Experimentation to transformation: A digital health inflection point

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World Health Organization

“The future of health depends on how well we power health through science, research, innovation, data, digital technologies, and partnerships.”

- WHO Director General Tedros Ghebreyesus

In the last decade:

> 112 Member States have developed national digital health strategies

600 health leaders in 103 countries have been trained on digital health strategy, governance and implementation

WHO evidence-based recommendations advise digital health tools for health system strengthening

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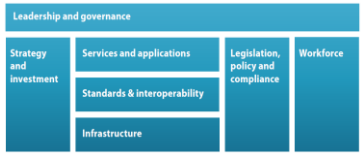
The Storyline

Repository of eHealth Strategies

Last update of Repository of eHealth Strategies



WHA58.28 on eHealth

Consider drawing up a long-term strategic plan for developing and implementing eHealth services promote equitable, affordable and universal access to their benefits

WHA71.7 Digital health

Develop… in close consultation with Member States and with inputs from relevant stakeholders… a global strategy on digital health, identifying priority areas including where WHO should focus its efforts".

Triple billion targets

2030 SDGs

2005 | 05 | 2010 | 2013 | 05 | 2016 | 2018 | 05 | 11 | 2023 NOW | 2025 | 2030

IMPLEMENTATION

WHA66.24 on eHealth standardization and interoperability

Consider developing… policies and legislative mechanisms linked to an overall national eHealth strategy

Global strategy on digital health

Improve health for everyone…affordable, scalable digital health and wellbeing…support equitable access to quality health services…implication for access, cost, quality of digital solutions

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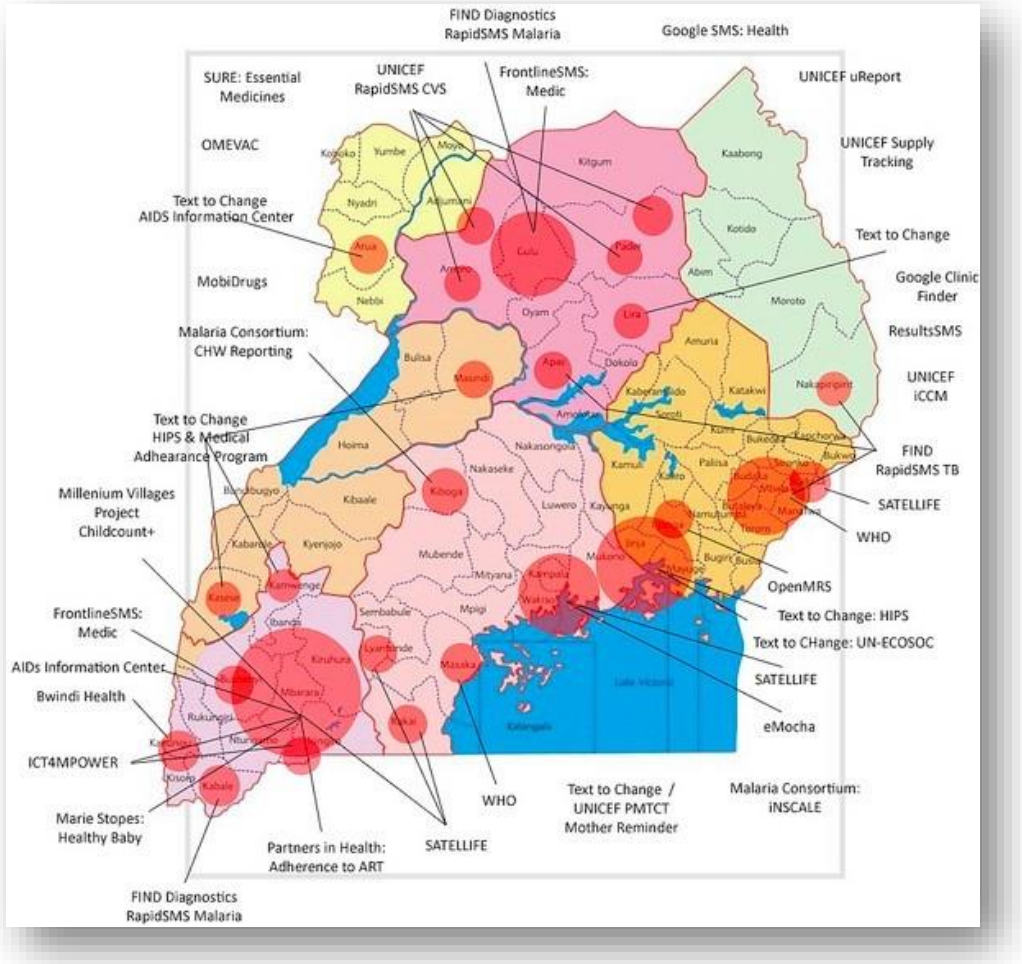
Experimentation and “pilotitis”

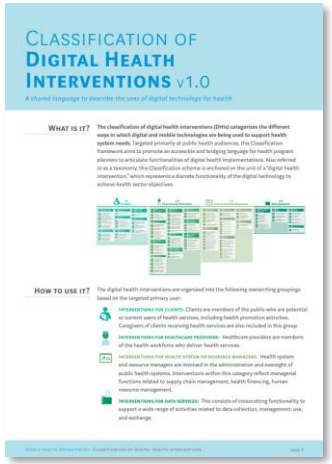
2010-2023:

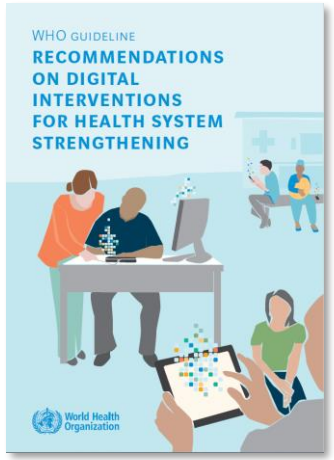
Moving from discordant "***pilotitis***" to planned enterprise architecture – with government in the driver's seat.



Source: State of Uganda Digital Health 2011. Sean Blaschke, UNICEF

WHO Stewardship of Digital Health "projects" to "transformation"





2012

ITU & WHO National eHealth Strategy Toolkit

2018

- World Health Assembly (WHA) Resolution on Digital Health
- Formation of Global Digital Health Partnership (GDHP)
- WHO Classifications of Digital Health Interventions

2019

WHO Guidelines: Recommendations on digital interventions for health system strengthening

2020

- Global Strategy on Digital Health 2020 - 2025
- Digital Health Investment Implementation Guide (DIIG)

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To improve **health for everyone**, everywhere by accelerating the development and adoption of appropriate digital health solutions to achieve the health-related SDGs

- Recommends defining "a national digital health architecture blueprint or road map, adopt open-source health data standards and aim for reusable systems or assets including interoperability of health information systems both at national and international levels in order to establish an innovative integration of different digital technologies using shared services, ensuring data are of good and comparable quality"
- "The global strategy promotes syntactic and semantic interoperability with WHO norms and standards as a cornerstone of health information to enable sharing of information in a connected world."

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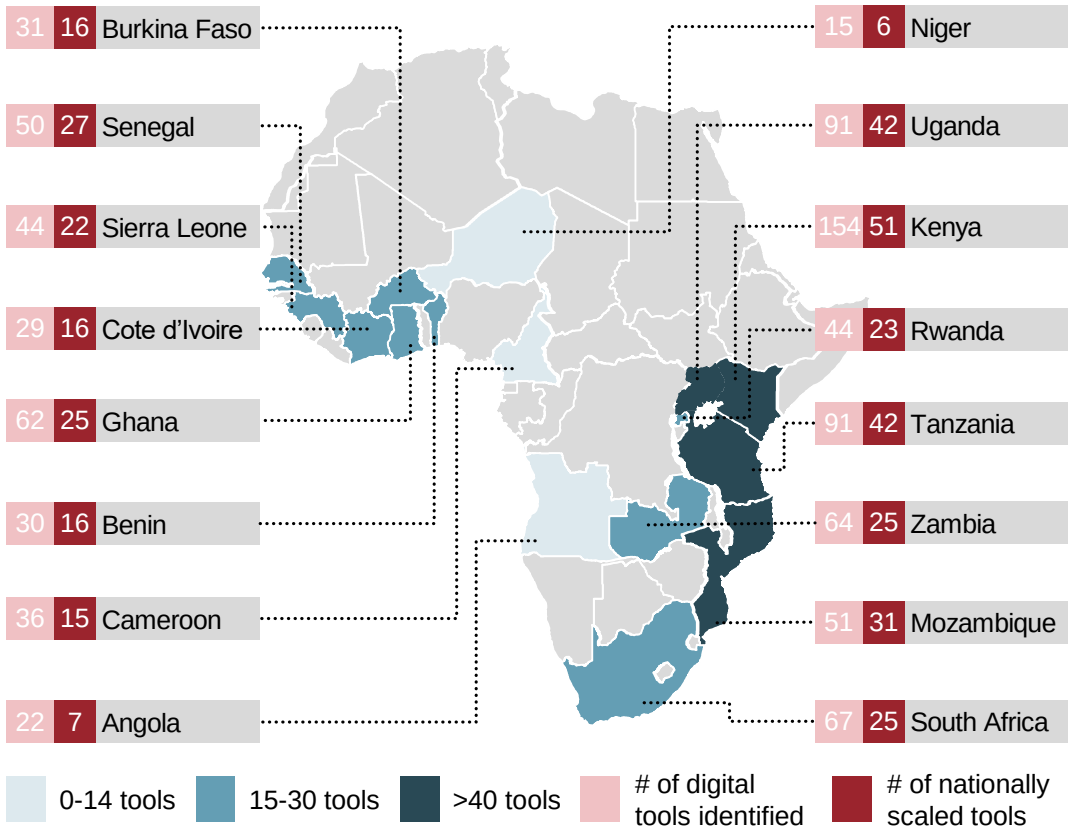
Global Digital Health Strategy 2020 – 2025, Strategic Objectives

- Promote global collaboration & advance the transfer of knowledge on digital health
- Advance the implementation of national digital health strategies
- Strengthen governance for digital health at global, regional and national levels
- Advocate people-centered health systems that are enabled by digital health

Digital Health tools are being used for solving multiple issues in LMICs, but often inefficiently

वसुधैव कुटुम्बकम् | ONE EARTH • ONE FAMILY • ONE FUTURE

~880 apps and platforms mapped in Africa of which ~390 are nationally scaled[1]



High proliferation of apps and platforms for vertical disease areas

These are primarily financed by donors and are often developed to address disease/vertical-specific use cases

- Majority of **global funders primarily invest in apps/platform layer**, specifically for a disease/vertical area
- Data suggests, at least **50% of apps/platforms tracked** were funded by Global organizations[2]

In SSA and South Asia, apps and platforms pilots often deliver short-term impact within a confined geography

- Almost **900 digital health apps** and platforms are in use across SSA (~150 in Kenya alone), but **less than half are scaled nationally**[3]
- Across 21 PMI partner countries, **53 digital tools are used by CHWs**, but few are scaled nationwide and, in some cases, CHWs have to use multiple tools[6]
- Instances where CHWs carry multiple devices[7]

Source (as of Q2 2022): 1. Digital Square Map and Match Analysis 2. Estimate based on available data for 22 countries; 3. Digital Square Map and Match Analysis; 4. UP Digital Health Strategy 2019; 5. Disrupt Africa, Pitchbook, Crunchbase; 6. PMI Digital Community Health Initiative; BMGF field experience; BCG analysis

WHO supports member-states and helps to build the global enabling environment for digital health through convening, evidence synthesis, guideline development, and promotion of norms and standards – engaging all stakeholders to support governments in their stewardship of digital health transformation.

