# UNICEF's Approach to Digital Health

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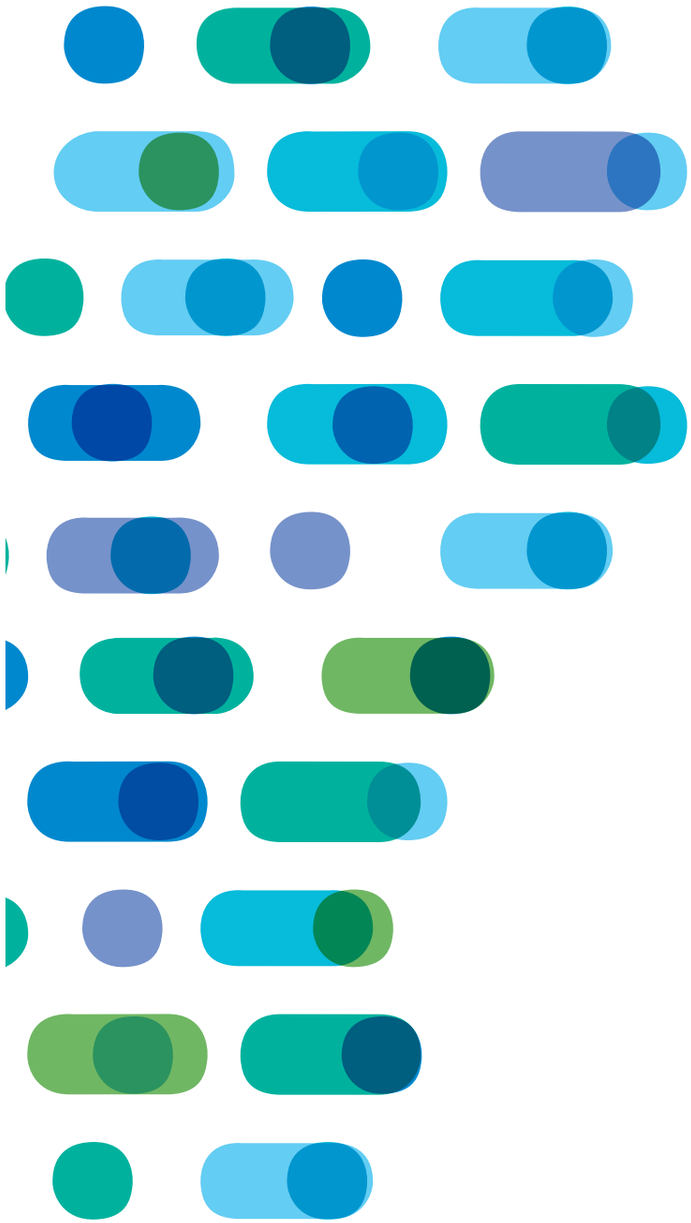

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# Acronyms

| | |
|---|---|
| AeHIN | Asian eHealth Information Network |
| DHIS2 | District Health Information System 2 |
| HIS | Health information system |
| HSS | Health system strengthening |
| ICT | Information and communication technology |
| OpenHIE | Open Health Information Exchange |
| SDGs | Sustainable Development Goals |
| SMS | Short messaging service |
| UNICEF | United Nations Children's Fund |
| WHO | World Health Organization |

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# Executive summary

## Background

With the launch of the 2030 Agenda for Sustainable Development, the world has resolved to leave no one behind by ending extreme poverty and preventable child deaths, and calling for integrated action across sectors to tackle complex development challenges. UNICEF has recently launched both its new Strategic Plan, 2018–2021[1] and the Strategy for Health, 2016–2030.[2] The Strategy for Health has two overarching goals: 1) end preventable, maternal, newborn and child deaths; and 2) promote the health and development of all children.

An increasingly connected world provides opportunities to achieve these goals. More than 7 billion people (95 per cent of the global population) live in an area that is covered by a mobile-cellular network, and nearly 41 per cent of people in developing countries have a mobile broadband subscription.[3] Advances in technology, such as improved network speed and efficiency, cloud computing, device connectivity and data analytics are accelerating conversations on the promise of digital health.[4] In this context, UNICEF can harness the power of information and communication technologies (ICT) to effectively support countries to ensure that every child survives and thrives.

1 United Nations Children's Fund, 'UNICEF Strategic Plan 2018–2021', UNICEF, New York, January 2018, <www.unicef.org/publications/files/UNICEF_Strategic_Plan_2018-2021.pdf>, accessed 17 August 2018.

2 United Nations Children's Fund Programme Division, 'UNICEF's Strategy for Health (2016–2030)', UNICEF, 2015, <www.unicef.org/health/files/UNICEF_Health_Strategy_Final.pdf>, accessed 17 August 2018.

3 International Telecommunications Union, 'ICT Facts and Figures 2016', ITU, <www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf>, accessed 17 August 2018.

4 Broadband Commission for Sustainable Development, Digital Health: A call for government leadership and cooperation between ICT and health, Broadband Commission for Sustainable Development, ITU and UNESCO, February 2017, <http://broadbandcommission.org/Documents/publications/WorkingGroupHealthReport-2017.pdf>, accessed 17 August 2018.

# UNICEF's Approach to Digital Health

The term 'digital health', which includes both mHealth and eHealth, describes the general use of ICTs (digital, mobile and wireless) to support the achievement of health objectives.[5] UNICEF developed its Approach to Digital Health to: 1) outline a common organizational vision for digital health; 2) identify strategic priorities for investments in digital health that align with the organization's Strategy for Health, 2016–2030, Health Systems Strengthening Approach,[6] Strategic Plan, 2018–2021 and Data for Children Strategic Framework;[7] and 3) describe UNICEF's comparative advantage in supporting governments and coordinating and aligning with other organizations, civil society actors, private sector partners and communities to leverage digital technologies to accelerate the achievement of health sector and Strategic Plan priorities. The development of this approach was guided by more than 30 UNICEF staff interviews, a consultative workshop, a task force and an open comment period.

5 World Health Organization, Monitoring and Evaluating Digital Health Interventions: A practical guide to conducting research and assessment, WHO, Geneva, 2016, <http://apps.who.int/iris/bitstream/handle/10665/252183/9789241511766-eng.pdf;jsessionid=148F506CE84E40EA26D09AC2B099589A?sequence=1>, accessed 17 August 2018.

6 United Nations Children's Fund, 'The UNICEF Health Systems Strengthening Approach: A synopsis', UNICEF, <www.unicef.org/health/files/HSS_Approach_Synopsis_Final_10Mar16.pdf>, accessed 17 August 2018.

7 United Nations Children's Fund, 'Data for Children Strategic Framework', UNICEF, April 2017, <https://data.unicef.org/wp-content/uploads/2017/04/Data-for-Children-Strategic-Framework-UNICEF.pdf>, accessed 17 August 2018.

# UNICEF's comparative advantages in digital health

UNICEF has long been a leader in designing, enhancing, and scaling digital health interventions globally and applying these solutions to its core mandate and focus on child health and rights. The organization's strong field and convening presence allows it to form and sustain multi-sectoral partnerships, support the alignment and coordination of investments, and strengthen the enabling environment (i.e., policies, regulation, governance and coordination structures) to leverage ICT-based solutions to support the achievement of health objectives. In addition, UNICEF's global leadership in child and adolescent health-focused data collection and use can further government accountability and transparency in ensuring that all children and adolescents are reached with high quality health services.

For these initiatives, UNICEF works with governments to design, enhance and scale digital health deployments that support national health goals and UNICEF's mission to reach every child.

## UNICEF's vision for digital health

UNICEF envisions a world where the health and well-being of children and adolescents are improved through digitally-enabled health systems, and where digital health technologies are used to enhance the quality and reach of vital health information and services, including for the most disadvantaged children, adolescents and their families.

To realize this vision, UNICEF works with governments, partners and communities to respond to government and community priorities for child and adolescent health and rights, and support efforts to strengthen the approaches, tools, evidence-base and enabling factors necessary to support digitally-enabled and child- and adolescent-focused interventions at all levels of the health system.

## Digital health contributions to advance the UNICEF's Strategy for Health actions

Priority areas where digital health can contribute to UNICEF's Strategy for Health actions (identified through UNICEF staff interviews, workshop consultations and task force inputs) include:

***Advocacy for every child's right to health** using digital tools and approaches that support real-time data capture, evidence generation and data use to identify and deliver services to children and adolescents most in need; protect patient privacy; promote community engagement, equity and transparency; and increase the accountability of governments to ensure every child survives and thrives.

***Influencing government policies** using digital tools and approaches that support evidence-based policy-making and financing (e.g., systematic planning and analysis tools); promote the scale-up of effective interventions and innovations; and share knowledge and promote South-to-South exchange (e.g., through collaboration platforms).

***Strengthening service delivery** using digital tools that contribute to building capacities of health providers and support management of programmes, in particular at the community level and in emergencies, and strengthen supply chain systems (e.g., e- and mHealth learning platforms, digital solutions for diagnosis, clinical decision support, supportive supervision, referral coordination, client identification and registration, and supply management, financial transactions and incentives).

***Empowering communities** using digital tools that support social and behavioural change, generate demand and strengthen accountability (e.g., targeted communication and citizen-based reporting).

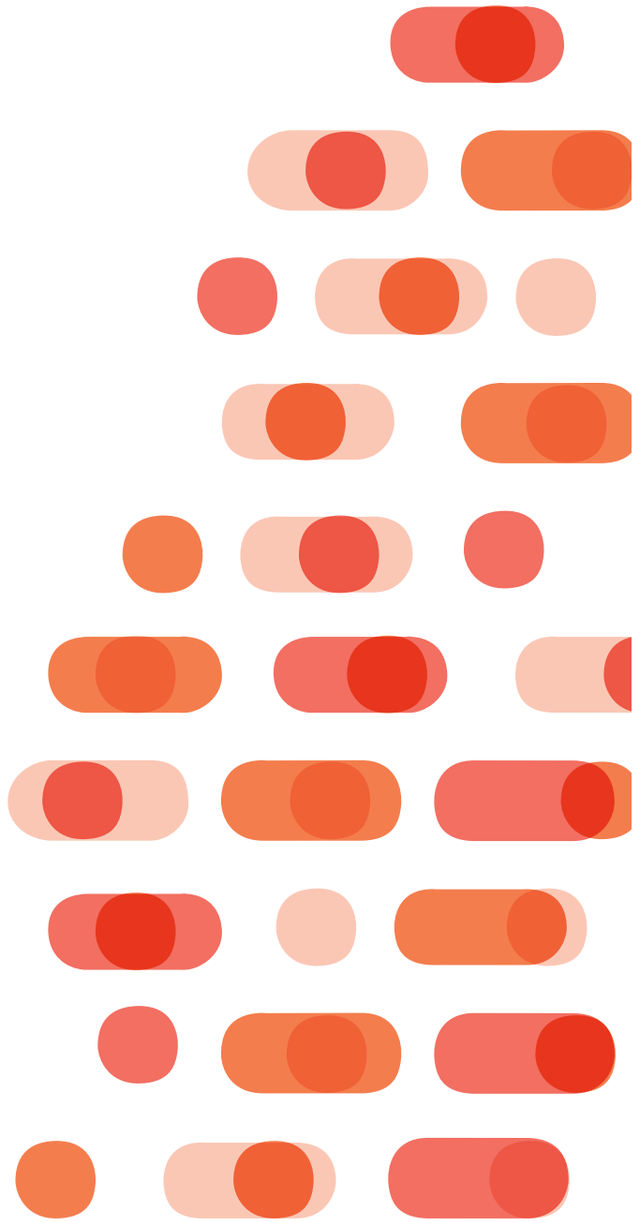
## Digital health implementation roadmap

An internal two-year roadmap was developed to support UNICEF staff to provide high quality technical assistance to governments to scale child- and adolescent-focused digital health interventions that contribute to Strategy for Health actions. The roadmap includes the following priority areas for investment/ strengthening:

- UNICEF staff knowledge and awareness of digital health;
- Enhanced coordination and multi-sectoral collaboration, operational resources and strategic partnerships in digital health;
- Knowledge management, case studies and communities of practice for digital health, including inventory of UNICEF-supported initiatives; and
- Implementation research and monitoring and evaluation of digital health investments for children and adolescents.

## Conclusion

As technology continues to evolve rapidly, UNICEF will prioritize efforts to internally align and consolidate its approaches to digital health and build the capacities of staff to effectively respond to government needs in this area. UNICEF's Approach to Digital Health and its two-year implementation roadmap were developed to help the organization shift its mind-set towards mainstreaming digital health as a routine aspect of health programming and partnerships. As digital health increasingly becomes a core component of government health strategies, UNICEF will strengthen its support to governments to scale these technologies to enhance health service delivery and achieve health goals. This approach and roadmap will support UNICEF staff to effectively advise and support governments, in coordination with partners, to leverage ICTs to contribute to equity-based investments in reducing maternal and child morbidity and mortality worldwide.



# I. Background and Context

With the launch of the 2030 Agenda for Sustainable Development, the world has resolved to leave no one behind by ending extreme poverty and preventable child deaths, and calling for integrated action across sectors to tackle complex development challenges. To reach the ambitious Sustainable Development Goal (SDG) targets for 2030, it is imperative that UNICEF strengthen its approach to health and related sectors, as well as its focus on equity-based approaches to health and development. Building on lessons learned in global health and development over the past 25 years, UNICEF has intensified efforts to design interventions and approaches that reach the world's most vulnerable children, adolescents and their families, in a more cost-effective and equity-focused manner.

UNICEF's vision of a world where no child dies from a preventable disease and all children have the opportunity reach their full potential in health and well-being is grounded in the Convention on the Rights of the Child, the United Nations Secretary-General's Global Strategy for Women's, Children's, and Adolescents' Health, 2016–2030, and the Convention on the Elimination of all Forms of Discrimination against Women. To realize this vision, UNICEF launched its Strategic Plan, 2018–2021,[8] which will guide the organization's investment in ensuring every child survives and thrives, and underscores its commitment to achieving the SDGs.

**Figure 1 Sustainable Development Goals**


8 United Nations Children's Fund, 'UNICEF Strategic Plan 2018–2021', UNICEF, New York, January 2018, <www.unicef.org/publications/files/UNICEF_Strategic_Plan_2018-2021.pdf>, accessed 17 August 2018.

To advance the Strategic Plan priorities, UNICEF launched the Strategy for Health, 2016–2030,[9] which has two overarching goals: 1) end preventable, maternal, newborn and child deaths; and 2) promote the health and development of all children.

UNICEF's Strategy for Health shifts the organization's approach to consider the health needs of the child at all life stages, while emphasizing the importance of prioritizing the needs of the most deprived children and promoting multi-sectoral approaches to enhance child development and address the underlying causes of poor health outcomes. It also shifts UNICEF's focus away from vertical disease programmes towards strengthening health systems and building resilience, including better integrating humanitarian and development health interventions by encouraging risk-informed programming in all contexts. The Strategy also reorganizes the types of technical assistance provided to countries based on their level of capacity and lays out new approaches and actions that countries can take to improve the quality of services at all levels and foster meaningful improvements in health outcomes.

To support countries to meet the health needs of the most vulnerable children, UNICEF is taking a wider view of the drivers of health and development, including health systems and the underlying determinants of health. UNICEF has also developed a new Approach to Health Systems Strengthening[10] (HSS), which articulates how UNICEF can drive improvements in the performance of health systems to effectively use resources to reach the most vulnerable.

