Data Management, Dashboard & Connectivity Solutions

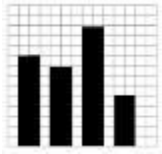
Agenda

- **Data utilization overview**
- **Dashboard & Data sources**
- **Ethiopia experience on health data management**

Why does test data matter?

For fast result delivery back to facility and patient for immediate clinical management, contact tracing, and tracing of patient status

Test outcome monitoring to quickly identify potential hotspots and guide national program decision making

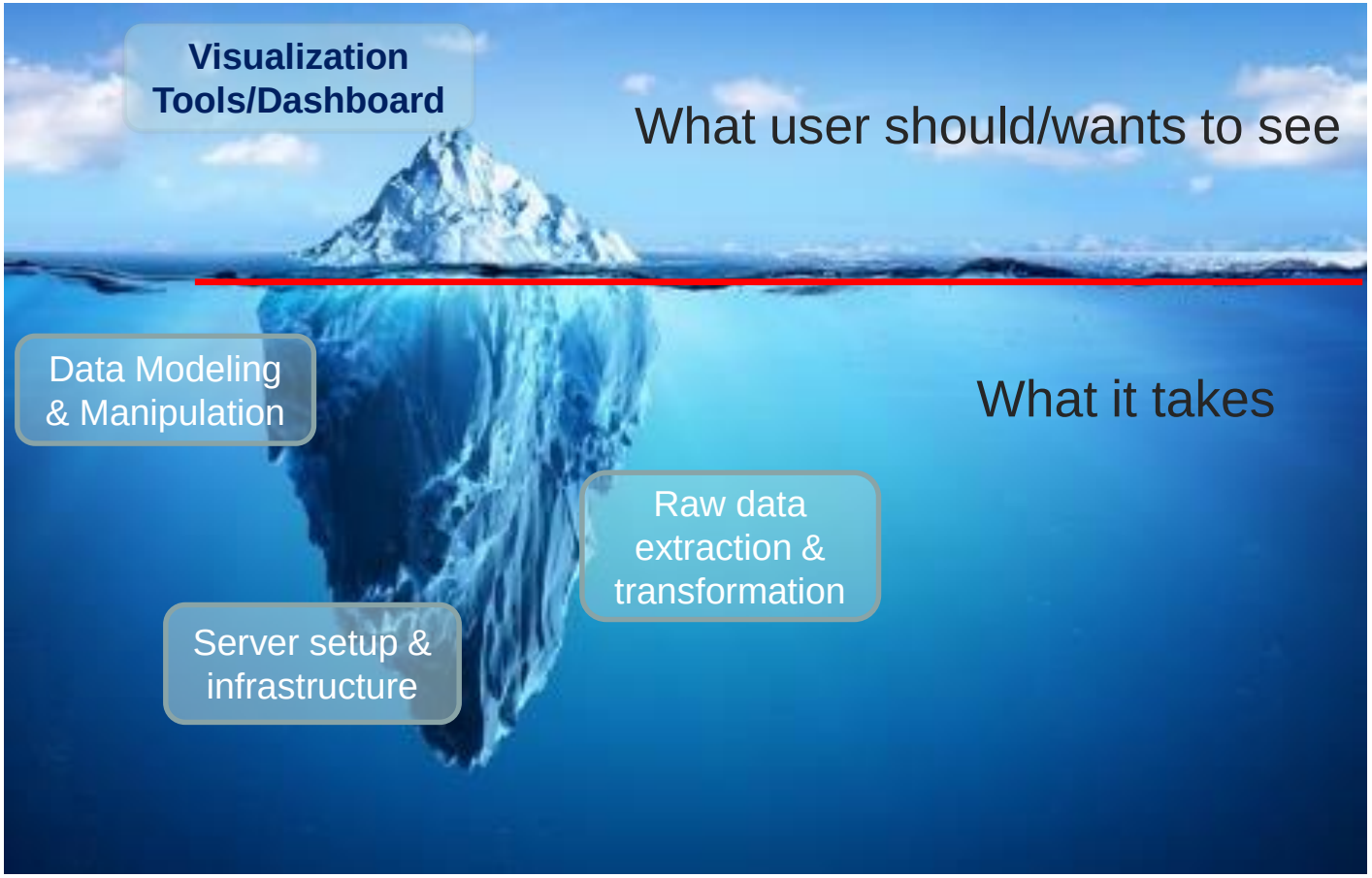


Diagnostic commodity monitoring to inform future procurement and mitigate risk of stock outs

Test Data visibility is key for optimizing health/Laboratory activities and decision making process

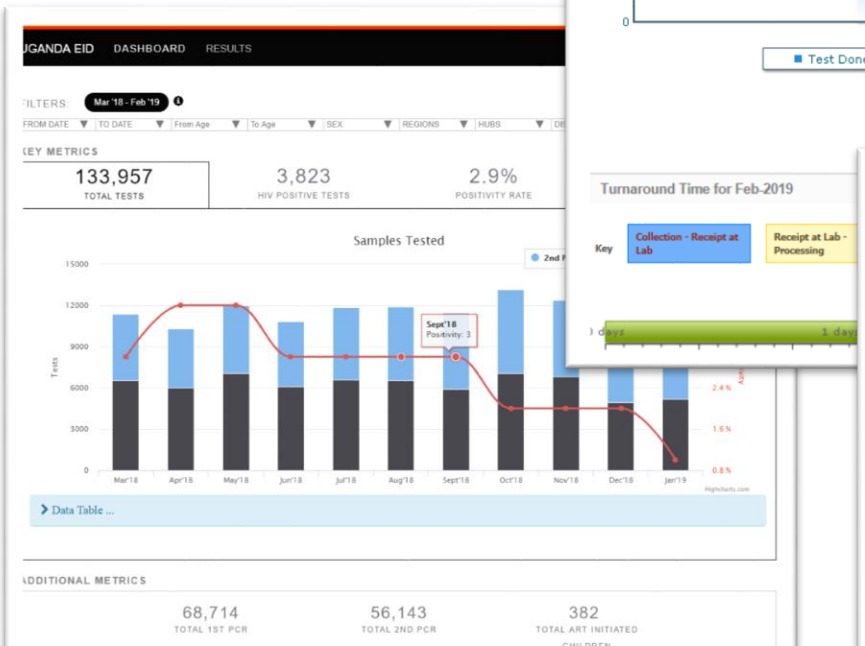
Dashboard – Visual Thinking

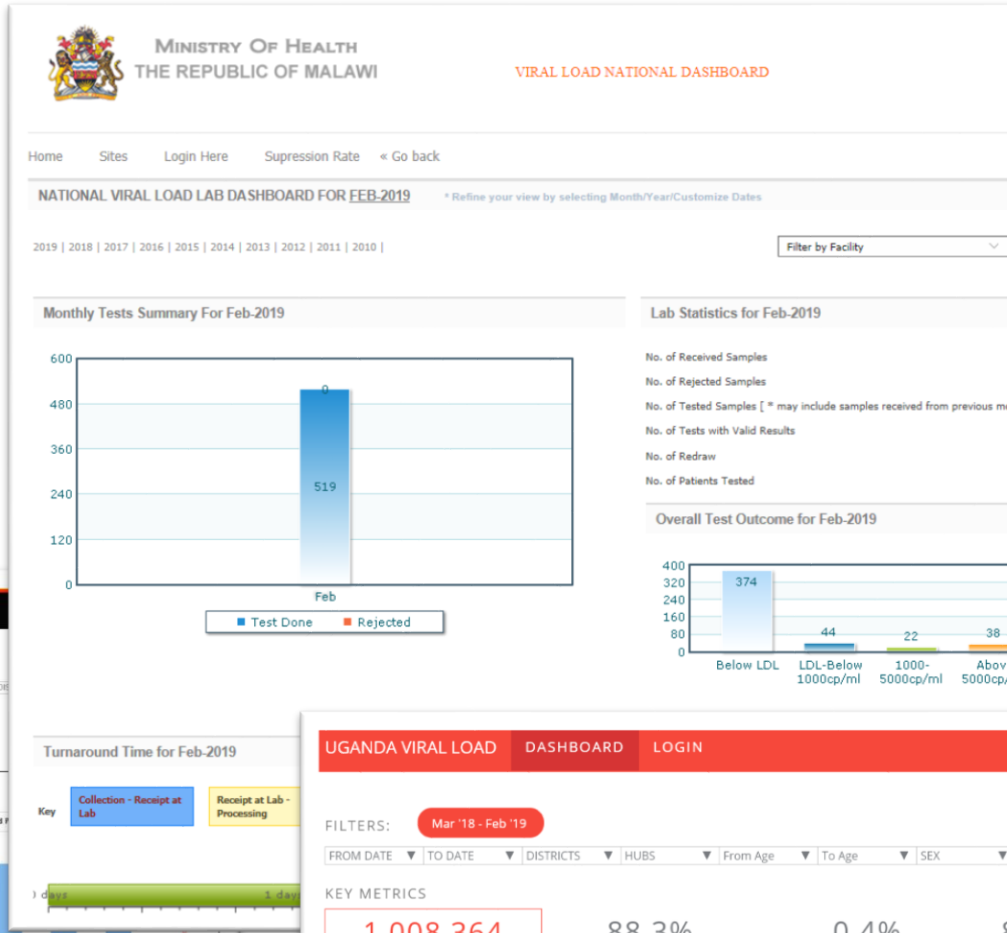
- Data visualization is the process of converting raw data/information into easily understood pictures of information that enable fast and effective decisions.

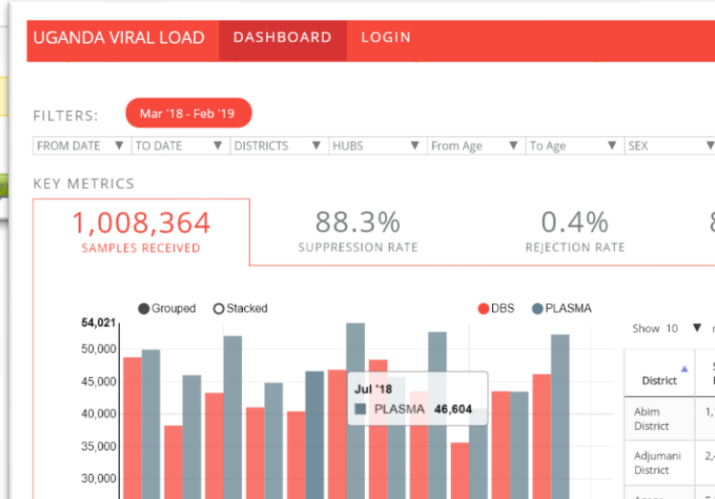


Dashboard – Benefits

- Allows users see several different perspectives of the data.
- Makes it possible to interpret vast amounts of data
- Offers the ability to note exceptions in the data.

