NATIONAL ELECTRONIC HEALTH INFORMATION MANAGEMENT SYSTEM (eHMIS) USER ACCEPTANCE TESTING REPORT

NTUNGAMO DISTRICT

21ST JANUARY – 1ST FEBRUARY 2019

FEBRUARY 2019

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LIST OF ACRONYMS

CAO-Chief Administrative Officer

CHEWS-Community Health Extension Workers DHT-District Health Teams

DHIS-Digital Health Information System

DHI-Division of Health Information

DHO-District Health Officer

DQA-Data Quality Assessment

HMU-Health Monitoring Unit

HMIS-Health Management Information System

mTrac-Mobile Tracking

MoH-Ministry of Health

SMS- Short Message Service

UAT-User Acceptance Testing

UNICEF-United Nations Children's Fund

UPDF-Uganda People's Defence Forces

WHO-World Health Organisation

CONTRIBUTIONS AND ACKNOWLEDGEMENTS

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2 INTRODUCTION

The Ministry of Health-Division of Health Information with support from Partners, revised the national HMIS data collection and reporting tools. In this exercise, HMIS 033b is among the tools that were modified to help cope with the ever-increasing data needs among others. HMIS 033b is an epidemiological weekly surveillance tool used to report diseases of public health importance among others. With help of technology, efforts were made in 2011 and HMIS 033b was turned into an electronic tool; that is to say mTrac. mTrac leverages rapid Short Message Service (SMS) to enable records assistants / health information assistants at health center levels to submit weekly surveillance data collected using HMIS form 033B from the facilities to the district and finally to the national level which is made possible through the mTrac-DHIS2 integration. The revision of HMIS 033b together with earlier challenges identified with mTrac among other factors, necessitated a need to upgrade both the software and hardware for mTrac. This upgrade has given birth to mTracPro, a solution aimed to; 1) be robust, efficient, effective and responsive to cope with the growing data demands, 2) reflect the changes in the primary data source document into the new system, 3) address the challenges that were associated with mTrac among other reasons.

2.1 BACKGROUND

Following the upgrade of mTrac to mTracPro, there existed justification for the need to conduct a user acceptance testing (UAT) of this new system before its national roll-out. User acceptance testing is a formal process conducted prior to system rollout aimed at testing the system with respect to; user needs, requirements and business processes in order to determine whether a system satisfies user' needs or not.

This submission reports the proceedings from the mTracPro user acceptance testing and DHIS2 integration activity conducted in Ntungamo district between 21st January – 1st February, 2019. The activity aimed at assessing user acceptance of mTracPro in a real working environment. It attracted a multitude of stakeholders including Ntungamo district local leaders (LCV District Chairman, Resident District Commissioner, Chief Administrative Officer), Ntungamo district health team (District Health Officer, District Biostatistician, Health Programs focal persons), facility incharges, biostatisticians from Ntungamo and other districts, health facility staff including enrolled nurses, nursing assistants, midwives, laboratory technicians, facility store managers, facility records officers / health information

assistants, the ministry of health, private sector, implementing partners, development partners, academia, medical bureaus and the mTrac developers (Good Citizen).

Throughout the activity, all the four (4) components of mTracPro were assessed and these included; -

The anonymous hotline (8200): This is the mTrac component that is available to users at all levels of health service delivery for purposes of reporting any health-related issues to the relevant authorities especially government by sending an anonymous message to 8200.

The SMS component (6767): This is a component available to users at health facility level using SMS in a prescribed format to send weekly surveillance reports to the 6767-short code.

The mTracProApp component: This is an android application where all the weekly surveillance reports are rendered for filling and submission at health facility level.

The dashboard component: This is a component available to users at district level. It serves many purposes including rendering of reports to biostatisticians for approval, management of users (addition, deactivation and user transfers between facilities) as well as monitoring of timeliness, accuracy and completeness of reporting.

3 OBJECTIVES OF THE USER ACCEPTANCE TESTING ACTIVITY

The major goal for conducting this activity in Ntungamo district by Ministry of Health was to evaluate user acceptance of mTracPro.

3.1 THE SPECIFIC OBJECTIVES INCLUDED;

1) To test mTracPro functionalities and the mTracPro integration with DHIS2 in a real working environment.
2) To evaluate whether the system meets the weekly reporting needs.
3) To further document mTracPro workflows and user requirements prior to national rollout.
4) To present the findings of user acceptance testing exercise to relevant stakeholders for next course of action.

4 PROCEEDINGS OF THE FIRST DAY OF THE UAT ACTIVITY

The activity started with a three-day town hall meeting with the overall goal of introducing mTracPro to the users who were the to-be testers and training the users about the new system. The meetings commenced on 21st January 2019 through to 23rd of January 2019.

On each day, different objectives were set. These objectives were in line with the main and specific objectives of the activity and various activities were done to ensure attainment of these objectives.

4.1 OBJECTIVES OF FIRST DAY OF THE UAT ACTIVITY

The objectives of the 1st day of the meetings were as follows; -

1) To understand the objectives and genesis of user acceptance testing of mTrac.

2) To appreciate mTrac capabilities in heath data reporting

3) To appreciate how different stake-holders make use of mTrac data.

4) To register any emerging concerns regarding mTrac and DHIS2

5) To address the registered concerns regarding mTrac and DHIS2

4.2 ACTIVITIES OF FIRST DAY OF THE UAT ACTIVITY

4.2.1 Opening remarks from the Ntungamo District Biostatistician

On behalf of the chair of the Ntungamo district health team, Mr Robert, the Ntungamo district biostatistician welcomed all attendees of the meeting and thanked them for making time for the activity. He thanked the Ntungamo district government for the organization and for hosting this activity. He noted that Ntungamo is a border district and hence surveillance is paramount. He thanked the Ministry of Health for efforts extended towards capacity building and encouraged team work among the District Health Teams (DHT) and the health teams at the various health facilities during this activity and beyond.

4.2.2 Remarks from Ministry of Health representative

On behalf of the Ministry of Health, Carol Kyozira, the Ag assistant commissioner, DHI welcomed all the attendees of the meeting and thanked them for making time for this activity. She also thanked the Ntungamo district local government for hosting the activity. She further acknowledged that the meeting started late but hoped that time keeping the next day will be

observed. She appreciated the teams that have been involved in the preparation of this activity since the previous year, especially, Mr. Jamiru Mpiima from MoH-DHI, UNICEF for funding the activity, the district biostatistician and all the technical teams that were involved in the preparation. She noted that in regards to HMIS, MoH works with all stakeholders offering health services in Uganda and welcomed Uganda Cares to the team of stakeholders that are supporting HMIS. She also appreciated the health workers because they do generate the data and submit it. She therefore encouraged them to maintain consistency and good quality of data that is reported. However, considering the sensitivity of health data reported through mTrac, she considers carrying out a data quality assessment (DQA) to ascertain its quality. She therefore called on funding partners to give a hand when the ideal time for this exercise comes. She encouraged reporters using mTrac, to always report whether there are any cases or not because MoH is supposed to be informed through the various systems and reports. She stressed the difference between monthly reports and weekly reports and emphasized that they both serve different purposes and therefore should both be filled. She added that there are reasons for variations in durations of reporting and that should be taken seriously. She further added that stakeholders in health need to be vigilant. She reiterated the objectives of the activity and concluded by stressing the importance of health data in the running of the health sector.

