DIPC

DIGITAL HEALTH SYSTEMS (DHS)

KEY DEFINITIONS IN DHS

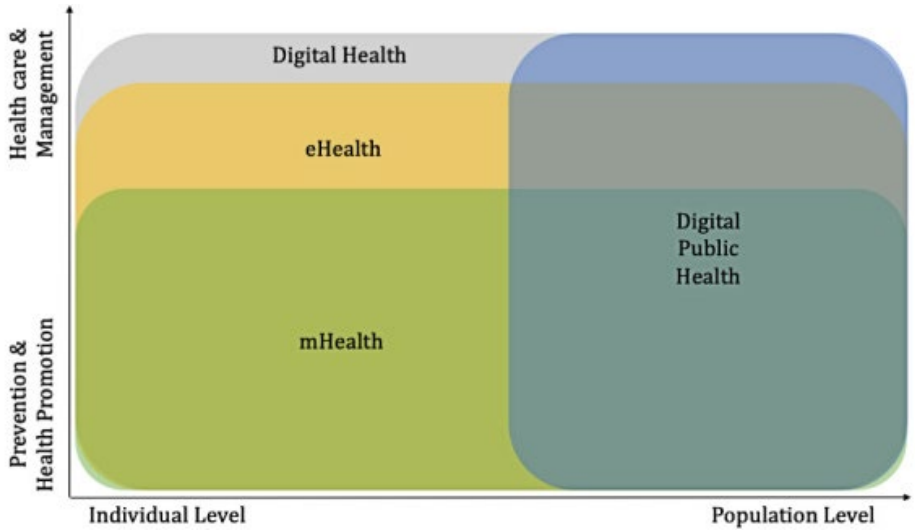
Digital Health (DH)
The field of knowledge and practice associated with any aspect of adopting digital technologies to improve health, and incorporates the subdomains of eHealth, medical informatics, telemedicine, telehealth and mHealth, as well as data-analytics, big data, and artificial intelligence. (WHO, 2021)

Electronic Health (eHealth)
The use of information and communications technology in support of health and health-related fields. (WHO, 2019)

Mobile Health (mHealth)
The use of mobile and wireless technologies to support the achievement of health objectives. (WHO, 2015)

Digital Public Health (DiPH)
DiPH focused on integrating digital technologies in health services and the potential of these technologies to improve health outcomes of populations and communities, rather than on tools that, for instance, assist individual users to take better care of aspects of their health (e.g., tracking of physical activity, diet, weight, or sleep).(Iyamu et. al, 2022)

Figure 1. Field of action and target groups of eHealth, mHealth, digital health and digital public health. (Adopted from Wienert et. al, 2022)



This figure 1 (Wienert et al., 2022) illustrates the core field of action and target group levels of mHealth, eHealth, digital health and digital public health and showcases the earlier mentioned considerable heterogeneity and interrelation between these commonly used terms in digital health.

References:
- WHO, 2021, (WHO, 2021c)
- WHO, 2019, (WHO, 2019b)

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Digital Public Health Intervention (DPHI)

Any intervention addressing at least one essential Public Health function through digital means. Applying a framework for functional classification and stratification categorizes its interaction level with the user. The developmental process of a digital public health intervention includes the user perspective by applying participatory methods to support its effectiveness and implementation with the goal to achieve a population health impact. (Wienert et. al, 2022)

Digital Health Intervention (DHI)

A discrete technology function designed to achieve a specific objective addressing a health system challenge in order to improve a health program process and help strengthen the overall health system. (WHO, 2023)

EXAMPLE OF DIPH INITIATIVE

Digital Innovation in Pandemic Control Program (DIPC) initiated by GIZ, aims to establish interoperable digital vaccine delivery solutions in five LMIC countries (Ghana, Malawi, Sierra Leone, Tanzania, and Peru) in collaboration with implementing partners (Digital Square, PAHO, UNICEF, and Regenstrief Institute). The goal is to facilitate disease prevention targeting communicable diseases through vaccine distribution and clinical services, and to contribute to the advancement of digital ecosystems in these countries to establish more resilient health systems by:

- Establishing interoperable digital vaccine delivery solutions and/or strengthening existing digital solutions to improve vaccine distribution processes and pandemic prevention efforts
- Improving interoperability between existing digital solutions for better data exchange and workflow by supporting the workforce through:
    - Training health and IT professionals on the effective use of strengthened digital tools.
    - Providing access to an open-source e-learning course

References:

- WHO, 2021, (WHO, 2021c)
- WHO, 2019, (WHO, 2019b)

Seven Building Blocks of the eHealth System

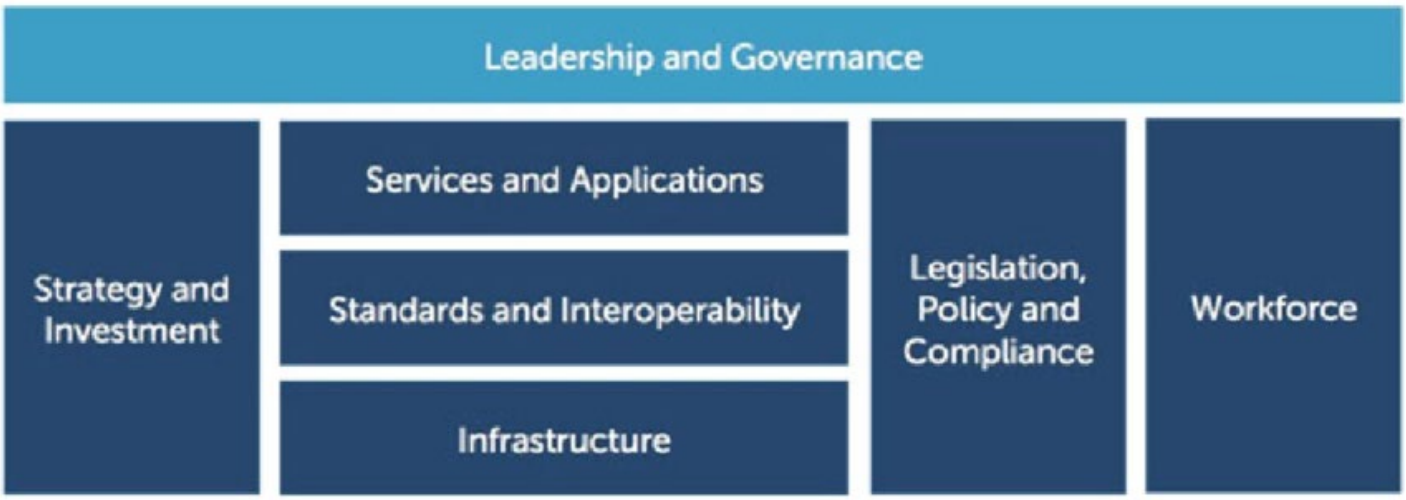


Figure 2. Framework of the seven components of an eHealth System (Source: WHO & ITU, 2012)

A national eHealth system comprises seven components or building blocks, which should be strengthened through a national eHealth strategy. These seven components can be grouped into the "ICT environment" and the "enabling environment", whereby 1) leadership & governance, 2) strategy & investment, 3) legislation, policy & compliance, 4) the workforce and 5) standards & interoperability fall within the "enabling environment", whilst 6) infrastructure and 7) services and applications (where DHIs are situated) fall within the "ICT environment" (WHO, 2019) . Figure 3. (adopted from WHO & ITU, 2012) describes in more detail the individual components and strategies for strengthening them.

Component	Role	Description
Leadership, governance and multi-sector engagement	Enabling environment	• Direct and coordinate eHealth at the national level; ensure alignment with health goals and political support; promote awareness and engage stakeholders. • Use mechanisms, expertise, coordination and partnerships to develop or adopt eHealth components (e.g. standards). • Support and empower required change, implementation of recommendations and monitoring results for delivery of expected benefits.
Strategy and investment	Enabling environment	• Ensure a responsive strategy and plan for the national eHealth environment. Lead planning, with involvement of major stakeholders and sectors. • Align financing with priorities; donor, government and private-sector funding identified for medium term.
Legislation, policy and compliance	Enabling environment	• Adopt national policies and legislation in priority areas; review sectoral policies for alignment and comprehensiveness; establish regular policy reviews. • Create a legal and enforcement environment to establish trust and protection for consumers and industry in eHealth practice and systems.

References:
- Recommendations on digital interventions for health system strengthening. Geneva: WHO,2019
- National eHealth Strategy Toolkit. WHO & ITU,2012

Workforce	Enabling environment	• Make eHealth knowledge and skills available through internal expertise, technical cooperation or the private sector. • Build national, regional and specialized networks for eHealth implementation. • Establish eHealth education and training programmes for health workforce capacity building.
Standards and interoperability	Enabling environment	• Introduce standards that enable consistent and accurate collection and exchange of health information across health systems and services.
Infrastructure	ICT environment	• Form the foundations for electronic information exchange across geographical and health-sector boundaries. This includes the physical infrastructure (e.g. networks), core services and applications that underpin a national eHealth environment.
Services and applications	ICT environment	• Provide tangible means for enabling services and systems; access to, and exchange and management of information and content. Users include the general public, patients, providers, insurance, and others. The means may be supplied by government or commercially.

Figure 3. Description of the seven components of an eHealth System (Source: WHO & ITU, 2012)

The WHO-ITU eHealth Strategy highlights the critical roles of data use and change management in transforming health systems. The Data Use Acceleration and Learning (DUAL) initiative added two components: change management and data use ecosystems. These components focus on improving data access and utilization, adjusting operations, and supporting health workers in adopting new technologies. The aim is to foster a data-centric culture and ensure smooth, sustainable digital transformation.

To fully capture a country's ICT environment, we also need to understand several technical constructs and taxonomies designed to facilitate a digital transformation from the national system level down to the functional level of a digital health intervention itself.

They serve as –

- Infrastructural,
- Architectural and
- Functional maps

They have been summarized in the following section.