An increasingly connected world provides opportunities to leverage ICTs as potential solutions to overcome bottlenecks in key health system areas (e.g., quality of care, supplies, front-line health worker supervision, training and communication, community engagement and participation in health services, and the availability and use of routine data by decision-makers and health care managers). More than 7 billion people (95 per cent of the global population) live in areas that are covered by mobile-cellular networks and nearly 41 per cent of people in low-income countries have a mobile broadband subscription.[11] This new global reality can make it easier and often more cost effective to use digital tools to improve communication, data reporting and feedback from communities, and deliver critical services to hard-to-reach communities.[12] Even in settings where connectivity may not be consistently available, many digital health tools work offline and have the ability to sync when connectivity becomes available. As the world becomes even more connected, governments are also learning to strengthen or replace paper-based systems and further utilize ICTs within the health system to improve the efficiency and reach of vital health and development interventions.[13]

Digital health is becoming a core part of broader government health strategies, and UNICEF is strengthening its support to governments, in coordination with other

9 United Nations Children's Fund Programme Division, 'UNICEF's Strategy for Health (2016–2030)', UNICEF, 2015, <www.unicef.org/health/files/UNICEF_Health_Strategy_Final.pdf>, accessed 17 August 2018.

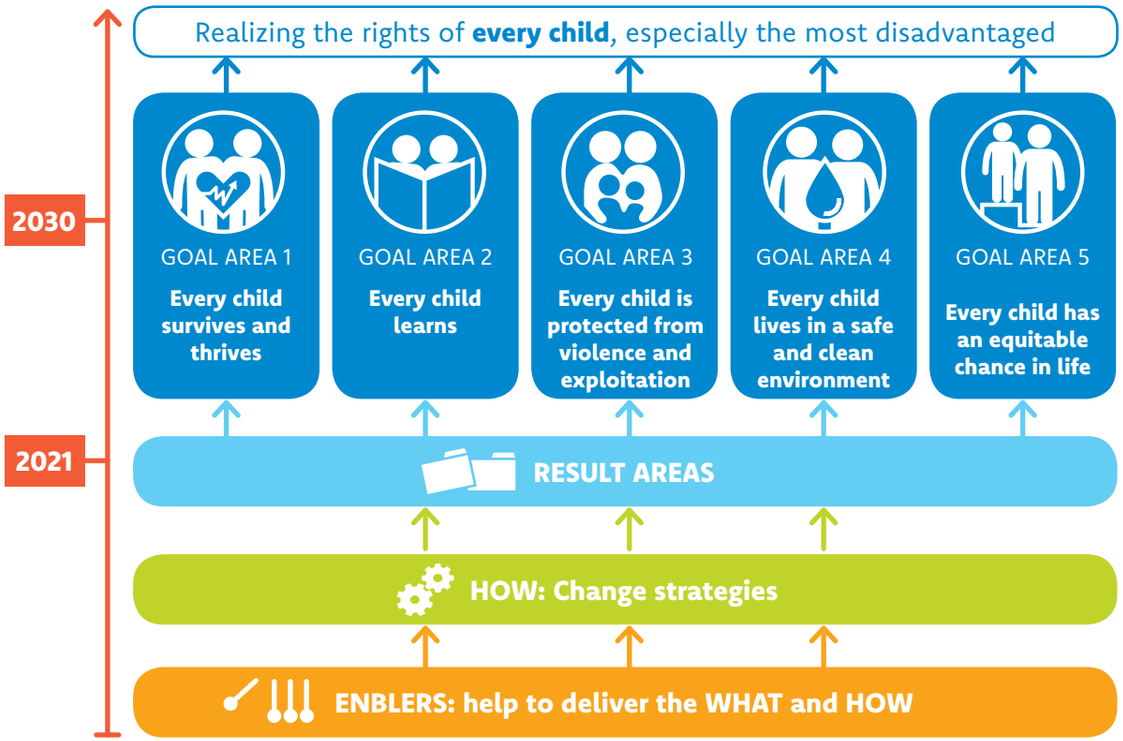
10 United Nations Children's Fund, 'The UNICEF Health Systems Strengthening Approach: A synopsis', UNICEF, <www.unicef.org/health/files/HSS_Approach_Synopsis_Final_10Mar16.pdf>, accessed 17 August 2018.

11 International Telecommunications Union, 'ICT Facts and Figures 2016', ITU, <www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf>, accessed 17 August 2018.

12 Mehl G. and A. Labrique, 'Prioritizing integrated mHealth strategies for universal health coverage', Science, vol. 345, no. 6202, 12 September 2014, pp. 1284-7.

13 Labrique A.B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', Glob Health Sci Pract, vol. 1, no. 2, 2013, pp. 160-171.

**Figure 2 UNICEF Strategic Plan, 2018–2020**




partners, to use digital health technologies at scale to strengthen health service delivery and achieve health goals.

Fostering innovations in programming and advocacy process and practices to promote the use of new technologies is a core UNICEF change strategy and will be central to achieving results under Strategic Plan Goal Area 1 – every child survives and thrives.

UNICEF delivers change by combining high-quality programmes at scale, harnessing innovation and collecting evidence, in partnership with governments, other United Nations organizations, civil society organizations, the private sector, communities, children and adolescents. UNICEF has a history of fostering innovation and pioneering the use of new technologies to help children and adolescents at greatest risk and in greatest need. In line with the Strategic Plan, UNICEF's Approach to Digital Health aims to:

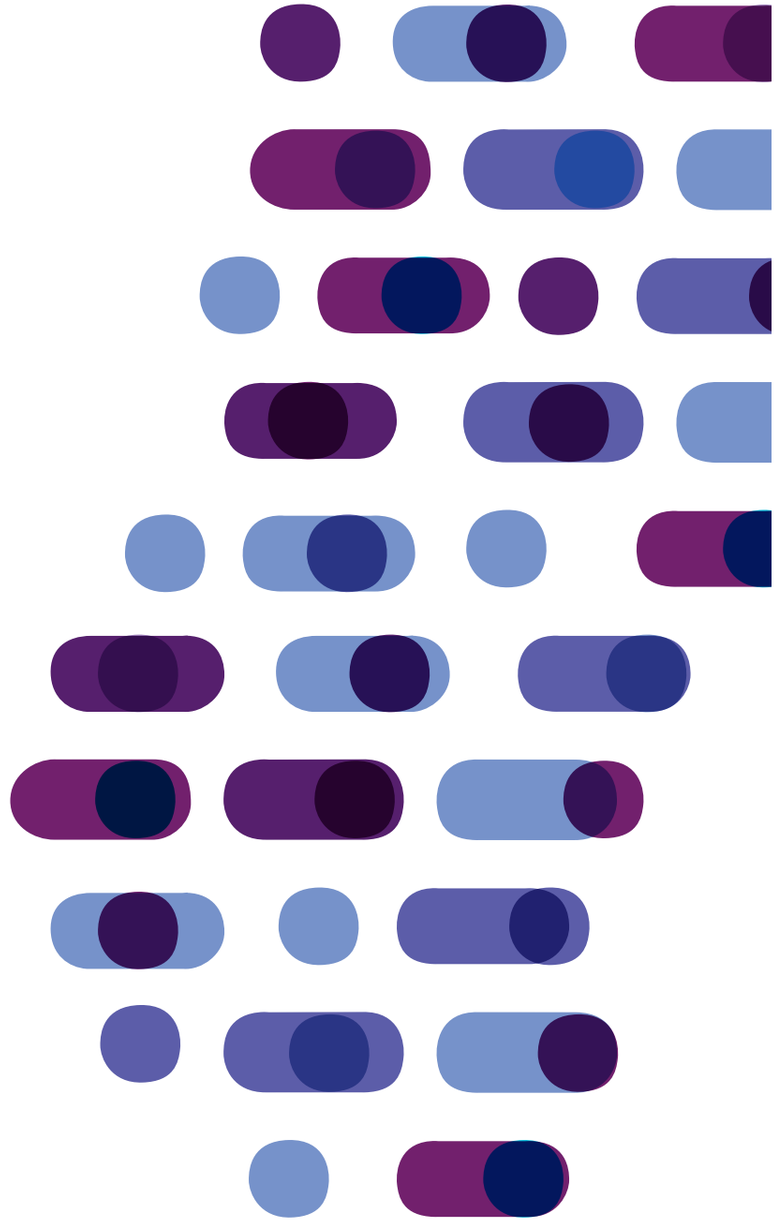
- Enhance the use of new technologies to strengthen systems, improve service delivery and engage communities, citizens and civil society organizations in public decision-making; and
- Identify the most promising programme innovations and work with partners to adopt, adapt and scale up the most successful approaches.

Achieving scalability and sustainability in digital health is not without its challenges. It requires strong investment cases and sustainable funding for workforce capacity, training, maintenance and upkeep; establishment and alignment with national eHealth strategies and policies; and strong

government leadership and coordination to reduce fragmentation of systems, duplication and data silos.[14] Sustaining proven digital health interventions requires a long-term strategy, including stable and secure financial and technical resources, enduring partnerships and the ability to continuously adapt and respond to evolving operational needs, demands and environments.

As described in below, UNICEF's approach to digital health is centred on supporting government-led digital health initiatives, working with partners, reducing fragmentation, and investing in scalable interoperable technologies. With its in-country presence and ability to convene governments, civil society actors and partners, UNICEF is well positioned to help scale such programmes at the national level.

**Working with partners, UNICEF is committed to supporting countries to leverage existing open-source digital tools that are designed, tested and proven to enhance results at scale.**



14 Broadband Commission for Sustainable Development, Digital Health: A call for government leadership and cooperation between ICT and health, Broadband Commission for Sustainable Development, ITU and UNESCO, February 2017, <http://broadbandcommission.org/Documents/publications/WorkingGroupHealthReport-2017.pdf>, accessed 17 August 2018.

# II. UNICEF's Approach to Digital Health

UNICEF has extensive experience designing and scaling digital health interventions to advance the goals of its Strategy for Health. For example, digital health interventions such as mTrac[15] and mHero[16] are now being replicated in a number of countries and have been successfully scaled and integrated into national programmes. This process has been facilitated by UNICEF's focus on and efforts to enhance existing health information systems (e.g., adopting ministry of health reporting formats and linking into existing platforms such as the District Health Information System 2 (DHIS2)); align with national eHealth policies; and use standards-based approaches for information exchange (i.e., the Open Health Information Exchange (OpenHIE)).

UNICEF's experience implementing and scaling digital health interventions in various contexts over the past decade has generated a number of lessons learned and best practices. These insights, past evaluations of UNICEF-supported interventions, and the rapid adoption of digital health interventions at the regional and country levels highlights the need for UNICEF to develop a common multi-sectoral approach for itself and its partners to designing, enhancing and scaling digital health interventions.

UNICEF's Approach to Digital Health was developed to this end. The Approach outlines a common organizational vision for digital health; identifies strategic priorities for digital health in line with the Strategy for Health, 2016–2030, the Health Systems Strengthening Approach, the Strategic Plan, 2018–2021, and the Data for Children Strategic Framework; and defines the organization's comparative advantage for working with governments and partners to support the use of digital technologies to achieve these and other health sector priorities. It highlights tools and approaches that can be leveraged to support ministries of health around the world, outlines key concepts in digital health and points colleagues to additional resources that capture best practices for

**UNICEF's Approach to Digital Health** is designed to ensure that every child survives and thrives. It provides guidance on how digital technologies can be used to further the goals of UNICEF's Strategy for Health 2016–2030, and outlines approaches that UNICEF can use to support countries to adopt digital health interventions that reach all children, including the most disadvantaged, through improved data collection and use, increased accountability and transparency, and greater reach of high quality health services.

15 mTrac facilitates the movement of data from front-line health workers to DHIS2 to track the incidence of disease, the occurrence of maternal and neonatal deaths and the stock of tracer medicines in near real-time.

16 mHero was developed in response to the Ebola epidemic to create a two-way communication mechanism between governments and health workers.

designing, implementing and scaling digital health interventions. Annex 2 provides a description of the basic concepts, tools and resources available for digital health programmes and country-level assistance. In addition, the accompanying roadmap defines priorities for implementing digital health programmes over the next two years and lays out key steps for expanding and scaling digital health interventions in UNICEF programme countries.

The Approach to Digital Health was developed based on interviews conducted with more than 30 UNICEF staff members covering UNICEF's vision for digital health, lessons learned, structural challenges and opportunities related to applying digital health solutions. Following these interviews, a consultative workshop was held with representatives from the UNICEF Headquarters health, data and analytics, information technology, and innovation teams to share interview results and discuss priorities for UNICEF's work in digital health moving forward. Key findings from staff interviews and the workshop are available upon request. Following the meeting, a task force was formed to guide the writing of this document.

## i. What is digital health?

The term 'digital health' refers to the use of digital technologies in health programming and financing. According to the World Health Organization (WHO), digital health can be defined as "the use of digital, mobile and wireless technologies to support the achievement of health objectives. Digital health describes the general use of information and communication technologies for health and is inclusive of both mHealth and eHealth".[17] Digital health interventions can include various technologies, such as mobile applications, short messaging service (SMS), interactive voice response, health management information systems, mobile diagnostic devices, wearables, drones and big data analytics.

