mHealth KENYA
Public Private Partnerships
We Develop, Implement & Sustain

Big Data and AI for achieving UHC: An international consultation on Ethics

WHO & University of Miami

12-13 October 2017

Presented By: Cathy Mwangi, PhD

CEO: mHealth Kenya

Current Situation

- According to the GSMA report (2016) titled Mobile Economy; Mobile growth is increasingly focused on the developing world: more than 90% of the incremental 1 billion new mobile subscribers forecast by 2020 will come from developing markets.
- The number of smartphone connections globally will increase by 2.6 billion by 2020, and again around 90% of that growth will come from developing regions[1].
- The Kenya Communications Authority in its third quarter report of financial year 2016/2017 estimated the number of mobile phone subscriptions to be 39.1 million.
- With a population estimate of 45.1 million people, Kenya's mobile phone penetration stood at 86.2% during the reporting period[2].
- Use of mobile innovations have been embraced making MPESA one of the most successful mobile money app in the world

Challenges Facing Kenyan Public Health System

- First quarter 2017, medical doctors in the public sector were on strike for more than 100 days
- Currently, nurses in the pubic sector have been on strike for more than 150 days and going…
- The public sector is currently paralyzed and you can not dare get sick now if you cannot afford to visit a private hospitals or travel to India
- Other challenges:
  - *Unsystematic disorganized data capture*
  - *Weak storage and analytical Infrastructure*
  - *Human resource deficits*
  - *Security, privacy and confidentiality*
  - *Adoption and sustainability*

Use of mHealth In Kenya

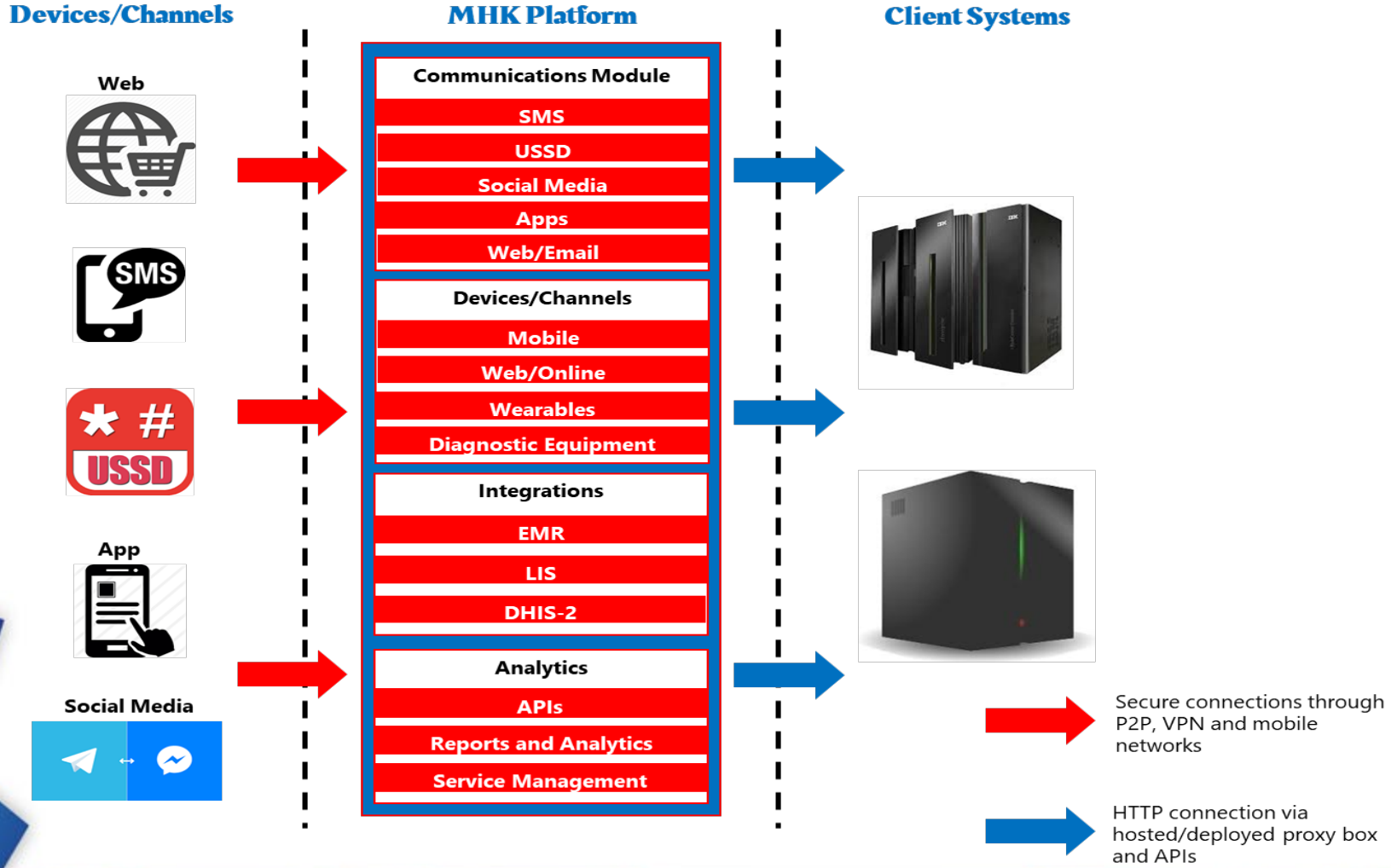
- *Adherence and wellness messages*
- *Data collection/ data capture tools*
- *Training Health Care Workers*
- *Transmission of laboratory results*
- *Mobile electronic medical record (EMR)*
- *Emergency alerts*
- *Notifications to patients*
- *Notifications to health care workers (HCWs) on patients' conditions*
- *Empowering patients by providing useful information*
- *Empowering Community Health Workers get information that assists them make the right decision*