References:
- Recommendations on digital interventions for health system strengthening. Geneva: WHO,2019
- National eHealth Strategy Toolkit. WHO & ITU,2012

Digital Public Infrastructure for Health (DPI-H)

The health-specific components of a country's digital infrastructure that enable an ecosystem of inclusive, scaled, user-driven digital applications in a health system. (Vital wave, 2023).
Digital Public Infrastructure (DPI) consists of secure, interoperable digital systems based on open standards, designed to provide equitable access to public and private services. Governed by legal frameworks, DPI promotes development, inclusion, innovation, and human rights.

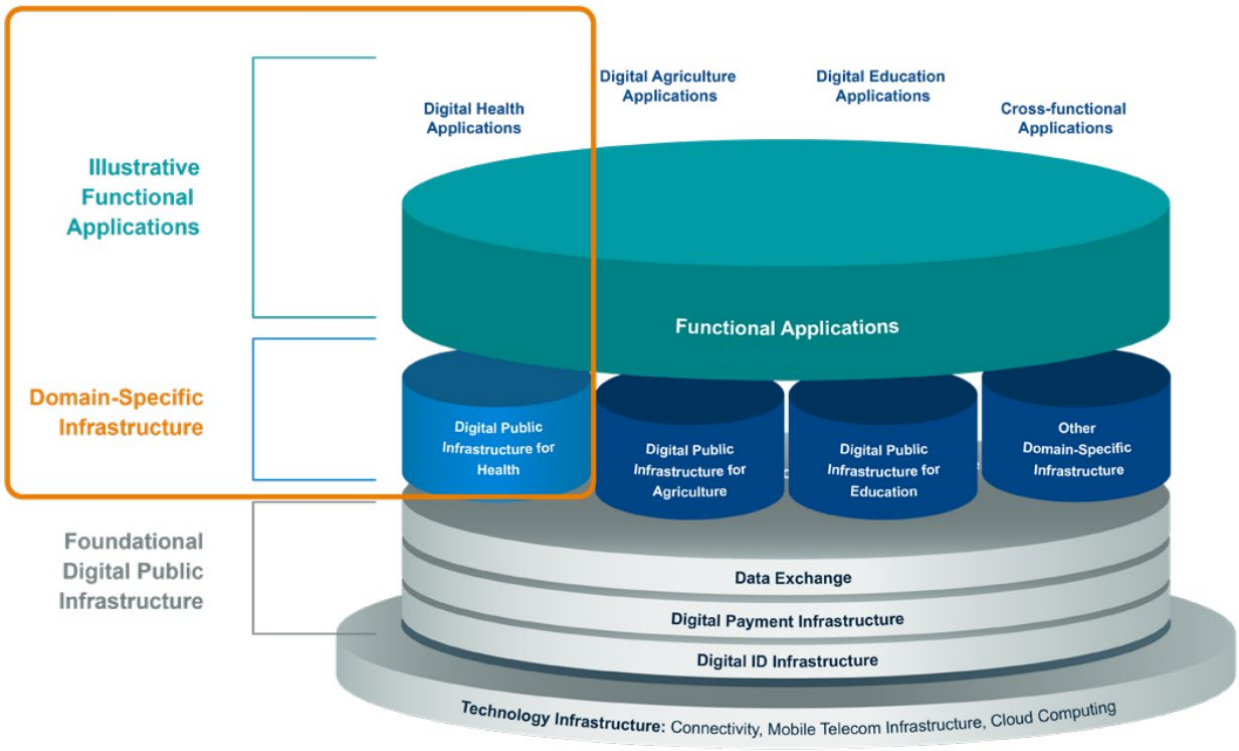


Figure 4. Framework of the seven components of an eHealth System (Source: WHO & ITU, 2012)

Examples include digital identity systems, payment platforms, and data exchanges. Digital Public Infrastructure for Health (DPI-H) enhances healthcare delivery in low- and middle-income countries through client registries, health information exchanges, and central data repositories. DPI-H aims to improve health outcomes, service delivery, and system efficiency. Successful implementation requires robust governance, technical capacity, core infrastructure, and stakeholder engagement, while addressing challenges like fragmented investments, regulatory gaps, and data governance.

References:

- Vital Wave. Digital Public Infrastructure for Health: Charting a path to implementation in LMIC health systems. 2023.

Digital Health Enterprise Architecture (DHEA)

The business processes, data, systems and technologies used to support the operations of the health system, including the digital health applications, point-of-service software applications, other software, devices, hardware, standards, governance and underlying information infrastructure functioning in a purposeful and unified manner. (WHO,DIIG, 2020)

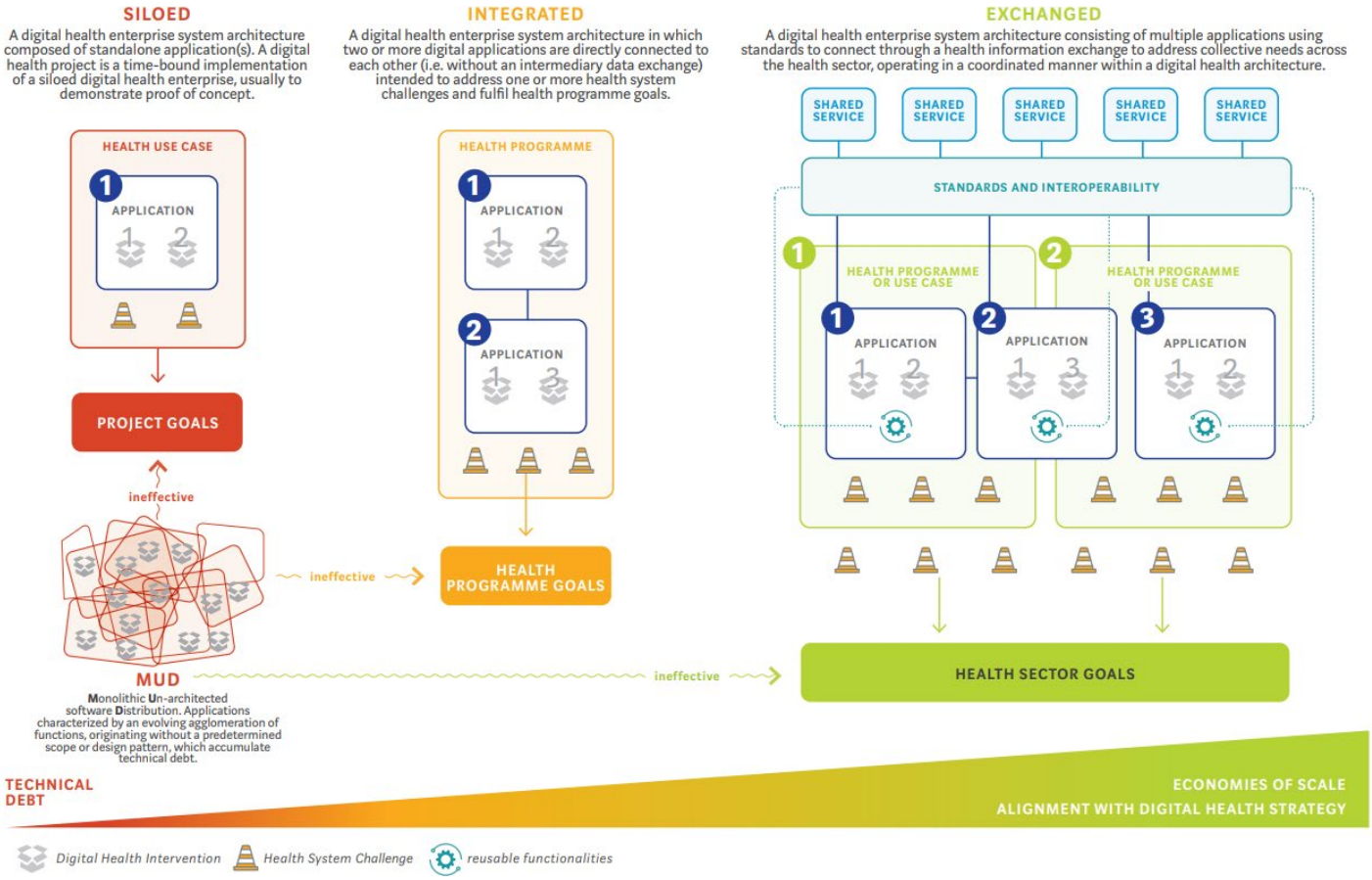


Figure 5. Digital Health Enterprise System Architectures (Source: WHO DIIG, 2020)

The "digital health enterprise architecture" (DHEA) is a framework defining the organization and coordination of digital health systems. According to WHO's Digital Implementation Investment Guide, it involves entities working together to deliver health services and products, encompassing business processes, data, systems, and technologies. DHEA includes software, devices, governance structures, and digital health platforms. The DIIG identifies four types of digital health enterprise architectures:

1. **SILOED:** Isolated applications focused on proof of concept.
2. **MUD (Monolithic Unarchitected Software Distributions):** Disorganized systems formed ad hoc, with significant technical debt.
3. **INTEGRATED:** Directly connected applications addressing specific health challenges.
4. **EXCHANGED:** Multiple applications connected via health information exchanges, addressing broader health system needs in a synchronized manner.

References:

- WHO. Digital Implementation Investment Guide: Integrating Digital Interventions into Health Programmes, 2020.

Developing a Digital Health Enterprise Architecture (DHEA) is a dynamic and adaptable process, tailored to a country's unique needs and context. Revisiting earlier stages is necessary to address changing health needs and the evolving digital health ecosystem.

