FEDERAL MINISTRY OF HEALTH

National Health ICT Strategic Framework

2015 - 2020

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Foreword

Nigeria is committed and aligned to the attainment of the Sustainable Development Goals (SDG) well ahead of the 2030 deadline. The cardinal pillar identified to support Nigeria's health goals is hinged on Universal Health Coverage (UHC). While Nigeria is making progress to attain this and other health goals, more needs to be done to fast track the progress.

Nigeria has equally advanced in her use of Information and Communication Technology (ICT) for citizen services. This has resulted in widespread application of ICT for health care delivery across the country. The full health benefits of these applications have not been realized due to uncoordinated Health-ICT ecosystem. This lack of coordination is responsible for duplication and wastage of resources and in some cases adverse health outcomes.

This Health ICT Strategic Framework is designed to address this anomaly. The Framework is a roadmap of actions for strategic application of ICT to help achieve universal health coverage, and other health goals and priorities. This effort will yield a harmonized and provide favorable environment for sustainable application of ICT in the health sector.

This plan will also guide State Ministries of Health, Development Partners, and the Private Sector in the applications of ICT to meet Nigeria's health goals and strategies. We therefore call on stakeholders in health and ICT to support our vision that, through strategic and coordinated investment and deployment of ICT based schemes in Nigeria:

"by 2020 Health ICT will help enable and deliver Universal health Coverage"

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Several organizations have been involved in developing the strategy. It is impossible to name all that contributed to this piece of work, but we would like to acknowledge as many as we can. They include but are not limited to: Departments of Federal Ministry of Health; the Federal Ministry of Communication Technology; the Saving One Million Lives (SOML) Programme Delivery Unit; the Nigerian Information Technology Development Agency (NITDA); the National Primary Health Care Development Agency; the National Agency for the Control of AIDS; the National Health Insurance Scheme (NHIS); National Agency for Food and Drugs Administration and Control; the National Identity Management Commission (NIMC); the Health Planning Research and Statistics Department of Federal Capital Territory Administration Health and Human Services Secretariat; the State Ministries of Health; and the State Ministries of Communications or Science and Technology.

Others are the Nigerian Communications Commission; the Digital Bridge Institute; the Universal Service Provision Fund; the Nigerian Communications Satellite Limited; the Centre for Management Development; and Galaxy Backbone Plc.; the SURE-P MCH PIU; the National Universities Commission; the Standards Organization of Nigeria; the Medical and Dental Council of Nigeria; Computer Professionals Registration Council of Nigeria.

We cannot thank enough and acknowledge the immense contribution from partners in non-governmental organizations and the private sector, such as the World Health Organization; John Snow Incorporated; Clinton Health Access Initiative; Health Information System Program (HISP); InStrat Global Health Solutions; Technology Advisers; AAJIMATICS; Pathfinder International; the Health Reform Foundation of Nigeria; the Praekelt Foundation; Maternal Action for Mobile Alliance; Groupe Speciale Mobile Association; and the Private Sector Health Alliance of Nigeria.

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Acronyms and Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CCT	Conditional Cash Transfer
CDC	Center for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CMD	Center for Management Development
CR	Client Registry
CRSV	Civil Registration and Vital Statistics
DBI	Digital Bridge Institute
DPRS	Department for Planning Research and Statistics
EMPI	Enterprise Master Patient Index
EMR	Electronic Medical Record
FCTA	Federal Capital Territory Administration
FMCT	Federal Ministry of Communication Technology
FMF	Federal Ministry of Finance
FMOH	Federal Ministry of Health
FR	Facility Registry
GBB	Galaxy Backbone
GSMA	Groupe Speciale Mobile Association
HDCC	Health Data Consultative Committee
HDGC	Health Data Governance Committee
HIA	Health in Africa
HIE	Health Information Exchange
HIS	Health Information System
HISP	Health Information Systems Program
HIV	Human Immunodeficiency Virus
HRH	Human Resources for Health
HRIS	Human Resource Management Information Systems
HWR	Health Worker Registry
ICT	Information and Communication Technology
ICT4SOML	ICT for Saving One Million Lives

IFC	International Finance Cooperation
IHE	Integrating the Health Enterprise
IL	Interoperability Layer
ITU	International Telecommunications Union
IVR	Interactive Voice Response
JSI	John Snow International
LGA	Local Government Area
LMIS	Logistic Management Information System
M&E	Monitoring and Evaluation
MAMA	Mobile Alliance for Maternal Action
MCCT	Mobile Conditional Cash Transfer
MCH	Maternal and Child Health
MDCN	Medical and Dental Council of Nigeria
MDA	Ministries, Departments and Agencies
MDG	Millennium Development Goal
MEMS	Monitoring and Evaluation Management Services
MSH	Management Sciences for Health
NACA	National Agency for Control of AIDS
NAFDAC	National Agency for Food and Drugs Administration and Control
NASCP	National AIDS Control and Prevention Programme
NCC	Nigeria Communications Commission
NCH	National Council on Health
NCS	Nigeria Computer Society
NDST	Network Data Services and Technology Ltd.
NHIS	National Health Insurance Scheme
NHMIS	National Health Management Information System
NIGCOMSAT	Nigeria Communications Satellite
NIMC	National Identity Management Commission
NIMS	National Identity Management System
NIN	National Identification Number
NITDA	National Information Technology Development Agency
NORAD	Norwegian Agency for Development Cooperation
NPHCDA	National Primary Health Care Development Agency

NPSCMP	National Product Supply Chain Management Programme
NTBLCP	National Tuberculosis and Leprosy Control Programme
NUC	National Universities Commission
OPENHIE	Open Health Information Exchange
PHC	Primary Health Care
POS	Point-of-Service
RH	Reproductive Health
SCMS	Supply Chain Management System
SDG	Sustainable Development Goal
SHR	Shared Health Record
SMS	Short Message Service
SOML	Saving One Million Lives
SON	School of Nursing
SURE-P	Subsidy Reinvestment and Empowerment Program
TS	Terminology Service
TWG	Technical Working Group
UHC	Universal Health Coverage
UN	United Nations
USAID	United States Agency for International Development
USD	United States Dollar
USPF	Universal Service Provision Fund
WHO	World Health Organization

Important Definitions

Both **Health Information and Communication Technology (Health ICT)** and **electronic health (eHealth)** refer to the use of information and communication technology (ICT) in support of health and health-related fields, including health care services; health surveillance; health literature; and health education, knowledge, and research. However, **Health ICT** is a more accessible term and extends beyond 'electronic' to involve concepts and systems (e.g., architecture and information systems) and communication (e.g., phone calls, bi-directional transfer of information) along with the necessary physical and technology infrastructure. Health ICT is more than electronic health records; it is applied across the health system and services to ensure continuity of patient care across time. It includes **mobile health (mHealth)** services, telehealth, health research, consumer health informatics to support individuals in health decision-making, and eLearning by health workers. In practical terms, Health ICT is a means of ensuring that correct health information is provided in a timely, coordinated and secure manner via electronic means for the purpose of improving the quality and efficiency of delivery of health services and prevention programs. **mHealth services**, in particular, focus on the application of mobile and other wireless technologies for health systems strengthening.

A **Health ICT Strategy** can serve as an umbrella for planning and coordinating different national Health ICT efforts while considering fundamental elements in terms of regulatory, governance, standards, human capacity, financing and policy contexts. An effective National Health ICT Strategy presents a set of interventions that the health sector plans to use to facilitate the efficient and effective delivery of services. Without an overarching national level strategy, ICT initiatives are left at the hands of individual organizations without coordination and a guarantee that they are in the best interest of clients. A national level Health ICT Strategy with sector-wide participation and ownership is an effort to fill this gap.

Frameworks serve as guides, rules or well-defined approaches towards addressing a particular matter. A **Health ICT framework** is specifically concerned with applying ICT in a health system. Different frameworks exist and can range from being general, and providing comprehensive approaches to governing the regulatory environment and guiding implementations within that context, to being specific and focusing on a particular aspect of Health ICT, such as data standards.

A **roadmap** is similar to a framework but is geared towards action. In a roadmap, goals and their corresponding activities are aligned in sequence to achieve an overarching vision. Thus, roadmaps contain action plans, mechanisms to monitor progress and resource forecasts (i.e., time, human resources, equipment, budget). Roadmaps are typically developed with stakeholders and reflect consensus. Inputs include a vision, current state of affairs, barriers and recommendations.

A **health information system (HIS)** is a system that collects, transmits, stores and manages health-related data. The data can be patient-specific (or row-level data) or aggregate. Reports can typically be generated from an HIS. If a system is primarily being used to inform and support health management practices, the system is referred to as a **health management information system**.

An **architecture** is a conceptual framework that is used to inform data collection, transmission, storage and sharing. Architectures show the integration of many components into a whole, as well as the interoperability that enables these components work together. Interoperability is the ability of an application or platform to establish a data exchange with another application or platform. For interoperability to occur, both services must use the same standards [for communication].

Standards serve as rules or guidelines that ensure consistency in the context in which they are applied. Standards can be used to align data, processes and systems. The standards development process is variable (e.g., government-mandated versus stakeholder-based). As such, it is possible for multiple standards to exist. Accordingly, formal alignment among the different standards is necessary.

These definitions were adapted from "Assessing the Enabling Environment for ICTs for Health in Nigeria: A Review of Policies." [1]

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Executive Summary

Beginning in late 2014 and in the first half of 2015, the Nigerian Federal Ministry of Health (FMOH) and Federal Ministry of Communication Technology (FMCT) led the multi-sectoral and stakeholder development of the National Health Information and Communication Technology (Health ICT) Strategic Framework. This framework, which incorporates the effort and inputs of over 150 public and private health and technology sector stakeholders, is a three-part document that articulates the collective vision and necessary actions of stakeholders involved in the health system in Nigeria. Borne out of the recognition for the opportunities that ICT present to support health systems strengthening and the achievement of health system goals, the National Health ICT Strategic Framework positions Health ICT within the current context of the health system. This means addressing Universal Health Coverage (UHC), one of the main priorities of the Federal Government of Nigeria.

Strategic Context

Nigeria is poised to become a major global powerhouse. Currently, Nigeria is Africa's largest economy and most populous nation. By 2050, Nigeria is expected to be one of the ten largest economies in the world and is already Africa's most populous country. Despite these economic gains, close to half of the population lives in poverty and life expectancy is projected to only increase marginally. Accordingly, health needs and priorities, along with demographic trends, must be considered to ensure the appropriate allocation of resources and optimize strategies to address the issues.

The government is developing and implementing policies and programs to strengthen the National Health System to support attainment of UHC. Initial focus is on primary health care, and innovations including the use of Health ICT to improve service delivery, access and coverage have been prioritized. Health ICT must be in alignment with the clear, actionable goals of the health system to help achieve UHC and improve service delivery.

Health ICT Vision

Subsequently, the National Health ICT Vision was established through an iterative stakeholder engagement process led by the FMOH and FMCT. With UHC as a national health priority, the vision was articulated through the following powerful statement:

> ***"By 2020, health ICT will help enable and deliver universal health coverage in Nigeria."***

To ensure that the vision can be achieved, the enabling environment components of the World Health Organization-International Telecommunications Union eHealth Strategy Toolkit were used to structure and craft the Health ICT Framework. The specific prioritized activities within Leadership and Governance; Strategy and Investment; Architecture, Standards and Interoperability; Legislation, Policy and Compliance; Capacity Building;

Infrastructure and Solutions (Services and Applications) reflect the current state and needs of the Nigerian health system as well as stakeholder recommendations on the appropriate Health ICT response.

Action and M&E Plans

Drawing from the recommendations for Health ICT to support the achievement of UHC and other health system goals and activities, an action plan was developed. A Theory of Change included as part of this plan articulates the pathway to change from Health ICT enablers to prioritized ICT-related actions to health system priorities and the achievement of UHC. The action plan forms the basis for the roadmap and orients the implementation of prioritized activities. It informs the steps that those governing and involved with the achievement of the Health ICT vision will need to make. The monitoring and evaluation (M&E) plan and budget build on activities outlined in the action plan. The M&E plan provides a link between the vision, action plan and desired results and the budget estimates the resources needed to attain the vision. The indicators captured in the M&E plan reflect short- and long-term activities as guided by the Theory of Change.

The overall approach is separated into three phases over a five-year time period.

PHASE 1: Set-up (Year 1)

PHASE 2: Deploy, Maintain and Support (Year 2 and Year 3)

PHASE 3: Consolidate and Continuous Review (Year 4 and Year 5)

Over the next five years, the National Council on Health, as owners of the Health ICT vision, will oversee the activities according to the action plan. The council will be guided and supported by the Health ICT Steering Committee, Project Management Office and Technical Working Group. Working collaboratively, the vision of Health ICT can be achieved.

This Nigerian National Health ICT Strategic Framework provides a vision and guide for alignment of current investments in technology within the health system towards a digitized health system that will help Nigeria achieve UHC by 2020.

Part I: Vision for Health ICT

PART I. SECTION 1:
STRATEGIC CONTEXT FOR HEALTH ICT

With a growing population and economy, Nigeria is emerging as a major global powerhouse. To maintain the path to prosperity, improvements in the health system are needed to ensure and optimize the health and wellbeing of the country's citizens. The Government of Nigeria recognizes that a healthy population is important for socio-economic development.

