6 December 2017
Global Digital Health Forum

Global Goods for Digital Health: (1) Digital Health Classifications (2) Digital Health Atlas

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Presentation Overview

- Recent digital health history contributing to recent global goods from WHO

- WHO **Digital Health Interventions Classification** System and definitions

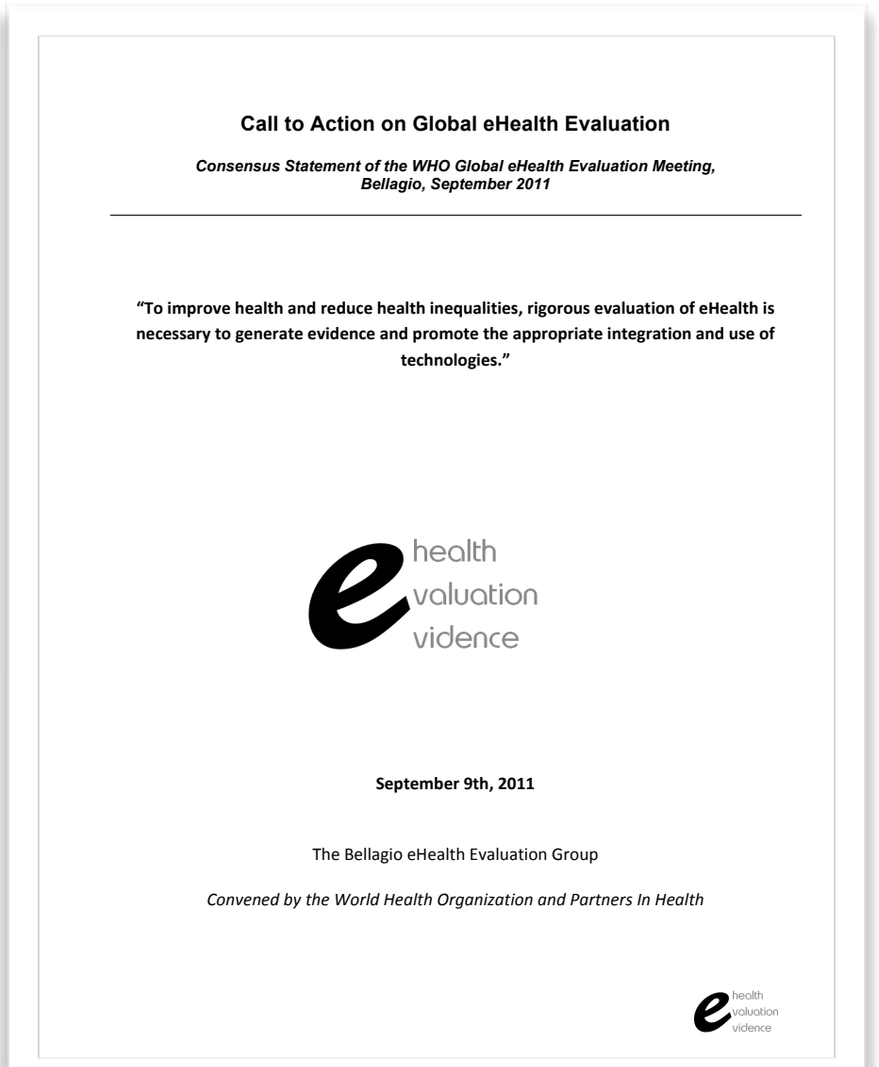
Digital Health Atlas

- ***Digital Health Atlas:*** a HDC **Technology Registry** to uniquely register, describe, compare and track country digital assets for multiple sectors

- **WHO Guidelines** on Digital Health Interventions for health systems strengthening and complementary implementation guide.

WHO Global eHealth Evaluation Meeting Consensus Statement Bellagio Call to Action

"**Evidence** equips decision makers with **information for choosing** the most effective and economical approaches to systems, strategies, implementation and training in m/eHealth."



Call to Action on Global eHealth Evaluation

Consensus Statement of the WHO Global eHealth Evaluation Meeting, Bellagio, September 2011

"To improve health and reduce health inequalities, rigorous evaluation of eHealth is necessary to generate evidence and promote the appropriate integration and use of technologies."

ehealth evaluation vidence

September 9th, 2011

The Bellagio eHealth Evaluation Group

Convened by the World Health Organization and Partners In Health

ehealth evaluation vidence

Jointly convened by Harvard University, and World Health Organization

(Fraser, Bailey, Mehl)

WHO Bellagio eHealth Evaluation Call to action, Bellagio, Italy, September, 2011

informed by rigorous and focused evaluation. Used appropriately, eHealth has the potential to catalyze, support and monitor health improvements at scale, and to accelerate achievement of national and global development goals, including the United Nations Millennium Development Goals. **If used improperly, eHealth may divert valuable resources and evencause harm.** To ensure effective and appropriate use of eHealth systems, implementation must be guided by evidence from evaluations at all design and scale-up stages. A small set of studies has shown positive impact of eHealthsolutions in resource-poor environments but more evidence, of better quality, is needed to make the health and investment case for scale-up.

Bellagio Call to Action 2011

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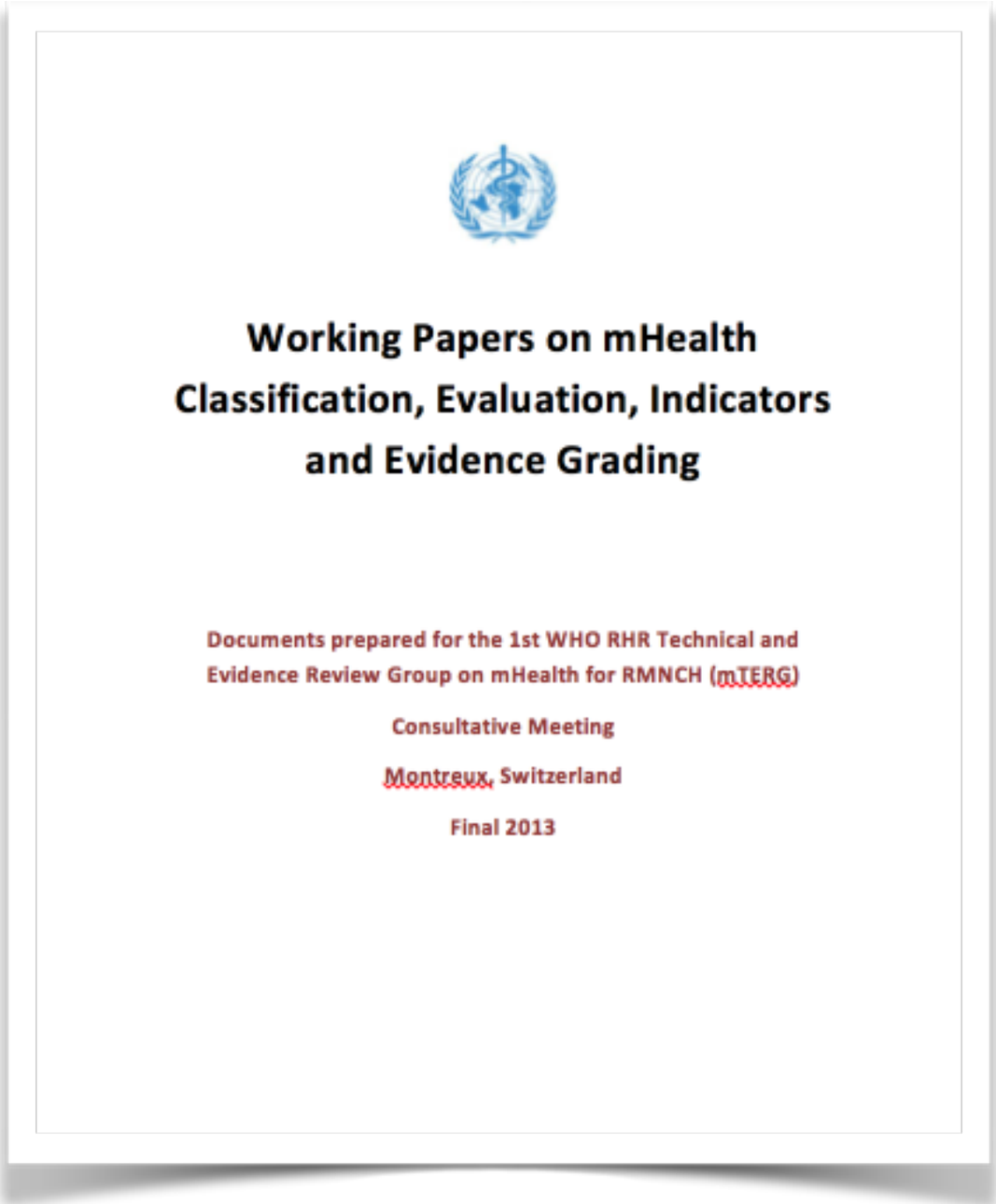
Bellagio Call to Action 2011

WHO mHealth Technical and Evidence Review Group

http://bit.ly/who-mterg

"Providing governments and implementing agencies objective, evidence-based guidance for the selection and scale of mHealth strategies across the reproductive, maternal, newborn and child health continuum"

WHO mTERG Focus



Working Papers on mHealth
Classification, Evaluation, Indicators
and Evidence Grading

Documents prepared for the 1st WHO RHR Technical and
Evidence Review Group on mHealth for RMNCH (mTERG)

Consultative Meeting

Montreux, Switzerland

Final 2013

Standardized Language to Describe mHealth

Classification Taxonomy

Criteria for describing Implementation and Evidence Grading Methods

Standardized Indicators on mHealth Maturity

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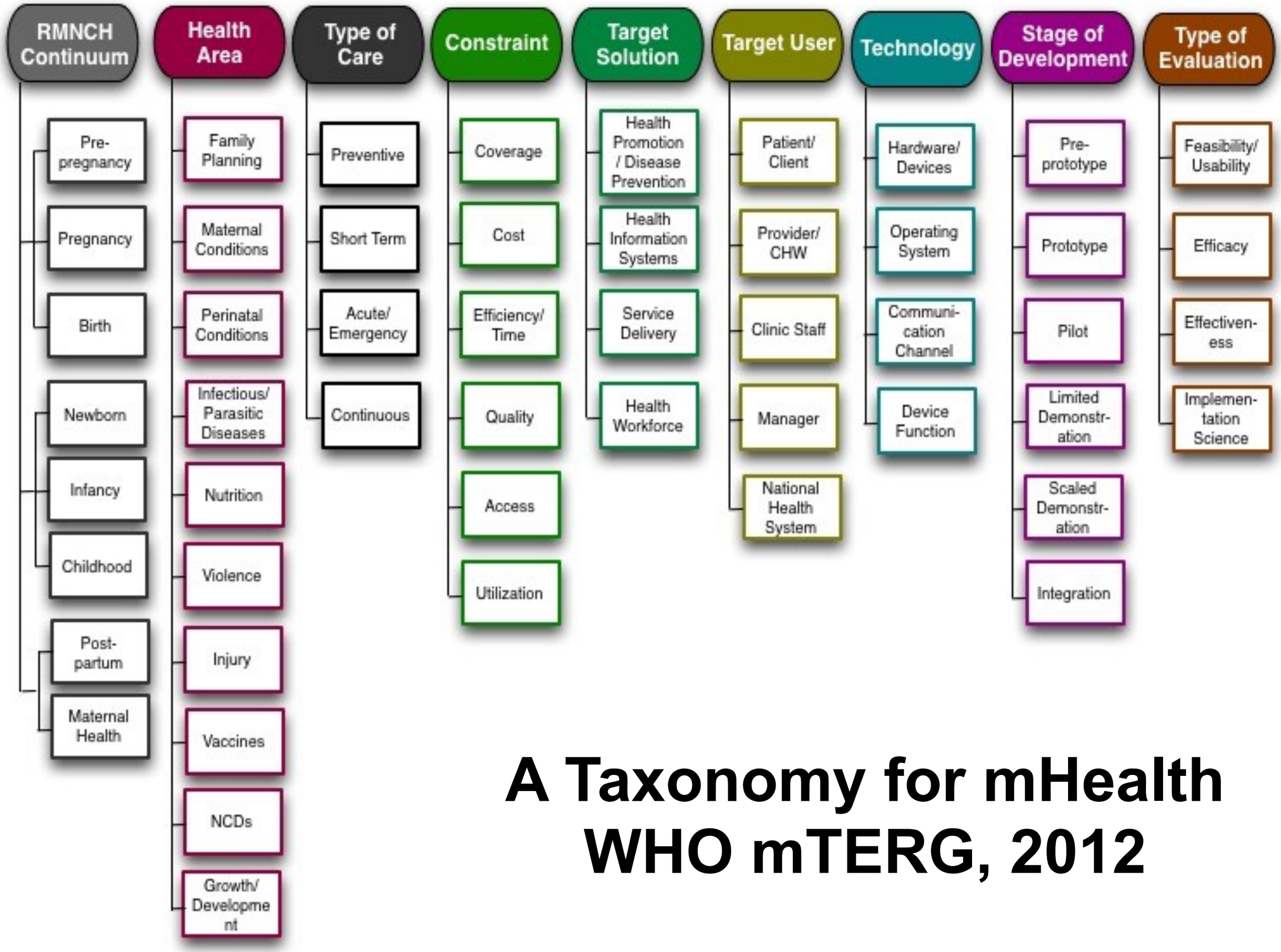
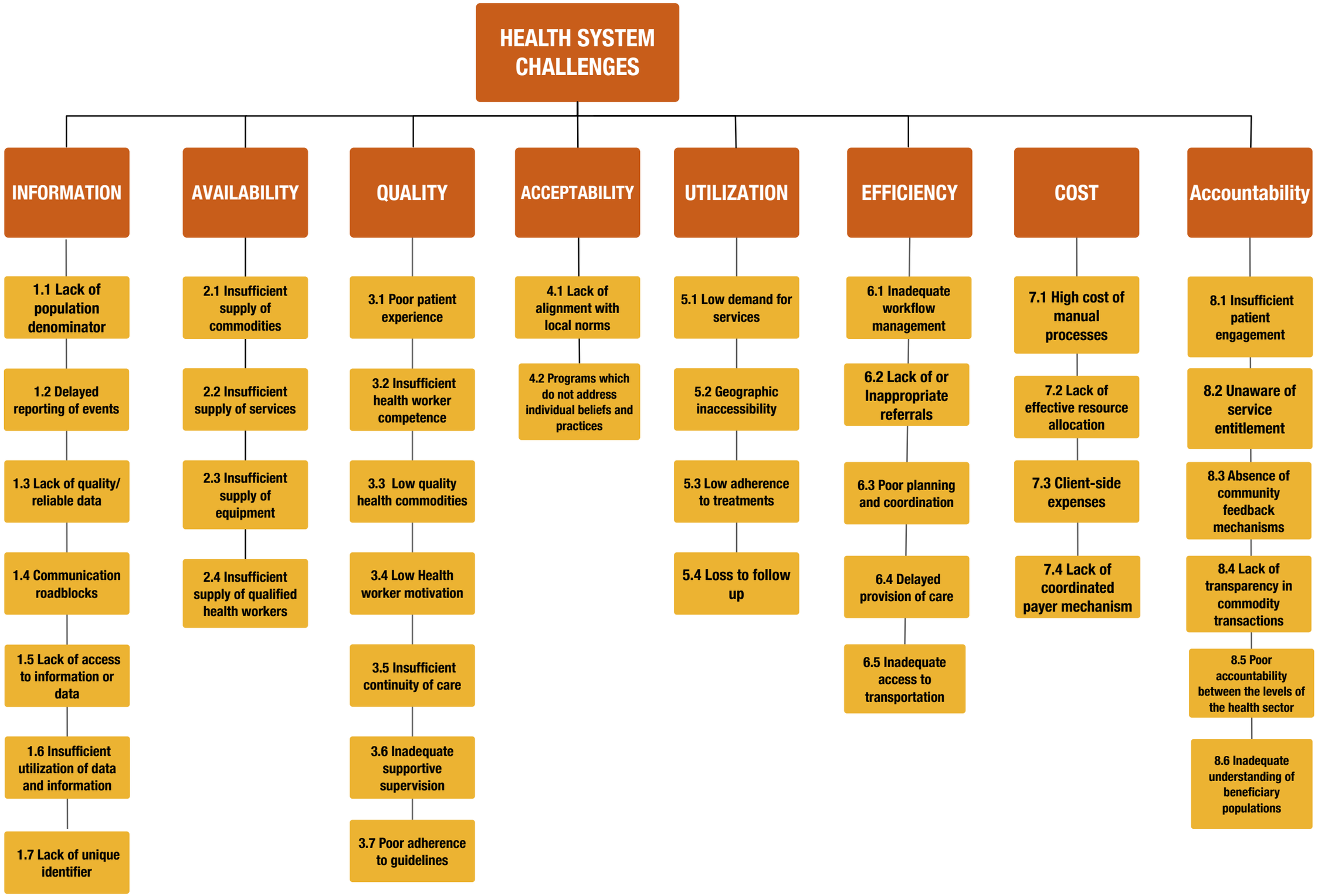