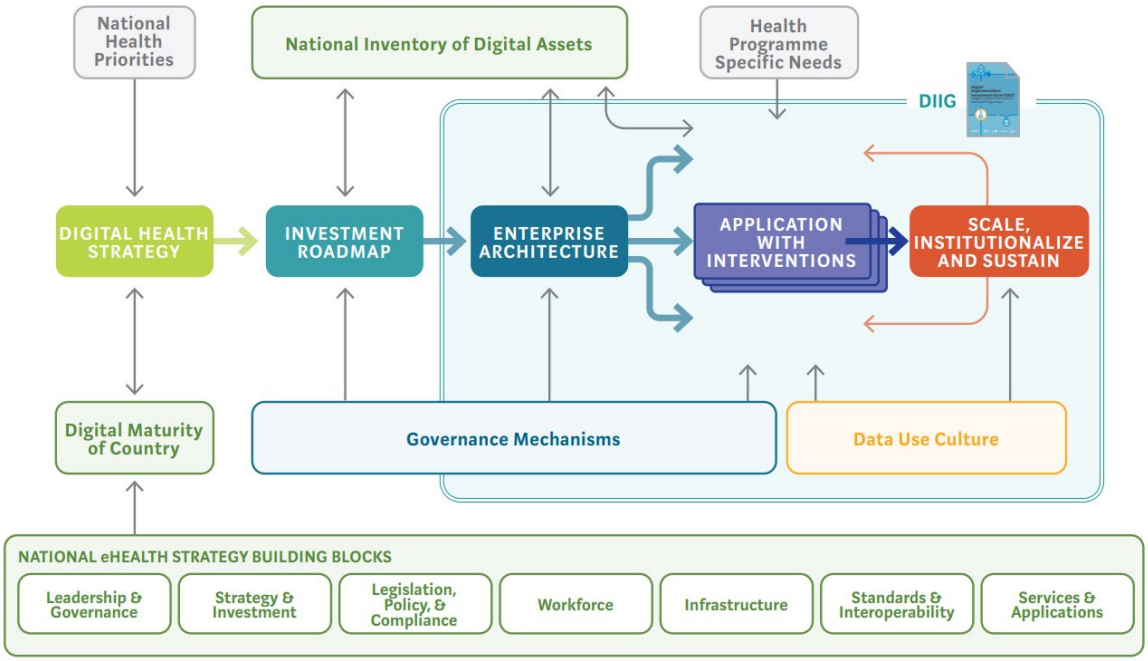


Figure 6. Essential processes of national digital health implementations (Source: WHO DIIG, 2020)

The relationship between Digital Public Infrastructure for Health (DPI-H) and DHEA can be summarized as follows:

1. **Foundation and Framework:** DPI-H provides the foundational infrastructure (e.g., identification, payment, data exchange platforms) that supports the broader digital health ecosystem. DHEA builds on this foundation to integrate various digital health applications.

2. **Interoperability and Standards:** Both emphasize interoperability and open standards. DPI-H ensures the infrastructure supports interoperable systems, while DHEA applies these standards to enable effective communication and data exchange between health applications.

3. **Scalability and Integration:** DPI-H supports large-scale implementations, providing the infrastructure needed for scalability. DHEA utilizes this to integrate health applications, ensuring they operate seamlessly across different domains.

4. **Governance and Regulation:** DPI-H is governed by legal frameworks ensuring secure and equitable use of digital infrastructure. DHEA aligns with these structures to ensure compliance with legal and regulatory requirements, maintaining data privacy, security, and trust.

5. **Innovation and Flexibility:** DPI-H offers a robust and flexible infrastructure, fostering innovation in digital health solutions. DHEA leverages this to design and implement adaptable health applications responsive to changing needs and technological advancements.

Together, DPI-H and DHEA enable the development of a cohesive, interoperable, and efficient digital health ecosystem, enhancing healthcare delivery and outcomes.

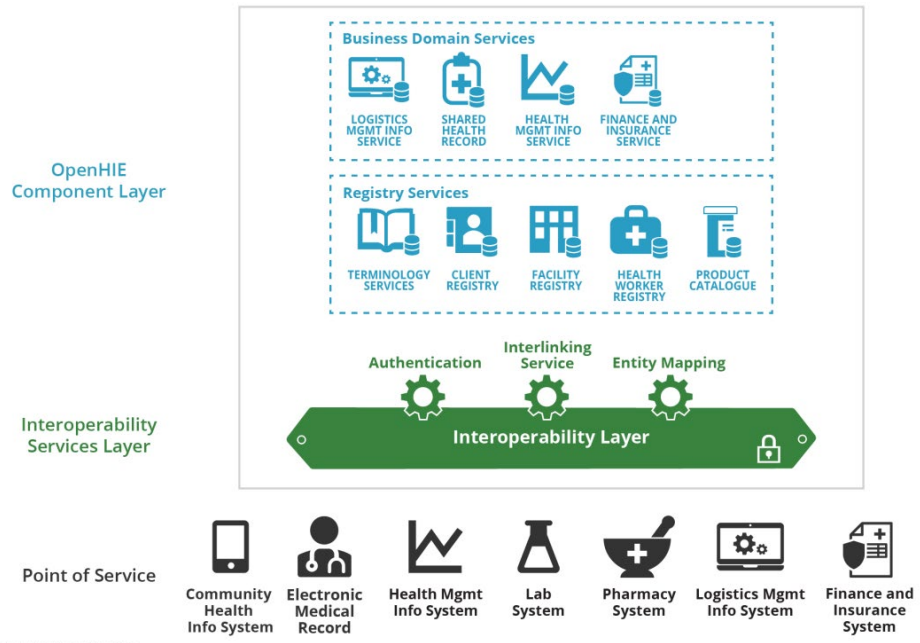
References:

- WHO. Digital Implementation Investment Guide: Integrating Digital Interventions into Health Programmes, 2020.

Open Health Information Exchange Architecture (OpenHIE)

A modular framework based on a number of individual components and an interoperability layer. It employs patterns to unify health information from diverse external systems into a single HIE. This is achieved by normalizing the context of health information, focusing on the "for whom," "by whom," "where," and "what" aspects of different workflows or patient journeys and brings relevant information through an interoperability layer directly to the point of service. (OpenHIE, 2021).

Figure 7. OpenHIE Architecture Framework (Source: OpenHIE, 2021)



Source: OpenHIE Architecture (10)

The WHO/ITU toolkit emphasizes the importance of data accuracy and information exchange in digital health systems, with "Health Information Exchange" (HIE) being essential for sharing data across systems. Given the varying digital systems between countries, establishing information exchange can be achieved using a flexible, component-based framework. OpenHIE's Architecture is a proposed solution, offering a modular framework with an interoperability layer to unify health information from diverse systems. It focuses on normalizing health information contexts, such as patient workflows, and delivers relevant data directly to the point of service. OpenHIE integrates medical supply data to support decision-making, aiming to enhance care quality, safety, continuity, and population health.

References:
- OpenHIE, 2021

Digital Health Interventions

The term Digital Health Intervention (DHI) refers to discrete functions of digital technology used to achieve health objectives, implemented within digital health applications and ICT systems. According to WHO, DHIs include tools like text messages, computers, software, the internet, telecom networks, and mobile devices. WHO's classification identifies specific DHIs to address health system challenges, such as providing prompts and alerts, checklists, and screening clients by risk or health status for healthcare providers. DHIs are part of the broader eHealth environment, influenced by health content, digital applications, and the surrounding digital health architecture. Effective implementation of DHIs requires integration into a cohesive digital health system, supported by a robust ICT and enabling environment to ensure effectiveness and sustainability.

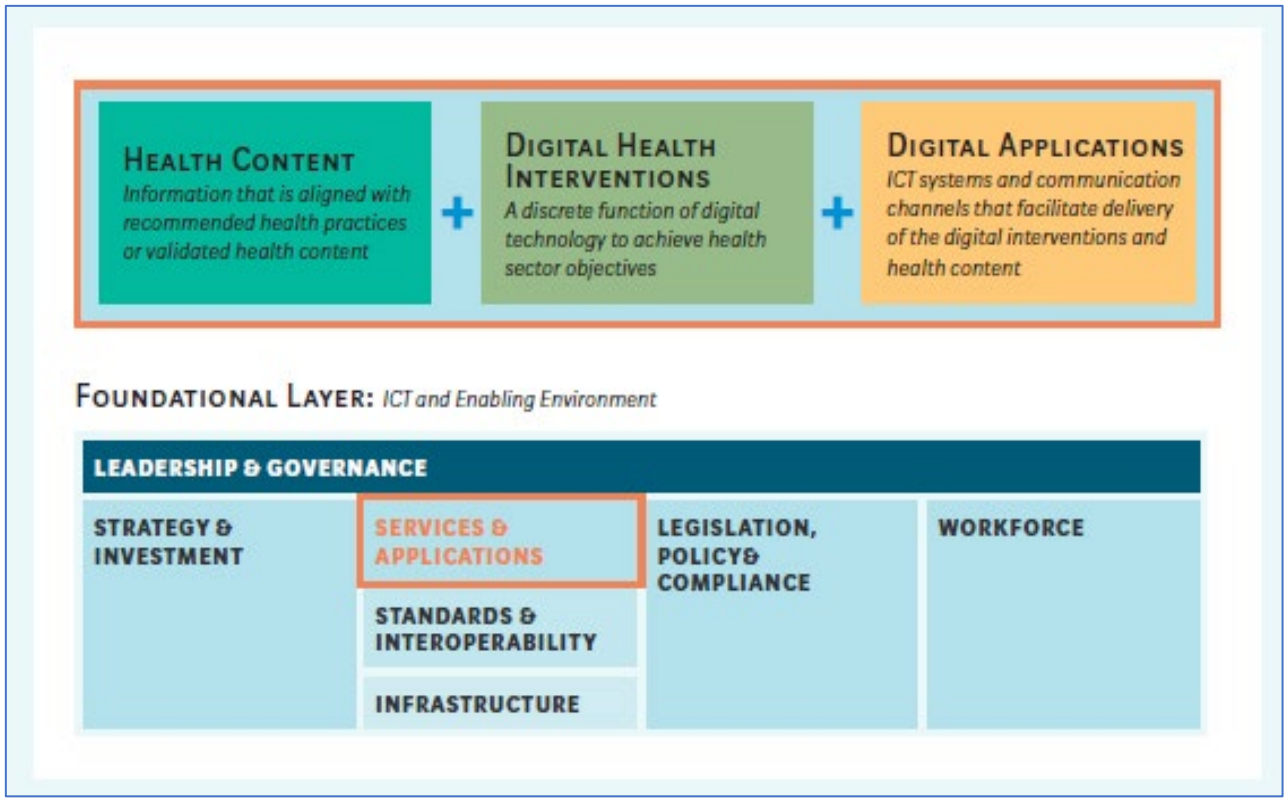


Figure 8. The seven components of an eHealth system, with focus on the "Services & Applications" component (Source: WHO, 2019)

References:

- Recommendations on digital interventions for health system strengthening. Geneva: World Health Organization, 2019.

