. This system being demonstrated is quite interesting. Is there any verification or validation of the location of the enumerator in relation to where he/she should be?

Answer - Mr. Ceesay

GPS locations are stored as meta-data along with all information collected and stored. The App does not permit any access and data entry unless the GPS service of the tablet is turned on.

Question: Mr. Tunkara – WFP: Security and Data Validation.

If data is entered while in one market location, can the user then login later while in another location and edit the data? This can have some undesirable effects.

Answer - Mr. Ceesay

Supervisors and enumerators work together, but only a supervisor can edit data that was already saved, and synchronize to the server.

Question: Mrs. Jallow – GBoS: Syncing.

Can a supervisor synchronize incomplete data?

Answer - Mr. Ceesay

No. The data has to be complete before the data is synced.

Comment: Mr. Tunkara - WFP

Mr. Tunkara reiterated his opinion that automatic syncing to the servers is better.

Comment - Mr. Fadia - GBoS

The gentleman's opinion is well noted and will be discussed in-depth for possible inclusion.

Question: Mr. Jallow

What happens when partial data is entered and the application freezes, as common with electronic devices? Is there any data loss?

Answer

No. Data that is entered is immediately saved in tablet locally. It is not removed from the tablet unless fully synchronized. Also, the project is not doing away with the paper surveys yet. These will run in parallel before the paper is phased out after the electronic versions are fully successful and established.

Question: Mr. Jallow

If data is collected in one location and then the enumerator moves to another location and enters more data, which coordinates are synced for that market?

Answer

Anytime data is entered, the coordinates for that record are stored. Multiple locations for data from one market will result in the data being flagged for verification.

Question: Modou Njie - Security

Are passwords saved on the device for automatic access, like some Android apps like Facebook etc? Is there automatic logout after a set time?

Answer

The system will log you out only when you select "LOGOUT". The enumerators and supervisors will be trained to ensure that they logout after every session.

PRESENTATION 3: MBEMBA HYDARA - RESEARCH

Subject: ***Project Approach, Accomplishments, Challenges and the Way Forward.***

Mr. Hydara's presentation updated the Workshop with the following:

- Approach:
  - Project Initiation - Completed
  - Project Planning - Completed
  - Project Execution - In progress
  - Project Closure - Pending

He also ran a brief comparison to the stages of development in other regional groups, showing that Gambia was ahead of the other territories.

He reassured the Workshop that they the team reviewed all challenges and came up with the best possible solution.

A copy of the presentation is attached as **Appendix 2**

COMMENTS, QUESTIONS AND ANSWERS:

Comment: Mr. Jobe – Ministry of Information, Communications and Infrastructure (MOICI).

Mr. Jobe commended the presenter and those before him, on the brilliance of the product, albeit in pilot stages still.

There are similar technology pilot projects in the country such as The Gambia e-Government and e-Commerce projects that are UN supported. These are very laudable Gambian initiatives. It is worth mentioning that the nation's ICT infrastructure is well developed, and final touches are being made to bring the benefits to all end users.

There is even an initiative which is in progress, to institute a national Data-Center to provide cloud facility for Gambians. It is high time Gambians are encouraged to delve into providing local solutions such as software development and solutions such as the one being discussed at this Workshop.

Comment: Mr. Sheriff Bojang Honorable Minister of Information, Communications & Infrastructure

The Minister asserted that he is very impressed with the exercise and the presentations. He informed the Workshop that he has just been called for other engagements and begs to leave. He encouraged to continuation of these laudable efforts and appreciated the time.

Comment: Mrs. Asifa – Senior Economist UNDP

Mrs. Asifa also expressed her regrets and informed the Workshop that she has another engagement and needs to leave. She thanked the meeting for accommodating everyone and encouraged the workshop to continue to exert efforts for success.

Comment: Abba Sankareh – Director of Planning, Ministry of Agriculture

Mr. Sankareh thanked the presenters for the information imparted to the Workshop attendees. The West African Producer Project (WAPP) has an online farmer registration component. The enumerators are very well trained but are always having problems with the systems. He encouraged the trainers to ensure the proper skills are imparted as well as the importance of completeness and accuracy.

He expressed his pride that this is a locally owned project. Previous projects were always outsourced to external consultants, and we always end up with severe problems or failure after launch.

Comment: Dr. Jain – Chairman / Moderator

It is good to note the local advantage over external/foreign products. All enumerators, designers, supervisors, technical support, developers etc., will be local. Mr. Sankareh thanked the presenters for the information imparted to the Workshop attendees.

PRESENTATION 4: PA SAFFIONG KEBBEH

Subject: ***Technology Platform and Configuration.***

Mr. Kebbeh, the project's Research Consultant presented on the following:

- Platform – Android Operating System:
    - Chosen after thorough research, discussions and evaluation of foreign experience in other regions.
    - He gave a genesis of the Android OS, features and uses.