A Taxonomy for mHealth
WHO mTERG, 2012

Health System Challenges



mHealth strategies as catalysts for valid health interventions

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mHealth strategies as catalysts for valid health interventions

INTERVENTION OF KNOWN EFFICACY

QUALITY & COVERAGE OF HEALTH INTERVENTION

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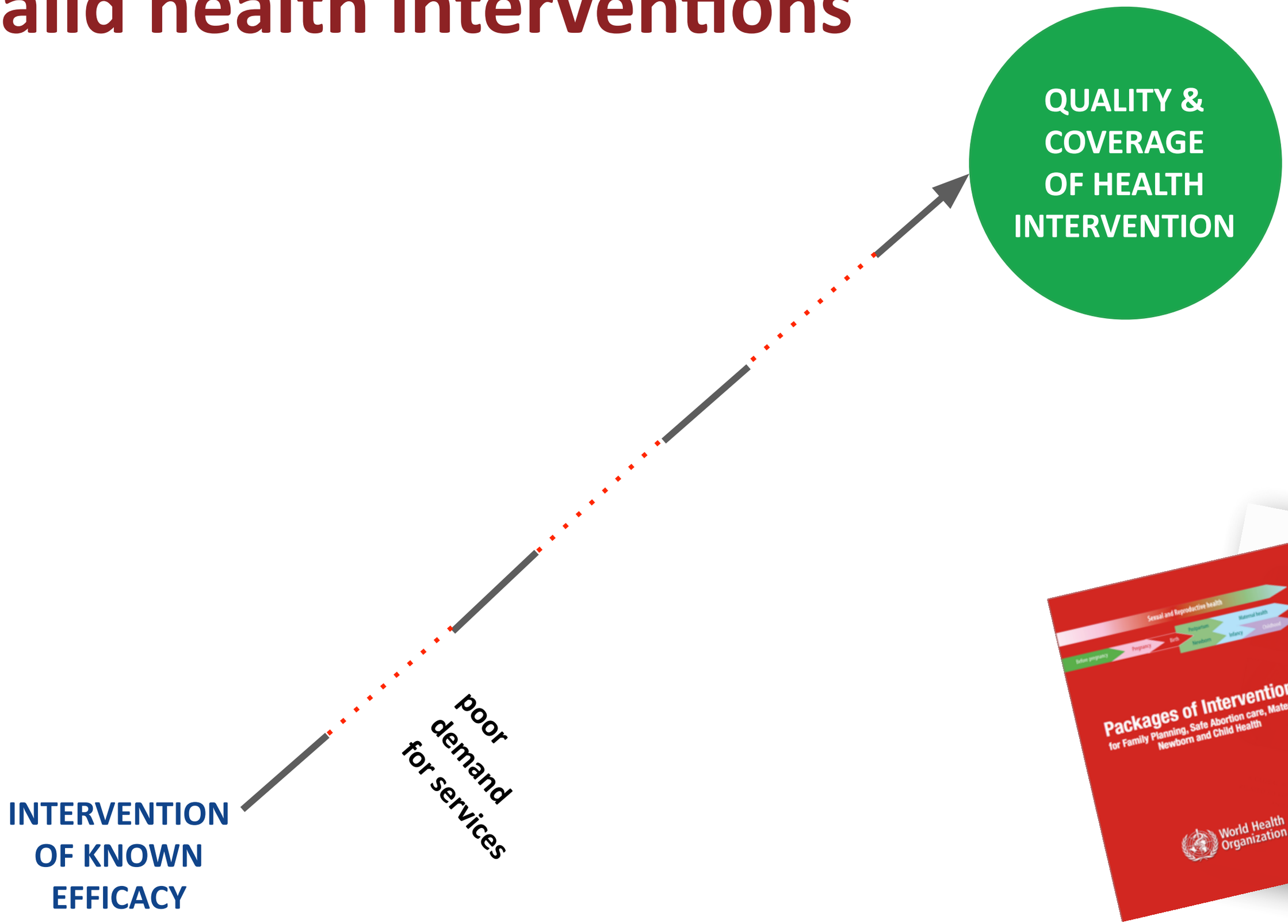

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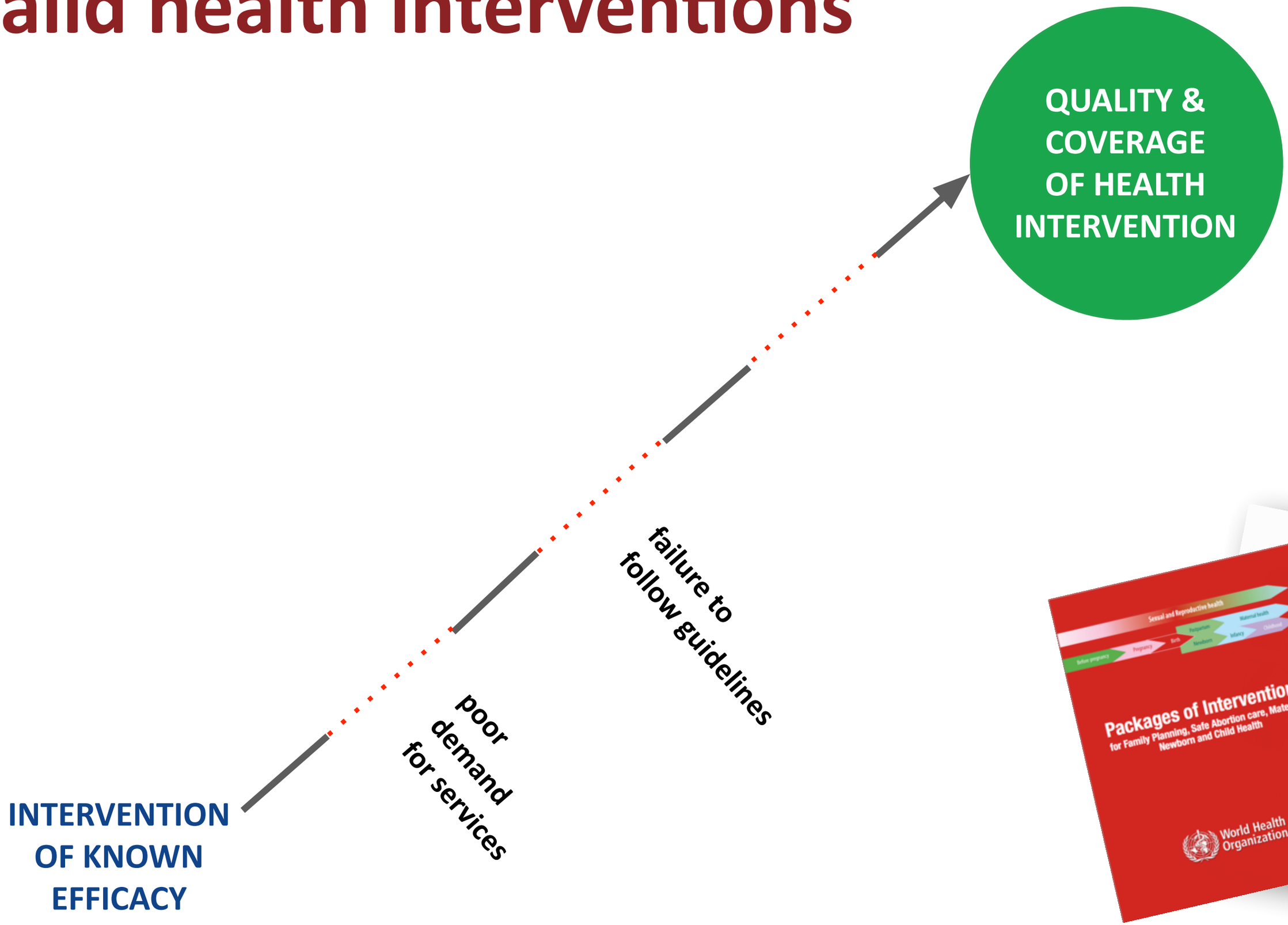

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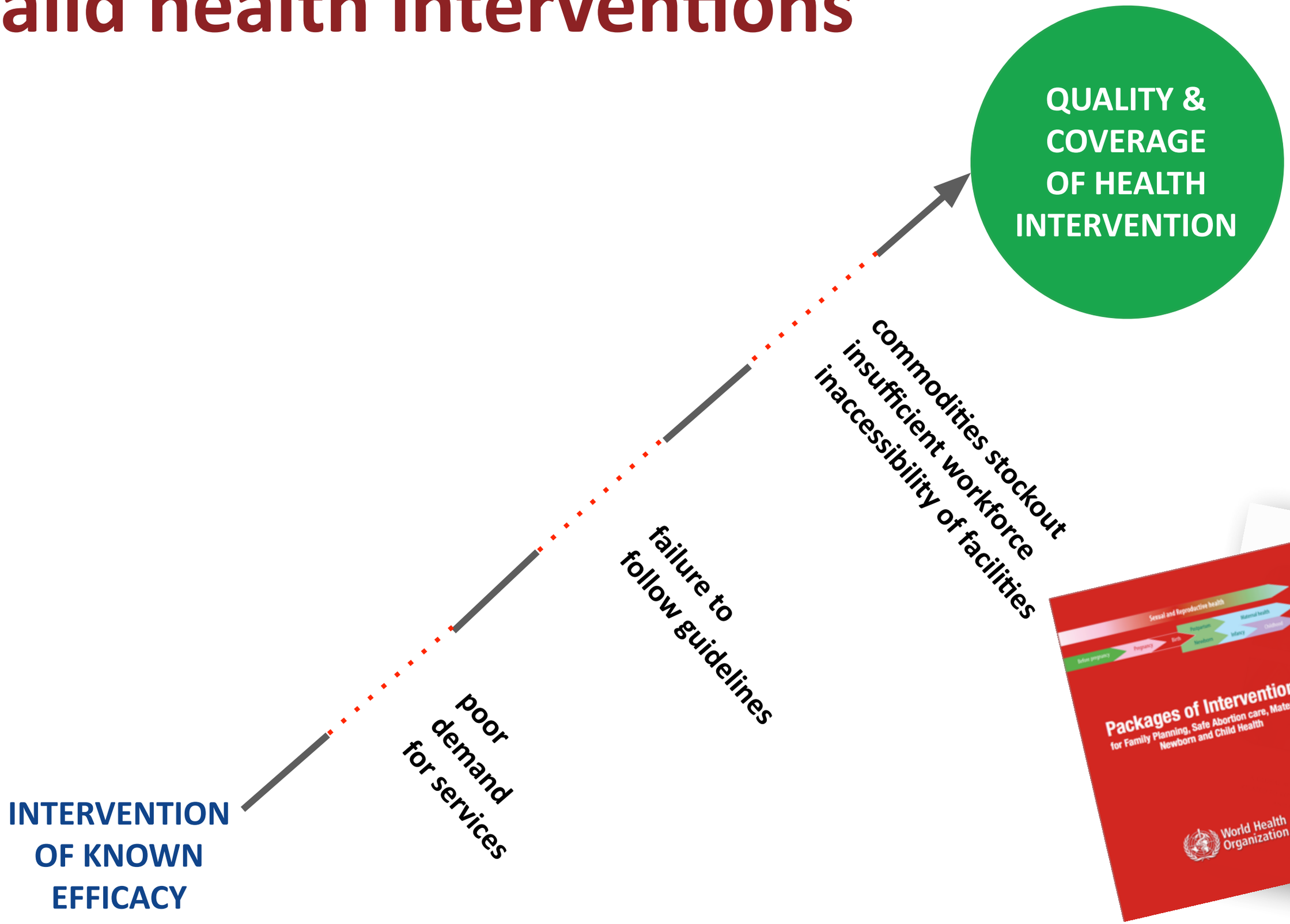

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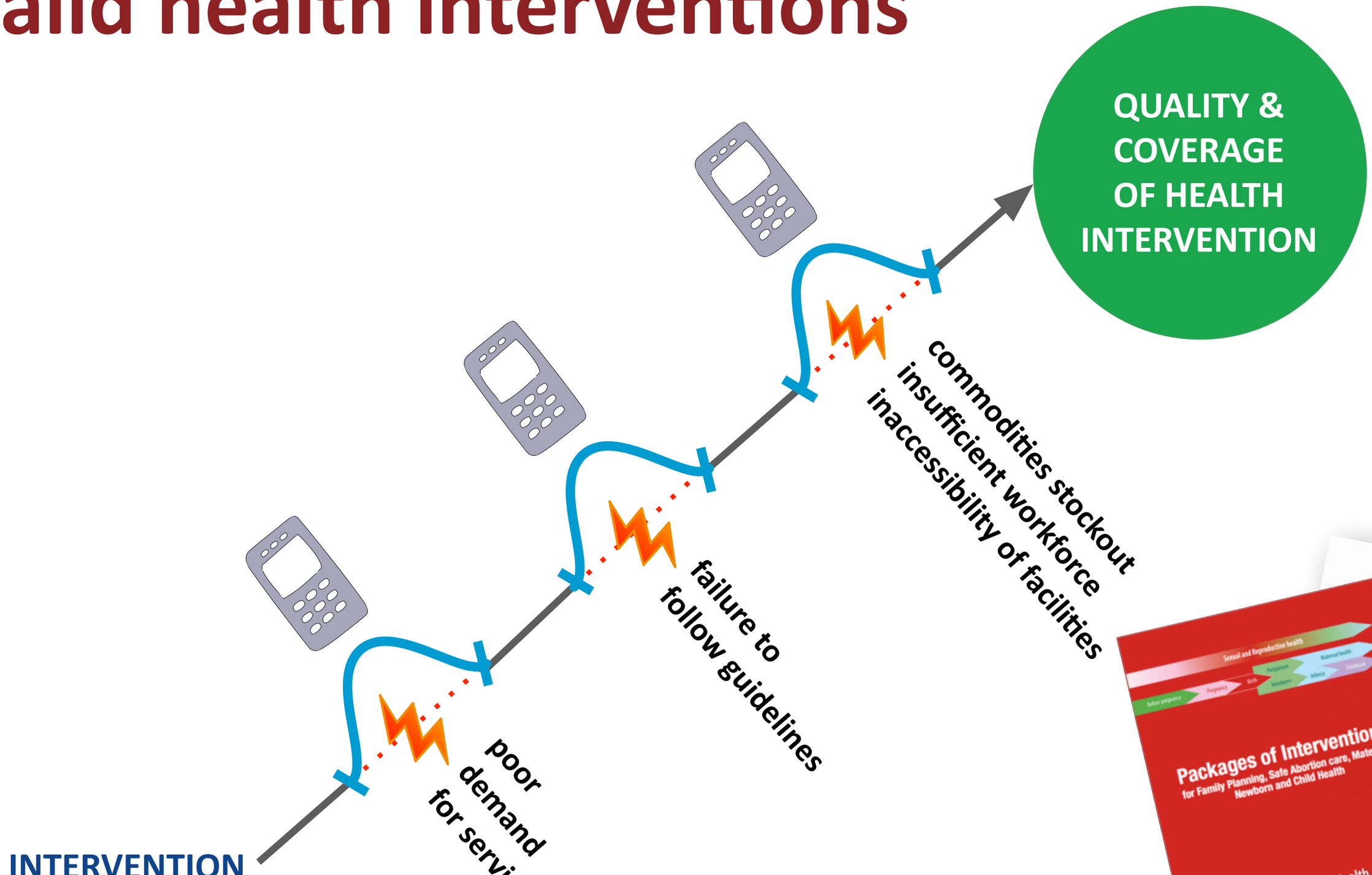