As Africa's largest economy and most populous nation, Nigeria is experiencing substantial economic expansion, yet the country's health system is strained. The country's economy is growing at an average annual rate of 7% and is expected to be among the ten largest economies by 2050.[2,3] Despite the country's economic gains, the overall health status of the Nigerian population is poor (as defined by the 2013 Nigeria Demographic and Health Survey);[4] infectious and non-communicable diseases remain among the leading causes of morbidity and mortality,[5,6,7,8] continuing to take their toll on the health and survival of Nigerians; and health coverage and financing remains low.[9,10,11]

Population and health status

- Over 46% of the population continues to live in poverty (2010 estimate)[2,3]
- Rural-urban divide is projected to increase [2,3]
- Maternal and under-five mortality rates remain high at 576 deaths per 100,000 live births and 201 deaths per 1,000 live births, respectively [4]
- Life expectancy at birth is projected to only increase marginally from 54.2 years to 56.2 years over the next 10 years (2015-2025) [2,3]

Burden of infectious and non-communicable diseases

- Nigeria is second to South Africa in the number of people living with HIV/AIDs worldwide. This represent 9% of Global burden of the disease" and a declining prevalence rate of 4.1 as of 2010. (NDHS 2013, page 224)
- Malaria is the leading cause of infant and child mortality [7]
- Diseases such as hypertension, diabetes and coronary heart disease also represent an increasing share of Nigerians' burden of disease [4]

Low health coverage and financing

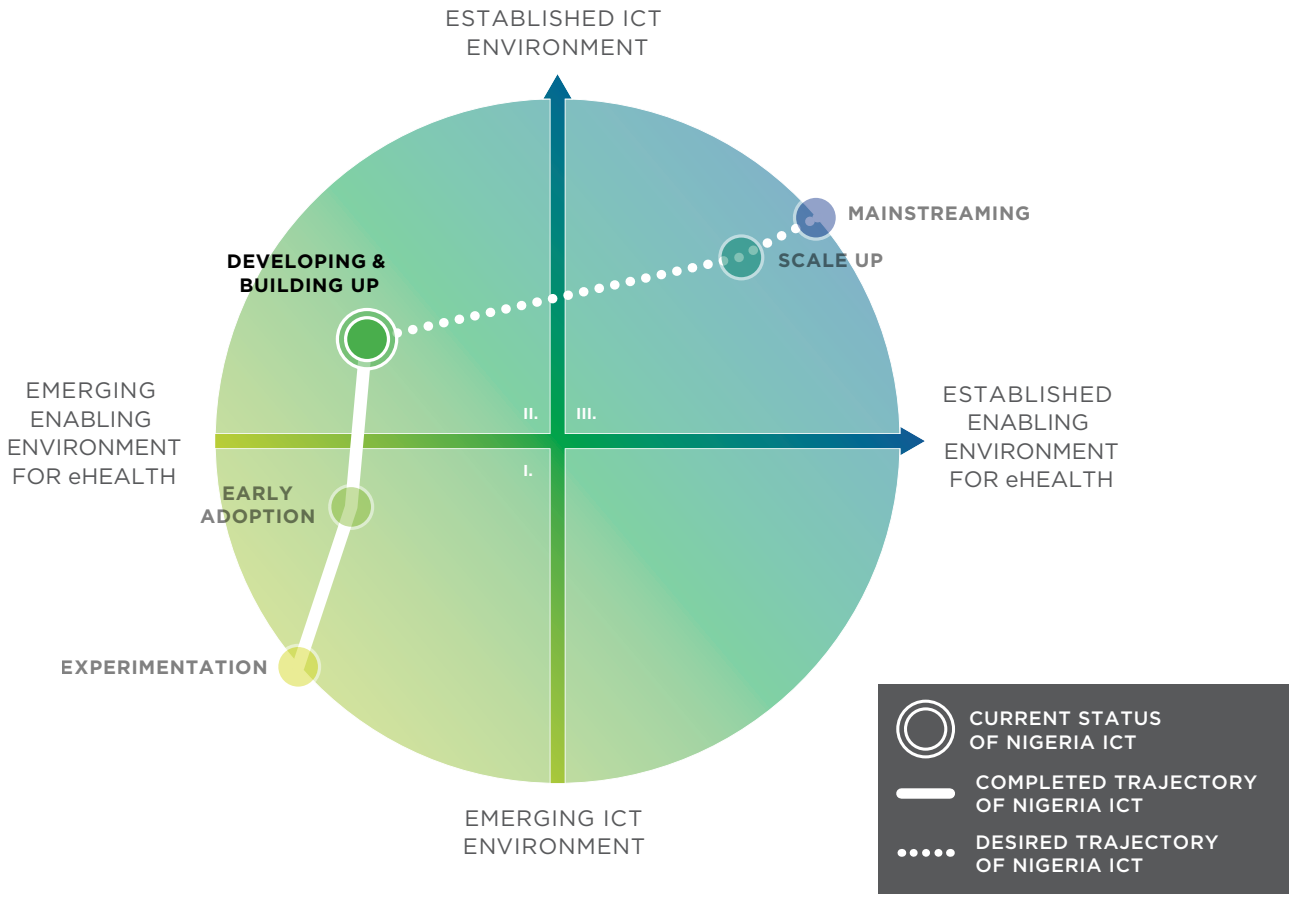
- As of 2013, fewer than 5% of the population were insured [4]
- Nigeria is among the 23 African nations that spends more than USD44 per capita on health care, however, the government expenditure on health is 6.1% of the gross domestic product — which is below the Abuja Declaration's target of 15% [7, 9]

Despite the health challenges, Nigeria's rising telecommunications and information and communication (ICT) sectors and the global proliferation of ICT for health (Health ICT) are creating new opportunities to strengthen the health system and improve the overall delivery of health services. Accordingly, Health ICT can be used to generate demand, increase access to and improve the quality of health services. Furthermore, Health ICT addresses the critical need to coordinate information and resources across the health system in a timely manner.

As a result of these opportunities and the Government of Nigeria's commitment to ICT, an assessment of the enabling environment for Health ICT was conducted in 2014. The report, *Assessing the Enabling Environment for ICTs for Health in Nigeria*, identified the need for a coordinated Health ICT Strategy. In addition, the report concluded that Nigeria is transitioning from 'experimentation and early adoption' to 'developing and building up' (*see* ***Figure 1***).[12]

In order to advance the enabling environment and support scale-up of initiatives, a unifying Health ICT Strategic Framework is required. A Health ICT Strategy will enable Nigeria to leverage current and future ICT investments to build an integrated national health information infrastructure and help enable Universal Health Coverage (UHC) by 2020.

FIGURE 1. Current State of Nigeria's Enabling Environment for Health ICT [13]



Identifying the potentials of Health ICT, the Government of Nigeria has begun to prepare and introduce the necessary building blocks to facilitate the digitization of the health system. The Federal Ministry of Health (FMOH) and the Federal Ministry of Communication Technology (FMCT) have collaboratively led an inclusive effort to set-up this strategic framework for Health ICT as well as a guiding architecture, health information exchange (HIE) and supportive policies, plans and budgets to improve health and wellbeing for all citizens through technological advancements and innovation. This document, the National Health ICT Strategic Framework, is meant to guide the deliberate and judicious use of ICT within the health system to enable the delivery of quality, affordable and equitable health services to all citizens. This National Health ICT Strategic Framework will facilitate the identification, prioritization and implementation of appropriate technologies that can potentially lead to a strengthened national health system.

PART I. SECTION 2:
VISION FOR HEALTH ICT

The FMOH, in collaboration with the FMCT and other Government of Nigeria Ministries, Departments and Agencies (MDAs); donors; and implementing partners, (*see* ***Appendix 1***) has developed, through an inclusive and iterative process, a collective vision for the use of Health ICTs in Nigeria.

> ***"By 2020, health ICT will help enable and deliver universal health coverage in Nigeria."***

UHC attainment will ensure that all Nigerians have access to the services they need without incurring financial risks. Specifically, UHC means health insurance becomes economical, whereby the cost of care is not a burden. It means equitable access to affordable and quality health services. It also means that the health system must be functional to ensure that supply meets the needs specified by demand. It is because of this last point that the value of Health ICT is so substantial. With its ability to support health systems strengthening, Health ICT can be used to improve the health system and ensure its adequacy for scaling up health insurance and health coverage over the next five years.

The successful use of Health ICTs to achieve UHC in Nigeria will achieve:

- Improved access to health services through the effective use of telemedicine and other ICTs for health worker training and support
- Improved coverage of health services through the effective use of Civil Registration and Vital Statistics (CRVS), National Identity Management System (NIMS), Human Resource Management Information Systems (HRIS), National Health Management Information System (NHMIS) and Logistic Management Information System (LMIS) for tracking demand and supply of health services and commodities
- Increased uptake of health services through the effective use of mobile messaging and cash transfer incentives for demand creation
- Improved quality of care through the effective use of ICT for decision support within the continuum of care

- Increased financial coverage for health care services through the effective use of ICT for the national health insurance scheme (NHIS) and other health-related financial transactions
- Increased equity in access to and quality of health services, information, and financing through the effective use of ICTs for delivering appropriate health services for those who need them

Figure 2 depicts the Nigeria National Health ICT Vision, mapping the goal of UHC with Health ICT outcomes and the long-term ICT output. The National Health ICT Vision embodies the development goals of the Government of Nigeria and provides a concrete target for stepwise, long-term investments into nationally scaled and integrated Health ICT services and applications. This would all be supported by a national Health Information Exchange (HIE), and implemented with appropriate governance, funding, infrastructure & equipment, training and policies.

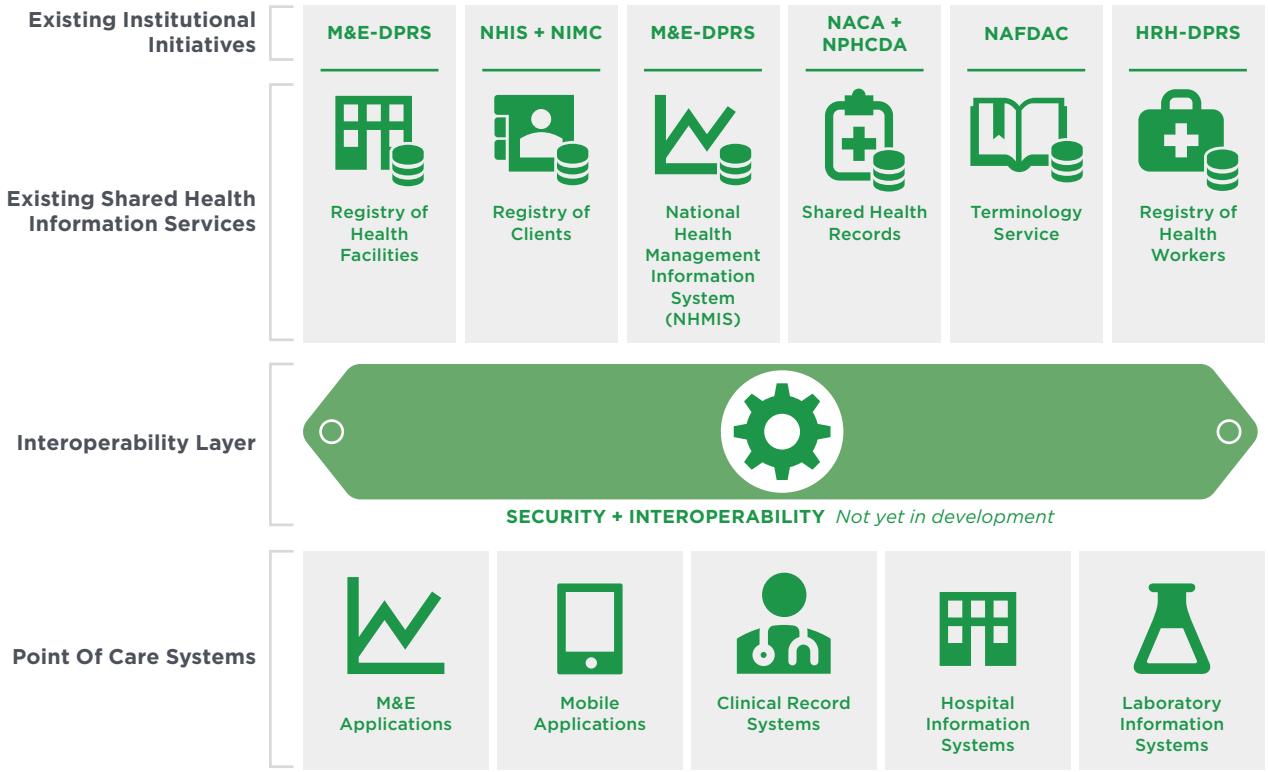
FIGURE 2. Nigeria National Health ICT Vision

NIGERIA NATIONAL HEALTH ICT VISION	**By 2020, Health ICT will help deliver and enable universal health coverage —** whereby Nigerians will have access to the services they need without incurring financial risk.					
UHC OUTCOMES	**Improved access to health services**	**Increased coverage of health services**	**Increased uptake of health services**	**Improved quality of care**	**Increased financial coverage for health care**	**Increased equity in, access to, and quality of health services, information, and financing.**
HEALTH ICT OUTCOMES	Effective use of telemedicine and use of ICT for health worker training and support	Effective use of CRVS, HRIS, NHMIS & LMIS for tracking demand and supply of health services and commodities	Effective use of mobile messaging & cash transfers for demand creation	Effective use of ICT for decision support & within the continuum of care	Effective use of ICT for health insurance & other health-related financial transactions	Effective use of ICTs for delivering appropriate health services for those who need them most based on epidemiology and ability to pay
LONG-TERM ICT OUTPUTS	**Nationally scaled integrated Health ICT services and applications supported by Nigerian Health Information Exchange implemented with appropriate funding, infrastructure & equipment, training & policies.**					

In recognition of the significant Health ICT investments already underway in Nigeria, this Health ICT Strategic Framework draws from and seeks to coordinate existing projects. As a part of this, an architecture that focuses on the long-term impact of Health ICT will be established. Such a forward-looking architecture will enable the achievement of the vision, while also setting the stage for the sustainable use of Health ICTs across the entire health system. **Figure 3** provides an example of what the integration of several key information systems (private and public sectors) in Nigeria could look like within an overarching architecture. Existing and planned digital point of care tools, such as insurance registration and claims systems, Electronic Medical Records (EMRs), laboratory and hospital information systems, mobile health (mHealth) solutions and Monitoring and Evaluation (M&E) applications could leverage shared health information services.

Building on both the Vision (with its Health ICT outputs) and architecture, the following scenario illustrates the crosscutting impact that could be possible

FIGURE 3. A National Health Information Architecture Based on Some Existing Initiatives



with an integrated ICT-enabled health system. It describes a collection of Health ICT advances that are not currently deployed across the three tiers of the Nigerian health system. *(See **Appendix 2** for the entire scenario and **Appendix 3** for information on the Health ICT Architecture.)*

While the scenario presented is aspirational, it identifies several capabilities of an ICT-enabled health system, such as the following:

- Ability to capture and exchange patient-level healthcare information
- Ability to exchange and report aggregate healthcare information
- Ability to enroll, pay for health insurance and verify coverage
- Ability to send appointment and care alerts to patients and health workers
- Ability for patients to send alerts to health care facilities
- Availability of electronic training and reference materials

TABLE 1. Components of the Health ICT Enabling Environment

COMPONENT	DESCRIPTION
Leadership and Governance	Focuses on the oversight and coordination of Health ICT activities at the federal, state and local levels, ensuring alignment with national health goals and priorities
Strategy and Investment	Describes the planning for, engagement of and alignment with all stakeholders involved in Health ICT activities and procurement of financing for Health ICT. It also outlines strategies to mobilize ICT in positioning health as an investment with good return to Nigeria economy.
Legislation, Policy and Compliance	Covers national policies and legislation for Health ICT in terms of development, alignment and regular review
Architecture, Standards and Interoperability	Describes the development and use of enterprise architecture and standards for enhanced interoperability, integration and health information exchange
Capacity Building	Details the empowerment of the health and ICT workforce to develop, use and maintain Health ICT through education and training programs
Infrastructure	Refers to the physical facilities and related assets that forms the foundation for Health ICT implementations
Solutions (Services and Applications)	Reports on devices and tools utilized by end users to collect, transmit, access and maintain health information

Adapted from the 2012 WHO-ITU eHealth Strategy Toolkit,[15] *Table 4*

First printed in the report, "Assessing the Enabling Environment for ICTs for Health in Nigeria: A Review of Policies" [16]

SCENARIO: THE HEALTH ICT VISION IN PRACTICE — IMPACT ON STAKEHOLDERS

A few months ago, Fatima enrolled with the NHIS*. Now, Fatima was expecting and due at any time. When she first learned that she was pregnant, she decided to sign up for weekly SMS* notifications about her pregnancy and to receive appointment reminders and pregnancy-care health information. When Fatima felt contractions, her family members texted the local clinic and called a taxi. Fatima proceeded to the clinic.