A copy of the presentation is attached as **Appendix 3**

COMMENTS, QUESTIONS AND ANSWERS:

Comment: Dr. Jain – Chairman / Moderator

Dr. Jain thanked Mr. Kebbeh for his presentation. He said he is sure that within one year, the connectivity worries and issues that bother internet users in the country would be a thing of the past.

Concern: Mr. Mustapha Conteh – Department. of Population Affairs (UNFPA)

Mr. Conteh expressed his appreciation for this great initiative. He said his main concern is viruses and malware. He has not heard any discussion about malware protection, as users may proceed to download and install software that may open the systems up for hijacking or corrupting the data collected and transmitted.

Answer: Mr. Kebbeh

Mr. Kebbeh reassured the meeting that the point is well noted. Despite not seeing an antivirus package installed, the embedded architecture of the software is very secure. The tablets will only be used for data collection and transmission, thus strengthening the resolve against malware infections.

Concern: Yaya Jallow – Participant

The chain of data handling is: Input and storage at Device > Upload to Cloud > Sync to GBoS server. What security measures are in place? Who determines who can access the data during and after transmission, as well as at GBoS?

Answer: Mr. Kebbeh

GBoS has a network policy which completely excludes access to everyone, unless he/she is explicitly granted permission to access a resource. This means that without unequivocal network permission (which is given in levels), a user will NOT be able to access any statistical data or other information.

Question: Mrs. Jallow - GBoS

Can we have a way to confirm that the data which has already been verified and validated by a supervisor is ok and not tinkered with?

Answer: Mr. Kebbeh

The supervisor, once he / she validates the data and transmits it, cannot do anything else to the data. Once this arrives at the GBoS servers, another validation is done before the information is appended to the database and analysis performed. At the level beyond the supervisor transmission, only Systems Administrators of the backend have access to the database and any changes would be recorded through an audit/change log.

Question: Karen – Banjul City Council

Karen expressed concern that she has not heard anything being said about the Area Councils, and what roles they play in this project. Will they be able to access the data?

Answer: Mr. Kebbeh

Mr. Kebbeh responded, stating that once the analysis is completed, the public consumable reports will be posted on the GBoS website. Only these reports will be accessible. Perhaps the Area Councils would need the output in order to calculate local rates and tax filings, Licensing and duty payments etc. They may also look at the model, and if required, a similar system can be developed for their own data collection as relevant to their exclusive operations.

Concern: Ebrima Bah - Participant

Mr. Bah expressed his happiness that we have a vibrant, young skill set available for local technology production. His concern is about cost for many departments or institutions.

Answer: Mr. Kebbeh

Mr. Kebbeh explained that the research, determination of need and identifying a solution is always the most expensive portion of such projects. Storage and infrastructure could also be a bit expensive, depending on the scale of deployment required. The institution must strike a balance between internal infrastructure solutions, and outsourcing.

APPENDIX I - PRESENTATION BY SHERIFFO CEESAY

THE GAMBIA DEMONSTRATION OF THE DEVELOPED TECHONOLOGY

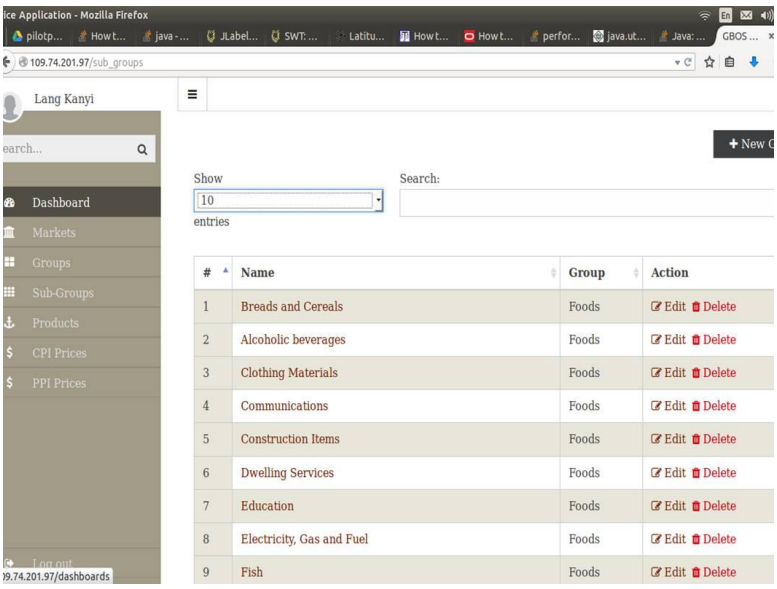
DATE: 2/03/15
Baobab Resort
Focal Point GBoS: Sheriffo Ceesay