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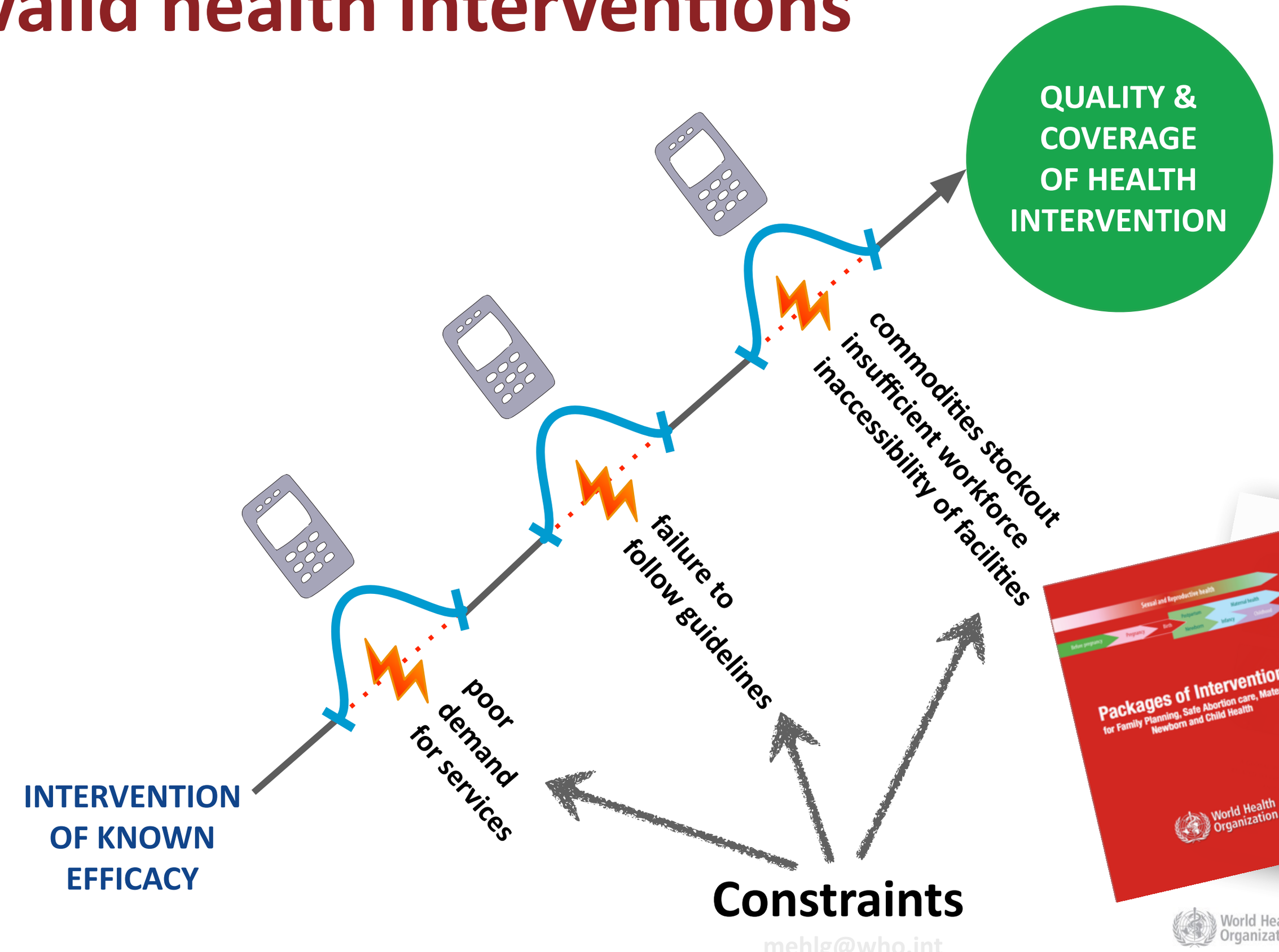

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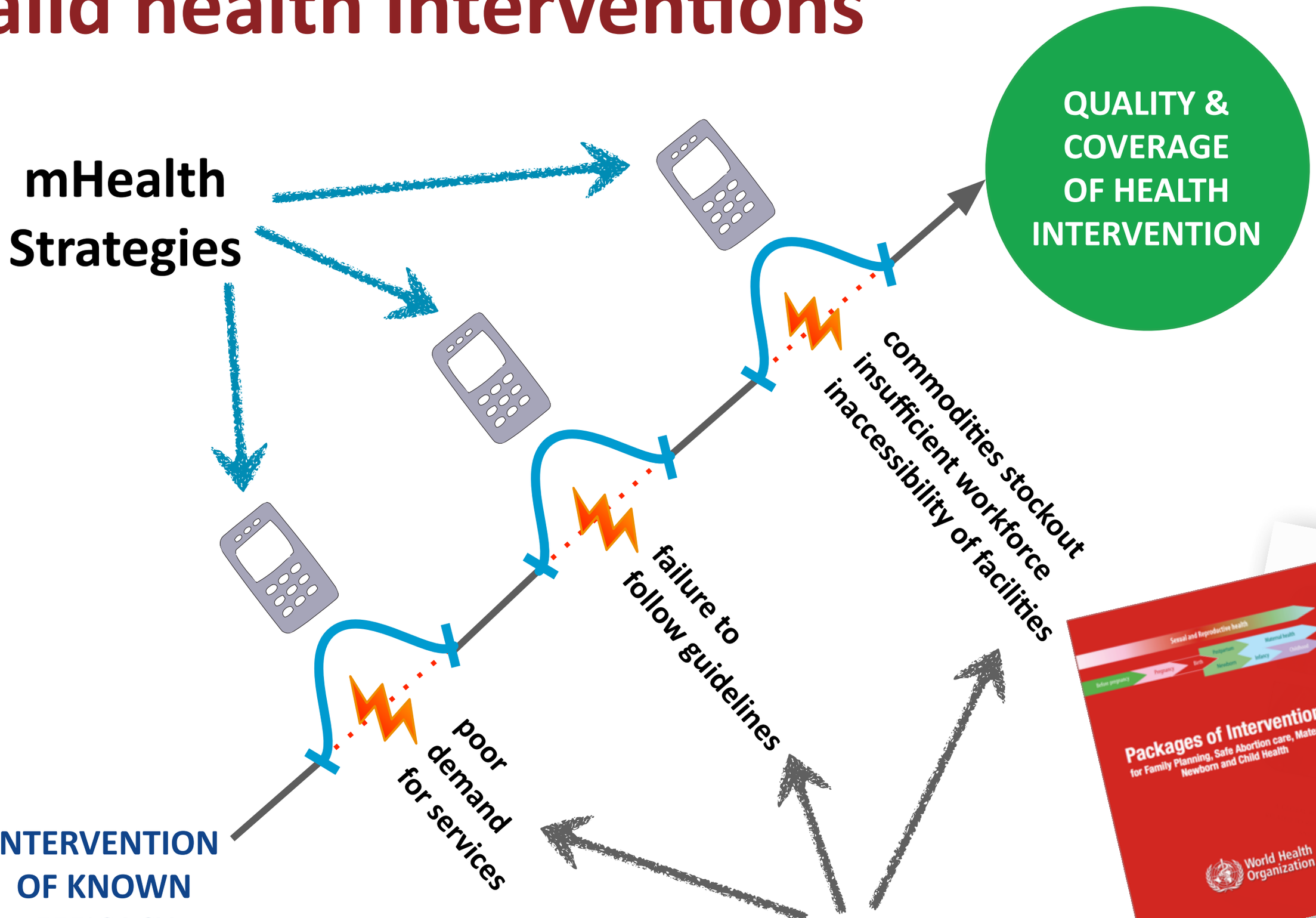

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mHealth Framework for Health Systems Strengthening

GLOBAL HEALTH: SCIENCE AND PRACTICE
Dedicated to what works in global health programs
OPEN ACCESS

TECHNICAL CONCEPT

mHealth innovations as health system strengthening tools: 12 common applications and a visual framework

Alain B Labrique,[a] Lavanya Vasudevan,[a] Erica Kochi,[b] Robert Fabricant,[c] Garrett Mehl[d]

This new framework lays out 12 common mHealth applications used as health systems strengthening innovations across the reproductive health continuum.

Glob Health Sci Pract Advance Access Article published on August 6, 2013 as doi: 10.9745/GHSP-D-13-00031

The rapid proliferation of mHealth projects—albeit mainly pilot efforts—has generated considerable enthusiasm among governments, donors, and implementers of health programs.[1] In many instances, these pilot projects have demonstrated conceptually how mHealth can alleviate specific health system constraints that hinder effective coverage of health interventions.

Large-scale implementation or integration of these mHealth innovations into health programs has been limited, however, by a shortage of empirical evidence supporting their value in terms of cost, performance, and health outcomes.[1–4] Governments in low- and middle-income countries face numerous challenges and competing priorities, impeding their ability to adopt innovations.[2] Thus, they need robust, credible evidence about mHealth projects in order to consider mHealth alongside essential health interventions, and guidance about which mHealth solutions they should consider to achieve broader health system goals.[2] Their tolerance for system instability or failure can be low, even when the status quo may be equally, or more, unreliable.

Current larger-scale effectiveness and implementation research initiatives are working to address the evidence gaps and to demonstrate the impact of mHealth investments on health system targets.[1] Other efforts are underway to synthesize such findings.[5]

MHEALTH AS A HEALTH SYSTEMS STRENGTHENING TOOL

Recent mHealth reviews have proposed that innovators focus on the public health principles underlying mHealth initiatives, rather than on specific mHealth technologies.[6] International agencies and research organizations have also endeavored to frame mHealth interventions within the broader context of health system goals or health outcomes.[2] The term "health system" includes all activities in which the primary purpose is to promote, restore, or maintain health.[7] Some elements of a framework for evaluating health systems performance by relating the goals of the health system to its essential functions have been proposed previously, which we believe can serve as a model for articulating and justifying mHealth initiatives and investments.[7]

Applying a health systems lens to the evaluation of mHealth initiatives requires different indicators and methodologies, shifting the assessment from whether the mHealth initiative "works" to process evaluation or proxy indicators of the health outcome(s) of interest. This new way of thinking would facilitate selection of mHealth tools that are appropriate for identified challenges. In other words, it would drive people to first identify the key obstacles, or constraints, to delivering proven health interventions effectively, and to then apply appropriate mHealth strategies that could overcome these health system constraints.[8]

Presenting mHealth as a range of tools for overcoming known health system constraints, as a health systems "catalyst," may also improve communication between mHealth innovators and health program implementers. Communicating mHealth technologies as tools that can enhance delivery of life-saving interventions through improvements in health systems performance, such as coverage, quality, equity, or efficiency, will resonate with health decision-makers.[7]

Hence, rather than being perceived as siloed, stand-alone solutions, mHealth strategies should be viewed as integrable systems that should fit into existing health system functions and complement the health

[a] Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[b] United Nations Children's Fund (UNICEF), New York City, NY, USA
[c] frog Design, New York City, NY, USA
[d] World Health Organization, Geneva, Switzerland
Correspondence to Garrett Mehl (mehlg@who.int).

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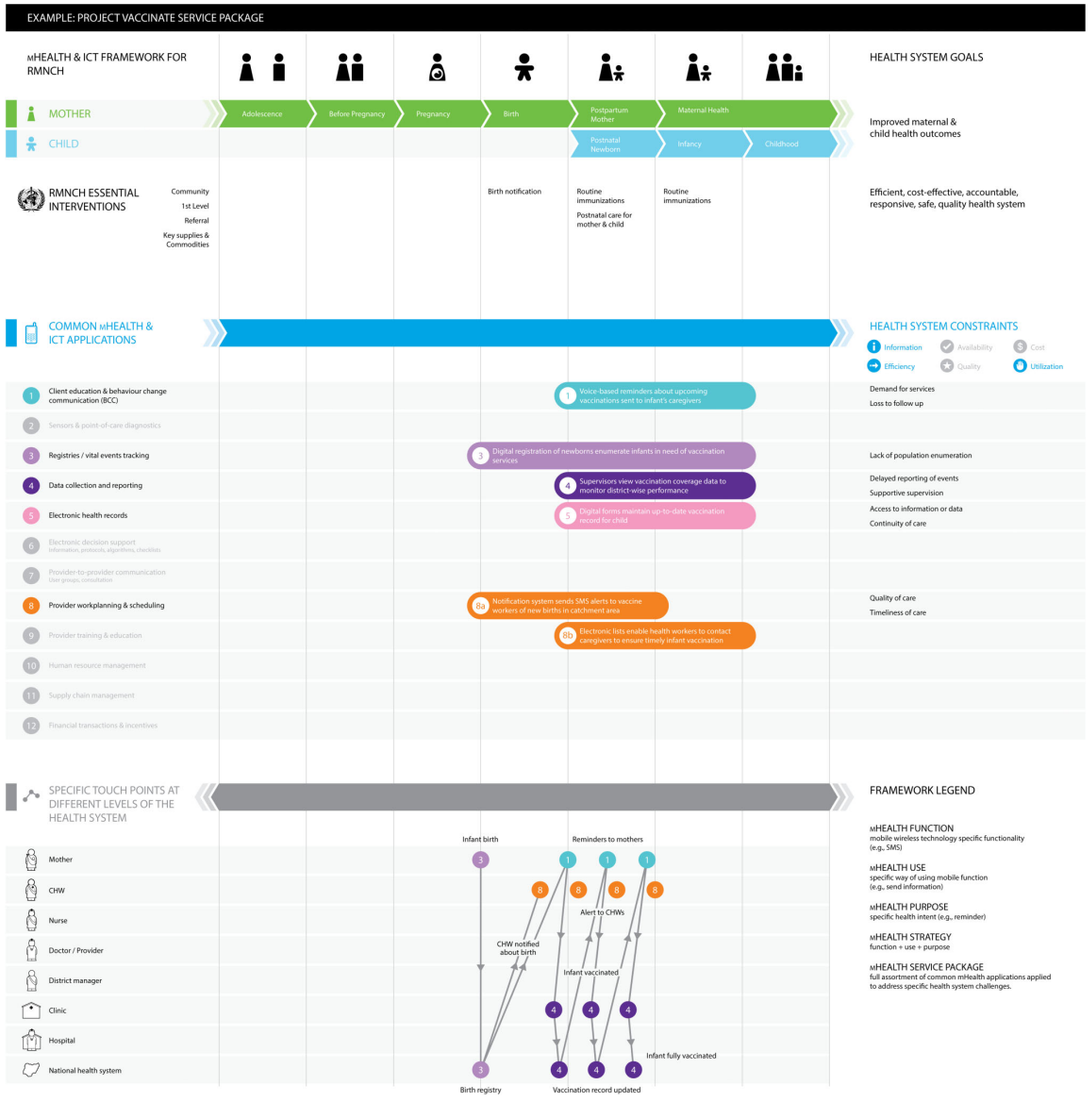
FIGURE 3. Sample Application of the mHealth and ICT Framework for RMNCH



Abbreviations: CHW, community health worker; ICT, information and communications technology; RMNCH, reproductive, maternal, newborn, and child health.

The fictional "Project Vaccinate" is an mHealth system that integrates 6 of the 12 common mHealth applications to identify newborns and support families and community health workers in ensuring timely and complete vaccination.