The term Digital Health Intervention (DHI) refers to discrete functions of digital technology used to achieve health objectives, implemented within digital health applications and ICT systems.

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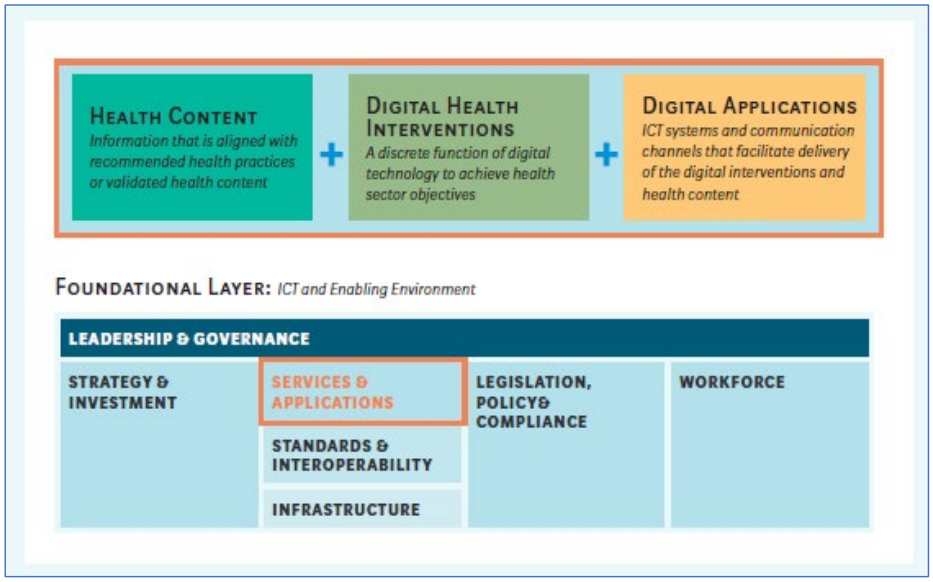

Figure 8. The seven components of an eHealth system, with focus on the "Services & Applications" component (Source: WHO, 2019)

DHIs are central to the Digital health enterprise system architecture (Figure 8) and WHO provided a taxonomy that classifies and identifies specific DHIs to address health system challenges, e.g., providing prompts and alerts, checklists, and screening clients by risk or health status for healthcare providers. (WHO, 2023),

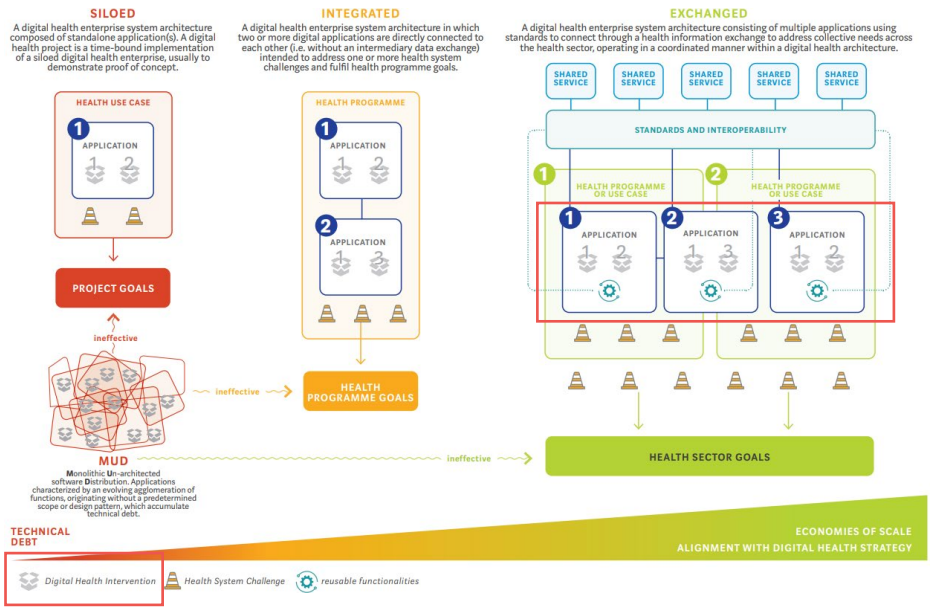

Figure 9. Digital Health Enterprise System Architectures (Source: WHO DIIG, 2020)

References:

- Recommendations on digital interventions for health system strengthening. Geneva: World Health Organization, 2019.
- WHO. Classification of digital interventions, services and applications in health: a shared language to describe the uses of digital technology for health, 2nd edition. Geneva: World Health Organization, 2023

Digital Public Goods

Digital Public Goods (DPGs) play a crucial role in the digitization of health systems. The UN defined DPGs as "open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and best practices, do no harm" (Secretary General's Roadmap for Digital Cooperation: United Nations 2020).

They support Sustainable Development Goals (SDGs) and must meet nine indicators: relevance to SDGs, use of approved open licenses, clear ownership, platform independence, documentation, data extraction mechanisms, adherence to privacy laws, standards and best practices, and a design that does no harm. DPGs provide accessible digital resources for education, healthcare, economic development, and research, especially benefiting low- and middle-income countries (LMICs).

Global Goods

Recognizing that DPGs do not evaluate scale, funding, or maturity, the concept of 'Global Goods' was introduced. Global Goods are non-rivalrous, non-excludable, and widely available. They are assessed using a maturity model developed by Digital Square, which includes criteria such as being free and open-source, supported by a strong community, having clear governance, diverse funding, extensive implementation, proven effectiveness, interoperability, and standard recognition. Global Goods are promoted by UN agencies, donors, and governments, with resources like Digital Square's Global Goods Guidebook providing detailed information on effective digital health applications.

A recent paper by the Peace Research Institute Oslo highlights the increasing demand for Global Public Goods for Health (GPGHs) and the challenges in meeting this demand due to a "participation trilemma." This trilemma involves conflicting interests among traditional donor countries, non-traditional donor countries, and recipient countries regarding funding and decision-making control. To address this, the paper advocates for the Global Public Investment (GPI) framework, which promotes a cooperative financing system involving diverse nations. GPI emphasizes collective responsibility, equity, inclusivity, democratic governance, transparency, and sustainability. This approach aims to enhance resource mobilization for GPGHs, crucial for the digitization of health systems, achieving Universal Health Coverage (UHC), and meeting the 2030 Sustainable Development Goals (SDGs), especially in low- and middle-income countries (LMICs). Effective digitization of health systems also requires clear guidance for stakeholders, including governments, donors, and implementers, to manage the process based on evidence and feasibility.

References:

- Secretary General's Roadmap for Digital Cooperation: United Nations 2020
- Digital Implementation Investment Guide: Integrating Digital Interventions into Health Programmes, 2020.
- Digital Public Goods Alliance. Digital Public Goods Standard. 2023.
- Udayasankaran JG, Källander K, Woods T, et al. Understanding the Relationship between Digital Public Goods
- and Global Goods in the Context of Digital Health. Paper Prepared By: Digital Public Goods Alliance,
- Digital Square, UNICEF Health and Information Communication Technology (ICT) Divisions 2021.
- Digital Square. Global Goods Guidebook: PATH, 2023.
- Reid-Henry S, Dwyer S, Benn C, Rødningen I. Country Contributions to Global Public Goods for Health: Patterns,
- Prospects, and Futures: PRIO, 2023.

DIGITAL HEALTH: GUIDELINES, FRAMEWORKS AND TOOLS

THE HISTORICAL CONTEXT OF GUIDELINE DEVELOPMENT

Amid tight fiscal constraints, health systems are under pressure to offer enhanced, high-quality, and integrated services. ICT has expanded rapidly to support health systems and must constantly adapt to technological changes. Regulatory efforts began in 2005 when the World Health Assembly encouraged member states to develop long-term eHealth plans. Initially, eHealth focused on digitalizing health data and creating Health Information Systems (HIS), such as DHIS 2, human resource information systems, and logistics management systems. By the late 2000s, the focus shifted to mHealth, using mobile devices for healthcare delivery. As technology evolved, the scope broadened to digital health, encompassing digital consumers, smart devices, IoT, AI, and big data.

Today, digital health is crucial for achieving UHC and the SDGs, requiring guidelines and frameworks for regulation. A World Bank report (2023) highlights 2012-2022 as a transformative period in digital health, marked by the introduction of the Principles for Digital Development and the release of AI tools like ChatGPT4. During this time, global agreements, resolutions, and guidelines were established to facilitate digital technology adoption in health systems. Significant milestones include the WHO/ITU eHealth toolkit (2012), the Digital Health Atlas and Index (2017), and WHO's Global Strategy on Digital Health 2020–2025.