About mHealth Kenya

- mHealth Kenya is a company that provides a critical needed link between public and private entities to support, improve, optimize and sustain provision of eHealth services in Kenya with our primary partner being the Ministry of Health
- mHealth Kenya is a pioneer of mobile health technologies and initiatives bringing together a team of experts with a diversity of knowledge, experience, and deep understanding of the health sector
- Our experience includes health information system projects design, development and implementation, mobile and network communication technology, and support in development of policy documents within the E-Health space
- We work closely with many developers, implementing partners and academia. Technology innovations and big data use cannot happen without collaboration with other partners
- Our services are used by clinicians, patients, hospital management and administration, county and national government administration

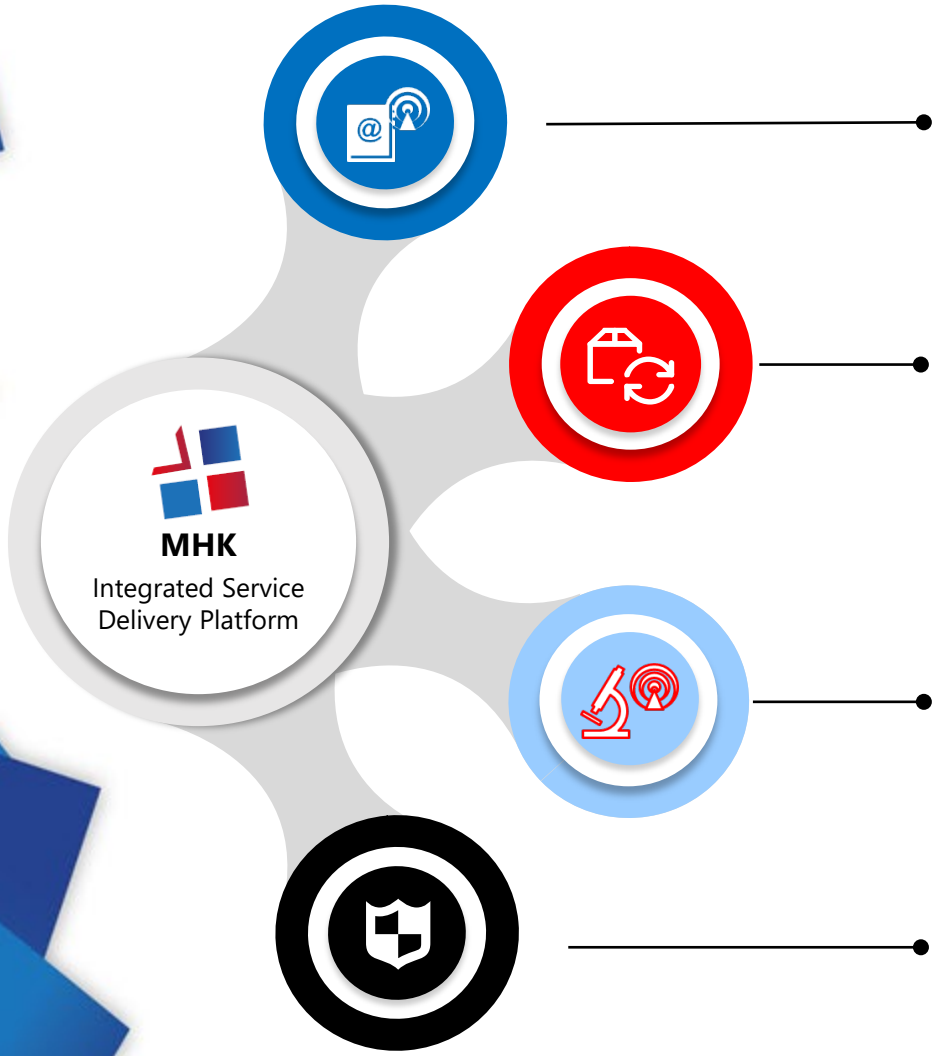
Our mHealth Platform

We have developed a platform that supports all services, channels and client systems currently operational in the healthcare space.



Data collection services

Our platform hosts 4 services as follows:



Digital diary and communications service

The digital diary supports healthcare workers at facility level to identify clients to be seen on particular days. It provides automated communication to clients for bookings and reminders for clinic appointments as well as scheduled motivational and educative information via SMS to consenting clients.

Logistics and inventory service

The logistics and inventory service provides facilities, partners, counties and other stakeholders with tools to manage, monitor and report on the status of commodities at the facility. It provides realtime tracking information on the order of commodities from factories to consumption. It can be customized to show dashboards and analytics showing consumption of commodities as per requirements.