Storage : Cloud and

Architecture of Data Collection App

Architecture of

Part 1 : Collection
Part 2 : Storage a



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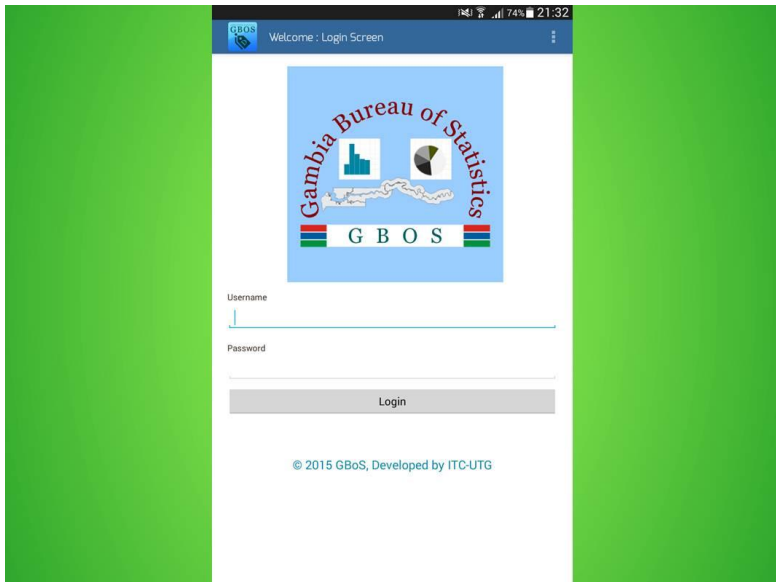
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© 2015 GBoS, Developed by ITC-UTG