Digital health interventions have demonstrated impacts on a wide range of outcomes, including reducing loss to follow-up, improving adherence to antenatal clinical visits and increasing adherence to life-saving medications or immunization schedules.[18] Mobile applications have helped community health workers provide essential household services and referrals that have improved the quality of care offered at the community level.[19] Several systematic reviews have also documented the impact that digital health interventions have had on health outcomes,[20] including improving

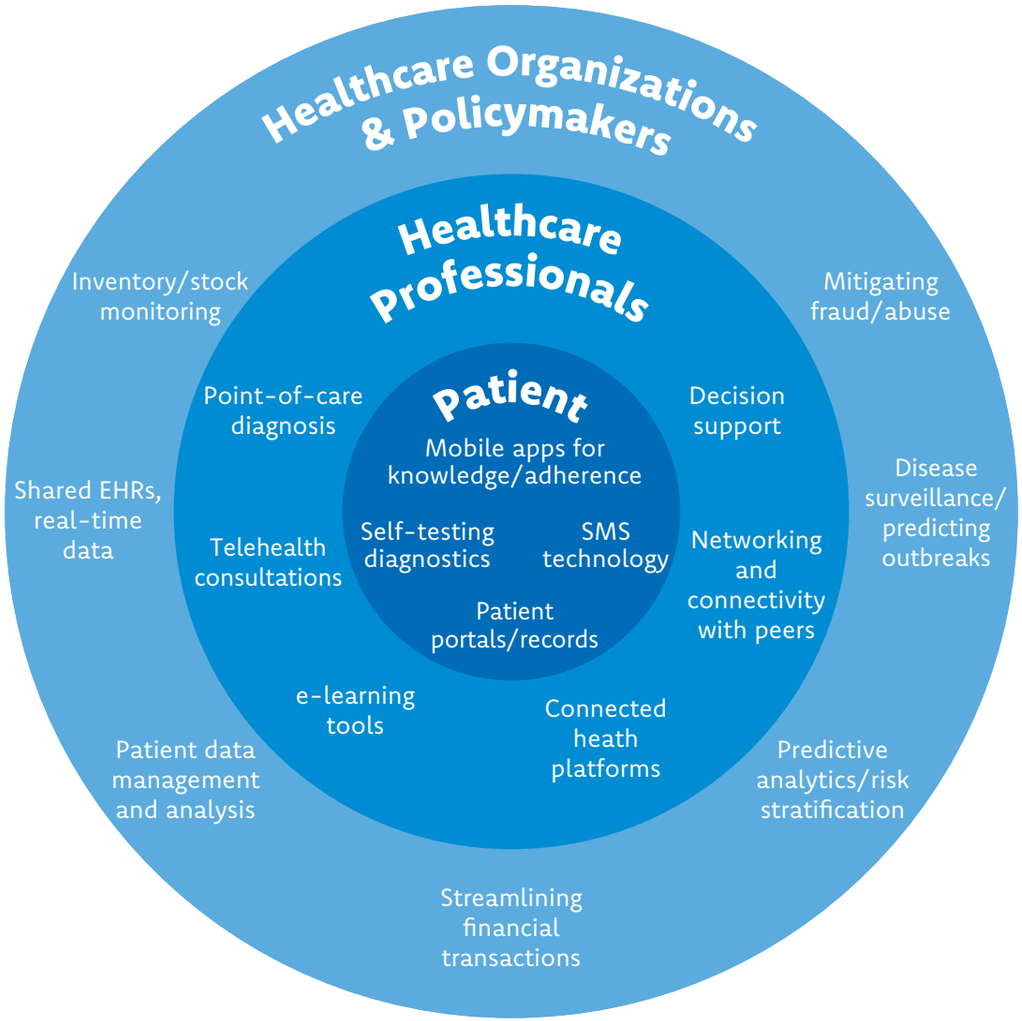
17 World Health Organization, Monitoring and Evaluating Digital Health Interventions: A practical guide to conducting research and assessment, WHO, Geneva, 2016, <http://apps.who.int/iris/bitstream/handle/10665/252183/9789241511766-eng.pdf;jsessionid=3A31CC30B1600D7830DAF35CC4EAC012?sequence=1>, accessed 20 August 2018.

18 Noordam, A.C. et al., 'Improvement of maternal health services through the use of mobile phones', Trop Med Int Health, vol. 16, no. 5, May 2011, pp. 622-6; and Sondaal, S.F.V. et al., 'Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries: A systematic review', PLoS ONE, vol. 11, no. 5, 4 May 2016, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0154664>, accessed 20 August 2018.

19 Braun, R. et al., 'Community health workers and mobile technology: A systematic review of the literature', PLoS ONE, vol. 8, no. 6, 12 June 2014, e65772; Källander, K. et al., 'Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low- and middle-income countries: A review', J Med Internet Res, vol. 15, no. 1, 25 January 2013, e17; Hall, C.S. et al., 'Assessing the impact of mHealth interventions in low- and middle-income countries – what has been shown to work?' vol. 7, 27 October 2014.

20 WHO, with input from partners, including UNICEF, is conducting a systematic review of digital health interventions and their impact on health outcomes. The review is expected to be published in 2019. WHO is also collaborating with UNICEF and partners to develop global guidelines for digital reproductive, maternal, newborn, child and adolescent health interventions.

**Figure 3 Digital technologies and applications, Broadband Commission, 2017**




service utilization,[21] quality of care[22] and information[23], and reducing supply stock-outs.[24] Systematic reviews of the literature also provide strong evidence for the feasibility of front-line health workers using digital health tools to support health service delivery, and that front-line health workers would welcome the integration of digital health technology into their work streams.

Despite the added value that digital health interventions have shown to date, many such interventions have so far been limited in scope and geographic scale.[25] Historically, investments in digital health have been uncoordinated, sometimes leading to duplication of efforts and making it difficult to compare digital systems in

21 For example, reducing loss to follow up, improving adherence to antenatal clinical visits, and increasing adherence to life-saving medications or immunization schedules.

22 For example, adherence to treatment protocols through the use of electronic decision support and mobile technology-supported referrals that improve the quality of care offered at the community level.

23 Through the use of mobile devices to improve the accuracy, speed and completeness of data collection.

24 Through mobile-based reported which has resulted in greater data visibility of existence of stock-outs.

25 Labrique, Alain B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', *Global Health: Science and Practice*, vol. 1, no. 2, August 2013, pp.160–171.

a standardized way.[26] Globally, there has also been a poor understanding of existing digital systems, how they function and the stages of maturity of interventions.[27]

The coming together and alignment of partners in the digital health community is essential to making efficient use of scarce resources and supporting government plans for scale and sustainability. Partnerships are emerging in the digital health space and alignment around a core set of principles for digital development and principles of donor alignment for digital health, both of which UNICEF has endorsed. It is imperative that partners across the digital health landscape harmonize efforts and draw on the many lessons learned from digital health demonstration projects to accelerate country health programming at scale, including community health.

In response to global needs, WHO and partners, including UNICEF, have developed digital health methodologies, frameworks and guidelines for planning national information system architectures. As digital health interventions are multi-sectoral, countries are moving towards aligning health priorities with existing ICT infrastructure and systems, including designing frameworks that cover regulation, governance, standards and interoperability, workforce and financing.[28] As described below, through its recognized role as a convener and broker with strong ties to national/local governments, implementing partners, non-governmental organizations, civil society and donors, UNICEF is in a unique position to support governments to leverage regional and national investments in digital health to advance child and adolescent health and rights. Global partnerships such as the Health Data Collaborative, which works to harmonize health-related data investments across donors and partners, can also be leveraged to support countries to coordinate resources for data-focused interventions.[29] Annex 2 provides additional information on digital health and available tools.

26 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017, <http://www.who.int/medical_devices/global_forum/Thedigitalhealthaltas.pdf>, accessed 17, August 2018.

27 Ibid.

28 Broadband Commission for Sustainable Development, *Digital Health: A call for government leadership and cooperation between ICT and health,* Broadband Commission for Sustainable Development, ITU and UNESCO, February 2017, <http://broadbandcommission.org/Documents/publications/WorkingGroupHealthReport-2017.pdf>, accessed 17 August 2018.

29 Health Data Collaborative, 'Who we are', <www.healthdatacollaborative.org/>, accessed 20 August 2018.

## ii. UNICEF's comparative advantages in digital health

Over the past decade, UNICEF has demonstrated that technology can be used to address constraints faced by health systems and improve approaches to reaching the hardest-to-reach children, adolescents, families and communities. UNICEF and its partners are well positioned to support countries to design, enhance and scale technology-supported interventions that improve the quality and reach of services and health information, address core health system strengthening constraints and target those most in need, while improving transparency and accountability. UNICEF's comparative advantages include:

1. UNICEF's core mandate and focus on child health and rights positions the organization to use digital health interventions to address core challenges to reaching children, adolescents and their families with quality health services.
2. UNICEF's convening power, strategic global, regional and private sector partnerships, and government relationships reflect the organization's multi-sectoral focus on child and adolescent rights. This focus and position allow UNICEF to bring health and ICT ministries and partners together to implement child- and adolescent-focused digital health interventions.
3. As a decentralized organization operating in more than 190 countries, UNICEF's strong field presence gives it both the policy experience and the field experience to support child- and adolescent-focused digital health interventions at all levels of the health system.
4. UNICEF's globally-respected brand and extensive experience solving complex issues using digital health interventions that address the core issues facing children and adolescents most in need foster government trust.
5. UNICEF's experience scaling digital health interventions – for example by co-creating interventions with government and partners, investing in robust and open-source platforms and interoperability and using systems and human-centred design approaches[30] – and the lessons learned from these experiences can be adapted to save scarce resources, while promoting South-to-South collaboration for digital health. UNICEF's experience designing nationally-scaled systems that are interoperable and responsive to government needs can be shared with other countries.
6. Data collection and use to support HSS – using tools such as the Multiple Indicator Cluster Survey conducted in more than 100 countries[31] – is a core area of UNICEF's work in child health. UNICEF recently launched the new Data for Children Strategic Framework to define key principles of data work and drive organizational investments in data collection and use.[32] UNICEF is also a core partner in the Health Data

30 United Nations Children's Fund, *Designing Digital Interventions for Lasting Impact: A human-centred guide to digital health deployments,* UNICEF, <https://drive.google.com/file/d/1hNx5drnRHTf_Rs1YlmpZQWKCdzRNM7sE/view>, accessed 20 August 2018.

31 United Nations Children's Fund, 'About MICS', UNICEF, <http://mics.unicef.org/about>, accessed 20 August 2018.

32 United Nations Children's Fund, 'Data for Children Strategic Framework', UNICEF, April 2017, <https://data.unicef.org/wp-content/uploads/2017/04/Data-for-Children-Strategic-Framework-UNICEF.pdf>, accessed 17 August 2018.

Collaborative, which works to improve health data capacity at the country level to track progress towards the SDGs.[33]

7. UNICEF's work improving accountability through digital health interventions such as U-Report and Scorecards – which promote data use and citizen feedback at the community, district and other levels of the system – can improve the quality and availability of real-time data.

## iii. UNICEF's vision for digital health

UNICEF envisions a world where the health and well-being of children and adolescents are improved through digitally-enabled health systems. That means countries are utilizing technologies for data capture and use, and implementing digital health interventions to reach the most disadvantaged children, adolescents and families with essential health information and services.

To realize this vision, UNICEF works with governments, partners and communities to respond to government and community priorities for child health and rights. UNICEF also supports efforts to strengthen the approaches, tools, evidence base and enabling factors necessary to implement digitally-enabled and child- and adolescent-focused interventions at all levels of the health system.

The Approach to Digital Health will support the implementation of UNICEF's equity and rights-based programmes and the achievement of the SDGs by:

1. **Leveraging digital health tools, approaches and experiences** to reach the most marginalized with technology-enhanced solutions that increase access to essential health services and real-time data and thereby improve child, adolescent and maternal health outcomes.
2. **Coordinating digital health operational resources, partnerships and investments** across the organization by strengthening communications, the documentation of digital health interventions, knowledge management systems and strategic partnerships, and inventorying and pointing staff to available internal and external resources.
3. **Empowering staff from health and other programme areas that contribute to health outcomes** by building their capacity to design, enhance and scale digital health interventions that address key bottlenecks and gaps faced at the country and regional levels.

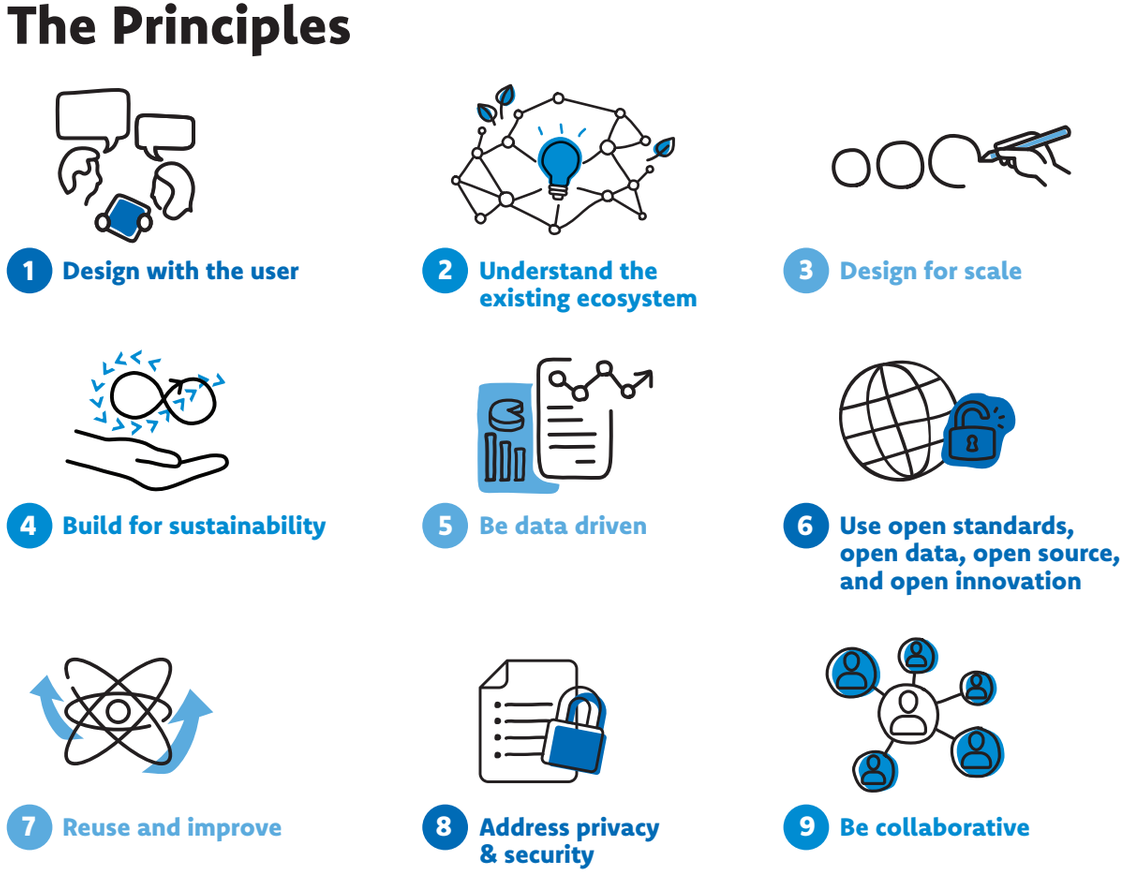
A country with a digitally-enabled health system has effectively and efficiently adopted technology solutions that prioritize reaching the most marginalized and vulnerable children, adolescents and families with health information and services, while strengthening the ability of the health system to collect, analyse and use health data to continually improve the reach and quality of services at all levels for children, adolescents and families.

33 Health Data Collaborative, <www.healthdatacollaborative.org>, accessed 20 August 2018.

## iv. How UNICEF engages in digital health

UNICEF's Approach to Digital Health is grounded in the Principles for Digital Development (*see Figure 4).* [34]These principles highlight the importance of designing with the end-user, understanding local ecosystems, designing for scale and using open-source technology solutions. In turn, the Approach is aligned with the more recently forged Principles of Donor Alignment for Digital Health. Drawing on these core principles, UNICEF strives to adapt existing tools, strategies and approaches across countries to maximize investments and consolidate technical assistance and guidance. This approach also provides an opportunity for countries to measure progress against each other and share lessons learned adapting approaches to improve efficiencies and drive results for the overall health system.

**Figure 4 Principles for Digital Development, 2016**




UNICEF also works regionally by engaging with partners to develop guidance, including by defining standards to guide interoperability between national health systems to advance regional health goals. For example, in many countries in the East Asia and the Pacific region, child health records are kept in manual registries and logbooks. This system often results in duplication, over reporting

34 Principles for Digital Development, <https://digitalprinciples.org/>, accessed 24 August 2018. See also United Nations Children's Fund, 'Innovation', UNICEF, <www.unicef.org/innovation/>, accessed 22 August 2018.

and underreporting. At the regional level, UNICEF, in partnership with WHO, the Asian Development Bank, and development partners such as the Asia eHealth Information Network (AeHIN) – a consortium of experts and senior officials – advises governments on how to fast track the digitization of health management information and civil registration and vital statistics systems. Ensuring that children are securely traceable through a unique identification gives them access to services and subsidies, and enables various national/subnational systems to recognize and support them across sectors. By working at both the national and regional levels, UNICEF can take a holistic look at how information systems and digital health interventions designed to support HSS can be leveraged to address the needs of the most disadvantaged children and adolescents.