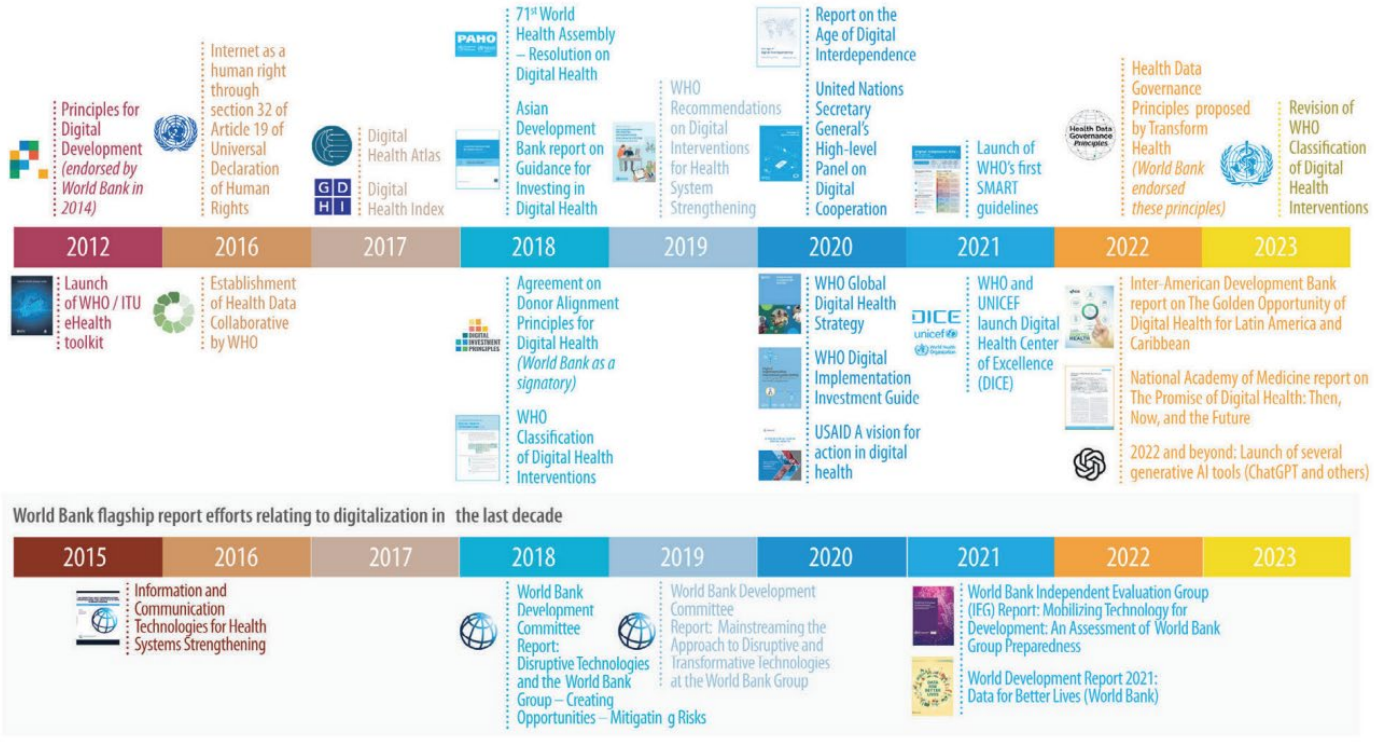

Figure 10. Milestones in the development of digital health and guidelines (Source: Digital-In-Health, World Bank, 2023)

References:

- Digital-In-Health, World Bank, 2023
- WHO. FIFTY-EIGHTH WORLD HEALTH ASSEMBLY - GENEVA, 16-25 MAY 2005 RESOLUTIONS AND DECISIONS ANNEX. Geneva: World Health Organization, 2005.
- Torgan C. The mHealth Summit: Local and Global Converge. Kinetics; 2009.
- Xiong S, Lu H, Peoples N, et al. Digital Health Interventions for Non-communicable Disease Management in Primary Health Care in Low and Middle Income Countries. NPJ Digital Medicine 2023; 6.
- Novillo-Ortiz D, De Fátima Marin, H., & Saigí-Rubió, F. The role of digital health in supporting the achievement of the Sustainable Development Goals (SDGs). International journal of medical informatics 2018; 114.

THE CLASSIFICATION OF DH GUIDELINES, FRAMEWORKS AND TOOLS

To support digital health (DH) programming in low- and middle-income countries (LMICs), particularly the DIPC initiative, we selected 75 key resources published between 2011 and 2024. These resources, including guidelines, frameworks, and tools, are intended for implementers, donors, policymakers, developers, and DH experts. Many of these resources are authored by the WHO and adhere to its guideline development handbook. Since 2011, the number of guidelines has increased significantly, with 62% published in the last five years and 21% authored by UN agencies, demonstrating their commitment to using ICT to achieve SDG targets.

To provide a structured overview of guidelines, frameworks, and tools relevant to DH-program development, the WHO previously classified and mapped key resources based on their utility across seven different phases of DHI development (WHO, 2020c). This mapping covers seven progressive phases for establishing a DHI, starting with "an assessment of the current state and enabling environment" and ending with "implementing, maintaining, and scaling."

For this report, we adapted this 7-phase model. Our analysis includes eleven components of DH programming and implementation (Figure 2). These components are not consecutive phases but thematic topics of relevance. The first seven topics are well-established focal areas for DH programming and bear similarity to the WHO model. Topics 8 to 11 are emerging areas gaining traction in the DH sphere due to their growing importance.

The review is organized around the following 11 thematic areas:

1. Digital Landscape Assessments
2. Regulations, Strategy & Policy Development
3. Solution Design & Development
4. Integration & Interoperability
5. Scaling-up
6. Monitoring & Evaluation
7. Sustainability and Financing
8. Gender, Equity & Inclusion
9. Capacity Strengthening
10. Technical Standards for Developers
11. Digitization of Immunization Programs

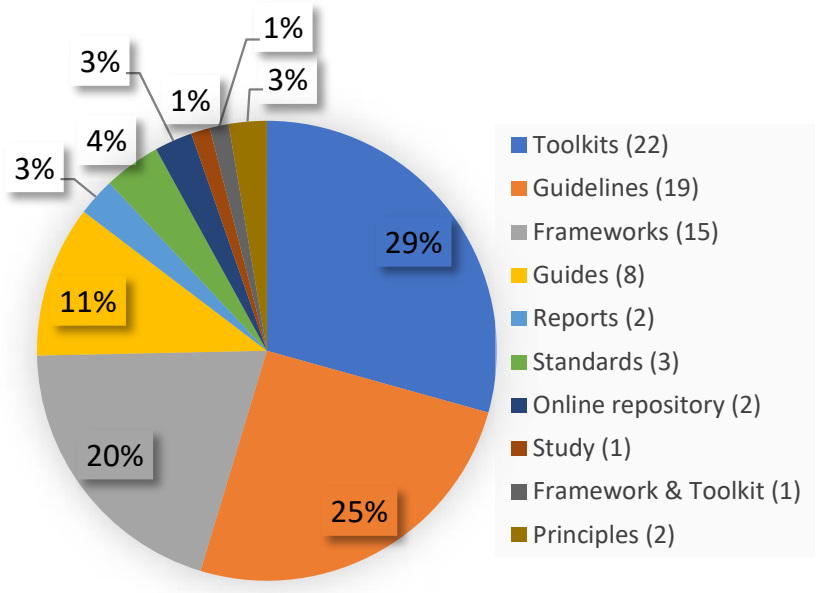

Figure 11. Types of normative resources selected for inclusion

References:
- WHO. WHO handbook for Guideline Development, 2nd edition. ISBN: 978 92 4 154896 0, 2014.

Thematic Area 1: **Digital Landscape Assessments**

Target Audience

Primary Users: Government bodies, ministries of health, donors, technology developers

Secondary Users: Healthcare providers

Relevance

Digital health landscape assessments (DLAs) should be considered as a crucial first step when approaching digital health projects, programs, or national initiatives. DLAs are critical for:

- Developing a comprehensive understanding of the stakeholder environment
- Understanding a nation's specific health challenges and priorities
- Assessing existing policies and regulations and their integration into the healthcare system
- Determining gaps in the current system

Findings

There are 15 resources available to support Digital Health Landscape Assessments (DLAs), with 14 specifically tailored for the health sector. Each resource is designed to be adaptable to the specific context and assessment needs of the respective country, offering flexibility in focus and depth of assessment.

These tools and guidelines have been developed by diverse international organizations including the World Bank, WHO, USAID, UNDP, PAHO, Digital Square, GIZ, and others. They collectively represent a significant effort to guide the development and enhancement of digital health systems. While these resources share the overarching goal of advancing digital health infrastructure, each brings a distinct perspective, methodology, and focal area.

A common feature among all reviewed resources is their provision of structured approaches or frameworks for evaluating aspects such as DH infrastructure, interoperability, governance, data management, and service delivery.

The review of Digital Health Landscape Assessments (DLAs) has yielded several key findings:

1. Systematic Approach and Country Leadership: It's crucial to tailor DLAs to specific country needs and ideally lead them locally or in close collaboration with relevant ministries. This approach enhances alignment with national digital health strategies, prevents duplication of efforts among partners, and ensures efficient resource allocation.

2. Building on Existing Digital Landscape Information**: Utilizing previously gathered country-specific data and datasets from initiatives like Map & Match can streamline assessment processes, optimize resource use, and accelerate progress. Sharing DLA results widely supports future assessments and strengthens the impact of findings, such as through the Digital Health Atlas.
3. Country Ownership of Assessment Results**: National governments should take ownership of DLA outcomes to facilitate coordinated DH development. In donor-funded initiatives where government engagement is lacking, international organizations should transfer findings and action points to ensure continuity and capacity building.

References:

- TBD

4. Methodological Flexibility and Integration of Tools**: DLAs employ a variety of tools and methodologies tailored to different aspects of the DH ecosystem. Flexibility in methodology allows for customization according to country-specific needs and promotes comprehensive assessments.

5. Integration of Harmonized DLA Results**: Harmonizing DLA outcomes with global DH repositories and standards is critical for effective coordination and learning across countries. Aligning assessment tools with existing global frameworks and taxonomies enhances interoperability and supports global DH initiatives.

6. Harmonization of DLA Guidelines & Tools**: Standardized DLA tools empower countries to make informed digital health investments aligned with broader health goals. These tools are particularly beneficial in low- and middle-income countries (LMICs), facilitating rapid advancement and adoption of best practices in digital health.

These findings underscore the importance of structured, collaborative, and standardized approaches to DLAs in advancing global digital health agendas.