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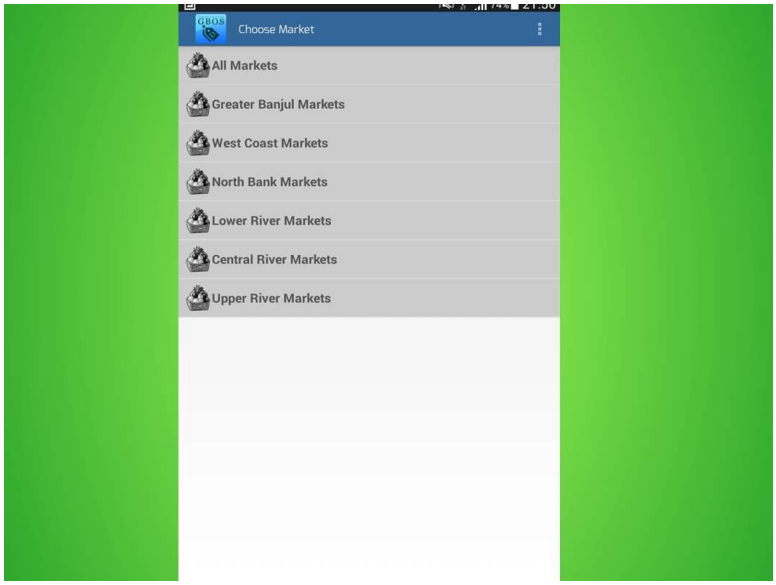
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West Coast Markets
North Bank Markets
Lower River Markets
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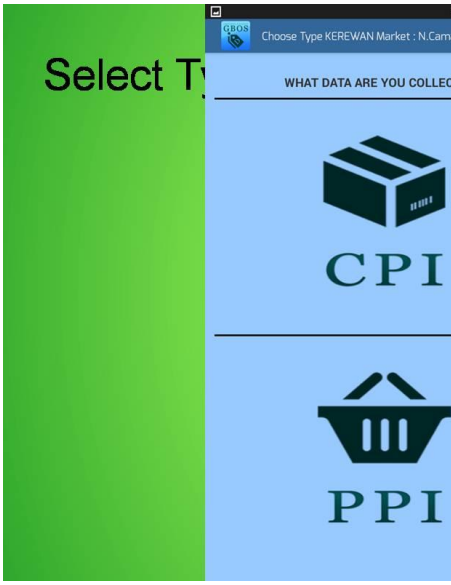
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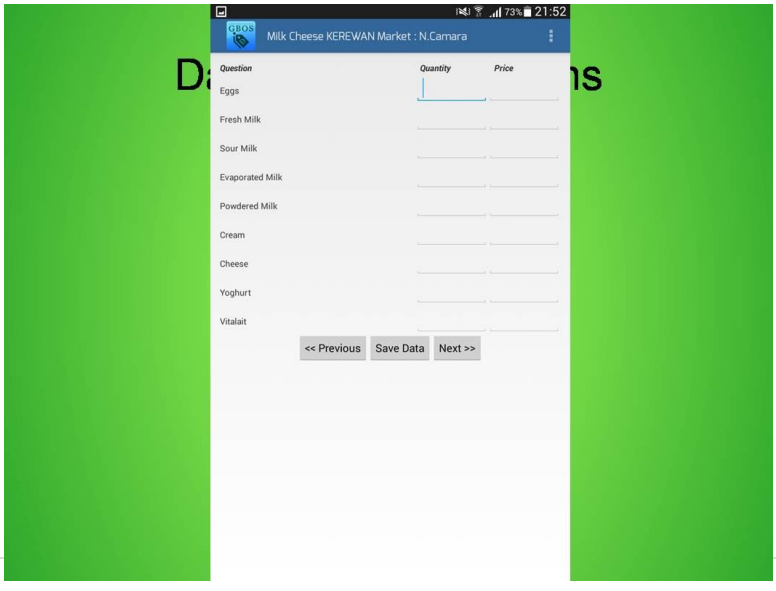
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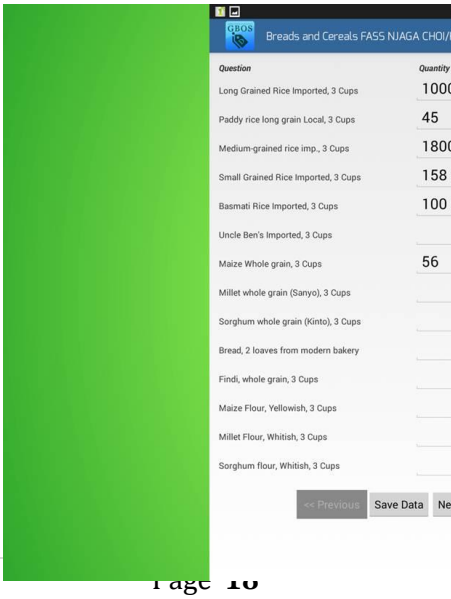
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Sorghum whole grain (Kinto), 3 Cups
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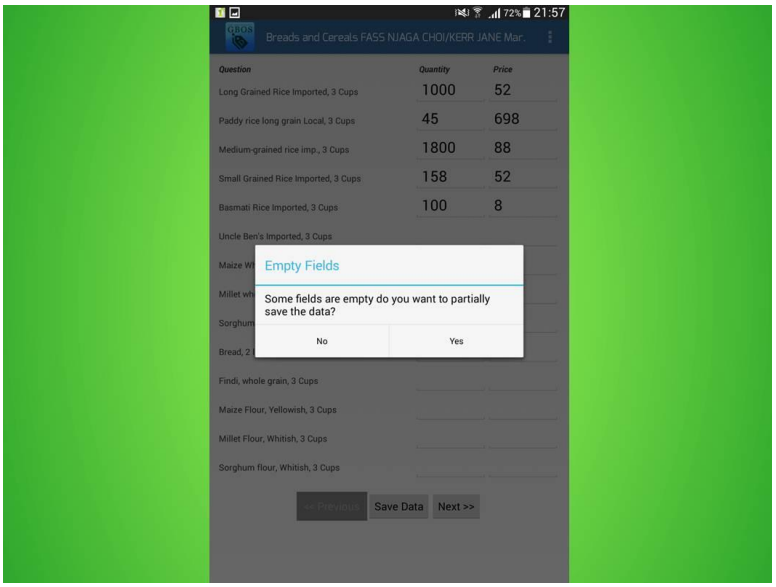
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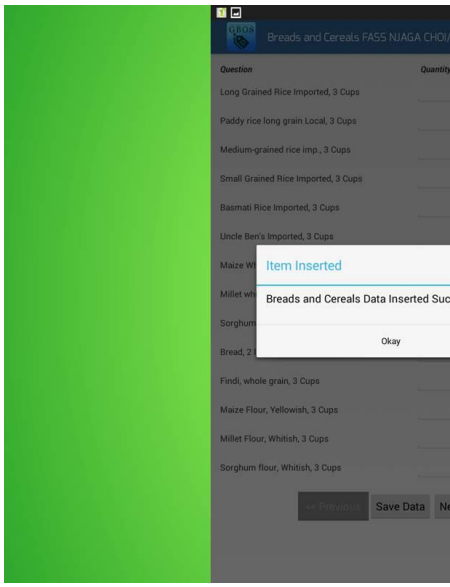
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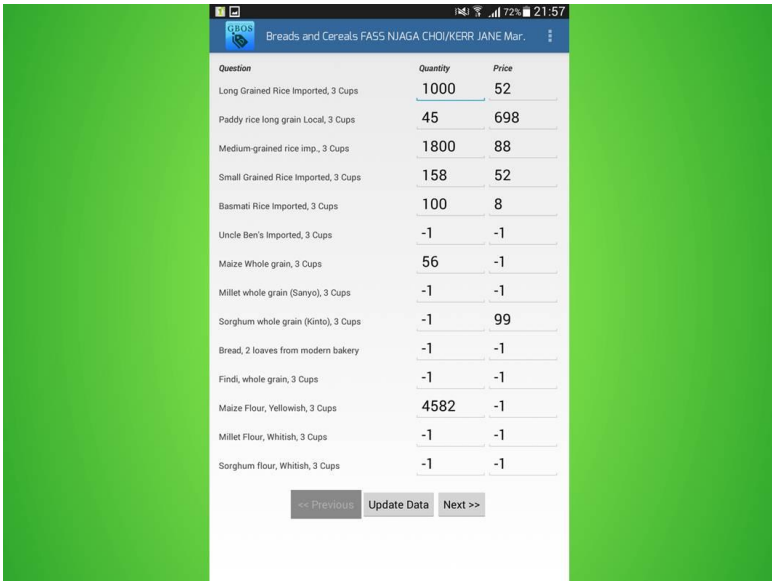
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Small Grained Rice Imported, 3 Cups 158 52
Basmati Rice Imported, 3 Cups 100 8
Uncle Ben's Imported, 3 Cups -1 -1
Maize Whole grain, 3 Cups 56 -1