UNICEF acknowledges that digital health interventions cannot be implemented in isolation. Digital technologies are best leveraged when they are embedded within public health interventions that address the key determinants of mother and child morbidity and mortality. With a renewed focus on ensuring that the most disadvantaged are reached, UNICEF recognizes that governments will increasingly invest in domestic spending on digital health interventions, while ensuring that the focus remains on the impact of these interventions on health, rather than monetary investments. Based on lessons learned, the global community is now shifting to applying a system-level approach to improving health system performance with digital interventions.[35] Applying an HSS lens shifts the thinking from designing a digital health programme that works to identifying and adapting tools that will impact health outcomes or systems.[36]

**UNICEF East Asia and the Pacific Regional Office: Digital health for strengthening programmes and systems**

Currently the UNICEF East Asia and the Pacific Regional Office, in close collaboration with WHO and other development partners, is supporting the Myanmar Ministry of Health and Sports to adopt an interoperable health management information system using OpenHIE. This solution includes the development of the Master Patient Index and Client Registry, which generates a unique identifier for everyone, including every child.

35 Mehl G. and A. Labrique, 'Prioritizing integrated mHealth strategies for universal health coverage', Science, vol. 345, no. 6202, 12 September 2014, pp. 1284-7.

36 Labrique A.B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', Glob Health Sci Pract, vol. 1, no. 2, 2013, pp. 160-171.

UNICEF uses a seven-step process within its HSS approach to design equity-focused health interventions.[37] Once bottlenecks have been identified in stage four, project leaders can then assess whether a digital health intervention is the right solution to implement, given the stage of ICT adoption and maturity in the country or region of interest. UNICEF is cognizant that digital health interventions should be part of the national health information system (HIS) architecture, and require engaging both ICT and health stakeholders to ensure that the interventions complement both health and ICT sector priorities.

A systematic approach should be taken to determine whether a digital health intervention can be used to address bottlenecks. This approach should identify 1) where on the life course digital tools will be applied; 2) what public health intervention will be enhanced; 3) which health constraint the intervention is seeking to overcome; 4) how digital health is applied (function, technology and purpose); and 5) where the digital programme engages stakeholders (health system managers, providers or clients).[38]

**Figure 5: UNICEF HSS Approach, 2016**

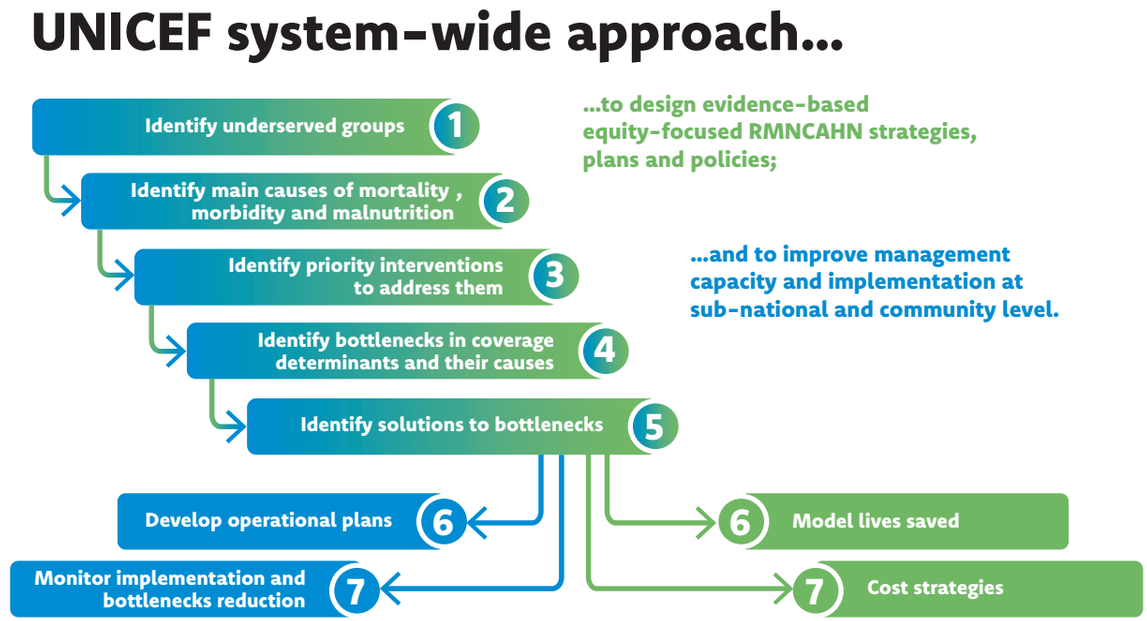
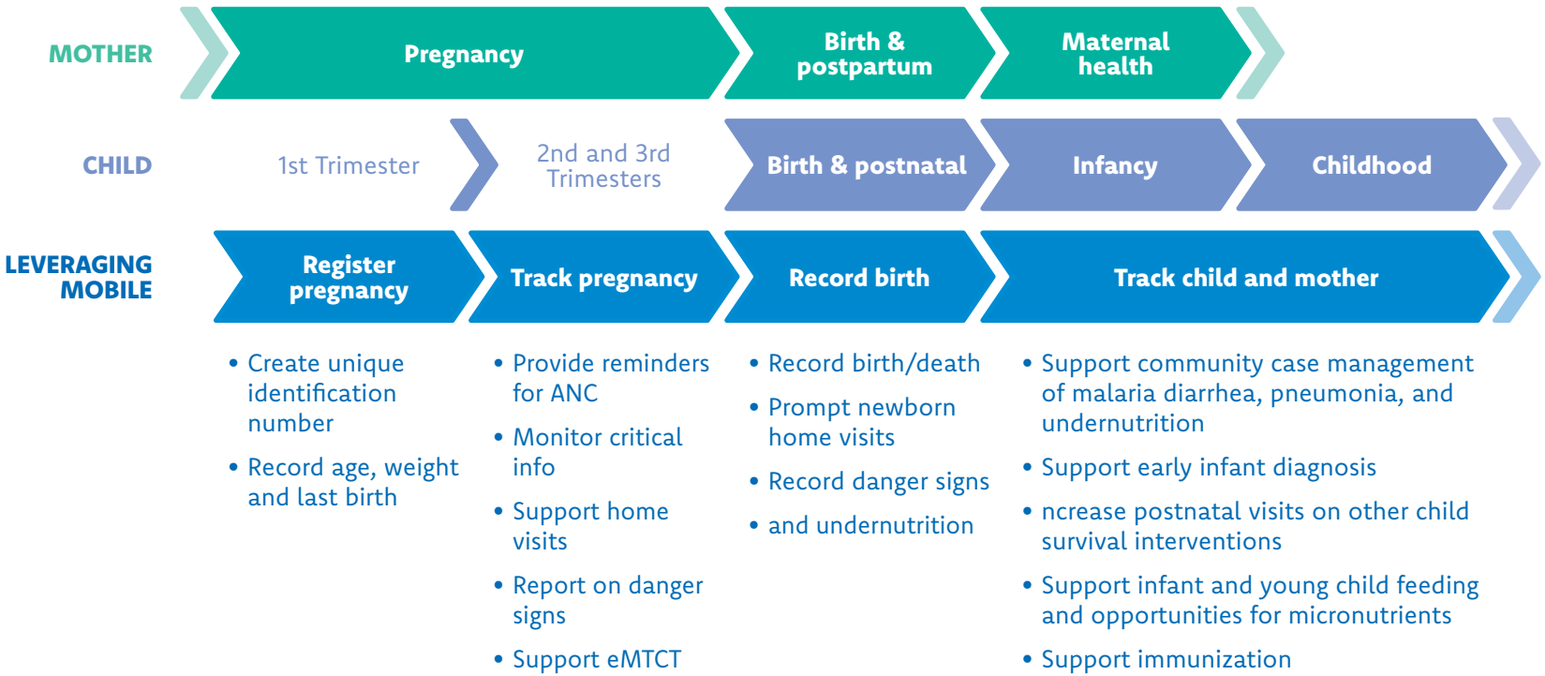



Figure 6 provides examples of how digital health interventions can be used to address key gaps along the maternal and child health continuum. Annex 2 also provides several toolkits that can be used to further plan and operationalize interventions. Finally, to build stronger evidence for investments in digital tools and systems, efforts to measure the impact of investing in digital health

37 United Nations Children's Fund, 'The UNICEF Health Systems Strengthening Approach: A synopsis', UNICEF, <www.unicef.org/health/files/HSS_Approach_Synopsis_Final_10Mar16.pdf>, accessed 17 August 2018.

38 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017; World Health Organization, 'Classification of digital health interventions v.1.0: A shared language to describe the uses of digital technology for health', WHO, 2018, < http://www.who.int/reproductivehealth/publications/mhealth/classification-digital-health-interventions/en/>, accessed August 17, 2018.

**Figure 6: UNICEF and Frog Design (2012)**




interventions should focus on health outcomes and the cost effectiveness of digital health tools versus other approaches. For example, the UNICEF East Asia and the Pacific Regional Office, in partnership with the Asian Development Bank and AeHIN, is developing a digital health costing tool that links with the Lives Saved Tool,[39] to ensure that metrics are designed based on the impact on health, rather than measured by monetary investments alone.

39 The Lives Saved Tool, <www.livessavedtool.org/>, accessed 24 August 2018.

# v. Digital health contributions to support health strategy actions

UNICEF supports countries to deploy digital health interventions that help them achieve the following health sector results from the UNICEF Strategic Plan:[40]

**1. Strategic Plan result one:** Newborns and mothers receive an essential package of quality maternal and newborn care services at scale, and improve the country-level evidence and action for the health, nutrition and well-being of adolescent girls and boys.

**Example contributions:**

- Client feedback on the quality and/or availability of health services and commodities (linked to client-side expenses, alignment with local norms, diversity of treatment options, health worker competence, quality of commodities, geographic inaccessibility, unnecessary referrals and transportation) for increased accountability and transparency;
- Providers report on relevant stock and notifiable diseases, addressing supply of commodities, supply of equipment and quality of commodities; and
- Policy-makers are informed about the functionality of components of the health system (planning and coordination).

**2. Strategic Plan result two:** Achieve and sustain immunization coverage at national and district levels.

**Example contributions:**

- Monitor progress towards immunization coverage at the individual or aggregate level, for example individual-level tracking of infants and children throughout the immunization schedule and aggregate-level tracking of mass vaccination campaigns to assess reach and identify bottlenecks (i.e., supply of services, addressing individual beliefs and practices, stigma, demand for services, loss to follow up and workflow management)

**3. Strategic Plan result three:** Children under 5 years receive preventive and curative services for pneumonia, diarrhoea, malaria and other priority child health conditions.

**Example contributions:**

- Digital decision trees to support health workers' treatment of childhood illness (i.e. efficiency, timeliness of care)

With the launch of the UNICEF Strategy for Health, 2016–2030, the organization has renewed its commitment to the value of leveraging digital technologies to support key actions, including:

1. Advocating for every child's right to health;
2. Influencing government policies;
3. Strengthening service delivery; and
4. Empowering communities.

The following list of key areas in which digital health can contribute to Strategy for Health actions were identified through UNICEF staff interviews, workshop consultations and task force inputs. This list is not exhaustive. Rather, it provides examples for consideration after accounting for factors such as country context, situation analysis, programmatic/health system constraints and evidence of the efficacy/suitability of the digital health intervention.

40 United Nations Children's Fund, 'UNICEF Strategic Plan, 2018–2021: Executive Summary, 2018, <https://www.unicef.org/publications/index_102552.html>, accessed 24 August 2018.

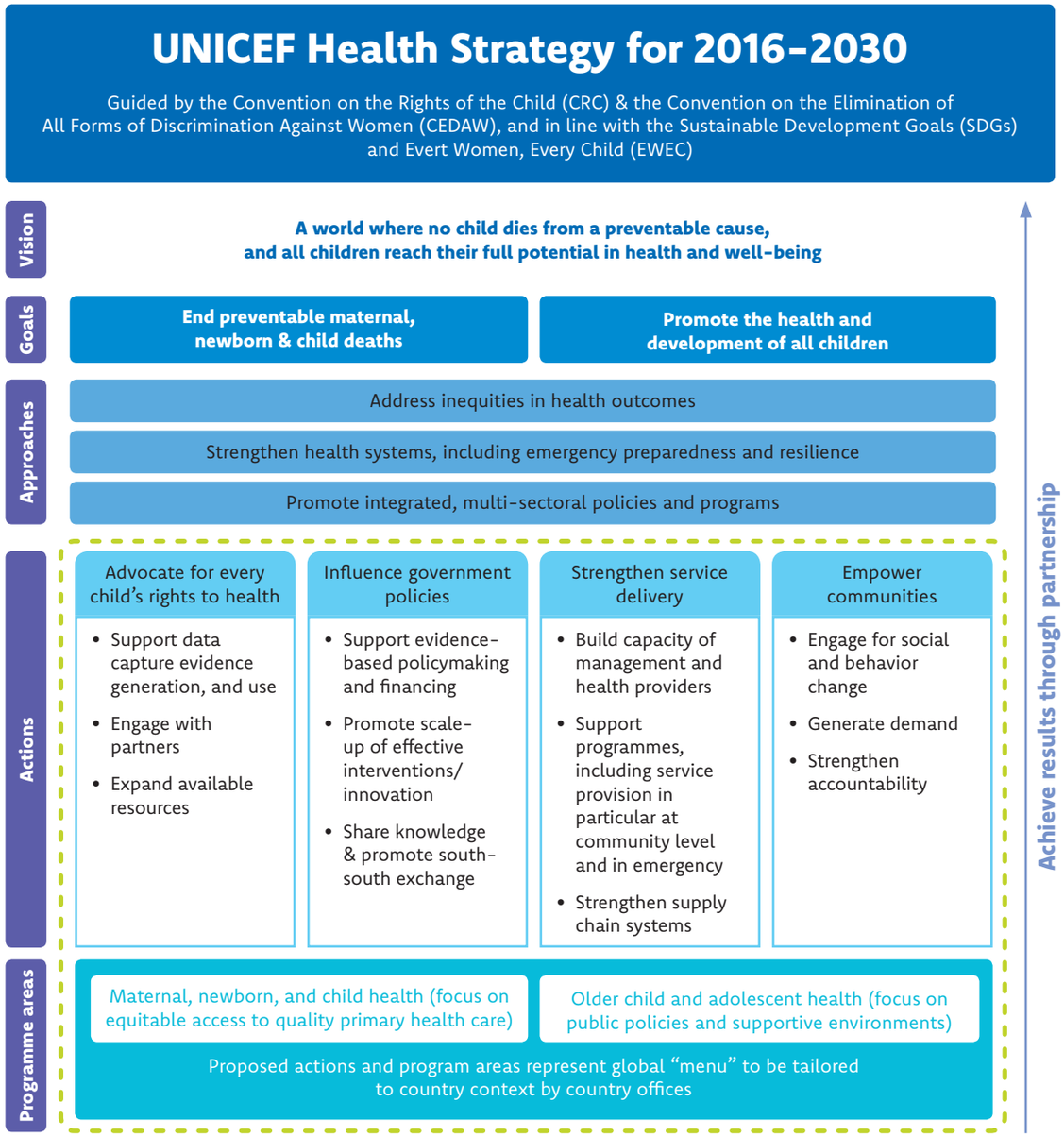
## Health strategy action 1: Strengthen service delivery

- Build capacity of management and health providers.
- Support programmes, particularly at the community level and in emergencies.
- Strengthen supply chain systems.