References:

- TBD

Guide and Guidelines

Classification of digital interventions, services and applications in health, second edition
Provides common language for stakeholders in the DH sector (to Communicate the use of DH)
Published by: WHO
Year: 2023
Language: English

Navigator for Digital Health Capability Models
Assisting (countries & organizations) in choosing the most suitable digital health maturity models
Published by: Digital Square
Year: 2022
Language: English

Frameworks

Digital Landscape Assessment Framework
Analysis of national digital landscapes in relation of SDGs – not health sector specific
Published by: UNDP
Year: 2021
Language: English

Toolkits

Digital Ecosystem Country Assessment (DECA) Toolkit
Conducting assessments for digital development decision-making
Published by: USAID
Year: 2022
Language: English

Digital Pandemic Preparedness Assessment Tool (DPPA)
Streamlining & Identification digital tools (in a nation' s ecosystem)
Published by: Digital Square, GIZ
Year: 2021
Language: English

Digital Health Assessment Toolkit Guide
Assessment of the maturity level of digital health in a country
Published by: World Bank
Year: 2021
Language: English

Health Information System Stages of Continuous Improvement (SOCI) Toolkit
Evaluate & enhance HIS ffectiveness
Published by: USAID
Year: 2020
Language: English

Global Digital Health Monitor
Online resource: evaluation of digital health maturity
Published by: GDI & Partners
Year: 2022
Language: English, French, Spanish, Portuguese, Arabic

National eHealth Strategy Toolkit
Provision of assessment framework
Published by: WHO & ITU
Year: 2012
Language: English, Arabic, Chinese, French

Early Stage Digital Health Investment Tool (EDIT)
A tabular toolkit for early-stage DH ecosystem assessments & fostering of coordinated strategies
Published by: DICE
Year: 2022
Language: English

HIS Interoperability Maturity Model (IMM) Toolkit
Assessing & Improving the interoperability of HIS
Published by: USAID
Year: 2017
Language: English

The Information Systems for Health (IS4H) Toolkit
Evaluate & enhance HIS effectiveness
Published by: WHO/PAHO
Year: 2020
Language: English, Espanol

U.S. President's Malaria Initiative Digital Community Health
To enhance healthcare quality in 27 African countries via digital health platforms.
Published by: USAID, PMI, CDC
Year: 2020
Language: English

Online Repository

Digital Health Atlas
Open-source online-based platform: coordinate global DH initiatives
Published by: WHO
Year: NA
Language: English, French, Spanish, Portuguese

Map & Match Initiative (M&M)
Visual baseline resource for ecosystem mapping
Published by: USAID
Year: NA
Language: English

References:
- TBD

Target Audience

Primary Users: Government health sector leaders in Ministries, Departments and Agencies who manage the development of digital health strategies

Secondary Users: Technology developers, Donors

Relevance

Developing policies and strategies for digital health (DH) is essential for governments as DH can significantly enhance the accessibility and quality of healthcare services.

Government policies, strategies, and regulations in DH are crucial for ensuring that digital technologies are integrated into healthcare systems in a secure, efficient, and equitable manner, enhancing healthcare delivery and outcomes while fostering innovation and addressing broader public health goals.

As digital health evolves, it is crucial to have a regulatory framework in place to manage emerging issues such as the ethical use of AI in healthcare, telemedicine practices, and digital health equity.

Findings

Seven resources have been identified.

The WHO released the "Global Strategy on Digital Health 2020-2025" to globally guide the development and adoption of digital health solutions that are appropriate, accessible, affordable, scalable, and sustainable. This strategy is built on four core principles:

- Institutionalizing digital health within national systems,
- Developing cohesive digital strategies,
- Promoting beneficial technology use,
- Addressing adoption barriers in least-developed countries.

Only one guideline specific to supporting governments in developing a national eHealth vision: "WHO's National eHealth Strategy toolkit"; despite being over a decade old, remains relevant due to its adaptable framework and fundamental principles such as stakeholder engagement, strategic planning, and governance. It is complemented by resources like the WHO's Digital Implementation Investment Guide (DIIG), which provides detailed guidance on financial planning for digital health initiatives.

Health data governance is crucial, with data privacy and security posing significant challenges. The Health Data Governance Principles offer globally accepted guidelines for developing robust data protection policies. Compliance with diverse regulations is essential for digital health providers to balance innovation with strong security measures, enabling sustainable use of health data for the public good.

Other resources are available that focus on guiding government actors on selected aspects of DH development. However, these can be considered as complementary to the eHealth Strategy Toolkit as they zoom in on particular areas.

References:
- TBD

Guidelines

Global Strategy on Digital Health 2020-2025
To guide the development and adoption of DH solutions that are appropriate, accessible, affordable, scalable, and sustainable, based on four core principles.
Published by: WHO
Year: 2021
Language: English, French, Arabic, Russian

The General Data Protection Regulation (GDPR)
GDPR is a crucial law within the EU, affecting any organization worldwide that processes personal data of EU/EEA residents.
Published by: EU
Year: 2016
Language: All the languages of EU

Health Insurance Portability and Accountability Act (HIPAA)
HIPAA establishes Privacy and Security Rules for handling protected health information in USA.
Published by: U.S Department of Health & Human Services
Year: 2021
Language: English

Guide to Privacy and Security of Electronic Health Information
To provide practical compliance support for healthcare professionals and aims to empower providers in safeguarding health information and preserving patient confidence.
Published by: The Office of the National Coordinator for Health Information Technology
Year: 2015
Language: English

Principles

Health Data Governance Principles
These principles, aim to protect individuals and communities, promote health value through data sharing, and ensure equitable benefits distribution. They guide global health data policies and serve as advocacy tools for fair governance.
Published by: TransformHealth
Year: 2023
Language: English

Framework

Framework for Improving Critical Infrastructure Cybersecurity
Provides detailed guidelines to help private sector organizations improve their cybersecurity.
Published by: National Institute of Standards and Technology
Year: 2018
Language: English

Toolkits

National eHealth Strategy Toolkit
Provision of assessment framework
Published by: WHO & ITU
Year: 2012
Language: English, Arabic, Chinese, French

References:
- TBD

Target Audience

Primary Users: Developers, Healthcare Providers

Secondary Users: Donors, government bodies, ministries of health

Relevance

These guidelines for digital health solution design prioritize effectiveness, safety, and user-friendliness, promoting interoperability with existing systems and ensuring ethical handling of sensitive data. They standardize development practices to address local and global health challenges, fostering innovation and collaboration among stakeholders. By adhering to national and international standards, these guidelines facilitate the creation of tailored solutions that enhance efficiency, automate tasks, and improve healthcare delivery through informed decision-making.

These guidelines are pivotal in making digital health solutions:

- Scalable
- Sustainable
- Evidence-based
- Addressing local & global health challenges
- Standardize development practices

Findings

Seven resources have been identified.

The WHO released the “Global Strategy on Digital Health 2020-2025” to globally guide the development and adoption of digital health solutions that are appropriate, accessible, affordable, scalable, and sustainable. This strategy is built on four core principles:

- Institutionalizing digital health within national systems,
- Developing cohesive digital strategies,
- Promoting beneficial technology use,
- Addressing adoption barriers in least-developed countries.

Only one guideline specific to supporting governments in developing a national eHealth vision: “WHO’s National eHealth Strategy toolkit”; despite being over a decade old, remains relevant due to its adaptable framework and fundamental principles such as stakeholder engagement, strategic planning, and governance. It is complemented by resources like the WHO’s Digital Implementation Investment Guide (DIIG), which provides detailed guidance on financial planning for digital health initiatives.

Health data governance is crucial, with data privacy and security posing significant challenges. The Health Data Governance Principles offer globally accepted guidelines for developing robust data protection policies. Compliance with diverse regulations is essential for digital health providers to balance innovation with strong security measures, enabling sustainable use of health data for the public good.

References:

- TBD

Thematic Area 4: **Integration & Interoperability**

Target Audience

Primary Users: Developers, Donors, Ministries of Health

Secondary Users: Healthcare Providers, Government Bodies

Relevance

The accelerating rate of digitization in the digital health ecosystem presents challenges, as numerous standalone solutions compete without full integration into the system, impacting data quality and medical practice. Seamless interoperability is essential for enhancing patient care coordination, reducing errors, and supporting public health surveillance. It facilitates seamless patient data exchange across healthcare providers, enhances Electronic Health Records (EHR) utilization, and aids in population health management and community health services. This integrated approach is crucial for optimizing disease tracking, resource allocation, and decision-making in healthcare systems.

Findings

Two resources have been identified.

Findings show that, in low- and middle-income countries (LMICs), vertical and partner-driven health investments often lead to fragmented systems lacking end-user involvement. To address inefficiencies in Africa's digital health systems, WHOAFRO recommends adopting the ITU-WHO Digital Health Platform Handbook to implement a unified Digital Health Platform (DHP). This approach aims to integrate disparate solutions, enhance interoperability, and align with digital health architectures. Tools like the Health Information Systems Interoperability Maturity Toolkit and PATH/Digital Square's assessment tools are crucial for measuring system interoperability and assessing national digital landscapes. Additionally, global efforts, such as adopting HL7 FHIR standards, are enhancing healthcare data exchange capabilities globally, supporting interoperable Electronic Health Records (EHRs) and digital health implementations.

All of them evaluate health system interoperability and are crucial for national digital landscape assessments.

Guidelines

Digital Health Platform Handbook: Building a Digital Information Infrastructure (Infostructure) for Health
Intended for health sector planners and enterprise architects in early-stage digital maturity countries; focuses on building national health platforms to support the SDGs.
Published by: WHO
Year: 2020
Language: English

Digital implementation investment guide (DIIG): integrating digital interventions into health programmes
Serves as a roadmap for integrating DHIs into health programs. DIIG complements the WHO guideline on digital interventions.
Published by: WHO
Year: 2020
Language: English, French, Spanish

Toolkits

HIS Interoperability Toolkit Users Guide
Aids Ministries of Health in evaluating Health Information System (HIS) landscapes for interoperability.
Published by: MEASURE Evaluation
Year: 2017
Language: English & French

References:

- TBD

Target Audience

Primary Users: Developers, Donors, Ministries of Health

Secondary Users: Healthcare Providers, Government Bodies

Relevance

Scaling up digital health initiatives improves healthcare access in underserved areas, enhancing equity and reaching vulnerable populations. Expanded programs can lead to better health outcomes, reduced costs per patient through economies of scale, and larger datasets for research and decision-making. Government support is bolstered, integrating digital health into national policies and fostering innovation. Despite challenges in scaling, successful initiatives integrate seamlessly into healthcare systems, transforming from pilot projects into sustainable solutions serving broader populations.