Millet whole grain (Sanyo), 3 Cups -1 -1
Sorghum whole grain (Kinto), 3 Cups -1 99
Bread, 2 loaves from modern bakery -1 -1
Findi, whole grain, 3 Cups -1 -1
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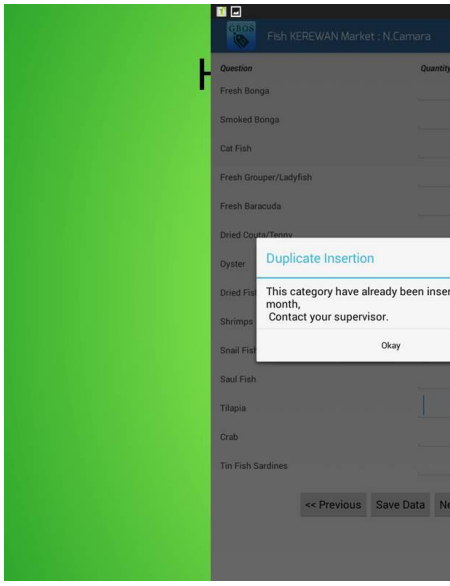
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Fresh Baracuda
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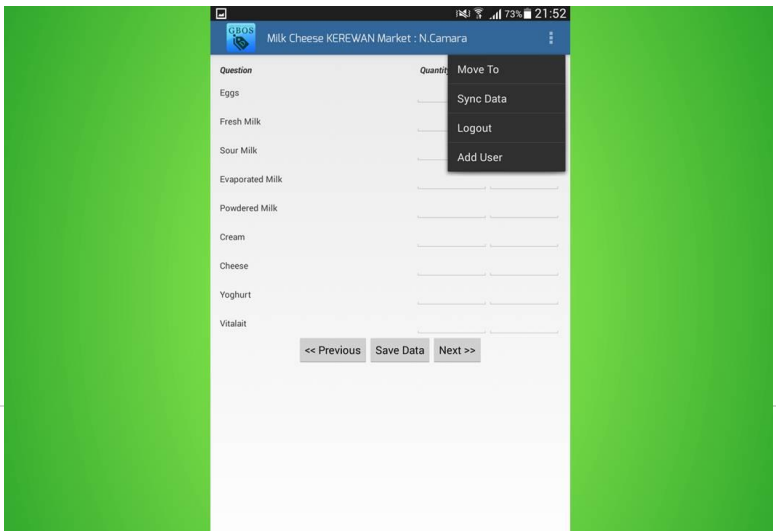
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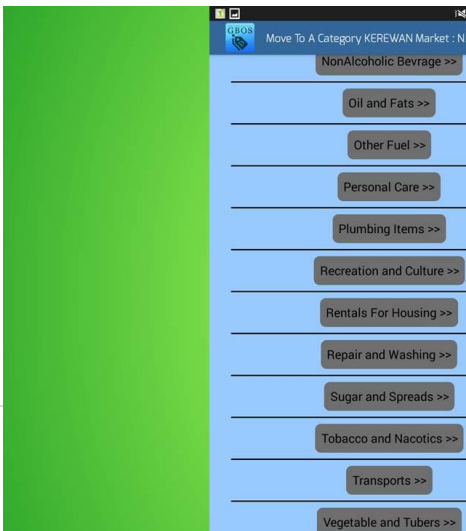
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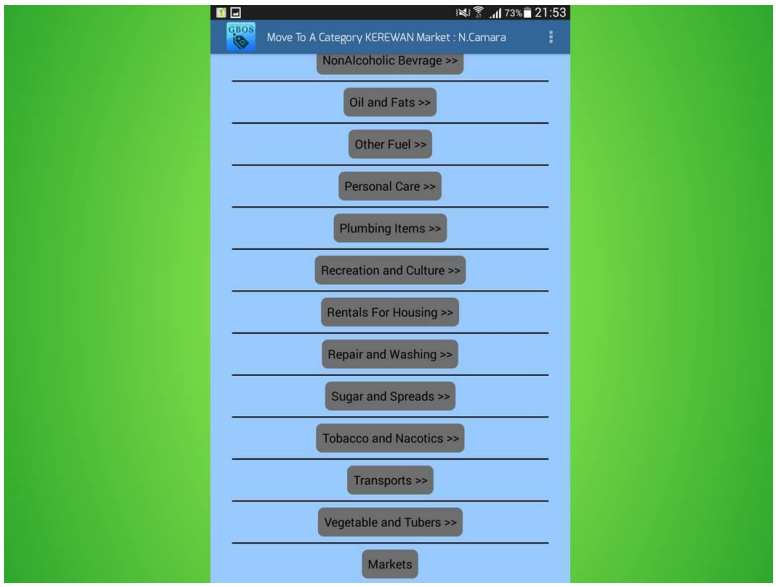
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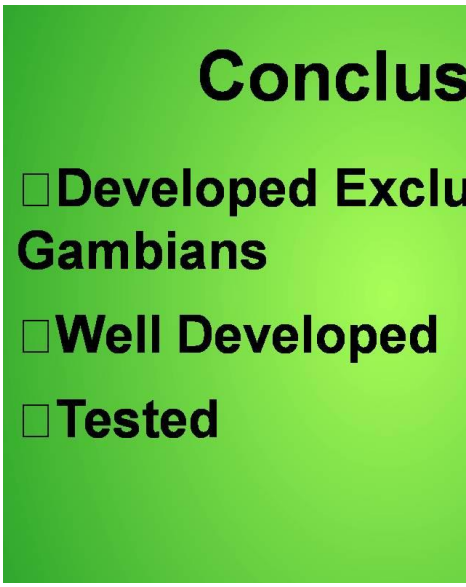
Move To A Category KEREWAN Market : N.Camara
NonAlcoholic Bevrage >>
Oil and Fats >>
Other Fuel >>
Personal Care >>
Plumbing Items >>
Recreation and Culture >>
Rentals For Housing >>
Repair and Washing >>
Sugar and Spreads >>
Tobacco and Nacotics >>
Transports >>
Vegetable and Tubers >>
Markets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APPENDIX II: PRESENTATION BY MBEMBA HYDARA