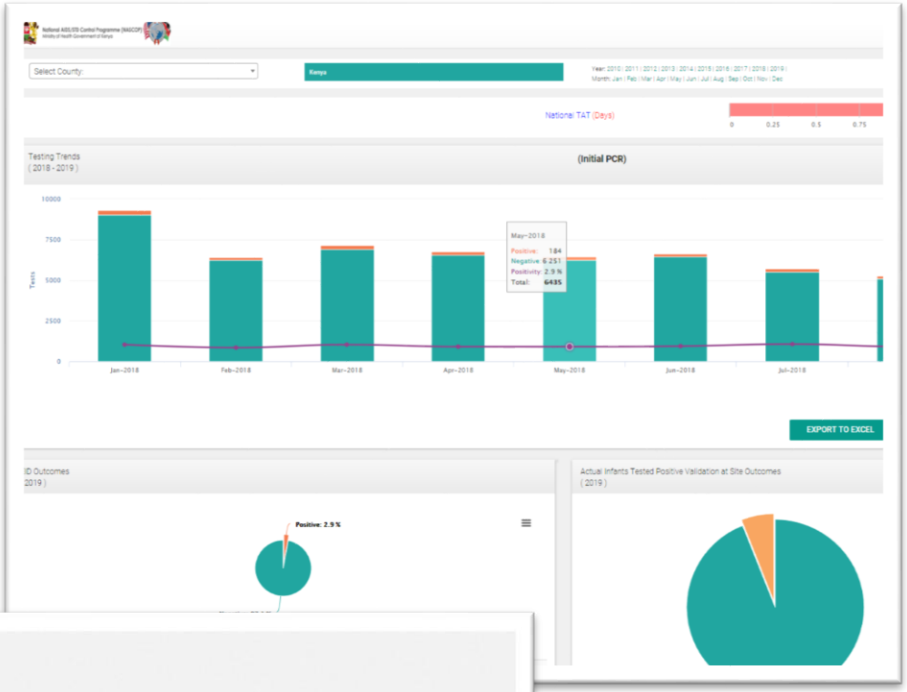


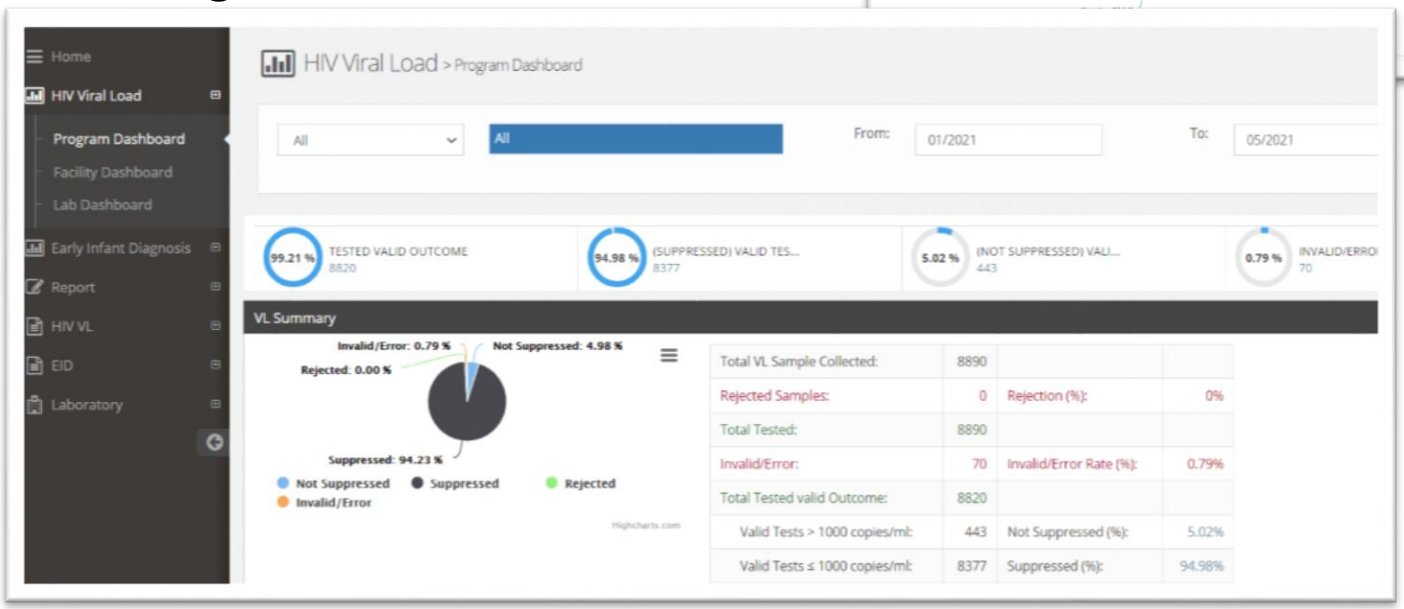




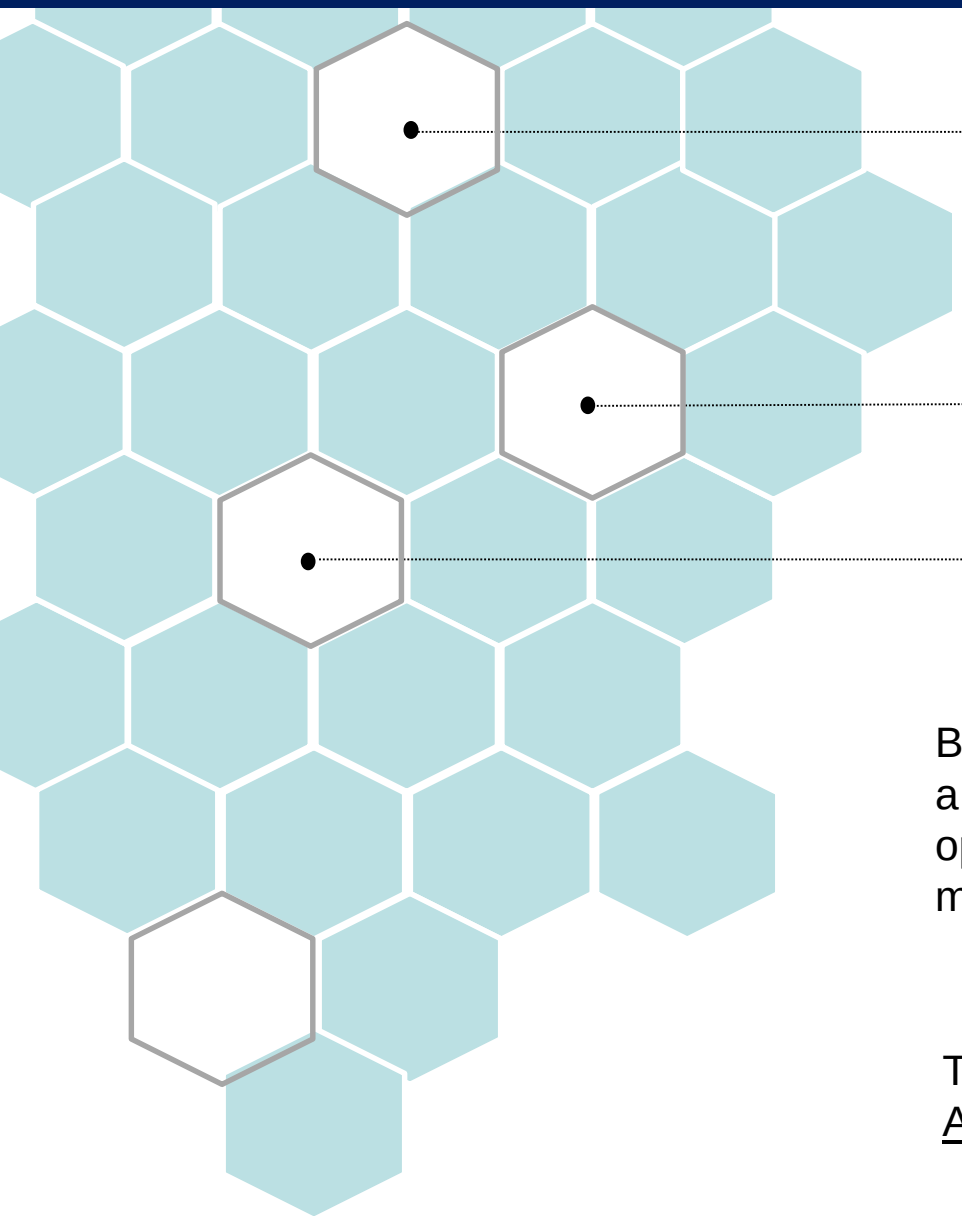
Dashboard – Benefits

- Allows the user to analyze visual patterns in the data.
- Exploring trends
- Translate data patterns into insights, making it a highly effective decision-making tool.





Data Sources

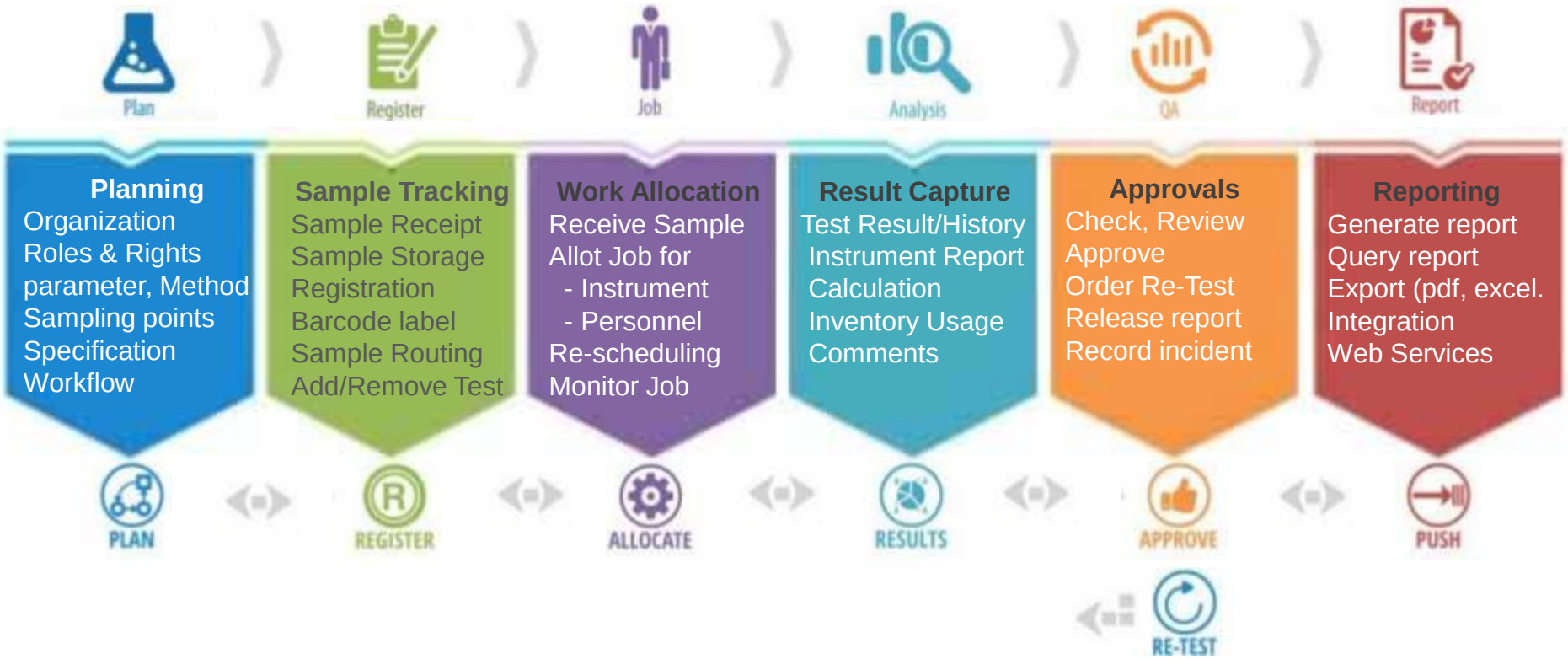


Based on infrastructure and capacity available, a single or combined solution can be used to optimize health/Laboratory data for decision making process

