REPUBLIC OF KENYA

MINISTRY OF HEALTH

KENYA HEALTH ENTERPRISE ARCHITECTURE BLUEPRINT 2025

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To establish a strong unified National Comprehensive and Integrated Health Information System that generates high quality data for improved health service delivery

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Preface

The Ministry of Health is proud to present the Kenya Health Enterprise Architecture (KHEA), a strategic blueprint that lays the foundation for a digitally integrated, efficient, and resilient health system. This initiative is a key milestone in Kenya's journey toward achieving Universal Health Coverage (UHC) and aligns with national development priorities under Vision 2030 and the Bottom-Up Economic Transformation Agenda (BETA), where healthcare is recognized as a critical pillar.

As the country continues to embrace digital transformation, the Ministry is committed to establishing a robust blueprint for digital health services that enhances access, affordability, and quality of care for all Kenyans.

The Digital Health Act, 2023 and the Digital Health Regulations, 2025 are central to this effort, providing the overaching legal foundations for the operationalization of health clients management, tracking health records, and streamlining healthcare processes across the continuum of care. These regulations are designed to ensure that digital health systems are secure, interoperable, and responsive to the evolving needs of our health sector. KHEA complements this regulatory framework by offering a structured approach to building a health architecture. It's building blocks and the Digital Health Superhighway provides for an ecosystem that enables seamless data exchange, real-time access to health information, and coordinated service delivery across all levels of the health system. It supports innovations such as telemedicine, intelligent analytics, precision health, and community-based care, while upholding the highest standards of data privacy and patient confidentiality.

Drawing on Kenya's experience in leveraging digital tools to manage public health challenges such as HIV, TB and COVID-19, KHEA provides a scalable and adaptable architecture that strengthens our capacity to respond to both routine and emergency health needs. It empowers healthcare providers, public health practitioners and implementors with timely information, enhances decision-making, and ensures that services reach even the most remote communities.

This document is a call to action for all stakeholders from government agencies, development partners, private sector actors, and civil society to align with this vision and actively participate in its implementation. By working together, we can transform healthcare delivery, improve health outcomes, and build a future where every Kenyan has access to high-quality, affordable, and timely healthcare.

Hon. Aden Duale, EGH
Cabinet Secretary,
Ministry of Health

Acknowledgments

The development and implementation of the Kenya Health Enterprise Architecture (KHEA) framework has been a collective endeavour, made possible through the unwavering support, dedication, and collaboration of numerous individuals and organisations. We extend our heartfelt gratitude to the visionary leadership of the Offices of the Cabinet Secretary, Principal Secretary, and the Director General of Health whose guidance, insights, and commitment have been instrumental in shaping the KHEA framework. Your dedication to advancing healthcare in our nation has been an inspiration.

We express our profound gratitude to the various funding agencies most notably the Centers for Disease Control and Prevention (CDC Kenya) and the Tony Blair Institute for Global Change whose financial support has been crucial in the development of this blueprint that will pave way for a transformative change in line with the Government of Kenya's vision on healthcare delivery and in striving to achieve Universal Health Coverage (UHC) goals.

The Ministry of Health (MoH) acknowledges the instrumental role of Dr. Joseph Sitienei in initiating the development of this Framework, and the continued support of Dr. Bernard Langat in guiding its evolution. Special recognition is extended to Dr. Ayub Manya, under whose visionary leadership this work was successfully completed. The editorial process was led by Dr. Joyce Wamicwe (Ministry of Health), supported by a dedicated and diverse team of experts including Pascal Mwele, Dr. Jacob Odhiambo, and Evans Munene (Palladium Kenya); Dr. Ramona Koech, Peter Muya Hamisi - Consultant (Tony Blair Institute for Global Change); George Owiso (University of Washington); and Steven Wanyee (Intellisoft). Your collective expertise and contribution have left an indelible mark on our healthcare landscape. The Ministry extends its sincere gratitude to all contributors for their commitment, insight, and teamwork in developing this important blueprint.

Together, we have embarked on a journey towards a future where healthcare is more efficient, accessible, and patient-centred. Your unwavering support and collaboration have brought us closer to achieving this vision.

Dr. Ouma Oluga, OGW,
Principal Secretary,
State Department for
Medical Services

Mary Muthoni, CBS,
Principal Secretary,
State Department for Public Health
and Professional Standards

Executive Summary

Taking note of the evolution of the healthcare delivery landscape, the advent and adoption of digital health technologies and significant changes in the legal environment, Kenya's Ministry of Health is currently reviewing various policies and strategies in order to offer citizens the highest quality of health.

The vision of this Kenya Health Enterprise Architecture Blueprint (KHEA) is an established and managed data-driven digital health enterprise that optimally employs its digital resources to deliver quality healthcare in a holistic and coherent manner. This vision aligns with the Government's agenda for healthcare revolution. In his inauguration speech, His Excellency, Dr. William Samoei Ruto, CGH, pledged to make a raft of reforms in the health sector, and one of them was the deployment of an integrated state-of-the-art health information system. This architecture blueprint provides a baseline for the implementation of the envisioned system.

The KHEA builds on the foundation of the KHEA, 2016, whose vision w*as to establish a strong unified National Comprehensive and Integrated Health Information System that generates high quality data for improved health service delivery.* This KHEA is designed as a blueprint for setting up different components of Kenya's health enterprise and to guide how they should be organised, governed, and synchronised to transform service delivery and data management in the health sector.

To this end, KHEA updates address six major challenges. Firstly, omni-channel architecture will ensure as few applications as possible per facility for efficient service delivery across different health programmes. End-to-end workflow processes, customised to create clinical pathways, will address specific needs by reusing the workflow rather than reinventing the wheel. For commonly shareable assets, data can be isolated into registries to ensure availability, accessibility, security and timeliness. Because there are currently diverse technologies running at both national and county levels, KHEA will enable standards-based open architecture to support multiple devices and technologies, and extend and create frameworks to harness and leverage Artificial Intelligence, Machine Learning and the Internet of Things to aid personalised and self-care services. For this architecture to be functional and work for the benefit of the country rather than for sub-sections of society, the updates will use a governance framework that ensures that each party involved is accountable on all levels.

This blueprint is intended to be consumed by various stakeholders in the health sector, both state and non-state actors.