Mary arrived at work right on time. She was excited for the day. During shift hand-over, she and her co-worker huddled over one of the clinic's tablets going through the different cases of clients present at the clinic. They prioritized the cases and she got to work. Shortly thereafter, Mary saw that a woman in labor was making her way to the clinic.

When Fatima arrived, she and her husband realized they had left the NHIS card at home in the hurry. But they were lucky, her NIN* was stored in her husband's phone contact. With the cross-reference she was triaged. During her assessment of Fatima, Mary observed that the baby was in a breech position. When she had a break, she read up on breech deliveries using the clinic tablet. After reading, Mary decided to review Fatima's chart again through the EMR* system accessible using the tablet. Mary retrieved Fatima's shared health record and learned that her first baby had been breech and did not survive. To be safe, Mary requested a brief consult with the obstetrics/gynecology department at the referral hospital. After speaking with the on-call physician, Mary was instructed to contact the physician through phone or videoconference if any complications arose. Mary felt confident going in to the delivery and provided support to Fatima.

After a successful delivery, Mary updated Fatima's EMR, and updates were automatically sent from the EMR system to the Civil Registration and Vital Statistics database, NHIS database for facility reimbursement, the facility's LMIS* to account for supplies used during the birth and the NHMIS* for health services planning. The local government M&E* officer was reviewing aggregate electronic NHMIS reports and supply requests from each of the LGAs*; he was pleased to see the decline in maternal and neonatal mortality continue.

Meanwhile, mum and baby were doing fine.

*** EMR = Electronic Medical Record**
LGA = Local Government Area
LMIS = Logistic Management Information System
NHIS = National Health Insurance Scheme
NHMIS = National Health Management Information System
NIN= National Identification Number
M&E = Monitoring and Evaluation
SMS = Short Message Service (or text)

PART I. SECTION 3:

FOUNDATIONS FOR CHANGE

The Foundations for Change for the successful application of Health ICT in Nigeria draws from the World Health Organization (WHO) and International Telecommunications Union (ITU) National eHealth Strategy Toolkit. The WHO-ITU components of an enabling environment (*see* ***Table 1***) are used to provide a strategic and policy-oriented framework to help realize the Nigeria National Health ICT Vision, address critical gaps and track progress.[14] The Foundations for Change ensure that investments in Health ICT will help enable and deliver UHC, while setting the stage for the sustainable and effective use of Health ICT across the entire health system.

In this section on Foundations for Change, the current status, critical opportunities and gaps, and recommendations for short- and long-term outputs for each framework component are discussed. **Table 2** provides a summary of the recommendations. The recommendations were iteratively developed through an extensive stakeholder engagement process. The **Action Plan** in Part II builds off of the recommendations and identifies specific inputs and activities required to achieve the desired outcomes.

3.1 Leadership and Governance

Effective leadership and governance of Health ICT activities at all levels is essential to ensure coordination, sustainability and alignment with national health priorities. While the National Council on Health (NCH) supports the strategic leadership of the FMOH in collaboration with the FMCT, there is currently no national governance structure in place for Health ICTs and to facilitate coordination across MDAs, with development partners and the private sector.

Therefore, it is essential for Nigeria to establish a National Health ICT Steering Committee and supporting structure. The Steering Committee will be responsible for overseeing Health ICT planning, implementation, coordination, governance and evaluation to the achievement of the Health ICT Vision. Specifically, the National Health ICT Governance Committee will be responsible for the following:

- Oversight of the implementation of the National Health ICT Framework and Strategy
- Ongoing coordination of Health ICTs across MDAs and with development partners and the private sector
- Alignment of Health ICT investments and activities with health system priorities
- Promoting awareness of Health ICT policies, regulations and best practices, and encouraging, incentivizing or mandating adoption of nationally-supported Health ICT services
- Oversight of Health ICT strategic planning, including integration of Health ICT into new health programs and workflows and evolution of the National Health ICT Architecture
- Implement National Health ICT Monitoring and Evaluation Plan to ensure delivery of expected outcomes
- Support and facilitate required change across MDAs

TABLE 2. Summary of Recommendations to Improve Health ICT Enabling Environment

COMPONENT	RECOMMENDATIONS
Leadership and Governance	• Establish a National Health ICT Steering Committee and supporting structure to oversee Health ICT planning, implementation, coordination, governance and evaluation • Engage in broad stakeholder engagement beyond the Federal Government to involve State governments, private sector and development partners
Strategy and Investment	• Develop and periodically review the National Health ICT Strategy • Secure sustainable funding to further develop and operationalize the National Health ICT environment, align existing projects and investments and explore incentives and additional sources of both traditional and catalytic funding • Set up structures and processes to ensure proper investment and management of allocated funds at the National and State levels • Leverage existing information systems, including the Health Finance Information System
Legislation, Policy and Compliance	• Conduct an extensive review of policies relevant to Health ICT and develop recommendations in collaboration with other ministries to harmonize existing policies and to address current and future policy gaps, including privacy and security of personal health information • Establish a mechanism for regular review of Health ICT policies, implementation guidance and best practices • Address key policy and regulatory gaps (i.e., privacy and security or standards and interoperability)
Architecture, Standards and Interoperability	• Define and implement a National Health ICT Architecture that defines high-level nationally-supported health information services, while harvesting from existing projects, supporting long-term meaningful use of ICTs within the health system • Implement and harmonize digital registries, data collection instruments and reporting indicators that meet the needs of UHC and other prioritized services and applications • Establish guidelines, minimum functional requirements, and interoperability standards that allow for the consistent and accurate collection and exchange of health information across the health system
Capacity building	• Establish a system for Health ICT workforce monitoring and evaluation, readiness, adoption and practices • Develop incentive mechanisms to encourage workforce development of Health ICT skills and competencies, leveraging the FMOH Collaborative Center Training Program and other existing mechanisms where possible • Establish methodology for accreditation and revision of Health ICT training Curriculum • Establish special Health ICT education, training and career path development programs • Develop and implement a strategy for the training and recruitment of a cadre of professionals into government positions to design, implement and maintain Health ICT systems
Infrastructure	• Reinforce existing strategies for ongoing funding and investment in power provision, acquisition, installation and maintenance at all health facilities throughout the country, including exploring mechanisms (i.e. regulatory) for promoting distribution of alternate power • Define minimum infrastructure and computing requirements for each type of health facility and health administrative office and link to accreditation and assessment • Develop and introduce a basic ICT and related equipment package for health facilities based on prioritized services and application needs that encourages local ownership and capacity building • Strengthen local and regional support programs, such as the Rural Information Technology Centers, to ensure ongoing support for infrastructure development and maintenance • Install and maintain Internet and/or broadband connectivity for all tertiary and secondary along with prioritized primary health facilities as well as State and LGA level health administrative offices • Develop incentive mechanism for Health ICT infrastructure improvement
Solutions (Services and Applications)	• Develop and implement services and applications to enable and deliver UHC, including at minimum digital beneficiary enrolment, premium payment, coverage verification, and recording of encounters • Select additional priority Health ICT services and applications for scale-up based on need, strategic alignment with Health and Health ICT priorities, preparedness and evidence • Gather and disseminate best practices for the implementation of Health ICT services and applications

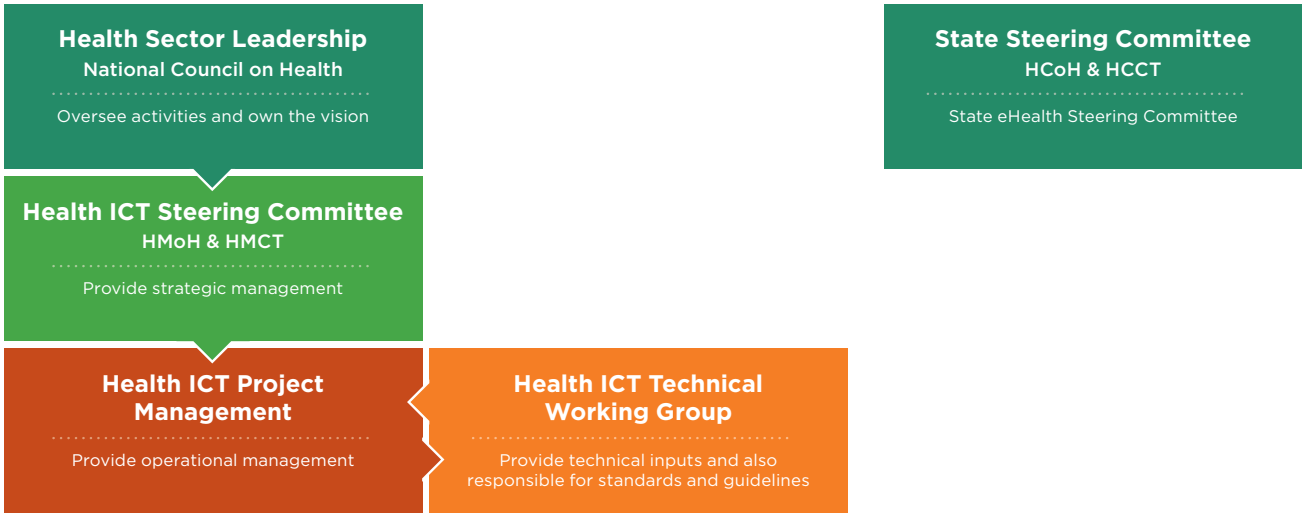
The National Health ICT Steering Committee and supporting structure will direct the application of ICTs to achieve the Health ICT Vision. The Steering Committee will report to the National Council on Health, which will own the Health ICT Vision and approve periodic updates. The Steering Committee will set up a Health ICT Technical Working Group to coordinate technical and operational inputs. A Health ICT Project Management team will be established to carry out the implementation of the Health ICT Vision in support of the Steering Committee and Technical Working Group (TWG). The National Monitoring and Evaluation (M&E) Advisory Group will facilitate M&E and linkages to the NHMIS. The recommended Health ICT governance structure is depicted in **Figure 4**. Refer to **Appendix 4** for a detailed description of each entity in the governance structure.

3.2 Strategy and Investment

The Health ICT Vision requires sufficient funding, sustainable financing mechanisms, incentives and accountability structures to support priority Health ICT activities. The combination of the strategy and investments ensures the development of a responsive plan and approach for improving the Health ICT environment and securing financing for sustained activities. Accordingly, four recommendations were provided that address current gaps in strategy and investment:

- Develop and periodically review the National Health ICT Strategy

FIGURE 4. Health ICT Governance Structure, State Health ICT Governance



HMoH – Honorable Minister of Health
HMCT – Honorable Minister of Communication Technology
ICT – Information and Communication Technology
M&E – Monitoring and Evaluation
NHMIS – National Health Management Information System

HCoH – Honourable Commissioner of Health
HCCT – Honourable Commissioner of Communication Technology

Note: *in some states, the lead inTechnology is a Special Adviser to the Governor or the Head (DG or ES) of a State Agency for ICT*

- Secure sustainable funding to further develop and operationalize the National Health ICT environment, align existing projects and investments and explore incentives and additional sources of both traditional and catalytic funding
- Set up structures and processes to ensure proper investment and management of allocated funds at the National and State levels
- Leverage existing information systems, including the Health Finance Information System

By drawing from existing health information systems and ongoing and planned activities, such as the Health Finance Information System, NHMIS, Human Resources for Health's (HRH's) Health Worker Registry and the National Health Insurance Scheme, the National Health ICT Strategy can leverage current investments in lowering overall costs while maximizing downstream value and providing direction to ensure achievement of the National Health ICT Vision. The National Health ICT Strategy can also capitalize on current funding sources.[15] Creative means of funding — catalytic funding, incentives for entrepreneurs and developers — may also be explored for their viability in addition to existing funding sources (e.g., donors and external funders and private sector investments). A recommendation has been made to establish a trust fund for Health ICT to pool government and development partner resources to simplify the management and investment of funds and promote transparency and accountability.

3.3 Legislation, Policy & Compliance

This component of the enabling environment addresses the legal and regulatory measures, public policy, and observance of rules and regulations related to Health ICT initiatives. There is a special focus on ensuring privacy and security of personal health information. To maintain and strengthen trust between consumers, the private sector and the health system, use of Heath ICTs must support and improve the safe, effective, efficient, equitable and timely delivery of care. In addition, policy and regulatory guidance must be clear. Three legislation, policy and compliance recommendations were suggested:

- Conduct an extensive review of policies relevant to Health ICT and develop recommendations in collaboration with other ministries to harmonize existing policies and to address current and future policy gaps, with a particular focus on privacy and security of personal health information
- Establish a mechanism for regular review of Health ICT policies, implementation guidance and best practices
- Develop and put in place systems of accountability and compliance mechanisms for key measures of the Health ICT Framework

There are existing privacy and security policies that are applicable to Health ICT, including Nigeria's Medical Code of Ethics, Constitution of the Federal Republic of Nigeria and National Health Law 2014. The Code of Ethics contains a special telemedicine provision. The provision covers the safety and maintenance of personal health information when that information is stored; sent; or received by fax, computer, e-mail or other electronic means.[17] Sections 37, 45 and 46 of the Constitution establish a general right of privacy for Nigerian citizens, which can be applied to health.[17] The National Health Law 2014 also provided for authorized access and storage of patient records.[18] Awareness

of these provisions is limited, and education and capacity building in how to apply them to the use of Health ICT is needed.[19]

3.4 Architecture, Standards and Interoperability

The architecture, standards and interoperability component of the enabling environment addresses the development of a blueprint of nationally supported digital services, such as the NHMIS and Health Worker Registry and their interactions, and the adoption of standards to maximize the meaningful use and sharing of health information. This is of particular importance given the federal structure of Nigeria's health system and diversity of systems and actors involved in the delivery and administration of health services.

A National Health ICT Architecture, that builds off of existing Health ICT solutions in Nigeria and best practices from other countries, was proposed in **Part I, Section 2**. The architecture defines the high-level structure of systems that the Nigeria FMOH is already supporting. With strategic coordination, the systems could support a broad set of health system use cases, in addition to enabling and delivering UHC by 2020. Proposed nationally-supported architectural components include the NHMIS; a digital facility registry based on the FMOH Department for Planning Research and Statistics (DPRS) registry; a digital health worker registry based on the FMOH HRH Health Worker Registry; a terminology service building off of the National Agency for Food and Drugs Administration and Control (NAFDAC) drug formulary; a registry of clients leveraging NHIS and the National Identity Management Commission (NIMC) and a shared digital patient record building off existing EMR implementations by the National Primary Health Care Development Agency (NPHCDA), National Agency for Control of AIDS (NACA) and others. In a heterogeneous environment with incompatible software projects and limited data and security standards, setting up a standards-based and interoperable National Health ICT Architecture is a prerequisite to a coordinated and connected health system.