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mHealth Framework for Health Systems Strengthening

FIGURE 3. Sample Application of the mHealth and ICT Framework for RMNCH

FIGURE 2. Twelve Common mHealth and ICT Applications

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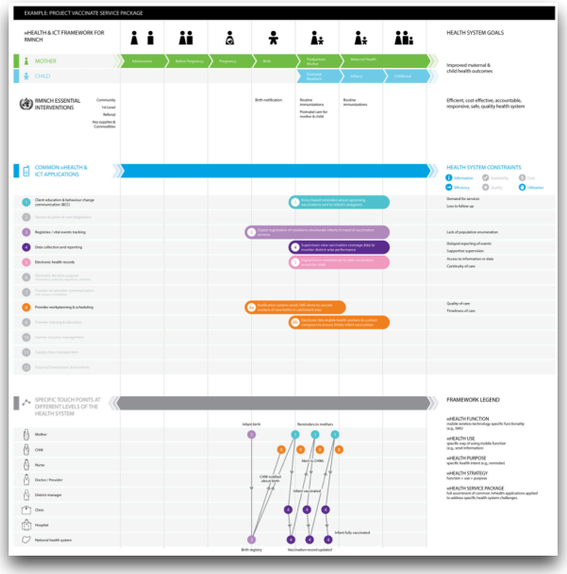
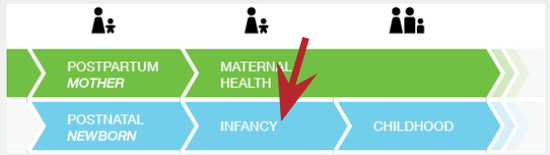
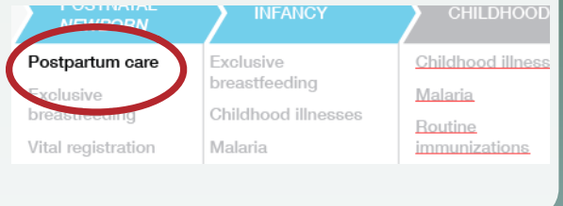
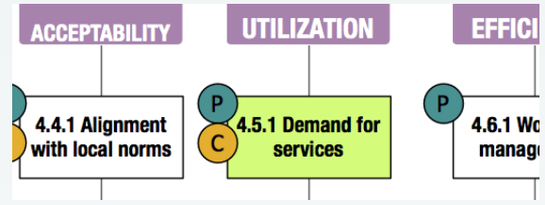
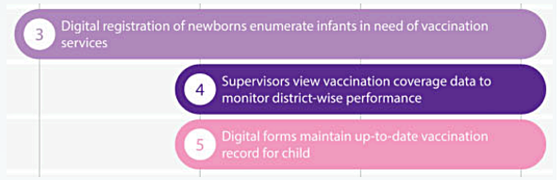
Framework for Health Systems Strengthening Components

WHO mHealth and ICT framework for RMNCH



Questions	Illustrative Options	Example	Visual on Framework
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
What Health Interventions are being enhanced?	Malaria treatment PMTCT, breastfeeding, micronutrient supplementation, tobacco cessation	Postpartum care	
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
Where does mHealth implementation engage actors (facilities, providers, clients)?	Home, PHC, district facility, client, provider, laboratory, national health information system	SMS reminder message about upcoming appointment is sent to client's phone	

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Framework for Health Systems Strengthening Components

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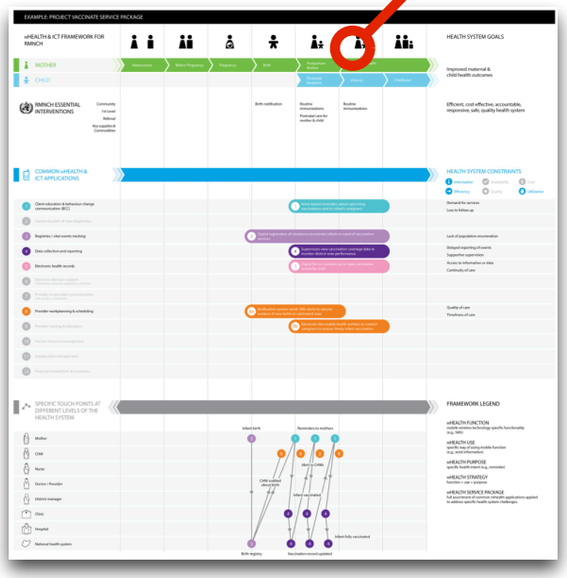

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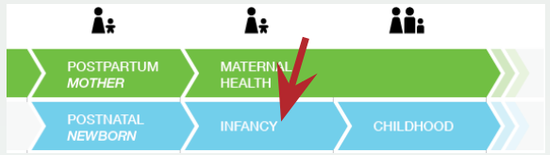
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
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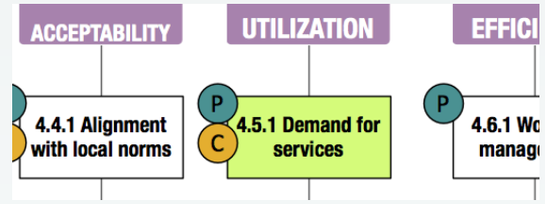
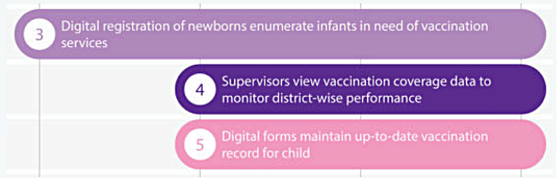
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
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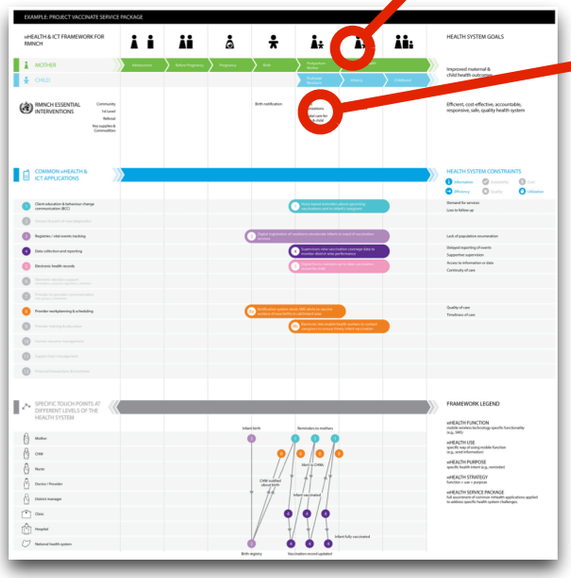

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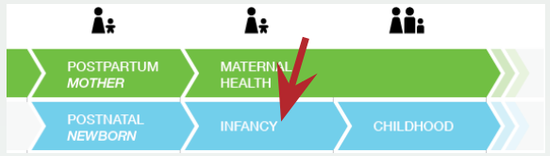
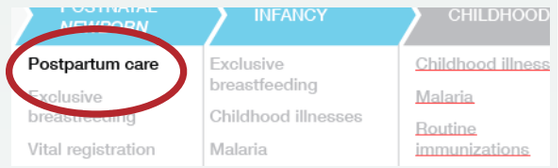
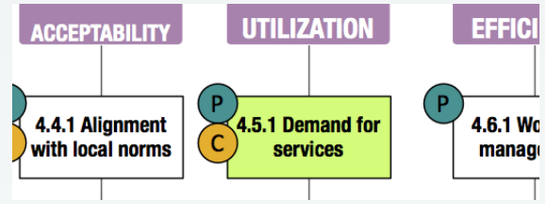
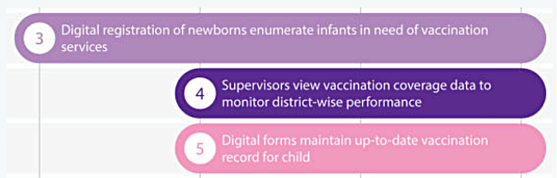
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
What Health Interventions are being enhanced?	Malaria treatment PMTCT, breastfeeding, micronutrient supplementation, tobacco cessation	Postpartum care	
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
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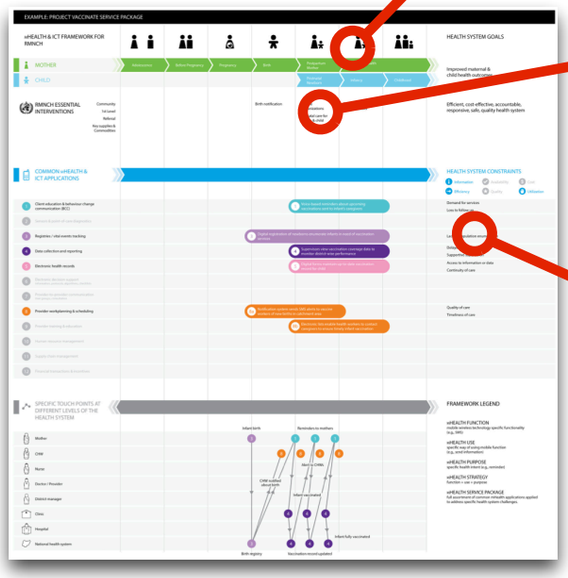

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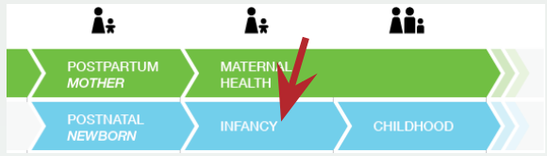
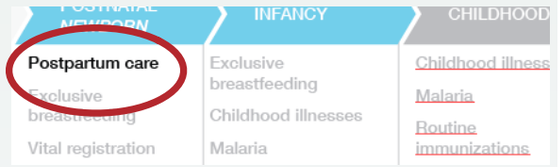
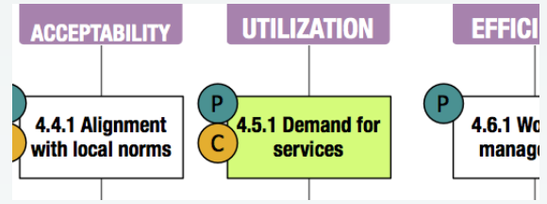
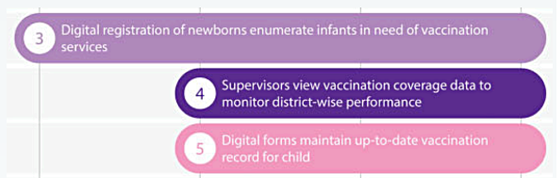
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
What Health Interventions are being enhanced?	Malaria treatment PMTCT, breastfeeding, micronutrient supplementation, tobacco cessation	Postpartum care	
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
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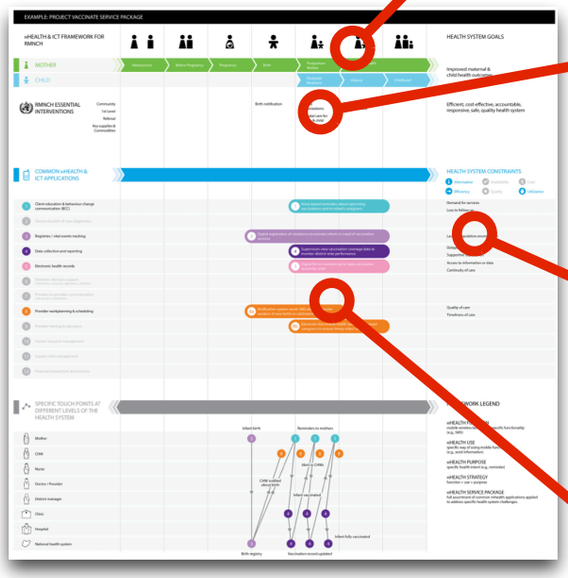

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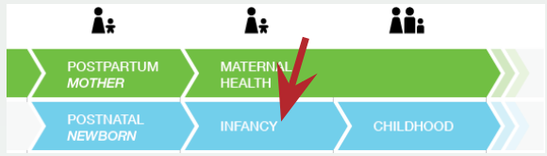
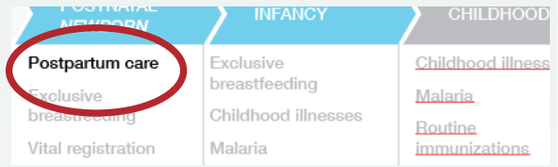
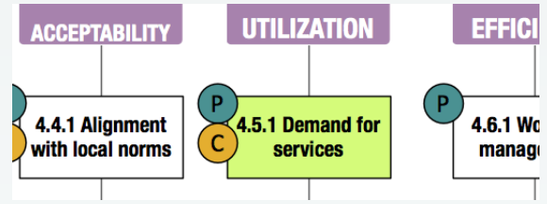
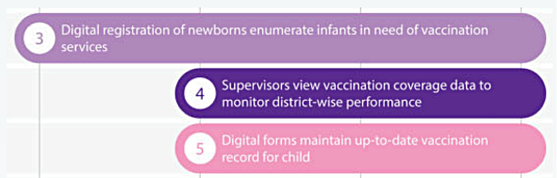
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
What Health Interventions are being enhanced?	Malaria treatment PMTCT, breastfeeding, micronutrient supplementation, tobacco cessation	Postpartum care	
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
Where does mHealth implementation engage actors (facilities, providers, clients)?	Home, PHC, district facility, client, provider, laboratory, national health information system	SMS reminder message about upcoming appointment is sent to client's phone	

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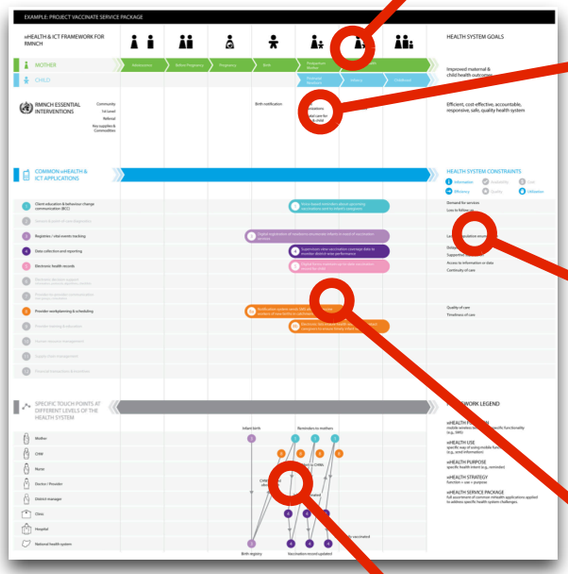
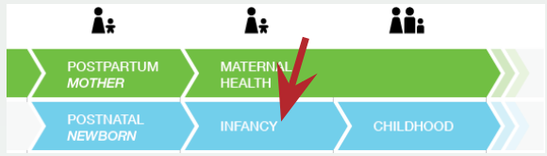
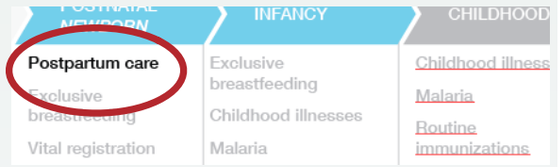
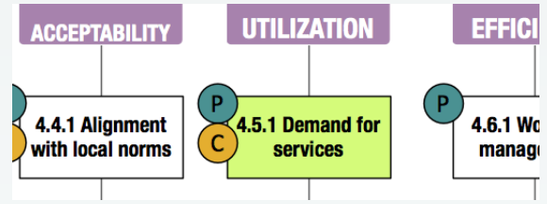
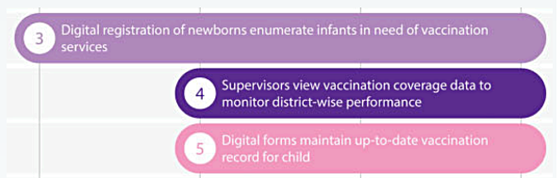
Framework for Health Systems Strengthening Components

WHO mHealth and ICT framework for RMNCH



Questions	Illustrative Options	Example	Visual on Framework
When is mHealth applied along the life course?	Adolescence Pregnancy Birth Childhood	During infancy	
What Health Interventions are being enhanced?	Malaria treatment PMTCT, breastfeeding, micronutrient supplementation, tobacco cessation	Postpartum care	
Which health constraint(s) are being overcome?	Geographic inaccessibility, poor demand for services, client-side expenses	Low Demand for Services	
How is mHealth applied (technology function, use, purpose)?	Client education and behavior change, sensors and point of care diagnostics	SMS reminder messages about upcoming vaccinations	
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mHealth Evidence
by K4Health

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What is mHealth Evidence?

mHealth is the use of mobile information and communication technologies for improving health. It can be used for a wide range of purposes, including health promotion and illness prevention, health care delivery, training and supervision, electronic payments, and information systems. Many believe that it has the potential to shift the paradigm on when, where, how and by whom health services are provided and accessed.