Examples of global initiatives and tools:

- Global Digital Health Certification Network (GDHCN)
- SMART Guidelines
- Global Initiative on AI for Health (AI4H)
- Global Initiative on Digital Health (GIDH)

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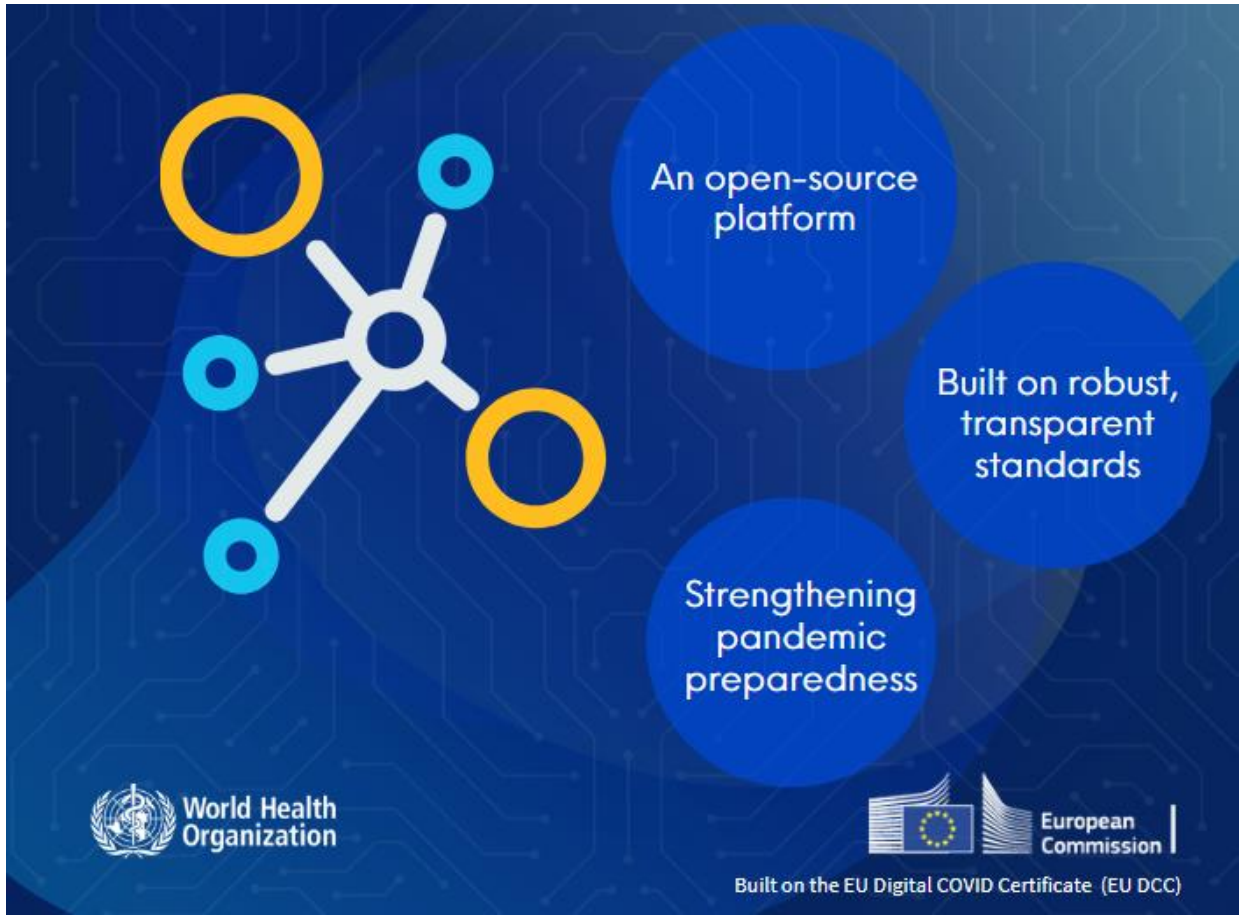
Global Digital Health Certification Network



- **Enabling citizens** of participating countries to **transport credentialed health information across borders.**
- For example: Immunization Records, Vaccine certificates, International Patient Summary, ”Digital Yellow Card”, Training Credentials.
- **Digital representation of the trust between countries** and WHO enabling transitive trust across network members.

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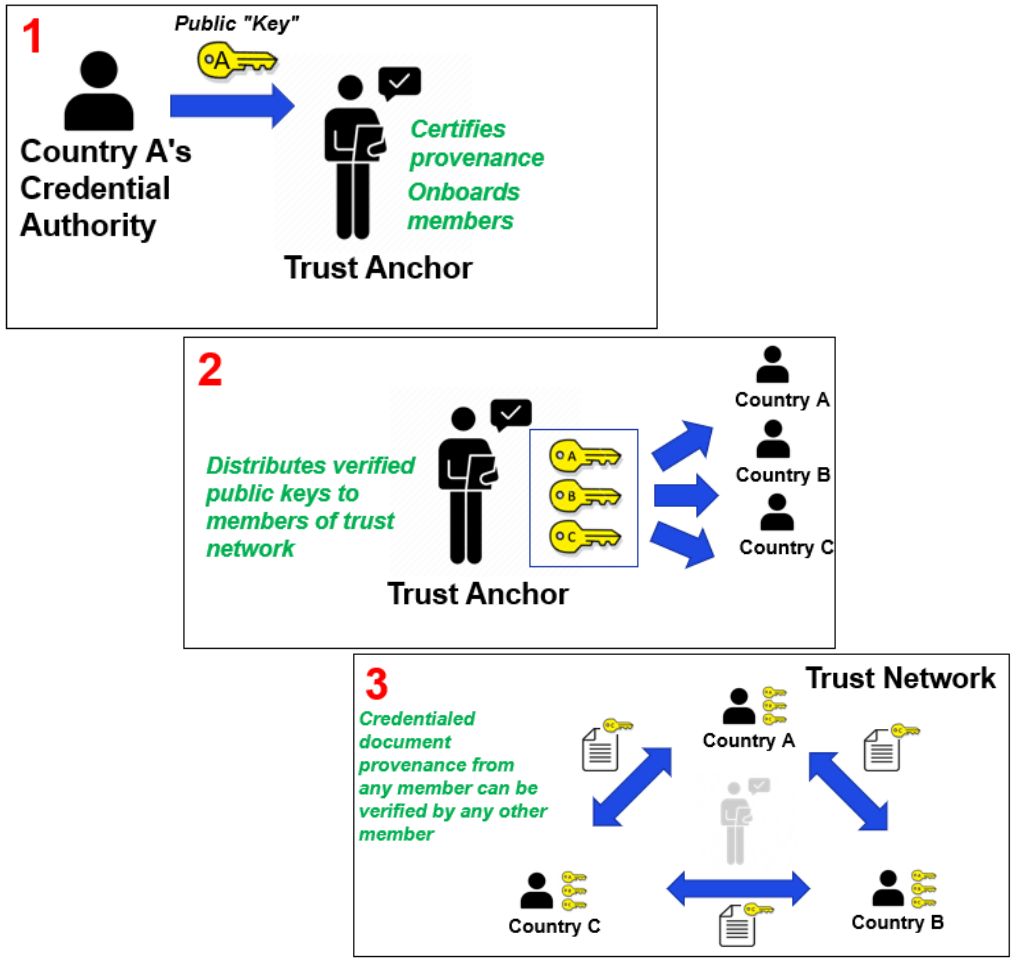
Global Digital Health Certification Network: Vaccine certificates, Digital Yellow Card, International Patient Summary (IPS), Work force credentials

- Building from Digital Documentation of COVID-19 Certificate (DDCC) guidance.
- Expanded technical specifications of EU Digital COVID-19 Certificate (DCC) Network.
- Result of successful G20 pilot in 2022.
- Connects across multiple trust networks (DIVOC, SHC, LacPass).
- WHO serves as trust anchor with Public Key Directory.



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Global Digital Health Certification Network: Vaccine certificates, Digital Yellow Card, International Patient Summary (IPS), Work force credentials

- Launched at WHO HQ in Geneva on 5 June 2023
- WHO Director General Dr. Tedros and Ms Stella Kyriakides, European Commissioner for Health and Food Safety
- EU Network 80 member states encouraged to join WHO Network
- Onboarding of Member States has begun
- Work towards expansion to other use cases (e.g., ICVP, routine immunizations, IPS)

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Global Digital Health Certification Network (who.int)

The European Commission and WHO launch landmark digital health initiative to strengthen global health security

Global Digital Health Certification Network: Vaccine certificates, Digital Yellow Card, International Patient Summary (IPS), Work force credentials

MORE INFORMATION AND HOW TO JOIN

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SMART Guidelines for PHC and disease surveillance: Recommended digitized clinical protocols, minimum datasets, interoperability, and functionality for rapid uptake & updates

Standards-based, **M**achine Readable, **A**daptive, **R**equirements-based, **T**estable

