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The use of digital tools at large scale: lessons from a health programme in Burkina Faso

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The first article of this Focus is feedback from a digital health project *Terre des hommes* has led for almost eight years. This timeframe makes it possible for the authors to argue that from the outset a project such as this must be designed on a large scale and in cooperation with the government, that it must follow an iterative approach to continuously take user feedback into account and overcome resistance to change.

Digital technologies today represent the greatest opportunity to transform primary healthcare in low and middle-income countries (LMICs). Over the last few years, we have witnessed a massive increase in the penetration of digital technologies, even in the poorest regions of the world. The number of mobile telephone subscriptions in sub-Saharan Africa has increased from 18% in 2006 to 74% in 2016. In that region, Internet use has increased 20-fold during the same period, with more than 20% of the population connected today[1].

The broad availability of digital devices has fuelled a surge in the number of health projects supported by information and communication technologies (ICT). A recent study reported almost 150 projects in LMICs using mobile digital tools to support frontline health workers (FHW)[2]. The majority of projects focused on data collection, training and decision support, followed by other functions such as provider-to-provider communication, electronic medical records, behaviour change communication, and supply chain management. Research studies have shown the feasibility and positive impact of these digital health interventions, mostly in terms of coverage and the timeliness of interventions, and to a lesser extent, better decision-making by providers and improved health outcomes[3].

High, under-exploited potential

However, despite the resources and energy spent on digital health in LMICs, only a fraction of the projects have achieved significant scale. Low scalability, fragmentation of donors and implementers, no interoperability between digital systems, and non-viable business models, are

[1] International Telecommunication Union, www.itu.int
[2] Smisha Agarwal *et al.*, *Mobile technology in support of frontline health workers. A comprehensive overview of the landscape knowledge gaps and future directions*, Johns Hopkins University Global mHealth Initiative, 2016, www.chwcentral.org/mobile-technology-support-frontline-health-workers
[3] Smisha Agarwal *et al.*, "Evidence on Feasibility and Effective Use of mHealth Strategies by Frontline Health Workers in Developing Countries: Systematic Review", *Tropical Medicine & International Health*, 20(8), 2015, 1003-1014; Caroline Free *et al.*, "The Effectiveness of Mobile-Health Technologies to Improve Health Care Service Delivery Processes: A Systematic Review and Meta-Analysis", *PLoS Medicine*, 10(1), 2013.

among the factors that undermine the potential of digital health in LMICs[4]. The study from Agarwal et al. mentioned above (footnote 3) identified only 11 projects with more than 1,000 users (out of the almost 150 active projects). Similarly, evidence of positive impact comes mostly from small-scale projects addressing a narrow set of health issues. Finally, in many countries the digital ecosystem (institutional leadership and capacity, infrastructure, policies, digital health strategy, local service providers, etc.) is still not strong enough to support the digital transformation of the health system.

Nowadays, many organisations entering the digital health space encounter huge challenges when trying to scale up their interventions beyond the pilot phase. This indicates the need to build digital health systems for scale from the start, complying with basic principles[5] to maximise the chances of scaling up the intervention at national level.

Terre des hommes (TDH) started using ICT tools in Burkina Faso in 2010 to improve the delivery of primary healthcare (PHC) services. Over the last few years the organisation has worked with the government and key stakeholders to build a scalable intervention that contributes to the digital health ecosystem in Burkina Faso. The journey from designing and piloting the tool, to scaling it up to almost one third of the country, has provided important lessons to TDH, the Ministry of Health (MoH) and other stakeholders. In the following pages, we provide a description of the intervention and reflect on some of the most important lessons we have learned along the way.

IeDA background

Adherence to clinical guidelines contributes to quality of care, and decreased morbidity and mortality. In the case of the Integrated Management of Childhood Illnesses (IMCI)[6], developed by the World Health Organization (WHO) and adopted by most developing countries[7], only a low percentage of FHWs follow the clinical protocols[8]. The Integrated e-Diagnostic Approach (IeDA)[9] was developed by TDH, in partnership with the MoH, to overcome this problem by assisting FHWs during consultations with children under five.