**Digital health contributions:**

- Facilitate health worker training using eHealth and mHealth learning for in-service training, local pre-service education, and post-training reinforcement of key concepts to address health worker competence, while supporting the management of the health workforce, including performance management and accountability, incentives and optimization that addresses motivation, supervision and coordination.
- Support community and front-line health workers to offer high quality services, through digital solutions for diagnosis, clinical decision support, supportive supervision, referral coordination, client identification and registration and supply management.
- Use mobile communication tools to support communication roadblocks

Figure 7: UNICEF Health Strategy (2016-2030) Summary



between and among health workers, supervisors, programme managers, clients and communities. For example, health workers have used their mobile phones to systematically coordinate emergency transport for patients in distress.

## Health strategy action 2: Advocate for every child's right to health

- Support data capture, evidence generation and use.
- Engage with partners.
- Expand available resources for children.

**Digital health contributions:**

- Leverage digital tools to reduce reporting delays, improve the quality of data, management and use, and increase the accessibility of data for faster data collection and trend analysis to facilitate evidence-based decision-making.
- Use digital tools to generate evidence and promote community engagement and transparency, increase government accountability and ensure that every child and adolescent survives and thrives.
- Form multi-sectoral public and private partnerships to support all relevant ministries to adopt child and adolescent-focused digital data collection approaches that are interoperable with national HIS architectures and frameworks, conform to national eHealth policies, and improve the capture of real-time data to identify and deliver services to the most marginalized children and adolescents.
- Work with governments and partners to support investment cases; sustainable funding for workforce capacity, training, maintenance and upkeep; establishment of and alignment with national eHealth strategies and policies; and strong government leadership and coordination to reduce fragmentation of systems, duplication and data silos for digital health investments.

## Health strategy action 3: Empower communities

- Engage for social and behaviour change.
- Generate demand.
- Strengthen accountability.

**Digital health contributions:**

Assist countries to design, scale and sustain digital health interventions that facilitate:

- Targeting communication to mothers, caregivers, adolescents and their families to reduce loss to follow up and low treatment adherence.
- Engaging citizens and communities with behaviour change communication to reduce stigma, promote healthy behaviours, generate demand for services, and collect feedback on the availability and quality of services and commodities.

## Health strategy action 4: Influence government policy

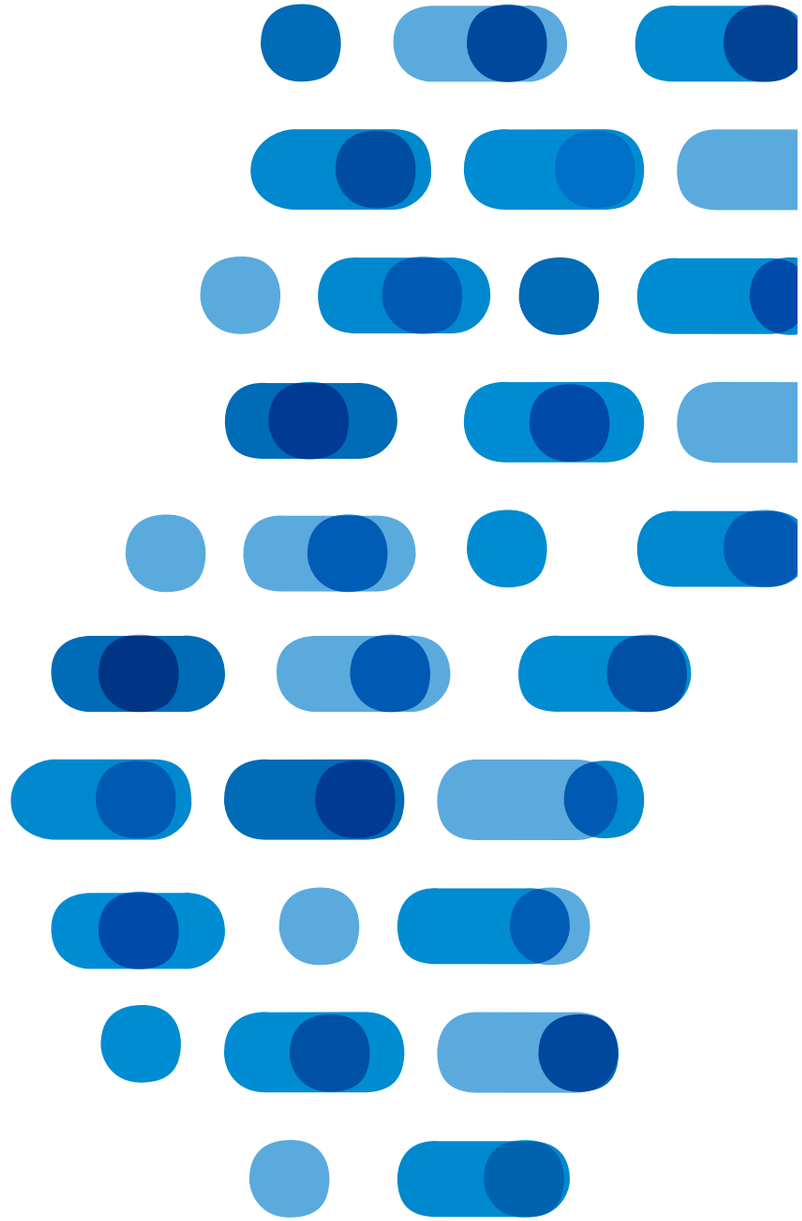
- Support evidence-based policy-making and financing.
- Promote the scale-up of effective interventions and innovations.
- Share knowledge and promote South-to-South exchange.

**Digital health contributions:**

- Make use of planning and analysis tools that track costs, highlight inequities and support analysis of high-impact

interventions and HSS strategies that foster equitable results for children and adolescents in a cost-effective manner and support evidence-based policy-making and financing.

- Generate evidence from child- and adolescent-focused digital health interventions that consider national health and ICT strategies, the enabling environment and HSS bottlenecks to reaching children and adolescents; are designed to scale from the start; and can be used to generate evidence and influence policy.
- Use digital collaboration tools that promote coordination and lesson sharing across borders to maximize the impact of digital health investments on child and adolescent health outcomes.



# III. UNICEF's two-year internal roadmap for digital health

To support governments to design, enhance and scale digital health interventions across country and regional contexts, UNICEF will need to do business differently. The organization will need to be open to successes as well as failures, and continue to expand its public and private sector partnerships. Engaging the right ministries and operating in line with the appropriate national frameworks and priorities will be key to building on and improving the organization's current approaches to working across sectors. Given the multi-sectoral nature of ICT and health programming, UNICEF must view digital health interventions as routine aspects its work with national health systems, rather than as innovations or unique pilot projects. There is also potential to leverage private sector partners, including emerging digital health stakeholders, such as local developers, local mobile network operators and banks in the case of mobile money.

During the development of UNICEF's Approach to Digital Health, staff reflected on internal opportunities for aligning and coordinating investments in digital health to better support countries to adopt child- and adolescent-focused digital health strategies. UNICEF is committed to supporting countries to invest in digital health interventions that are rooted in HSS, equity-driven and supportive of national and regional health and ICT priorities. By aligning internally, UNICEF can invest in the capacity and infrastructure necessary to successfully guide regions and countries to design, scale and sustain child and adolescent health investments. UNICEF is therefore committed to investing institutional resources, capacity and fundraising efforts to ensure that:

- **UNICEF staff is competent and conversant in digital health** and able to support countries to utilize national and subnational investments in digital health to advance child health and rights.
- **Strategic partnerships and multi-sectoral and multi-division collaboration within UNICEF are strengthened** to effectively support ministries to collaborate in the design, enhancement, deployment and scale-up of child- and adolescent-focused digital health interventions.
- **Digital health knowledge management and communities of practice are strengthened within UNICEF** to promote open communication, inventorying of digital health initiatives, documentation of use cases, sharing of lessons learned, and the adaptation of successful approaches across countries and regions.
- **Implementation research and monitoring and evaluation approaches focus on digital health investments for children and adolescents**, particularly those that support governments to document impacts on child and adolescent health outcomes.

The following activities, which were conceived to achieve the above outcomes, aim to build UNICEF's internal capacity to support governments to create, enhance, scale and sustain child- and adolescent-focused digital health interventions. Together, they comprise a two-year roadmap for the implementation of UNICEF's Approach to Digital Health. The activities were developed based on staff recommendations and priorities identified through interviews, the workshop and input from the task force.

## 1. Build technical capacity for digital health at the country, regional and headquarters levels

1.1. **Conduct both e-learning and face-to-face trainings at the country, regional and headquarters levels.** These trainings should cover the basics of digital health, including the tools and resources available to integrate digital health interventions into work plans and funding proposals.

1.2. **Build staff capacities at the country, regional and headquarters levels to use digital health solutions for advocacy and accountability,** both internally and within national and subnational health systems. Training will focus on technology platforms that are open-source, scalable, standards-based and interoperable, as well as core components of HIS/architecture in low- and middle-income countries (*see Annex 2 for examples of open-source platforms*).

1.3. **Place dedicated staff with digital health expertise within regional health teams and the Headquarters health section.** These staff should provide overall support/technical guidance, leadership and coordination – including within UNICEF and externally with partners – on digital health initiatives.

1.4. **Develop a global donor advocacy plan to secure longer-term funding** for ongoing internal capacity building.

## 2. Improve coordination

**Internal**

2.1. **Form digital health teams at the country, regional and headquarters levels** that consist of experts in data, health, innovations and information technology, and can be engaged to co-design, implement and scale digital health interventions. **Hold regular meetings or teleconferences and exchange brief reports** at the country, regional and headquarters levels to share updates on digital innovations and highlight priority needs and new technologies available to countries. **Openly discuss successes, failures and lessons learned** from digital health projects to share experiences and improve approaches.

2.2. **Leverage UNICEF Information and Communication Technology Division technology for development staff** in country and regional offices to support programme colleagues to design and scale technology solutions.

2.3. **Develop a global directory of UNICEF digital health experts at the country, regional and headquarters levels** who can be called upon to provide technical assistance and advice on designing, enhancing and scaling digital solutions.

2.4. **Engage UNICEF programme, innovation, ICT, data and analytics and monitoring and evaluation staff** to co-develop, implement, monitor and evaluate digital health programmes early in the process.

2.5. **Generate resources** to address internal staffing deficits and enhance external partnerships to support UNICEF digital health initiatives.

**External / partnerships**

2.6. **Leverage the commitments made to the Health Data Collaborative at the global and regional (e.g., AeHIN) levels** to coordinate resources and approaches to data and digital data collection in support of countries.

2.7. **Develop a roster for short-term surge support** and Long Term Arrangement for Services for technical assistance on the implementation and scaling of digital health solutions.

## 3. Strengthen knowledge management and communities of practice

3.1. **Develop a global digital health community of practice** within UNICEF using tools such as Yammer to promote digital health exchange among health, ICT, innovation and other staff.

3.2. **Develop country and regional case studies** of successful digital health projects that can be scaled at the regional level, and provide input on the strategic coordination of deployments at the global level

3.3. **Create an inventory of digital health initiatives** supported by UNICEF.

## 4. Design implementation research and monitoring and evaluation for digital health

4.1. **Embed implementation research** in digital health programmes.

4.2. **Develop country, regional and global level monitoring and evaluation** frameworks for digital health interventions that consider the WHO practical guide for reporting and evaluating digital health programmes[41] and follow the UNICEF Data for Children strategic framework.[42]

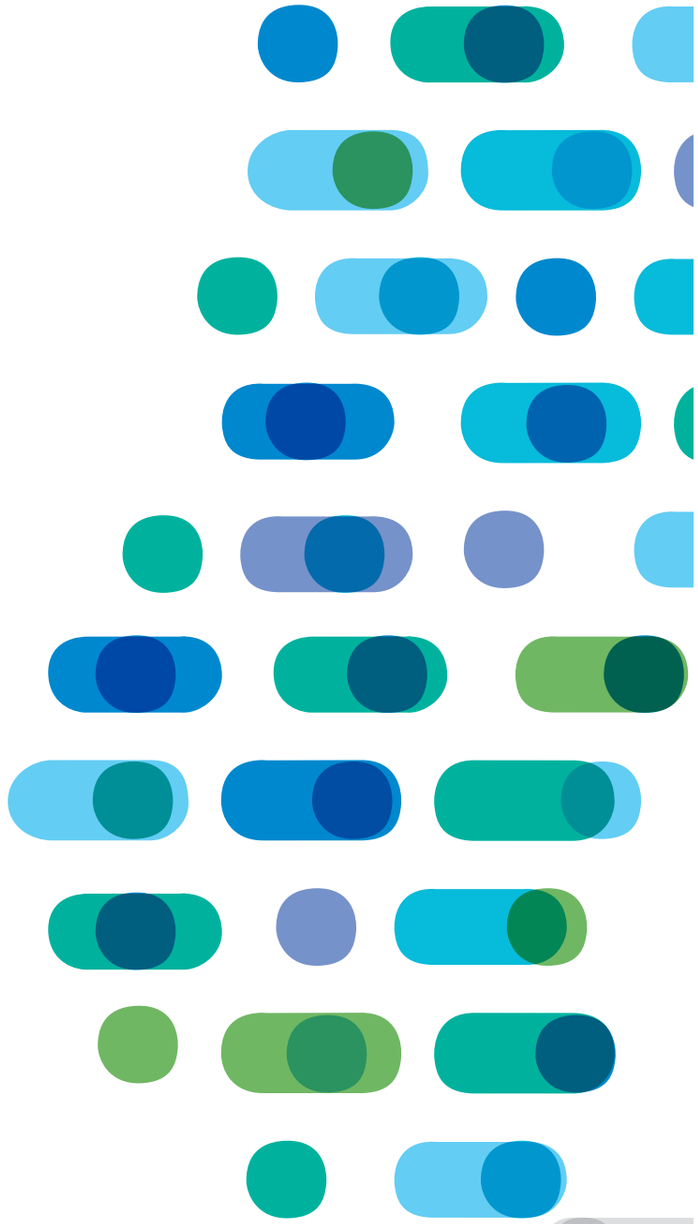
41 World Health Organization, Monitoring and Evaluating Digital Health Interventions: A practical guide to conducting research and assessment, WHO, Geneva, 2016, <http://apps.who.int/iris/bitstream/handle/10665/252183/9789241511766-eng.pdf;jsessionid=148F506CE84E40EA26D09AC2B099589A?sequence=1>, accessed 17 August 2018.

42 United Nations Children's Fund, 'Data for Children Strategic Framework', UNICEF, April 2017, <https://data.unicef.org/wp-content/uploads/2017/04/Data-for-Children-Strategic-Framework-UNICEF.pdf>, accessed 17 August 2018.