The main out put of ANY laboratory, serving ANY purpose, in ANY industry, is **information**

Data Sources - LIMS

- Specialized application of information technology to optimize and extend laboratory operation
  - Manage laboratory data from sample log-in to reporting
  - Interfaces with diagnostic instruments
  - Sort and organize data into various report formats



Data Sources - LIMS

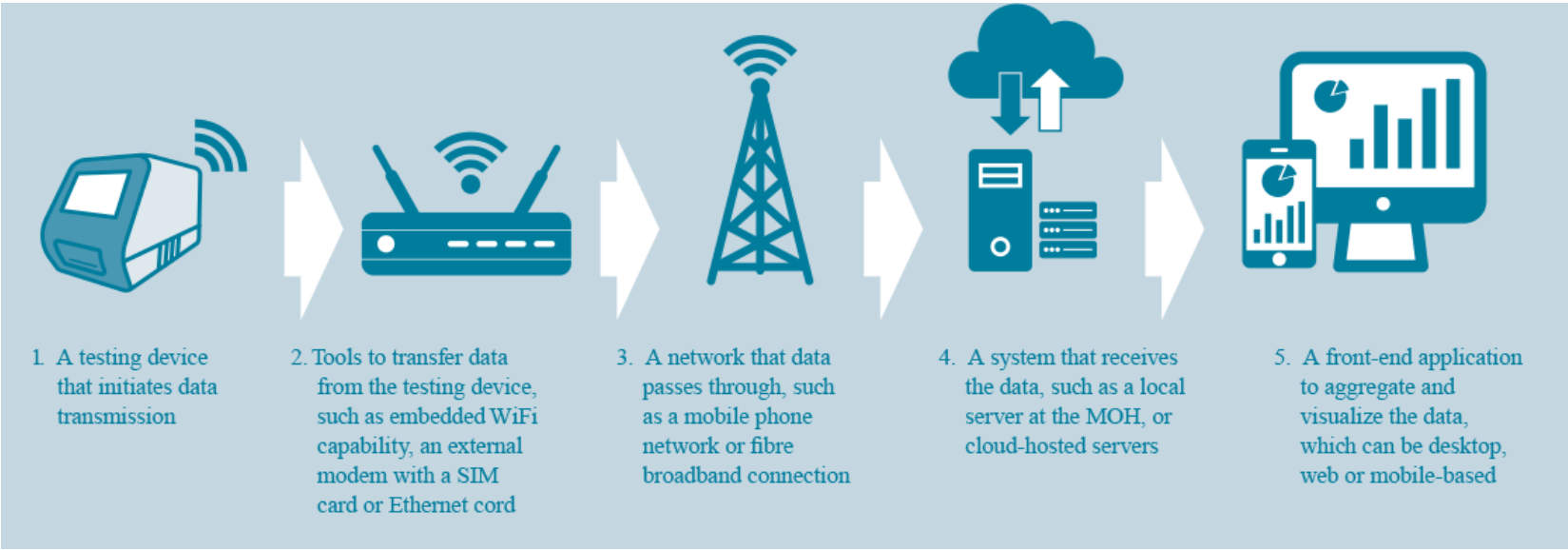
- Management of the data explosion
- Enhance business processes/workflow
- Quality assurance and control
- Error reduction
- Fast sample turnaround
- Easy access to information

Most Common LIMS

- BIKA, BLIS, DISA Labs, OpenELIS, CHAI EID/VL System, OpenLIS

Data Sources - Dx Device Connectivity Solutions

- Connectivity is the ability of a device to transmit data to another device or system to allow for remote monitoring



Real time data from remote laboratories across platforms	• Consumption data • Information on uptime • Quality information	• Forecasting • Service and Maintenance	• Procurement • Supply Chain

Data Sources - Dx Device Connectivity Solutions

- We can group existing solutions in three categories:
  - Integrated solutions (providing data aggregation & data transmission)
  - Data aggregation and
  - Data transmission

Product	Manufacturer	Components	Associated Devices
Integrated Solutions			
Alere Connectivity Pack	Alere	Samba 3G-E or CT63 terminal, USB extension cord, external FME antenna, (requires but does not come with an active SIM card)	PIMA, AlereQ HIV ½ (connecting one device at a time) + local SIM
GxAlert/Aspect with Connectivity Pack	SystemOne	Router, mobile SIM, antenna, user interface, and mobile data	GeneXpert + laptop BD MGIT, Abbott m2000, Roche COBA (connecting one device at a time)
Data aggregation			
Aegis POC	Alere	Software platform	PIMA, AlereQ HIV ½ (and other compatible devices) + laptop + modem
Aspect Reporter	SystemOne	Software platform	GeneXpert, BD MGIT, Abbott m2000, Roche COBA + modem
C360	Cepheid	Software platform	GeneXpert + laptop + modem
Connected Diagnostics Platform (CDP)	BlueFrontier	Software platform	GeneXpert + laptop + modem (and intended as a platform for recording patient data from multiple disease areas)

Alere™ Data Point

HOME DEVICES REPORTS

GxAlert

Dashboard for MTB/Rif HIV Qual

AegisPOC

Cepheid C360

CDP

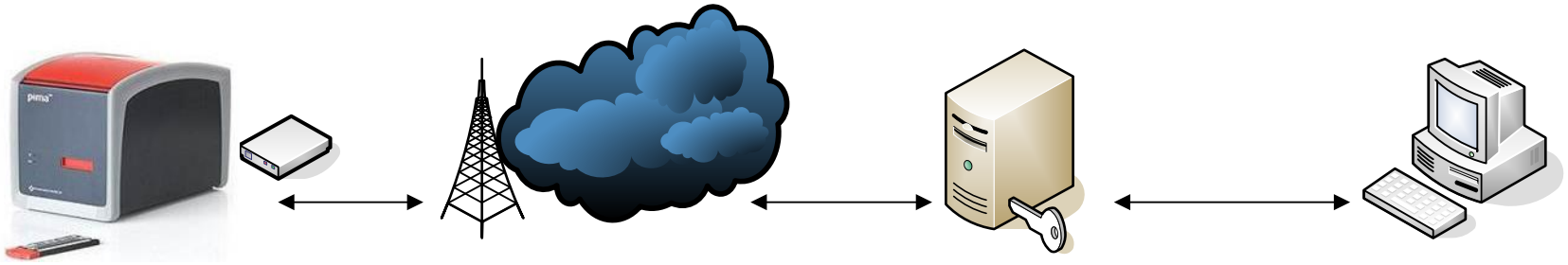
THE FUTURE OF DIAGNOSTICS

PocLAB

Centralized Data Management Syste

Product	Manufacturer	Components	Associated Devices
Data aggregation			
Epicenter	BD	Software platform	MGIT
DataToCare	Savics	Software platform	GeneXpert + laptop + modem (other devices can have their data entered manually)
Data transmission			
USB Dongles	Offered by most major telecom companies	SIM card enabled modem	Simple internet connection (no device tailoring)
Mobile Network Routers	Aliya, Netcomm Wireless (M2M Router), Sierra Wireless (Airlink), Vodaphone (machinelink) etc.	SIM card enabled modem and router	Simple internet connection with multiple device capability

Common deployment Option – In house (MoH) Server



Countries will be responsible for the purchase of modems

Data enabled Local SIM will be used.

SIM card purchase and data transmission cost will be covered by respective countries

Data transmission happen over the existing mobile network

Server will be located inside MoH countries,

Maintenance and management of the server will be handled by MoH countries

MoH will have access to the testing data through an application developed by CHAI

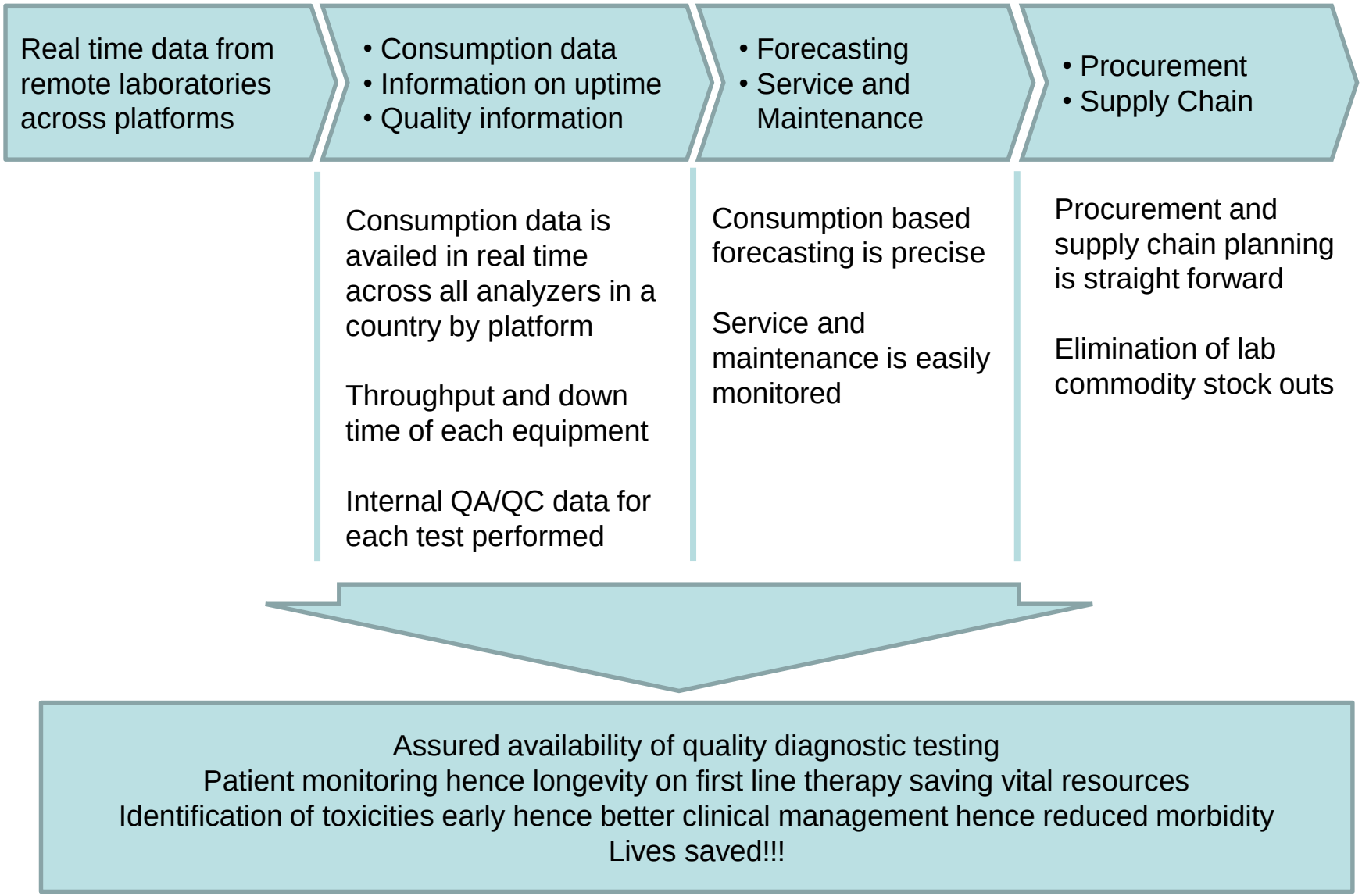
This application will be insalled and maintend from MoH central sever