Pilot Project on the use of Mobile Technology for data Collection in The Gambia

Presentation
by
Mr. Mbemba Hydara
Project Research Analyst

Introduction

- **Project Approach**
- **Accomplishments**
- **Challenges**
- **Way Forward**

Project Objectives

- Improve the capacity of National Statistic Bureau (GBoS)
- Utilize developed mobile data collection software application to generate quality and reliable data.
- Document experiences of enumerators on consumer (CPI) and producer (PPI) price data collection for statistical production.
- Determine the suitability of such data for the compilation of price and production statistics;

Literature Review
Africa Experience on mobile Technology use for Data

Country	Activity	Technology	Outcome
Cape Verde	Population and Housing Census (PHC)	Personal data Assistants (PDAs)	successful
Malawi	Household Surveys	Personal data Assistants (PDAs)	Successful
Sao tome and Principe	Population and Housing Census (PHC)	Personal data Assistants (PDAs)	Successful
Senegal	Census	Personal data Assistants (PDAs)	Work in progress
Kenya	Monitoring MDG's Achievements	Software Application	Successful

Project Approach

Systematic Development Approach

Project Approach

Phase	Gates	Status
Project Initiation	Phase # 1	Completed
Project Planning	Phase 2	Completed
Project Execution	Phase 3	In Progress
Project Closure	Phase 4	Pending

Systematic Approach

- Concept
- Feasibility Analysis
- Design
- Implementation
- Testing
- Deployment
- Maintenance

Detail Approach

- Project scoping, options, and technology
- Data generation and Analysis
- Detailed design and planning
- Development and Documentation
- Configuration and Testing
- Deployment - Field testing
- Project Closure