# IV. Conclusion

As digital health increasingly becomes a core component of government health strategies, UNICEF is investing in strengthening internal capacity, coordination and partnerships to better support governments to use digital health technologies at scale to enhance health service delivery and achieve health goals. UNICEF is well positioned to guide countries to use ICTs to realize the right to health of all children and adolescents.

UNICEF's Approach to Digital Health is meant to provide the organization with a basic understanding of digital health, identify the organization's comparative advantages and vision for digital health and align digital health approaches to advance the UNICEF Strategic Plan, 2018–2021, and the UNICEF Strategy for Health, 2016–2030. By considering digital health a routine part of business, UNICEF and its partners can more effectively use ICTs to promote equity-based investments and interventions to engage citizens, improve government transparency and accountability, and reduce maternal and child morbidity and mortality.



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# Annex 2: What is digital health?

The term 'digital health' refers to the use of digital technologies in health programming and financing. According to WHO, digital health can be defined as "the use of digital, mobile and wireless technologies to support the achievement of health objectives. Digital health describes the general use of information and communication technologies for health and is inclusive of both mHealth and eHealth".[43] Digital health interventions can include various technologies, such as mobile applications, short messaging service (SMS), interactive voice response, health management information systems, mobile diagnostic devices, wearables, drones and big data analytics.

Digital health interventions have demonstrated impacts on a wide range of outcomes, including reducing loss to follow-up, improving adherence to antenatal clinical visits and increasing adherence to life-saving medications or immunization schedules.[44] Mobile applications have helped community health workers provide essential household services and referrals that have improved the quality of care offered at the community level.[45] WHO, with input from partners, including UNICEF, is also working on a systematic review of digital health interventions and their impact on health outcomes. The review will be available in 2017.

Despite the added value that digital health interventions have shown to date, many such interventions have so far been limited in scope and geographic scale.[46] Historically, investments in digital health have been uncoordinated, sometimes leading to duplication of efforts and making it difficult to compare digital systems in a standardized way.[47] Globally, there has also been a poor understanding of existing digital systems, how they function and the stages of maturity of interventions.[48]

There are currently opportunities to support countries to better understand the tools available, best practices and cost-effective approaches to adopting technology-focused solutions that are more holistic and systems-focused. UNICEF's leadership in the Health Data Collaborative,

43 World Health Organization, Monitoring and Evaluating Digital Health Interventions: A practical guide to conducting research and assessment, WHO, Geneva, 2016, <http://apps.who.int/iris/bitstream/handle/10665/252183/9789241511766-eng.pdf;jsessionid=3A31CC30B1600D7830DAF35CC4EAC012?sequence=1>, accessed 20 August 2018.

44 Noordam, A.C. et al., 'Improvement of maternal health services through the use of mobile phones', Trop Med Int Health, vol. 16, no. 5, May 2011, pp. 622-6; and Sondaal, S.F.V. et al., 'Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries: A systematic review', PLoS ONE, vol. 11, no. 5, 4 May 2016, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0154664>, accessed 20 August 2018.

45 Braun, R. et al., 'Community health workers and mobile technology: A systematic review of the literature', PLoS ONE, vol. 8, no. 6, 12 June 2014, e65772; Källander, K. et al., 'Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low- and middle-income countries: A review', J Med Internet Res, vol. 15, no. 1, 25 January 2013, e17; Hall, C.S. et al., 'Assessing the impact of mHealth interventions in low- and middle-income countries – what has been shown to work?' vol. 7, 27 October 2014.

46 Labrique, Alain B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', Global Health: Science and Practice, vol. 1, no. 2, August 2013, pp.160-171.

47 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017, , <http://www.who.int/medical_devices/global_forum/Thedigitalhealthaltas.pdf>, accessed 17, August 2018.

48 Ibid.

which works to harmonize investments across donors and partners and adopt country-driven approaches, is a good example of the organization's commitment to pursuing partnerships driven by country needs and system-related bottlenecks to achieve the SDGs.

## Moving towards national HIS

The digital revolution is transforming the global economy, allowing governments to move away from legacy systems towards utilizing technological innovations that cut across sectors. This means that countries are changing the ways that they do business, and national investments, policies, governance frameworks, skills and competencies will need to be aligned to support the scaling and sustainability of digital health interventions. This includes ensuring that governance, policy, legislation, standards and human resources are able and available to support scaled digital health systems, and that new partnerships are forged with ICT sectors.

In order to guide countries to develop national digital health frameworks, WHO and the International Telecommunications Union developed a national eHealth strategy toolkit to help countries design national policies and strategies and build the capacity to implement and sustain technology-focused investments.[49] These national strategies and information architectures go beyond any one solution to depict how current and emerging technologies can be incorporated into health care delivery processes and systems.

**Figure 8 WHO-International Telecommunications Union National eHealth Strategy Toolkit, 2012**


Figure 8 depicts the seven major components of a national HIS, as outlined in the toolkit. These components include investing in strategies, governance structures, infrastructure, and capacity building to sustain interventions over time. As investments in national digitally-enhanced systems continue to grow, countries are grappling with how investments in the larger system can not only help grow economies, but also

49 World Health Organization and International Telecommunication Union, 'National eHealth Strategy Toolkit', WHO and ITU, Geneva, 2012, <www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-E.pdf>, accessed 26 August 2018.

improve the availability, quality and reach of maternal and child health outcomes.

As evidence of the usability and acceptability of digital health programmes continues to emerge, the global community is shifting to applying a system-level approach to leveraging technologies to improve health system performance.[50] Applying a HSS lens shifts the thinking from designing a digital health programme that works to considering the tools that will impact health outcomes or systems.[51] This can be done by first identifying the key bottlenecks and barriers to achieving adequate coverage of quality health services and then assessing whether technologies can be applied to address these bottlenecks.

WHO is currently working on developing a robust taxonomy for the utilization of digital health interventions across the reproductive maternal, neonatal and child health continuum. Starting by identifying the bottlenecks and barriers to achieving a health or system goal, the taxonomy then helps to identify how digital tools can be leveraged to address constraints. The global taxonomy also outlines key digital health terminology.

50 Mehl G. and A. Labrique, 'Prioritizing integrated mHealth strategies for universal health coverage', *Science,* vol. 345, no. 6202, 12 September 2014, pp. 1284–7.

51 Labrique A.B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', *Glob Health Sci Pract,* vol. 1, no. 2, 2013, pp. 160–171.

**Figure 9 Twelve functions of digital technologies[52]**


52 Labrique A.B. et al., 'mHealth innovations as health system strengthening tools: 12 common applications and a visual framework', Glob Health Sci Pract, vol. 1, no. 2, 2013, pp. 160-171.

This taxonomy leverages WHO digital health framework for HSS that helps to frame how digital tools can be targeted to reach health goals. The framework encourages thinking about: 1) where on the life course digital tools will be applied; 2) what public health interventions will be enhanced; 3) which health constraint the intervention is seeking to overcome; 4) how digital health is applied (function, technology and purpose); and 5) where the digital programme engages stakeholders (facilities, providers, clients).[53] The taxonomy also outlines how to identify the health constraint that is being addressed (e.g., information, availability, quality, acceptability, utilization, efficiency, and cost and accountability).

Following the identification of health constraints, the taxonomy then further identifies how a digital function can be used to address needs. This helps programme staff view the role digital tools can play, and keeps the focus on the types of functions, rather than the tools themselves. Figure 9 defines 12 major functions that digital tools can play.

53 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017; World Health Organization, 'Classification of digital health interventions v.1.0: A shared language to describe the uses of digital technology for health', WHO, 2018, < http://www.who.int/reproductivehealth/publications/mhealth/classification-digital-health-interventions/en/>, accessed August 17, 2018.

**Figure 10 Examples of common mobile phone functions related to ICT for health[54]**

## Examples of Common Mobile Phone Functions Related to ICT for Health

| | Common mHealth and ICT Applications | Examples of Mobile Phone Functions |
|---|---|---|
| 1 | Client education and behavior change communication (BCC) | • Short Message Service (SMS)<br>• N Multimedia Messaging Service (MMS)<br>• Interactive Voice Response (IVR)<br>• Voice communication/Audio clips<br>• Video clips<br>• Images |
| 2 | Sensors and point-of-care diagnostics | • Mobile phone camera<br>• Tethered accessory sensors, devices<br>• Built-in accelerometer |
| 3 | Registries and vital events tracking | • Short Message Service (SMS)<br>• Voice communication<br>• Digital forms |
| 4 | Data collection and reporting | • Short Message Service (SMS)<br>• N Digital forms<br>• N Voice communication |
| 5 | Electronic health records | • Digital forms<br>• N Mobile web (WAP/GPRS) |
| 6 | Electronic decision support (information, protocols, algorithms, checklists) | • Mobile web (WAP/GPRS)<br>• Stored information "apps"<br>• Interactive Voice Response (IVR) |
| 7 | Provider-to-provider communication (user groups, consultation) | • Short Message Service (SMS)<br>• Multimedia Messaging Service (MMS)<br>• Mobile phone camera |
| 8 | Provider work planning and scheduling | • Interactive electronic client lists<br>• Short Message Service (SMS) alerts<br>• Mobile phone calendar |
| 9 | Provider training and education | • Short Message Service (SMS)<br>• Multimedia Messaging Service (MMS)<br>• Interactive Voice Response (IVR)<br>• Voice communication<br>• Audio or video clips, images |
| 10 | Human resource management | • Web-based performance dashboards<br>• Global Positioning Service (GPS)<br>• Voice communication<br>• Short Message Service (SMS) |
| 11 | Supply chain management | • Web-based supply dashboards<br>• Global Positioning Service (GPS)<br>• Digital forms<br>• Short Message Service (SMS) |
| 12 | Financial transactions and incentives | • Mobile money transfers and banking services<br>• Transfer of airtime minutes |

*Abbreviations: GPRS, General Packet Radio Service; WAP, Wireless Application Protocol.*

54 Ibid.

## Figure 11 WHO classification of digital health interventions v1.0[55]

### 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** | **UNTARGETED 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 CLIENTS** |
| 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 HEALTH PROVIDERS

| | |
|---|---|
| **2.1** | **CLIENT INDENTIFICATION 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 |
| 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 | Consultation 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 events 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 services within health sector |
| 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 TRANING** |
| 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 MANAGEMENT** |
| 2.10.1 | Transmit diagnostic result to health orders |
| 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 HEALTH 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 MANGEMENT** |
| 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 sub-standard 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 |
| 4.2.1 | Merge, de-duplicate, and curate coded datasets or terminologies |
| 4.2.1 | Classify disease codes |
| **4.3** | **LOCATION MAPPING** |
| 4.4.1 | Data exchange across systems |
| 4.4.2 | Map location of health events |
| 4.4.3 | Map location of clients and households |
| 4.4.4 | Map location of healthcare provider(s) |
| **4.4** | **DATA EXCHANGE AND INTERPERABILITY** |
| 4.4.1 | Data exchange across systems |

55 Ibid.

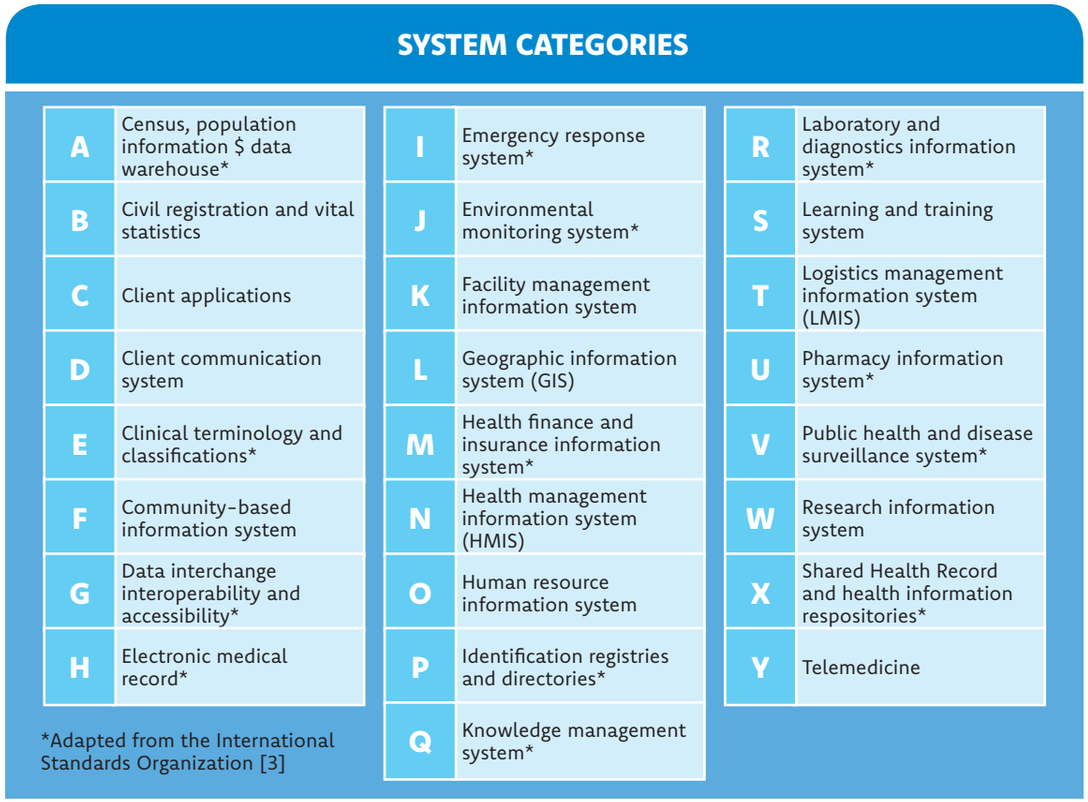
Once the functions are identified, different types of technology solutions can be leveraged. These can include SMS, mobile decision support applications, interactive voice response, mobile money and others (*see Figure 10 for examples of mobile phone technologies that can be used for health*). Programme staff can then identify which technology software platforms to utilize.

The taxonomy also identifies the actors that will be engaged in the intervention – the client, the provider and the system itself.[56]

## National health information architectures and interoperable systems

Countries are now moving away from paper-based and fragmented data collection and surveillance systems towards digitally connected and integrated national HIS.[57] Many digital health tools can support national health systems with the foundational elements of a strong HIS, such as electronic medical records, enhanced pharmacy systems, improved diagnostics, client communication systems, payroll management, data collection and shared health records, among others.[58] Figure 12 shows the different types of systems defined by WHO.

**Figure 12 WHO HIS system categories, 2018**




56 World Health Organization, 'Classification of digital health interventions v.1.0: A shared language to describe the uses of digital technology for health', WHO, 2018

57 Health Data Collaborative Digital Health and Interoperability Working Group Co-Chairs, 'Taming the Wild West of Digital Health Data: Linking systems to strengthen global health outcomes', Health Data Collaborative, 29 September 2016, <www.healthdatacollaborative.org/news/article/taming-the-wild-west-of-digital-health-data-linking-systems-to-strengthen-global-health-outcomes-79/>, accessed 26 August 2018.

58 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017, <http://www.who.int/medical_devices/global_forum/Thedigitalhealthaltas.pdf>, accessed 17, August 2018.

**Examples of Open Source Software Solutions for Low and Middle-Income Countries**

**District Health Information System (DHIS2)** is as information system platform for data management, visualization, analysis, and use. The software is customizable and has been used by over 60 countries to monitor health programs, and for facility registries, service mapping, logistics management, and mobile tracking of clients.