4.2.3   Remarks from the Chief Administrative Officer (CAO) Ntungamo district

The deputy CAO, Mr. Ahimbisibwe Leanard, representing the CAO who is on leave thanked the district health team for organizing this activity, MoH for the support as well as development partners especially UNICEF for funding this particular activity. He said that the district pledged to invest in health service delivery and reiterated the district's commitment to this cause. He thanked all the technical officers in the district and thanked all the health workers for extending health services to the populace. He emphasized the objective of this activity and acknowledged that health service delivery can only be better if there is available data. He asked those present to pay attention during the activity.

4.2.4   Remarks from the Ntungamo District Chairperson

The district chairperson, Singahakye David welcomed the attendees to the meeting. He thanked organizers and participants for offering their time. He reiterated the goal of the healthcare system which is giving good health services to the populace and thanked MoH for the improved mTracPro and the fact that it is being piloted in Ntungamo district. He thanked development partners for funding health activities.

He thanked the health workers present for restoring life to God's people. He recognized the importance of data as the basis of health service delivery and the fact that it supports disease prevention. He implored the attendees to use the workshop as a cornerstone for planning and improving health service delivery and concluded by declaring the meeting open.

4.3 PRESENTATION ON mTRAC

Mr. Emmanuel Arinaitwe - Biostatistician from the Ministry of Health made a presentation on mTrac in order for all the participants in attendance to appreciate the capabilities of mTrac in health data reporting and surveillance. He started off by clearly defining what mTrac is to the attendees after which he communicated the importance of mTrac in health systems strengthening. Some of the purposes communicated included the following;

- Facilitating timely reporting of key indicators. Reporting is done weekly every Monday before midday.
- Enhancing national medicines monitoring and availability.
- Generating community action for accountability.
- Disease surveillance notifications and alerts.

Some of the benefits of mTrac as shared by Mr. Emmanuel included; -

- It is quick i.e information quickly moves from the facility level to the national level.
- It is user friendly-A health worker uses his/her own phone and the SMS functionality that they are familiar with.
- It enables health workers to send messages to the DHT and vice versa.
- It facilitates rapid response to the medicine stock-outs and enables drug redistribution.
- It encourages accountability in management of medicines, good record keeping, and time management.
- It facilitates good resource allocation.
- It eliminates the cost of transporting the weekly report from one level of healthcare service delivery to another. There is no cost attached to any SMS report sent.
- It makes the list of health workers visible at the various levels of healthcare delivery for as long as they are registered in the system.

He also shared the messaging codes used in mTrac. These included 6767 for weekly surveillance in addition to 8200, which is the anonymous hotline. He went on to mention the users of mTrac who included community, VHTs, local council leaders, health center staff and others, District Health Team, national level decision makers, planners, implementing partners, Ministry of Health and other stakeholders at national level. Additionally, key data streams such as Formal Health Sector data-surveillance data on cases and deaths, stock status, MCH indicators, anonymous SMS hotline both at village level and the community of Social Monitors-U report in addition to tools required to run mTrac such as the HMIS report 033B, a phone, and database were discussed. He also gave the attendees tips on filling the report. Some of them included; -

- Ensuring that the reports are sent every Monday by midday.
- The reporting follows the calendar week; for example, in week 4, week 3 data is reported.
- The difference between codes and numbers was emphasized. 044 is a code and 44 is a number.
- Reporters were encouraged to strictly use numbers to report on the various indicators and use the given codes for the particular diseases. E.g. MAL for malaria.
- If there are no cases, reporters were advised not to use zeros to avoid making errors in the messages. Snapshots were used to show how data sent from the HIA's phone is viewed from the system interface at the district.

He concluded by discussing the different levels of mTrac use including the national, district, health center and community levels with the meeting attendees.

4.3.1 mTrac Live Demo

Mr. Senkandwa Herman, a Biostatistician from Ssembabule district led the attendees through an mTrac demo where he demonstrated the different features of the mTrac dashboard including registration on mTrac, viewing of facilities, approving of reports, campaigns, anonymous messages, direct reports entry into mTrac and transfer of health workers which necessitate reallocation of facilities to individual health workers by the district biostatisticians. He concluded by leaving the attendees with a few points to note regarding mTrac. These included the following; -

- Every key player needs to take their roles seriously and thus need to be registered on mTrac.

- Data is integrated in DHIS2 at midnight every day.
- Whenever approval is being done, biostatisticians should ensure specific feedback to the facilities.
- Data quality in mTrac is affected by the source and therefore the source document ought to be clearly known to all entrants.
- Self-registration using 'JOIN 'to 6767 and deactivating one's account by sending "QUIT "to 6767 are both currently disabled.

4.3.2 Question and Answer Session

After the mTrac presentation and live demo, meeting attendees were given an opportunity to ask any questions that might have arisen in the course of the two activities. These are expressed in the table below; -

Table 1: Question and Answer Session

Question	Answer
Is the biostatistician responsible for the quality of data reported through mTrac?	The responsibility for the health data through mTrac lies with the in-charge at the health facility during verification before signing off.
What is the role of the DHO before approval?	The DHO has no role in data reporting before approval. This mandate was handed to the biostatistician by the DHO. After the reports have been sent, the biostatistician needs to present a snapshot of the weekly reports from all the facility reports to the DHO. **PS:** Roles of each player have to be accurately streamlined such that one player does not waste time doing another's work and ignoring theirs.
Design-related: In the armed forces (UPDF, POLICE, ARMY) there was a discussion regarding utilization of mTrac to improve reporting rates. Request to have an account for supervisory purposes for facilities under	Data goes through mTrac to DHIS2 and monitoring can be done from DHIS2. Need for viewing rights to the armed forces personnel to monitor but not edit.

armed forces before the information gets to DHIS2. Biostats are afraid of introducing interaction with armed forces, so if armed forces would be able to monitor and get in touch with the biostatistician	
Suggestion to introduce a secondary code to have the data first be sent to a supervisor /in-charge before it gets to the district.	In-charges need to verify the reports (hardcopy) before it is sent and that require in-charges to perform their role.
	The register is well designed and for someone to have malaria, you have to first suspect before confirming using a relevant test e.g RDT. In other words, a suspected malaria case to report should include those that have fever i.e those that have been suspected. Fever is the recognized symptom for suspicion of malaria. The suspected and the confirmed shouldn't be mixed up. When there are uncertainties in what is to be reported, it raises questions on the quality of data reported through mTrac. An appeal was made by Ass. Comm. to the development partners to support mTrac DQA before national rollout. Because how can a yellow fever case be identified at HCIII?...this really brought us down! Partners should not do any activities on behalf of MoH without MoH acknowledgement because they distort the valid messages and cause confusion. People should desist from doing HMIS training without the Ministry's knowledge.

Why most of the times, feedback is insufficient: e.g, sent 8 messages and get 4 feedbacks.	Monday is a busy day with 99% of the system being used. This is caused because of heavy traffic. Need to confirm with the biostatisticians to find out if the report was received or not.
Registered, can send weekly report but cannot send option B+ messages	There could be an issue with this particular account: Advised to reach out to biostatisticians and if cannot solve, escalate to MoH.
Programs have been piloted in Ntungamo district e.g program that involved VHTs where they were given phones but ended abruptly: Sustainability?	ehealth Technical working group in place to co-ordinate ehealth investments within the health sector. All the pilots have to be made visible by going through the MoH. No project is supposed to be piloted without express permission from the MoH. There are governance structures that have to be followed. Any pilots have to have a letter from MoH. mTrac is not a pilot. We are simply moving from level 1 to level 2 in order to serve the data needs of the populace and the health sector. Following revision of the HMIS tools, there is need to harmonize them with the ehealth national HMIS ie mTrac and DHIS2.
Can there be an application for performance report of a facility for in-charges?	This has been taken care of in mTracPro. The same HMIS procedure needs to be followed even as the eHMIS tools are being used.
Why can't the ministry harmonize implementation of these systems and support them instead of leaving it to development partners like UNICEF?	MoH -DHI is working hard to ensure that mTrac is under full custody of the MoH. There are guidelines in place under the eHIS technical working group to ensure harmonization of systems in the health sector.