The application organize and present analyzed POC testing information

The application can also be accessed remotely via internet if valid credential is given

Focus on commodities, quality & Availability of tests

Data availability in real time saves lives



Establishing Data Management Systems, Dashboards and Data Triangulation for Program Monitoring

Ethiopia's Experience in Implementing EID/VL Data Systems

Out line

- ✓ Background
- ✓ EID/VL Database Basic Features
- ✓ EID/VL Database Details
- ✓ Major Accomplishments
- ✓ Data Synchronization
- ✓ Regional Access Dashboard
- ✓ Electronic Test Order and Result Reporting System- ETORRS
- ✓ GxAlert

Background

- ✓ Computerized systems facilitate and enhance the efficiency of data capturing and utilization processes
- ✓ In collaboration with CHAI, EPHI has developed integrated HIV VL& EID Database System based on the nationally implemented test request and result reporting forms
- ✓ Currently, 21 testing centers have the system installed and use it for systematic and easy data capturing, storage, transfer and report generation
- ✓ Successfully synchronized the system installed at testing centers to a Central Server located at EPHI for real-time flow of data to the national level
- ✓ System enabled to allow RHBs, pertinent agencies and concerned departments of the FMOH to access data from the Central Dashboard
- ✓ System is featured with capabilities for easy generation of reports in various formats including that of CDC / DATIM

Data management systems for informed decision making

Which patients are not virally suppressed ?

How much is the viral suppression rate

How much is the sample rejection rate

How do I generate reports

Which patients are in First Line/Second Line treatment

How can I send test results electronicall y?

EID/VL Database Basic Features

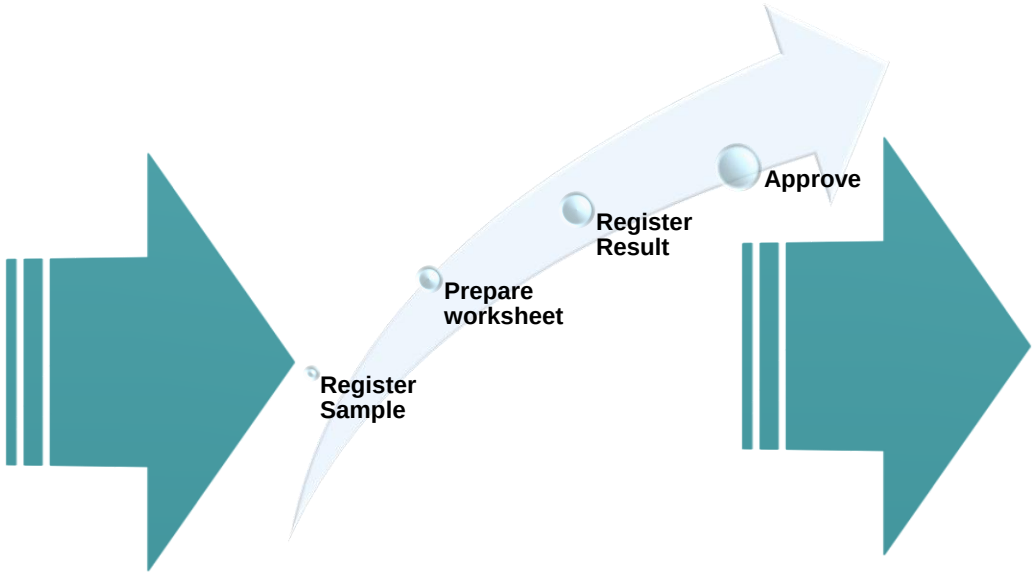
- ✓ **Data capturing tool**: Electronic registration of request forms
- ✓ **worksheet preparation**: Providing details on samples on process
- ✓ **Result Registration and approval**: Filling test result and approval
- ✓ **Patient data tracking**: Tracking of patient data for subsequent viral load tests
- ✓ **Electronic result delivery**: Delivering result via SMS
- ✓ **Customizable report:** Periodic report generation
- ✓ **Raw data for analysis:** Data exportable in excel format
- ✓ **Automatic dashboard:** Graphic and numerical summary on key indicators

EID/VL Database Details

Input

- Region/Facility
- Client Information
- Sample Information
- Lab related information
- Results

Process

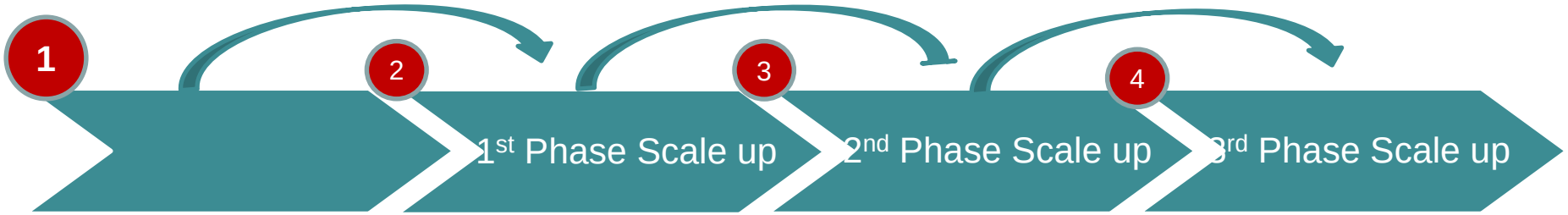


Output

- Electronic Results
- Raw data for analysis
- Summary Report
- Archive

Major Accomplishments

Implementation Phases

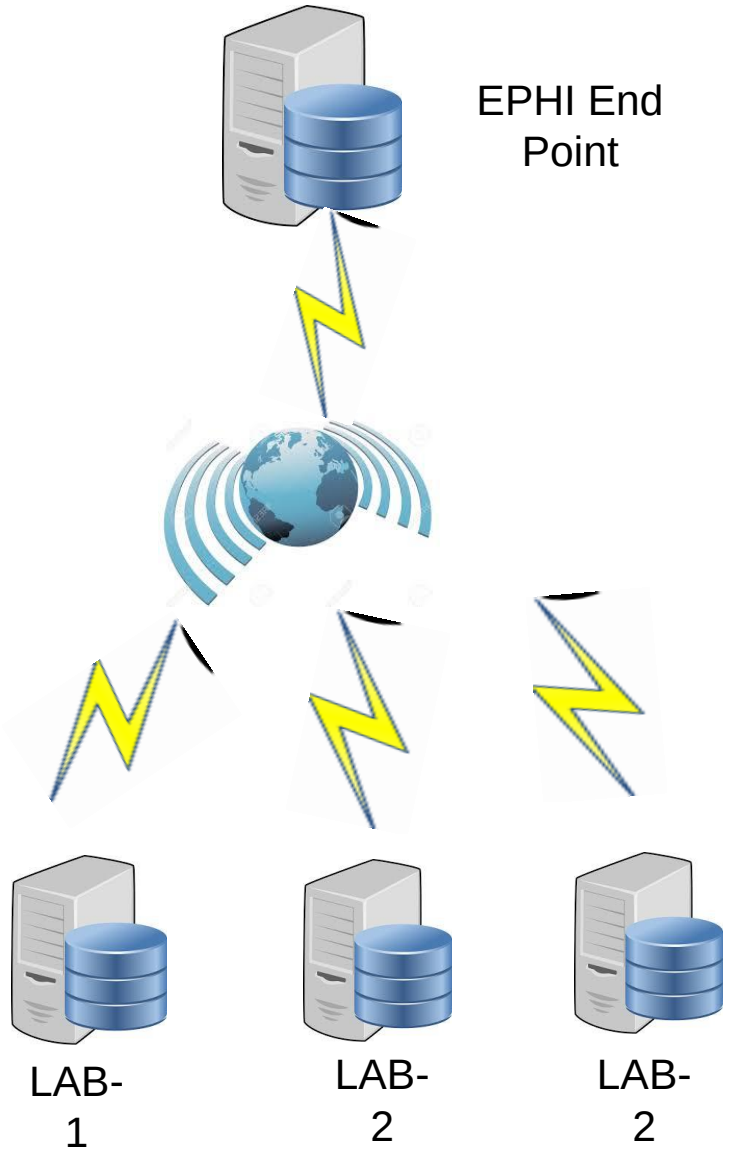


- 1.1 Application development
- 1.2 User Manual Preparation
- 1.3 Pilot at EPHI, Harari and Adama RL
- 2.1 Evaluation of pilot phase
- 2.2 Clearing field validations
- 2.3 Scale up to Jimma Univ, Nekemte RL, Hawassa RL
- 3.1 Integrating Electronic Result Delivery
- 3.2 Install database on ICAP provided computers
- 3.3 Scale up to Dessie RL, Bahirdar RL, GUH, Deberberhan HL, Debremarkos HL, Black Lion HL, ALERT HL, Police HL, Armed Forces HL,
- 4.1 Upgrading all previous installations
- 4.2 Scale up to Mekelle RL, Gambella RL, Metu Karl HL, Afar RL, Arbamich HL