Standards define how information is stored in Health ICT systems and how it is transferred between them, enabling interoperability. The absence of mandated Health ICT standards and interoperability requirements and guidelines has exacerbated fragmentation, limited scale-up and increased market risk. Establishing interoperability, data and software functionality standards and requirements will allow for consistent and accurate collection and exchange of health information across health systems and services.

Recommendations within Architecture, Standards and Interoperability are as follows:

- Define and implement a National Health ICT Architecture that defines high-level nationally-supported health information services, while aligning existing projects, supporting long-term meaningful use of ICTs within the health system and helping enable and deliver UHC by 2020
- Implement and harmonize digital registries, data collection instruments and reporting indicators that meet the needs of UHC and other prioritized services and applications
- Establish guidelines, minimum functional requirements and interoperability standards that allow for the consistent and accurate collection and exchange of health information across the health system. Outputs may include guidelines for use of Health ICT within public facilities and requirements for electronic reporting of health data and indicators

3.5 Capacity Building

Skilled and empowered health and ICT workforces are needed to design, develop, maintain, govern and use the services and applications critical to meeting the National Health ICT Vision. Recent estimates put the density of doctors and nurses/midwives in Nigeria at 4 and 16 per 10,000 populations, respectively.[20, 21] However, there are significant urban-rural and regional differences in health worker distribution. Health ICT training is limited and there are no career paths available to specialize in Health ICTs in Nigeria. Additionally, no incentive schemes exist for the adoption of ICTs in health service delivery. A recent baseline field assessment of Health ICT implementations across Nigeria's six geopolitical zones found that 32% of Local Government Area (LGA) M&E Officers interviewed and fewer facility-level health workers had been trained on the use of the widely implemented and adopted NHMIS.[22]

In response to challenges with managing the health workforce, the FMOH designed and developed an electronic health workforce registry (eRegistry) that has improved the management of a subset of the health workforce and enabled the tracking of capacity building activities and health worker competencies. In addition to incorporating Health ICT training into standardized curricula, the eRegistry and other Health ICT services and applications present an opportunity for a nationally scaled health workforce registry and digitally supported health and ICT workforce education and training.

Specific recommendations for the Capacity Building component are as follows:

- Establish a system for Health ICT workforce monitoring and evaluation, readiness, adoption and use
- Establish special Health ICT education, training and career path development programs, leveraging the FMOH Collaborative Center Training Program and other mechanisms where possible
- Develop incentive mechanisms to encourage workforce development of Health ICT skills and competencies
- Establish methodology for accreditation and revision of Health ICT training curricula
- Develop and implement a strategy for the training and recruitment of a cadre of professionals into government positions to design, implement and maintain Health ICT systems

3.6 Infrastructure

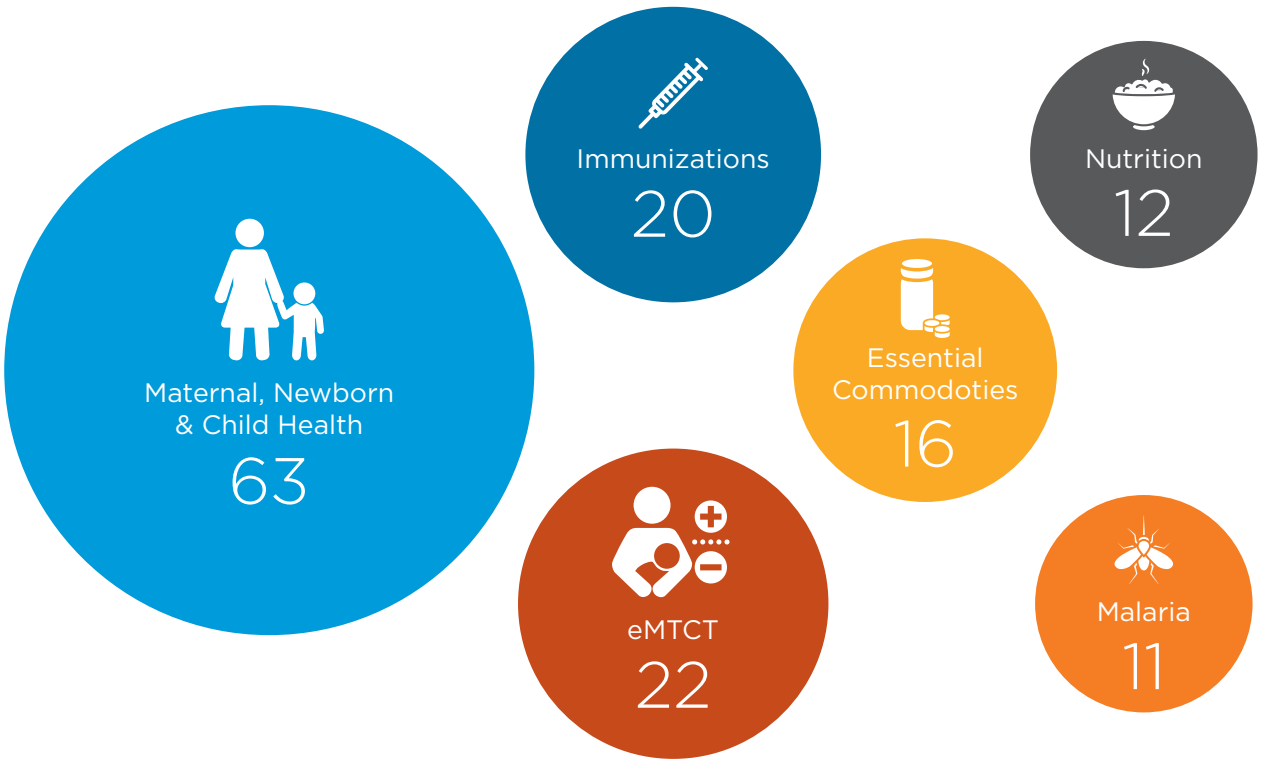
Infrastructure refers to the physical facility and related assets that form the foundation for Health ICT implementations, consisting of reliable electricity, cellular and Internet connectivity, and ICT equipment (e.g., computers, servers and data warehouses). Currently, infrastructure is inadequate to scale up Health ICT systems nationally, especially in under-served areas of the country.

Given the magnitude of the gap, infrastructure investments should be coordinated to ensure that they are in step with Health ICT and health system priorities (e.g., to enable UHC by 2020). Existing programs, like the Rural Information Technology Centers and the Universal Service Provision Fund's Community Resource Centers, may be leveraged.

Specific infrastructure recommendations include the following:

- Establish a workable strategy for ongoing funding and investment in electrical power provision, acquisition, installation and maintenance at all health facilities throughout the country, including exploring other mechanisms (i.e., regulatory) for promoting distribution of power
- Define minimum infrastructure and computing requirements for each type of health facility and health administrative office and link to accreditation and assessment
- Develop and introduce a basic equipment package for health facilities based on prioritized services and application needs that encourages local ownership and capacity building
- Strengthen local and regional support programs, such as the Rural Information Technology Centers, to ensure ongoing support for infrastructure development and maintenance
- Install and maintain Internet and/or broadband connectivity for all tertiary and secondary along with prioritized primary health facilities as well as State and LGA level health administrative offices
- Develop incentive mechanism for further Health ICT infrastructure improvements

FIGURE 5. Key Findings from Baseline Inventory Assessment on Number of Health ICT Implementations by Program Area (UNF Assessment Report)



In 2014, when the baseline assessment was conducted, 84 Health ICT projects were identified and included in the inventory. 28% of those initiatives were pilots and 24% were in the process of scaling up from pilot implementations.

3.7 Services and Applications

Services and applications provide the tangible means for end users to derive benefits from the application of ICTs to health. They facilitate service delivery and provide access to the information required for health planning and administration. Examples range from electronic medical records and laboratory information systems to mobile applications for health insurance enrolment, premium payment and verification. The focus of the services and applications component is to facilitate selection of a small number of Health ICT solutions, building off of existing projects where possible, that align with national health system priorities, have sufficient preparedness and evidence for national scale-up and simultaneously drive strategic investments into the National Health ICT Architecture.

Although health services delivery in Nigeria is primarily based on traditional or paper-based approaches, there are numerous Health ICT tools at varying degrees of maturity implemented throughout the country. Prevalent cellular coverage and mobile subscriptions throughout Nigeria has encouraged experimentation with mHealth or mobile-supported interventions, especially within maternal and child health. An opportunity remains to integrate mHealth into national health programming, especially in underserved regions. Patient and supply-chain information systems, though at their infancy, are being adopted for health services delivery, as well. NHMIS is the most prevalent Health ICT application in the health system, but routine data is generally still collected manually on paper forms and then entered electronically at the LGAs.[23]

Specific recommendations for the services and applications component are:

- Develop and implement services and applications to enable and delivery UHC, including at minimum digital beneficiary enrolment, premium payment, coverage verification, and recording of patient encounters
- Select additional priority Health ICT services and applications for scale-up based on need, strategic alignment with Health and Health ICT priorities, preparedness and evidence
- Gather and disseminate best practices for the implementation of Health ICT services and applications

Part II: Action Plan for Health ICT

PART II. SECTION 1:
HEALTH ICT THEORY OF CHANGE

ICT is well positioned to help achieve the key UHC outcomes of improved equity, access, service and financial coverage, uptake, and quality.[25] Each of these aspects of UHC can be supported by ICT services and applications that contribute to its accelerated achievement. The elements required to achieve the vision of Health ICT in the delivery of UHC have been layered on to the National Health ICT Vision, UHC outcomes, Health ICT outcomes and long-term ICT outputs to form the Theory of Change (*see* ***Figure 6***). The set of interconnected elements are presented in a graphical form and illustrate the pathway of change from the Health ICT enablers, short- and long-term ICT-related outputs and Health ICT outcomes as they align with UHC outcomes. The Health ICT enablers, directly and indirectly support activities that make other more direct outputs and outcomes possible, ensuring that there is a career path within the health sector for technology professionals; there is also a requirement that appropriate governance structures are in place to make informed decisions and

FIGURE 6. Theory of Change for the Nigeria National Health ICT Vision

NIGERIA NATIONAL HEALTH ICT VISION	**By 2020, Health ICT will help deliver and enable universal health coverage —** whereby Nigerians will have access to the services they need without incurring financial risk.					
UHC OUTCOMES	**Improved access to health services**	**Increased coverage of health services**	**Increased uptake of health services**	**Improved quality of care**	**Increased financial coverage for health care**	**Increased equity in, access to, and quality of health services, information, and financing.**
HEALTH ICT OUTCOMES	Effective use of telemedicine and use of ICT for health worker training and support	Effective use of CRVS, HRIS, NHMIS & LMIS for tracking demand and supply of health services and commodities	Effective use of mobile messaging & cash transfers for demand creation	Effective use of ICT for decision support & within the continuum of care	Effective use of ICT for health insurance & other health-related financial transactions	Effective use of ICTs for delivering appropriate health services for those who need them most based on epidemiology and ability to pay
LONG-TERM ICT OUTPUTS	**Nationally scaled integrated Health ICT services and applications supported by Nigerian Health Information Exchange implemented with appropriate funding, infrastructure & equipment, training & policies.**					
SHORT-TERM OUTPUTS (1 YEAR)	Strategic framework, governance structure & Health ICT Fund established	Guidance on existing policies & gaps identified	Review and adoption / adaptation of prioritized standards	Health ICT assessment, curriculum developed, career path developed	Define minimum package & plan for connectivity, power & equipment	Prioritized services & applications identified & requirements gathered
HEALTH ICT ENABLERS	Leadership, governance, strategy & investment	Legislation, policy, and compliance	Standards & Interoperability	Capacity building	Infrastructure	Solutions (services & applications)

investments in technology. The enablers are based on the WHO-ITU eHealth Strategy Toolkit[14] and highlight the importance of investing in the enabling environment in addition to the implementation of ICT services and applications. The Health ICT outcomes include the use of ICT to facilitate and track the coverage and delivery of health services and commodities through digitized CRVS, HRIS, LMIS, health service delivery and timely decision-making (through NHMIS) as well as enrollment, claims and reimbursement software for managing financial transactions within the health system (particularly in relation to insurance).[26]

The long-term outputs of nationally scaled integrated Health ICT services and applications are the bridge that maps and aligns key Health ICT enablers and short-term outputs with the achievement of UHC. This is supported by a Nigerian Architecture implemented with appropriate funding, infrastructure, equipment, training and policies. Targeted outputs detailed in this National Health ICT Strategic Framework serve as catalysts towards creating the appropriate combination of governance, strategy, financing, workforce ICT-readiness, infrastructure, policy, standards and prioritized services and applications that will ultimately inform and generate the enabling environment needed for Nigeria to move towards nationally scaled integrated digital health systems that contribute to improved health outcomes and greater well-being.

PART II. SECTION 2:
HEALTH ICT ACTION PLAN

A detailed action plan was developed using the Theory of Change along with the stakeholder-generated recommendations from **Part I, Section 3**. Reflective of the key stakeholders' inputs and needs, the action plan will be used to direct implementation for the realization of the Health ICT vision (including development of the budget), and the M&E plan will be used to track and assess progress.

The vision recommendations, categorized by the seven components of the enabling Health ICT environment, were converted into an actionable, measurable form in the detailed action plan (*see* ***Appendix 5***). Each recommendation has a set of steps that informs how the recommendation will be achieved. The steps have been organized into activities and sub-activities, with dependencies noted. The persons or entities responsible for carrying out each of the activities are clearly identified in the plan, as well. The following integrated action plan is a high-level summary of the detailed action plan (*see* ***Table 3***).

Based on the Theory of Change, the recommendations are connected along a logical pathway of activities with short- and long-term impact. The activities reflect a five-year process, separated into three phases, to support the attainment of UHC. The phases are:

PHASE 1: Set-up (Year 1)

PHASE 2: Deploy, Maintain and Support (Year 2 and Year 3)

PHASE 3: Consolidate and Continuous Review (Year 4 and Year 5)

Set-up and preparation will take place in year 1. During years 2 and 3, activities that reflect Deploy, Maintain and Support to help meet the vision will be carried out. The final two years (years 4 and 5) will be focused on Consolidate and Continuous Review activities and reviews of progress. The initial phase will be front-loaded as important foundational structures and activities will need to be established. As time advances, there will be opportunities to assess the status of progress and revisit the action plan.

Some activities are longitudinal and will span the entire course of the time-frame, while others may be more discrete. All are captured in the action plan, including the timeframe needed to meet or sustain each recommendation. Revisiting the action plan will be important to ensure the continued alignment of the activities with achieving UHC.

The members of the NCH, as owners of the Health ICT vision, will oversee the action plan with guidance and support from the Health ICT Steering Committee, Technical Working Group and Project Management Office.