Can someone enter the report directly in DHIS2 without sending the SMS?	It is possible to enter the report directly into DHIS2 for those that have access and resources before the 4th day of the week i.e. However, we advocate for mTrac because it's widely used that DHSI2 when it comes to reporting. So it is better to do our reporting the easy way with mTrac than DHIS2.
Why the JOIN and QUIT was deactivated?	Inconsistency of the users that kept joining and quitting. These were deactivated. The biostatistician has the mandate to add and deactivate people.
The in-charge does not have access to the submitted data to ensure that what was verified is what has been sent.	Roles of the users are going to be streamlined. The more the supervisors, the better.
Need to share the link to system's registration for input from district teams.	The website is for registering new systems. Go to MoH website, there is a health information system link which you follow to register. A digital health atlas is being developed. It was an idea by WHO. There is evaluation going on to support its developments and all stakeholders will be invited.
Inquiry on when one quits. Does the biostatisticians get to know once one quits?	These functionalities were completely deactivated.
There are partners that the Ministry has failed to control like the Traditional Healers. The ministry should break silence when people are being made to drink jerricans of herbs.	The bill has been tabled in parliament, and the MOH Top leadership is following it up.
The messages not being able to get sent.	It is a possible that a phone can fail to send out a message completely.

4.3.3 Presentation on mTrac data use

4.3.3.1 The Health Monitoring Unit (HMU) perspective

The Assistant Director Health Monitoring Unit (HMU), Ms. Hope Achiro presented on how her unit uses mTrac data. She noted that HMU mostly makes use of the data from the anonymous hotline i.e 8200. She went on to explicate the role of HMU in mTrac which include support to the mTrac program in both the initial and rollout stages including membership on the e-health technical working group, monitoring and supporting program implementation using both the formal data and anonymous reports as well as serving as the national action center for the anonymous hotline. As a national action center for the anonymous hotline, HMU promotes anonymous reports (publicize) using the different platforms provided and verifies and follows and acts on assigned complaints. She also emphasized the positive impact that mTrac has had in the communities citing benefits such as; strengthening, monitoring and evaluation of health care delivery with involvement of all the relevant stakeholders including the political leaders, use of the anonymous hotline by health workers to air out their grievances and provision of a platform for dissemination of feedback and encouraging dialogue to solve conflicts. She also reminded the attendees of the meeting that the district is the first line of action when it comes to resolution of issues reported through the anonymous hotline and issues are only escalated if the district fails to successfully resolve them.

A discussion of the challenges of the Health Monitoring Unit in mTrac implementation followed. Some of the challenges discussed included; -

- Reduction of HR support.
- Misconception of HMU's role.
- The help desk and collaborative work with the relevant stakeholders has reduced.
- Reduced frequency of reports because of reduced publicity.
- Reduced supervision visits.
- Poor quality reports.

Thereafter, recommendations for the discussed challenges were given. These included; -

- Collaborative work on clearly defined roles at all levels.
- District should be the first respondents.

- Support supervision should be strengthened.
- Allocate funds to publicity for mTrac

4.3.3.2 The Development Partner's Perspective (UNICEF)

Mr. Alex Muhereza, from UNICEF shared on the use of mTrac data by the development partners. He started off by explaining the role of development partners in health service delivery saying that these organizations come in to team/help the government when resources are limited to ensure government programs are achieved. He further added that they help organize resources which could be financial, technical, knowledge management or logistical support in instances where the government is short of these. He emphasized that development partners such as ADB, UNICEF, CDC, USAID, WHO are not implementers rather we just share responsibilities with governments. He cited an example of UNICEF and its role in healthcare service delivery adding that UNICEF has many programs it runs in conjunction with the Ministry of Health sharing the challenges, successes and failures as a unit. He therefore concluded that the way the development partners use mTrac data does not differ at all from the way the government of Uganda uses it. He gave an example of ACTS can be procured based on mTrac reports.

4.3.3.3 The Development Partner's Perspective (WHO)

Mr. Moses Bagyendera from WHO noted that; he thinks that how we use data points back as to why we collect data.

4.3.4   Closing remarks of the first day of the UAT activity

Mr. Bakunda George, the RDC first gave apologies for not having been able to start this exercise with you. He took the honor to welcome all the attendees to the meeting and thanked the MoH for choosing Ntungamo to host this exercise. He said they were patiently waiting for guidance from the MoH so that they could curb the traditional healers. He raised the issue of locally manufactured drinks which have flooded the markets that they may be dangerous to our health and asked the MoH to act. He assured the team of security in the district during and after the activity. He acknowledged the work that MoH does (contribution/service) in ensuring healthcare service delivery across the country and was quoted; "**Because you are, so the nation is**". He used this platform to remind the health workers in HCIIs that people get sick even on weekends. Kindly serve God's people diligently by working all days of the week. He encouraged the people of Ntungamo to actively participate and ensure that the rest

of the nation learns from them. He then declared the meeting closed and adjourned to the 22nd January 2018.

5 PROCEEDINGS OF THE SECOND DAY OF THE UAT ACTIVITY

5.1 OPENING REMARKS

The second day of the meeting was the 22nd January 2019. Mr. Jamiru Mpiima from the Ministry of Health welcomed the participants back to the second day of the meeting and introduced the day's objectives as well as activities.

5.2 OBJECTIVES OF THE SECOND DAY OF THE UAT ACTIVITY

1) To appreciate DHIS2 capabilities in health data management.

2) To establish and document user roles in regards to reporting.

3) To register any emerging concerns regarding mTrac and DHIS2.

4) To address the registered concerns regarding mTrac and DHIS2.

5.3 ACTIVITIES OF THE SECOND DAY OF THE UAT ACTIVITY

In order to attain the objectives of the day, various activities took place throughout the day. These included;

- A presentation on DHIS2.

- Live DHIS2 demo in different groups that were to be formed depending on the roles of the attendees in health data management at their various work places.

- Collection and documentation of DHIS2 and mTrac personas including the various user roles and challenges encountered during reporting.

5.3.1 Presentation on DHIS2

Mr. Lubowa Nathan from the Ministry of Health made a presentation on DHIS2 and how it is used in health data management at the various levels of healthcare delivery. He started by stating the objectives of the presentation, which included; -

- To know DHIS2.

- To know the health data flow

- To know the features in DHIS2

- To know the analytical features

He defined DHIS2 as a comprehensive system for reporting and analyzing HMIS data for the various users. Nathan further expounded on the rationale of DHIS2 and the various HMIS data that is reported in DHIS2 and the varied analytics that are possible on this data. He also added that with input from the HMIS review, a newer version of DHIS2 will be released for user testing over the coming days as part of the ongoing user acceptability testing.

He went ahead and mentioned the benefits of using DHIS2 including that; -

- It is a comprehensive HIS solution based on data warehousing principles and a modular structure.

- It is customized to replicate paper forms – to make easy the process of data entry.

- It provides data entry facilities which can either be in the form of standard lists of data elements online as well as Offline.