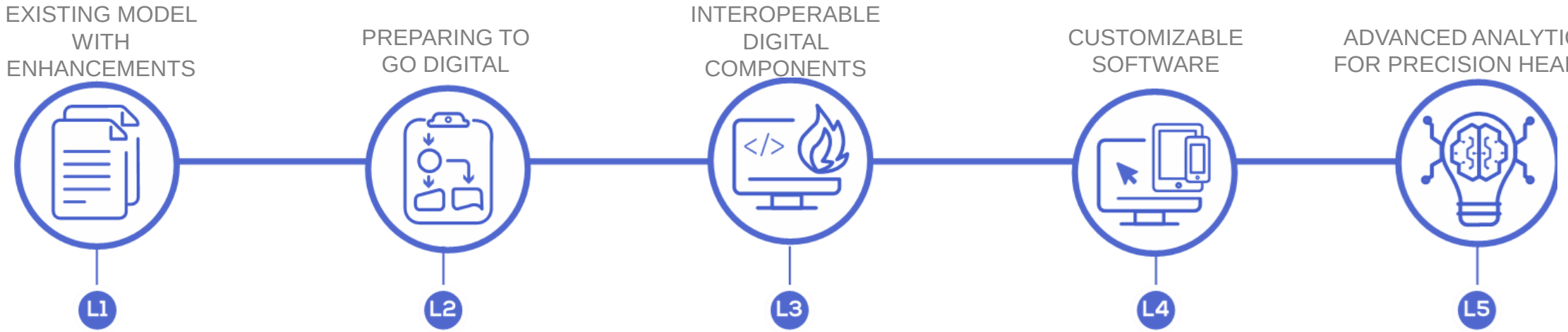

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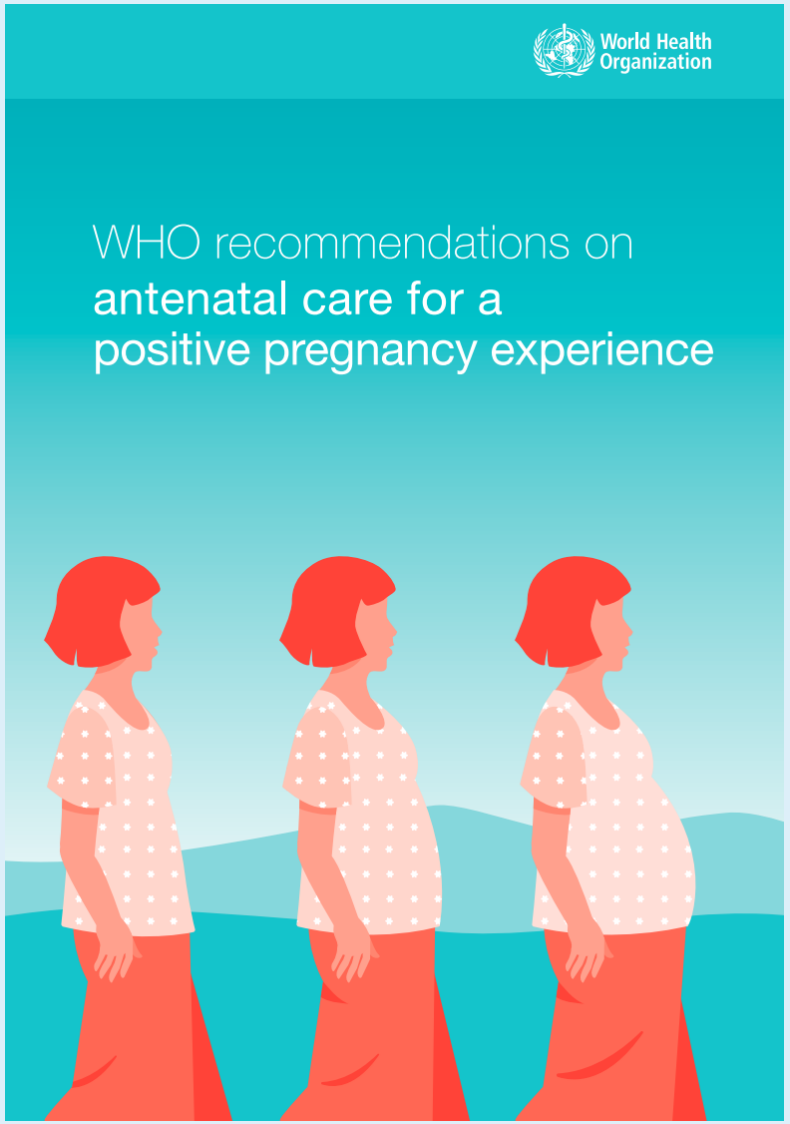
Image sources: OpenSRP FHIR Core COVID-19 vaccine EIR
AFRO Precision public health team



Illustrative example: Anaemia & Iron Folic Acid Supplementation

Recommendations from the WHO recommendations on antenatal care for a positive pregnancy experience

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Source: https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/

L1: Narrative | Existing model with enhancements

Current guideline format from the guideline document

Iron and folic acid supplements	**A.2.1:** Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron[b] and 400 µg (0.4 mg) of folic acid[c] is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth.[d]	Recommended
	A.2.2: Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron[e] and 2800 µg (2.8 mg) of folic acid once weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is not acceptable due to side-effects, and in populations with an anaemia prevalence among pregnant women of less than 20%.[f]	Context-specific recommendation
Anaemia	**B.1.1:** Full blood count testing is the recommended method for diagnosing anaemia in pregnancy. In settings where full blood count testing is not available, on-site haemoglobin testing with a haemoglobinometer is recommended over the use of the haemoglobin colour scale as the method for diagnosing anaemia in pregnancy.	Context-specific recommendation

World Health Organization

Source: https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/

Components of a L2 Digital Adaptation Kit (DAK)

1 Health Interventions & Recommendations

Relevant health interventions and recommendations from the WHO guideline and guidance

Setting the Stage

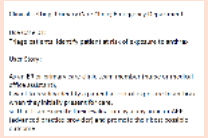
2 Generic Personas

Roles, responsibilities, and essential interventions performed by targeted personas

Contextualization

3 User Scenarios

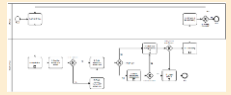
Brief narrative description of how the targeted personas may engage with the digital system



Contextualization

4 Business Processes & Workflows

Generic workflows representing clinical and non-clinical processes

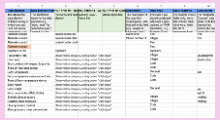


Contextualization

System design

5 Core Data Elements

Data elements, used for clinical decision-making, indicators, and other data needs



System design

Interoperability

6 Decision Support Logic

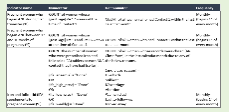
Decision tables representing counselling and treatment algorithms, scheduling logic

System design

Adherence to recommended clinical practice

7 Indicators & Monitoring

Indicators for reporting & monitoring with numerator, denominator of data elements



System design

Adherence to indicator reporting

8 Functional & Non-functional Requirements

A non-exhaustive list of key functions and non-functional requirements for a digital tracking and decision support system

System design

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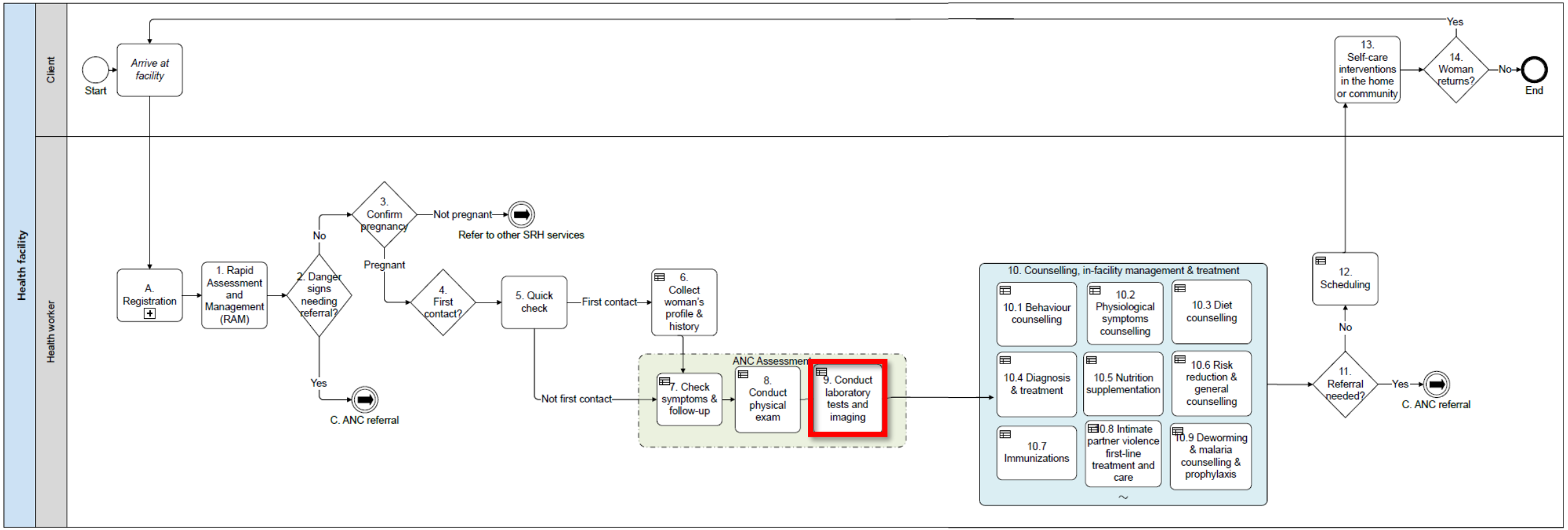
Images are illustrative

L2: Example of L2 Workflow (Anaemia)

ANC Consultation workflow



Source: [Digital Adaptation Kit for Antenatal Care: Operational requirements for implementing WHO recommendations in digital systems]

Example: L3 Computable Guideline for Recommendation A2: Iron & Folic Acid Supplements + B1.1: Anaemia

Home | Profiles | Artifacts | Terminology | Examples | Test Data | Documentation | Dow

Antenatal Care Guidelines Implementation Guide

Relevant Guideline Recommendation Text

2.0.0 A.2: Iron and folic acid supplements

WHO recommendations on antenatal care for a positive pregnancy experience

Contents
Recommendation A.2 - Iron and folic acid supplements
Functional Description
Content

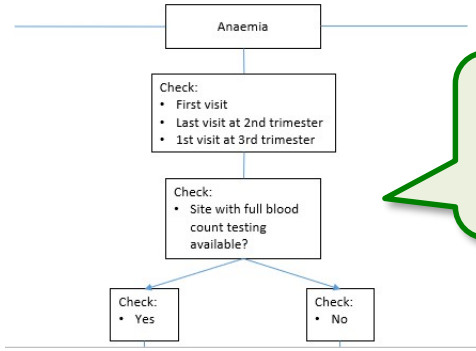
RECOMMENDATION A.2.1: Daily oral iron and folic acid supplementation with 30 mg to 6[illegible]mg acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low bi[illegible]ght, and preterm birth. (Recommended)

RECOMMENDATION A.2.2: Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron and 2800 µg (2.8 mg) of folic acid once weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is not acceptable due to side- effects, and in populations with an anaemia prevalence among pregnant women of less than 20%. (Context-specific recommendation)

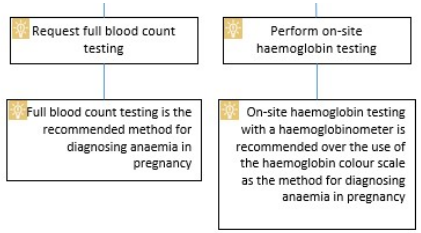
Recommendation Text in semi-structured logic (IF/THEN)

2.1.0 Functional Description

On every contact,
  if anaemia detected
    recommend 120 mg of elemental iron and 400 ug of folic acid, daily (Recommendation A.2.1)
  else if population anaemia prevalence >= 40%
    recommend 60 mg of elemental iron and 400 ug of folic acid, daily (Recommendation A.2.1)
  else if population anaemia prevalence < 20% or daily iron not acceptable due to side-effects
    recommend intermittent oral iron: 120 mg of oral iron, and 2.8 mg of folic acid, weekly (Recommendation A.2.2)
  else
    recommend 30 to 60 mg of elemental iron and 400 ug of folic acid, daily (Recommendation A.2.1)
  check iron-intake compliance;
  check iron-side effects;



Graphical depiction (i.e. decision tree)



Source code in JSON, XML

2.2.0 Content

The following artifacts formalize the description of the logic and behavior defined by this recommendation.