TABLE 3. Nigeria National Health ICT Vision Integrated Action Plan 2015 - 2020

PHASES TIME/ SEQUENCE		PHASE 1 – SETUP				PHASE 2 – DEPLOY, MAINTAIN AND SUPPORT (YEAR 2 AND YEAR 3)								PHASE 3 – CONSOLIDATE AND CONTINUOUS REVIEW (YEAR 4 AND YEAR 5)							
	YEAR 0	YEAR 1				YEAR 2				YEAR 3				YEAR 4				YEAR 5			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Leadership & Governance	Framework Endorse-ment	State Engagement / Governance																			
	Establish SC, TWG & PMO	Framework adoption and ongoing broad stakeholder engagement																			
	Link policies with Health ICT Framework																				
Strategy & Investment		Setup Investment management structure	Fund coor-dination mechanism																		
	Explore source of funds & align with framework				Establish catalytic funding		Establish incentive mechanisms							Review and re-explore sources of Health ICT funds							
		Establish special purpose Health ICT Fund																			
Standards & Interoperability	Training and capacity building on Health ICT standards & interoperability		Review existing national and interna-tional standards		Develop, adapt or adopt high-level requirements and design for foundational Health ICT services		Ongoing review and update of national standards and requirements														
			Ongoing on-the-job Health ICT mentoring																		
	Establish Nigerian Health Information Exchange (HIE)						Scale-up the Nigerian HIE														
				Advocacy, communication and education to decision makers and end users to ensure support for Health ICT standards application																	
				Develop and approve standards for secure messaging, high-priority health information, terminologies and data dictionaries																	
Legislation, Policy & Compliance	Health ICT PMO & TWG capacity strengthening			Review and update of policies																	
								Establish & implement compliance mechanisms													

TABLE 3. Nigeria National Health ICT Vision Integrated Action Plan 2015 - 2020 *continued*

PHASES TIME/ SEQUENCE		PHASE 1 – SETUP				PHASE 2 – DEPLOY, MAINTAIN AND SUPPORT (YEAR 2 AND YEAR 3)								PHASE 3 – CONSOLIDATE AND CONTINUOUS REVIEW (YEAR 4 AND YEAR 5)							
	YEAR 0	YEAR 1				YEAR 2				YEAR 3				YEAR 4				YEAR 5			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Capacity Building	Assess Health ICT readiness of stakeholders			Define professional practice standards																	
		Develop and Roll-out inventive schemes for Health ICT adoption					Develop strategy for continued Health ICT skills and competency acquisition			Design Health ICT skills and competencies career progression plan											
		Develop standard Health ICT competency framework		Define new accreditation requirements		Implement new accreditation requirements															
		Identify education and training course changes				Review FMoH collaborative programs to include health informatics															
						Implement education and training course changes															
						Establish specialized Health ICT qualifications and certification track															
						Implement specialized Health ICT courses															
					Monitor Health ICT adoption																
		Establish National Health ICT knowledge repository																			
			Develop Health ICT awareness campaign strategy and roll-out	Design M&E framework for measuring effectiveness of engagement				Monitor effectiveness of Health ICT use and adoption													
		Design targeted stakeholder reference and working group			Engage and consult with stakeholder reference and working groups																

TABLE 3. Nigeria National Health ICT Vision Integrated Action Plan 2015 - 2020 *continued*

PHASES TIME/ SEQUENCE		PHASE 1 – SETUP				PHASE 2 – DEPLOY, MAINTAIN AND SUPPORT (YEAR 2 AND YEAR 3)								PHASE 3 – CONSOLIDATE AND CONTINUOUS REVIEW (YEAR 4 AND YEAR 5)							
	YEAR 0	YEAR 1				YEAR 2				YEAR 3				YEAR 4				YEAR 5			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Infrastructure	Identify under-served areas	Develop data connectivity implementation and design plan			Select imple-mentation partners to develop data connectivity infrastructure	Deploy data connectivity infrastructure for underserved areas															
	Identify and assess ongoing infrastructure projects in underserved areas						Local participation of communities in support, maintenance and use of Health ICT services and applications														
	Define minimum computing, power and connectivity infrastructure requirements for health implementation			Link health organization providers' Health ICT acceditation to meet minimum health facility computing infrastructure																	
			Advocate for priority infrastructure																		
Solutions (Services & Applications)	Identify priority services and/or applications		Develop/revise requirements and design for iden-tified services & applications		Identify resources to support the expansion and development of identified services & applications	Build/deploy/scale identified priority National Health ICT services and/or applications															
							Operate, support and sustain priority Health ICT services and application														
			Develop/implement collaboration portal				Foster continuous upgrades of implemented high priority Health ICT solutions														
							Promote research and development of priority Health ICT solutions														
	Ongoing scale-up of priority services and application																				
							Identify best practices in Health ICT and disseminate widely														

Part III: Monitoring & Evaluation Plan for Health ICT

PART III. SECTION 1:
MONITORING & EVALUATION PLAN

The M&E plan provides a link between the vision, action plan and desired results (*see* ***Appendix 6***). The M&E plan draws from the Theory of Change to define the relationship between the inputs, activities, outputs, outcomes and impact. Its contents are measurable and presented in the form of indicators. Accordingly, progress towards achievement of the vision can be tracked and evaluated and inform whether the implementation is yielding intended results and outcomes. In line with the adopted result-based management approach[27], the M&E plan has three aspects: the **indicators** for the activities outlined in the action plan, the baseline and target **measures** and the **governance** to oversee and support progress.

The indicators developed for and used in the Health ICT M&E framework focus on outcomes and health impact. The outcomes are related to the enabling environment and translate the recommendations and activities from the action plan into a measurable form. The health impact reflects the national focus on UHC and uses national indicators for health services access, delivery, coverage, quality and equity. For each indicator, its scope or reach (e.g., National, State or both) along with the data source, collection method and frequency of data collection are articulated. The baseline measures will be obtained and target measures for 2020 set by the leadership and supporting entities.

Appendices

APPENDIX 1:
LIST OF CONTRIBUTING ORGANIZATIONS

ABT Associates - HS2020

Ajimatics

ANADACH group

Bill and Melinda Gates Foundation

Center for Management Development (CMD)

Centers for Disease Control and Prevention (CDC)

Clinton Health Access Initiative (CHAI)

Computer Professionals (Registration Council of Nigeria)

Digital Bridge Institute (DBI)

eHealth Nigeria

Federal Capital Territory Administration (FCTA)

Federal Civil Service

Federal Ministry of Communication Technology - Department of Planning Research and Statistics (FMCT-DPRS)

Federal Ministry of Health - Budget

Federal Ministry of Health - DPRS

Federal Ministry of Health - Family Health

Federal Ministry of Health - Food and Drugs

Federal Ministry of Health - Hospital Services

Federal Ministry of Health - National AIDS Control and Prevention Programme (FMOH-NASCP)

Federal Ministry of Health - National AIDS Control and Prevention Programme (FMOH-NPSCMP)

Federal Ministry of Health - Public Health

FMCT- eGovernance (FMCT-eGov)

Fortern Global Ltd

Futures Group

Galaxy Backbone (GBB)

Groupe Special Mobile Association (GSMA)

Health Finance and Governance

Health in Africa (HIA)

Health Information Systems Program (HISP) Nigeria

Health Reform Foundation of Nigeria

ICT for Saving One Million Lives (ICT4SOML)

InStrat Global Health Solutions

Intel

International Finance Corporation (IFC)

John Snow Incorporated (JSI)

Medical and Dental Council of Nigeria

Millennium Development Goals (MDGS) Nigeria

Mobile Alliance for Maternal Action (MAMA)

National Agency for Control of AIDS (NACA)

National Agency for Food and Drugs Administration and Control (NAFDAC)

National Health Insurance Scheme (NHIS)

National Identity Management Commission (NIMC)

National Information Technology and Development Agency (NITDA)

National Primary Health Care Development Agency (NPHCDA)

National Tuberculosis and Leprosy Control Programme (NTBLCP)

National Universities Commission (NUC)

Network Data Services and Technology Ltd. (NDST)

Nigeria Communications Commission (NCC)

Nigeria Computer Society (NCS)

Nigeria Telecommunications Satellite (NIGCOMSAT)

Norwegian Agency for Development and Cooperation (Norad)

Nurses and Midwifery Council of Nigeria

Pathfinder International

Praekelt Foundation

Private Sector Health Alliance

Saving One Million Lives (SOML)

Standards organization of Nigeria (SON)

State Ministries of Health - DPRS

State Ministries of Information/ Communication/Science and Technology or Relevant Agencies or designates

Subsidy Reinvestment and Empowerment Program Maternal and Child Health (SURE-P MCH)

United Nations (UN) Foundation

United States Agency for International Development (USAID)

Universal Service Provision Fund (USPF)

USAID Monitoring and Evaluation Management Services (USAID/MEMS)

World Bank

World Health Organization (WHO)

APPENDIX 2:

HEALTH ICT SCENARIO ILLUSTRATING CHANGE AND IMPACT ON STAKEHOLDERS

SCENARIO: THE HEALTH ICT VISION IN PRACTICE

A few months ago, Fatima registered her children in the NHIS* through the Primary School Enrollment Process. At that time, Fatima and her husband were also enrolled in the NHIS and they were issued NHIS Cards that can be used for healthcare services.

Mary woke up early. She checked her phone. It was 6 AM. She had 30 minutes to get ready before going to work. She scrolled through her apps to double check the shift calendar. Earlier on in the week, she had received a request to swap shifts with one of her co-workers who was headed out of town to attend to a family matter. She started getting ready.

Around the same time, Fatima was going about her day. She was expecting and due at any time. She had developed a birth plan with the local midwife. When she first learned that she was pregnant, she decided to sign up for weekly SMS* notifications about her pregnancy and to receive appointment reminders. She found the messages and pictures informative and even enjoyable, and would often discuss them with her sisters. She was especially proud that she had not missed a single appointment. This was unlike her previous pregnancies. *She sighed as she recalled her previous experiences.* Back then, she did not know the importance of antenatal visits or setting up a birth plan. Sometimes she would make appointments, but not show up. This time was different... *Fatima felt a contraction.*

Mary arrived at work right on time. She was excited for the day. During shift hand-off, she and her co-worker huddled over one of the clinic's tablets going through the different cases of clients present at the clinic. They prioritized the cases and she got to work.

Fatima notified her family members that she needed to be taken to the clinic. She then directed one of her sisters to text the local clinic about the situation. A taxi was called and Fatima proceeded to the clinic.

[Alert.] Mary checked the clinic tablet. She read that a 33 year old female, G4P2 (Gravida of 4, Parity of 2)*, in labor was headed to the clinic.

When Fatima arrived, she and her husband realized they had left the NHIS card at home in the hurry. But they were lucky; her NIN* was stored in her husband's phone contact. With the cross-reference she was triaged and encouraged to relax or walk about until the contractions came closer together.

During her assessment of Fatima, Mary observed that the baby was in a breech position. When she had a break, she decided to read up on breech deliveries. She browsed the resources on the clinic tablet and began reading. After reading, Mary decided to review Fatima's chart again through the EMR system accessible using the tablet. Fatima had mentioned a history of pregnancy complications, but Mary did not see that in the clinic's system so she checked the Nigerian Health Exchange to see if the records were there. Mary retrieved Fatima's shared health record and learned that the first baby had been breech and did not survive. It had been a home delivery in a different village. To be safe, Mary decided to request a brief consult with the obstetrics/gynecology department at the referral hospital. She sent off the request through the hospital tablet. Within a few short minutes, she was on the phone with the on-call physician in that department.

Fatima's contractions shortened. Mary checked up on her and moved her to the delivery room. Mary had instructions to contact the on-call physician her through phone or videoconference if any complications arose. Mary felt confident going in to the delivery and provided support to Fatima.

Fatima, G4P3, delivered a healthy baby boy weighing 3.4 kgs, 49.3 cm in length at 17h21 on... Mary typed into the clinic computer, updating Fatima's chart as she smiled. Through the chart update, the baby was registered in the Civil Registration and Vital Statistics database. The data were also automatically transmitted to the NHIS database for facility reimbursement, the facility's LMIS* to account for supplies used during the birth and the NHMIS* for health services planning. Meanwhile, mum and baby were doing fine in the recovery unit.

One week later, Oye, the local government M&E* officer was reviewing aggregate electronic NHMIS reports from each of the LGAs*. That week, the decline in maternal and neonatal mortality continued. He concluded his day by emailing off performance reports to each of the supervisors in his department and fulfilling supply requests and systems prompts.

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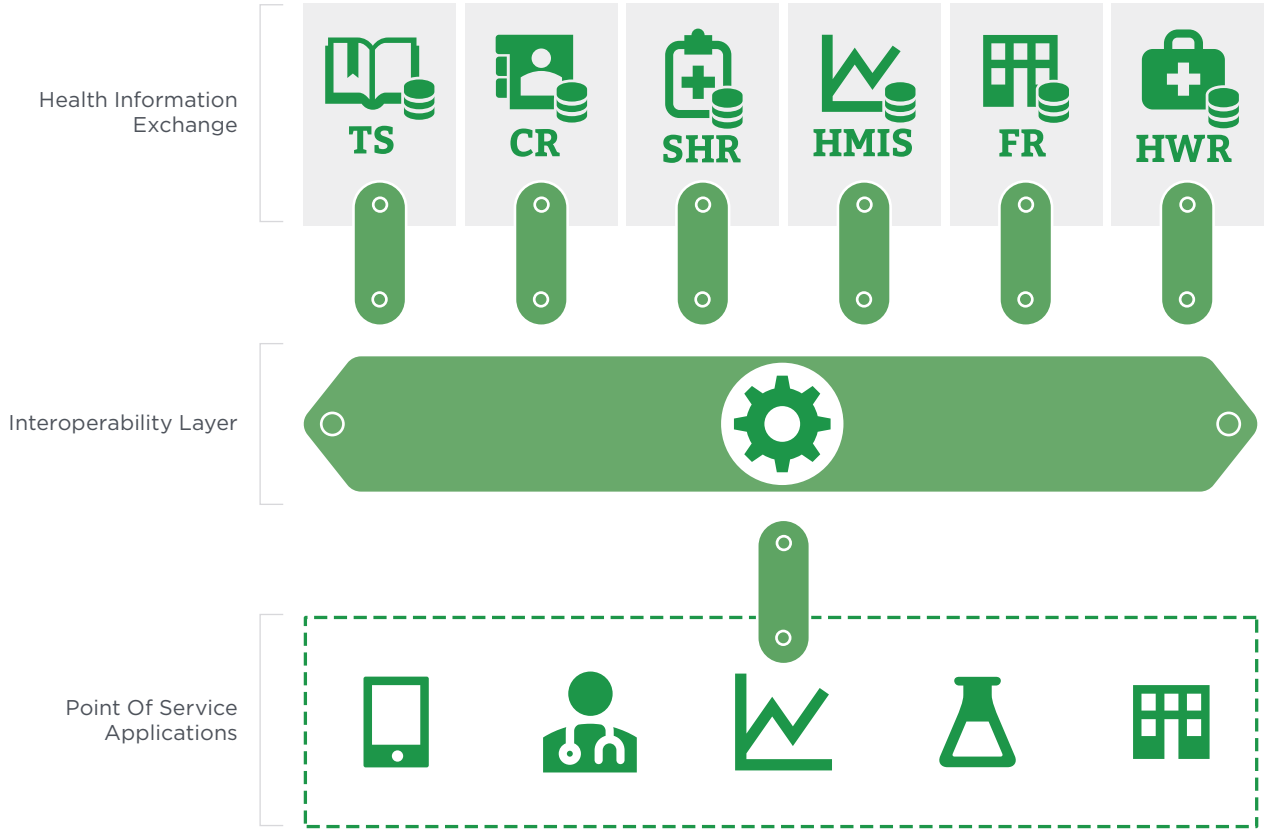
* EMR = Electronic Medical Record
G = Gravida (number of pregnancies)
LGA = Local Government Area
LMIS = Logistic Management Information System
M&E = Monitoring and Evaluation
NHIS = National Health Insurance Scheme
NHMIS = National Health Management Information System
NIN= National Identification Number
P = Parity (number of successful births)

APPENDIX 3:

RECOMMENDED NIGERIA HEALTH ICT ARCHITECTURE

In Health ICT projects, the architecture serves as the conceptual framework that defines the high-level structure and behavior of the system components. The recommended architectural approach is a components-based approach that fosters collaboration and interoperability.