- It provides different kinds of tools for data validation and improvement of data quality.

He continued by explaining that in order for one to get access to DHIS2, they needed to enter the DHIS2 link (http://hmis2.health.go.ug) in a web browser. After which they will be required to input a username and password. He also went ahead to share the link to the documentation of DHIS2(http://apps.dhis2.org/documentation). At the various levels of healthcare delivery, specific roles and the level of access that they possess were explained. At national level, Nathan went on to list the MOH (programmes, warehouses), HDP (World Health Organization, UNICEF, Donors (CDC, USAID, DFID) and IPs (MSH, URC.TASO, Baylor) as those that can access DHIS2. At sub-national level, Community (VHT, Local council leaders, CHEW), Health Facilities (HW, I/C, and the Districts (DHT, regional stake holders) were listed as the ones that can have access to DHIS2 for their varied data needs.

5.3.1.1 The health data flow

The data flow that comprises flow of data from the pre-primary to primary tools, through summary tools, secondary tools and then finally into DHIS2 was explicated. The attendees of the meeting were then taken through the secondary tools i.e the reports which included;

- ARV Medicines Order and Patient Report – JMS, MAUL, NMS

- **HMIS 009a**: PMTCT Option B+ Addendum Weekly Report

- **HMIS 033b**: Weekly Epidemiological Surveillance Report

- **HMIS 097**: VHT/ICCM Quarterly Report

- **HMIS 105**: Outpatient Monthly Report

- **HMIS 106a**: Health Unit Quarterly Report

- **HMIS 107**: Health Unit Annual Report

- **HMIS 108**: Inpatient Monthly Report

The presenter went ahead and explained the three main dimensions in the DHIS2 data model. These are the dimensions which at minimum a data element should have. They include; -

a) The what, **data element** which explains what is collected and what is analyzed which are sometimes referred to as indicators. However, Nathan emphasized to the attendees that in DHIS2, indicators and data elements are different**.**

b) The where, **organisation unit which** are organised in a hierarchy, in Uganda there are five levels: National, Region, District, Sub-county, and Health facility

c) The when, **period which is organised by types/frequencies;**

Monthly, Quarterly, Six-monthly, Yearly.

Most data is collected monthly.

IDSR weekly, HR quarterly, Population yearly.

5.3.1.2 The DHIS2 applications /features

The features of DHIS2 discussed included the dashboard, pivot table, data visualizer, GIS, Data entry, Event Visualizer, Event Reports, Event capture and Tracker capture. There was a theoretical deep delve into each of the applications and what they do by the presenter as explained below; -

Data entry application which lets one capture all the health data, allows you to make validation of data entered and uses SMS and the mobile application for reporting and viewing reports.

Data reporting status application which track reporting of health facilities at various levels and gives a summary status of reporting units.

Dashboard application which lets you arrange the dashboard items in a completely flexible way, allows you to create shortcuts by marking dashboards as favorites and allows switch between visualization types such as pivot, chart and map and insert free-text items. Dashboards can be shared, translated and filtered.

The maps application: A new maps app (previously GIS) is available, offers a new, intuitive and user-friendly interface for creating map layers, lets you arrange the order of map layers in a simple way, and view the map data in a data table. Any number of map layers can be added to a map.

Pivot table which uses the pivot table rendering engine and allows for very large pivot tables to be viewed in the web browser and allows one to create favorites for routine data needs.

Event reports table layout download

Nathan went on to elucidate event reports and inform the attendees that one can now download event reports in Excel or CSV format in the same tabular format which was rendered in the web browser.

Validation message tickets: This is similar to ticket/feedback messages. The presenter also explained to the meeting attendees that validation messages now have access to status, priority and user assignment. The messages will inherit priority based on the importance of the validation results.

5.3.2   Live demo of DHIS2

Following the theoretical presentation that was made on DHIS2 by the previous presenter, Mr. Brian Ntare, from HISP (U), led the live demo of DHIS2 for all meeting attendees. The attendees were divided into groups based on the roles that they play at their various work places. The various groups included; -

- Nursing Assistants,
- Enrolled Nurses
- Midwives
- Records Assistants
- Developers

- Biostatisticians
- Political Leaders
- Implementing Partners
- Development Partners
- Medical Bureaus,
- Defense Forces.
- Private sector

Each of these groups was assigned a technical person to lead the DHIS2 live demo. The participants interacted well with the aforementioned features of DHIS2.

Figure 1: A group of health-workers during a DHIS2 live demo.

While this was ongoing, a persona collection exercise was also taking place. This entailed various user roles of both mTrac and DHS2 together with the challenges, motivations and suggested solutions to challenges. The smaller groups were then merged into two groups. One of the groups was assigned the role of discussing challenges associated with DHIS2 and the proposed solutions whereas the other group was handling the challenges of mTrac and the proposed solutions.

Figure 2: A group of participants discussing mTrac challenges and proposed solutions

The resulting findings from those two discussions are as shown in the tables below;

5.3.2.1 The challenges of DHIS2 and proposed solutions

Table 2: Challenges of DHIS2 and proposed solutions

Challenge	Solution
Data management is left to records assistants at facility level	▪ Cadres need to play their part in the data management process. ▪ Make summaries in the registers. ▪ Records Assistants need to interest themselves in their work and engage in records capture at the various service points. ▪ Records assistants should also be reminded of their key activities and key outputs. ▪ Team work and review of data by different departments before it is

	submitted.
Capacity building in DHIS2 among lower level health facility personnel is insufficient.	▪ Offering DHIS2 mentorships using a phased approach.
Unavailability of computers at lower level facilities for data entry.	▪ Self-funding ▪ Data entry at HSDs
Congestion and too much workload for entrants at HSDs during reporting period.	▪ Invest transport funds in data purchases for those facilities that have computers. ▪ Lower level health facilities submit their reports to the HSDs by 4th of every month.
Errors in the system related to catchment area populations.	▪ Proper projection of catchment area populations; - Base on previous cases, - Working with VHTs - Working with the district planner
Inconsistencies between the HMIS data tools and their representations in DHIS2 - HMIS 105-BMI section - Some elements captured in the register are not provided for in the system. - Annual report in the DHIS2 is not consistent with the hardcopy	▪ To be examined by the technical team to ensure alignment of the tools
Missing data quality checks	▪ Identify of all the missing data quality checks and incorporating them in the new version.
Low levels of data use	▪ Understand the meaning of data use and the importance of data at all levels of healthcare delivery. ▪ Departments should visualize their data routinely using graphs. ▪ Leaders need to interest

	themselves in the data and demand for it.

5.3.2.2 Challenges of mTrac and proposed solutions

Table 3: Challenges of DHIS2 and proposed solutions

Challenges	Solutions
Understanding data elements (ARVS, Malaria)	National wide training on HMIS tools is underway.
Reporting is usually tagged to one person.	Need to create awareness among all health workers that reporting is a collective responsibility
Most facilities are not on rural electrification grid.	Need to use solar till facilities get on electrification grid
There is no motivation for those doing reporting.	This is a requirement by MoH to have facilities report weekly and timely.
Poor network.	Identify spots with fair network reception within those facilities with this issue
Some health workers are not granted reporting rights.	Always contact your district biostastician
Mondays are always busy days at facilities for us to achieve timely reporting.	You need to have good planning given reporting is a continuous process.
Private health workers don't know how to report.	MOH should consider training PH facilities. There is a planned nation- wide training on the new HMIS tools.
Some HWs are not knowledgeable about HMIS033B	Facility based training should be further carryout.
Poor documentation from OPD registers.	Sensitization on the importance of quality data should be carried out.
Lab figures not tallying with OPD register- causes delay.	Always cross-validate data (with Lab people).
EPC & EPD not being linked to DHIS2.	EPC & EPD issues have been addressed in

	the new design
In DHIS2 fansidar appears twice.	This is being addressed by the technical team
Forms in DHIS2 are not consistent with HMIS registers.	This is being handled by the technical team
Some HWs are using wrong reports which have MC.	Always use updated tools by MoH.
Delayed feedback once reports are sent.	Gov't is engaging Telecom companies to prioritize mTrac messages.
mTrac doesn't track error sources.	This is being addressed in the new design.