The A.2 Recommendation implemtenation depends on the following common libraries.

Resource	Type	Description
ANC Common Library	Library	CQL Library that provides logic for common pregnancy data points.
ANC Common	CQL Source	For reference, the complete CQL source for the ANC Common Library.

Recommendation A.2 libraries.

Resource	Type	Description
Recommendation A.2 - Plan Definition	PlanDefinition	Event-Condition-Action rule that implements behavior for WHO Antenatal Care Guideline Recommendation A.2
Recommendation A.2 - Iron and folic acid supplements	Library	Defines the data requirements to support evaluation of recommendation A.2
Recommendation A.2 - CQL	CQL Source	For reference, the complete CQL content for Recommendation A.2

Footnotes:

[1] If a woman is diagnosed with anaemia during pregnancy, her daily elemental iron should be increased to 120 mg until her Hb concentration rises to normal (Hb 110 g/L or higher). Thereafter, she can resume the standad daily antenatal iron dose to prevent recurrence of anaemia.

Can be accesses here: http://build.fhir.org/ig/who-int/anc-cds/index.html

L3: Machine-readable | L3 Anamia example

Same recommendations in standards-based software code format

ANC.DT.25 Anaemia, iron and folic acid supplementation:
When: *named-event:* ANC.B9. Conduct laboratory tests and imaging
Then:

Anaemia can be diagnosed if Hb level is less than 11 in first or third trimester or Hb level less than 10.5 in second trimester; OR there is no Hb test result recorded, but woman has pallor. If a woman is diagnosed with anaemia during pregnancy, conduct counselling for managing and treating anaemia. Her daily elemental iron should be increased to 120 mg until her haemoglobin (Hb) concentration rises to normal (Hb 110 g/L or higher). Thereafter, she can resume the standard daily antenatal iron dose to prevent recurrence of anaemia. The equivalent of 120 mg of elemental iron equals 600 mg of ferrous sulfate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate. Please refer to iron sources listed below for additional guidance that can be provided.

If: *applicability:* ((("Blood haemoglobin test result" < 110 g/L) AND ("Gestational age" ≤ 12 weeks)) OR (("Blood haemoglobin test result" < 110 g/L) AND ("Gestational age" ≥ 28 weeks))) OR (("Blood haemoglobin test result" < 105 g/L) AND (13 weeks ≤ "Gestational age" ≤ 27 weeks))) OR (("Blood haemoglobin test conducted" = FALSE) AND ("Pallor present" = TRUE)) *(Should Conduct REQUIRED anaemia counselling)*
Then:

Conduct REQUIRED anaemia counselling:
"Amount of iron prescribed" = 120 mg:
"Type of iron supplement dosage provided" = "Daily":
"Amount of daily dose of folic acid prescribed" = 0.4 mg:

If a woman is not diagnosed for anaemia, iron and folic acid supplementation is still recommended. Due to the population's high anaemia prevalence, a daily dose of 60 mg of elemental iron is preferred over a lower dose. A daily dose of 400 micrograms (0.4 mg) folic acid is also recommended. The equivalent of 60 mg of elemental iron is 300 mg of ferrous sulfate heptahydrate, 180 mg of ferrous fumarate or 500 mg of ferrous gluconate. Please refer to iron sources listed below for additional guidance that can be provided.

If: *applicability:* ((("Blood haemoglobin test result" ≥ 110 g/L) AND ("Gestational age" ≤ 12 weeks) AND ("Population prevalence of anaemia" ≥ 40%)) OR (("Blood haemoglobin test result" ≥ 110 g/L) AND ("Gestational age" ≥ 28 weeks) AND ("Population prevalence of anaemia" ≥ 40%))) OR (("Blood haemoglobin test result" ≥ 105 g/L) AND (13 weeks ≤ "Gestational age" ≤ 27 weeks) AND ("Population prevalence of anaemia" ≥ 40%))) OR (("Blood haemoglobin test conducted" = FALSE) AND ("Pallor present" = FALSE) AND ("Population prevalence of anaemia" ≥ 40%)) *(Should \"Anaemia counselling conducted\" IS OPTIONAL)*
Then:

"Anaemia counselling conducted" IS OPTIONAL:
"Amount of iron prescribed" = 60 mg:
"Type of iron supplement dosage provided" = "Daily":
"Amount of daily dose of folic acid prescribed" = 0.4 mg:


```
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ester or Hb level less than 10.5 in second trimester; OR there is no Hb test result recorded, but woman h
as pallor.\n\nIf a woman is diagnosed with anaemia during pregnancy, conduct counselling for managing and
treating anaemia. \n\nHer daily elemental iron should be increased to 120 mg until her haemoglobin (Hb) c
oncentration rises to normal (Hb 110 g/L or higher). Thereafter, she can resume the standard daily antena
tal iron dose to prevent recurrence of anaemia.\n\nThe equivalent of 120 mg of elemental iron equals 600
mg of ferrous sulfate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate.\n\nPlease
refer to iron sources listed below for additional guidance that can be provided. ",
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            "label" : "WHO ANC recommendations (2016): B1.1, A.2.1, A.2.2 (3)\nPregnancy, childbirth, p
ostpartum and newborn care guide (2015): C4 (1)"
          }
        ],
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ge\" ≤ 12 weeks))\n  OR ((\"Blood haemoglobin test result\" < 110 g/L)\n  AND (\"Gestational age\" ≥ 28 w
eeks)))\n  OR ((\"Blood haemoglobin test result\" < 105 g/L)\n  AND (13 weeks ≤ \"Gestational age\" ≤ 27
weeks)))\n  OR ((\"Blood haemoglobin test conducted\" = FALSE)\n  AND (\"Pallor present\" = TRUE))",
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            "title" : "\"Type of iron supplement dosage provided\" = \"Daily\""
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          {
            "title" : "\"Amount of daily dose of folic acid prescribed\" = 0.4 mg"
```
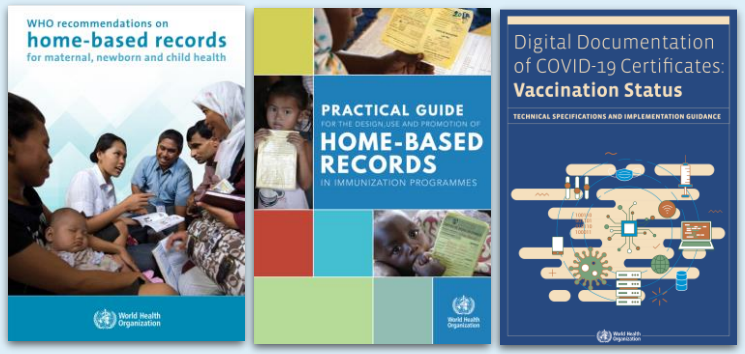


19

SMART Guidelines scale provider-side & client-side solutions

Healthcare worker



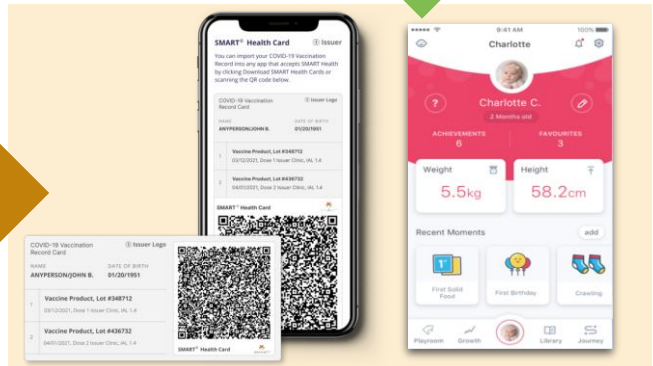
Individuals

SMART Guidelines: trusted interoperable health and data content for service delivery
(Within a FHIR-based enterprise architecture & trust network)

Access to individual health information & means to verify
(e.g., Maternal, Child, Immunization Card held by individuals)

Provider-side applications

Personal health "wallet" / IPS



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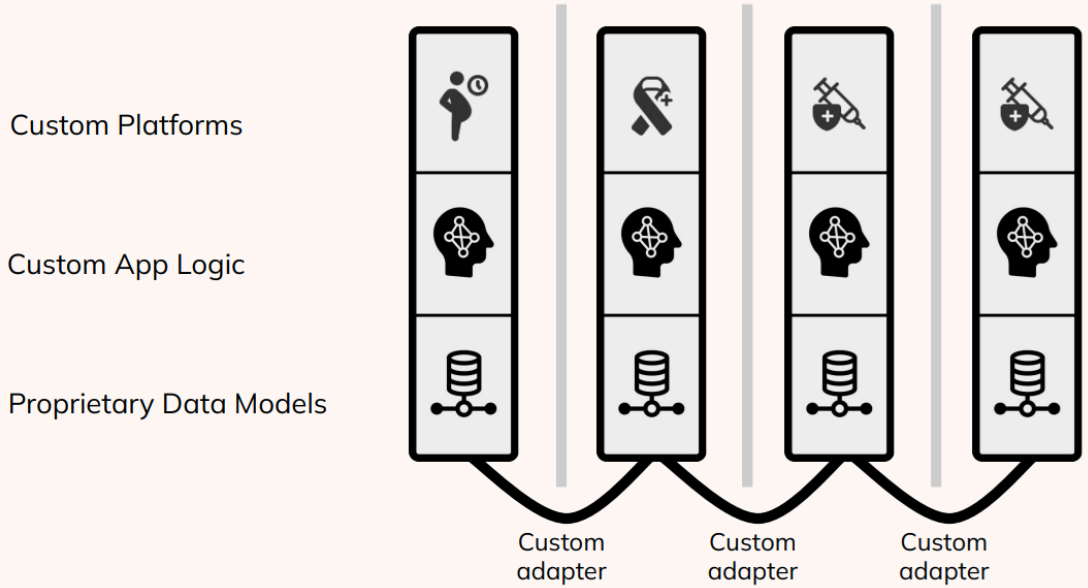
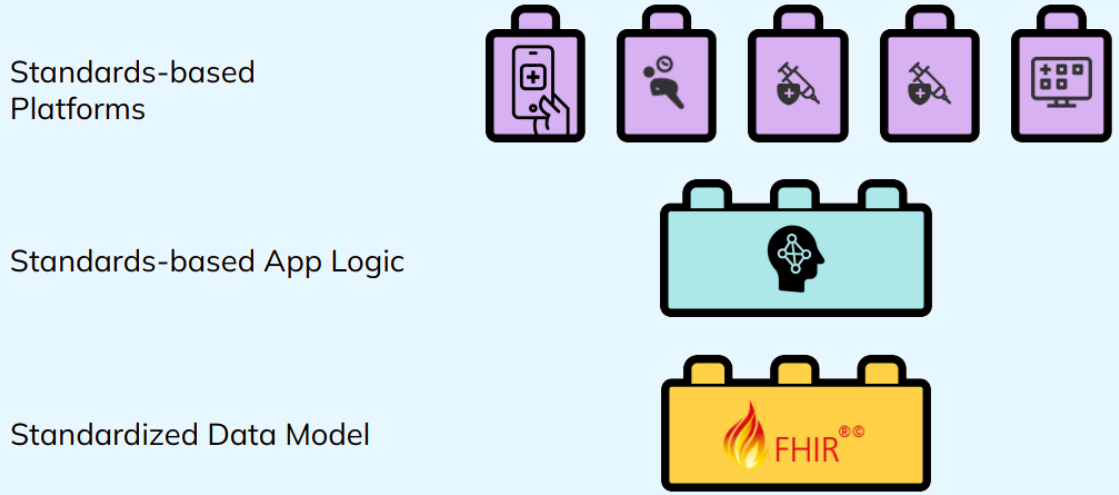
Adoption of SMART Guidelines content reduces time for development while maintaining quality with a standardized data model among local technology developers