Laboratory results transmission service

The laboratory results transmission platform in a web and mobile-based system that sends results from laboratories to facilities, clinicians and patients as soon as results are uploaded to a Laboratory Information System. It uses SMS technology to automatically transmit the results to a designated mobile number. It provides detailed analytics for tracking and follow-up

Emergency reporting service

The emergency reporting service allows the public to send in reports of public health events for coordination of response. The system operates on SMS technology and can be integrated to a call center for data capture and for management of incidents. The service can be integrated to all emergency responders such as the police, ambulance services, Kenya Red Cross and county rapid response teams to coordinate response to the incidents.

Projects

1. Digital diary and communications services

- A service available either as an app or a web portal depending on client use cases.
- Digital diary replaces paper diary and provides a breakdown all appointments including missed appointments and unplanned visits
- Digital communications sends SMS reminders to clients to come for clinic visits. Can schedule wellness and educative messaging to clients to enhance adherence to clinic visits, drug regimens and good healthy behaviours and customizable into local languages.

Care for the Carer (C4C)

Key Client

MINISTRY OF HEALTH
REPUBLIC OF KENYA

USHAURI
Getting Better One Text At A Time

Key Client

NASCOP

National Aids & STI Control Program

Text 4 Adherence

Key Clients

Elizabeth Glaser Pediatric AIDS Foundation

Until no child has AIDS.

chs
Centre for Health Solutions - Kenya

Digital Diary & Communication Services

SMS: "How \?"

" ?"

" ?"