Findings

Three resources have been identified.

The National eHealth Strategy Toolkit outlines essential conditions for scaling national eHealth strategies, including a supportive policy environment, adequate human resources, and robust technology infrastructure. Implementers play a pivotal role in advancing these strategies at the national level despite external factors like electrical grid stability or cellular coverage. The WHO's MAPS toolkit further guides DH planners on program scale-up, emphasizing sustainability and institutionalization as crucial goals. Best practices from a 2018 study ((Labrique et. al, 2018) underscore the importance of addressing practical needs, ensuring technical simplicity and interoperability, aligning with healthcare policies, and considering infrastructure readiness for successful digital health scale-up in LMICs. Global collaborative efforts aim to integrate and scale digital health solutions, fostering innovation and collaboration among healthcare stakeholders.

Framework and Toolkit

Understanding scale of digital tools: a framework and triangulation tool to measure scale of digital deployments in the context of the COVID-19 pandemic'
Provides a way to evaluate scaling efforts by assessing an intervention's scale through three dimensions.
Published by: Digital Square
Year: NA
Language: English

mHealth Assessment and Planning for Scale (MAPS) Toolkit
Currently the only comprehensive and targeted guideline document for DH planners and implementers addressing DH program scale-up, and thus a "must-consult" for practitioners.
Published by: WHO
Year: 2015
Language: English

Guide

The journey to scale – moving together past digital health pilots
Offers insights into achieving widespread and sustainable digital health interventions. It emphasizes coordinated efforts towards institutionalization, highlighting critical success factors such as clear goals, strong leadership, viable economic models, and interoperability standards.
Published by: PATH
Year: 2014
Language: English

References:

- TBD

Target Audience

Primary Users: Developers, donors, ministries of health

Secondary Users: Healthcare providers, government bodies

Relevance

Monitoring and evaluation (M&E) in digital health are crucial for several reasons. They provide empirical evidence of the effectiveness of ICT, help identify and resolve issues promptly, and inform resource allocation decisions to maximize impact. M&E also ensures accountability and supports continuous improvement in digital health interventions. Additionally, M&E identifies barriers to adopting digital health technologies, offering insights to overcome them. By tracking usage trends and outcomes, stakeholders can ensure the success of digital health programs. The data collected also aids research and innovation, driving progress in the digital health field.

Findings

Monitoring and evaluation (M&E) in digital health (DH) programs require unique considerations compared to non-digital projects due to their dynamic nature. DH programs evolve through stages, each with changing M&E needs. Initially, they assess alignment with needs, functionality, and feasibility, later focusing on user satisfaction, effectiveness, impact, and cost-effectiveness.

Seven key resources have been identified to aid program planners, implementers, and monitoring teams in navigating DH program cycles by providing valuable suggestions for evaluations and monitoring activities at different development stages.

These resources include WHO's "Monitoring and Evaluating Digital Health Interventions" for foundational guidance, and the Evidence DEFINED Framework, CONSORT-EHEALTH, and iCHECK-DH for evaluating effectiveness and impact. WHO's implementation monitoring guide provides case evidence, while "Recommendations on digital interventions for health system strengthening" offers case studies and evidence to guide M&E activities throughout program development.

References:

- TBD

Toolkits

The Evidence DEFINED framework
Designed for practical use, which streamlines the assessment of DHIs in four steps with a more technical and methods-oriented content.
Published by: Various Authors
Year: 2023
Language: English

Reporting Trials of Electronic and Mobile Health Applications and Online Telehealth
CONSORT-EHEALTH extends the established CONSORT statement, offering guidance on reporting trials for eHealth & mHealth interventions.
Published by: Various Authors
Year: 2011
Language: English

mHealth Evidence Reporting and Assessment (mERA) Checklist
Designed to improve the reporting of mHealth interventions. It outlines essential details for replicating mHealth interventions, including content, context, and technical features.
Published by: WHO
Year: 2016
Language: --

iCHECK-DH
A 20-item checklist for reporting digital health implementations, covering areas such as claims, methods, sustainability, and budget planning.
Published by: Various Authors
Year: 2023
Language: English

Study

Monitoring the implementation of digital health
Focuses on monitoring the implementation of digital health initiatives, consolidating information from several institutions.
Published by: WHO
Year: 2022
Language: English

Framework

Framework for the Economic Evaluation of Digital Health Interventions
A recent (2023) and specialized economic evaluation framework for scaling up DHIs (based on WHO's Classification) within limited health budgets.
Published by: World Bank
Year: 2023
Language: English

Guideline

Monitoring and Evaluating Digital Health Interventions
Specifically for enhancing M&E initiatives in Digital Health (DH). User-friendly and provides the theoretical foundations required.
Published by: WHO
Year: 2016
Language: English

References:
- TBD

Thematic Area 7: **Sustainability & Financing**

Target Audience

Primary Users: Donors, Government Bodies

Secondary Users: Developers, Implementers

Relevance

There a several aspects that need to be considered when it comes to financing DH initiatives.

- Integrating DH solutions into existing health systems can leverage current funding streams and infrastructure, making them more sustainable.
- Financing models must also include budgeting for ongoing maintenance, updates, and operational costs, including staffing and training.
- Importantly, regular monitoring and evaluation help in demonstrating the impact of digital health systems, which is crucial for continued funding and support.

Key for justifying resource allocation:

- Understanding digital health investments' long-term value
- Financing digital health initiatives requires sustainable, long-term funding models,
- Incorporating government support, private investments, and public-private partnerships

Findings

Eight resources have been identified addressing the broad spectrum of issues around DH Financing and Sustainability.

This review identified numerous resources addressing digital health (DH) financing and sustainability. The Digital Investment Principles, endorsed by major donor agencies, aim to align investments with national digital health strategies, addressing fragmentation and promoting strategic investments. Despite this, there is a lack of economic evaluations of digital health interventions, complicating decision-making for policymakers and funders. The World Bank's Framework for economic evaluations of DHIs offers a five-step approach to enhance investment decisions in resource-limited settings, promoting methodological transparency.

WHO's Digital Implementation Investment Guide (DIIG) provides guidance on financing and costing for digital health initiatives, identifying cost drivers and developing comprehensive budgets. The Digital Health Investment Review Tool helps align investments with national health priorities, while the SDG Digital Investment Framework offers a comprehensive approach for governments to invest in digital infrastructure aligned with SDGs.

The report "Closing the digital divide: More and better funding for the digital transformation of health" presents six strategic recommendations for national governments, international donors, and the private sector. Additionally, Digital Square's Total Cost of Ownership Tool and Digital Health Sustainability Calculator help stakeholders understand the full financial scope of sustaining digital health efforts and develop budgets.

References:

- TBD

Toolkits

Digital Health Investment Review Tool to guide investment in digital health
A tool to support strategic investments in DH, that includes a country self-assessment of the ICT environment and readiness for eHealth.
Published by: Digital Impact Alliance (DIAL) at the United Nations Foundation
Year: 2018
Language: English

Digital Health Sustainability Calculator
The Excel-based tool estimates the total cost of implementing national sustainable digital health systems for informational purposes. It serves as a starting point for cost estimation, not as a substitute for professional expert consultation.
Published by: Digital Square
Year: 2022
Language: English

Total Cost of Ownership Tool
The Excel-based TCO Tool helps health leaders create accurate budgets for digital health initiatives by highlighting hidden costs, cost drivers, and variances, with a focus on operational expenses. Its interactive design incorporates user inputs to enhance budget precision.
Published by: Digital Square
Year: 2022
Language: English

Frameworks

SDG Digital investment framework (eGoV)
A framework to assist governments and partners in digital infrastructure investment and SDG programming enhancement.
Published by: WHO
Year: 2019
Language: English, Spanish, French

A Framework for the Economic Evaluation of Digital Health Interventions
A recent (2023) and specialized economic evaluation framework for scaling up DHIs (based on WHO's Classification) within limited health budgets.
Published by: World Bank
Year: 2023
Language: English

Guidelines

Digital implementation investment guide (DIIG): integrating digital interventions into health programmes
A guide that aids governments and technical partners plan and implement digital health initiatives aligned with national health system objectives.
Published by: WHO
Year: 2020
Language: English, French, Spanish

Closing the digital divide: More and better funding for the digital transformation of health
Advocates for stronger and more unified funding support and offers six strategic recommendations.
Published by: Transform Health
Year: 2022
Language: English

Principles

The Principles of Donor Alignment for Digital Health
These are 10 principles for donors to align their investments with national digital health strategies in LMICs.
Published by: Various Authors
Year: 2018
Language: English

References:
- TBD

Thematic Area 8: **Gender, Equity, Inclusion & Ethics**

Target Audience

Primary Users: Developers, Healthcare Providers, Ministries of Health, Donors

Secondary Users: Government bodies

Relevance

Digital health technologies risk reinforcing or creating disparities, which highlights the importance of integrating Gender Equity and Inclusion (GEI) into digital health planning, implementation, and scale-up.

Digital tools can inadvertently reinforce existing inequalities or create new disparities.
To fulfill their promise, it is imperative that GEI considerations become an integral part of DH planning, implementation and scale-up.
In the realm of DH, inclusivity means creating user-friendly, culturally and socially sensitive digital tools with clear navigation and customizable options to suit diverse user groups.

Findings

We summarized ten key resources relevant to gender, equity and inclusion in the digital space.

They differ considerably in their format and intended application, including fundamental information on the principles of digital inclusion relevant beyond the health domain and should be consulted by policy makers, researchers and DH practitioners.

UNICEF's foundational guide on "Designing Digital Interventions for Lasting Impact: A Human-Centered Guide to Digital Health Deployments" is a resource which should certainly also be considered in the GEI context as it allows planners, developers and implementers to focus their efforts towards their user groups and adapt technologies accordingly.

Digital inclusion activates community engagement and empowerment and is critical to the success of the Sustainable Development Goals (SDGs).