Current: Siloed digital health architecture by health verticals requiring custom adaptation for each new health area



Future: standards-based digital health architecture as building blocks for digital solutions



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Graphics from Ona Solutions

SMART Guidelines Ecosystem of Tools & Collaboration with Google Open Health Stack

L1- L3 Authoring, testing and dissemination

L1 Living Guidelines

SMART Guidelines Exchange

1 L2 SMART authoring & adaptation platform for DAK content

2 L3 FHIR IG authoring & testing platform for forms & algorithms

5 SMART Guidelines API

3 IG Publisher through GitHub

4 Terminology service

9 Global Digital Health Certification Network (i.e. Trust Architecture) for SMART Guidelines

L4 Adaptation and Execution

FHIR-based digital ecosystem

7 Android FHIR SDK

7 iOS FHIR SDK

6 L4 Reference software conformant & assessed against clearinghouse criteria

Adapted context-specific localized applications, services, algorithms

Enable and Assess

11 Enabling code libraries, including Google's Open Health Stack

10 WHO Digital Clearinghouse

8 L5 Analytics engine

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Legend: Application | SDK | Service/API | Analytics engine | # In Progress | # Deployed | # Not started

SMART Guidelines and supporting the eco-system of tools

MORE INFORMATION

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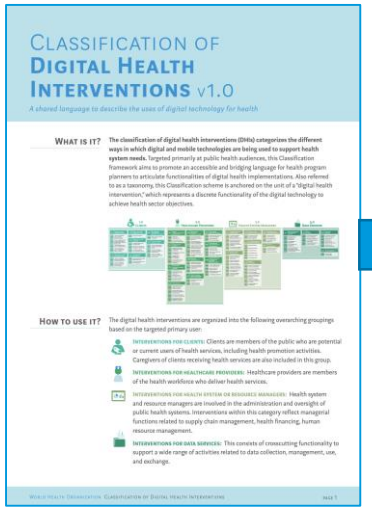
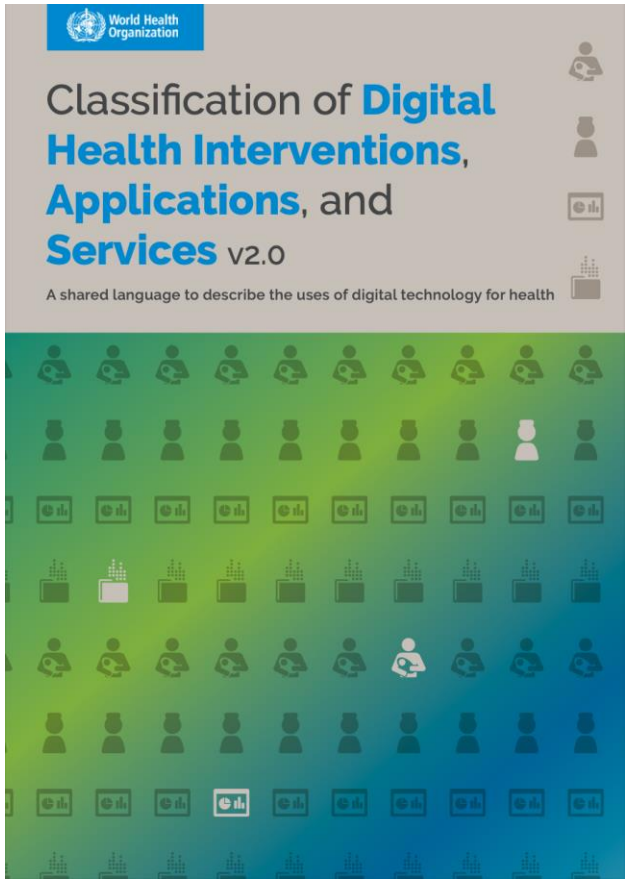
Classification of Digital Health Interventions, Applications, and Services v2.0: A shared language to describe the uses of digital health technology





The classification of Digital Health Interventions is organized around three axes:

1. Digital health interventions (DHIs)
2. Health system challenges
3. Services and Application types

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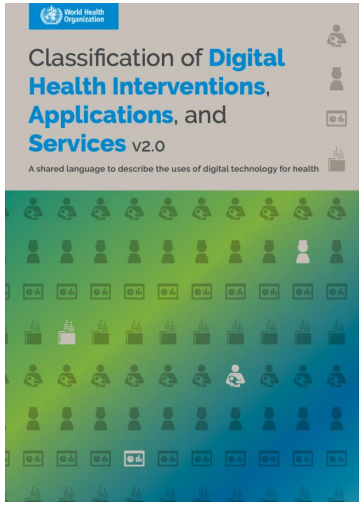


HEALTH SYSTEM CHALLENGES

1. Information

1.1	Lack of population denominator
1.2	Delayed reporting of events
1.3	Lack of quality/ reliable data
1.4	Communication roadblocks
1.5	Lack of access to information or data
1.6	Insufficient utilization of data and information
1.7	Lack of unique identifier

2. Availability

2.1	Insufficient supply of commodities
2.2	Insufficient supply of services
2.3	Insufficient supply of equipment
2.4	Insufficient supply of qualified health workers

3. Quality

3.1	Poor patient experience
3.2	Insufficient health worker competence
3.3	Low quality health commodities
3.4	Low health worker motivation
3.5	Insufficient continuity of care
3.6	Inadequate supportive supervision
3.7	Poor adherence to guidelines
3.8	Inadequate identification and management of risks

4. Acceptability

4.1	Lack of alignment with local norms
4.2	Programs which do not address individual beliefs and practices

5. Utilization

5.1	Low demand for services
5.2	Geographic inaccessibility
5.3	Low adherence to treatments
5.4	Loss to follow up

6. Efficiency

6.1	Inadequate workflow management
6.2	Lack of or inappropriate referrals
6.3	Poor planning and coordination
6.4	Delayed provision of care
6.5	Inadequate access to transportation
6.6	Burden of manual processes

7. Cost

7.1	Lack of effective and equitable resource allocation
7.2	Health-service-user catastrophic health expenditure
7.3	Lack of coordinated payer mechanism
7.4	Lack of financial protection for health service users

8. Accountability

8.1	Insufficient patient engagement
8.2	Unaware of service entitlement
8.3	Absence of community feedback mechanisms
8.4	Lack of transparency in commodity transactions
8.5	Poor accountability between the levels of the health sector
8.6	Inadequate understanding of beneficiary populations

9. Equity

9.1	Inadequate literacy
9.2	Inadequate representation

SERVICES AND APPLICATION TYPES

A. Point of service

A1	Communication systems
A2	Community-based information systems
A3	Decision support systems
A4	Diagnostics information systems
A5	Electronic medical record systems
A6	Laboratory information systems
A7	Personal health records
A8	Pharmacy information systems
A9	Telehealth systems

B. Health system/ Provider administration

B1	Blood bank information management systems
B2	Health finance-related information systems
B3	Health program monitoring systems
B4	Human resource information systems
B5	Learning and training systems
B6	Logistics management information systems (LMIS)
B7	Patient Administration systems
B8	Research information systems

C. Registries & Directories

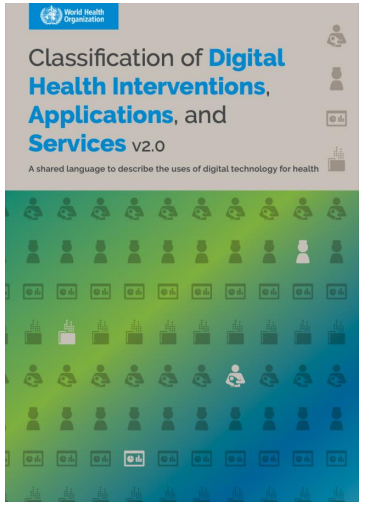
C1	Census and population information systems
C2	Civil registration and vital statistics (CRVS) systems
C3	Facility management information systems
C4	(Health) Facility registries
C5	Health worker registry
C6	Identification registries and directories
C7	Immunization information systems
C8	Master patient index
C9	Product catalogues
C10	Public Key directories
C11	Terminology and classification systems

D. Data Management services

D1	Analytics Systems
D2	Data interchange and interoperability
D3	Data warehouses
D4	Environmental monitoring systems
D5	Geographic information systems (GIS)
D6	Health Management Information systems (HMIS)
D7	Knowledge management systems
D8	Shared Health Record and Health Information Repository

E. Surveillance and Response

E1	Emergency preparedness and response systems
E2	Public health and disease surveillance systems



4.0 DIGITAL HEALTH INTERVENTIONS FOR DATA SERVICES

4.3	Geo spatial information management
4.3.1	Map location of health facilities/structures and households
4.3.2	Map location of health event
4.3.3	Map location of health service users and settlements
4.3.4	Map location of healthcare provider(s)
4.3.5	Map health and health indicator data to geographic data

4.5	Data governance compliance
4.5.1	Authentication and authorisation
4.5.2	Data privacy protection
4.5.3	Data consent and provenance
4.5.4	Trust architecture

2.0 DIGITAL HEALTH INTERVENTIONS FOR HEALTHCARE PROVIDERS

2.1	Health service user identification and registration
2.1.1	Verify health service user unique identity

2.4	Telemedicine
2.4.1	Consultations between remote health service user and healthcare provider
2.4.2	Remote monitoring of health service user's health or diagnostic data by provider
2.4.3	Transmission of medical data (e.g. images, notes, and videos) to healthcare provider
2.4.4	Consultations for case management between healthcare providers

2.5	Healthcare provider communication
2.5.1	Communication from healthcare provider to supervisor(s)
2.5.2	Communication and performance feedback to healthcare provider(s)
2.5.3	Transmit routine news and workflow notifications to healthcare provider(s)
2.5.4	Transmit non-routine health event alerts to healthcare provider(s)
2.5.5	Peer group for healthcare providers
2.5.6	Generative AI for tailored content creation

2.6	Referral coordination
2.6.1	Coordinate emergency response and transport
2.6.2	Manage referrals between points of service within health sector
2.6.3	Manage referrals between health and other sectors (social services, police, justice, economic support

2.7	Scheduling and activity planning for healthcare providers
2.7.1	Identify health service users in need of services
2.7.2	Schedule healthcare provider's activities

2.8	Healthcare provider training
2.8.1	Provide training content to healthcare provider(s)
2.8.2	Assess capacity of healthcare provider(s)

2.9	Prescription and medication management
2.9.1	Transmit or track prescription orders
2.9.2	Track health service user's medication consumption
2.9.3	Report adverse drug effects

2.10	Laboratory and diagnostics imaging management
2.10.1	Transmit health service user's diagnostic result to healthcare provider
2.10.2	Transmit and track diagnostic orders
2.10.3	Capture diagnostic results from digital devices
2.10.4	Track biological specimens

2.11	Healthcare provider financial transactions
2.11.1	Verify health service user's health coverage and financing scheme membership
2.11.2	Receive payments from health service users

1.0 DIGITAL HEALTH INTERVENTIONS FOR HEALTH SERVICE USERS

1.1	Targeted communication to Health Service Users
1.1.1	Transmit health event alerts to specific population group(s)
1.1.2	Transmit targeted health information to health service user(s) based on health status or demographics
1.1.3	Transmit targeted alerts and reminders to health service user(s)
1.1.4	Transmit diagnostics result, or availability of result, to health service user(s)

1.2	Untargeted communication to Health Service Users
1.2.1	Transmit untargeted health information to an undefined population
1.2.2	Transmit untargeted health event alerts to undefined group.