Dr. Patrick Amoth, CBS
Director General for Health

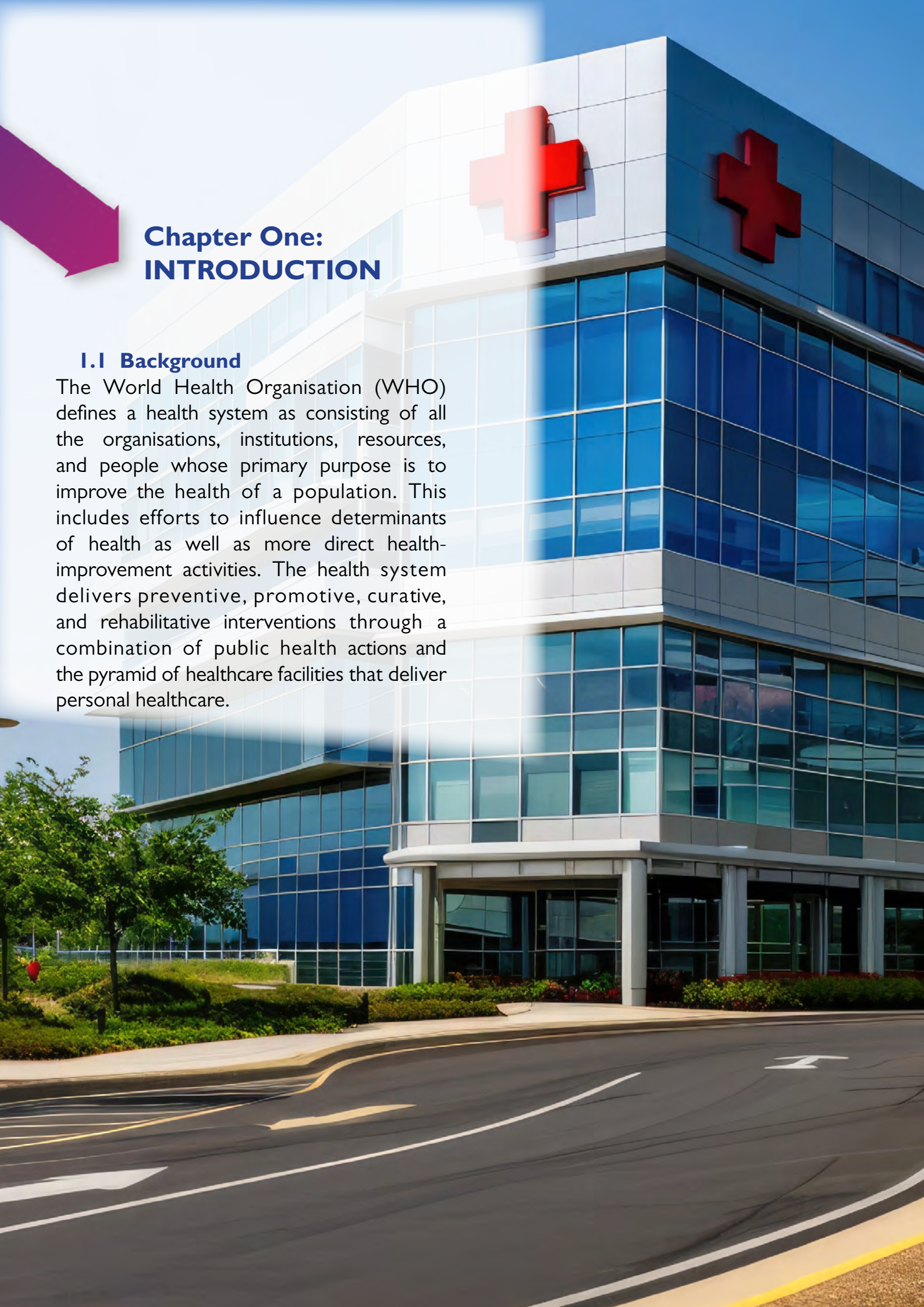
List of Abbreviations

Term	Description
ADD	Architecture Definition Document
ADM	Architecture Development Method
API	Application Programme Interface
BAM	Business Activity Monitoring
BI	Business Intelligence
BPM	Business Process Management
DHP	Digital Health Platform
EA	Enterprise Architecture
EAI	Enterprise Applications Integration
ESB	Enterprise Service Bus
ETL	Extraction Transformation and Loading
FEAF	Federal Enterprise Architecture Framework
GEA	Government Enterprise Architecture
GRC	Governance Risk and Compliance
HIS	Health Information System
KEBS	Kenya Bureau of Standards
KHEA	Kenya Health Enterprise Architecture
PEAF	Pragmatic Enterprise Architecture Framework
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
TOGAF	The Open Group Architecture Framework
TRM	Technical Reference Model
SPOC	Single Point of Contact
WAN	Wide Area Network
WSDL	Web Service Description Language
XML	eXtensible Markup Language

Chapter One: INTRODUCTION

1.1 Background

The World Health Organisation (WHO) defines a health system as consisting of all the organisations, institutions, resources, and people whose primary purpose is to improve the health of a population. This includes efforts to influence determinants of health as well as more direct health-improvement activities. The health system delivers preventive, promotive, curative, and rehabilitative interventions through a combination of public health actions and the pyramid of healthcare facilities that deliver personal healthcare.



The WHO health system building blocks describes six core components of health systems, namely;

- Leadership and governance
- Service delivery
- Health workforce
- Health information systems (HIS)
- Medical products, vaccines, and technologies
- Health financing

Leadership and governance and health information systems components are cross-cutting and provide the basis for all the other health system components. The Government of Kenya has enacted the Health Act, 2017 that facilitates the establishment and maintenance of a comprehensive integrated health information system. For this to be realised, the Ministry of Health has developed policies and guidelines to inform the consolidation and harmonisation of health information systems in the country and enable a data-driven health system. Additionally, it lays mechanisms for interconnectivity and foundational guiding principles for management and administration of health information banks in support of Kenya's health system.

The Ministry of Health, in partnership with its stakeholders, has developed this sector-wide health enterprise architecture for implementation in the country. The enterprise architecture (EA) shall provide a systematic way of consolidating leadership, governance, and information systems components by:

- Defining the complexities of a comprehensive integrated health information system and its components and how they relate and interact with each other in the operating environment.
- Providing the guiding principles for designing the EA and how it evolves as it matures over time.
- Describing the core functions, the standardised information management processes, data processing tools and relationships between the different sub-components such as actors and systems within and outside the health sector.