Training | Supervision | Technical Support | System Upgrade

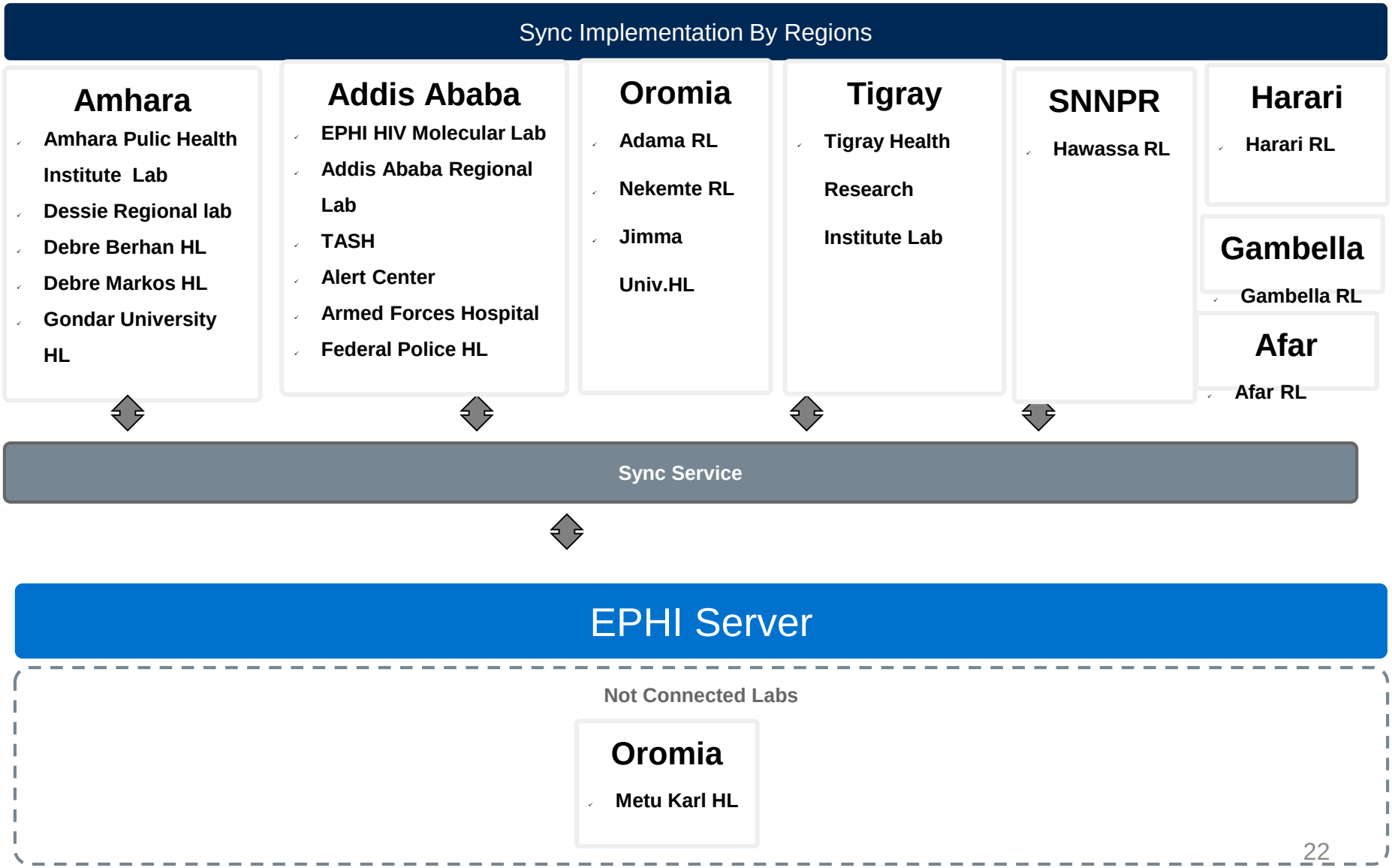
Data Synchronization

- ✓ VL database systems are installed at each testing site on locally configured computers
- ✓ These systems can work in off-line mode, no internet connection is required to access the system
- ✓ Users can get access to the system only on local area networks available in regional labs and hospitals
- ✓ It was recommended to work on database synchronization to EPHI server to enable central repository of data for easy access by all stake holders



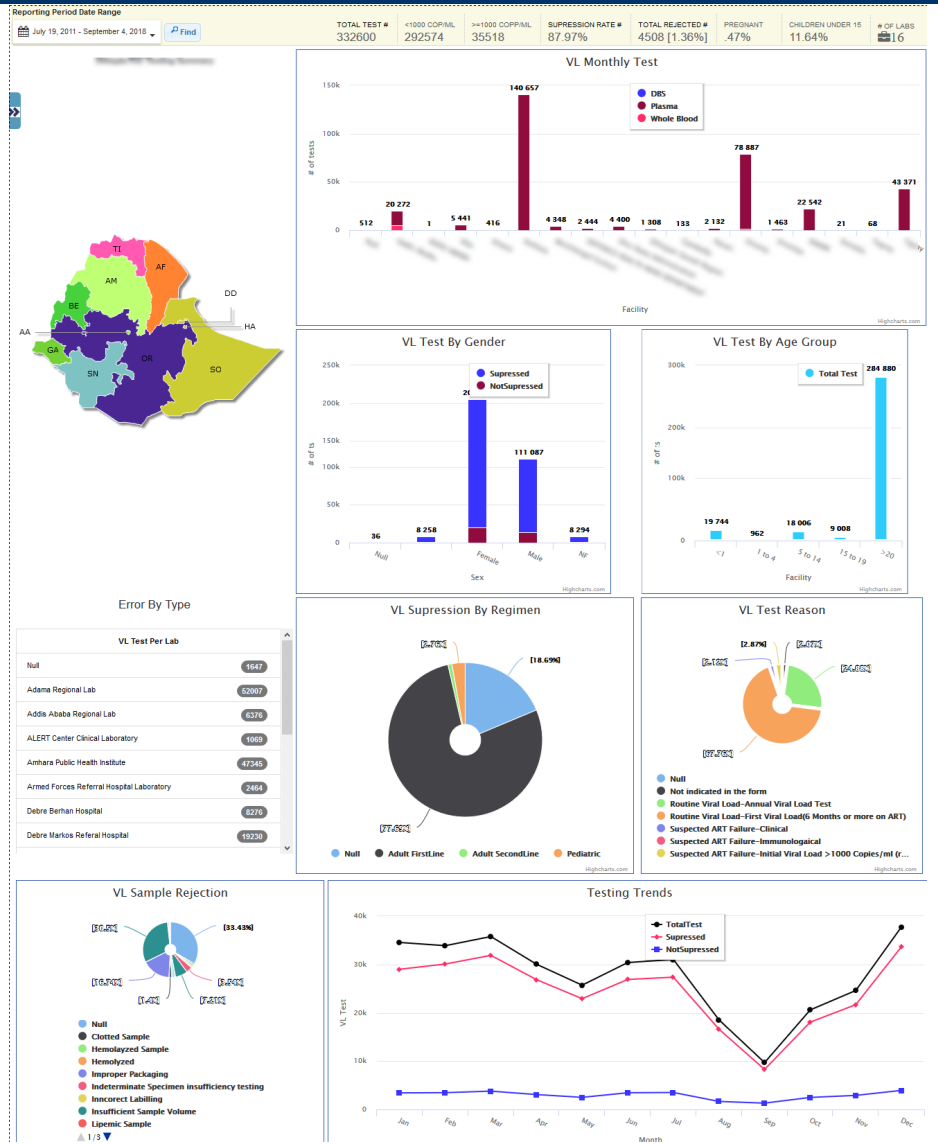
Implementation Status

Synchronization Status



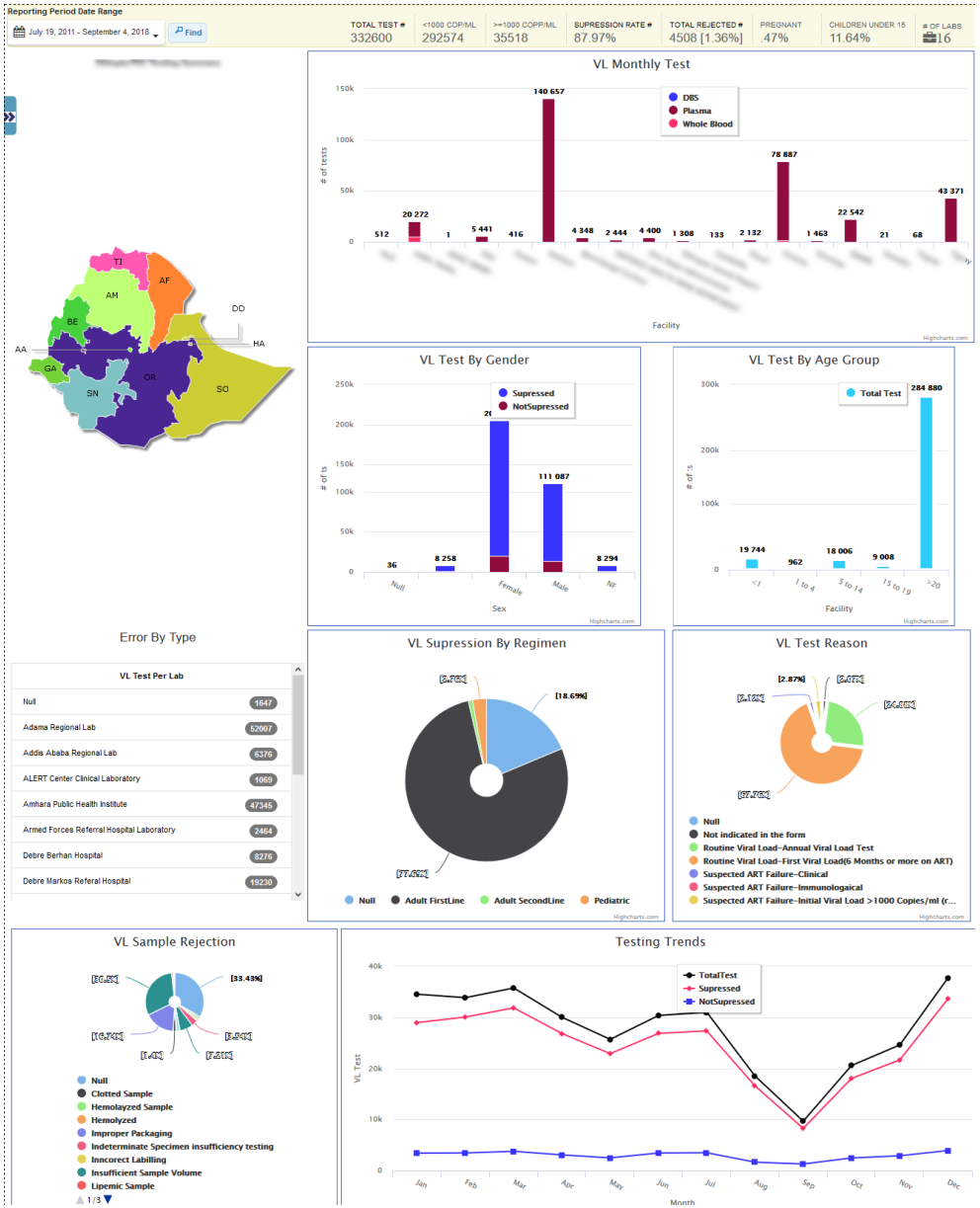
Regional Access Dashboard

- ✓The regional access dashboard is a system built on synchronized data.
- ✓Enables regions to monitor VL testing across multiples labs available in their region
- ✓Regional access dashboard provides varieties of graphical visualizations and reports that help in informed decision making not only for regions, but for FMOH and all its agencies and partners