But mHealth is a young field and much of the evidence on "what works" is still emerging. Even the evidence that exists can sometimes be difficult to find.

BROWSE MHEALTH EVIDENCE TOPICS

- Beneficiary Age Range
- Care Model
- Health Domain
- Health System Constraint
- Location
- mHealth Application
- Special Population
- Stage of Development
- Stage of Evaluation
- Target User
- Technology

VIEW MOST RECENT RECORDS

- Temporal motifs reveal homophily, gender-specific patterns, and group talk in call sequences.
- Tobacco smoking surveillance: is quota sampling an efficient tool for monitoring national trends? A comparison with a random cross-sectional survey.
- Mobile Phone-based Syndromic Surveillance System, Papua New Guinea.
- Design and Test of a Hybrid Foot Force Sensing and GPS System for Richer User Mobility Activity Recognition.
- Mobile phone tracking: in support of modelling traffic-

mHealthEvidence.org

Guidelines for reporting of health interventions using mobile phones: mobile health (mHealth) evidence reporting and assessment (mERA) checklist

Smisha Agarwal,[1,2,3] Amnesty E LeFevre,[1,2] Jaime Lee,[1,2] Kelly L'Engle,[4,5] Garrett Mehl,[6] Chaitali Sinha,[7] Alain Labrique[1,2] for the WHO mHealth Technical Evidence Review Group

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Accepted: 09 February 2016

To improve the completeness of reporting of mobile health (mHealth) interventions, the WHO mHealth Technical Evidence Review Group developed the mHealth evidence reporting and assessment (mERA) checklist. The development process for mERA consisted of convening an expert group to recommend an appropriate approach, convening a global expert review panel for checklist development, and pilot testing the checklist. The guiding principle for the development of these criteria was to identify a minimum set of information needed to define what the mHealth intervention is (content), where it is being implemented (context), and how it was implemented (technical features), to support replication of the intervention. This paper presents the resulting 16 item checklist and a detailed explanation and elaboration for each item, with illustrative reporting examples. Through widespread adoption, we expect that the use of these guidelines will standardise the quality of mHealth evidence reporting, and indirectly improve the quality of mHealth evidence.

SUMMARY POINTS

To improve the reporting of mobile health (mHealth) interventions, the WHO mHealth Technical Evidence Review Group developed a checklist on mHealth evidence reporting and assessment (mERA)

The checklist aims to identify a minimum set of information needed to define what the mHealth intervention is (content), where it is being implemented (context), and how it was implemented (technical features), to support replication of the intervention

Through widespread adoption, these guidelines should standardise the quality of mHealth evidence reporting, and indirectly improve the quality of mHealth evidence

Mobile technologies have the potential to bridge systemic gaps needed to improve access to and use of health services, particularly among underserved populations. mHealth—defined as the use of mobile and wireless technologies for health—aims to capitalise on the rapid uptake of information and communication technologies (ICT) to improve health system efficiency and health outcomes. Over the past decade, global enthusiasm and the interest of development agencies, researchers, and policy makers have led to the rapid proliferation of mHealth solutions throughout developed and developing countries. The World Bank reported that there were more than 500 mHealth projects in 2011 alone.[1] Despite the emergence of hundreds of mHealth studies and initiatives, there remains a lack of rigorous, high quality evidence on the efficacy and effectiveness of such interventions.[2,3] The current mHealth evidence is disseminated in multiple forms including peer reviewed literature, white papers, reports, presentations, and blogs. The evidence base is heterogenous in quality, completeness, and objectivity of the reporting of mHealth interventions—thus making comparisons across intervention strategies difficult. This has led to a call for a set of standards that can harmonise and improve the quality of future research publications, to facilitate screening of emerging evidence and identification of critical evidence gaps. Such improvements in reporting of evidence can support policy makers in making decisions around mHealth intervention selection.[4]

The value of standardised guidelines is well accepted and several tools exist to assess the quality and to standardise the reporting of scientific evidence. For example, the grading of recommendations assessment, development, and evaluation (GRADE) approach rates the quality of evidence and the strength of recommendations, and is routinely used by international organisations such as the World Health Organization and Cochrane Collaboration.[5] In other fields, the consolidated health economic evaluation reporting standards (CHEERS) statement provides reporting guidance for economic evaluations.[6] Other tools have also been developed to standardise the reporting of systematic reviews and meta-analyses (eg, preferred reporting of systematic reviews and meta-analyses (PRISMA)),[7] and assess their methodological quality or reliability (eg, assessing methodological quality of systematic reviews (AMSTAR)).[8] The consolidated standards for reporting trials (CONSORT) statement provides a 22 item checklist for reporting of randomised controlled trials.[9] Other evidence reporting and synthesis approaches exist for

mERA:

mHealth Evaluation, Reporting and Assessment Guidelines

mERA:

mHealth Evaluation, Reporting and Assessment Guidelines

WHO mTERG complement to PRISMA / CONSORT

A pragmatic approach that promotes high-quality reporting of mHealth innovation research, across varied study designs to facilitate evidence synthesis and development of guidance

- **Domain 1: Research Methodology Reporting**
- **Domain 2: Essential mHealth (Technology, Functionality, Delivery) Reporting**

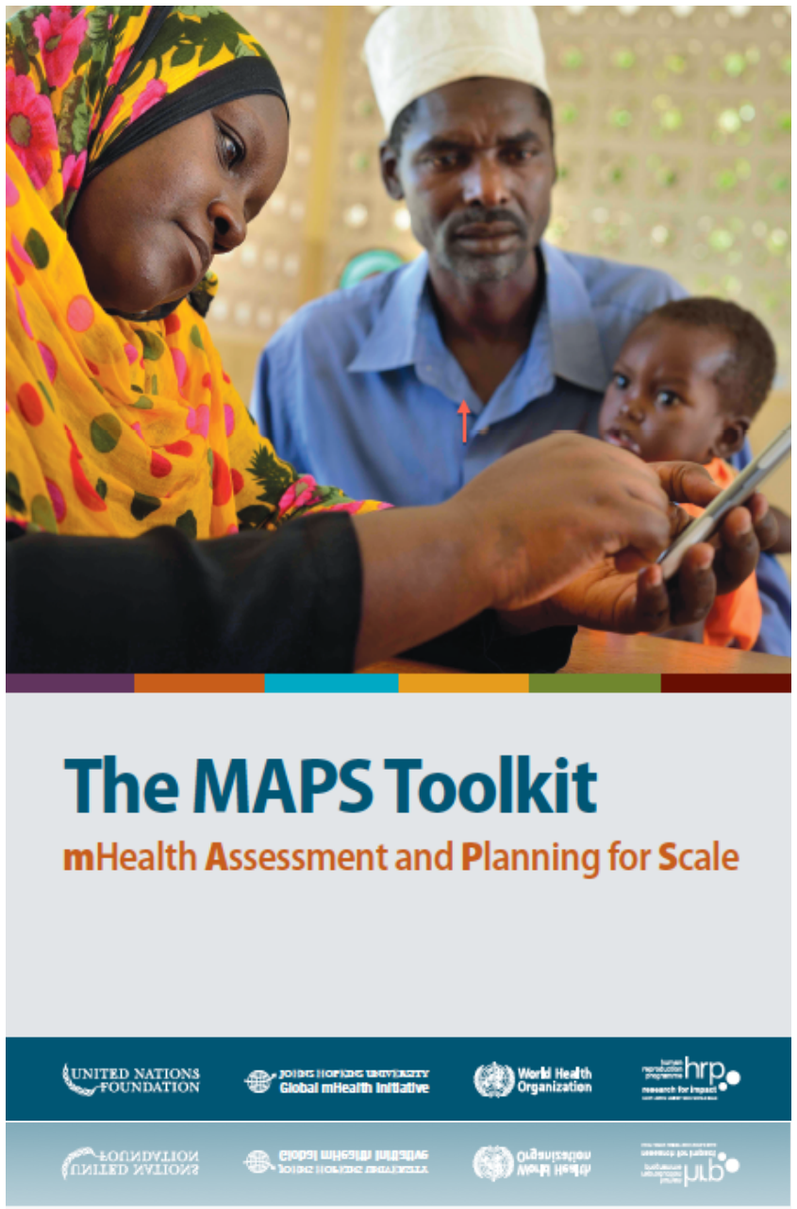
Domain	Description	No.
Domain 1.1	General Reporting and Methodology Criteria	23
Domain 1.2	Quantitative Criteria	4
Domain 1.3	Qualitative Criteria	3
Domain 2	mHealth Criteria	14

M&E for digital health

A pragmatic workbook to assist with monitoring and evaluation of digital health interventions

World Health Organization
human reproduction programme hrp research for impact
JOHNS HOPKINS UNIVERSITY Global mHealth Initiative
UNITED NATIONS FOUNDATION

mHealth Assessment and Planning for Scale (MAPS) toolkit for Maturity Assessment

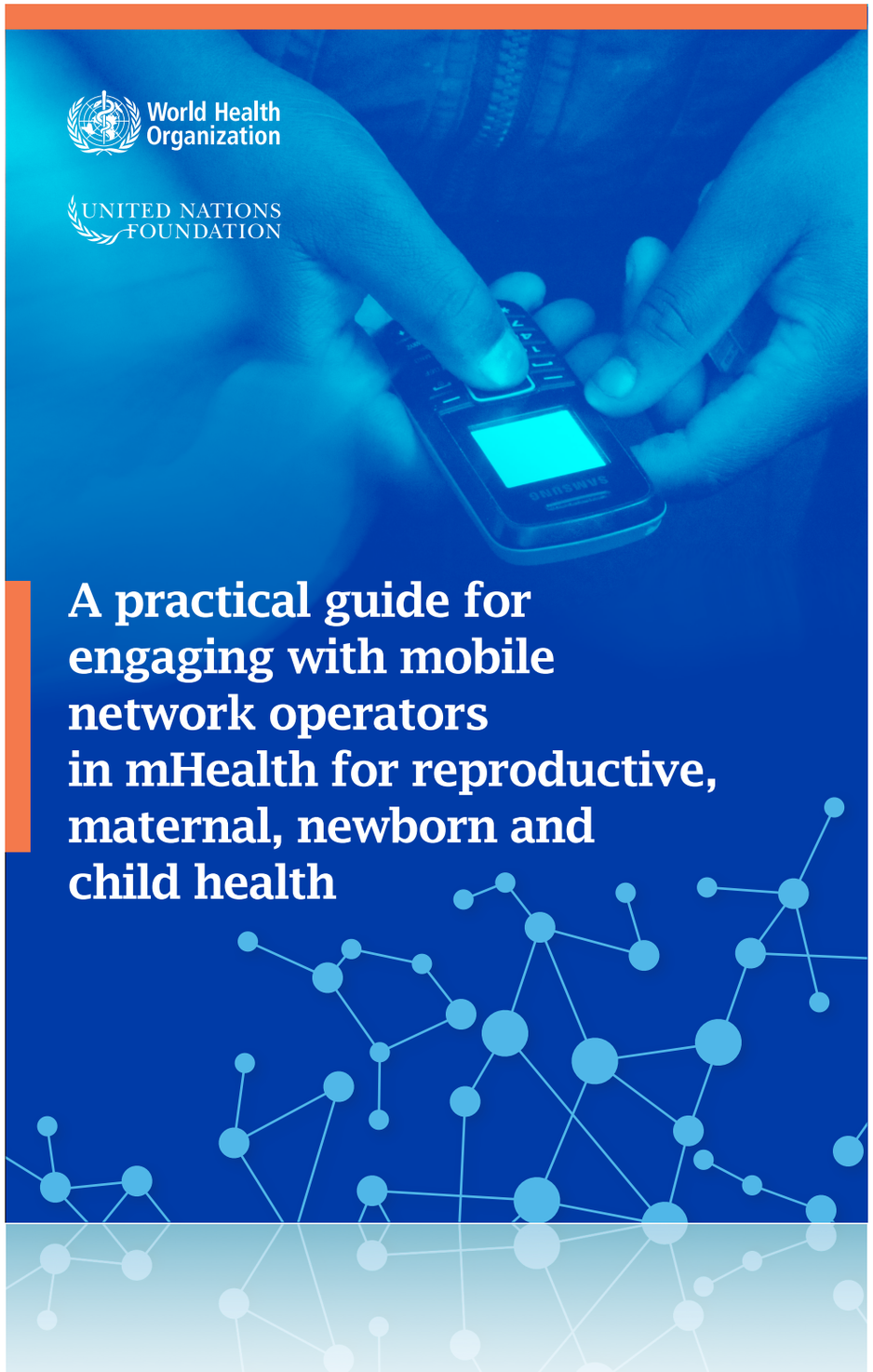


- MAPS provides **actionable information** to improve mHealth projects' capacity to scale up

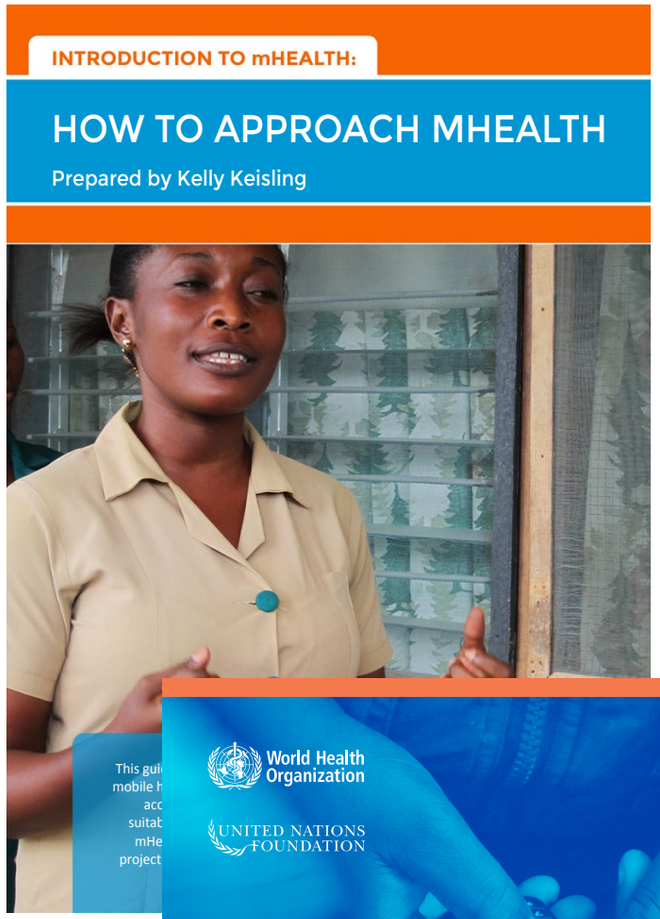
- Informed by WHO, UN IWG Catalytic Grant Mechanism for mHealth projects

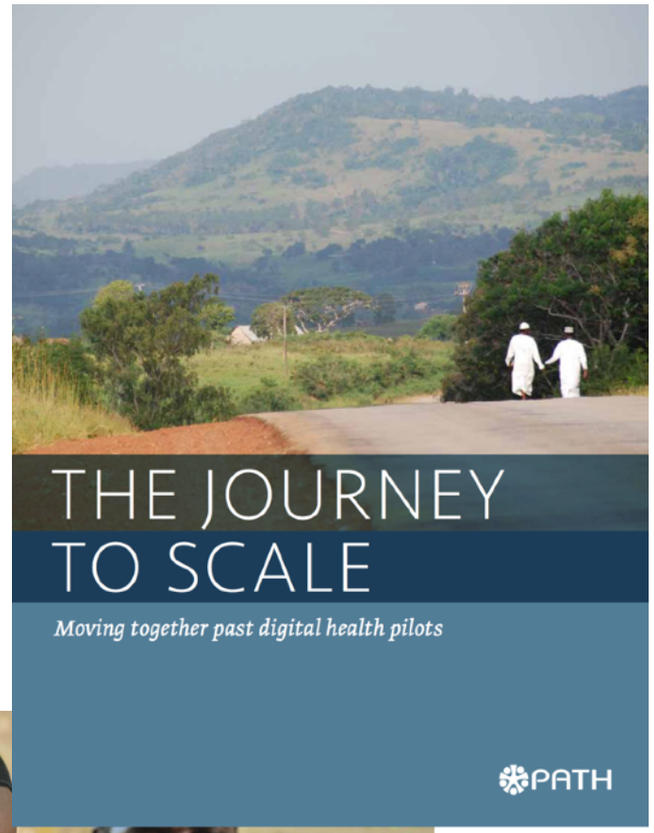
- MAPS has **two main goals**:
  1. Assess Maturity
  2. Plan