Some key considerations have emerged as relevant for GEI-programming in DH:

- Privacy and Ethical Data Use
- Digital Literacy and Access Disparities
- Inclusive Data Representation
- Human-Centered Design and Continuous Engagement

References:

- TBD

Frameworks

Digital Health Equity Framework (DHEF)
A theoretical framework (Crawford & Serhal, 2020), which integrates health equity with digital health determinants to address health disparities.
Published by: Academic Paper
Year: 2020
Language: English

National Institute on Minority Health and Health Disparities Research Framework Expanded for Digital Health Equity
A theoretical framework (Safiya Richardson, 2022) on DH equity, which underscores the need to consider both digital determinants of health (DDoH) and social determinants of health, especially for those digitizing health solutions.
Published by: Academic Paper
Year: 2022
Language: English

Why Gender Matters for Digital Health
A technical brief that focuses on gender-sensitive programming in DH and emphasizes that DH solutions should address differences and inequalities for empowering marginalized groups.
Published by: GIZ
Year: 2021
Language: English

Youth-centred digital health interventions
A framework to guide the development and implementation of DH solutions for young people, targeting a range of professionals from designers to funders.
Published by: WHO
Year: 2021
Language: English

Reports

Roundtable on Digital Inclusion
key document covering digital inclusion's definitions and themes, emphasizing an intersectional approach to tackle challenges like racism, gender discrimination, and biases against marginalized groups.
Published by: UN
Year: NA
Language: English

Bridging the digital gender divide
Aims to support women's equitable participation in the digital economy by addressing barriers to digital gender equality. It provides policy recommendations for policymakers, government officials, and stakeholders to bridge the digital gender gap.
Published by: OECD
Year: 2018
Language: English

Guidelines

Ethics and governance of artificial intelligence for health
A guide that aids governments and technical partners plan and implement digital health initiatives aligned with national health system objectives.
Published by: WHO
Year: 2021
Language: English, French, Spanish

Ethics and governance of artificial intelligence for health – Guidance on large multi-modal models
Advocates for stronger and more unified funding support and offers six strategic recommendations
Published by: WHO
Year: 2024
Language: English

Standars

Global Standards for accessibility of telehealth services
Provides technical requirements to improve telehealth usability for people with disabilities, ensuring services are effective, safe, and inclusive.
Published by: WHO & ITU
Year: 2022
Language: English, French, Portuguese

Toolkits

GenderTech Toolkit: Building digital solution for, with, and by girls
To aid digital innovators in creating solutions that cater to girls, with the aim to bridge the gender digital divide.
Published by: UNICEF
Year: 2020
Language: English

References:
- TBD

Target Audience

Primary Users: Healthcare Providers, Government Bodies, Ministries of Health.

Secondary Users: Developers, Donors.

Relevance

Empowering healthcare staff in all aspects of health ICT systems is crucial for the effective utilization, maintenance, and evolution of digital tools and systems.

Importantly, knowledge and skills required for digital health initiatives then become increasingly less reliant on external organizations, thereby promoting sustainability and long-term success.

Capacity building plays a key role in addressing digital disparities. Providing targeted training to women or other digitally marginalized groups, facilitates intervention scale-up and promotes work, and economic possibilities.

Findings

WHO's 'Digital education for building health workforce capacity' is the only "official" document we were able to identify, that addresses some of the basic questions around the implementation of digital education for health sector worker in LMICs, but it should be emphasized that it is not a planning or implementation guideline.

A second resource (OECD, 2019), although based on the HWs in the European regions provides to some extent applicable guidance for DH planners and implementers around barriers and enablers to fully engage in the digital transformation of health systems.

The lack of clarity in the effectiveness of various digital education modalities, alongside little evidence on the challenges of the HWF in LMICs, raises skepticism about the feasibility and robustness of such guidelines.

Framework

Empowering the health workforce – Strategies to make the most of the digital revolution
A strategy document that discusses digital transformation challenges in European healthcare, focusing on health workers' experience with digital tools.
Published by: OECD
Year: 2019
Language: English

Guidelines

Digital education for building health workforce capacity
A guide for integrating ICT in health education. It emphasizes digital education's role in addressing global health workforce challenges and covers themes, including enrollment, learning outcomes, remote access.
Published by: WHO
Year: 2020
Language: English

References:

- TBD

Thematic Area 10: **Technical Standards for Developers**

Target Audience

Primary Users: Developers; DH Planners

Secondary Users: Donors.

Relevance

The commercialization of digital health products in global markets requires adherence to specific standards to ensure user safety.

More complex digital solutions deliver precise health information upon which medical decisions are based. Thus, strict regulations are necessary to ensure patient safety once we can label our digital intervention a Software as a Medical Device (FDA, 2018).

Findings

We identified four resources as particularly relevant.

They collectively contribute to enhancing the reliability, safety, and efficacy of digital health products.

These frameworks provide a structured approach to assessing digital health technologies, ensuring that products meet a certain level of reliability and functionality. These standards provide clear guidance for developers, helping them understand what is required for regulatory approval.

Frameworks

Evidence Standards Framework for Digital Health Technologies (ESF)
A tiered framework that categorizes digital health products based on functionality and specifies evidence requirements for developers.
Published by: National Institute for Clinical Excellence (NICE)
Year: NA
Language: English

Digital Health Applications (DiGA) process
A process framework which mandates specific criteria for healthcare tools to qualify as medical products under the German Digital Healthcare Act.
Published by: DiGA
Year: 2020
Language: English, German

Standards

ISO-82304-2
A European standard enabling developer self-certification and guiding assessment process with accrediting bodies.
Published by: ISO
Year: 2021
Language: English

FDA Digital Health quality regulations
The U.S. FDA, responsible for public health safety, established by the Digital Health Center of Excellence in 2020 to support high-quality digital health innovations.
Published by: Digital Health Centre of Excellence (DICE)
Year: 2020
Language: English

References:

- TBD

Thematic Area 11: **Digitizing Immunization Programs**

Target Audience

Primary Users: Government Bodies, Ministries of Health, DH implementers, Healthcare Providers

Secondary Users: Developers, donors

Relevance

Guidelines for digitizing vaccination programs, are important because they can provide a structured approach to address the multifaceted challenges these entail.

Leveraging behavioral science to develop and implement interventions that can effectively increase the uptake of immunization services and is crucial in addressing vaccine hesitancy and improving vaccine coverage.

A structured, evidence-based approach is needed to understand and address immunization demand, select and implement digital tools, and ensure that these interventions are user-centered and context-specific.

Findings

The COVID-19 pandemic prompted the largest vaccination campaign effort in history (Tatar & Wilson, 2021; WHO & UNICEF, 2022), as national governments, international organizations, nonprofits and the private sector sought to vaccinate the world's population. At the same time, the pandemic also accelerated the adaptation and adoption of DH tools in LMICs and numerous guidelines specifically were published.

The absence of such a standard may hinder the optimal utilization of digital resources in streamlining vaccination logistics, especially in a global crisis where efficiency and consistency are crucial.

Guidelines can be pivotal in guiding MoHs, donors, and implementers through the complex process of digitizing vaccination programs.

References:

- TBD

Guideline

Guidance on the use of digital solution to support COVID-19 national deployment and vaccination plans
A guideline provides a framework to facilitate equitable access to and distribution of COVID-19 vaccines across countries, particularly in low- and middle-income settings.
Published by: DICE
Year: 2021
Language: English

Primer on Digital Solutions for COVID-19 Vaccination Service Delivery
A practical guide to support those directly engaged in vaccination efforts with strategies for effectively using digital health tools and data to enhance vaccine distribution and administration beyond the COVID-19 pandemic.
Published by: DICE
Year: 2022
Language: English

Digital Health Information Interventions for Immunization Demand Generation: A guide for selecting appropriate tools and technologies
A guideline to assist national immunization program managers, social and behavior change specialists, and immunization implementing partners in selecting and planning digital technologies to increase the demand for routine childhood immunization using a step-by-step approach.
Published by: GAVI
Year: 2022
Language: English

Electronic Immunization Registries
A briefing guide to improve immunization data quality and use, exemplified on Tanzania and Zambia.
Published by: PATH
Year: 2017
Language: English

Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation
A guide to aid in the development, implementation, and evaluation of EIRs, aimed at health decision-makers and program managers in PAHO Member States.
Published by: PAHO
Year: 2018
Language: English, Spanish, French

Frameworks

Guidance on developing a national deployment and vaccination plan for COVID-19 vaccines
An interim guide aimed at assisting national and sub-national health authorities and immunization program managers in planning and executing COVID-19 vaccination strategies.
Published by: WHO & UNICEF
Year: 2020
Language: English, French

Digital Applications and Tools Across an Epidemic Curve
A strategic guide for using digital tools in various stages of pandemics and outbreaks. It's designed for governments, health organizations, and investors, focusing on integrating digital technologies into epidemic responses.
Published by: Digital Square & GIZ
Year: 2021
Language: English

Considerations for integrating COVID-19 vaccination into immunization programmes and primary health care for 2022 and beyond
A guide to provide strategies for incorporating COVID-19 vaccination into existing health systems, designed for public health planners and immunization program managers.
Published by: WHO & UNICEF
Year: 2022
Language: English, Spanish, French, Portuguese

References:
- TBD

Some guidelines and principles are relevant across the DH-programming spectrum or apply to more than one thematic area, and these are highlighted in the 'Cross-cutting Principles & Guidelines' table.

The Global Goods Guidebook Version 4.0 serves as an interactive guide to the digital health global goods ecosystem. This guidebook compiles established digital health applications known for their use of open standards and backed by a solid developer community. These applications have been included in a separate table labeled 'Digital Public Goods' because they have proven to be effective and versatile enough to be adapted to various countries and scenarios.

Cross-cutting Principles & Guidelines				
1	Principles for Digital Development	Guideline	Digital Impact Alliance (DIAL) at the United Nations Foundation	2012
2	National eHealth Strategy Toolkit	Toolkit	WHO/ITU	2012
3	Recommendations on digital interventions for health system strengthening	Guideline	World Health Organization (WHO)	2019

Digital Public Goods				
1	Global Goods Guidebook Version 4.0	Guideline	Digital Square	2023

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Digital Innovation in Pandemic Control

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- NA