1.3	Health Service User to Health Service User

1.4	Personal health tracking
1.4.1	Access by health service user to own medical or summary health records
1.4.2	Self monitoring of health or diagnostic data by health service user
1.4.3	Active data capture/ documentation by health service user
1.4.4	Access by health service user to verifiable documentation of a health event or health status

1.5	Health Service User based reporting
1.5.1	Reporting of health system feedback by health service users
1.5.2	Reporting of public health events by health service users

1.6	On demand communication with health service users
1.6.1	Health service user look-up of information on health and health services
	Simulated human-like

1.7	Health Service User financial transactions
1.7.1	Transmit or manage out-of-pocket payments by health service users
1.7.2	Transmit or manage vouchers to health service user for health services
1.7.3	Transmit or manage incentives to health service users for health services

1.8	Health Service User consent management
1.8.1	Manage provision and withdrawal of health service user consent

3.0 DIGITAL HEALTH INTERVENTIONS FOR HEALTH MANAGEMENT AND SUPPORT PERSONNEL

3.1	Human resource management
3.1.1	List health workforce cadres and related identification information
3.1.2	Monitor performance of healthcare provider(s)
3.1.3	Manage registration/ certification of healthcare provider(s)
3.1.4	Record training credentials of healthcare provider(s)
3.1.5	Manage health workforce activities

3.2	Supply chain management
3.2.1	Manage inventory and distribution of health commodities
3.2.2	Notify stock levels of health commodities
3.2.3	Monitor cold-chain sensitive commodities

3.3	Public health event notification
3.3.1	Notification of public health events from point of diagnosis

3.4	Civil Registration and Vital Statistics (CRVS)
3.4.1	Notify, register and certify birth event
3.4.2	Notify, register and certify death event

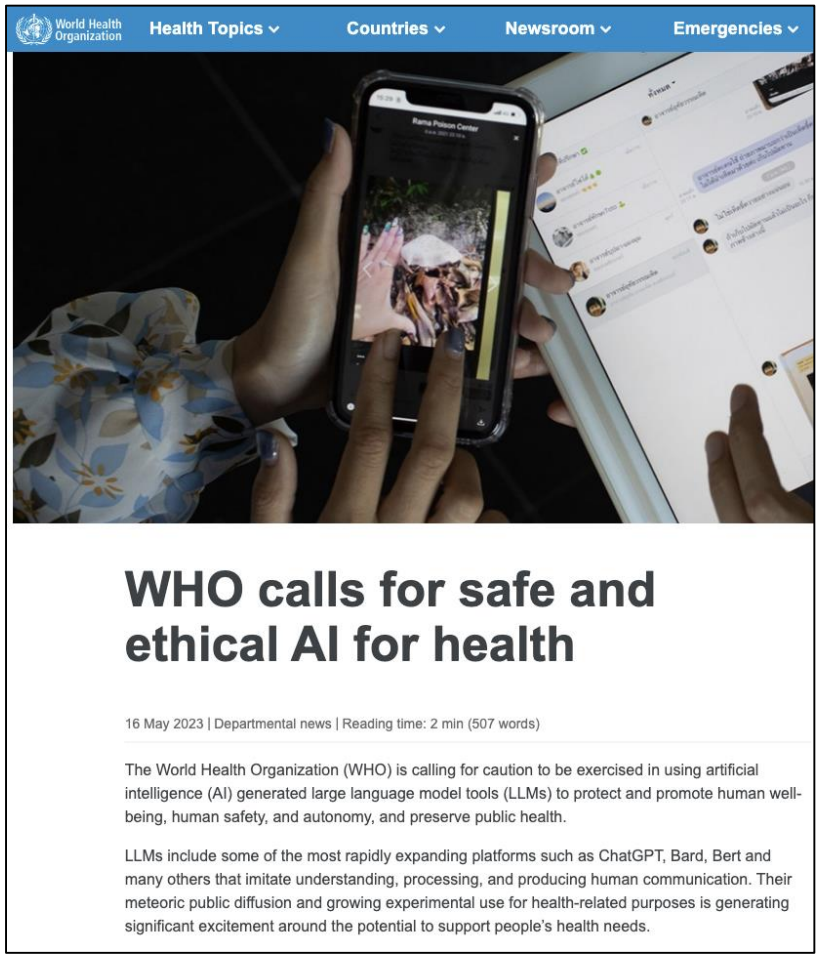
3.5	Health system financial management
3.5.1	Register and verify health coverage scheme membership of health service users
3.5.2	Track and manage insurance billing and claims processes
	Transmit and manage

3.6	Equipment and asset management
3.6.1	Monitor status and maintenance of health equipment
3.6.2	Track regulation and licensing of medical equipment

3.7	Facility management
3.7.1	List health facilities and related information
3.7.2	Assess health facilities

3.8	Health service users' health certificate management
3.8.1	Register and store current health certificate information
3.8.2	Retrieve and validate current health certificate information

Global Initiative on AI for Health



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WHO-ITU AI4Health focus group

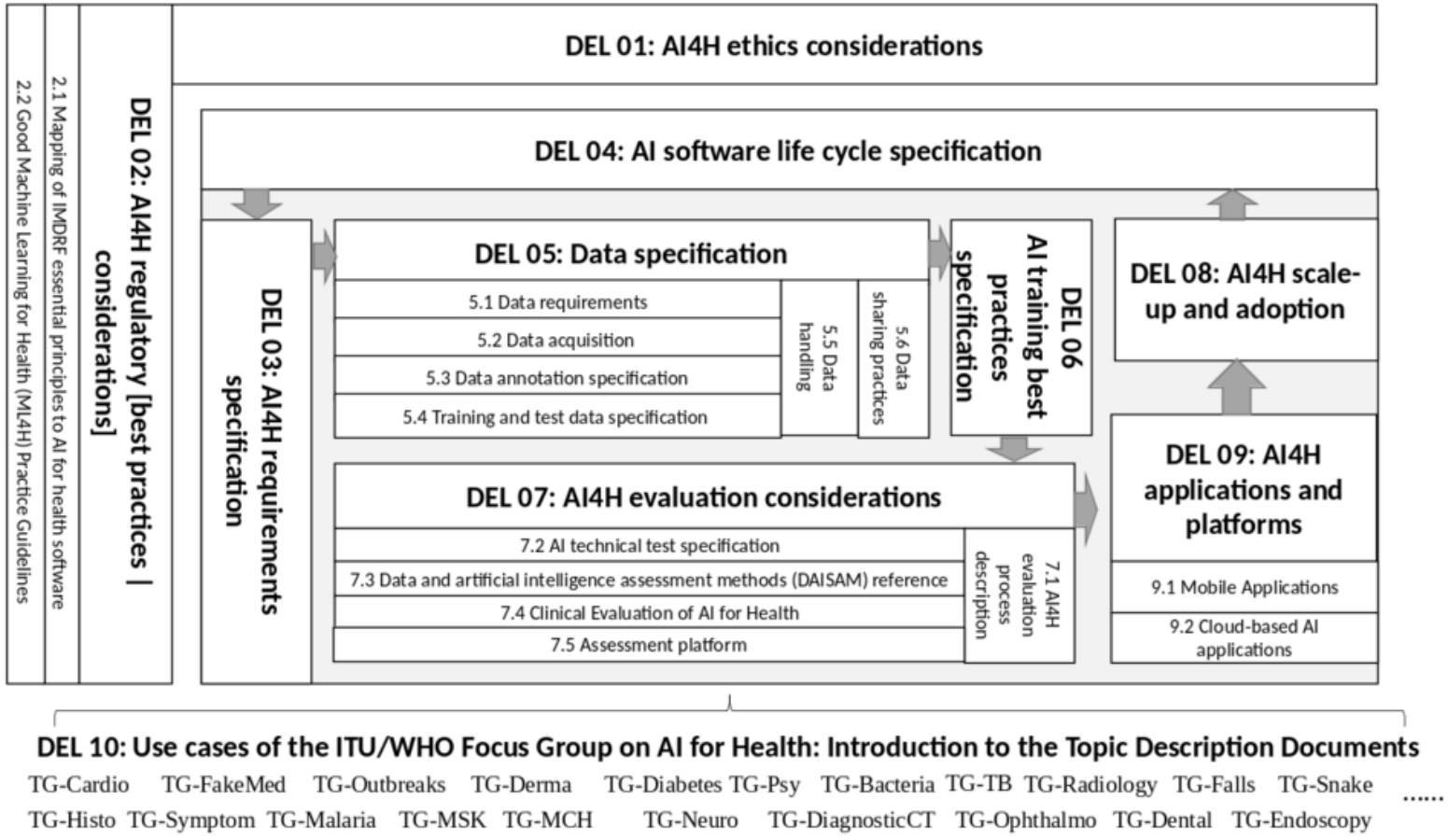
AI benchmarking for all

- Established in 2018 as **a joint focus group** between **ITU** and **WHO** and100+ experts and researchers
- Bring together specialists to develop a benchmarking framework for international standards
- Steer the creation of **policies** to ensure the safe, appropriate use of AI in the health sector
- Identify use cases for potential **scaling** up
- Transform to **Global initiative on Ai4H**

AI for Health
An ITU Focus Group
In collaboration with WHO

Facilitating Policy

1. **AI4H ethics considerations**
2. **AI4H regulatory [best practices | considerations]**
3. AI4H requirements specification
4. AI software life cycle specification
5. Data specification
6. AI training best practices specification
7. AI4H evaluation considerations
8. AI4H scale-up and adoption
9. AI4H applications and platforms
10. **Use cases of the ITU-WHO Focus Group on AI for Health**



Key ethical principles for use of artificial intelligence for health.....