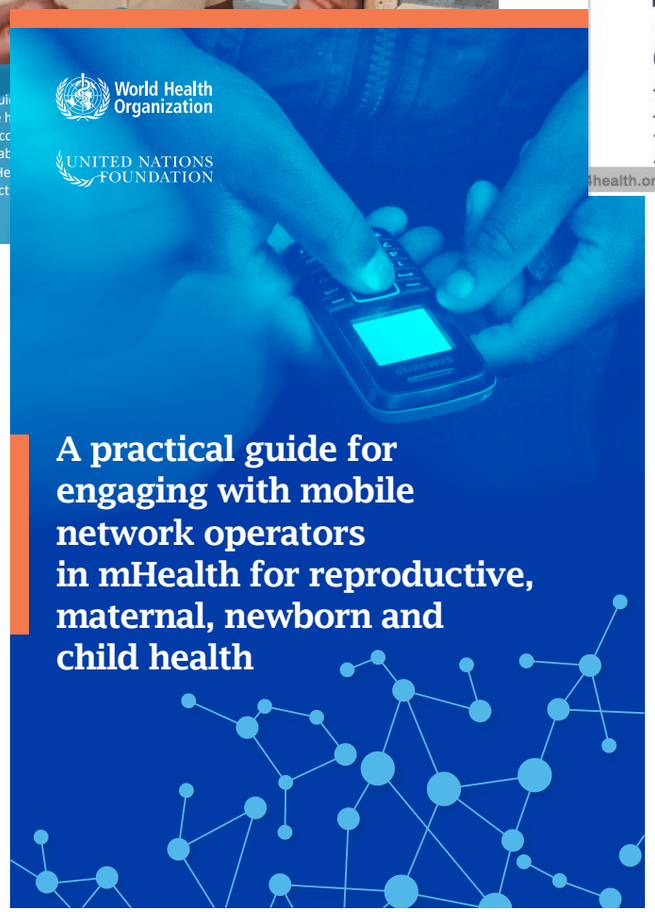
Practical Engagement with mobile network operators (MNOs)

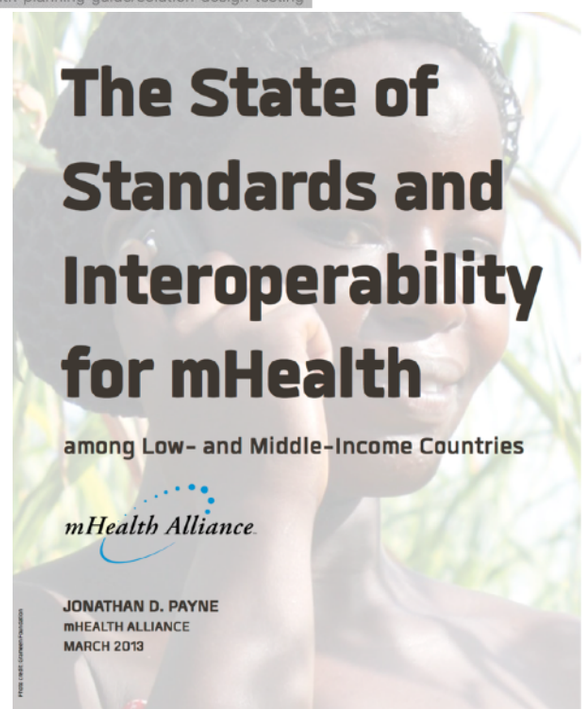


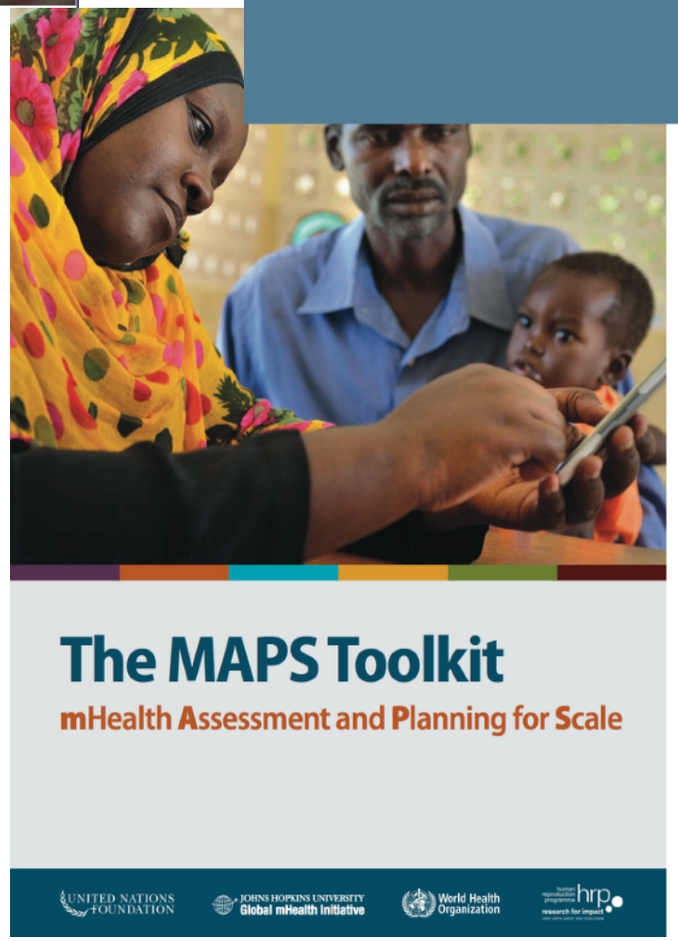
Ecosystem of Project Toolkits











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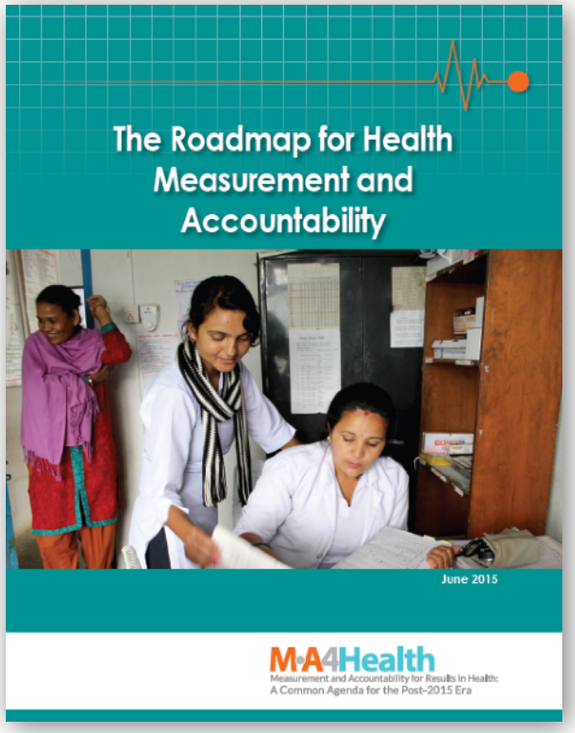
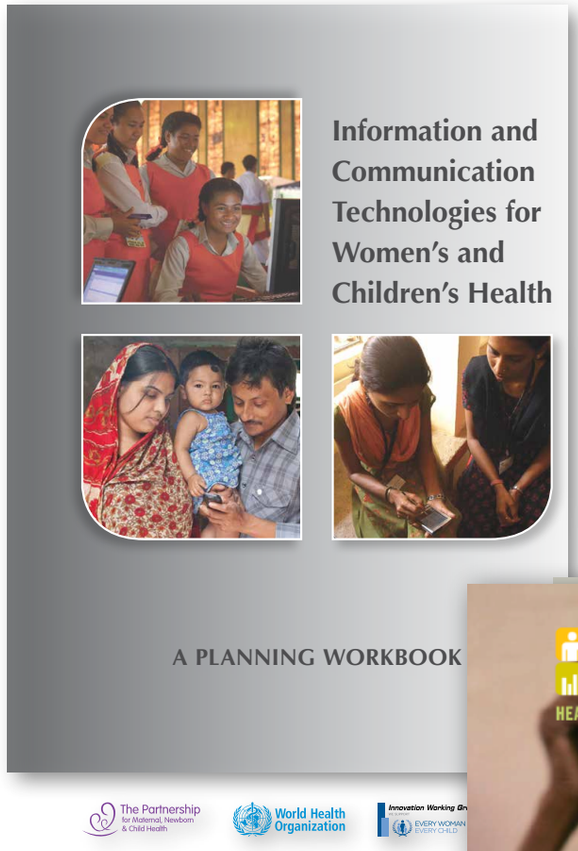
Government Guidance





Garrett Mehl: mehlg@who.int

WHO is now focused on:

- **Digital Health Classifications (2017)**
- **Digital Health Atlas (2017)**
- Guidelines on Digital Health (evidence-based recommendations) - 2018
- Government Implementation and Financing Guide - 2018

Linking questions to resources

World Health Organization

Linking questions to resources

Common question	Resource
How can I describe the digital system in a consistent way?	**WHO Digital Health Classification:** Provide consistent language to describe functionality
How can I use digital health to address a problem? **Is there any evidence that a digital health Intervention works?**	**WHO Digital Health Guidelines:** Provide evidence-based recommendations on the effectiveness of digital health interventions to inform decisions and country investment plans.
How do I know what projects/ investments already exist in the country?	**Digital Health Atlas:** Web-based inventory to curate information on digital health investments for mapping, monitoring, and planning needs.
How do I implement digital health?	**WHO-PATH Implementation and Financing Toolkit:** Provides operational guidance on how to prioritize, plan, and finance digital interventions in the country-context.

CLASSIFICATION OF DIGITAL HEALTH INTERVENTIONS V1.0

A shared language to describe the uses of digital technology for health

December, 2017

1.0 CLIENTS

1.1 TARGETED CLIENT COMMUNICATION
- 1.1.1 Transmit health event alerts to specific population group(s)
- 1.1.2 Transmit targeted health information to client based on health status or demographics
- 1.1.3 Transmit targeted alerts and reminders to client(s)
- 1.1.4 Transmit diagnostics result, or availability of result, to clients

1.2 UNTARGETED CLIENT COMMUNICATION
- 1.2.1 Transmit untargeted health information to an undefined population
- 1.2.2 Transmit untargeted health event alerts to undefined group

1.3 CLIENT TO CLIENT COMMUNICATION
- 1.3.1 Peer group for clients

1.4 PERSONAL HEALTH TRACKING
- 1.4.1 Access by client to own medical records
- 1.4.2 Self monitoring of health or diagnostic data by client
- 1.4.3 Active data capture/ documentation by client

1.5 CITIZEN BASED REPORTING
- 1.5.1 Reporting of health system feedback by clients
- 1.5.2 Reporting of public health events by client

1.6 ON-DEMAND INFORMATION SERVICES TO CLIENT
- 1.6.1 Client look-up of health information

1.7 CLIENT FINANCIAL TRANSACTIONS
- 1.7.1 Transmit or manage out-of-pocket payments by client
- 1.7.2 Transmit or manage vouchers to client for health services
- 1.7.3 Transmit or manage incentives to clients for health services

2.0 HEALTHCARE PROVIDERS

2.1 CLIENT IDENTIFICATION AND REGISTRATION
- 2.1.1 Verify client unique identity
- 2.1.2 Enrol client for health services/clinical care plan

2.2 CLIENT HEALTH RECORDS
- 2.2.1 Longitudinal tracking of client's health status and services received
- 2.2.2 Manage client's structured clinical records
- 2.2.3 Manage client's unstructured clinical records
- 2.2.4 Routine health indicator data collection and management

2.3 HEALTHCARE PROVIDER DECISION SUPPORT
- 2.3.1 Provide prompts and alerts based according to protocol
- 2.3.2 Provide checklist according to protocol
- 2.3.3 Screen clients by risk or other health status

2.4 TELEMEDICINE
- 2.4.1 Consultations between remote client and healthcare provider
- 2.4.2 Remote monitoring of client health or diagnostic data by provider
- 2.4.3 Transmission of medical data 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
- 2.5.2 Communication and performance feedback to healthcare provider
- 2.5.3 Transmit routine news and workflow notifications to healthcare provider(s)
- 2.5.4 Transmit non-routine health event alerts to healthcare providers
- 2.5.5 Peer group for healthcare providers

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

2.7 HEALTH WORKER ACTIVITY PLANNING AND SCHEDULING
- 2.7.1 Schedule clients appointments based on clinical care plan
- 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

2.9 PRESCRIPTION AND MEDICATION MANAGEMENT
- 2.9.1 Transmit or track prescription orders
- 2.9.2 Track client's medication consumption
- 2.9.3 Report adverse drug effects

2.10 LABORATORY AND DIAGNOSTICS IMAGING MANANGEMENT
- 2.10.1 Transmit 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

3.0 SYSTEM MANAGERS

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 certification/ registration of healthcare provider(s)
- 3.1.4 Record training credentials of healthcare provider(s)

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
- 3.2.4 Register licensed drugs and health commodities
- 3.2.5 Manage procurement of commodities
- 3.2.6 Report counterfeit or substandard drugs by clients

3.3 PUBLIC HEALTH EVENT NOTIFICATION
- 3.3.1 Notification of public health events from point of diagnosis

3.4 CIVIL REGISTRATION AND VITAL STATISTIC
- 3.4.1 Notify birth event
- 3.4.2 Register birth event
- 3.4.3 Certify birth event
- 3.4.4 Notify death event
- 3.4.5 Register death event
- 3.4.6 Certify death event

3.5 HEALTH FINANCING
- 3.5.1 Register and verify client insurance membership
- 3.5.2 Track insurance billing and claims submission
- 3.5.3 Track and manage insurance reimbursement
- 3.5.4 Transmit routine payroll payment to healthcare provider(s)
- 3.5.5 Transmit or manage incentives to healthcare provider(s)
- 3.5.6 Manage budget and expenditures

3.6 EQUIPMENT AND ASSET MANAGEMENT
- 3.6.1 Monitor status 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

4.0 DATA SERVICES

4.1 DATA COLLECTION, MANAGEMENT, AND USE
- 4.1.1 Non-routine data collection and management
- 4.1.2 Data storage and aggregation
- 4.1.3 Data synthesis and visualization
- 4.1.4 Automated analysis of data to generate new information or predictions on future events

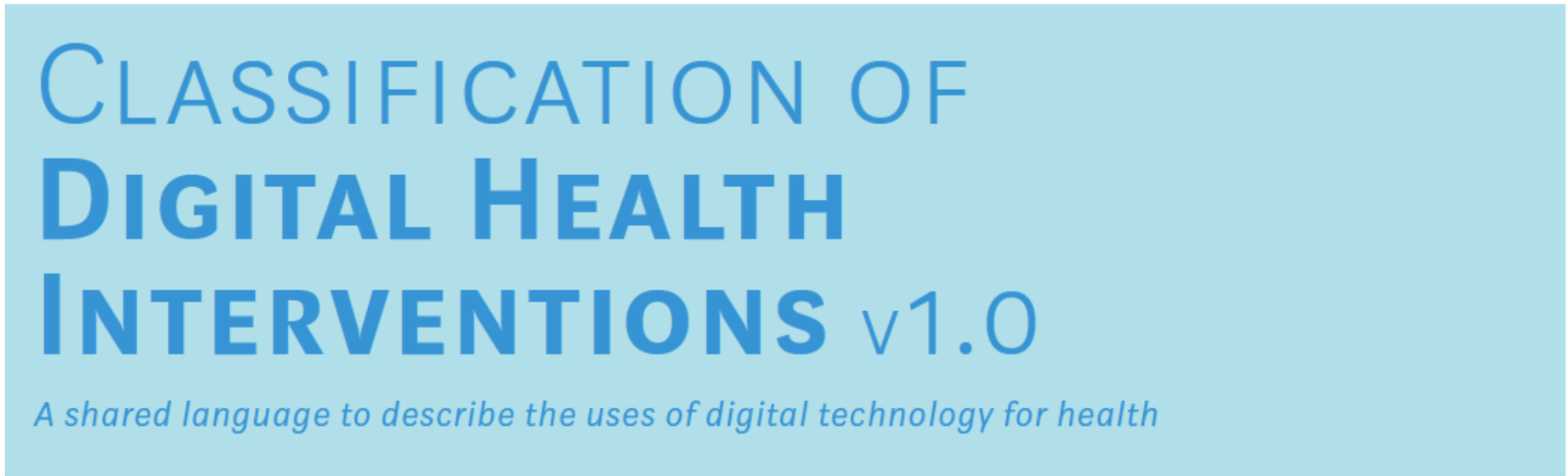
4.2 DATA CODING
- 4.2.1 Parse unstructured data into structured data
- 4.2.2 Merge, de-duplicate, and curate coded datasets or terminologies
- 4.2.3 Classify disease codes