The architecture facilitates interoperability by creating a reusable framework that is service oriented, maximally leverages health information standards, enables flexible implementation and supports the interchangeability of individual components. Integrating the Health Enterprise (IHE) and other transaction standards form the basis for the interactions between the architecture components and Point-of-Service (POS) applications. This architecture is designed to build upon and amplify the health benefits of existing Nigerian health and government initiatives.



Many of the components in the proposed architecture are already being developed or can leverage existing projects or information. The following is an overview of each of the proposed architecture components and some examples of Nigerian projects or activities that could be leveraged in the proposed architecture.

- An **enterprise master patient index (EMPI), or Client Registry (CR)** manages the unique identity of citizens receiving health services with the country – "For whom"

  The work that NIMC and NHIS are doing to link insurance beneficiaries to unique patient identifiers can be leveraged to provide a strong

foundation for a client registry portion of a health information exchange (HIE). The National Identification Number (NIN) could be considered as a key, highly "discriminating", attribute for identifying patients. To take advantage of that, we recommend understanding the relationship between NIMC and NHIS and gaining a better understanding of how the NIN relates to healthcare identification across the entire health system.

- A **Health Worker Registry (HWR)** is the central authority for maintaining the unique identities of health providers within the country – "By whom"

  HRH has already created an OpenHIE-compatible Health Worker Registry and they are in the process of working towards populating it. To position the registry to be utilized outside of HRH, we recommend that the team continue to expound upon the value that this data can provide across the healthcare system.

- A **Health Facility Registry (FR)** serves as a central authority to uniquely identify all places where health services are administered within the country – "Where?"

  Significant work has been done to collect facility registry information, largely led by the FMOH DPRS. This information is valuable and can provide value across the public and private health system. For example, the data can be used in supply chain planning and in verifying the location of a patient's clinical interaction. The FMOH is well positioned to move this content toward a digital platform that can be more widely used and supported. We recommend further conversations around governance models.

- A **Health Management Information System (HMIS)** is a repository containing the normalized version of aggregate-level content created within the community, after being validated against each of the previous registries. It is a collection of indicator-centric records for cohorts with information in the exchange.

  The FMOH Department of Planning, Research and Statistics (DPRS) has selected DHIS2 as the HMIS platform and there are currently web and paper data collection processes for reporting of primary health indicators. DHIS2 is compliant with the proposed architecture.

- A **Shared Health Record (SHR)** enables the collection and storage of electronic health information about individual patients in a centralized repository which is capable of being shared across different healthcare settings.

  There are numerous point-of-care systems that are EMRs and capturing data about clinical encounters. Depending upon the initial health priority that the team decides to pursue, many of these implementations could provide input on data standards and/or be positioned to contribute to a shared health record.

- A **Terminology Service (TS)** serves as a central authority to uniquely identify the clinical activities that occur within the care delivery process by maintaining a terminology set mapped to international standards such as ICD10, LOINC, SNOMED, and others – "What?"

  While no terminology service currently exists, some indicator, registry and data definitions do exist. The initial health priority will help focus the team on the terminology standards that need to be defined first.

- A **Health Interoperability Layer (IL)** receives all communications from point of service applications within a health geography, and orchestrates message processing among the point of service application and the hosted infrastructure elements.

  Because there currently is not an HIE, this component of the architecture does not currently exist in Nigeria.

- **Point of Service (POS)**, or point of care applications are a diverse group of actors that leverage the health information exchange to improve the quality of care by using higher quality and more timely data to support their activities. These systems include mobile messaging tools [SMS/interactive voice response (IVR)], EMRs, laboratory or stock management systems and monitoring and evaluation tools.

APPENDIX 4:

PROPOSED GOVERNANCE STRUCTURE

Federal Level

The following table outlines the proposed Health ICT governance structure. This table complements the governance structure illustration in Part I, section 3.1. The general functions and responsibilities are also included in the table.

ROLE	COMPOSITION	GENERAL FUNCTIONS AND RESPONSIBILITIES
Health Sector Leadership	National Council on Health	Provide oversight and own the Health ICT vision
Health ICT Steering Committee	Ministers of Health and Communication Technology in addition to CEOs of Government Departments/ Agencies as may be identified by the two (2) Ministers.	Strategic direction and support
Health ICT Project Management Office	This will be hosted by FMOH	Provide operational management through: • General daily management and operation • Facilitate design, implementation and maintenance of the strategic architecture • In charge of logistics for meetings of the steering committee • Generate and coordinate reports and other key documentation for Health ICT • Stimulate stakeholders and private sector involvement/investment in Health ICT • Develop and help implement the Health ICT Strategy and administrative funding • Interface with the Health ICT Steering Committee
Health ICT Technical Working Group	• The Chair member will be appropriate government ministry, department or agency. • Other members can be drawn from a wide range of stakeholders ranging from the private sectors, to development partners to health ICT subject experts • There may be several subject matter specific working groups	Coordinate technical consultation on appropriate subject matter: • Produce subject-specific guidelines that will inform the work of the Health ICT Program Management Office • holding monthly reviews meetings

State Level

The following table outlines the proposed Health ICT governance structure at the states. This is meant as a guide to help states develop appropriate governance for health ICT. This recognizes that different states have varying priorities and varying degree of ICT governance. While some may have ministry of science and technology, other have special advisers and some commissioners embedded in contiguous ministries. The general functions and responsibilities are also included in the table.

ROLE	COMPOSITION	GENERAL FUNCTIONS AND RESPONSIBILITIES
State Health ICT Committee	Commissioners of Health and Communication Technology / Science and Technology and heads of state government agencies as identified by the two (2) commissioners. The secretary of this committee shall be the appropriate as identified by SMOH within the state. The State steering committee should also include other agencies of SMOH.	Strategic management and support within the state

APPENDIX 5:

DETAILED HEALTH ICT ACTION PLAN

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
1.0 Leadership and Governance	1.1 Governance Structure	National Health ICT governance structure established	Establish a national Health ICT governance structure to oversee Health ICT decision-making, planning, implementation and monitoring/evaluation	Establish National Health ICT Steering committee (SC), National Health ICT Technical Working Group (TWG) and National Health ICT Project Management Office (PMO)	Governs Health ICT planning, implementation and evaluation, as well as interoperability and integration requirements, funding, clinical documentation requirements, architectural guidelines, privacy, security, and auditing requirements	NCH, FMOH, FMCT plus parties listed in the governance table
	1.2 State Government Engagement	State Government engaged	Support setup of state level governance structure as appropriate Broad stakeholder engagement beyond the federal government to involve the state governments for maximum support and participation	Formalize governance interactions between Federal and States as well as between States and LGAs	Dedicated Health ICT governance functions will need to coexist with existing governance functions operating at Federal, and State levels There will be a need to identify and formalize the relationships with these governance functions and clearly define how they will interact in relation to Health ICT strategy, investment and coordination	FMOH, FMCT, State Health and Technology ministries, State PHC boards and agencies
	1.3 Broad Stakeholder Engagement	Broad stakeholder engagement achieved	Establish mechanisms for ongoing broad stakeholder engagement beyond government to involve the private sector, development partners, civil society and citizens	Broad stakeholder engagement	Beyond government MDAs, involve the private sector, development partners, civil society and citizens	TWG, PMO, Civil society organizations, Patient health associations, private providers association, ICT providers association, development partners and professional societies
	1.4 Linked and Integrated Policies	National Health ICT Framework integrated and linked with National health Act, NHP, National ICT policy and NSHDP	Link National Health ICT Framework with the major emerging National policies (e.g., the National Health Act, National Strategic Health Development plan (NSHDP), National Health Policy and National ICT policy)	Ensure inclusion of Health ICT during reviews of NHA, NHP, National ICT Policy and NHSDP.	Advocate for a subsection on Health ICT within NSHDP, NHP, and other relevant and emerging institutional mechanisms.	FMOH, FMCT, National Health Act sub committees, National M&E technical working group, and other relevant platforms.
	1.5 Framework Adoption	National Health ICT Framework developed, endorsed and periodically reviewed	Ensure the endorsement, adoption and periodic review (at most every 5 years) of developed National Health ICT Framework as a part of a larger National Health Strategy	Ensure endorsement, periodic review and adoption of National Health ICT Framework	Framework contributes to establishing a National Health ICT strategic framework, but multi-sectoral adoption is critical, as is a system of 5-yearly review and evaluation	Steering Committee, TWG
2.0 Strategy and Investment	2.1 Funding for Health ICT	Funding for Health ICT operations secured	Secure sustainable funding for the development and operation of the national Health ICT environment, making sure to explore the viability of existing funds, catalytic funding and incentives	A. Explore sources of Health ICT funds and align with Framework	Explore sources of Health ICT funds: revenue (National and States), development partners and external funders, including private-sector investments	FMOH-DPRS, Health Financing, FMF, FMCT, Private sector stakeholders
				B. Establish catalytic funding	Establish seed catalytic funding to support innovation	FMOH, FMCT, PSHAN, USPF, WB/IFC and development partners
				C. Establish special purpose fund for Health ICT	A special purpose fund for Health ICT will ensure adequate funding for Health ICT innovation and implementations	NHIS, NITDA, CBN, FMF, NCC-USPF, development partners
	2.2 Motivation	Motivation mechanism established	Establish motivation mechanism for infrastructure development, entrepreneurs and developers	Set up motivation mechanism	Establish motivation mechanism for infrastructure development, entrepreneurs and developers, including providing enabling environment for potential export and revenues from Health ICT	FMOH, FMCT, PSHAN, WB/IFC, Development partners and the private sector

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
	2.3 Investment	Investment management plan established	Investment management to enable proper allocation of Health ICT investment funding to priority projects	A. Investment management structure	Introduce a structure for planning and coordinating Health ICT budgets to improve prioritization, allocation and release	FMOH, FMCT and TWG; major funders; development partners and private sector
				B. Fund coordination mechanism	Establish fund coordination mechanisms to mitigate risks from fragmented funding structure	FMOH and TWG, major funders, private sector and development partners
3.0 Standards and Interoperability	3.1 Established Standards	Standards for Health ICT and health information exchange defined and established	Define and prioritize Health ICT and related data standards, as well as establish processes and infrastructure to facilitate safe and secure exchange of health information	A. Review existing national and international standards and Define Health ICT standards	Process for developing, reviewing, approving and publishing national Health ICT standards, and which is supported by the health sector and the Health ICT industry will need to be established Review existing national and international Health ICT and other standards to determine what can be adopted	FMOH, NITDA, FMCT, TWG
				B. Establish a Nigerian Health Information Exchange (HIE)	A HIE system will facilitate the exchange of health information among stakeholders across geographical and health-sector boundaries based on defined standards	FMOH, FMCT, NHIS, USPF, NIMC, NITDA, Galaxy Backbone, NBS
	3.2 Standards capacity building	Capacity built for ensuring standards and interoperability	Capacity of stakeholders built as appropriate, to understand, define, review, apply and manage standards in Health ICT initiatives	A. Partners provide training and capacity building in Health ICT	Training and Capacity Building provided by competent partners	FMOH, NITDA, FMCT
				B. Regular mentoring and on the job training to sustain knowledge gained and ensure its application	Regular mentoring and on the job training to sustain knowledge gained and ensure its application	
	3.3 Data Collection and Registries	Standardized registries, instruments (data collection forms, reports etc.) and indicators	Building on existing standards and requirements for some foundational Health ICT services	A. Develop, adapt or adopt high-level requirements and design for foundational Health ICT services	Implementation of foundation Health ICT services (e.g., national health identifiers, national authentication, electronic health records, etc.), begins with understanding the high-level requirements for the service and defining a high-level design for how the service would be delivered for the country	FMOH, FMCT, NIMC, NITDA, NHIS, NPC, TWG, Professional and regulatory organizations e.g. MDCN, NMCN FMOH, NIMC, NITDA, NHIS, NPC, implementers, end-users
			Build on existing instruments to support key registries (health facility, patient, health workers, citizen etc.) foundational to health information exchange	B. Develop and approve standards for secure messaging, high-priority health information, terminologies and data dictionaries	Ensures that health information exchanged between healthcare organizations and providers through a national Health ICT environment are appropriately defined and the messages utilize standard terminologies and remain private and confidential. All must be properly authenticated and delivered to intended recipient	FMOH, NIMC, NITDA, NHIS, NPC, implementers, end-users