MORE INFORMATION

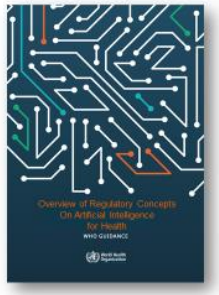
World Health Organization

Global Initiative on AI for Health

WHO + ITU AI for health Focus Grou


Ethics and Governance of Artificial Intelligence for Health


Generating Evidence for Artificial Intelligence-based Medical Devices


Regulatory Concepts on Artificial Intelligence for Health (Feb 2023)

WHO Online course on AI for health governance and ethics
~10,000 users

Regional workshops on AI4H conducted in PAHO , EMRO and EURO

World Health Organization

GI-AI4H Approach
The How?

Enable — Governance, policies, and guidance on evidence-based AI4H

Facilitate — Pool funding & a global community of experts

Implement — Sustainable models of AI programs implementation at the country level

Global Initiative- Governance Structure

WHO + ITU + WIPO

Secretariat
Cross cutting team from WHO, ITU, WIPO

Associate committee | **Partners** | **Informal expert groups**

Taking AI to the People

Launched on July 6, 2023!

GI-AI4H Planned Actions
The Deliverables

1. AI4h guidelines standards and policies for implementation at the country level
2. Evidence and policy guidance on specific topic areas
3. Facilitate research , innovation and data sharing on Ai for health
4. Establish global, regional and national networks of experts, academics and stakeholders for AI4h
5. Establish resource and knowledge sharing among stakeholders
6. AI4h programs implemented at country levels with regions

Intentional partnerships and co-creation accelerate support to national digital health transformation

World Health Organization

Global Initiative on Digital Health:

Implementation of the Global Strategy advocated through the G20 process and India's Presidency

World Health Organization

G20 भारत 2023 INDIA

Global Strategy on Digital Health 2020 -2025

- Endorsed by **194** Member States
- **GIDH** addresses ~70% of WHO actions
- **GIDH** addresses over 50% of actions for Member States & partners

Goals

- **Reduce** risk of entropy
- **Prevent** wheel reinvention
- **Align and optimize** resources for digital health transformation
- **Support member-states** in managing interoperable digital health ecosystem
- **Accelerate measurable progress** over time in ecosystem maturity
- **Promote knowledge sharing** across regions
- **Improve access to quality assured digital solutions** and technical assistance

Foundational Pillars

Country Needs Tracker	Country Resource Portal	Transformation Toolbox	Convening & Knowledge Exchange
Resource optimization and alignment with country priorities		Quality assured Digital Public Goods and strengthened local capacity	

Global Initiative on Digital Health: Framework

Main Activities

- **Capture Country Needs and Priorities** (Country Request Tracker)
- **Optimize investments** (Resource Portal)
- **Support, Convene** and **exchange knowledge** between networks

Country-Enabling Resources

Transformation Toolbox

1. *DH Maturity Model (Monitor)*
2. *DH Strategy & Policy Repository*
3. *DH Atlas*
4. *DH Training*
5. *DH Clearinghouse / DPG / DPIs*

ALIGN

Country needs with available financial and technical resources

SUPPORT

Knowledge-sharing and timely response to country needs

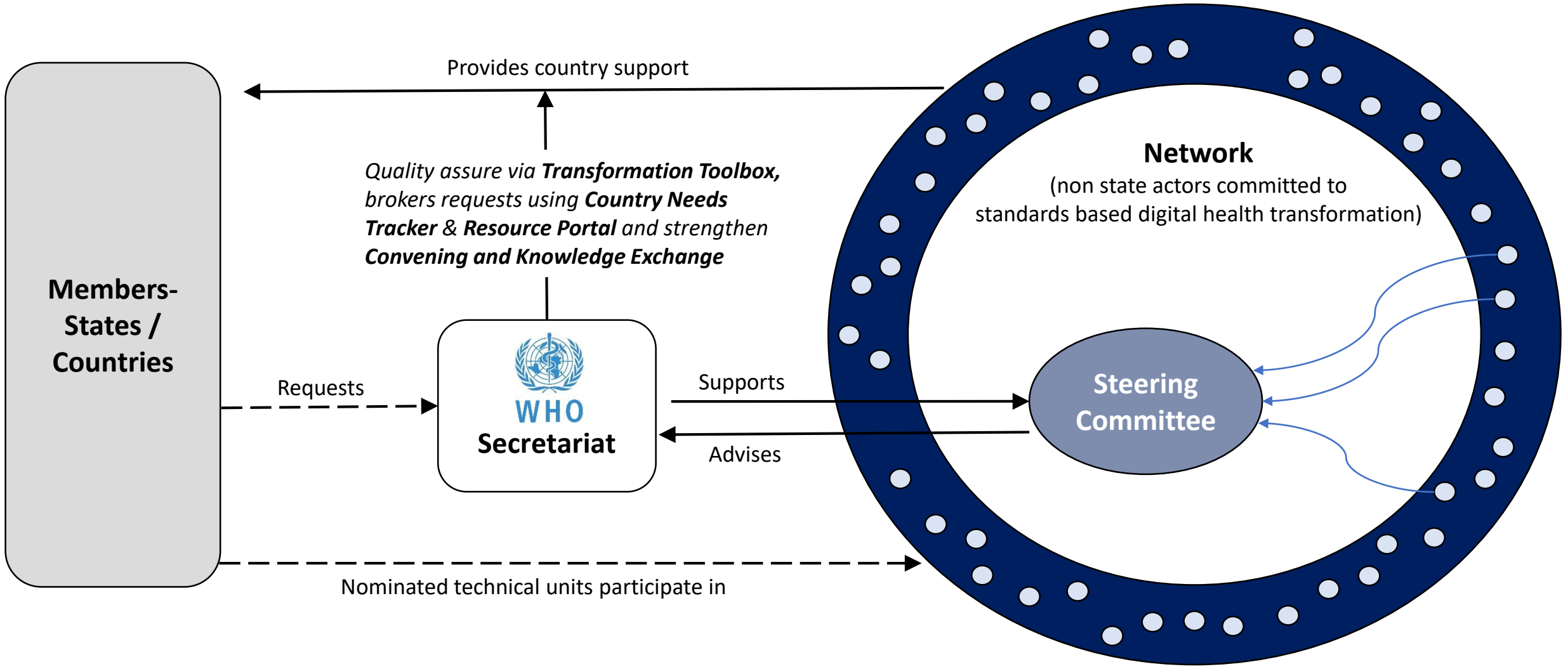
CONVERGE

Facilitate use of technology aligned with norms & standards

World Health Organization

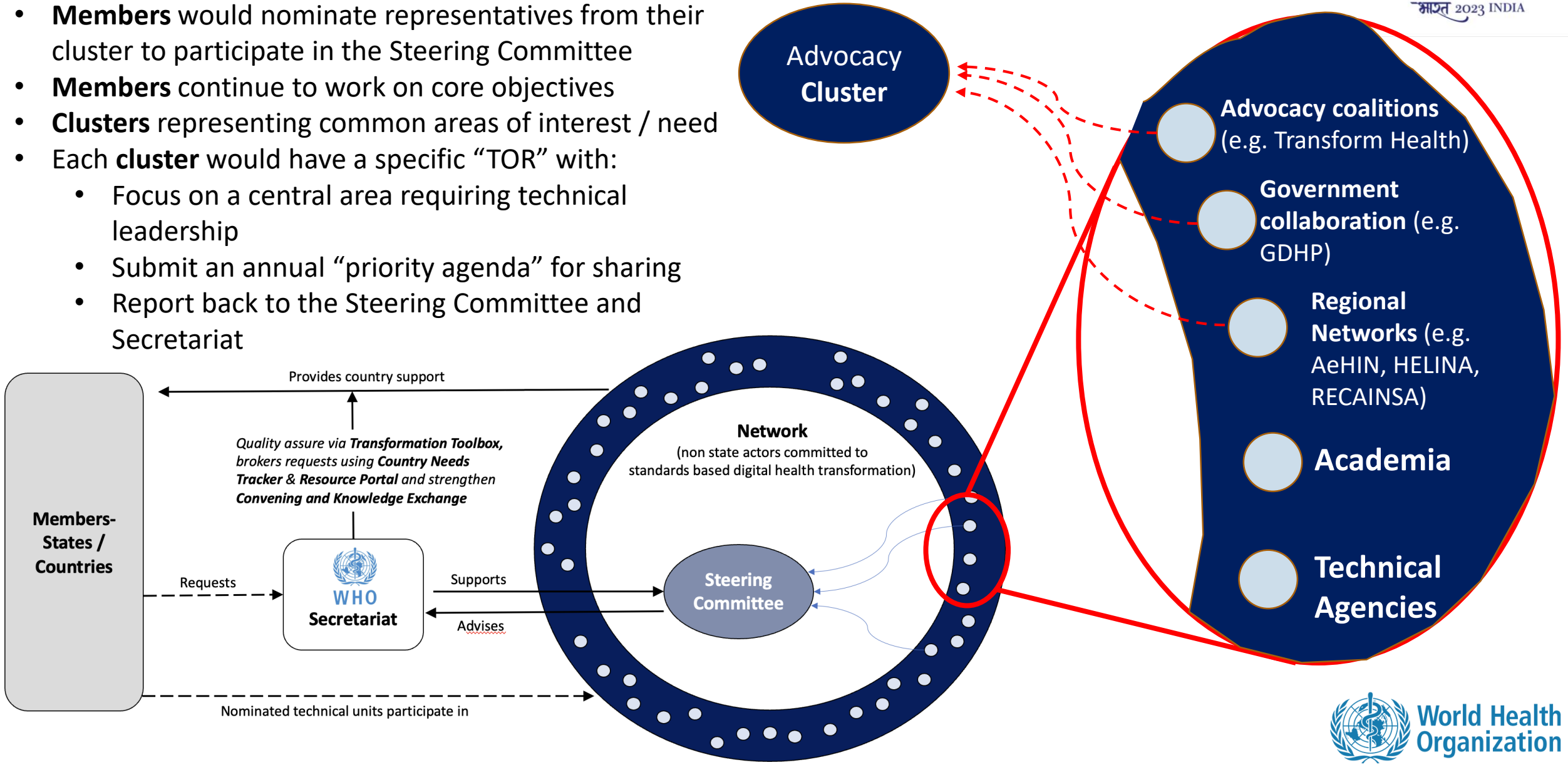
G20 भारत 2023 INDIA

GIDH– Relationship Matrix for Quality Assured Technical Assistance



GIDH Illustrative Members & Clusters

- **Members** would nominate representatives from their cluster to participate in the Steering Committee
- **Members** continue to work on core objectives
- **Clusters** representing common areas of interest / need
- Each **cluster** would have a specific "TOR" with:
  - Focus on a central area requiring technical leadership
  - Submit an annual "priority agenda" for sharing
  - Report back to the Steering Committee and Secretariat



Status and Next steps

- Progress presented at the G20 3rd Health Working Group Meeting in Hyderabad, India on 5 June 2023
- Co-creation on-going
- Launch on 9 August 2023

MORE INFORMATION

Celebrating partnerships

Digital Health Collaborating Centers, Academic partners, IOs and Associations

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Universitat Oberta de Catalunya

MAYO CLINIC

I-DAIR

CAICT
中国信息通信研究院
China Academy of Information and Communications Technology

Transform Health

AIDH AUSTRALASIAN INSTITUTE OF DIGITAL HEALTH

AMRO/PAHO EURO AFRO

World Health Organization

WPRO SEARO

UNIVERSITÉ DE GENÈVE

National Health Commission of the People's Republic of China
中华人民共和国国家卫生健康委员会

ILLINOIS

ISfTeH International Society for Telemedicine & eHealth
Your Global Partner in Digital Health

UNIVERSITETSSYKEHUSET NORD-NORGE
DAVVI-NORGGA UNIVERSITEHTABUOHCCEVIESSU

UNIVERSITY OF OSLO

IMIA
International Medical Informatics Association

GDHP
Global Digital Health Partnership

Recent partnership with HL7 FHIR

- Support the adoption of open interoperability standards, globally.
- Adoption of interoperability standards are critical for consistent representation of data and information in health.
- Further enable equitable development of and access to, health interoperability standards, evidence-based guidance, and foundational architectural building blocks for digital health, to accelerate progress towards UHC.