The Kenya Health Enterprise Architecture (KHEA) draws from leading international authorities and guides such as The Open Group IT4IT™. The Government Enterprise Architecture (GEA) is the means of organising the government enterprise resources, i.e., its services, processes, information, applications and technology infrastructure. It establishes a set of policies and technical choices to achieve desired business outcomes, technical standardisation and integration.

By aligning the Kenya Health Enterprise Architecure with the GEA, the Kenya Health Sector can reap the benefits of providing a blueprint that guides the design, development and evolution of the comprehensive integrated health information system to align investments in technology, information and processes that are cost-effective, sustainable, and aligned with the Kenya health sector strategic goals.

1.2 The rationale for the Kenya Health Enterprise Architecture

Kenya's health sector has traditionally used paper-based information systems. This is characterised by low quality of data, lack of real-time reports, tedious processes, occasional loss of vital data, inefficiencies in focused care and operational inefficiencies during planning. Several attempts have been made to digitise the health information system mainly by partners in the absence of legal and policy guidance. These attempts have resulted in siloed and disparate systems that have a limited ability to meaningfully exchange health information for focused patient care and planning. In a bid to provide quality health services and to achieve the aspiration of the Article 143(1a) of Kenya's Constitution, the Digital Health Act,

2023 established the Kenya Health Enterprise Architecture as the guide for the design, development, and evolution of the comprehensive integrated health information system, provided for in the Health Act 2017, aligning investments in technology, information, and processes that are cost-effective, sustainable, and aligned with the Kenya health sector strategic goals. Further, the Data Protection Act, 2019, recognizes health data as sensitive data and moves to ensure its privacy, security and confidentiality.

The review and update of the Kenya Health Enterprise Architecture is a step in creating an enabling policy environment for the realisation of comprehensive, integrated health information systems.

1.3 Situation Analysis

The technical working group carried out an assessment, based on the Open Group Architectural Framework (TOGAF), in order to understand the existing health enterprise environment. This assessment focused on the following six architecture components:

i. ***Strategy Component (Architecture Alignment to Strategic Objectives):*** How the current state architecture is linked to the transformation strategy, internal business, and IT capabilities and investments. How it provides a means to measure the impact of those investments on strategic outcomes.

ii. ***Channel Component (Architecture Alignment to Service Delivery Channels):*** How the current state of architecture responds to the key imperatives of service delivery set out in the policy orientations of the Kenya Health Policy 2014-2030.

iii. ***Business Services Component (Architecture Alignment to the Health Sector Business Objectives):*** How the current state architecture responds to the objectives of the Kenya Health Policy 2014-2030 on the eight policy orientations intended to achieve a patient-centric, efficient, collaborative, and accountable health system.

iv. ***Common Services Component (Architecture Maturity in deployment of Common and Re-usable Services of the Health Sector):*** To what extent the current state architecture exposes opportunities for sharing of common services to eliminate duplication and leverage muti-sector strengths to enable efficient and transparent service delivery. Whether the current approaches to common services management effective.

v. ***Technology Services Component (Architecture Alignment to Applications, Data, Interoperability, Infrastructure and Security Requirements):*** How the current state architecture responds to the business requirements for:

- Core and non-core business applications,
- Master, transactional, and analytical data,
- Seamless exchange of data between internal systems within hospitals and externally with 3rd parties,
- Robust, scalable, and affordable compute, storage, and network infrastructure at national and county levels,
- Secure, access-controlled data at rest and in-transit in compliance with various data security standards adopted by the sector.

vi. ***Governance Component (Architecture Maturity in Enforcement of Policy and Standards for various Digital Initiatives):*** How the current state architecture supports the ideation, elaboration, implementation, support,

and evolution of digital initiatives aimed at implementing the eHealth Strategy.

The summary of the assessment is tabulated below

Architecture Component	**Current State (Overall score is based on the TOGAF Architecture maturity model: Level 0 -None; Level 1- Initial; Level 2- Under developed; Level 3 – Defined; Level 4- Managed; Level 5-Optimizing)**
Strategy Component (Architecture Alignment to Strategic Objectives)	• The alignment towards the eHealth strategic plan 2019-2024 • A total of 16 e-health initiatives were evaluated • Of the evaluated initiatives, 12% were partially done, 13% are ongoing, and only 19% had been done, The main obstacle noted was lack of financial resources. • Assessment score: Level 3.5
Channel Component (Architecture Alignment to Service Delivery Channels)	• How the current state of architecture responds to the key imperatives of service delivery set out in the policy orientations of the Kenya Health Policy 2014-2030. • Overall Challenge is infrastructure challenges e.g. power and connectivity, health record exchange, robust HMIS systems. • Assessment score: Level 3
Business Services Component (Architecture Alignment to the Health Sector Business Objectives)	• How the current state architecture responds to the objectives of the Kenya Health Policy 2014-2030 on the eight policy orientations intended to achieve a patient-centric, efficient, collaborative, and accountable health system. • 38 core business processes were identified, out of which 18 of them were modelled to show how systems interact with business services • Overall challenge was clarity in communication and compliance checks • Assessment Score: Level 3
Support Services Component	Meant to cover office tools and software that enables users to access digital solutions in the sector There exists a helpdesk system used to log and track support of issues, The critical issues reported are; • low skills & poor management support systems, • system downtime, • slow resolution to open tickets/items, • outdated hardware, • power outages, • minimal budget for support, • staff turnover, • insufficient coverage of both the service areas at health facility and system functionality.