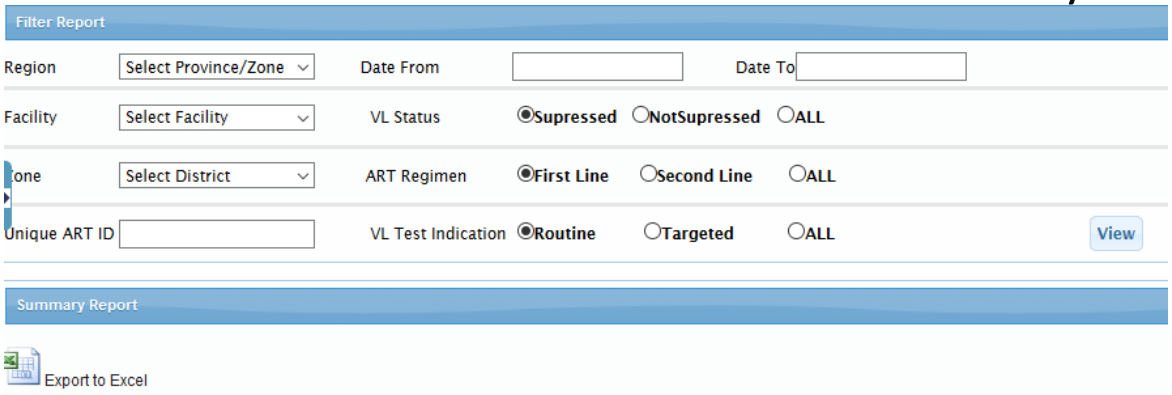
Regional Access Dashboard Details

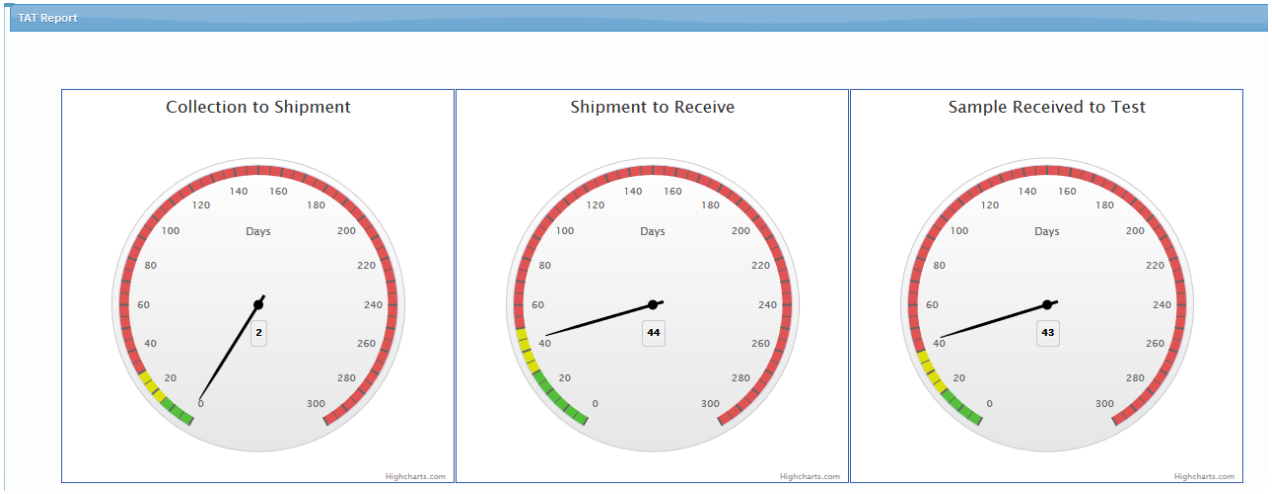
- Graphical Visualization
- Different Reports
  - Regional testing summary
  - Lab Testing Summary
  - DATIM Report
  - Raw Data



Regional Access Dashboard

- ✓ The regional access dashboard has different options to customize reports
- ✓ Enables exporting raw data and reports to excel format
- ✓ Individual client data is also accessible from the system





Electronic Test Order and Result Reporting System(ETORRS)

- ETORRS is a systems that enables ordering of VL test requests and delivery of results electronically by developing interoperability between EID/VL data system installed at testing lab and Smart Care ART available at referring sites

Viral load test request and result delivery process

- ✓ ART clinic of the referring facility fills out test request form and send the client to laboratory at the same facility for sample collection
- ✓ The facility lab collects sample and sends it together with request form to the testing lab(regional lab) via courier services
- ✓ Receiving regional lab checks the quality of sample at reception, registers request form on EID/VL data system and send it for testing
- ✓ Once testing is completed, data clerks register test result for specimens
- ✓ Regional lab send results back to referring facility via courier service

Electronic Test Order and Result Reporting System(ETORRS)

- ✓ **Enhanced EMR-ART**
  - ✓ ICAP with CDC and FMOH developed an enhanced EMR-ART
  - ✓ It incorporates all changes related to HIV preventive and treatment programs
  - ✓ (Tracing, ICT, ASM, CB tracking/reporting, Re-test, scheduled visit, PEP, etc.)
  - ✓ Support ART-Clinic activities including data capturing and management
  - ✓ Has Report module that produces HMIS, DATIM, Line list & custom reports
  - ✓ Rolled-out in more than 470 health facilities
- ✓ **VL & EID Database System**
  - ✓ Developed by CHAI in collaboration with EPHI
  - ✓ National standards , guidelines, test request and result reporting forms and procedures for VL testing
  - ✓ Supports Testing facility's activities & meets national and partners' report data need including DATIM
  - ✓ Implemented in 21 testing centers in the country

Electronic Test Order and Result Reporting System(ETORRS)

Challenges Encountered

ETORRS

Proposed Solution

- ✓ Developing electronic data exchange platform(interoperability) between the systems at testing lab and referring facilities found to be a technology solution.

Enhanced EMR-ART

- ☞ Implemented by ICAP with CDC and FMOH
- ☞ Support ART-Clinic activities including data capturing and management.
- ☞ Rolled-out in more than **470 health facilities**

VL & EID Database System

- Developed by CHAI in collaboration with EPHI

ETORRS

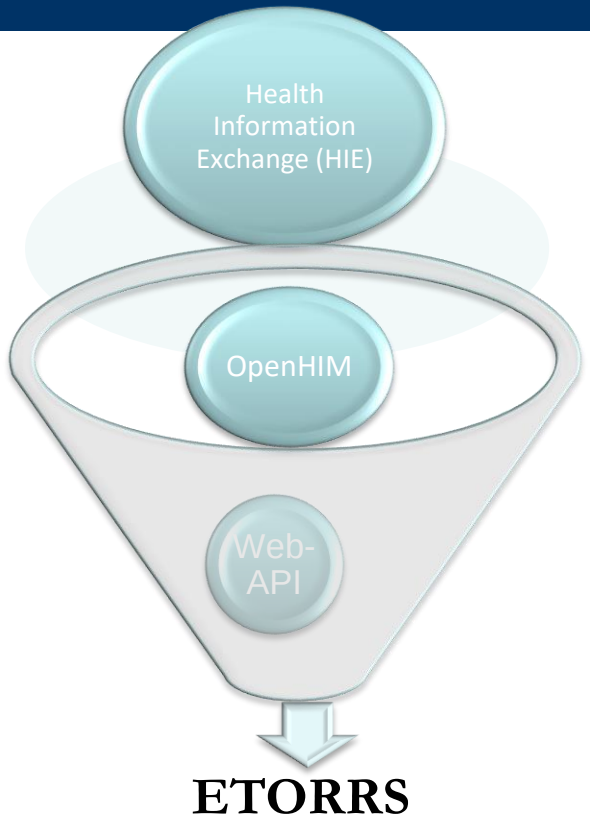
Proposed Solution

- ✓ ART clinic fills out the test request form
- ✓ Data clerks capture the test request electronically into Smart Care ART
- ✓ Send test request electronically to testing lab
- ✓ Update medical record on receiving results

- ✓ Receives test request electronically and wait for the sample
- ✓ Upon arrival of sample, quality is checked, if rejected referring facility is informed electronically
- ✓ Once testing is completed, data clerks register result
- ✓ Quality officers approve test results
- ✓ Approved results automatically delivered to Hf

ETORRS

4. Criteria for Technology Selection

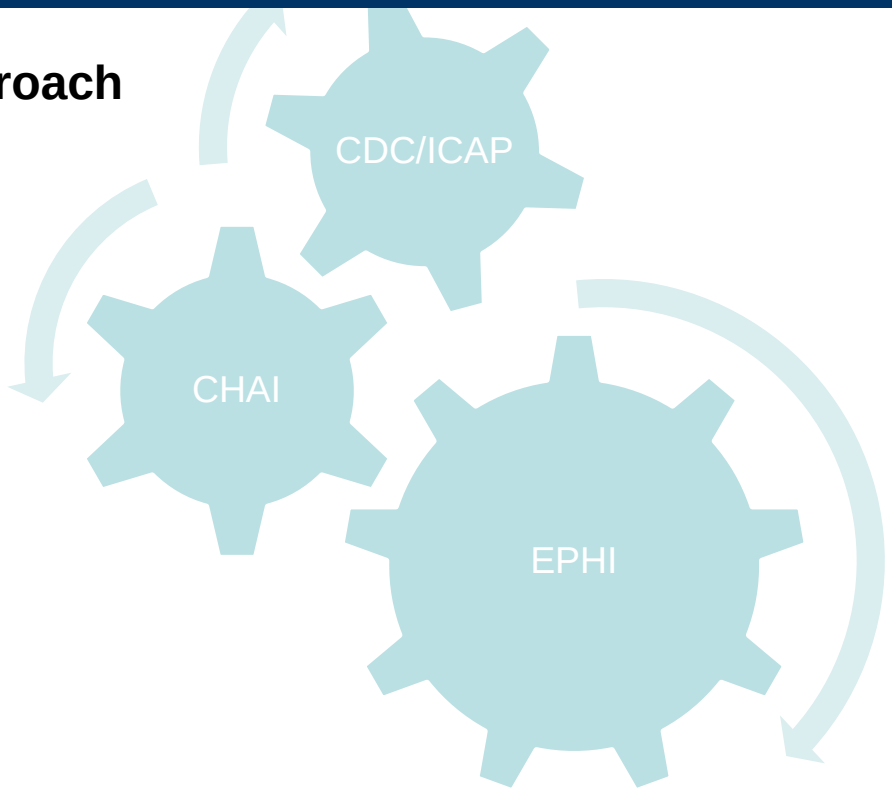


Why Web-API:

- **Prior experience** with the technologies.
- **Meets basic technical requirements** for an interoperability service and data exchange.
- **Limited investment** to build capacity in short period of time.