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
	3.4 Communication	Health ICT standards communicated and advocated	Ensure that communications and information disseminated about Health ICT standards are appropriate to encourage the adoption and application of Health ICT standards	A. Concerted and focused advocacy, communication and education to decision makers and end users to ensure a support for the application of standards	Highlight benefits of the adoption of Health ICT standards while emphasizing the costs of non-adoption to all relevant stakeholders	FMOH, TWG
4.0 Legislation, Policy and Compliance	4.1 Regulatory Framework Established	Empower National Health ICT PMO to support legislation, policy and compliance	Develop or identify a relevant regulatory framework (legislation, policy and compliance processes) to encourage and incentivize Health ICT initiatives	A. Empower the Health ICT governing body with the capacity to oversee, review and harmonize policy, legislation, regulation (including compliance) and implementation of Health ICT initiatives	The Health ICT governing body described under Leadership and Governance should be empowered to guide, influence and mid-wife a regulatory framework for Health ICT activities	FMOH, NITDA, FMCT, HERFON, NASS, Legal Consultants and Partners
				B. Agree and adopt a nationally consistent regulatory framework for health information	Ensuring private and confidential information exchange requires a nationally consistent regulatory framework for health information protection This is often a requirement where data protection legislation and frameworks differ, or conflict, at a national, state and local level Developing and adopting such a framework ensures that data protection, privacy, access and consent is approached and managed consistently at a National, State and Local level	FMOH, NITDA, FMCT, HERFON, NASS, Legal Consultants and Partners
				C. Review and update policies		
				D. Ensure compliance of providers, services and applications with regulatory framework defined in the action line above	Focusing on compliance with established regulations (legislation and policy), the PMO or TWG will promote, encourage and ensure compliance	FMOH, NITDA, FMCT, HERFON, NASS, Legal units
5.0 Change and Adoption (Capacity Building)	5.1 System for Health ICT Adoption	5.1. Establish a system for Health ICT Readiness, M&E and best practices adoption	Establish a system for structured assessment for Health ICT readiness among stakeholders. The system will support monitoring and evaluation of Health ICT adoption.	A. Assess Health ICT readiness of stakeholders	Recognize priority stakeholder segments (consumer, care provider and health-care manager) that should be targeted for Health ICT adoption, assess their readiness to adopt specific Health ICT solutions and identify opportunities to build momentum for scale	TWG, FMOH
				B. Establish national Health ICT knowledge repository	Create a national, web-based knowledge repository that captures Health ICT project successes and enables knowledge sharing	TWG, FMOH, FMCT, implementing partners, SMOH

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
				C. Define professional practice standards	Work with cross-sectoral stakeholders to guide the development of a professional practice standards and guidelines for healthcare providers Define the expectations and obligations of these providers to collect, store and share high-quality electronic health-care information in a timely, appropriate and secure manner	TWG, FMOH, NITDA
				D. Monitor Health ICT adoption	Monitor and review adoption of Health ICT solutions routinely among stakeholders	TWG, FMOH
	5.2 Incentivize skills uptake	5.2. Develop and adopt Incentive mechanisms to encourage uptake of Health ICT skills and competencies	Design and adopt structured incentive scheme (both financial and non-financial) to encourage uptake and retention of Health ICT skills and competencies.	A. Develop and Roll-out incentive schemes for Health ICT adoption	Design incentive programs to encourage the adoption and use of Health ICT services and applications. This should include conditions of funding, eligibility criteria, application and approval processes, funding administration, and associated roles and responsibilities	NCH, SMOH, TWG, FMOH
				B. Disseminate incentive program	Develop communication strategy and materials to publicize incentives and put in place necessary mechanisms to support this, including funding guidelines, information and application forms	
				C. Develop strategy for continued Health ICT skills and competency acquisition	Develop a strategy for on the job Health ICT skills improvement, training and retraining for relevant cadre of health workforce	Community and Health Practitioner Registration Board of Nigeria (CHPRBN);Health Records Officers Regulatory Board of Nigeria (HRORBN); Medical and Dental Council of Nigeria (MDCN); Medical Science Council of Nigeria; Nursing and Midwifery council of Nigeria (NMCN); Pharmacists Council of Nigeria (PCN); Environmental Health Registration Board of Nigeria.and relevant professionals
				D. Design Health ICT skills and competences career progression plan	Design and institutionalize Health ICT skills and competencies progression plan through the federal civil service and other related schemes of service	CHPRB; HRORBN; MDCN; NMCN;PCN; Environmental Health registration Board of Nigeria
	5.3 Skills accreditation and curriculum review	5.3. Establish methodology for accreditation and revision of Health ICT Curriculum	Develop/review Health ICT curriculum in health, technology and relevant institutions Also support new accreditation regimes for regulatory organizations	A. Identify education and training course changes	Determine changes that are required to existing education and training courses to ensure the development of Health ICT workforce capabilities	School of Medicine; School of Health technology; Nursing and others Health Informatics degree awarding Universities; NUC, NBTE, NITDA
				B. Define new accreditation requirements	Identify and define changes to existing professional accreditation programs for healthcare institutions and individual healthcare providers to include Health ICT	

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
				C. Develop standard Health ICT competency framework	Develop a standard Health ICT competency framework for health workers and Health ICT practitioners Framework should provide an understanding of required Health ICT knowledge, skills and attributes for these various professional groups	FMOH, TWG, NITDA
				D. Establish specialized Health ICT qualifications and certification track	Identify and establish nationally recognized tertiary qualifications in Health ICT (e.g. health informatics exchange) and implementing formalized training/education programs designed to recognize and promote the spread of Health ICT skills and expertise	FMOH, TWG, NUC, NBTE
				E. Implement new accreditation requirements	Liaise with the appropriate professional bodies and working groups to agree to changes to accreditation requirements and implement these changes throughout segments of the health sector, and broader health sector	School of Medicine; School of Health Technology; Health Informatics degree-awarding universities; NUC, FMOH
	5.4 Awareness and stakeholder engagement	5.4. Establish a plan for Health ICT awareness and stakeholder engagement	Establish mechanism for Health ICT activities awareness and targeted Health ICT stakeholder engagement.	A. Develop Health ICT awareness campaign strategy	Develop awareness campaigns that utilize appropriate communication mechanisms and forums to promote awareness of Health ICT, specific services and applications, and their benefits Roll-out awareness campaigns to high-priority change and adoption targets, and over time extend to broader health sector and public	TWG, FMOH, Implementing partners
				B. Rollout Health ICT awareness campaigns		
				C. Design M&E framework for measuring effectiveness of engagement	Define clear criteria and targets for Health ICT awareness and progress, and periodically measure actual awareness and programs against these, to assess the effectiveness of Health ICT change and adoption activities across stakeholders	Nigeria Medical Association (NMA); DPRS-FMOH; SMOH
				D. Design targeted stakeholder reference and working groups	Design a set of targeted stakeholder engagement forums that have clear goals, objectives and deliverables	TWG, FMOH
				E. Engage and consult with stakeholder reference and working groups	Engage/Involve stakeholder reference groups throughout the development of the Health ICT environment Groups will be involved in exploring particular issues and risks related to the development of the country's Health ICT environment, and the identification of acceptable solutions to these	TWG, FMOH

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
	5.5 Health ICT Education and Training	5.5. Establish Health ICT education and training programs	Create new Health ICT education and training programs to support improved Health ICT skills and competencies among priority stakeholders (consumers, health providers, health care managers, and health administrators)	A. Implement education and training course changes	Work with education institutions (e.g. universities, vocational training institutions, professional bodies) to insert Health ICT into their curricula were necessary.	School of Medicine; School of Health technology; Health Informatics degree awarding Universities; NUC, TWG
				B. Implement specialized Health ICT courses	Identify and establish internationally recognized tertiary qualifications in Health ICT (e.g. health informatics) and implement formalized training/education programs designed to recognize and promote the spread of Health ICT skills and expertise	School of Medicine; School of Health technology; Health Informatics degree awarding Universities; NUC, NBTE, TWG
				C. Review FMOH collaborative programs to include health informatics	Design and insert relevant Health ICT and informatics competency skills required to advance relevant skills and competencies amongst managers in the FMOH collaborative center program	FMOH, Relevant Universities, TWG
6.0 Infrastructure	6.1 Expanded Coverage	Connectivity coverage expanded and enhanced	Focusing and prioritizing interventions based on population density, disease prevalence, and providing adequate connectivity and supporting them with relevant policies and enabling environments	A. Identify underserved areas	Health Facilities and communities. Services coverage will cover power, connectivity and computing infrastructure coverage	USPF, TWG, GBB, MGOs
				B. Local participation of communities in support, maintenance and use of infrastructure Health ICT services and application	Ensure local participation and ownership of Health ICT projects and equipment	FMOH, FMCT (eGovt), Galaxy Backbone (GBB), LGA and community leaders, Mobile Telcoms, NCC, NGOs, USPF, NHIS
				C. Assess infrastructure availability of health facilities and programs	Data connectivity is a key foundation for sharing electronic information between care providers, and for the provision of health-care services through electronic channels (e.g. teleHealth ICT) This activity needs to identify the priority health-care provider segments and communities that require investment in 'fit for purpose' data connectivity In order to aid efficiency and optimize limited funds, health care facilities with the highest reach in communities should be identified and enhanced, technology-wise	FMOH, FMCT (eGovt), Galaxy Backbone (GBB), LGA and community leaders, Mobile Telcoms, NCC, NGOs, USPF
				D. Select implementation partners to develop data connectivity infrastructure	The country will need to select data connectivity infrastructure providers and operators to assist in developing the required data connectivity infrastructure These could be private and/or public organizations	FMCT, NCC, USPF, Mobile Telcoms, GBB, NGOs

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
				E. Develop data connectivity implementation design and plan	Investing in data connectivity infrastructure will be guided a high-level design for how improving or providing data connectivity to priority care providers and communities can be achieved, and how this will be extended to the broader health sector and population While some government agencies have already begun several initiatives, there still remains a plan to effectively link them to Health ICT	FMCT, NCC, GBB
				F. Deploy data connectivity infrastructure for underserved areas	Deployment would explore wired, fixed wireless and mobile connectivity infrastructure Some government agencies have already begun work on putting IT infrastructure in place. These can be leveraged for Health ICT purposes	FMOH, SMOH, USDF, FMCT, NCC, GBB, Telecoms
	6.2 Identify and assess existing infrastructure	Existing Infrastructure for Health ICT identified and assessed	Existing infrastructure can be leveraged to support Health ICT initiatives; alternative sources of power could also be explored NIPOST kiosks are an example of an organization infrastructure Others are Power, Connectivity and Equipment	Identify and assess ongoing infrastructural projects in underserved areas	This activity will explore the possibility of leveraging Health ICT initiatives on existing infrastructure such as RITCs, community connectivity projects and community based power (solar/ wind etc.) initiatives	FMOH, FMCT (eGovt), USPF, GBB, community leaders, private organizations (especially telecoms) Alternative power companies (solar generation, hydro, wind farms, inverters, etc.)
	6.3 Define Minimum Infrastructural Requirements	Minimum infrastructural requirements for e-health implementation defined	By thinking through and agreeing upon what different health facilities at all levels will need, the FMOH can define the basic/ minimum requirements for Health ICT adoption. Once these requirements are defined, health facilities will simply not initiate Health ICT implementations without meeting these requirements. This will give the general public some comfort that the healthcare facilities they attend has met certain Health ICT standards/ conditions/ requirements.	Define minimum computing, power and connectivity Infrastructure requirements for e-health implementation	These are the minimum infrastructural requirements for health facilities to optimally deploy and implement Health ICT initiatives	FMOH, FMCT (eGovt), GBB, USPF, NITDA
				Link healthcare organization and provider e-health accreditation to meeting minimum computing Infrastructure	One potential method to drive investments in Health ICT is to link their Health ICT accreditation to their meeting of defined infrastructural requirements Although it is typically a long-term aspiration, such an activity can be used to encourage initial investment in Health ICT related infrastructure. Once standards have been established, it becomes easier to monitor and enforce, and reward compliance across organizations	FMOH, SMOH, NITDA, NHIS

Component	Output Title	Output (Recommendation)	Output Description	Activity	Activity Description	Stakeholders
7.0 Solutions (Services and Applications)	7.1 Prioritize Services and Applications	Core set of appropriate Health ICT services and Applications prioritized and deployed	Identify and prioritize services and applications that have scaled, or are scalable	A. Identify services and/or applications for prioritization	This would include identifying: - Existing scalable services and applications - Necessary services and applications for prioritization -Services and application that have evidence for high impact -Solutions with potential for ease of	FMOH, NOTAP, NITDA, implementing partners in private sector
				B. Develop/revise high level requirements and design for identified national Health ICT service and/or application	This involves the development of requirements for priority services and applications to meet identified business process needs of the Nigerian Health ICT eco-space	
				C. Identify resources to support the expansion and development of identified services and applications	This involves identifying, evaluating and selection of resources (within public and private sectors) to undertake the detailed design and implementation or expansion of national Health ICT services or applications that adhere to the high-level requirements and design	
				D. Build and Deploy identified priority national Health ICT services and/or applications	This involves working with selected implementation partners to execute, needed programs at scale	
				E. Operate, support and sustain developed priority Health ICT services and application		
				F. Ongoing scale-up of prioritized services and application	This will focus on supporting identified priority services and application. (e.g., DHIS2)	
				G. Foster continuous upgrades of implemented high priority Health ICT solutions	Technology is dynamic, therefore system reviews and updates are mandatory for long-term implementations	
				H. Promote research and development of priority Health ICT solutions		
	7.2 Share Best Practices	Best practices in development and use of Health ICT documented and disseminated	Assess and document Health ICT services and applications in the repository (change and adoption).	Identify best practices in Health ICT and disseminate widely	A dynamic portal for text, documents and audiovisuals resource materials	FMOH, NITDA, implementing partners in private sector, MDCN, NUC, various medical bodies

APPENDIX 6:

HEALTH ICT M&E FRAMEWORK

Health ICT Enablers

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
Enabling and sustainable environment for implementation and scale-up of Health ICT in Nigeria	**1.0- Established sustainable governance structure**	Number (No.) of Health ICT initiatives led by key stakeholders in government - National and State Technical Working Groups (TWGs)	N/A							TBD	TBD
		Health ICT policy changes adopted and enacted Yes/No (Y/N)	N/A		PMO	Reports of meetings	Bi-Annual	TWGs - National and State, FMOH	National, State	TBD	TBD
	1.1- National Health ICT governance structure established	National Health ICT Steering Committee (Y/N)	N/A		PMO			FMOH, PMO	National	TBD	TBD
		National Health ICT TWG/committee (Y/N)	N/A		PMO					TBD	TBD
		National Health ICT project management office (PMO) (Y/N)	N/A		PMO					TBD	TBD
		Percentage (%) of meetings held by the National TWG in a year (with outputs and resolutions)	No. of meetings held within the reporting period	No. of planned meeting for within reporting period	PMO					TBD	TBD
	1.2- State Government engaged	State Health ICT TWGs established (Y/N)	N/A				Quarterly	State PMO, SMOH, FMOH		TBD	TBD
		% of states in Nigeria with functional state level TWGs (functional -defined a meeting per quarter)	No. of states with functional TWGs	36 States of Nigeria	State PMO				State	TBD	TBD
		% of states in Nigeria with state strategy, plan and budget	No. of states with state strategies, plans and budgets	36 States of Nigeria	State PMO		Quarterly	State PMO, SMOH, FMOH	State	TBD	TBD
	1.3-Broad stakeholder engagement achieved	% of identified key stakeholder groups engaged	No. of stakeholder groups represented at meetings	Identified stakeholder groups	National/State PMO		Quarterly	PMO	National/State	TBD	TBD
	1.4- National Health ICT Framework integrated and linked with National Health Act and	% of national policy documents released/reviewed in the preceding year with subsections for Health ICT	No. of national policy documents released/reviewed in the preceding year with subsections for	No. of national policy documents released/reviewed in the preceding year	Policy documents released/reviewed	Policy document review	Yearly	PMO	National	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	NSHDP and others		Health ICT								
	1.5-National Health ICT Framework developed, endorsed and periodically reviewed	National Health ICT framework endorsed (Y/N)	**N/A**		FMOH's annual report	Report of review	One-off	FMOH DPRS	National	TBD	TBD
		National Health ICT framework reviewed after 5 years (Y/N)	**N/A**		PMO	Report of review	5 yearly	FMOH	National	TBD	TBD
	2.0- Increased Funding for Health ICT	Resources committed to Health ICT implementation and scale-up from partners, donors and other stake-holders (financial and in-kind contributions)								TBD	TBD
	2.1- Funding for Health ICT operations secured	Total NGN secured	N/A		Budget document		TBD	FMOH		TBD	TBD
		% Health ICT budget secured	Amount secured for Health ICT	Annual Health ICT budget			TBD	FMOH		TBD	TBD
		Total amount of seed fund disbursed to Health ICT initiatives	Amount disbursed for Health ICT	Amount of seed fund allocated for Health ICT	Audit report	Audit report	TBD	FMOH	National	TBD	TBD
		% of statutory health budget allocated for Health ICT	Statutory health budget allocated for Health ICT	Statutory health budget	Fund raised		TBD	FMOH	National	TBD	TBD
		% of statutory health budget released for Health ICT	Statutory health budget released for Health ICT	Statutory health budget	Seed funds reports	Seed funds reports	TBD	FMOH	National	TBD	TBD
	2.2- Incentives mechanism established	No of incentive programs/structures and mechanism established	N/A		TWG/PMO reports	TWG/PMO reports	TBD	FMOH	National	TBD	TBD
		No of companies/organizations utilizing incentive mechanisms/scheme	N/A		TWG/PMO reports	TWG/PMO reports	TBD	FMOH	National	TBD	TBD
	2.3-Investment management plan established	Framework for planning and coordinating Health ICT budgets developed (Y/N)	N/A		TWG/PMO reports	TWG/PMO reports	TBD	FMOH	National	TBD	TBD
		National fund coordinating mechanism established (Y/N)	N/A		TWG/PMO reports	TWG/PMO reports	TBD	FMOH	National	TBD	TBD
		% of states with established state fund coordinating mechanisms	No. of states with established state fund coordinating mechanisms	Total no. of states in Nigeria	TWG/PMO reports	TWG/PMO reports	TBD	FMOH	National	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	3.0- Standards and Interoperability	No. of Interoperable Health ICT applications available in Nigerian Health ICT space	N/A				TBD			TBD	TBD
	3.1- Standards for Health ICT and	Standards for Health ICT and health information exchange	N/A		TWG/PMO reports	TBD	TBD	PMO	National	TBD	TBD
	health information exchange defined and established	defined (Y/N)									
		Standards for Health ICT and health information exchange disseminated (Y/N)	N/A		TWG/PMO reports	TBD	TBD	PMO	National	TBD	TBD
		% of defined Health ICT and HIE disseminated	Total disseminated	Total no. of defined Health ICT standards and HIE	TWG/PMO reports	TBD	TBD	PMO	National	TBD	TBD
	3.2- Capacity built for ensuring standards and interoperability	% of individuals trained to provide support for Health ICT standardization and interoperability to other key stakeholders	No. of individuals trained to provide support for Health ICT standardization and interoperability to other key stakeholders	Total No. of targeted individuals to be trained	TWG/PMO reports	Training registers + Registered targets	Quarterly	PMO	National, State	TBD	TBD
		% of organizations trained to provide support for Health ICT standardization and interoperability to other key stakeholders	No. of organizations trained to provide support for Health ICT standardization and interoperability to other key stakeholders	Total no. of targeted organizations to be trained	TWG/PMO reports	Training registers + Registered targets	Quarterly	PMO	National, State	TBD	TBD
	3.3-Registries, instruments (data collection forms, reports etc.) and indicators, standardized	% of registries, instruments and indicators standardized in line with the agreed Health ICT framework	No. of registries, instruments and indicators standardized in line with the approved Health ICT framework	Total no. of registries, instruments and indicators in use by health programs line with the approved Health ICT framework	TWG/PMO reports	Registries of instruments and standardized instruments	Bi-Annual	FMOH/PMO	National	TBD	TBD
	3.4- Health ICT Standards advocated for	Health ICT Standards advocated for (Y/N)	N/A		TWG/PMO reports	Monthly Reports	Monthly	FMOH	National, State	TBD	TBD
	4.0- Legislation, Policy and Compliance	Health ICT policy changes adopted and enacted (Y/N)	N/A		TWG/PMO reports					TBD	TBD
	4.1- Legislation, policy and compliance supported by National Health ICT PMO	Legislation, policy and compliance supported by National Health ICT PMO (Y/N)	N/A		TWG/PMO reports	Periodic Review	Bi-Annual	PMO	National , State	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	5.0- Change and Adoption (Capacity Building)	1. % of consumers, care providers and health-care managers using Health ICT solutions/innovations 2. % of consumers, care provider and health-care managers satisfied with using Health ICT solutions/innovations	1. No. of consumers, care providers and health-care managers using Health ICT solutions/innovations 2. No. of consumers, care provider and health-care managers satisfied with using Health ICT solutions/innovations	1. No. of consumers, care providers and health-care managers reached with Health ICT solution/innovation interventions 2. No. of consumers, care providers and health-care managers reached with Health ICT solution/innovation interventions						TBD	TBD
	5.1- System for Health ICT readiness, M&E and adoption of best practices established	1. Health ICT readiness assessment completed (Y/N) 2. Health ICT readiness system established (Y/N)	N/A		Workforce TWG	Periodic Review	Annually	PMO	National	TBD	TBD
	5.2- Incentive mechanisms to encourage uptake of Health ICT skills and competencies established	1. No of incentive mechanisms developed 2. % of incentive mechanisms adopted	No of incentive mechanisms adopted	No of incentive mechanisms developed	Workforce TWG	Periodic Review	Bi-Annual	PMO	National , State	TBD	TBD
	5.3- Methodology for accreditation and revision of Health ICT training curriculum established	Methodology for accreditation and revision of Health ICT training curriculum established (Y/N)	N/A		Workforce TWG	Periodic Review	Annually	PMO	National	TBD	TBD
	5.4- Plan for Health ICT awareness and stakeholder engagement established	Plan for Health ICT awareness and stakeholder engagement established(Y/N)	N/A		Workforce TWG	Periodic Review	Bi-Annual	PMO	National	TBD	TBD
	5.5- Health ICT education and training programs established	No of Health ICT education programs established	N/A		Workforce TWG	Periodic Review	Quarterly	PMO	National	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	6.0- Infrastructure	% of health providers with increased access to electronic health information	No of health providers with access to electronic health information	No of health providers reach with electronic health information interventions	FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
		% of healthcare consultations made through telemedicine	No of healthcare consultations made through telemedicine	No of health providers reach with telemedicine interventions	FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
	6.1-Connectivity coverage expanded and enhanced	1. % of communities/ health facilities supplied with connectivity hardware infrastructure	No of communities/ health facilities supplied with connectivity hardware infrastructure	total no. of communities/ health facilities targeted to be supplied with connectivity hardware infrastructure	FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
		% of communities/health facilities connected to an ISP	No of communities/health facilities connected to a ISP	total no. of communities/health facilities targeted to be connected to a ISP	FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
	6.2- Existing Infrastructure for Health ICT identified and assessed	% of health facilities with needs assessment completed	no of health facilities with needs assessment completed	no of health facilities targeted for assessment	FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
	6.3- Minimum infrastructural requirements for Health ICT infrastructure defined	Minimum infrastructural requirements for Health ICT infrastructure defined (Y/N)	N/A		FMCT Annual Surveys/TBD	TBD	TBD	FMCT	National	TBD	TBD
	7.0-Solutions (Services and Applications)									TBD	TBD
	7.1- Core set of appropriate Health ICT services and Applications prioritized and deployed	% of innovative Health ICT solution deployed	No of innovative Health ICT solution deployed	Total no innovative Health ICT solution developed/available	TBD	TBD	TBD	FMCT/FMOH	National /state	TBD	TBD
		% with appropriate Health ICT solution amongst target population	no with appropriate Health ICT solution amongst target population	target population	TBD	TBD	TBD	FMCT/FMOH	National /state	TBD	TBD
	7.2- Best practices in development and use of Health ICT documented and disseminated.	Best practices in development and use of Health ICT documented and disseminated. (Y/N)	N/A		TBD	TBD	TBD	FMCT/FMOH	National /state	TBD	TBD

Health ICT Outcomes[i]

appropriate impact evaluations to assess the effectiveness, efficacy, and cost-utility of Health ICT implementations will be conducted.

Health Impact	Proximal Outcome/Output	Indicator	Indicator definition		Data sources	Data collection method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
By 2020, Health ICT will help enable and deliver universal health coverage	**1.0- Improved access to health services**	***National indicator for access to health services***									
	1.1- Effective use of telemedicine	% of health facilities providing telemedicine services	No. of health facilities delivering telemedicine services	No. or health facilities identified as potential telemedicine centers	NHMIS-facility registry	Existing/ new electronic systems	Quarterly	National/ State PMO	National/ State	TBD	TBD
		% of health encounters resolved or supported through telemedicine	No. of health encounters resolved or supported through telemedicine	No. of health encounters	Telemedicine platforms/ NHMIS					TBD	TBD
	1.2- Effective use of ICT for health worker training	% of health workers trained using ICT	No. of health workers trained using ICT	No. of health workers by cadre	HRIS		Quarterly	National/ State PMO	National/ State	TBD	TBD
	1.3-Effective use of ICT for health worker supervision and support	% of health workers being supervised using ICT tools	No. of health workers supervised using ICT tools by cadre	No. of health workers by cadre	HRIS		Quarterly	National/ State PMO	National/ State	TBD	TBD
	2.0- Improved coverage of health services	***National indicator for coverage of health services***								TBD	TBD
	2.1- Effective use of CRVS for child health	% children born registered in birth registry system	No. of children registered in birth registry	No. of children born (estimated through DHS or Census)	Birth registry/ other sources TBD	Existing/ new electronic systems	Quarterly	National Population Commission	National/ State	TBD	TBD
	2.2- Effective use of pregnancy registry for maternal health	% pregnant women registered in pregnancy registry	No. of pregnant women registered in pregnancy registry	No. of pregnant women (estimated through DHS or Census)	Pregnancy registry/ other sources TBD	Existing/ new electronic systems	Quarterly	FMOH/ SMOH	National/ State	TBD	TBD
	2.3-Effective use of human resource information system (HRIS) for distribution of health workers	% health workers by cadre registered in HRIS	No. of health workers registered in HRIS	No. of health workers by cadre (as estimated by key sources)	Health workers by cadre baseline	Existing/ new electronic systems	Quarterly	FMOH HRH/ SMOH	National/ State	TBD	TBD
	Effective use of NHMIS for health system planning	% of health facilities reporting into NHMIS (public and private)	No. of health facilities reporting into NHMIS (public and private)	No. of health facilities (public and private)	DHIS2	Existing/ new electronic systems	Quarterly	FMOH/SMOH	National/ State	TBD	TBD
	Effective use of LMIS for tracking supply and demand for commodities	% of facilities with eLMIS reporting no stock outs	No. of facilities with eLMIS reporting no stock outs	No. of facilities with eLMIS	eLMIS	Existing/ new electronic systems	Quarterly	FMOH/ SMOH	National/ State	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	3.0- Increased uptake of health services	***National Service Delivery Indicators***									
	3.1- Effective use of mobile messaging for demand creation for RMNCH	% of pregnant women and new mothers receiving mobile messages accessing health services	No. of pregnant women and new mothers receiving mobile messages accessing health services	Estimated no. of pregnant women and new mothers targeted for mobile messaging	MAMA/ Other sources TBD	Existing/ new electronic systems	Quarterly	National/ State PMO & MAMA	National/ State	TBD	TBD
	3.2- Effective use of mobile conditional cash transfer for demand creation	% of citizens accessing health services through mobile conditional cash transfer programs	No. of citizens accessing health services through mobile conditional cash transfer programs	Estimated no. of citizens to be covered/ supported through mobile conditional cash transfer programs	mCCT/ Other sources TBD	Existing/ new electronic systems	Quarterly		National, State	TBD	TBD
	4.0- Improved quality of care	***National quality of care indicators***									
	Effective use of ICT for decision support	% of health workers using decision support tools to improve quality of care	No. of health workers using decision support tools to improve quality of care	Estimated no. of health workers targeted for decision support tools	Decision support tool dashboards / TBD	Existing/ new electronic systems	Quarterly	National/ State PMOs and implementers	National , State	TBD	TBD
	Effective use of ICT within the continuum of care (incl. referrals)	% of facilities implementing ICT to support the continuum of care	No. of facilities implementing ICT to support the continuum of care	No. of facilities	TBD	Existing/ new electronic systems	Quarterly	National/ State PMOs and implementers	National , State	TBD	TBD
	5.0- Increased financial coverage for health care	***National financial coverage for health care indicators***									
	5.1- Effective use of ICT for NHIS	% of citizens enrolled in NHIS system	No. of citizens enrolled in NHIS system	No. of citizens targeted for enrollment in NHIS	NHIS/ TBD	Existing/ new electronic systems	Quarterly	NHIS	National/ State	TBD	TBD
		% of claims and reimbursements processed through NHIS platform	No. of claims and reimbursements processed	No. of claims and reimbursements submitted for processing	NHIS/ TBD	Existing/ new electronic systems	Quarterly	NHIS	National/ State	TBD	TBD
	5.2- Effective use of ICT for non-Insurance-related financial transactions	TBD- this may include the use of mobile money or electronic payments for health workers, etc.	TBD	TBD	TBD	Existing/ new electronic systems	Quarterly	PMO/ TBD	National/ State	TBD	TBD

Intermediate Outcome	Proximal Outcome/Output	Indicator	Indicator Definition		Data Sources	Data Collection Method	Frequency of Data	Responsibility	Scope	2015 Baseline	2020 Target
			Numerator	Denominator							
	6.0- Increased equity in access to and quality of health services, information, and financing	***National health equity indicators***									
	6.1- Effective use of ICT for delivering appropriate health services for those who need them most based on epidemiology	% of distribution of services and human resource plans and fund allocations made through the use of epidemiological data accessed through ICT services	No. of distribution of services and human resource plans and fund allocations made through the use of epidemiological data accessed through ICT services	No. of distribution of services and human resource plans and fund allocations made	NHMIS/ Other sources TBD	Existing/ new electronic systems	Quarterly	PMO/TBD	National/ State	TBD	TBD
	6.2- Effective use of ICT for delivering appropriate health services for those who need them most based on financial need	% of plans and fund allocations made that target NHIS services to the poor and most in financial need	No. of plans and fund allocations made that target NHIS services to the poor and most in financial need	No. of plans and fund allocations made to deliver NHIS services	NHIS/ Other sources TBD	Existing/ new electronic systems	Quarterly	PMO/ TBD	National / State	TBD	TBD

Endnotes

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