	Different partners have different models of support that complement and support existing systems. Assessment score: Level 2.5
Technology Services Component	**Applications layer** • There were 86% of open-source systems and just 14% of proprietary systems among the surveyed systems, • Over 60% of the applications are used to manage appointments, patient records, billing and payment and reporting, • There was a notable duplication of efforts in the applications functionalities. • Assessment score: Level 2.5 **Data Layer** • The challenge of data quality at primary level of data generation remains, • Transactional data for reviewed systems is mostly held by systems of record with no data sharing (2 systems), • Some systems maintain an IL layer ready for data exchange with other systems. • Assessment score: Level 2.5 **Interoperability Layer** • 86% of the systems do integrate with other digital tools and of these 50% have a daily data exchange, • Different systems have different implementation mechanisms limiting health information exchange. • Assessment score: Level 2.5 **Infrastructure Layer** • 29% of the systems have data located at the national level, • 43% of the systems have data located at health facility, • 28% of the systems have data located on the cloud, • 29% of the respondents reported that their data is centrally stored, • 43% of the data is on a distributed storage, • 71% of the systems configured for high availability, • Assessment score: Level 2.5

	Security Layer - (approaches taken to ensure data at rest and in transit is secure) • 14% had no security used, • 86% have adopted Access Control, Data Encryption, and Data masking. • Assessment score: Level 2
Governance Component	Kenya has relevant standards and guidelines; however, several of these guidelines are due for update. Additionally, the legal framework for implementation of the guidelines by the health sector players was not favourable under KHEA 2016. Assessment score: Level 2.5

Table 1: Summary Findings

Chapter Two:
THE ARCHITECTURE

2.1 Summary

The Kenya Health Enterprise Architecture is anchored on the vision articulated in the eHealth Strategic Plan, 2019-2024; the Kenya Health Policy 2014-2030; and the Kenya Health Sector Strategic Plan, 2018-2023, and builds on the enterprise envisioned in the Kenya Health Enterprise Architecture, 2016-2022 (KHEA 2016).

To address the challenges outlined in the situation analysis and improve on existing enterprise to meet the new digital era, the illustration in Figure 1 has been developed to represent an ecosystem for a digitally enabled Kenya Health Enterprise.

The KHEA is designed to guide the efforts towards modernisation and reorganisation of Kenya's digital health ecosystem into an enterprise. The KHEA will be built on a strong backbone of infrastructure for data collection and storage, transmission, and secure and seamless support for flow of data across different components throughout the data life cycle and in line with Kenyan data laws. This will ensure coordinated service provision across the sector.

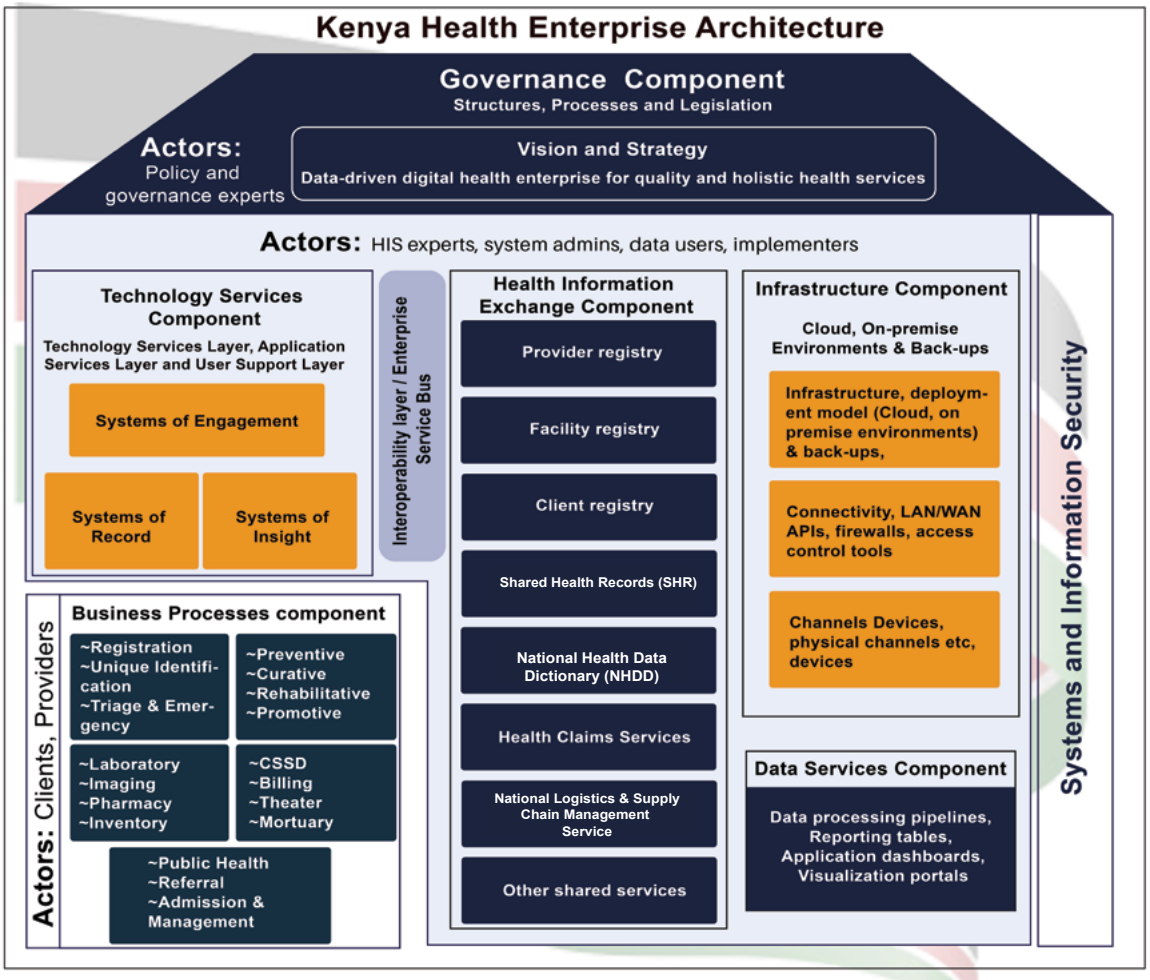


Figure 1: KHEA Architectural Diagram

2.2 Architectural Components of the KHEA

2.2.1 Governance Component

The governance of the Kenya Health Enterprise Architecture (KHEA) is anchored in the formal leadership and oversight structures of the Ministry of Health as established through the Health Act, 2017, the Digital Health Act, 2023, and other applicable national policies and regulations. These structures provide the statutory mandate for policy direction, standards-setting, regulatory oversight, coordination, and accountability for digital health across all levels of the health system.

At the apex, the Cabinet Secretary provides overall policy leadership. The Principal Secretaries and the Director General for Health offer strategic oversight for digital health and enterprise architecture. The Ministry's governance organs including the technical directorates and technical units for standards, regulation, quality assurance, health information systems, monitoring and evaluation, research, legal affairs, and sector planning ensure that KHEA aligns with national priorities, legal mandates, and sector standards.