After the fruitful discussions, the meeting was closed and adjourned to the next day, 23rd January 2019

6 PROCEEDINGS OF THE 3RD DAY OF THE UAT ACTIVITY

6.1 OPENING REMARKS

The third day of the meeting started with opening remarks from Mr. Mpiima Jamiru. He welcomed the attendees back to the third day of the meeting and introduced the objectives followed by the activities of the day.

6.2 OBJECTIVES OF THIRD DAY OF THE UAT ACTIVITY

1) To have an overview of the past two days of the meeting and the way forward.

2) To acquaint meeting attendees with mTracPro and the added functionalities

3) To prepare for field work.

6.3 ACTIVITIES OF THE THIRD DAY OF THE UAT ACTIVITY

The activities of the 3rd day included;

- Presentation of an overview of the past two days of the meeting (21st and 22nd January 2019) and way forward.

- Presentation of mTracPro capabilities and the added/ new functionalities.

- Preparation for field work.

      o   Formation of groups

      o   mTracPro scenarios testing exercise in the formed groups

6.3.1   Presentation of an overview of the first two days of meeting

A presentation of an overview of the proceedings of the previous two days was made. This presentation entailed reiteration of the objectives of the User Acceptance Testing activity. The objectives of each day of the previous two days were presented alongside the activities that were undertaken to achieve the given objectives. A sample Health Information Assistant DHIS2 persona was presented. The persona was comprised of the key demographics, responsibilities, challenges, proposed solutions and motivations.

The DHIS2 challenges that arose from the live demos done in groups the previous day and from the personas data collection exercise as well as the suggested solutions were presented. Similarly, challenges of mTrac as well as the suggested solutions were presented.

6.3.2   Presentation of mTracPro

A presentation on mTracPro was done by Mr. Samuel Sekiwere from the Good citizen team, clearly articulating the differences between mTrac and mTracPro aimed at demonstrating the added features and functionalities in response to various stakeholder requests.

The differences presented were as shown in the table below; -

Table 3: Differences in features/functionality of mTrac Vs mTracPro

Feature/Function ality	mTrac (2011)	mTracPro (2018)
SMS engine	RapidSMS	RapidProSMS More features than RapidSMS RapidPro has a big community and following thus maintenance and upgrades are easily done and supported. -Uses channels like Facebook, WhatsApp messages. (*Integration of this feature in mtracPro is in progres*s) -Surveys are easy to design

DHIS2 Integration middleware	Disptach 2.0 -Manual configuration -Does not support XML -Less advanced interfaces	Dispatcher 2.1 -Supports XML -Advanced interfaces
Facility Synchronization	Semi-automated	More automated
iHRIS integration	iHRIS API not integrated	iHRIS API integrated
Advanced management web interfaces	Not responsive Not integrated	Responsive Integrated
Validation		Better data validation
Alerts		Alerts when values reported are beyond the thresholds are incorporated

6.3.3 Preparation for fieldwork

Groups were formed based on the four health sub-districts in Ntungamo district. These were; Ruhaama A, Ruhaama B, Kajara and Rushenyi.

Each group consisted of documenters in charge of documenting the fieldwork proceedings and administering data collection tools during the user acceptance testing, two technical persons from Good Citizen to lead the facility staff through the testing scenarios, a guide to give directions to the various facilities to be visited and, a team leader to co-ordinate the activities of the group. The groups were as shown below; -

Table 4: HSD based groups and facilities visited

Health Sub-District	Name of group members	Facilitates visited
RUSHYENYI	Rogers Kagimu	Doctor's Referral Hospital
	Bagenda Livingstone	Rubaare HCIV
	Henry Kiragga	Kayonza HCII
	Ivan Muguya	Rushoka HCII
	Lubowa Nathan	Kigaaga HCII
	Mugabi Denis	Ngoma HCIII
	Mugulo Henry	Rugarama HCIII
	Musubo Conoredia	Nyenga HCII
	Ssekandwa Herman	Poly care Medical Center
	Katwesigye Justine Fay	Kyafoora HCII
	Kivumbi Muzamiru	
RUHAAMA A		
	Probuse Nimukama	Kyamwasha HCII
	Jeremiah Kyazze	St Patrick HC II
	Joan Nakibuuka	Rwoho HCII
	Philip Waiswa	Ngomba HCII
	Peace Nyiransaba	Kafunjo HCII
	Lt Francis Mulwana	Ruhaama HC III
	Dr Ssengendo Christopher	Kibeho HC III
	Jackline Nanyombi	Kitwe HCIV
		Rakiriiro HC III
		Kiyoora HC II
KAJARA	Kayanja Edward	Rwamabondo HCII
	Kato Aloysious	Nyakibigi HCIII
	Kasim Nabudele	Rwanda HCIII
	Jolly	Rukoni HCII
	Tony	Rwashameirwe HCIV

	Job Kyakasibwa	Karuruma HCII
	Muyingo Edmond	Kagamba HCIII
	Komakech Wilfred	Kitondo HCIII
	Michael	Bwongyera HCIII
	Asiimwe Moses	
	Kinobe Jordan	
RUHAAMA B	Samuel Sekiwere	Ntungamo HCIV
	Barbara Nakasagga	Buhanama HCII
	Mary	Butare HCIII
	Harriet Namwanje	Sheema Clinic
	Emmanuel Samuel	Nyonyozi HCII
	Carol Namuweje	Itijo Hospital
	Walter Tobin	
	Deo	
	Ian	
	Arinaitwe Emmanuel Samuel	

7 PROCEEDINGS OF DAY 4 -DAY 8 OF THE UAT TESTING ACTIVITY

On the 24th up-to 30th of January 2019, the teams were engaged in fieldwork. The main aim of the field work was to test mTracPro in a real working environment. For each of the fieldwork days, the following activities were undertaken;

1) The anonymous hotline awareness assessment among the communities represented by the Village Health Teams.
2) Users' interaction with the system following the laid-out testing scenarios. This activity targeted all the staff involved in weekly surveillance reporting at health facilities visited.
3) User acceptance testing of mTracPro using the standard user acceptance questionnaire. This was administered among the staff after interaction with mTracPro.

4) Documenting the reporting business processes and tasks. A standard business process mapping questionnaire was administered among staff involved in weekly surveillance reporting.

The teams went out to the facilities as listed in *table 4* and on getting to each of the health facilities, introductions were made and the purpose of the visit was explained by the team leaders. All the health workers interacted with at the facilities had prior knowledge of mTracPro owing to the training they received in the first days of this activity. User personas and mTrac process mapping tools were administered to the health workers in charge of data management before taking them through the user experience testing scenarios. As the testing was ongoing, the communities represented by Village Health Teams (VHTs) were engaged in the anonymous hotline awareness assessment. At every health facility, each of the health workers tasked with weekly surveillance reporting was trained on the testing scenarios and each of them took turns to submit weekly surveillance data using mTracPro.