The digital tool is built on Dimagi's CommCare platform[10]. Using an existing digital platform allowed us to focus on the design of the digital tool rather than the platform itself, and comply with individual health data collection, transmission and storage regulations. In terms of mobile penetration, the situation in Burkina Faso is similar to other countries in the region (estimated at 78% in 2015) as network coverage was estimated at 85% in 2012.

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[4] Mike Meloan and Pablo Iacopino, *Scaling digital health in developing markets, Opportunities and recommendations for mobile operators and other stakeholders*, GSMA Intelligence, June 2017, www.gsmaintelligence.com/research/?file=c581aa43bdb7b7d236bb937698c2d6fd&download

[5] https://digitalprinciples.org/principles

[6] Siri Lange *et al.*, "Why don't clinicians adhere more consistently to guidelines for the Integrated Management of Childhood Illness (IMCI)?", *Social Science & Medicine*, 104, March 2014, 56-63; Carsten Krüger *et al.*, "Adherence to the integrated management of childhood illness guidelines in Namibia, Kenya, Tanzania and Uganda: evidence from the national service provision assessment surveys", *BMC Health Services Research*, 17(1), 2017, 822.

[7] World Health Organization, *Integrated Management of Childhood Illness. Global survey report*, WHO, Geneva, 2017.

[8] Tarun Gera *et al.*, "Integrated Management of Childhood Illness (IMCI) Strategy for children under five: effects on death, service utilisation and illness", *Cochrane Database of Systematic Reviews*, 12th September 2012.

[9] http://ieda-project.org. Implementing partners include the Ministry of Health, Dimagi, Inc., and University Research Co. The evaluation is performed by the London School of Hygiene and Tropical Medicine and Centre Muraz.

[10] CommCare platform, developed by Dimagi, Inc.: www.dimagi.com

IeDA provides FHWs with a digital job aid for IMCI. Using a tablet device, FHWs fill in the information requested by the digital version of the clinical protocol and at the end of the process obtain the recommended treatment and advice according to the signs and symptoms of the child. The consultation data is synchronised with the server over the mobile network, and individualised reports are generated to support supervisory activities by district health teams. A set of indicators is automatically sent to the government's health information system (DHIS2 in Burkina Faso) for national-level monitoring. An eLearning platform to provide targeted training to FHWs was recently added to the suite of digital tools and is now being tested in a few PHC facilities.

Today the intervention covers 620 rural PHC facilities, accounting for almost one third of the country. Over 3,600 FHWs have used the tool to date, to deliver close to 2 million consultations to children under five. FHWs use the tool in almost 8 of every 10 consultations they perform. The London School of Hygiene and Tropical Medicine is performing an impact evaluation to understand the effect of the intervention on the performance of FHWs, the context and mechanisms that allow the intervention to have an impact, and its cost[11].

Working with the government from the start

Our hypothesis was that the tool would eventually be adopted by the government and scaled up nationally under the stewardship of the MoH. This influenced the way the intervention was designed and the engagement model with the MoH. From the initial ideation and design phases, TDH partnered with the MoH and, in particular, with the Chief Medical Officer (CMO) of the first district where the tool was piloted. The CMO provided critical input and leadership that shaped the design of the tool. A few years later, that CMO transitioned to the central level of the MoH, becoming one of the most important advisors and advocates for the scale up of IeDA.

Designing with government adoption in mind influenced the choices made in some aspects of the tool. The most significant example is the algorithm used to guide health workers during the clinical consultations. The project used the (paper-based) IMCI protocol – national policy in Burkina Faso – as the source for the development of the digital job aid. This allowed IeDA to be adopted quickly by the government and scaled up in a short period of time. Alternative algorithms leveraging the capabilities of digital tools to improve user experience, manage complex algorithms and incorporate point-of-care diagnostics[12] were not considered. These innovations may be tested within the IeDA platform and adopted at scale if agreed by the MoH.