At the strategic and technical levels, the Ministry exercises its governance function through:

- Policy formulation and regulatory oversight for digital health systems, standards, and data governance;
- Sector-wide stewardship, including setting priorities, issuing directives, and enforcing compliance with the KHEA and related national frameworks;
- Standards development and approval, encompassing interoperability specifications, data governance requirements, enterprise architecture principles, and technology standards;
- Quality assurance, inspection, and compliance monitoring, ensuring that investments and digital solutions conform to approved guidelines and sector norms;
- Performance monitoring and reporting, anchored in routine assessments, self-attestation, audits, and architecture maturity evaluations; and
- Strategic alignment of digital health investments, enabling coherent resource mobilisation and coordination across national and county levels.
- Capacity building and workforce development to ensure components of the architecture are implemented.

These governance functions are executed through existing MoH mechanisms such as the directorates, Technical Committees, standards-setting committees, sector planning forums, and legal and regulatory entities empowered by national laws.

Role of the Partnership and Coordination Framework

While governance rests with the Ministry's statutory organs, the Kenya Health Sector Partnership and Coordination Framework (KHSPCF) provides the main platform for stakeholder engagement. Through its ICCs, the Inter-Governmental Consultative Forum, and thematic working groups, it facilitates collaboration and harmonisation among national and county governments, development partners, private sector, civil society, academia, and implementers. Within the KHEA, the KHSPCF is a mechanism that strengthens engagement, consultation, co-creation, and joint planning. It ensures digital health actors coordinate their efforts, align to the architecture, and contribute to an integrated digital health ecosystem.

2.2.2 Infrastructure Component

The infrastructure component covers data centre environments, servers, connectivity such as LAN and WAN, and devices that will be deployed for use by all actors in the health sector to host applications that automate any business processes in the health sector. The infrastructure will cover digital assets used at the National, County, Sub-County, health facility and community levels to ensure security, safety, confidentiality, access, and management requirements are met.

2.2.3 Data Services Component

Health data is generated at all services delivery points at health facilities and in the community (Level 1). The transactional data in paper-based system is held in paper registries while digital data is held in computer devices, servers, cloud, and the National Health Data Centre (NHDC).

The KHEA envisions a data service component that maximises the value of this data through data integration, deduplication, transformation, enrichment, analytics, and visualisation. The data services component consists of data processing pipelines and context services, data management services and orchestration services. The data utilisation component models the business processes, manages data search and common business processes.

Data access services include tools for standardising and exposing datasets for secure and easy access to users. The system has the capacity for seamless development of interactive dashboards using aggregate and individual level data from different source systems in response to business needs. It accommodates portals for visualisations and dissemination of information products that highlight health gaps and communicate service uptake and progress in care provision.

2.2.4 Health Information Exchange Component

KHEA is at the centre of facilitating health information interchange among digital health systems in the health sector. The Kenya Health Information Systems Interoperability Framework (KHSIF) was developed to help in bringing coherence in the interoperability of health information systems in the county as outlined in KHSIF .

The Health Information Exchange Layer, also referred to as the Interoperability Layer (IL), orchestrates secure data exchange between applications (within facilities and with external applications) while operating on a set of standards and rules as defined in the KHSIF. It will be complemented by other relevant databases while upholding the principles of data minimisation and privacy as prescribed in the Data Protection Act, 2019 (DPA), other relevant statutes and health policies such as the Kenya Health Data Governance framework (KHDGF).

Some of these shared resources include National Health Data Centre (NHDC), client registry, health facility registry (KMHFL), health worker registry, National Health Data Dictionary (NHDD) and shared health records. ***A digital health superhighway*** calls out the Key systems within the architecture that need to be integrated for effective information exchange. This has been

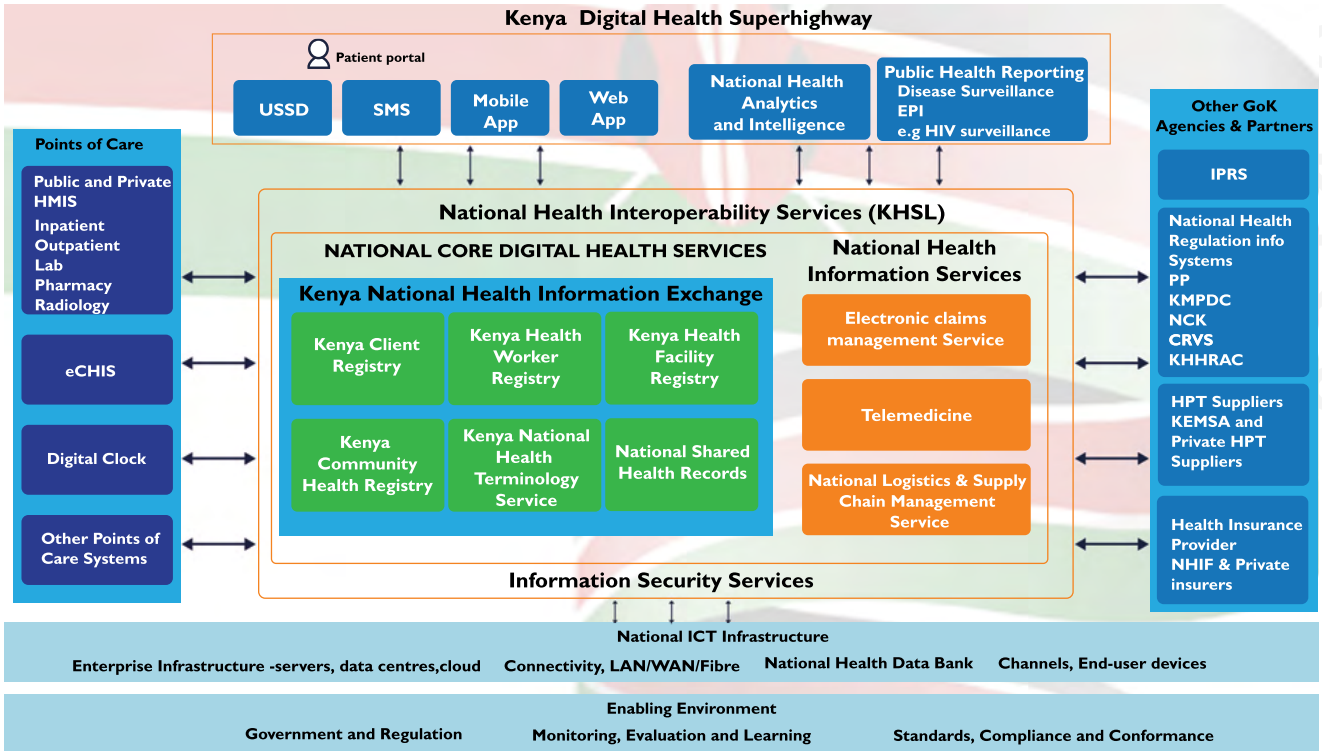


Figure 3: The Kenya Digital Health Superhighway

elaborated in Figure 3.