SMS Wellness Check

" ine" or " ot fine"

" " or " "

" " or " "

Monday

(Day and Time based on patient's preference)

If necessary

Patient Education

Health Advice

Automated Diary

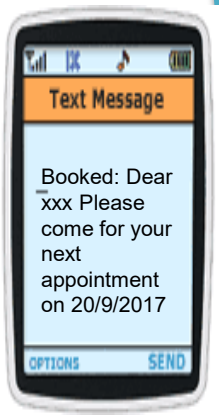
Sending Appointment Reminders

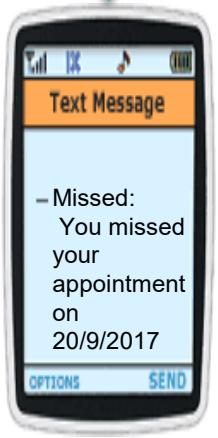
*Derived from **focused group discussions** with HCW and **patients**

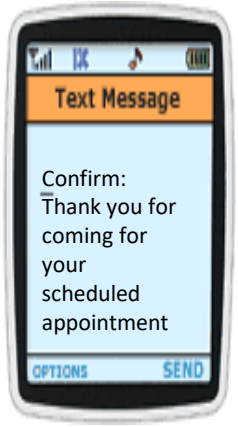
(Currently has English, Swahili & Luo)

What is T4A appointments service?

- ✓Appointments monitoring
- ✓Refills, test :VL and CD4
- ✓Follow up
- ✓Adherence
- ✓Treatment failure early detection







Our projects

2. Logistics and inventory service

- A monitoring service that allows stakeholders to order and track their commodities and produces detailed analytical information
- Service is available as an application or a web-portal and can be customized based on client requirements and KPIs
- Service can also be used by individuals to enter information on consumption of commodities

Our projects

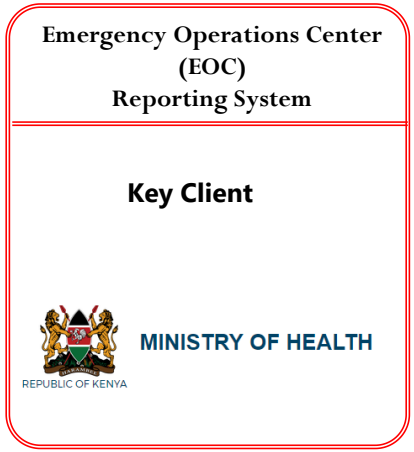
3. Laboratory results transmission service

- A mobile and web service integrated to a Laboratory Information System (LIS) that sends results via SMS as soon as they are available
- The service supports cascaded access to allow a clinician to assign a distinct mobile number rights to receive results
- Service also allows patients to receive results from the lab on a real-time basis

Our projects

4. Emergency reporting service

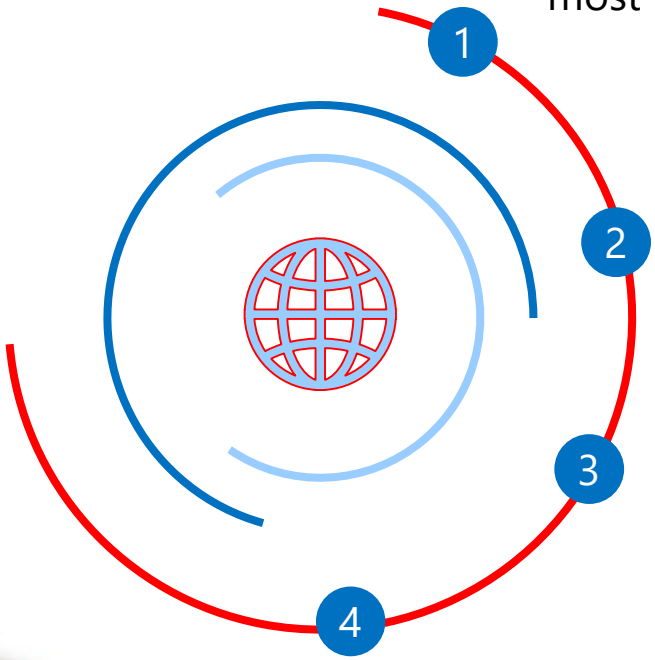
- Web based system that allows management of emergencies, incidents and events reported. Service can be open to specific cohorts (e.g. health care workers, employees) or can be open to the public
- Service can send cautionary alerts via SMS, either scheduled or managed through a central location.
- Service contains an incident manager, GIS mapping/heat maps and is able to do predictive analysis based on historical reports.