ETORRS

Collaborative Approach



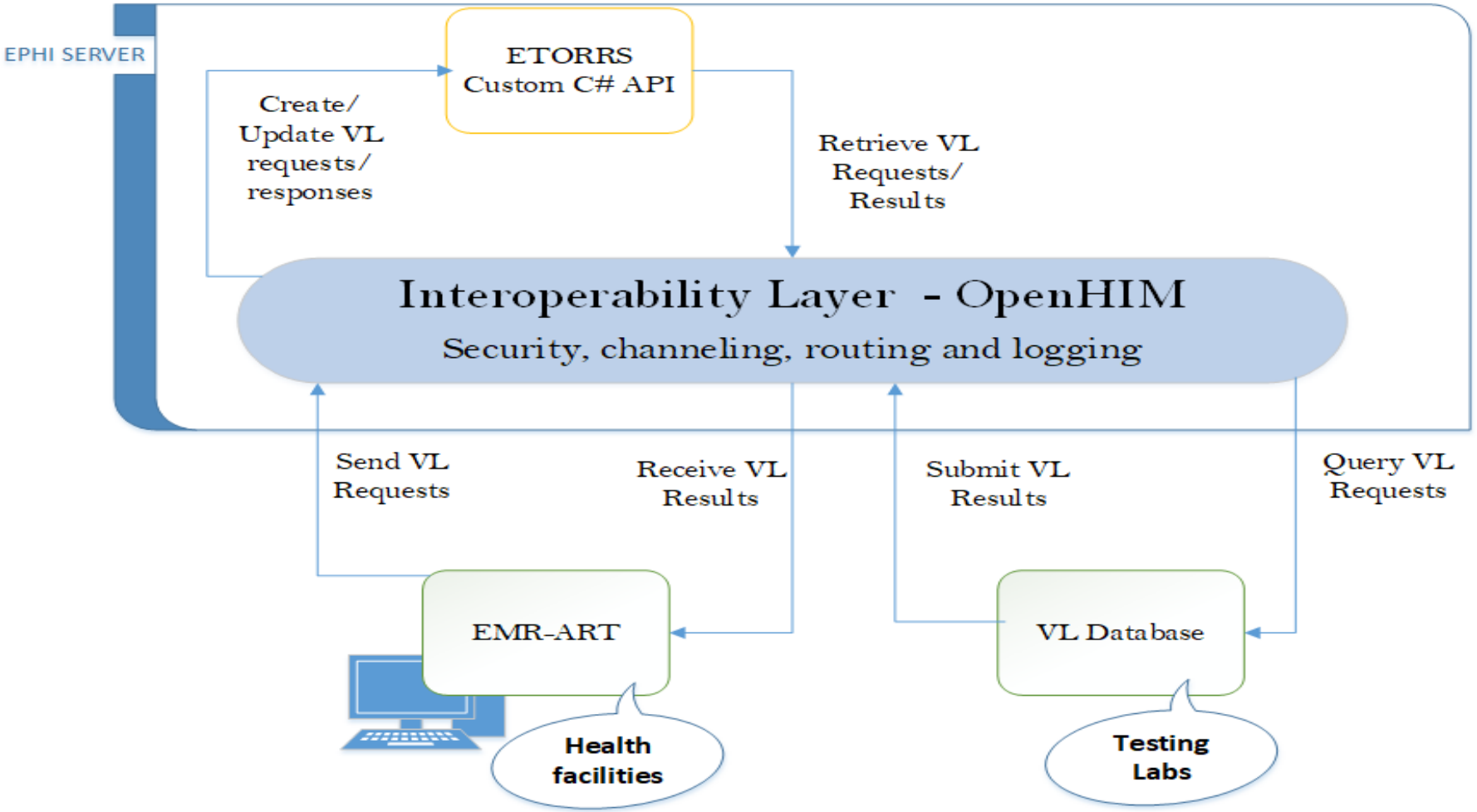
Regular TWG Meeting

Follow up on Assignments & Discussion

Working Together As One

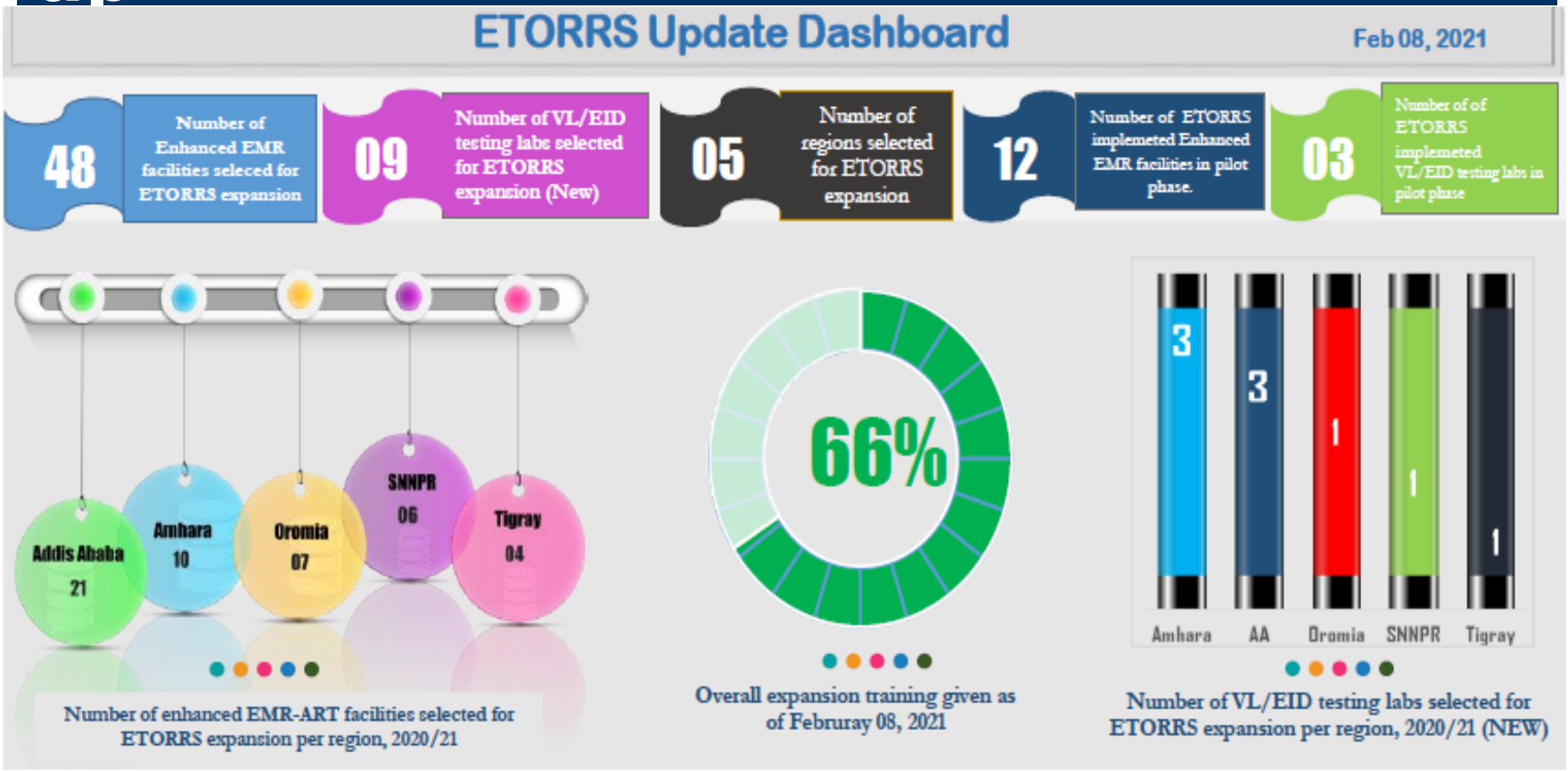
ETORRS

High level Architecture



ETORRS

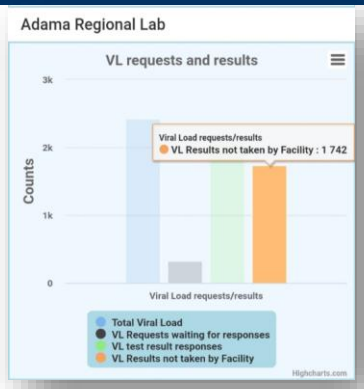
Implementation Status and Follow-up

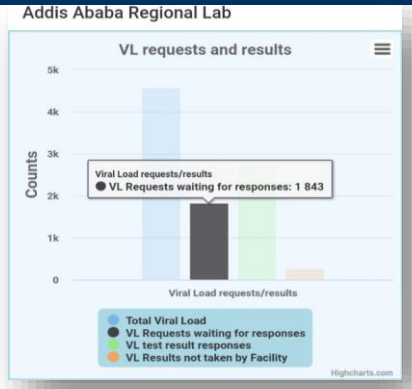


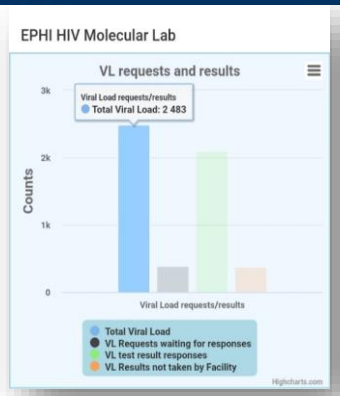
- At present 7 testing labs and 50 HF are connected and using the system

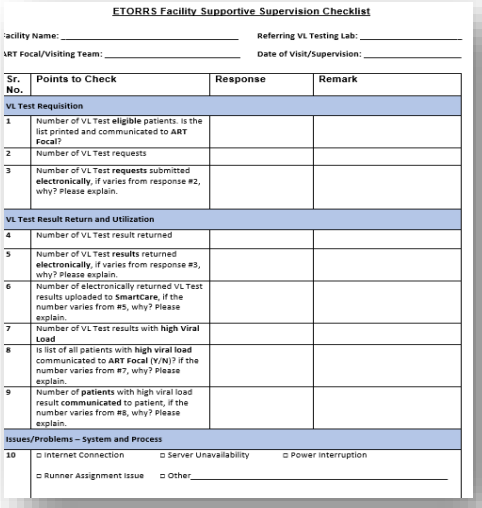
ETORRS

Implementation Status and Follow-up







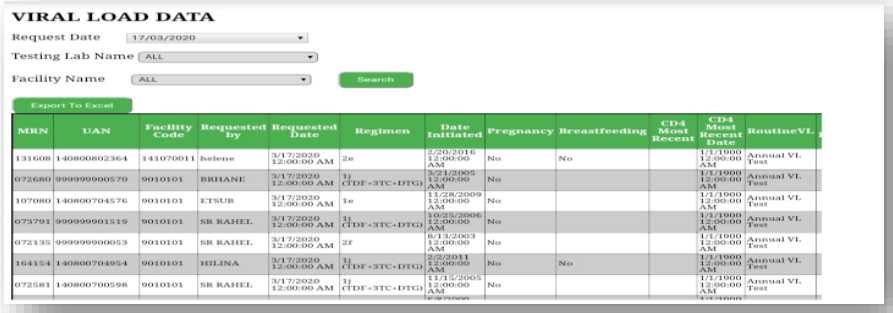


ETORRS Facility Supportive Supervision Checklist

Facility Name: _____ Referring VL Testing Lab: _____

ART Focal/Visiting Team: _____ Date of Visit/Supervision: _____

Sr. No.	Points to Check	Response	Remark
VL Test Requisition			
1	Number of VL Test **eligible** patients. Is the list printed and communicated to **ART Focal**?		
2	Number of VL Test requests		
3	Number of VL Test **requests** submitted **electronically**, if varies from response #2, why? Please explain.		
VL Test Result Return and Utilization			
4	Number of VL Test result returned		
5	Number of VL Test **results** returned **electronically**, if varies from response #3, why? Please explain.		
6	Number of electronically returned VL Test results uploaded to **SmartCare**, if the number varies from #5, why? Please explain.		
7	Number of VL Test results with **high Viral Load**		
8	Is list of all patients with **high viral load** communicated to **ART Focal** (Y/N)? if the number varies from #7, why? Please explain.		
9	Number of **patients** with high viral load result **communicated** to patient, if the number varies from #8, why? Please explain.		
Issues/Problems – System and Process			
10	☐ Internet Connection ☐ Server Unavailability ☐ Power Interruption ☐ Runner Assignment Issue ☐ Other_____		