Finally, the transition of the innovation to the government is a complex process that requires time. Understanding how the innovation fits within the country's digital health strategy, capacities and financial resources (for data hosting, software management, future deployments, etc.), and planning to ensure a smooth transition to government stewardship and management is key. Options such as third-party contracting can also be part of the solution, particularly if that model is already being used for other health system functions.

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[11] Karl Blanchet *et al.*, "A mixed methods protocol to evaluate the effect and cost-effectiveness of an Integrated electronic Diagnosis Approach (IeDA) for the management of childhood illnesses at primary health facilities in Burkina Faso", *Implementation Science,* 11, 2016, 111.

[12] See for instance ALMANACH: Amani Flexson Shao *et al.,* "New algorithm for managing childhood illness using mobile technology (ALMANACH): a controlled non-inferiority study on clinical outcome and antibiotic use in Tanzania", *PloS one*, 10(7), 2015; or MSFeCARE: Clotilde Rambaud-Althaus *et al.*, "MSFeCARE: an electronic algorithm to improve the management of childhood illness in primary health care", *F1000Research*, May 2016, https://f1000research.com/slides/5-934 ; and MEDSINC (www.thinkmd.org/medsinc).

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Using an iterative approach

Iterative approaches are especially important when developing digital tools. It is really hard to get it right before the launch, and thus, once deployed the product must be continuously adapted based on user feedback and other sources of performance data. The team worked with the software development partner, Dimagi, using a methodology based on intense testing, user feedback, and rapid development cycles. After the deployment of the first version, the development roadmap involved the release of five versions over the two years following the launch of IeDA.

As an example, usability is an area in which this approach is key. The use of IeDA by FHWs is not incentivised, and thus adoption relies on users finding the tool useful and convenient for their daily work. The team iteratively worked with users and incorporated their feedback into the IeDA development process. Today, the average adoption by FHW is almost 80%. This approach is a paradigm shift for many organisations working in the digital health space for the first time.

Making the most out of data

Digital tools generate large amounts of data. We are going from a situation where data is scarce (in traditional projects), to a situation with digital tools in which organisations have to distil valuable information from big datasets. Information exploitation is often an afterthought in digital health projects, particularly in those focused on supporting FHWs. Organisations are initially intensely focused on getting the intervention to work, deploying it and scaling it up. They may later realise they are sitting on a trove of data that is underutilised.

In our case, each one of the close to 2 million consultations generates more than 100 data fields. So, what should be done with that data? The impulse (often from all stakeholders) is to create busy dashboards showing the data in every possible way. It soon becomes evident that in many cases data is not being used effectively by health workers and managers, and that data visualisations do not meet users' real needs.

Understanding managers' incentives and responsibilities and discussing with them what information could support their decision-making processes, is key to designing a strategy to improve the use of data. Once the initial tool has been designed, iterative testing with feedback from users helps ensure data analysis supports decision-making. The process may reveal that less is more, and simple indicators linked to specific decision-making processes may be more effective than complex and busy dashboards. This is an area in which we can still do more.

Data ownership, privacy, hosting and interoperability with the country's health information platform are important issues that need to be defined from the start of the project. Using a software platform that complies with the highest standards in individual and aggregated health data collection, transmission, storage and use is critical. In our case, the platform we chose was already compliant with those standards.

Acceptability for users and healthcare professionals

Digital health applications can cause significant disruption to the way work is organised and the culture of the organisation. A new ICT tool may require PHC services or patient flows to be reorganised and will likely make the PHC facility and FHW performance easier to assess. This might generate some resistance to change by FHWs and managers, even more so if they are unfamiliar with digital systems.