World Health Organization

WHO and HL7 collaborate to support adoption of open interoperability standards

BMJ Global Health

WHO and digital agencies: how to effectively tackle COVID-19 misinformation online

Federico Germani ,[1] Andrew B Pattison,[2] Monta Reinfelde[2]

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INTRODUCTION

On 30 January 2020, as a consequence of the globally deteriorating epidemiological situation, WHO Director-General Tedros Adhanom Ghebreyesus declared the COVID-19 situation to be a public health emergency of international concern.[1] The global health disaster has been exacerbated by a concomitant epidemic of misinformation online, which has been referred to as an 'infodemic'.[2] The prominent feature of this infodemic is an epidemic-like circulation of fake news, which includes scientific misinformation about COVID-19 and vaccines.[3] Misinformation circulates through digital channels faster and more effectively than accurate information does.[4] Through social media in particular,[5 6] unfounded rumours and conspiracy theories can have a broad reach, greatly contributing to people's beliefs and behaviours. Scientific misinformation has been a large challenge for the implementation of solutions to halt the ongoing pandemic, and high rates of vaccine hesitancy have been a deterrent to a successful management of COVID-19. COVID-19 misinformation is driven by conspiracy theories on the origin of the pandemic, on the dangers posed by global vaccination campaigns or by inaccurate measures to prevent or treat the disease.[7 8] For instance, one of the most popular conspiracy theories on the origin of the pandemic proposes that the outbreak was a plan to mitigate overpopulation through the employment of massive vaccination campaigns. Other popular conspiracies propose that 5G technology causes illnesses due to electromagnetic radiation and that the pandemic serves as a cover for the health damages caused by the new technology. These conspiracies have had real-life effects, with people burning 5G masts or attacking telecommunication workers.[9 10] Furthermore, misinformation reduced adherence to mask regulations and social distanci ures,[3] due to the broad misunder of the mechanisms of SARS-CoV-2 sion, COVID-19 symptoms or the of herd immunity. All these factors profound negative effects on the pe of the dangers posed by COVID-19.

In this process, political trust h shown to play a direct and indir proving that rumours and misinforma spread from corners of the internet from institutional figures.[11] As an in 2020 a prominent political figure ously stated that chloroquine and chloroquine were approved by the and Drug Administration for the t of COVID-19.[12] This was followed b request for these drugs, causing a sh medical supplies for those patients from diseases which require chl and hydroxychloroquine.[13] Misguid mixed with misinformation also led p inhale disinfectants, to get exposed violet radiation to kill the virus, as w create cocktails of drugs to make

Summary box

- ⇒ WHO convened the Tech Task Force (TTF) on COVID-19, with companies in the social media and tech industry from around the world to identify strategies to limit the circulation of fake news and harmful contents.
- ⇒ WHO has worked with Google to ensure th who search information related to COVID-1 posed to evidence-based information.
- ⇒ WHO has been actively promoting eviden messages, has worked with tech compani down misinformation from the Internet, an support of digital agencies – has created plications, and new channels to amplify th trustworthy health information.
- ⇒ Joint efforts between WHO and the priva can promote health and keep the world sa

MoU Signed at WHA 2023
Between WHO and Google
Health/Search/YouTube/etc.

To improve **health for everyone**, everywhere by accelerating the development and adoption of appropriate digital health solutions to achieve the health-related SDGs

- Recommends defining "a national digital health architecture blueprint or road map, adopt open-source health data standards and aim for reusable systems or assets including interoperability of health information systems both at national and international levels in order to establish an innovative integration of different digital technologies using shared services, ensuring data are of good and comparable quality"
- "The global strategy promotes syntactic and semantic interoperability with WHO norms and standards as a cornerstone of health information to enable sharing of information in a connected world."

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Global Digital Health Strategy 2020 – 2025, Strategic Objectives

- Promote global collaboration & advance the transfer of knowledge on digital health
- Advance the implementation of national digital health strategies
- Strengthen governance for digital health at global, regional and national levels
- Advocate people-centered health systems that are enabled by digital health

Global Strategy on Digital Health 2020 – 2025: Action Plan

ANNEX

PROPOSED ACTIONS FOR MEMBER STATES, THE SECRETARIAT AND PARTNERS FOR IMPLEMENTING THE GLOBAL STRATEGY ON DIGITAL HEALTH

World Health Organization

Call to action for MEDINFO 2023 participants

STRATEGIC OBJECTIVE 1: PROMOTE GLOBAL COLLABORATION AND ADVANCE THE TRANSFER OF KNOWLEDGE ON DIGITAL HEALTH			
Proposed Actions	**Short-term (1-2 years)**	**Medium-term (2-4 years)**	**Long-term (4-6 years)**
Proposed actions by partners	• Collaborate with countries and the Secretariat to support digital health transformation being prioritized at national, regional and global levels. • Participate in collaborations and partnerships for sustainability and acceleration of digital health transformation. • Develop capacity-building to help Member States to identify, systematize and share good practices and lessons learned on digital health. • Promote collaborations and partnership models within and across organizations on digital health initiatives including on the use of software global goods, open-source standards and common architecture for digital health.	• Manage or engage in partnerships that serve public health system objectives (including interoperability and standards, coordinated investment, and secondary use of health data). • Establish a knowledge-management approach for sharing and emphasizing the role of digital health investments in catalysing the achievement of national health priorities, universal health coverage, Sustainable Development Goals and WHO's Thirteenth General Programme of Work, 2019–2023.	• Promote centres of excellence or innovation hubs to assess and implement digital health solutions that are aligned with country-defined needs and health related Sustainable Development Goals.

Call to action for MEDINFO 2023 participants

STRATEGIC OBJECTIVE 2: ADVANCE IMPLEMENTATION OF NATIONAL DIGITAL HEALTH STRATEGIES			
Proposed Actions	**Short-term (1-2 years)**	**Medium-term (2-4 years)**	**Long-term (4-6 years)**
Proposed actions by partners	• Collaborate with WHO to provide support to countries in developing (or ensure in place) a national digital health strategy or equivalent strategic framework. • Collaborate with WHO to provide support to countries to enabling prioritizing national investment in digital health in support of primary health care and universal health coverage. • Ensure end-user communities and beneficiary populations are adequately engaged in the design, development, deployment, scale-up and sustainability phases. • Promote sustainable financing models in support of digital health development, implementation, integration into health systems and maintenance. • Collaborate with WHO to develop innovative technical tools to effectively monitor and accelerate implementation of national and global strategy on digital health. • Collaborate with WHO to ensure digital health transformation happening in various development context and at various levels, accelerating the achievement of health-related Sustainable Development Goals.		

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Call to action for MEDINFO 2023 participants

STRATEGIC OBJECTIVE 3: STRENGTHEN GOVERNANCE OF DIGITAL HEALTH AT GLOBAL, REGIONAL AND NATIONAL LEVELS			
Proposed Actions	**Short-term (1-2 years)**	**Medium-term (2-4 years)**	**Long-term (4-6 years)**
Proposed actions by partners	• Support and contribute to good governance of digital health, adherence to national policies and programmes, and compliance and use of standards required. • Support the Secretariat in establishing international health data regulation, a framework for regulating, benchmarking or certifying artificial intelligence and digital health medical devices. • Support the Secretariat in the development of a guideline on global interoperability standards for digital health. • Support the Secretariat to provide surge training capacity in response to acute public health events.	• Develop research on cutting-edge health technologies and share the evaluation results of the implementation of digital health interventions. • Support the Secretariat in the development of global guidance on planning, development and use of digital hospitals and digital therapeutics, with partners' expertise during routine and emergency health service delivery.	• Support practices and innovations that deliver positive health outcomes and enhance overall quality of health care delivery aligned with the Sustainable Development Goals.

World Health Organization

Call to action for MEDINFO 2023 participants

STRATEGIC OBJECTIVE 4: ADVOCATE PEOPLE-CENTRED HEALTH SYSTEMS THAT ARE ENABLED BY DIGITAL HEALTH

Proposed Actions	Short-term (1-2 years)	Medium-term (2-4 years)	Long-term (4-6 years)
Proposed actions by partners	• Collaborate with the Secretariat in supporting countries in prioritizing an accessible tool for literacy in digital health technologies, digitization, digitalization and change management. • Collaborate with the Secretariat in developing a framework allowing individual feedback in validating the performance of digital health tools and services, with partners' expertise. • Support the Secretariat in developing global minimum standards for electronic patient health records and their implementation. • Support the Secretariat in developing global guidance on personalized medicine and its implementation. • Support the Secretariat in developing ethics frameworks for technologies for health, and supporting countries in strengthening public trust in digital health including in the context of a public health emergency. • Support countries to adopt and effectively use person-centric digital technologies for the health workforce to facilitate evidence-based decision-making and strengthen health systems' accountability. • Support countries to identify and implement appropriate digital health interventions, including in the context of a public health emergency combined with appropriate health data across interoperating digital health systems to achieve increased quality, coverage and accessibility of health care.		• Develop and promote the use of tools that support digitalizing processes at health service centres or relevant occasions with a focus on patients' empowerment, standardized processes and managed quality of service.

شكرا

Merci

ধন্যবাদ

Gracias

Thank you

Digital health should be an integral part of health priorities and benefit people in a way that is ethical, safe, secure, reliable, equitable and sustainable. It should be developed with principles of transparency, accessibility, scalability, replicability, interoperability, privacy, security and confidentiality.

Danke

Xiè xie

Dhanyavaad

спасибо