Figure 3: User Scenarios Testing at Kibeho HCII

After testing mTracPro, a user acceptance questionnaire was administered. This was aimed at getting the user's perception of mTracPro on; learnability, satisfaction, and usefulness in weekly surveillance reporting. On the afternoon of 30th of January 2019, the teams gathered

for a presentation from the developers of mTracPro on the issues that arose from the field and the response plan to these issues.

The table below depicts those SMS scenario test that did not successfully satisfy the end users at different facilities and needed to be rectified.

Table 5: SMS Scenario tests with issues during testing of the mTracPro SMS components

SMS Scenario Testing		Outcome
i)	**Send CASES SMS** **Test Procedure:** Reporter types the following message and sends to 6767: CASES.MA.3.DY.4.TF.1 **Expected Feedback:** "You reported cases: 3 Malaria, 4 Dysentery, 1 Typhoid, If there's an error please resend."	Feedback needs to be consistent to reflect the message body. Syntax needs revision. • It 's a general comment except for **ARVs**. Message accepted and feedback given yet there was a typo (**day for DY**) (Kibeho HCII)
iv)	**Send EPD SMS** **Test Procedure:** Reporter types the following message and sends to 6767: EPD.SP.1.DP.3 **Expected Feedback:** "You reported other cases: 1 Smallpox. 3 Diphtheria. If there's an error, please resend."	1. At **Rubaare HCIV & St. Patrick Medical Clinic**; Feedback given was different from the expected feedback. ['you reported other deaths; 1 influenza-like illness, 1 small pox, 3 diptheria, if there is an error please resend'] 2. There is an error with your report or system failed to process your report. [**at doctor's hospital**]
vi)	**Send MAT SMS** **Test Procedure:** Reporter types the following message and sends to 6767: MAT.50.50.30.20.15.0.15.30.0.15	• U nder MAT, feedback returned only suspected and RDT tested cases.

	Expected Feedback: "You reported 50 Suspected Malaria, 50 RDT Tested, 30 RDT +ve, 20 Microscopy Tested, 15 Microscopy +ve, 0 Not tested treated, 15 RDT -ve treated, 30 RDT +ve treated, 0 Microscopy -ve treated and 15 Microscopy +ve treated. If there's an error, please resend"	• m TracProApp; response was only about microscopy positive case only (**Itojo hospital**).
vii)	**Send TRA SMS** **Test Procedure:** Reporter types the following message and sends to 6767: TRA.100.50.200.150.10.45.300.60 **Expected Feedback:** "You reported 100 ACT (Tablets), 50 ORS (Sackets), 200 Measles Vaccine, 150 Amoxcilline, 10 DMPA, 45 IV Artesunate, 300 Fansidar and 60 RDT (Malaria). If there's an error please resend."	mTracProApp; ORS missing in the reporter's history (**Itojo hospital**)
viii)	**Send ARV SMS** **Test Procedure:** Reporter types the following message and sends to 6767: ARV.200.500.200.450.300.45.300.600.90.50 **Expected Feedback:** "You reported 200 HIV 1&2 Screening Tests, 500 ARVs, 200 Lopinavir, 450 Navirapine, 300 Tenofovir, 45 RHZE, 300 RH Blisters, 600 R75H50Z150, 90 INH300 & 50 INH100. If there is an error please resend"	The form was incomplete; did not have all the fields [**mTracProApp**]
xi	**Send IPT SMS**	mTracProApp; does not give

)	Test Procedure: Reporter types the following message and sends to 6767: IPT.20.15.10.10.5.5 Expected Feedback: "You reported 20 Adult, 15 Child (0-19), 10 Adult Initiated, 10 Child(0-19) Initiated, 5 Child(0-4) Contact & 5 Child (0-4) Initiated. If wrong resend"	feedback for children 0-4 contact and 0-4 initiated (**itojo hospital**)
Validation rules		
xi v)	***Send MAT SMS*** **Test Procedure:** Reporter types the following message and sends to 6767: MAT.50.50.55.20.15.0.15.30.0.15 **Expected Feedback:** "The RDT positive cases (55) should be less than the RDT tested cases (50). Please make a correction and resend."	*Expected feedback not given; Instead "There is an error in your MAT report. Please resend a correct one" [**at doctor's hospital**] • W hen used a different phone, it expected feedback was given.

The table below depicts those features of mTracPro that did not satisfy user needs at first time of testing and had issues calling for technical redress. The table further shows new user requirements emanating from the issues as well as the actions to be or that were taken to correct these issues.

Table 6: Issues, emerging user Requirements and Actions needed/taken during testing of the mTracPro components

Feature	Functionality	Issues	Requirements	Action needed/taken
SMS BASED REPORTING				
Feedback	Responses to users' interactions with the system. It is very important to note that there are many failure points during messaging of reports. A report might fail to be sent at the reporter's end because of reasons such as poor network or wrong message center numbers. Feedback might be sent when the reporter's phone is off and after 24 hrs, the feedback might be erased. Failure could also	The syntax of the feedback on sending a report does not match with the report sent i.e. 1 malaria (response) vs malaria 1(sent report)	The reporter should receive feedback in the same format as the report sent	The indicator and value will be exchanged in the feedback
		Getting less feedback messages than report messages sent for example sending 8 report messages and getting 4 feedback messages.	The reporter should receive feedback messages for all the report messages sent	A status feature to give feedback on the reporting status of each reporter. Increasing server resources such that they are able to cater for the reporting demands.

	be at the MoH servers or even system backend. All these have to be factored in during SMS based reporting and issues that could impede reporting at the different failure points ought to be addressed to smoothen the reporting process.			Redesigning of flows of processing forms to enable a reporter to get feedback before additional processing is done.
		Ambiguous feedback when a reporter sends an incomplete report or veers off the required format of reports for example "**The report has an error**"	A sender should get feedback tailored to the error made during composition of the report for example, if the report is incomplete, he/she should get a report specifically pointing out that the report was incomplete	This is to be handled.
		Getting feedback on indicators that were not reported on	Reporters should only get feedback for indicators reported on.	This was rectified and only feedback on indicators reported is provided
		No feedback given for reports with	Reporters should receive feedback prompting them to	This is to be rectified

		misspelt indicators	check the keywords	
THE ANDROID APPLICATION				
Validation	This is to ensure data quality	No validation on the APT form	All form elements should be validated to ensure good data quality	All validation rules were elicited and are to be applied wherever they are needed.
Feedback	These are responses of the users' interactions with the system	There was no feedback on incomplete forms like APT	The reporter should get specific feedback on every form that is filled and submitted	This is to be handled.
Form fields	These are different elements about which data is collected	There were missing fields on some of the forms like the ARV form	The forms should have all the forms fields to enable collection of data on all indicators	This was ably handled.
Access to the application	This is required for anyone that is to interact with the application	The application was only permitting logging in with the international numbers format as in (256).	The reporter should be able to log into the application using both local and international numbers format	This was rectified.
		Anyone that has the application can log in	Only authorized reporters should have access to the application and thus	Use of double authentication i.e the system should be able

		with their phone number and send data	send data	to authenticate numbers against the registered users after which a person is sent a code to enter to gain access to the application.
Reports submission	Sending of reports to the mTrac database	There is no progress bar as a reporter is sending a report	A reporter should be able to see progress of his/her report submission	This was addressed

Table 7: Depicts issues with Anonymous Hotline Reporting during 8200 awareness testing.

| ANONYMOUS HOTLINE REPORTING			
FEATURE	ISSUE	ACTION NEEDED	RECOMMENDATION
8200	Community (VHTs) unaware of this hotline	Create awareness for this anonymous hotline	Need to create more awareness for anonymous hotline reporting through; • Media (radio & Tvs adverts) • Print media-Posters on this hotline should be at all facilities and in facility wards or in public places for people to see and read (Should be in native language of the community). • Public gatherings such as market places, church services, LC meetings and public rallies etc.
	Lack of knowledge on how to use this hotline.	Educate the community on how to use this platform	
	Feedback was not being given to those few who	Educate the community on how feedback	

	have used the hotline	is got.	• Community SACCOs & Village PA systems. • HMU & MoH need to partner with telecom and send indiscriminative awareness messages to people about this platform. **(A** case of promotional messages from telecom to subscribers).