4.3 LOCATION MAPPING
- 4.3.1 Map location of health facilities/structures
- 4.3.2 Map location of health events
- 4.3.3 Map location of clients and households
- 4.3.4 Map location of healthcare provider(s)

4.4 DATA EXCHANGE AND INTEROPERABILITY
- 4.4.1 Data exchange across systems

Shared language is foundational…

- Standardized "**classifications**" used across resources for **inventory**, formulating **WHO recommendations**, and **implementation guidance**



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2.0 Healthcare Providers

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2.2 Client health records

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2.3 Healthcare provider decision support

2.3.1	Provide prompts and alerts based according to protocol
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2.3.3	Screen clients by risk or other health status

2.4 Telemedicine

2.4.1	Consultations between remote client and healthcare provider
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2.6 Referral coordination

2.6.1	Coordinate emergency response and transport
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2.6.3	Manage referrals between health and other sectors

2.7 Health worker activity planning and scheduling

2.7.1	Identify clients 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

2.9 Prescription and medication management

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3.7 FACILITY MANAGEMENT

3.7.1	List health facilities and related information
3.7.2	Assess health facilities

4.0 DATA SERVICES

4.1	DATA COLLECTION, MANAGEMENT, AND USE
4.1.1	Non routine data collection and management
4.1.2	Data storage and aggregation
4.1.3	Data synthesis and visualization
4.1.4	Automated analysis of data to generate new information or predictions on future events

4.2	DATA CODING
4.2.1	Parse unstructured data into structured data
4.2.2	Merge, de-duplicate, and curate coded datasets or terminologies
4.2.3	Classify disease codes

4.3	LOCATION MAPPING
4.3.1	Map location of health facilities/structures
4.3.2	Map location of health events
4.3.3	Map location of clients and households
4.3.4	Map location of healthcare provider(s)

4.4	DATA EXCHANGE AND INTEROPERABILITY
4.4.1	Data exchange across systems

3.0 Health System Managers

Category	Interventions	Synonyms	Illustrative examples*
3.1 Human resource management Digital approaches to manage the health workforce, including the use of databases to record training levels, certifications, and identification of health workers.	3.1.1 List health workforce cadres and related identification information	- Health worker registry; provider registry - Documentation of healthcare providers' demographics, identification, health facility assignment, and other identifier information	**iHRIS Manage:** "... supports Ministry of Health and other service delivery organizations to track, manage, deploy, and map their health workforce." [24]
	3.1.2 Monitor performance of healthcare provider(s)	- Remote monitoring of healthcare providers - Workforce management - Audit and feedback - Supervision, supportive supervision - Clinical task tracking	**iCCM:** The application includes a "routine supervision checklist on few key indicators of performance by the Health Surveillance Assistants (HSAs)...and a dashboard that enables users to see at a glance the status of the work being done by HSA." [8] **Health Enablement and Learning Platform (HELP):** "Community Health Extension Workers (CHEWs)receive weekly reports on worker performance and are able to target those in need of additional support." [8] **mHealth for Community-Based Family Planning Services:** "A system for the field team to monitor data and provide feedback to CHWs on a weekly basis..." [8]
	3.1.3 Manage registration/ certification of healthcare provider(s)	- Management of health worker registration - Certification or licensure with regulatory authority such as a professional council	**iHRIS Qualify:** "...enables a licensing or certification authority, such as a nursing council, to track complete data on a health worker cadre from pre-service training through attrition. It captures information about health professionals in that cadre from the time they enter pre-service training through registration, certification, and/or licensure." [24]
	3.1.4 Record training information on healthcare provider(s)	- Track or manage preservice and/or in-service training received by a health worker	**iHRIS Train:** "Consolidates health worker training attendance and related data from several training organizations into a centralized database that can be queried and used to generate reports for further analysis." [24]
3.2 Supply chain management Digital approaches for monitoring and reporting stock levels, consumption and distribution of medical commodities. This can include the use of communication systems (e.g. SMS) and data dashboards to manage and report on supply levels of medical commodities.	3.2.1 Manage inventory and distribution of health commodities	- Stock monitoring of health commodities - Logistics management - Stock management - Commodity security	**International Quality Short Messaging System (IQSMS):** "Healthcare workers' send preformatted commodity reports on key HIV stock status to a central server via SMS. The tool enables districts to full order of all commodities as quantified by the system and based on what has been consumed." [8] **eLMIS Bangladesh:** "...electronic Logistics Management Information System (eLMIS) collects data on consumption and availability of FP commodities, which is consolidated and entered for [viewing on] an interactive dashboard." [8] **cStock:** "HSAs sent a toll-free SMS using their personal mobile phones reporting current stock levels and medicines received..." [8]
	3.2.2 Notify stock levels of health commodities	- Stockout prevention and monitoring - Alerts and notifications of stock levels - Restocking coordination	**iCCM:** "Health workers can report stock levels and then submitted the data to cStock, a program to improve the tracking of inventories..." [8] **cStock:** "... automatically calculated resupply quantities and notified staff at health centers, who check their stock levels and advise HSAs whether stock was available for pick up or alerted health facilities and district managers that there was insufficient stock."[8] **Informed Push Model:** "Logistics professionals enter logistics data into CommTrack on tablets at the moment of delivery and

Intervention	Synonyms	Illustrative examples
3.2.2 Notify stock levels of health commodities	-Stockout prevention and monitoring -Alerts and notifications of stock levels	• **cStock:** "... automatically calculates resupply quantities and notifies staff at health centers, who check their stock levels and advise HSAs on whether stock is available for pick up or alerts health facilities and district managers if there is insufficient stock."[8]

HEALTH SYSTEM CHALLENGES

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

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

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

ACCEPTABILITY

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

UTILIZATION

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

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

COST

- 7.1 High cost of manual processes
- 7.2 Lack of effective resource allocation
- 7.3 Client-side expenses
- 7.4 Lack of coordinated payer mechanism

Accountability

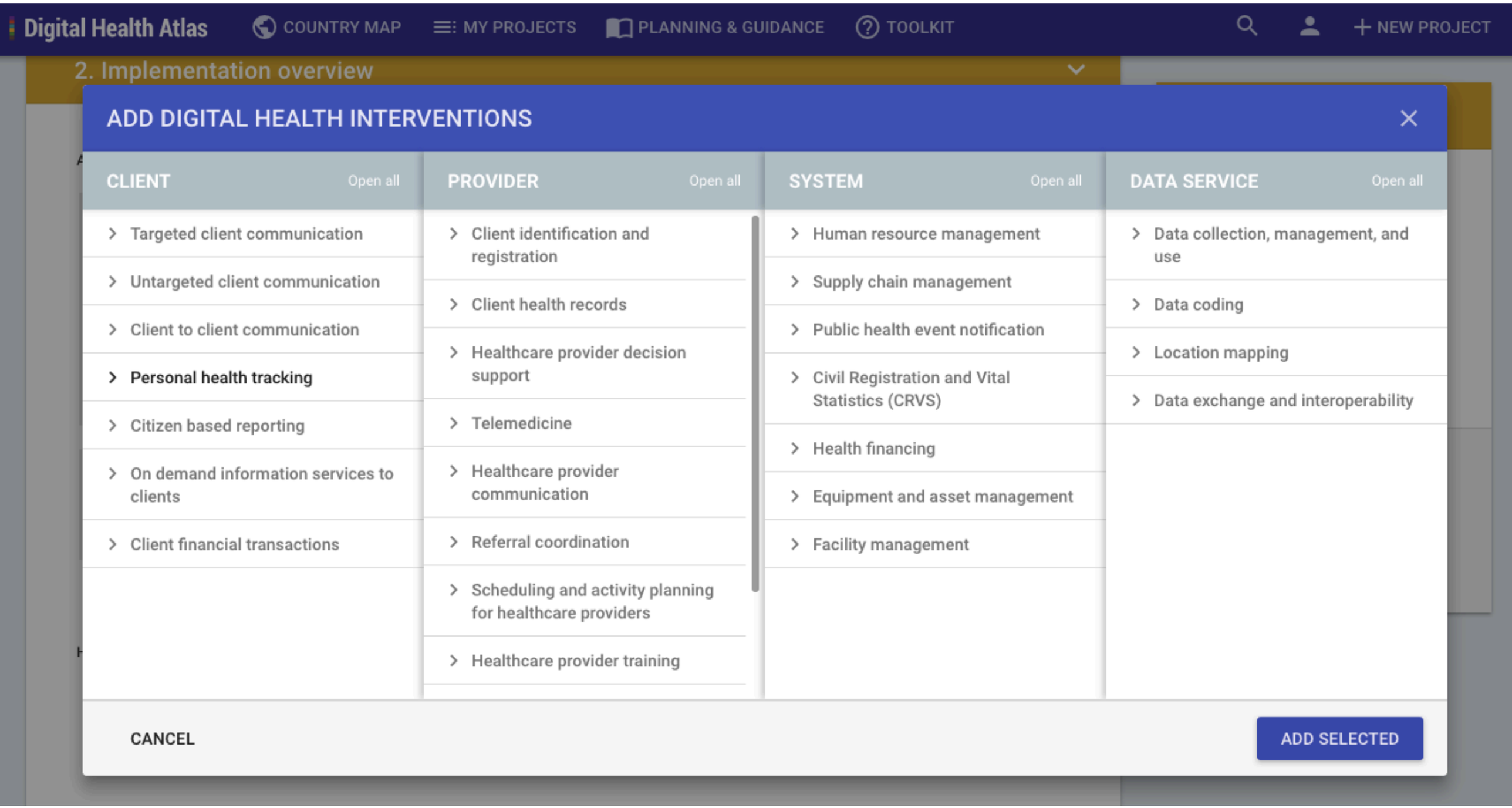
- 8.1 Insufficient patient engagement
- 8.2 Unaware of service entitlement
- 8.3 Absence of community feedback mechanisms
- 8.4 Lack of transparency in commodity transactions
- 8.5 Poor accountability between the levels of the health sector
- 8.6 Inadequate understanding of beneficiary populations

Application Categories

A. Electronic Medical Record	F. Facility Management Information Systems	K. Facility Management Information System	P. Client Communication Systems	U. Terminology service**
B. Physical Asset Information Systems	G. Payroll Management* Systems	L. Learning and Training Systems	Q. Routine Health Information Systems*	V. Shared health record**
C. Laboratory Systems*	H. Health Management Information Systems	M. Pharmacy Systems*	R. Data collection and research systems	W. Facility registry**
D. Diagnostic Systems*	I. Disease Surveillance*	N. Human Resource Information Systems	S. Logistics Management and Information System*	X. Health worker registry**
E. Knowledge Management*	J. Client registry**	O. Civil Registration and Vital Statistics*	T. Geographic Information Systems (GIS)	Y. Medical devices

Health System Challenge (HSC) *Need or problem to be addressed*	Digital Health Intervention (DHI) *Digital functionality for addressing the Health System Challenge*	Application Category *ICT system that delivers one or more of the Digital Health Interventions*
Insufficient supply of commodities	3.2.1 Manage inventory and distribution of health commodities 3.2.2 Notify stock levels of health commodities	» Logistics Management Information System
Healthcare provider's poor adherence to clinical guidelines	2.3.1 Provide prompts and alerts based according to protocol 2.3.2 Provide checklist according to protocol 2.5.2 Communication and performance feedback to healthcare provider 2.7.2 Scheduling of health worker activities	» Telemedicine systems » Decision support systems
Lack of access to information or data	2.2.4 Routine health indicator data collection and management 4.1.2 Data storage and aggregation 4.1.3 Data synthesis and visualizations	» Health Management Information System (HMIS) » Electronic Medical Record » Identification registries and directories
Loss to follow-up of clients	1.1.3 Transmit targeted alerts and reminders to a client 2.2.1 Longitudinal tracking of client's health status and services received	» Client communication system » Electronic Medical Record

Practical application of classification



Challenges at Country-level

- Uncoordinated investment and development, and reinvention of tools;
- Poor understanding of existing goals, functionality, and maturity of existing digital systems;
- Inability to compare digital systems in standardized way
- Inadequate registry mechanisms that offer value to all stakeholders

MINISTRY OF HEALTH
SINGAPORE

SINGAPORE | LEARN MORE | SIGN UP | LOGIN

Get MAPS Toolkit now!

Lorem ipsum dolor sit amet, consectetur adipisici elit, sed eiusmod tempor incidunt umque!

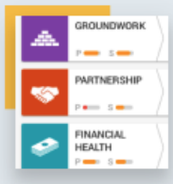
DOWNLOAD PDF

Welcome!

(Editable) This Digital Health Atlas aims to strengthen the value and impact of digital health investments, improve coordination, and facilitate institutionalization and scale.

Type and search project...

What Digital Health Atlas is?



Digital Health Atlas offers technologists, implementers, financial investors, and governments a platform of tools and guidance to improve the use of digital innovations for health. Leverages the WHO mHealth Assessment and Planning for Scale (MAPS) Toolkit.

Using metrics from the WHO mHealth Assessment and Planning for Scale (MAPS) Toolkit, the DHA allows implementers to assess the maturity of

Sign up

Whether you are an implementer, government, or financial investor, sign up below.

1. SELECT YOUR ROLE

☑ I'm an "Implementer"

How can I better scale-up my implementation? Are there tips and resources that I should consider to improve my implementation? Sign up to complete the digital version of the MAPS toolkit and track the performance of your implementation.

☐ I'm a "Financial Investor"

What are the different projects within your portfolio? Sign up to access a visual dashboard displaying the performance metrics of projects within your portfolio.

Digital Health Atlas

- Global web-platform to **curate digital health intervention** and shared asset info-structure investments, supporting **governments**, **donors, technologists and implementers** to map, monitor, and foster digital health investments planning to meet Government health goals

World Health Organization

HEALTH DATA COLLABORATIVE

human reproduction programme hrp research for impact
UNDP · UNFPA · UNICEF · WHO · THE WORLD BANK

digital square

USAID FROM THE AMERICAN PEOPLE

Digital Health Atlas

- Supports **government led mechanisms to conduct dynamic inventories of digital health investments.**
- Allows for trusted partner to **uniquely identify and categorize** specific investments using minimum data set, and then hand over to project to add details.
- Additional **data fields and customization** will be added throughout 2017 with input from Governments, donors, and technologists.
- Mechanism for Government to verify information.