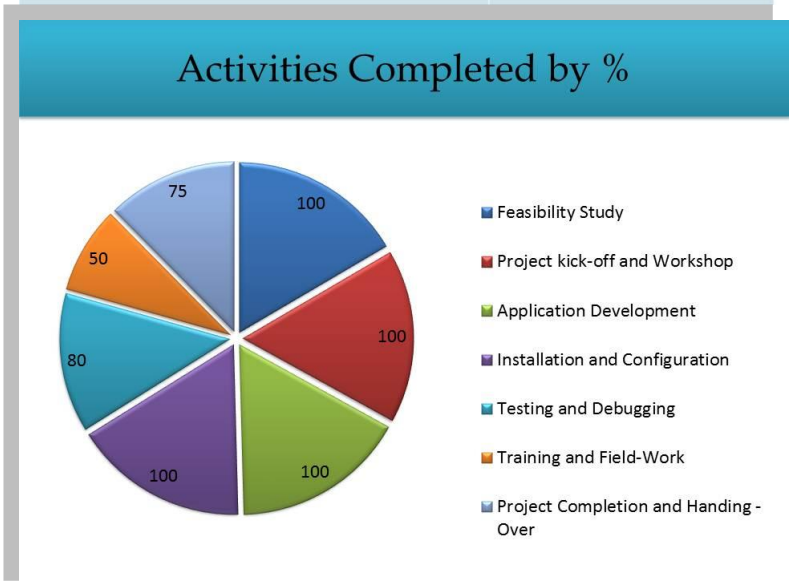
Survey on the Gambia Experience

Organisation	Activity	Technology	Challenges
Catholic Relieve Service (CRS)	Bed Net Distribution exercise	Android on Apple Platform	Electricity
NaNa and Health Ministry Gambia	Health impact baseline survey	Android	Network down time
World Food Programme (WFP)	Protracted Relieve and Recovery operation assessment	Device PDA	Network downtime and Electricity
Agriculture Planning and other Agencies	Online Farmer registration	RIG Mobile Phones	Network connectivity

Key Accomplishments to date

- Study on the feasibility of project completed
- Project kick-off workshop completed
- Software application developed within timeline
- Installation and configuration of hard and software completed
- Testing of developed Application completed
- Issues escalated successfully fixed
- Fieldwork to test application live into the markets due

Activity	Status (%)
Feasibility Study	Completed 100%
Project kick-off workshop	Completed 100%
Application Development	Completed 100%
Installation and Configuration	Completed 100%
Testing and Debugging	Completed 80%
National Training workshop and Field work Due	Completed 50%
Project completion and Handing-over	Completed 75%



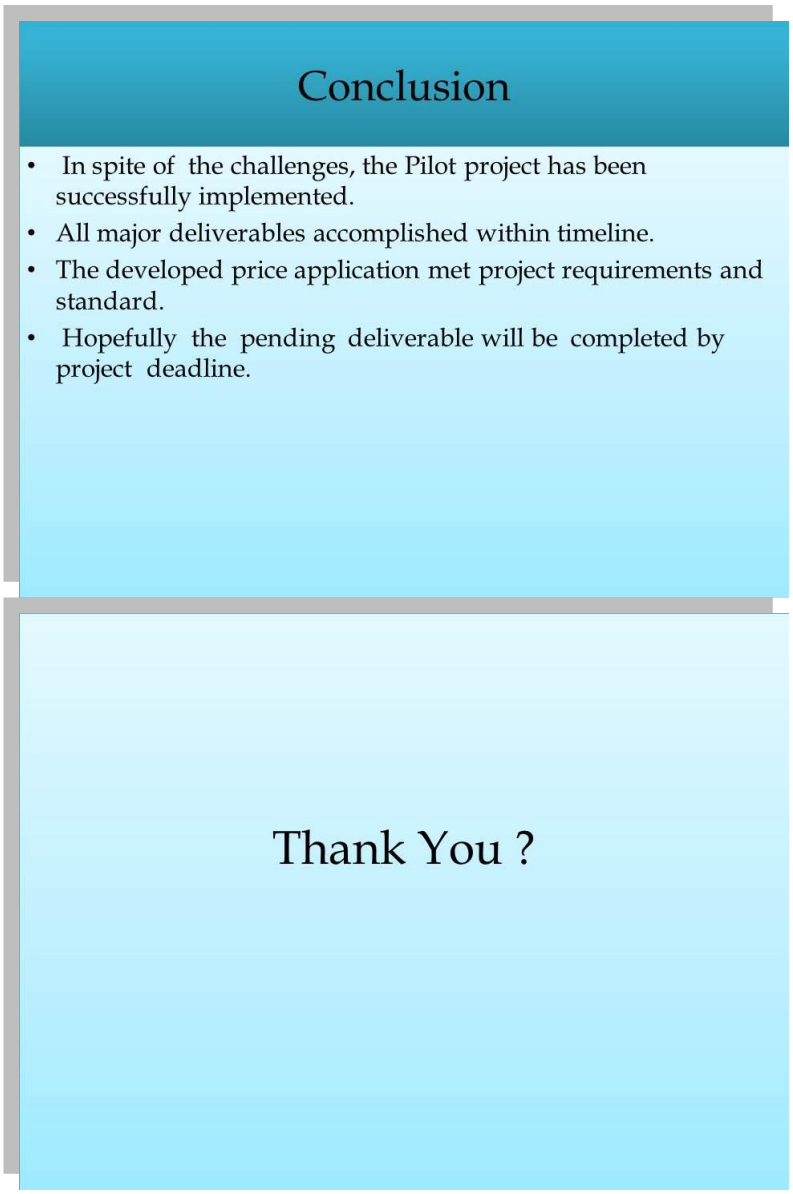
Challenges

- Due to limited time and budget the following s are the challenges;
  - Timely mobilisation of required resources
  - Scope of work more than expected
  - Completing functional testing of developed Application within the timeline
  - Managing operational risks