**RapidPro** is UNICEF supported open source platform, to send and receive data using complex workflows and facilitate communication in real-time using SMS and other channels.

**Open Medical Record System (OpenMRS)** is the leadning open source platform that enables countries to design custom medical records system that stores diagnosis, test, procedures and other client health information.

**Open Logistic Management Information System (OpenLMIS)** is the leading open source platform to manage health commodity supply chains in low and middle-income counties.

**Open Smart Register Platform (OpenSRP)** is an open source mobile platform that allows frontline health workers to register and track their client populations.

Key to developing a national HIS is ensuring that technology solutions are interoperable, and can exchange and use data through linked systems. This means moving towards interconnected systems, removing fragmentation and reducing inefficiencies.[59] With the proliferation of open-source digital tools, countries are now developing data standards and guidelines geared towards interoperable systems. OpenHIE – an information architecture that connects key information systems to facilitate effective data exchange – has emerged as an important community and resource for countries.[60] The OpenHIE framework consists of registries that help countries register and monitor clients, facilities and health workers. The framework creates an interoperability layer that can pull and push data between systems using established data standards. Figure 13 illustrates how the OpenHIE framework supports data exchange between information systems at the country level.

59 Health Data Collaborative Digital Health and Interoperability Working Group Co-Chairs, 'Taming the Wild West of Digital Health Data: Linking systems to strengthen global health outcomes', Health Data Collaborative, 29 September 2016, <www.healthdatacollaborative.org/news/article/taming-the-wild-west-of-digital-health-data-linking-systems-to-strengthen-global-health-outcomes-79/>, accessed 26 August 2018.

60 OpenHIE, 'A Laypersons Guide to OpenHIE', PowerPoint presentation, 2016, <https://wiki.ohie.org/download/attachments/13926693/A%20Laypersons%20Guide%20To%20OpenHIE.pptx?api=v2>, accessed 26 August 2018.

## Available open-source technologies

Countries now have access to several open-source technology solutions that can be adapted to their specific needs. Open-source refers to software that can be modified and shared openly because it is made publicly available. Open-source projects, products or initiatives embrace principles of open exchange, collaboration, transparency and community-oriented development.[61]

It is important to note that open-source does not mean free; nor does it mean that the software is necessarily a good solution that is ready for piloting or scaling. Many available tools require investments in adaptations or enhancements to fit local contexts and needs. Several open-source software solutions have been developed to support various country-level HIS needs, such as UNICEF's RapidPro, a robust communication engine powering millions of messages around the world that reach people on their mobile phones. Although many of the messages sent and received through RapidPro focus on health messaging or reporting, RapidPro is not a standalone health platform, but a generic, flexible software platform that enables personalized messages and customizable reports at scale.

In addition to the open-source tools available, many private sector technology companies are also developing proprietary solutions that are being adopted within countries and require ongoing financial and technical resources to adapt and scale. Regardless of the tool selected, countries need to ensure that systems are interoperable.

61 Opensource.com, 'What is open source?' <https://opensource.com/resources/what-open-source>, accessed 26 August 2018.

**Figure 13: OpenHIE Framework, 2016**

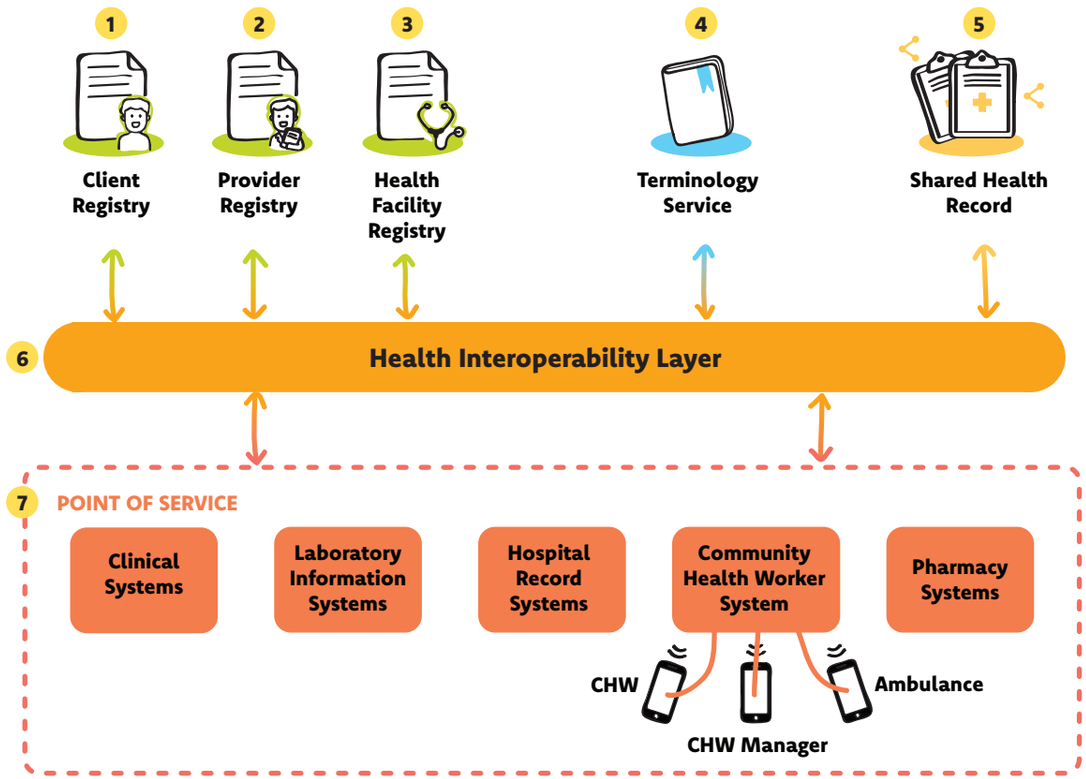
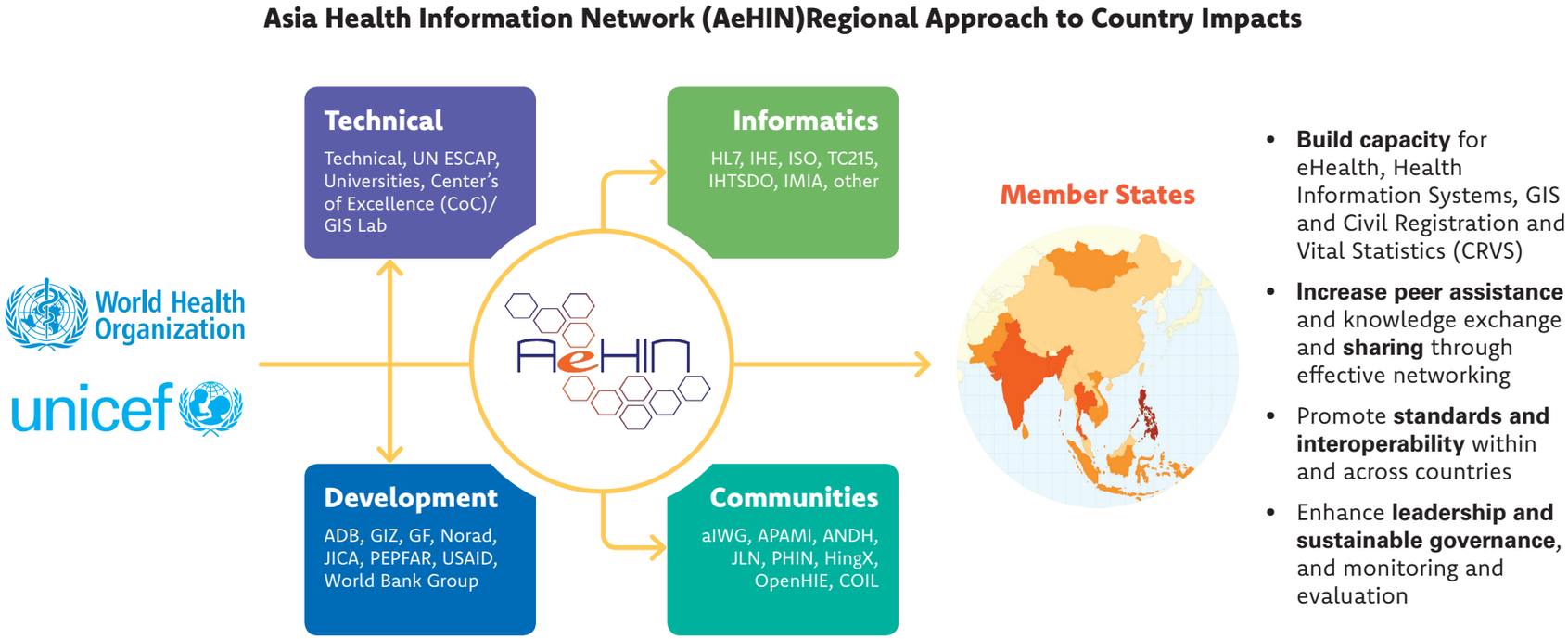


Figure 14: AeHIN Regional Network Approach, 2017




## Regional frameworks

In addition to the planning being done at the country level, efforts are also being made to develop standards for data exchange and information system planning at the regional level. For example, since 2011, AeHIN has been working with countries in the Asia-Pacific region to shape the digital health landscape. In recent years, the UNICEF East Asia and the Pacific Regional Office has been working with AeHIN to develop the Mind the GAPS Framework.

Beginning in 2015, AeHIN developed a country-led eHealth convergence workshop series to better guide countries to implement digital health solutions and unify development partner support. These workshops have been invaluable to moving digital health solutions forward in at the country level, including through the exchange of lessons on key opportunities and challenges.

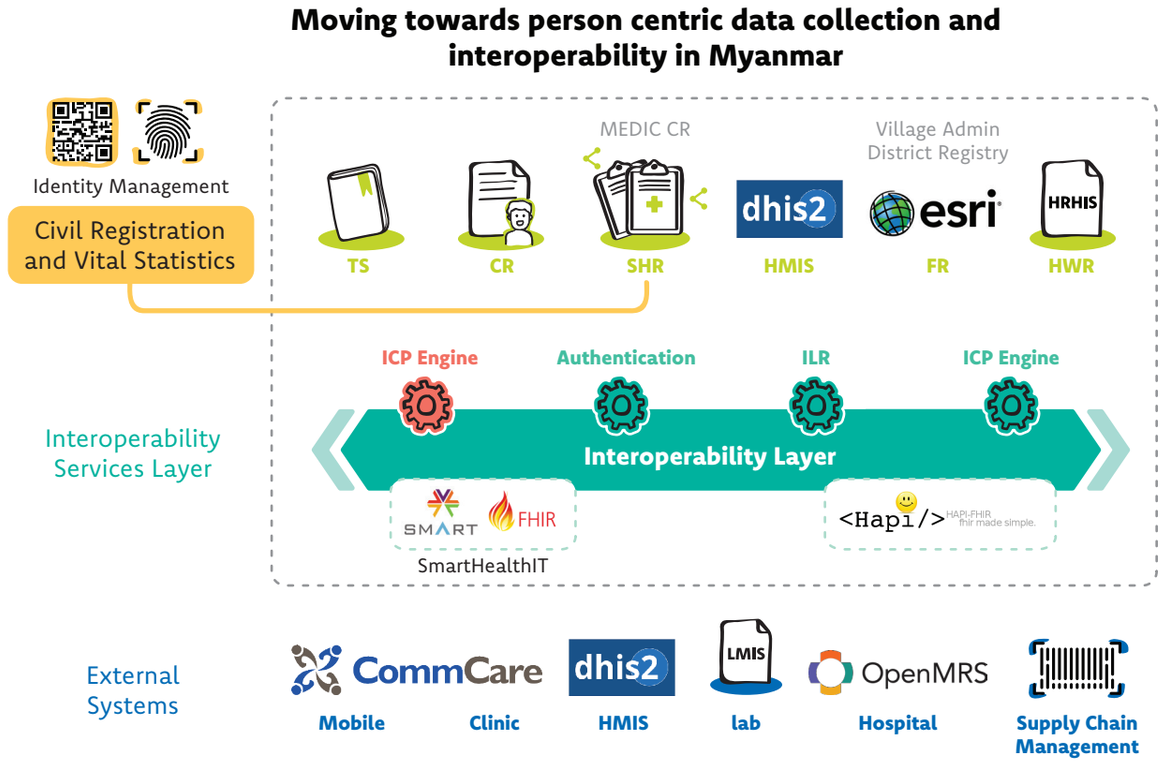
Output from the first AeHIN convergence workshop held in Myanmar in 2015 included adoption of the OpenHIE Framework to guide digital investments and advocacy. Several of the key components of the OpenHIE framework are currently being implemented in Myanmar including DHIS2, Master Patient Index/Client Registry, Facility Registry, and

Health Worker registry. Beyond OpenHIE, the convergence workshops draw heavily on the WHO Classification of Digital Health Interventions and the WHO/ITU eHealth Strategy Toolkit.

Increasing equitable access to quality health services and measuring progress towards universal health coverage will be central to achieving SDG-3 – ensure healthy lives and promote well-being for all at all ages. As part of this process, ICT solutions that facilitate the generation, integration and analysis of geospatial data on population and health services – such as geographic information systems – will be essential to addressing health system inefficiencies and improving health service delivery planning and management.

The Health Geo-Lab collaborative established to support the effective implementation of GIS uses the 4Ts – training, tooling, testing and teaming – approach to strengthen in-country capacity for a geo-enable HIS. This approach supports geographically-based decision-making and therefore a more systematic approach to solving public health problems and achieving equity and UHC.