2.2.5 Business Services Component

Business processes in the health sector are well defined. A total of 38 business processes have been identified and are presented in the form of process maps. Business process maps are critical resources that form the basis of requirements for systems implementation. Initiatives to develop digital health solutions will be guided by these processes during design, development, enhancement and deployment. They ensure user centricity of the applications and service channels.

2.2.6 Technology Services Component

This component consists of approved applications, tools and vital digital health infrastructure that work together to coherently deliver the business of care provision in the health sector. It is comprised of three layers.

2.2.6.1 Technology Services Layer

This refers to Architecture Alignment to Applications, Data, Interoperability, Infrastructure and Security Requirements. It describes how the current state architecture responds to the business requirements for core and non-core processes.

2.2.6.2 User Support (Common Services) Layer

The support layer refers to tools, applications, and hardware used by providers for service delivery, communication, word processing and user identity management. It includes service applications and tools used to provide end-user

support via a helpdesk / service. This provides for support processes by various actors in a coherent manner.

2.2.6.3 Applications Layer

- ***Systems of engagement:***

These are systems that are used at point of care for managing interactions between provider and patient during service delivery and for managing other processes in the facility. This includes but is not limited to public and private HMIS, eCHIS, digital kiosks and others. The KHEA will leverage few applications that provide a holistic view of the patient in diverse settings. The digital solutions must interact with each other across the value chain in line with business process maps and align with approved service channels.

- ***Systems of record:***

Refers to systems that are fundamental sources of data (single sources of truth) for transactional information generated at points of care. To the systems of engagement, they provide vital information to enable service delivery such as health record, drug information etc. to the systems of insight, they provide vital data to help answer key questions that health indicators seek.

- ***Systems of insight:***

These systems (and the services they offer) will be used at sub-national and national level to provide aggregated data about the health sector. This will include secure, integrated, and modular analytics applications and portals that provide insights and services aligned with reporting needs. These systems will access case data from systems of engagement/record via an interoperability layer and process the data collected from primary sources to compute vital statistics about health indicators in the sector. Statistics aggregated from digital sources must be traceable to services offered.

Chapter Three: IMPLEMENTATION STRATEGY

The KHEA has the potential to effectively address the challenge of weak information systems that have hindered quality decision-making in the health sector and enable the health sector to achieve its vision of ***establishing a comprehensive, integrated health information system.*** The aim is to develop a strong, unified, and integrated web-based national health information system that generates quality data used to improve health service delivery and national planning. This system is country owned, country led, and country managed. This is primarily predicated on the effectiveness of implementing the KHEA in the sector and includes management of behavioural and organisational changes that are necessary.

A comprehensive maturity model-based assessment of the current state of KHEA indicates that the overall current state is at level 2.65 (refer to table 1). This, which corresponds to an architecture that is still in development but is beginning to be controlled. This level is characterised by good motivation for health information exchange, interoperability and need for collaboration. However, it is hindered by disparate approaches to achieving these objectives through various initiatives that don't have clear implementation status tracking and compliance checks on adherence to guidance and standards.

The architecture roadmap outlined in Figure 4 is therefore informed by the results of the maturity model assessment and aligned to ongoing implementation programs in keeping with the provisions of the KHEA 2025. It borrows the

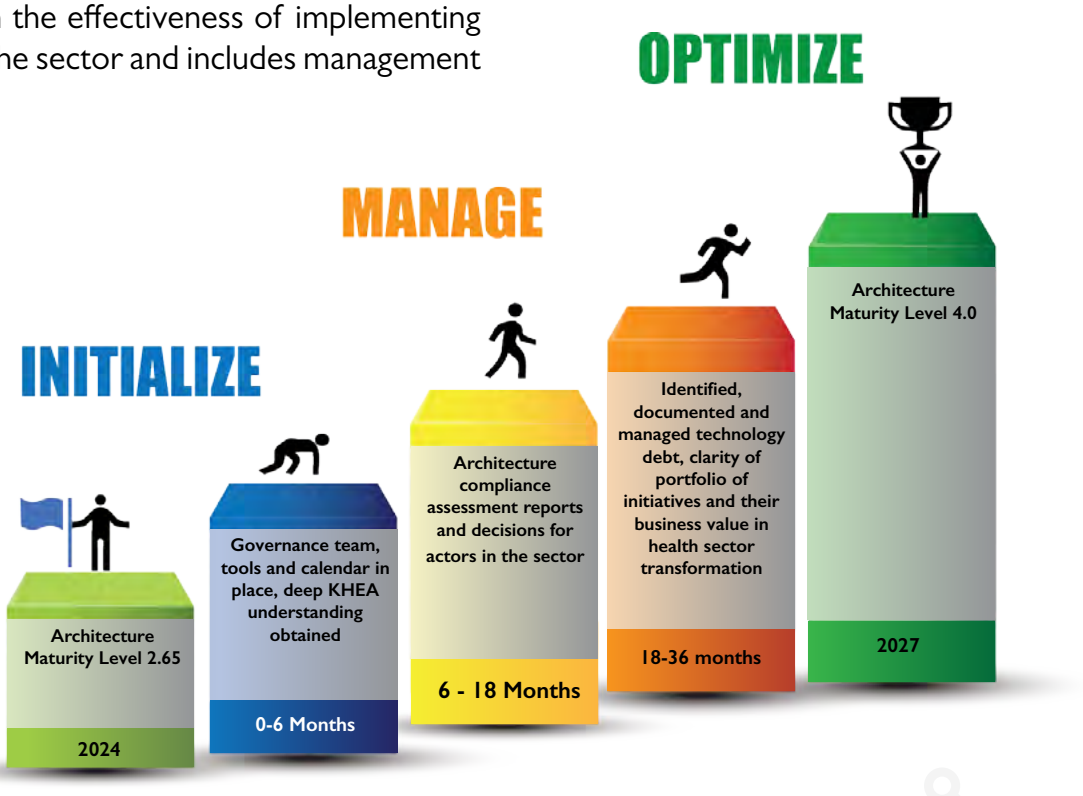


Figure 4: Architecture Roadmap

three thematic areas of KHEA 2016 architecture roadmap, as illustrated:

3.1 Work Package 1: Initialise

The MoH has established comprehensive governance structures. These structures are realised administratively and through the partnership framework. In addition, these structures are cascaded from the national to the subnational levels for leadership, co-ordination, resource mobilisation and implementation. The KHEA governance framework provides the foundational operational anchorage for the digital health ecosystem. All digital health initiatives and interventions will plug into the relevant governance provisions implemented through the KHEA. Specific tools and instruments required to operationalise the KHEA at all levels (vertically and horizontally) are available to all implementers. This phase of KHEA implementation is achieved within a period of six months from launch of the KHEA policy.

3.2. Work Package 2: Manage

A KHEA implementation will be monitored and coordinated through the existing governance structures. Digital health actors are encouraged to routinely carry out self-attesting to ensure compliance with the requirements of the KHEA.

3.3. Work Package 3: Optimise

Optimisation of the KHEA is primarily driven by data and evidence from its implementation. Additional sources of data may be considered when necessary to strengthen and to ensure accurate determination is achieved.

3.4. Benefits to Stakeholders

Adoption of KHEA to support digital health programs delivers the following benefits:

1. Provides guidance for exchange of health data while maintaining security, confidentiality, and privacy to protect the patient data while using the Health Information Exchange Platform

2. Acts as a reference guide for the development of a fully interoperable digital health platform that will be the basis to unlock more complex advanced data analytics in the health sector employing machine learning, Artificial intelligence, and other Technology innovations deployments to improve quality of care delivered and reporting in the sector

3. Enables the coherent approach to integration of the HIS for seamless quality data exchange while also ensuring a robust, secure, and scalable hosting infrastructure connecting to different sources including state and non-state actors

4. Facilitates the linkage between the public sector, private sector, partners and tech-companies with local academia for research and innovation environment and further position the Ministry as a centre of critical research collaboration across the sectors

5. Attracts young talent across the ecosystem including data scientists, engineers, and architects to build up and broaden the capability set beyond health statistics, to further accelerate job creation and employment opportunities for the youth

6. Creates a platform that provides granular data for patient care, preventive and promotive health as a common “source truth”

Chapter Four: MONITORING AND EVALUATION

The implementation of the KHEA will be monitored and evaluated through several initiatives. A monitoring and evaluation (M&E) framework will be developed to guide how KHEA will be monitored and evaluated. Routine monitoring of KHEA will be provided for in MoH annual planning processes and conducted to measure inputs towards its establishment implementation/maintenance and optimisation and the outputs relevant to this process. The M&E framework will describe Indicators and activities towards their generation, analysis and reporting. These activities will include automated generation of data from HIS, self-attestation, field supervisions, routine reports, rapid assessments, stakeholder engagements and monitoring of risk logs.

Guided by the M&E Framework, evaluation activities will be undertaken to measure the degree to which stakeholders have been successful in establishment of the KHEA and the impact of its implementation in the sector.

The following evaluation questions will need to be answered:

i. To what extent have the components of KHEA been established and operationalised as envisioned?

ii. Does the architecture provide the right business and technical alignment to realise the aspirations of the digital strategy for the sector?

iii. How effectively is the architecture enabling relationships over transactions?

iv. How efficiently does the architecture enable conversion of transactions into social conversations? Is collaboration, for example, conversational or simply transactional?

These questions will be answered through periodic surveys and assessments. The main approach will be managing what is referred to as the Transformation debt™.

The Transformation Debt™ will expose and aid in considering:

i. Cost of Compliance - What is preventing the initiative from complying with the guidance and what is required to allow the initiative to comply?

ii. Cost of Non-Compliance - What issues and risks going forward will this non-compliance create for the initiative?

iii. Cost of Remediation - What will it cost the health sector to become compliant?