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As an example, during the initial roll-out of IeDA three years ago, there was a wave of opinion against the intervention among FHWs, stating that it increased their workload and there were no significant benefits (also seen in other digital health projects[13]). The absence of financial incentive probably fuelled this perception by FHWs. These opinions were addressed through quality improvement and coaching sessions, which were used to provide advice on how to best use the digital tool, discuss issues and obtain feedback from FHWs, and assess the performance of FHWs when using the digital job aid. The field officers conducting these sessions were former FHWs, which strengthened their relationship with facility staff. These field officers also worked with CMOs to ensure institutional buy-in.

Other interventions helped foster adoption, such as providing performance data through the tablet device to FHWs, as well as key statistics on the consultations made at each PHC facility. Given the amount of time spent by FHWs on reporting[14], availability of aggregated data also creates an incentive to have all consultations recorded in IeDA.

Today the tool is widely accepted by FHWs and used in almost 80% of all consultations. Some FHWs have started to express the need to expand IeDA to other areas such as immunisation or malnutrition. In some other cases, FHWs (especially the youngest ones) have expressed their unwillingness to go back to paper-based IMCI. At the district level, there has been one case in which a CMO – from a district outside the intervention zone – asked to implement IeDA using the district's resources.

TDH also carried out awareness activities at the community level, involving elected officials and traditional leaders. Interviews and focus groups with healthcare professionals in the context of the ongoing realistic evaluation found high acceptability by the population. Quotes from these conversations highlight the perception that IeDA is improving the ability of FHWs to diagnose and treat their kids, and to find information from previous consultations: "With the application, there are no lies or errors in the diagnosis". In some cases, healthcare professionals even request FHWs use the digital tool, because of their perception of improved quality of care.

The beginning of a revolution?

When we started developing IeDA, one of our primary goals was to demonstrate that an ICT intervention could improve FHWs' adherence to clinical protocols when deployed and managed on a large scale in rural Burkina Faso. The high coverage we have achieved (almost one third of the country and plans to reach half of the country in the next couple of years) and strong uptake of the intervention by FHWs (almost 80% of all consultations) show the potential of our approach.

During the past few years, we have learned many lessons, as outlined above. Some of the things we did worked well, and some are ongoing challenges. We are constantly trying to increase the usability and effectiveness of the digital tool (including through point-of-care diagnostics or big data analysis approaches). Performance data, feedback from users and beneficiaries, scalability and our engagement with the MoH, will continue to drive our development work.

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13 Vincent Duclos *et al.*, "Situating mobile health: a qualitative study of mHealth expectations in the rural health district of Nouna, Burkina Faso", *Health research policy and systems*, 15(1), 2017, 47.

14 Hibret Tilahun *et al.*, "Ethiopia's health extension workers use of work time on duty: time and motion study", *Health Policy Plan*, 32(3), 2017, 320-328; Kassimu Tani *et al.*, "A time-use study of community health worker service activities in three rural districts of Tanzania (Rufiji, Ulanga and Kilombero)", *BMC Health Services Research*, 16(1), 2016, 461.

What we have seen so far in the digital health space is probably just the start of a revolution that will change the way health services are managed and provided. Efforts need to focus on building the digital ecosystem and management capacity in LMICs and developing tools for scale and sustainability. We hope our experience in Burkina Faso will help understand how to scale up and sustain digital health interventions in LMICs.

Biographies

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Guillaume Foutry • IeDA Regional Coordinator at *Terre des hommes*. Guillaume has over 10 years of IT project management experience in seven countries in Europe, USA and Africa, working for both governmental and non-governmental organisations. Since 2016, he has been in Burkina Faso leading one of West Africa's largest mHealth projects, IeDA. Guillaume Foutry holds a master's degree in European business from the École Supérieure de Commerce de Paris (ESCP) and a bachelor's degree in political science and law from the Institute of Political Studies in Aix-en-Provence.

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