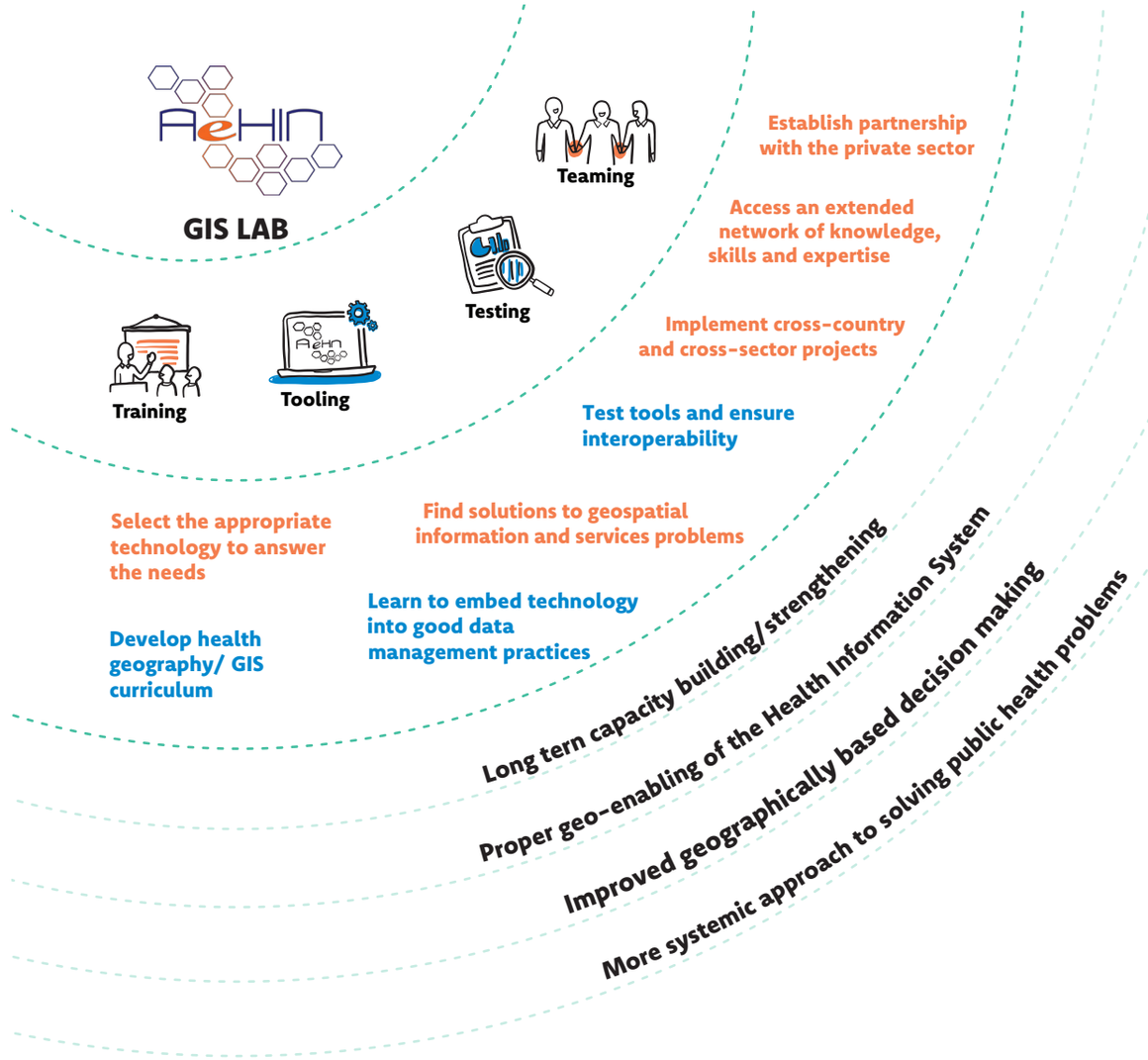
**Figure 15: Myanmar HIS, 2016**



## Available country- and regional-level resources

As more countries adopt digital technologies, resources will become available to support intervention planning. These resources will be key to designing scalable digital health programmes. WHO and its partners have developed the mHealth Assessment and Planning for Scale tool,[62] which serves as a resource for countries and partners to assess the enabling environment, as well as technical and programmatic considerations for scaling and sustaining solutions. Other resources, such as national inventories of digital health projects, including the Digital Health Atlas, can also help to reduce duplication and promote collaboration.[63]

**Figure 16 AeHIS Geographic Information System Lab, 2016**




Main driver: Universal Health Coverage (UHC)

62 World Health Organization, *The MAPS Toolkit: mHealth assessment and planning for scale,* WHO, 2015.

63 Mehl, G., 'The Digital Health Atlas for Inventories and Routine Registration of Digital Health Investments', 2017, <http://www.who.int/medical_devices/global_forum/Thedigitalhealthaltas.pdf>, accessed 17, August 2018.

## Leveraging digital health to improve data collection and use

One of the challenges that the digital health field has faced is a lack of standardized reporting frameworks for monitoring and evaluation. This has led to a lack of completeness in project reporting and has limited the extent to which intervention impact can be analysed.[64]

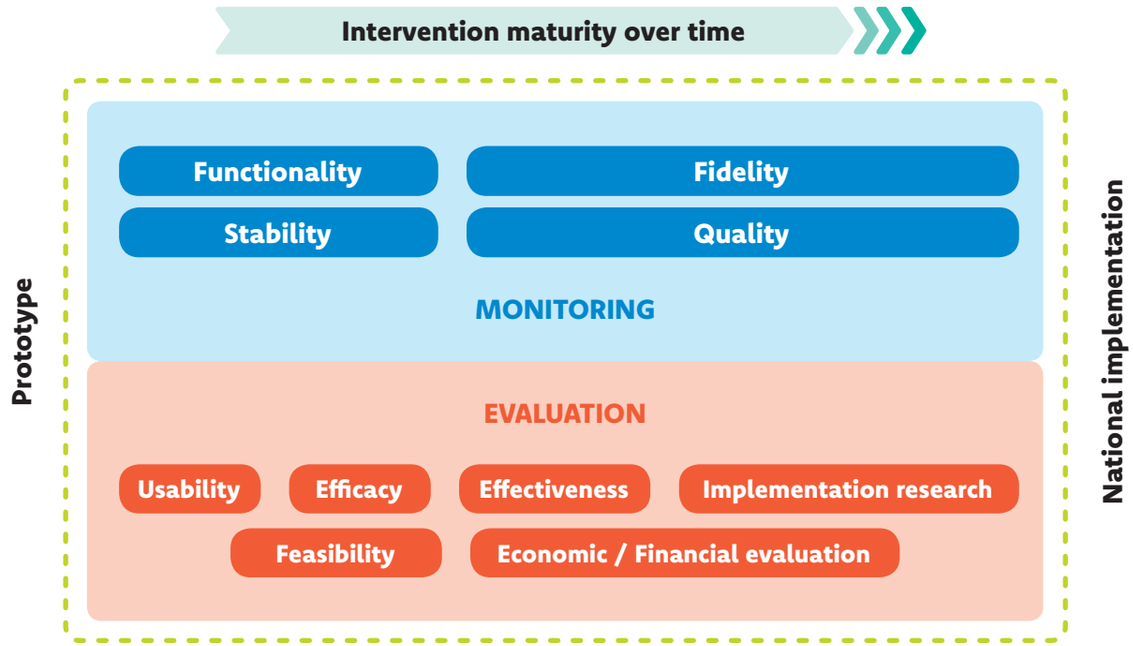
Digital technologies can produce a large amount of data that can be leveraged and used to improve programming, increase accountability and encourage citizen engagement. When planning a monitoring and evaluation plan for a digital health intervention, it is important to understand how intervention will likely mature over time. WHO developed the Monitoring and Evaluating Digital Health Interventions tool, which helps programmes define the types of monitoring and evaluation inputs that will be necessary over time.[65]

Throughout the life cycle of implementation, it is important to ensure the digital health solution is functional and stable. As the solution achieves functional stability, monitoring indicators move towards considering the degree to which fidelity and quality are maintained over time and at a national scale.

In terms of evaluation, key indicators relate to usability, feasibility and efficacy during initial the stages. Research and data collection on effectiveness, economic evaluation and implementation research can provide insights into the progress made towards the health outcome or system strengthening component of interest.[66]

**Digital Health Atlas: National mHealth Inventory Platform:** This WHO-led web-based tool helps countries document digital health programs implemented within a country setting to coordinate efforts.

**Figure 17: Monitoring and Evaluating Digital Health Interventions, WHO 2016**




64 Agarwal, S. et al., 'Guidelines for reporting of health interventions using mobile phones: Mobile health (mHealth) evidence reporting and assessment (mERA) checklist', *BMJ*, vol. 352, 17 March 2016.

65 World Health Organization, *Monitoring and Evaluating Digital Health Interventions: A practical guide to conducting research and assessment*, WHO, Geneva, 2016, <http://apps.who.int/iris/bitstream/handle/10665/252183/9789241511766-eng.pdf;jsessionid=148F506CE84E40EA26D09AC2B099589A?sequence=1>, accessed 17 August 2018.

66 Ibid.

# Annex 3: Internal UNICEF digital health resources

## UNICEF Headquarters in New York, Health Section, Implementation Research and Delivery Science Unit

The Implementation Research and Delivery Science Unit serves a coordinating role that supports the development, dissemination and implementation of UNICEF's Approach to Digital Health. This includes supporting UNICEF staff digital health expertise; multi-sectoral and multi-division collaboration; digital health partnerships; knowledge management and communities of practice; implementation research; and monitoring and evaluation for digital health. The aim is to strengthen support to ministries across sectors to design, deploy and scale government-led child- and adolescent-focused digital health interventions.

## Designing Digital Interventions for Lasting Impact: A human-centred guide to digital health deployments

The Designing Digital Interventions for Lasting Impact toolkit[67] introduces human-centred design, a problem-solving process that starts with understanding the community and context surrounding a challenge. Designing for people and their everyday interactions assures that you will uncover and solve for the right problems. A well-functioning digital solution fails if it only works in theory and doesn't anticipate issues faced by front-line workers, members of the community, caregivers and the existing technology system. No digital health expert has more knowledge than a community health worker or nurse about how to solve his or her problem. The methodologies in the toolkit focus on observing, interacting with and diagnosing human behaviour and the interactions and actions of different stakeholders within health systems, as well as the technical constraints and specifications needed to inform the design of a digital health deployment.

## RapidPro Health Microsite

The RapidPro Health Microsite[68] provides an overview of different applications, use cases and case studies of RapidPro in the health sector. The site is designed to support existing and future RapidPro users to better design and deploy digital health interventions.

## Office of Innovation,[69] Global Innovation Centre, Scale Team

The Global Innovation Centre supports and incubates innovations developed by UNICEF and partners and facilitates the adoption of proven innovations within UNICEF. The Centre provides leadership and technical support for the roll-out and scale-up of proven innovative solutions globally.

67 United Nations Children's Fund, *Designing Digital Interventions for Lasting Impact: A human-centred guide to digital health deployments,* UNICEF, <https://drive.google.com/file/d/1hNx5drnRHTf_Rs1YlmpZQWKCdzRNM7sE/view>, accessed 20 August 2018.

68 RapidPro, <https://community.rapidpro.io/about-rapidpro/>, accessed 26 August 2018.

69 United Nations Children's Fund, 'Innovation', <www.unicef.org/innovation/>, accessed 26 August 2018.

## Office of Innovation, Ventures Team

The Ventures Team invests in early stage solutions that have the potential to impact children in the one- to two-year future. This group also manages the UNICEF innovation Fund, which provides seed funding for open-source products and projects with the potential to accelerate results for children.

## Office of Innovation, Futures Team

The Future Team looks towards the two- to five-year horizon for emerging and trending technologies that UNICEF can leverage. Investment areas include transportation, mobile financial services and digital currencies, wearables and sensor technology.

## UNICEF Supply Division in Copenhagen

This division develops new products and technologies that have an impact on programmes and emergencies, with solutions ranging from mobile diagnostic aids to Zika diagnostics.

## UNICEF Stories of Innovation

The UNICEF Stories of Innovation website[70] provides information about UNICEF innovations, principles and stories from across the Office of Innovation, including digital health deployments.

## Directory of UNICEF digital health experts (forthcoming)

The UNICEF Headquarters Health Section maintains a directory of digital health experts at the country, regional and global levels. These experts can provide technical assistance, as well as advice and guidance on designing, enhancing and scaling digital solutions.

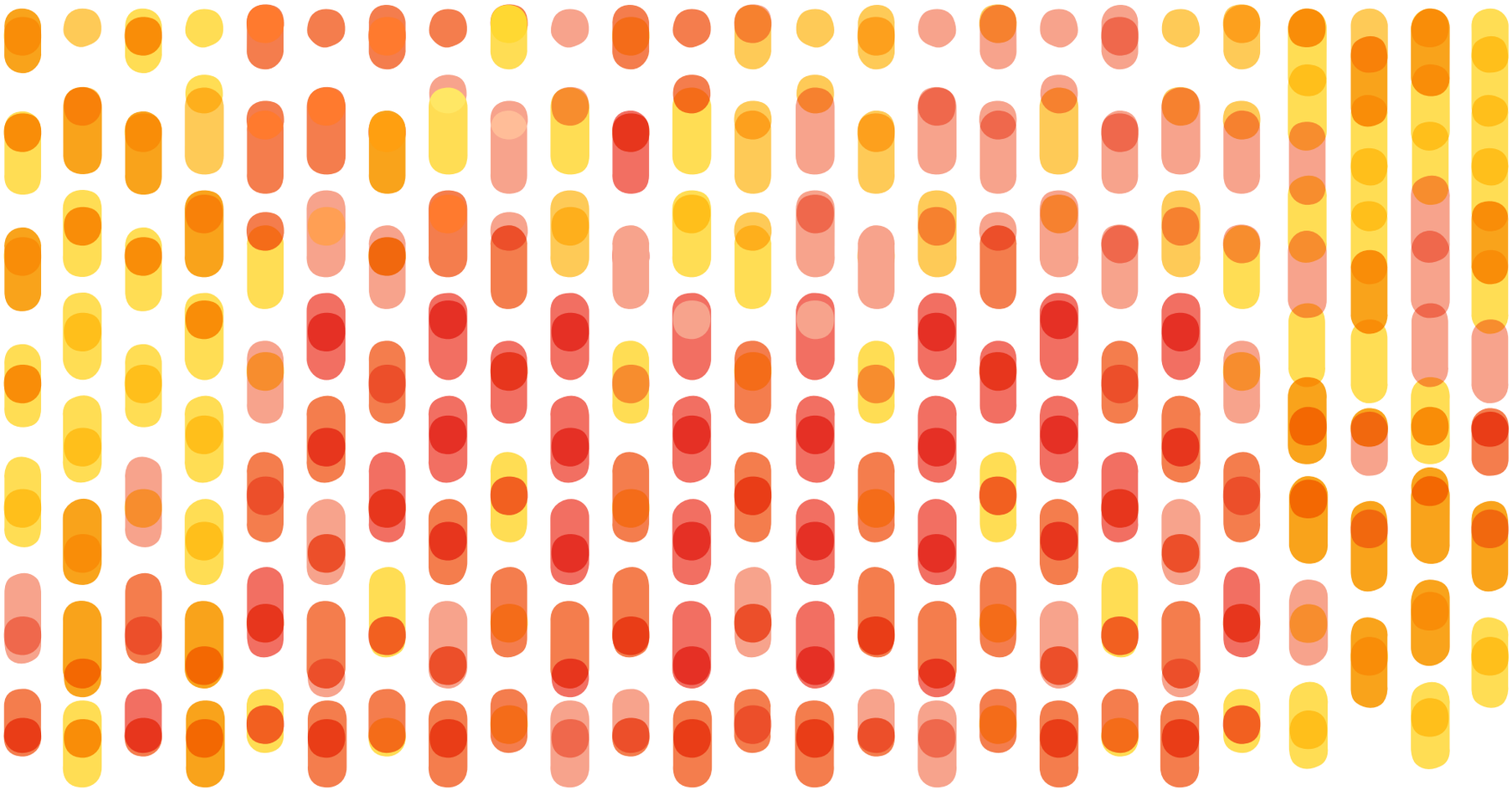
## Long Term Agreement for Services (LTAS), digital health (forthcoming)

UNICEF holds a number of LTAS with key partners for implementing and scaling digital solutions. Links providing details of the LTAS are forthcoming.

## UNICEF ICT Division

The goal of the UNICEF ICT Division is to help programme and innovations staff identify and address technology needs for designing, enhancing, scaling and maintaining digital health deployments to support programme goals. Regional offices have technology for development regional business analysts, and most country offices have ICT posts that can also be leveraged.

70 United Nations Children's Fund, 'Stories of Innovation', <http://unicefstories.org/>, accessed 26 August 2018.



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