Our value proposition

Convenience

Our platform allows healthcare workers to provide services to their clients with ease and available in the most remote geographic regions



Scalable

Our platform leverages mobile technology, especially SMS, that allows us to implement at scale and they are continuously improved based on challenges faced during implementation

Analytics

We provide cognitive and intuitive analytics allowing our clients to make fact-based decisions

Agile

Delivery of our platforms can be customized to suit our clients' needs. They can be accessed and operated on the web and on mobile devices

Implication of mobile phone penetration

- The increasing advancements from basic phones to smart phones, penetration and use of mobile phone technology in Kenya adds sense to the definition of the concept of big data using the element of the 5 V's
  - Volume
  - Velocity
  - Variety
  - Validity
  - Value
- The increasing advancements from basic phones to smart phones enabling the capability to **hold**, **transmit**, and **access high volumes of data**, at **high speed**, **in different formats** of **different quality** than ever before

Potential and benefits of big data in Kenya

- Health sector already producing lots of big data via innovations geared towards digitization of care

Examples:

DHIS-2
Electronic medical records Other
mobile and web-based platforms

- Communication companies also producing data are Safaricom, Airtel and Telecom in Kenya
- Social media sites such as Facebook, Twitter, and Instagram could provide good big data sources for public health
- Data produced currently is rarely taken seriously, never analysed and most of the times never put to use in informing actions by relevant authorities.
- Tapping into big-data could indeed revolutionize the health sector in Kenya in many ways by generating knew knowledge, disseminating knowledge and information, translating personalized medicine initiatives into clinical practices

Use of DHIS 2 data

List of Countries that are using DHIS2

1. Afghanistan	2. Ghana	3. Namibia	4. Sudan
5. Bangladesh	6. Guinea Bissau	7. Niger	8. Tanzania
9. Benin	10. DRC	11. Nigeria	12. Gambia
13. Algeria	14. India	15. Rwanda	16. Tajikistan
17. Bhutan	18. Laos	19. Samoa	20. Timor Leste
21. Burkina Faso	22. Liberia	23. North Korea	24. Uganda
25. Burundi	26. Kenya	27. Sierra Leone	28. Zimbabwe
29. Burkina Faso	30. Malawi	31. Senegal	32. Vanuatu
33. Cameroon	34. Mozambique	35. Solomon Islands	36. Togo
37. Congo Brazzaville	38. Mexico	39. South Sudan	40. Zambia
41. Colombia	42. Myanmar	43. Sri Lanka	44. Zanzibar
45. Cote d'Ivoire	46. Nepal	47. South Africa	48. Vietnam

Red indicates countries that have implemented DHIS 2 completely. The rest are still in the process.

Reference

https://www.dhis2.org/

What countries are doing with DHIS-2

Zambia

- Collection of data from facilities in every part of the country
- DHIS-2 mobile being used in the eradication of Malaria with reports on stocks, cases and lab results while using trend analysis for monitoring

Ghana

- Used since 2012 and currently being used nationwide
- Case-based data from inpatient admissions and deaths enabling more accuracy in morbidity and also mortality statistics

Tanzania

- DHIS-2 is rolled nationwide with data from facilities sent monthly using HMIS tools
- Use for disease surveillance and emergency response
- Pay for Performance payout model in the DHIS-2 National data store which helps health service providers to fully monitor and supervises their performance and payments through DHIS

What countries are doing with DHIS-2

Kenya

- Kenya was among the first country in Sub-Saharan Africa to put in place a completely online national HIS in September 2011
- Country-wide use with over 2000 users doing data entry and data analytics features in DHIS 2 helping counties to improve on management of health districts and also other administrative areas by county officer.
- The Kenya ministries of health permits people to self-register their account, so people are free to log in and have a look.
- DHIS 2 system in Kenya is seeing growth in the use of the collaborative tools. District officers from all over the country are using Interpretations to share charts and also to discuss where interventions are needed to improve health care, and every day many users send feedback messages or ask for support to the national team using the messages feature.

mHealth Kenya contribution towards bridging the big data gap

- Linking through integration with other government owned sources of data to make good of informing service delivery

- The EOC reporting system indicated above is our first successful step towards coordinated real time collection, analysis, reporting and stimulating response to emergencies in Kenya

- mHealth Kenya team played a key role in the development of the Kenya mHealth Standards and Guidelines, 2017 and the Kenya National eHealth Policy 2016 - 2030