7.1 RESULTS OF USER ACCEPTANCE TESTING OF MTRACPRO.

After interacting with the system, every reporter at all facilities visited filled out a usability and user satisfaction questionnaire aimed at assessing their perceptions on mTracPro. The questionnaire was based on four (4) standard dimensions of user acceptance including learnability, perceived ease of use, perceived usefulness and user satisfaction.

7.1.1   Learnability

95% of the participants agreed that the system is very easy to learn and remember this was attributed to: fact that they have been using mTrac system, and training given. The 4% who disagreed put it on the network issues
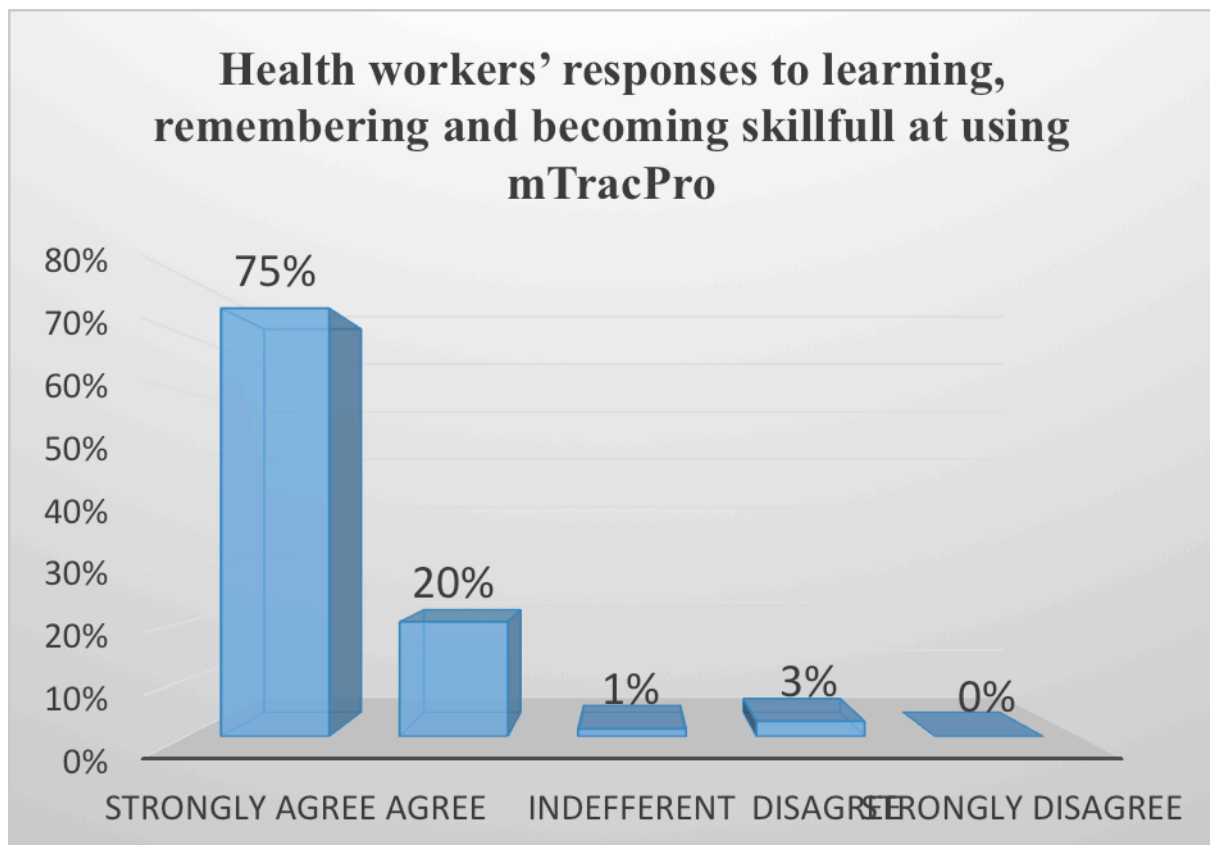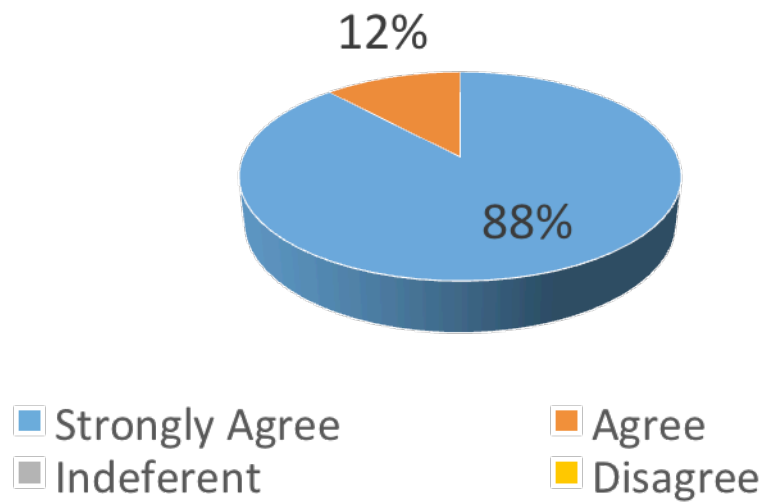
7.1.2 Perceived Ease of Use