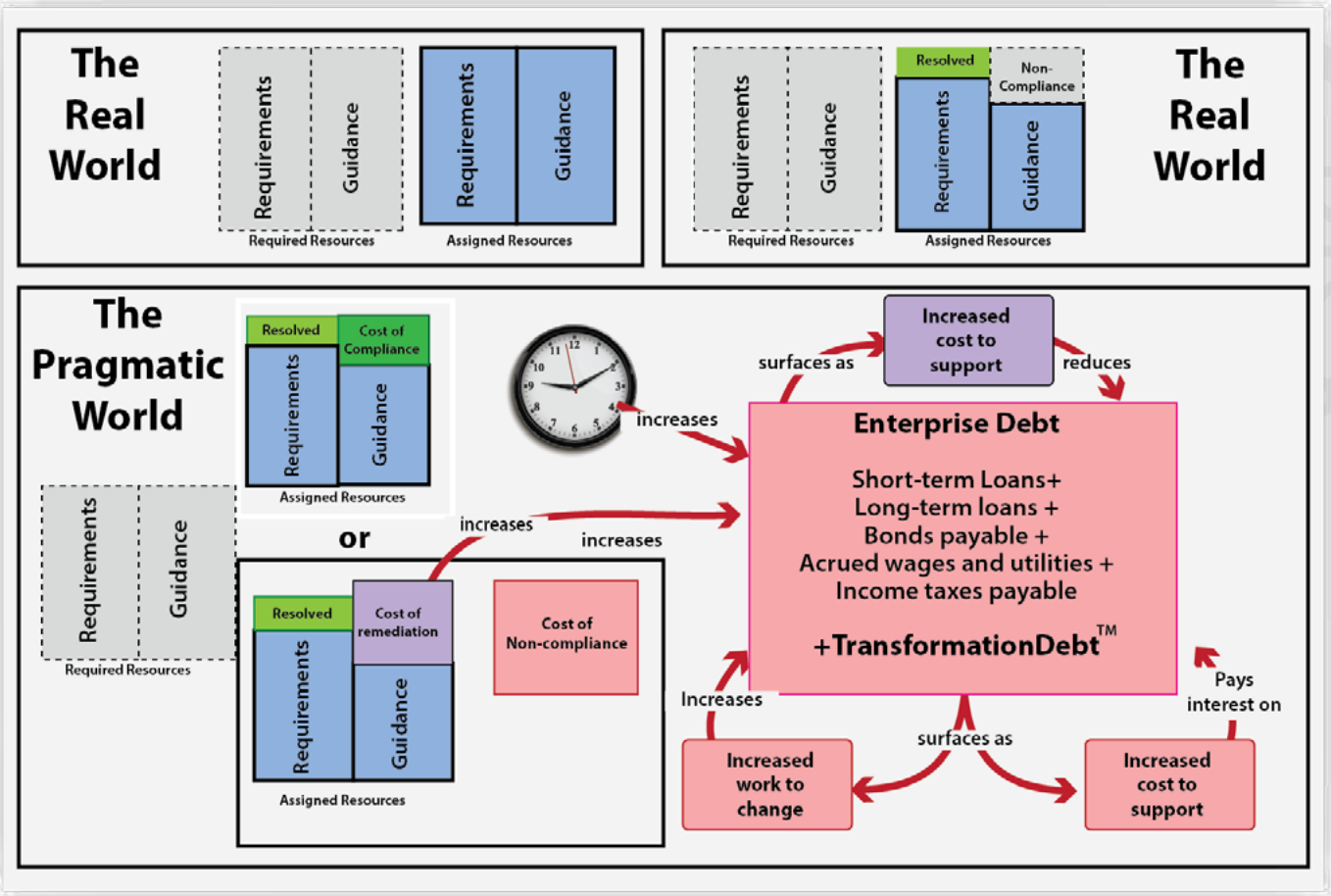


Figure 5: Transformation Debt
(Source: Pragmatic EA)

Figure 5 describes the ideal and pragmatic situations in the implementation of an enterprise with regard to transformation debt

Transformation Debt™ is what it will cost to service the debt going forward, and what it would cost to bring the work being done up to the same standard as would have been produced if the Assigned Resources had been provided. It should be noted that the Cost of Remediation is bigger than the difference between the ***Required Resources***, and the ***Assigned Resources***. This is because it will always cost more to do something one way and then change it to another than it would have cost to just do it right the first time.

If the business decision is made to not provide what is required to comply, this Transformation Debt™ adds to the overall Enterprise Debt™. ***Enterprise Debt*** is a measure of the overall debt an Enterprise has incurred and is literally a list of the debts the Enterprise has on its books. It is a well understood accounting term meaning short- and long-term loans, accrued wages and utilities, income taxes payable, and other liabilities.

Exposed and Managed Enterprise Debt
How should architecture help in exposing and managing transformation debt? By exposing and managing TD, the following are the resultant characteristics of transformation:

i. An increased level of transformation costs while Transformation Debt™ is exposed and managed.

ii. Followed by moderate transformation costs

when planned.

iii. Providing predictability leading to stability and full control of transformation.

The implementation of digital transformation initiatives within the Ministry can take any of these three fundamental types:

- **Compliant Work (Strategic Work):** Work that complies with guidance of this blueprint. This is generally the most effective, most efficient, and least risky manner of achieving an end.

- **Non-Compliant Work (Tactical Work):** Work that contravenes guidance. This is generally less effective, less efficient, and more risky manner of achieving an end.

- **Remedial Work:** Work that exists to correct any undesired effects of previous tactical work (i.e., changing previous tactical work into strategic work)

Chapter Five:
RISKS AND ISSUES

Industry thoughts on risks in Enterprise Architecture adoption

The alignment of business and IT is top of the list of motivation for an organisations' desire to embark on Enterprise Architecture (EA) journey. Other reasons for having an EA agenda are to support change and strengthen organisational adaptability to change.

EAs risk and issues have been guided by LeanIX[4] and the architecture is anchored around the TOGAF[5] readiness factors.

Risk ID	Risk	Effect	Likelihood	Impact	Mitigation
RSK-001	Vision: Lack of adoption or delay in acceptance of agreed target / future state and roadmap	Critical	Low to Medium	High	Completely and fully adopt the architecture as a key input in the implementation of the eHealth Strategic Plan. Utilise workshops to socialise both technical and non-technical teams about the blueprint and obtain ownership
RSK-002	Sponsorship & Leadership: Stagnation of this process at technical level without fully maturing to active leadership at board / investment level	Critical	Medium to High	High	Continually engage leadership by communicating value on qualitative and quantitative metrics that are understood by leadership.
RSK-003	Capacity to Execute: This design could remain a "utopia" type of design where there is no adequate capacity to implement it in terms of human and financial resources.	Critical	Medium to High	High	The identification of the roles of a solution architect and business analyst mitigates this risk. Additionally, provision of two-tier governance structures helps with tactical and strategic management of the change program.

Table 2: Risk Log

CONCLUSION

In conclusion, the Kenya Health Enterprise Architecture Blueprint, 2025 aligns with international best practices and standards, and is a significant step toward realising Kenya's Vision 2030 and the delivery of the government's healthcare objectives for Universal Health Coverage. Along with the enactment of four Universal Healthcare Acts in 2023, this blueprint paves the way for a future of seamlessly integrated, efficient, and person-centric healthcare.

The blueprint is meticulously designed to align with Vision 2030's key pillars, emphasising a knowledge-based economy, social inclusion, and infrastructural development. Drawing from the wisdom of leading authorities and relevant frameworks, such as *The Seven Levers of Digital Transformation* by The Open Group, *Enterprise Transformation*: A *Pragmatic Approach Using POET* by K. Smith, and others, the architecture places paramount importance on the quality of healthcare services. This commitment to best practices and standards ensures that our healthcare architecture adheres to the highest global benchmarks, fosters interoperability and integrated service promotion for streamlined delivery at all levels.

Crucially, this architecture focuses on improving the quality of healthcare services and promotes a unified and centralised approach for streamlined service delivery at all levels, reducing redundancies, simplifying healthcare delivery, and ensuring efficient resource utilisation. By enhancing the interoperability of healthcare systems, the architecture also empowers healthcare providers to offer more accurate diagnoses and personalised treatments.

With this emphasis, the blueprint ensures that the healthcare system is robust and interlinked. It positions Kenya as a global healthcare trailblazer, making comprehensive, patient-focused care an everyday reality while streamlining operations for efficiencies at all levels.

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