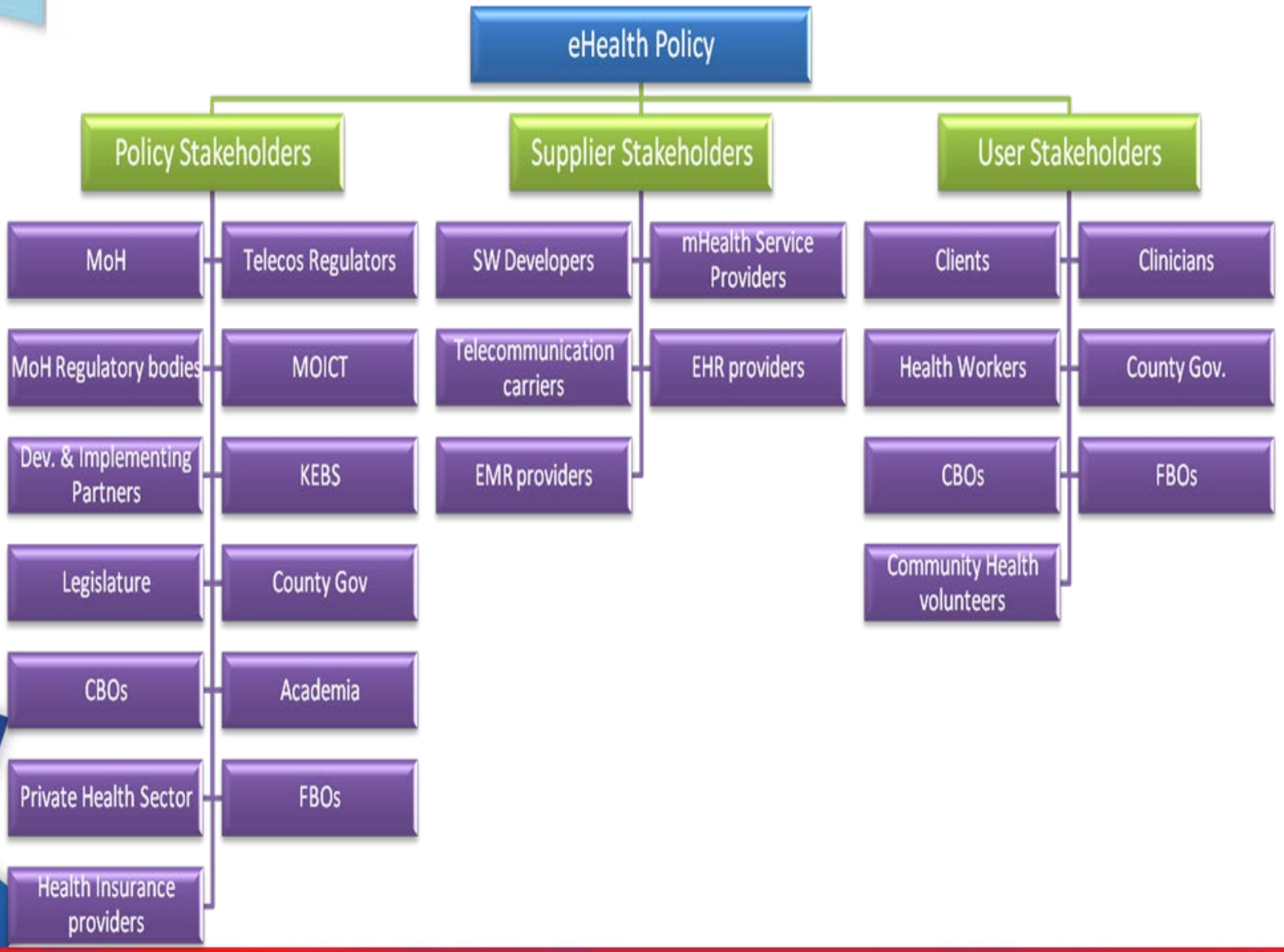
mHealth Kenya contribution towards bridging the big data gap

EOC system developed by mHealth Kenya has contributed to the fight and eradication of Guinea Worm Disease (GWD) in Kenya as follows:

- Monitoring and reporting the extent of GWD in Kenya through the information that is recorded at the Emergency Operations Center (EOC) situated in the DSRU in the Ministry of Health
- The EOC through call-ins by the watchers receives information from the members of the public
- The reports from the call-ins are analyzed and shared on daily basis
- The EOC has come in handy as the watchers have the module to click on to generate the situation reports
- The situation reports are shared promptly, as through the system the contacts of the officers are in the staff document
- The feedback of the call-ins is relayed to the focal person for GWD at the Ministry of Health for action (to appreciate the role of community in GWD)
- The EOC provides a platform for sharing information on GWD diseases
- The EOC system provides an avenue for awareness creation in Kenya for detection of cases as we move towards eradication of the disease

Kenya Standards and Guidelines for mHealth Systems 2017

eHealth Policy stakeholders



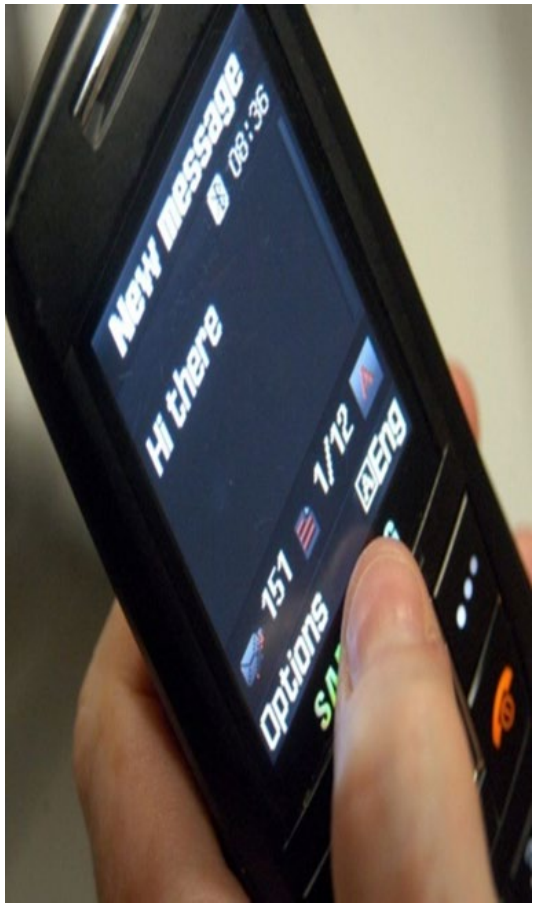
Areas covered in the standards and guidelines

Regulation

Certification Framework
Protection of Privacy and Confidentiality
Management of Disclosure of Health Information
Source Code and Application Ownership

Data Governance

Security
Validation
Ownership
Accountability



Legal and Ethical Concerns in addressed in the guidelines

Developers of mHealth systems must take the necessary steps to apply the principles of domestic legislation, such as the National Health Bill 2015, the Constitution of Kenya 2010 and the eHealth policy, in order to ensure that fundamental human rights of all individuals are respected with regard to processing of personal data. Implementers of mHealth system must ensure that:

- ***Data is obtained and automatically processed fairly and lawfully.***
- ***Data is collected for specified and legitimate purposes only.***
- ***Data is not used in any way that is incompatible with the purposes for which it was collected.***
- ***Data is stored only for as long as it is required for these purposes.***
- ***Data is recorded in an adequate, relevant, and non-excessive (proportional) manner visa-vis the said purposes.***
- ***Data must be accurate.***

mHealth systems must conform to ethical and legal requirements relating to:

- Ownership of data and information
- Access and disclosure of patient data
- Usage of patient data
- Storage of Personal Health Information and Personally Identifiable information
- Storage of health data: Health data must not be stored out of the jurisdiction of the Republic of Kenya without a written permission from the Ministry of Health (MOH)
- Remote diagnosis and prescription of medicine: The mHealth system must maintain confidentiality as per the eHealth policy guidelines
- Technology: **Collection, storage, transmission, sharing and usage of patient data** must be within the confines of the legal framework embodied in the Kenya Health Bill 2015, the Constitution of Kenya 2010, the Records Disposal Act, HIE guidelines and Data Protection Act requirements
- Any mHealth system must not infringe on any person's intellectual property rights

The future of big data is in effective partnerships