VIRAL LOAD DATA

Request Date 17/03/2020

Testing Lab Name ALL

Facility Name ALL

Search

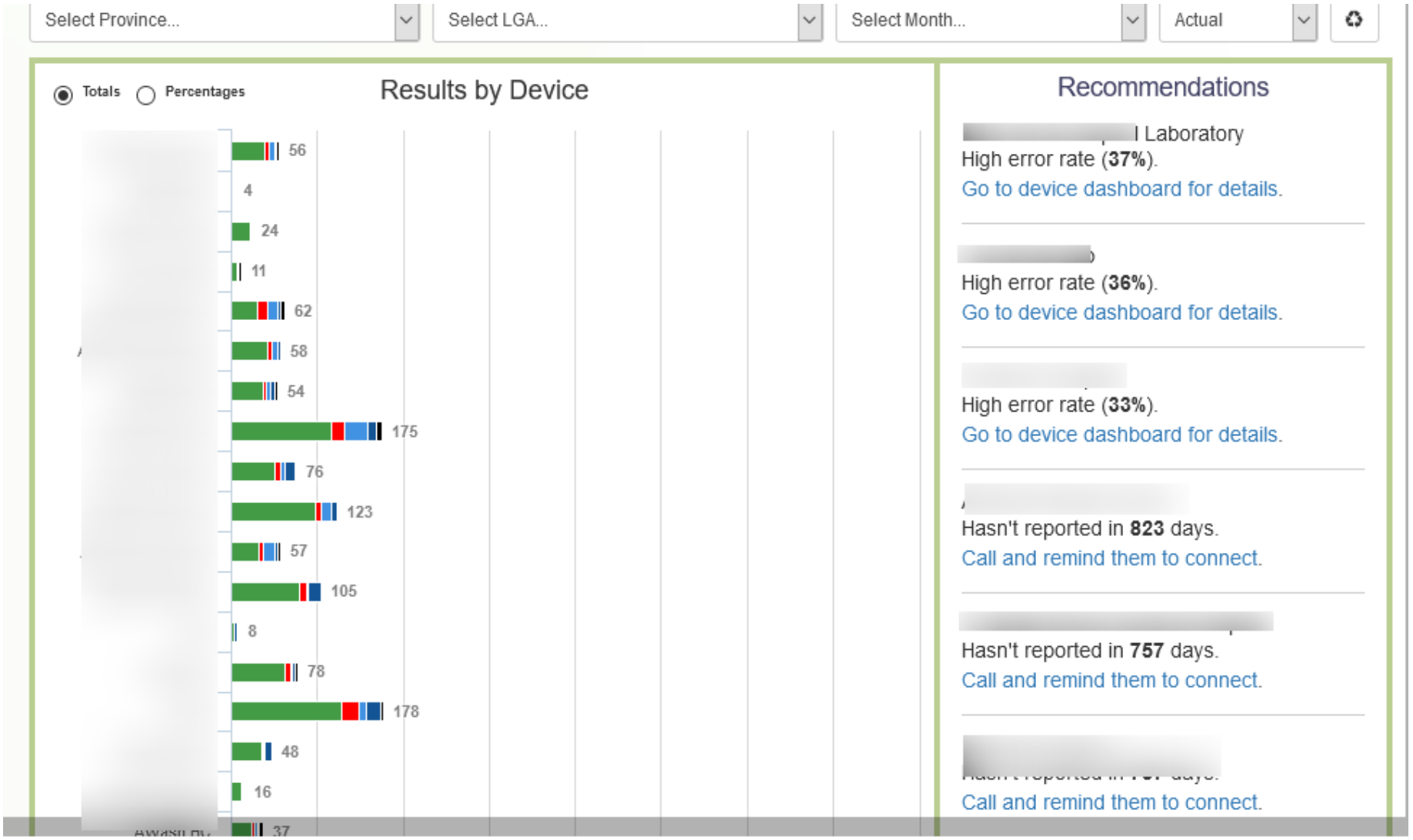
Export To Excel

MRN	UAN	Facility Code	Requested by	Requested Date	Regimen	Date Initiated	Pregnancy	Breastfeeding	CD4 Most Recent	CD4 Most Recent Date	RoutineVL
131608	140800802364	141070011	helene	3/17/2020 12:00:00 AM	2e	2/20/2016 12:00:00 AM	No	No		1/1/1900 12:00:00 AM	Annual VL Test
072680	999999900570	9010101	BRHANE	3/17/2020 12:00:00 AM	1j (TDF+3TC+DTG)	3/21/2005 12:00:00 AM	No			1/1/1900 12:00:00 AM	Annual VL Test
107080	140800704576	9010101	ETSUB	3/17/2020 12:00:00 AM	1e	11/28/2009 12:00:00 AM	No			1/1/1900 12:00:00 AM	Annual VL Test
073791	999999901519	9010101	SR RAHEL	3/17/2020 12:00:00 AM	1j (TDF+3TC+DTG)	10/25/2006 12:00:00 AM	No			1/1/1900 12:00:00 AM	Annual VL Test
072135	999999900053	9010101	SR RAHEL	3/17/2020 12:00:00 AM	2f	8/13/2003 12:00:00 AM	No			1/1/1900 12:00:00 AM	Annual VL Test
164154	140800704954	9010101	HILINA	3/17/2020 12:00:00 AM	1j (TDF+3TC+DTG)	2/2/2011 12:00:00 AM	No	No		1/1/1900 12:00:00 AM	Annual VL Test
072581	140800700598	9010101	SR RAHEL	3/17/2020 12:00:00 AM	1j (TDF+3TC+DTG)	11/15/2005 12:00:00 AM	No			1/1/1900 12:00:00 AM	Annual VL Test

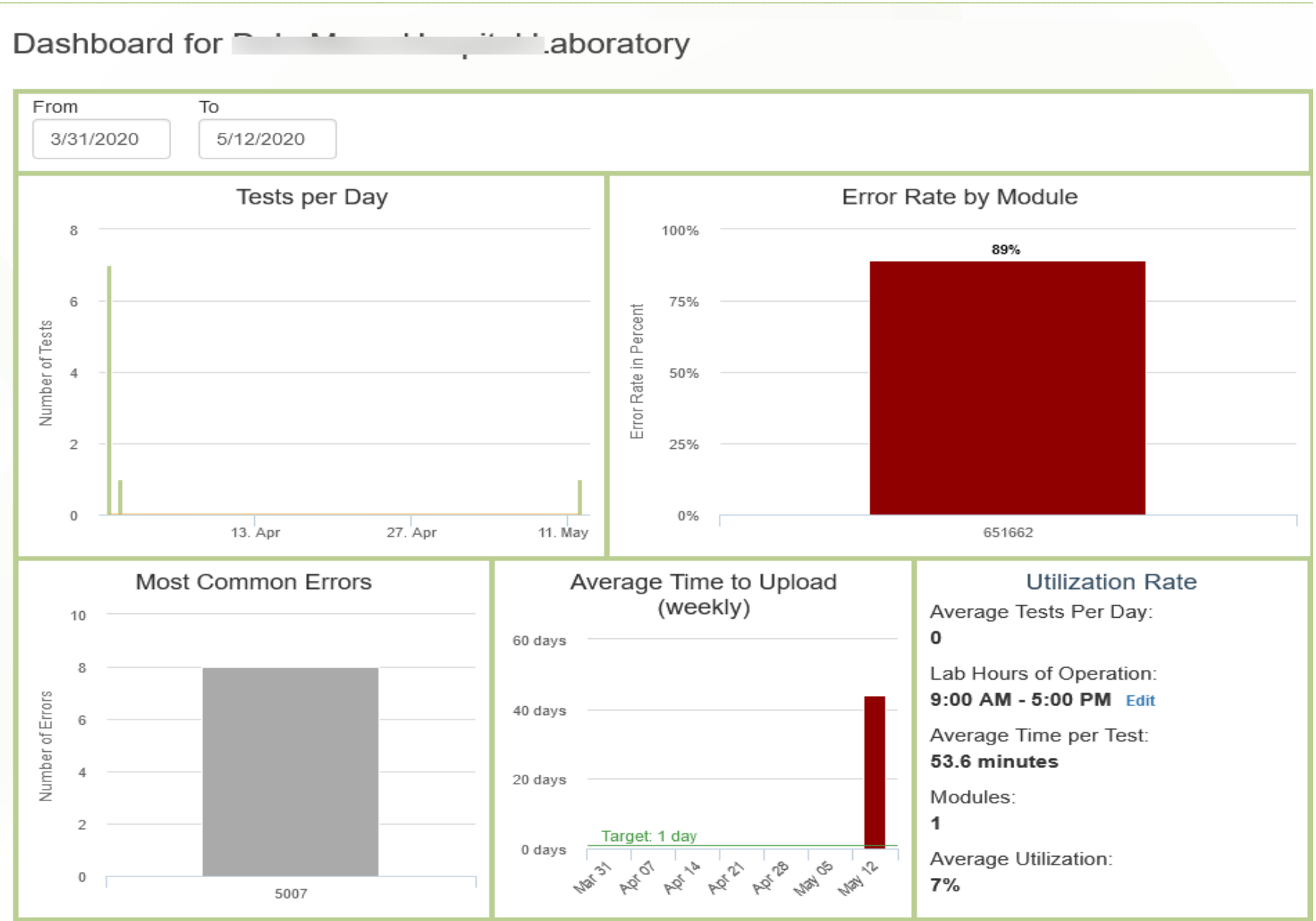
GxAlert System

- GxAlert, is a web-based system based on the Aspect™ software platform designed to work with the Cepheid's GeneXpert.
- Initially used for MTB/RIF , now upgraded to visualize and report data for GeneXpert HIV1-Qual Result (EID)
- Provides dashboard and information that impact on :
  - Clinical work, through text-messaging to provide real-time alerts about diagnoses to appropriate clinical staff
  - Supply chain management
  - Health policy, allowing ministries of health to understand how disease is moving and where to focus resources in real time.

GxAlert System



GxAlert System



Custom Field Data Capturing

- ✓ Following the POC EID scale up, significant number of EID test is done on GeneXpert machines and EID test data is available in two separated dashboards
- ✓ Integration of POC EID data with the national dashboard was recommended by MOH and it is essential for single point of access to data
- ✓ Integration requires complete dataset to be captured both from the POC and convectional testing labs
- ✓ Cepheid's GeneXpert DX software allows capturing of only limited data sets like patient ID and Sample ID
- ✓ Custom field data capturing is an effort to capture all clinical information's available on the request form using GXConnect software used for sending data to the GXAlert dashboard

Major Challenges and Responses

Internet connectivity- poor service internet in few testing labs

Response

- **Discussing with lab heads on availability of usable internet for data sync**

Low capacity server resulting slow response

Solution

Upgrade the capacity of computers to mid range servers

Data Backlog

Response

- **This is mainly due to staff turnover and lack of follow up on data entry**
- **Temporary network setup for using multiple station to clear backlog and arrange onsite training to part-time data clerks**

Hardware failure which might lead to loss of data

Response

- **and re installation of the system Regular back up and , troubleshooting and recovery**