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Classification of **Digital Health Interventions** V1.0

A shared language to describe the uses of digital technology for health

1.0 Clients

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

1.2 Untargeted client communication
- 1.2.1 Transmit untargeted health information to an undefined population
- 1.2.2 Transmit untargeted health event alerts to undefined group

1.3 Client to client communication
- 1.3.1 Peer group for clients

1.4 Personal health tracking
- 1.4.1 Access by client to own medical records
- 1.4.2 Self monitoring of health or diagnostic data by client
- 1.4.3 Active data capture/ documentation by client

1.5 Citizen based reporting
- 1.5.1 Reporting of health system feedback by clients
- 1.5.2 Reporting of public health events by client

1.6 On-demand information services to client
- 1.6.1 Client look-up of health information

1.7 Client financial transactions
- 1.7.1 Transmit or manage out-of-pocket payments by client
- 1.7.2 Transmit or manage vouchers to client for health services
- 1.7.3 Transmit or manage incentives to clients for health services

2.0 Healthcare providers

2.1 Client identification and registration
- 2.1.1 Verify client unique identity
- 2.1.2 Enrol client for health services/clinical care plan

2.2 Client health records
- 2.2.1 Longitudinal tracking of client's health status and services received
- 2.2.2 Manage client's structured clinical records
- 2.2.3 Manage client's unstructured clinical records
- 2.2.4 Routine health indicator data collection and management

2.3 Healthcare provider decision support
- 2.3.1 Provide prompts and alerts based according to protocol
- 2.3.2 Provide checklist according to protocol
- 2.3.3 Screen clients by risk or other health status

2.4 Telemedicine
- 2.4.1 Consultations between remote client and healthcare provider
- 2.4.2 Remote monitoring of client health or diagnostic data by provider
- 2.4.3 Transmission of medical data 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
- 2.5.2 Communication and performance feedback to healthcare provider
- 2.5.3 Transmit routine news and workflow notifications to healthcare provider(s)
- 2.5.4 Transmit non-routine health event alerts to healthcare providers
- 2.5.5 Peer group for healthcare providers

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

2.7 Health worker activity planning and scheduling
- 2.7.1 Schedule clients appointments based on clinical care plan
- 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

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

2.10 Laboratory and Diagnostics Imaging Mananagement
- 2.10.1 Transmit 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

3.0 System managers

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 certification/ registration of healthcare provider(s)
- 3.1.4 Record training credentials of healthcare provider(s)

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
- 3.2.4 Register licensed drugs and health commodities
- 3.2.5 Manage procurement of commodities
- 3.2.6 Report counterfeit or substandard drugs by clients

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

3.4 Civil Registration and Vital Statistic
- 3.4.1 Notify birth event
- 3.4.2 Register birth event
- 3.4.3 Certify birth event
- 3.4.4 Notify death event
- 3.4.5 Register death event
- 3.4.6 Certify death event

3.5 Health financing
- 3.5.1 Register and verify client insurance membership
- 3.5.2 Track insurance billing and claims submission
- 3.5.3 Track and manage insurance reimbursement
- 3.5.4 Transmit routine payroll payment to healthcare provider(s)
- 3.5.5 Transmit or manage incentives to healthcare provider(s)
- 3.5.6 Manage budget and expenditures

3.6 Equipment and asset management
- 3.6.1 Monitor status 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

4.0 Data services

4.1 Data collection, management, and use
- 4.1.1 Non routine data collection and management
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4.4 Data exchange and interoperability
- 4.4.1 Data exchange across systems

Digital Health Atlas | GO BACK TO DASHBOARD

COUNTRY LEVEL VIEW

MAP VIEW | LIST VIEW

Sierra Leone

Area name #1234

Helen Keller International
Routine nutrition monitoring

eHealth Africa
SENSE contact tracing

GOAL International
SENSE contact tracing

23 projects
Click on district to show all!

How to use this map?

Hover on districts shows list the list of active projects in an area.

Click on a district to enlarge and browse the list of projects.

Digital Health Atlas | GO BACK TO DASHBOARD

COUNTRY LEVEL VIEW | MAP VIEW | LIST VIEW

Sierra Leone

★ My projects

Project name	Country	Organization name	Donor name	I'm following	I've funded
★ eHealth Africa	Sierra Leona	Organization name	Donor name	✓	✓
GOAL International	Sierra Leona	Adipisici Elit	Adipisici Sed Magna		
★ Helen Keller International	Sierra Leona	Sed Eiusmod Tempor	Sed Eiusmod	✓	✓
Lorem ipsum dolor	Sierra Leona	Incidunt Labore	Tempor		✓
Sit amet Consectetur	Sierra Leona	Et Dolore Magna	Incidunt Labore		
Adipisici Elit	Sierra Leona	Aliqua	Et Dolore Magna		
Sed Eiusmod Tempor	Sierra Leona	Sed Eiusmod Tempor	Aliqua Tempor	✓	
★ Incidunt Ut Labore	Sierra Leona	Incidunt Ut	Sed Eiusmod		
Et Dolore Magna	Sierra Leona	Et Dolore Magna	Incidunt Tempor		
Aliqua Lorem	Sierra Leona	Lorem Ipsum	Donor name	✓	✓
Sed Eiusmod Tempor	Sierra Leona	Organization name	Adipisici Sed Magna		
Incidunt Ut Labore	Sierra Leona	Adipisici Elit	Sed Eiusmod	✓	
Et Dolore Magna	Sierra Leona	Et Dolore Magna	Incidunt Magna		
Aliqua Lorem	Sierra Leona	Aliqua	Aliqua Eiusmod		

Digital Health Atlas | COUNTRY VIEW | + NEW PROJECT

DASHBOARD | VISUALIZE PROJECT | EDIT PROJECT | UPDATE SCORE | SUMMARY SCORE

Demo 1 ★ ▾

Version: 2. (Jun 13, 2016) | Organization: Pulilab | Contact Person: WHO WHO

STATISTICS

2.
Version

Push to save your current stats as a new version:

+ SNAPSHOT

1
Donors

PROJECT DETAILS

OVERVIEW | AXIS | DOMAINS | TECHNOLOGY | RESOURCES

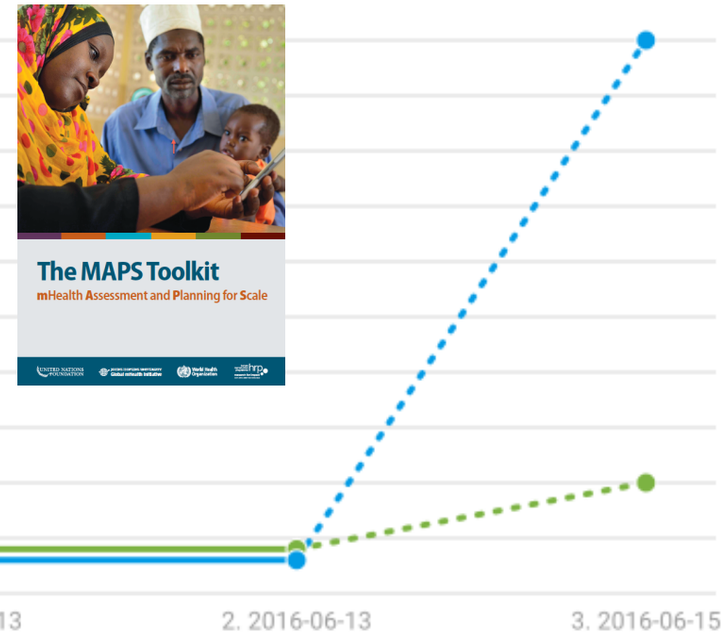
GROUNDWORK P S	Parameters Of Scale S	Contextual Environment S	Scientific Basis S	
PARTNERSHIPS P S	Strategic Engagement	Partnership Sustainability		
FINANCIAL HEALTH P S	Financial Management S	Financial Model S		
TECHNOLOGY & ARCHITECTURE P S	Data	Interoperability	Adaptability	
OPERATIONS P S	Personnel	Training And Support	Outreach And Sensitization	Contingency Planning
MONITORING & EVALUATION P S	Process Monitoring	Evaluation Research		

Already started | Not started yet | P - Progress | S - Score | 0-49% | 50-99% | 100%

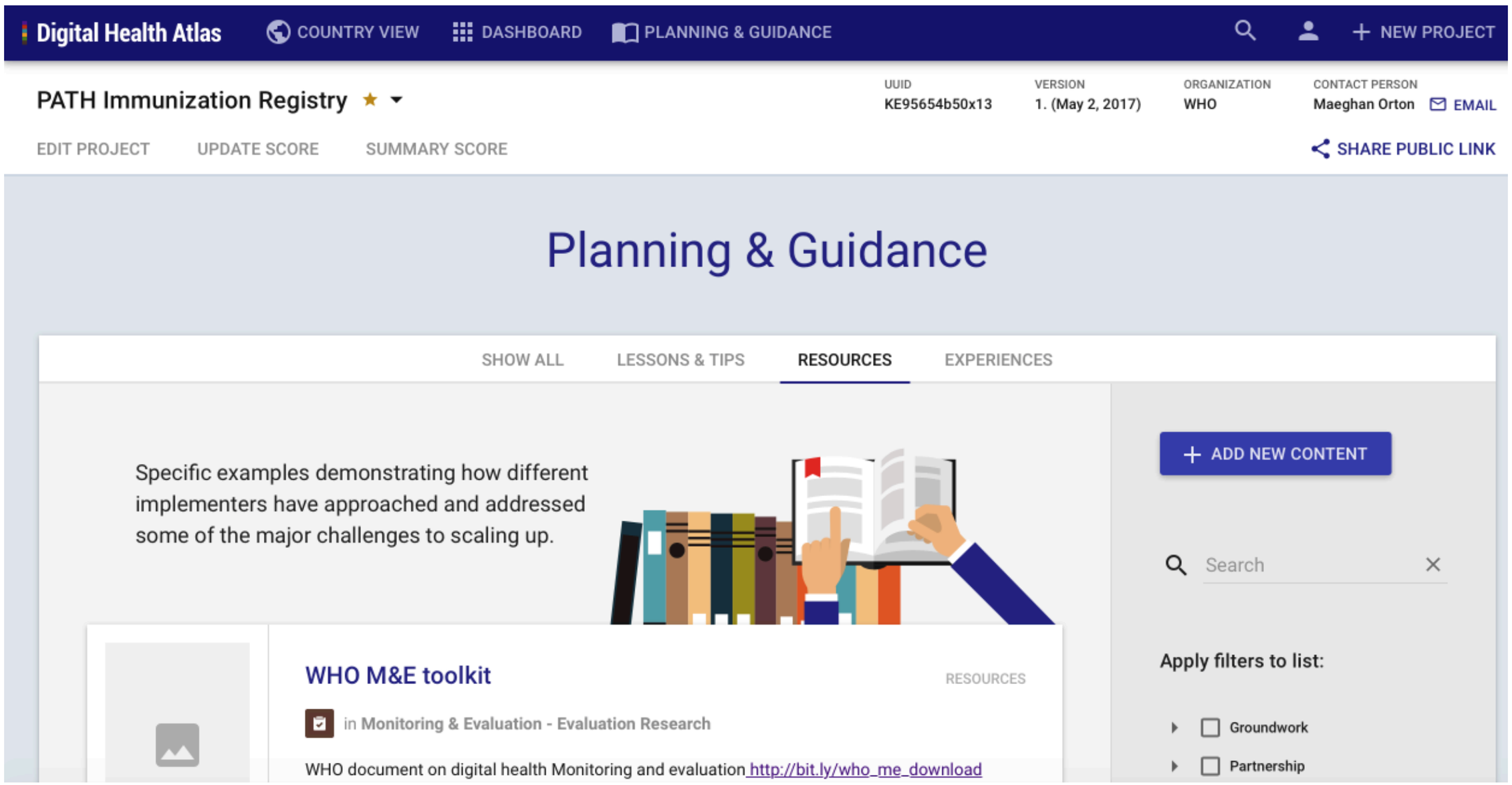
PROJECT PERFORMANCE

GEOGRAPHICAL VIEW | HISTORICAL VIEW

— closed
····· in progress
● Facilities
● Health Workers



Curated guidance and knowledge sharing



Use Case: Country Planning

- **Use Case:** Understanding current assets against future needs, to develop **digital health investment plan**
- DHA has been developed as a **complement to WHO guidelines** and online digital health implementation Guide due in Q2 2018

WHO Guidelines (2018)

- **Official request from member states** on Guidelines regarding the selection and prioritization of digital strategies of value for the SDGs.

- Global financing mechanisms and governments increasingly recognize potential value of digital health interventions, but **lack evidence-base guidance** to direct planning and investments.

- Need to demonstrate **evidence of effect** of digital health interventions on outcomes.

WHO + PATH

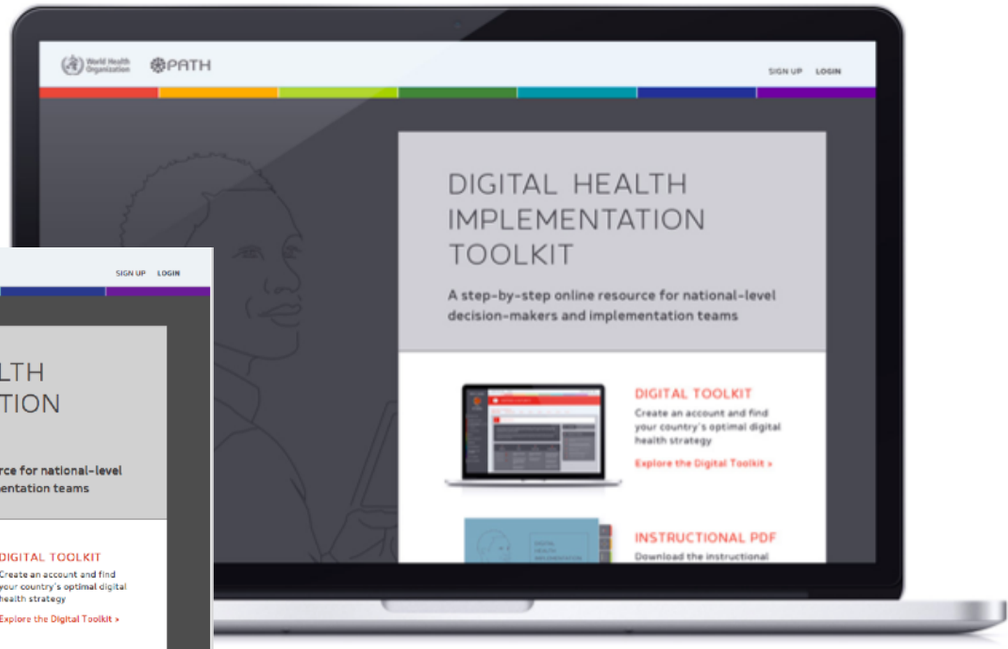
- Co-developing print AND digital toolkits
- Connected to **Digital Health Atlas** and first ever **WHO guidelines** on digital interventions
- Integrates BID best practices and other case studies
- Update of Optimize toolkit
- Targets MOH departmental leaders AND implementing partners

v1

v2

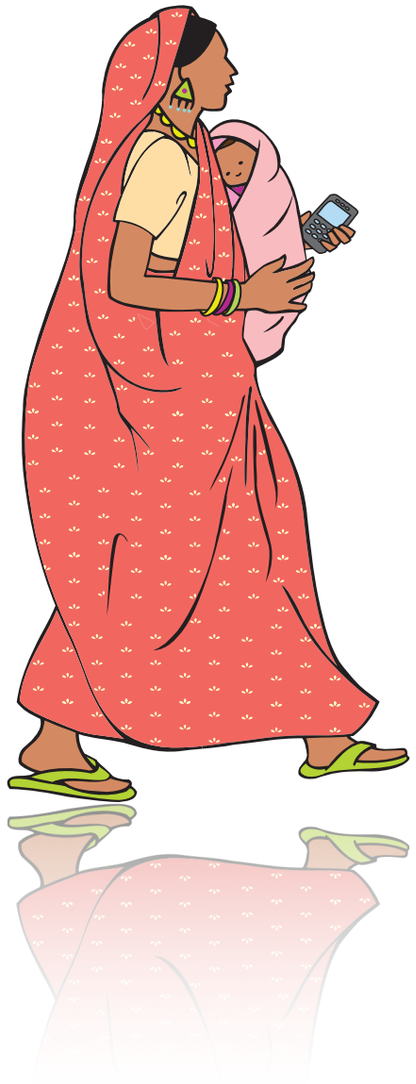
Digital Health Implementation and Financing Toolkit (mid-2018)

Paper & PDF



Digital Website

Digital Health Atlas
LOGIN
SIGN UP
Get MAPS Toolkit
A WHO toolkit for measuring and facilitating scale-up
and national institutionalization of digital health solutions.
DOWNLOAD PDF
Register now at
DigitalHealthAtlas.org
Type and search projects...



Thank you

Dr. Garrett L. Mehl
World Health Organization, Switzerland
mehlg@who.int

human reproduction programme hrp
research for impact
UNDP · UNFPA · UNICEF · WHO · WORLD BANK

World Health Organization