Way Forward

- We therefore provide recommendations on solutions for any future work. These includes,
- Recommended Strategies for enhanced connectivity
- Robust security and disaster recovery
- Scalability for the developed application

Details will be covered on the Technology part of the next Presentation



APPENDIX III: PRESENTATION BY PA SAFFIONG KEBBEH

Pilot Project on the use of Mobile Technologies for Statistical Data Collection in The Gambia

The Technology Platform & Configuration

Pa Saffiong Kebbeh

Research Consultant

INTRODUCTION

WHAT IS ANDROID?

- A Software platform and operating system for mobile.
- Based on the Linux kernel.
- Android was found way back in 2003.
- It was developed in Palo Alto, California.
- Android was developed by the Andy Rubin, Rich Miner, Nick Sears and Chris White.
- Android was purchased by GOOGLE in AUGUST,2005 for 50 million $. & incorporated in 2005

Introduction Cont.

- Anroid is a software cluster for mobile devices that includes an operating system OS, key application and middleware.
- About the design, the kernel of Anroid is based on Linux kernel and further enhanced by Google

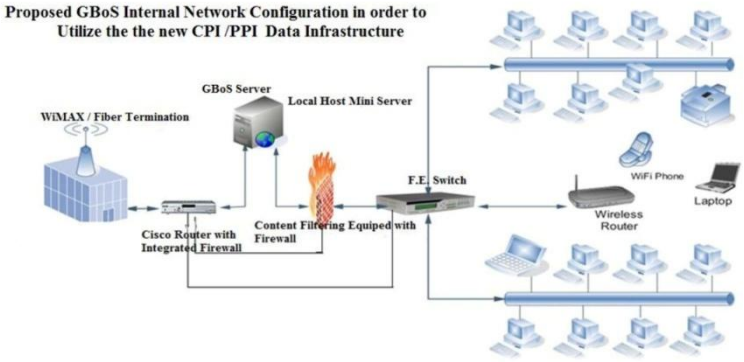
Platform

- Anroid is not a single piece of hardware, it's a complete end – to - end software platform that can be adapted to work on any number or hardware configuration.
- Everything is there, from the boot loader all the way to the application.

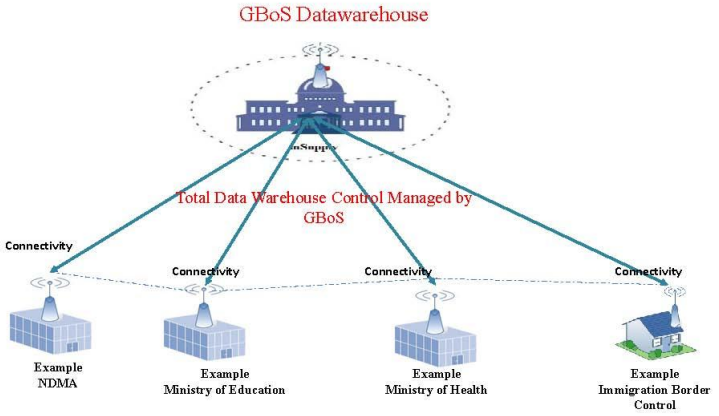
THE APPLICATION

- The application supports wireless communication using:-
  - 3G Networks
  - 4G Networks
  - 802.11 Wi-Fi Networks
  - Bluetooth Connectivity
- Android is a multi-process system, in which each application (and parts of the system) runs in its own process.

Proposed GBoS Data Infrastructure Setup



Possible Future Extension of Mobile Data Collection for other Sectors



Critical Functions Considered in Deploying the APP / Data Infrastructure

- Authentication – validates that the data was sent from the sender.
- Access control – limiting unauthorized users from accessing the network.
- Confidentiality – preventing the data to be read or copied as the data is being transported.
- Data Integrity – ensuring that the data has not been altered

Quality of Service

- We guarantee that the application we developed will provide facilities to monitor, control data collection errors with minimum impact to the quality of your services
- The system we deployed is of high capacity and fault-tolerant, and will have efficient management functions that can deliver quality service for the purpose inteded.
- Your application is designed for 99.99% availability and a grade of service (GOS) of 99%.
- We plan to provide the most reliable and efficient network solution for the application by minimizing outages due to either equipment failures or unavailability of network resources.

Thank You