On average, 96% of participants agreed that mTracPro is easy to use and apply as a reporting system at facility level.
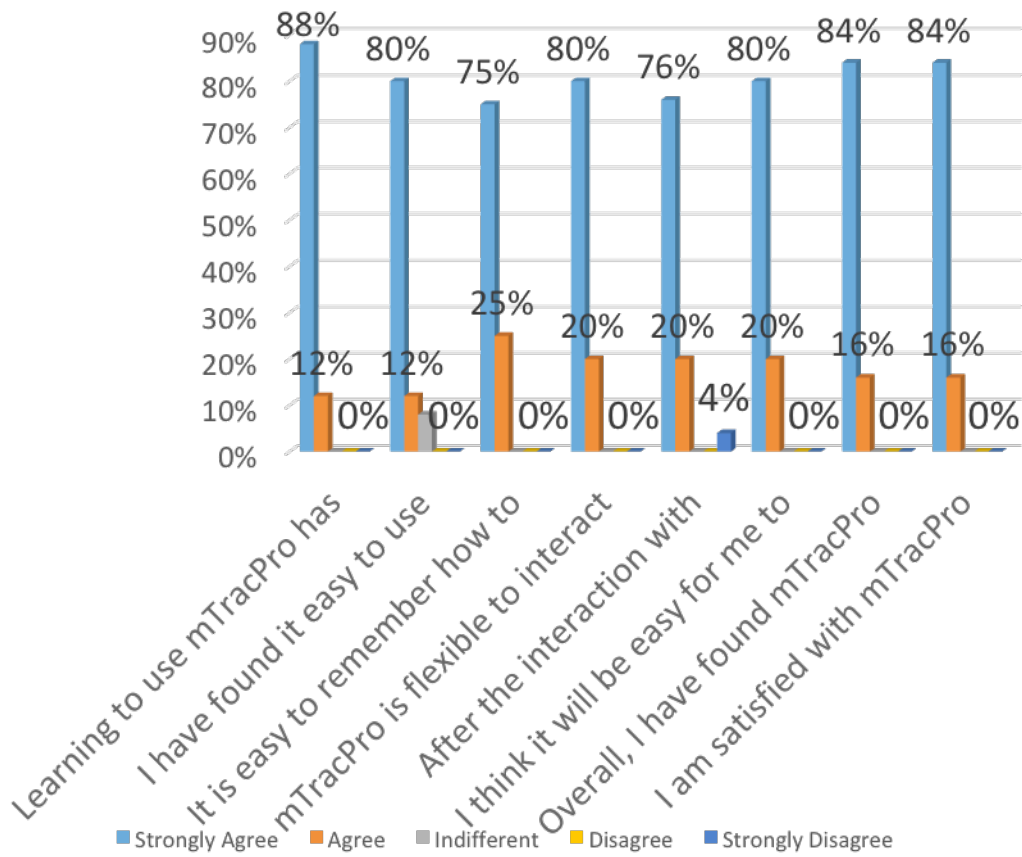
7.1.3 Perceived Usefulness

88% of the participants agreed that they think mTracPro will make it easier to carryout weekly surveillance.

7.1.4   Satisfaction

95% of participants agreed that they were satisfied with the mTracPro and would recommend it to someone for easy weekly reporting.
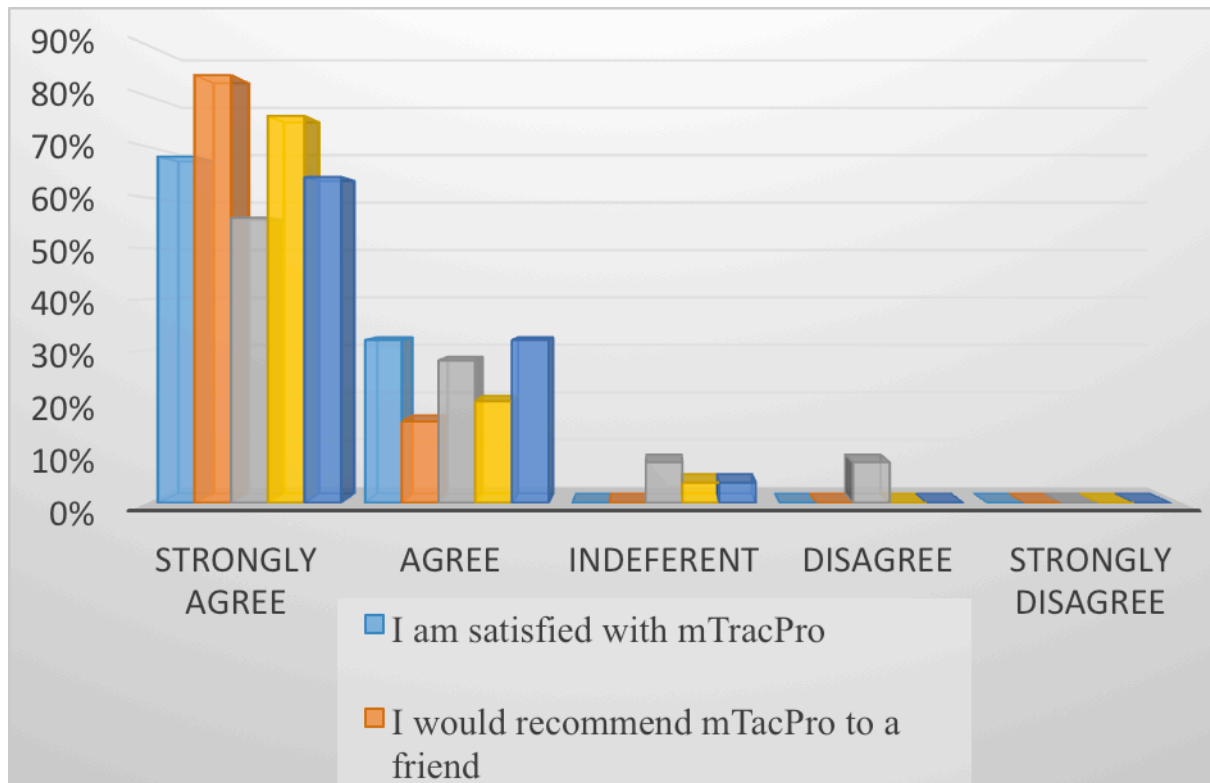
8   WAY FORWARD

The technical team is to work closely with MoH to;

- See how fast they can address the issues raised and
- Incorporate the new user requirements which have emerged
- Then communicate formally the new changes made.
- The MoH shall consider national training of users on mTracPro and HMIS tools
- Finally national rollout of mTracPro and HMIS tools.

APPENDIX A: USER PERSONA

User Name		Job Title	Reporting
Tesfai	Photo	Nursing Assistant	mTrac

	Key Demographic Details	About
	Age: 32 years **Gender:** Female **Family:** Married, two children **Education:** Certificate Holder **Facility details:** HCIII, Public **Employment:** 6 years.	Tesfai is a nursing assistant working at HCIII boarding Ntungamo with Kabale district. The facility location is connected to rural electrification grid. She has 6 years' experience and has no training on mTrac. She has a mobile phone with no Internet and has no computer skills. Helps in dispensing medicines,

Responsibilities	Challenges	Motivations
.Tesfai records patients in OPD register accurately **.**Compiles HMIS105 reports **.**Writes mTrac weekly reports. **.**Ensures that the facility reports on time	**.**Have little knowledge on how to do it (report). **.**Calculating stock bal. in mTrac report is a problem. **.**Network issues **.**Other staff not getting	- Its part of my daily -Salary (reporting is a reflection that am working)

. Supervises to ensure good recording of data. .Ensures reporting tools are available	involved in reporting .Changes in reporting tools are not fast tracked .No motivation, High staff turn-over	
Solutions		
.Onsite mentorship & refresher trainings	.Making reports on weekends	.Need to be provided with phones to report

8.1 APPENDIX C: UAT AND PILOT TESTING AGENDA

Day	Activity	Duration	Agenda
Day 1	Introduction meeting	1 day	• Opening Prayer • Introductions • Welcome remarks (district) • Objectives and expected of the activity (MoH) • Teaming
Day 2	Training	1 day	• Training on revised HMIS reports • Training on the UAT scenarios • Training on documentation
Day 3 to day 8	User experience testing and sessions of mTracPRO done at facility and for every after 2 days, the teams will hold a 2-hour meeting for updates and debrief	6 days	• Testing messaging module • Testing all dashboards • Documenting all the processes • User Requirements gathered and documented • Anonymous Hotline
Day 5	2-hour meeting for updates and debrief	1 day	• Field updates from all teams

Day 9	A debrief meeting with every participant will be held as the concluding activity.	1 day	• Collating reports from all the teams • A detailed user acceptance report • Consolidated user requirements report