Understanding scale of digital health tools

digital square

A framework and triangulation tool to measure scale of digital deployments in the context of the COVID-19 pandemic

USAID FROM THE AMERICAN PEOPLE

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Introduction

The global digital health community broadly supports adaptation and reuse of existing digital global goods to support the complex and urgent response to the COVID-19 pandemic. Identifying, adapting, and deploying digital tools already at scale in a country can be the most rapid, efficient, and effective route to integrate digital technologies into a country's COVID-19 response.

However, the process of selecting the digital health tool that best matches a specific need can be complex. This process is not about selecting the tool with the most end users or the tool that is most interoperable with others, nor is it as simple as adapting existing tools for a multitude of uses.

Specific challenges when understanding and measuring the scale of digital tools used within a country include:

- **The "end user" is highly contextual and fluid.** Many factors determine the number and type of users. For example, the "end user" of the tool could be an individual user or could be the health facility. There are differences between potential users (denominator) and actual users (numerator). It can be challenging to correctly estimate the potential and actual users, so it is advisable to gather as much information as possible to accurately make this determination.
- **The ecosystem is constantly changing, both within a country and among the tools available in countries.** For example, government leaders may shift their digital health policies and strategies, impacting the tools they support. Government leaders may also move to proprietary systems as budgets become more flexible.
- **Country capacity varies over time as shifts occur in digital literacy, infrastructure, and financial resources.**

Purpose

The purpose of the United States Agency for International Development (USAID)-funded Map and Match project is to help countries (e.g., ministries of health, frontline health workers), donors, implementers, and the global digital health community understand:

- What digital tools are already deployed at scale in a country.
- What digital tools are already used for COVID-19 response.
- Which tools can easily and efficiently be adapted to support a country's response.

After a broad landscaping, in consultation with USAID, Digital Square prioritized 22 countries for in-depth mapping and produced a brief for each country, visually depicting tools deployed and opportunities for tools to be adapted for COVID-19. As part of this project, Digital Square sought to better understand scale of tools deployed in countries to illustrate the impact a given tool may have for a potential COVID-19 use case.

This document explains the approach the project team used to understand and measure scale in the context of a landscape assessment project about digital tools. It highlights existing literature about scale in the digital health ecosystem, defines the three-dimension framework used to help understand scale, and provides the survey questions used to determine which tools were 'not scaled,' 'scaling,' or 'at scale.'

Understanding scale through the lens of the Principles for Digital Development

Over the past decade there have been numerous efforts to understand scale in the digital tool context, specifically providing guidance about how to design a product for scale.

Design for scale is one of the nine Principles for Digital Development. This principle devotes significant focus on how to "move beyond a pilot" as well as providing guidance for monitoring, measuring, and evaluating impact of digital development investments. The 2014–2015 Ebola outbreak in West Africa highlighted the importance of adaptation of existing tools, especially during an outbreak.

Reuse and improve is another relevant Principle for Digital Development. In line with this principle, the global digital health community has made a concerted effort to support countries to prioritize adaptation of existing global goods as a best practice for harnessing digital technologies to meet desired health outcomes.

Design for scale

Achieving scale is a goal that has been elusive for many digital development practitioners. The mHealth field, for example, has identified the problem of 'pilotitis,' or the inability to move initiatives beyond pilot stage. Achieving scale can mean different things in different contexts, but it requires adoption beyond an initiative's pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions. Different implementers may define scale as reaching a certain percentage of a population or a certain number of users. Designing for scale means thinking beyond the pilot and making choices that will enable widespread adoption later, as well as determining what will be affordable and usable by a whole country or region, rather than by a few pilot communities. You may need to evaluate the trade-offs among processes that would lead to rapid start-up and implementation of a short-term pilot versus those pilots that require more time and planning but lay the foundation for scaling by reducing future work and investment. By designing for scale from the beginning, your initiative can be expanded more easily to new users, markets, regions, or countries if the initiative meets user needs and has local impact.

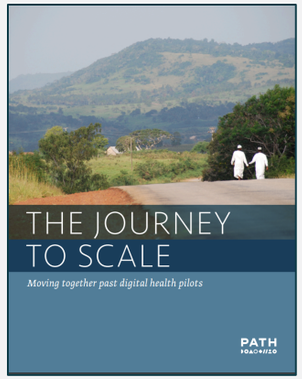
Reuse and improve

Instead of starting from scratch, programs that "reuse and improve" look for ways to adapt and enhance existing products, resources, and approaches. Reuse means assessing what resources are currently available and using them as they are to meet program goals. Improve means modifying existing tools, products, and resources to improve their overall quality, applicability, and impact. Start by identifying relevant methods, standards, software platforms, technology tools, and digital content that have already been tried and tested. You can learn about digital development tools that have been piloted or scaled through conferences, blogs, program evaluations, and the digital development community. If an existing tool or approach doesn't exactly fit all your needs for reuse, consider improving and building on it, rather than creating something entirely new. The result is a tool that is now better and more reusable by all because of your improvements. Reusing and improving is about taking the work of the global development community further than any organization or program can do alone. Reusing and improving can also dramatically reduce the time needed for development and testing, and reduce your costs.

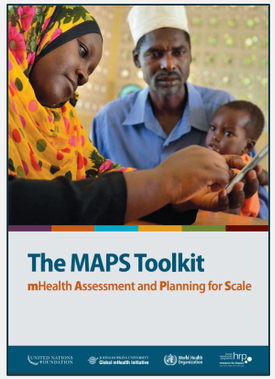
Principles *for* Digital Development

Existing literature on scale

The global digital health community has undertaken multiple efforts to better understand and articulate components of scale over the past several years. This literature takes a holistic approach to helping implementers understand scale and prioritize actions that facilitate scaling up tools in a country. These documents focus extensively on institutionalization and governance of digital technologies as a pathway to scaling tools.



PATH's The Journey to Scale: Moving Together Past Digital Health Pilots (2014) focuses on **institutionalization** of digital interventions. Conditions for successful scale include leadership, an effective product, a viable economic model, supportive policy/regulations/ standards, effective program management, and human capacity.



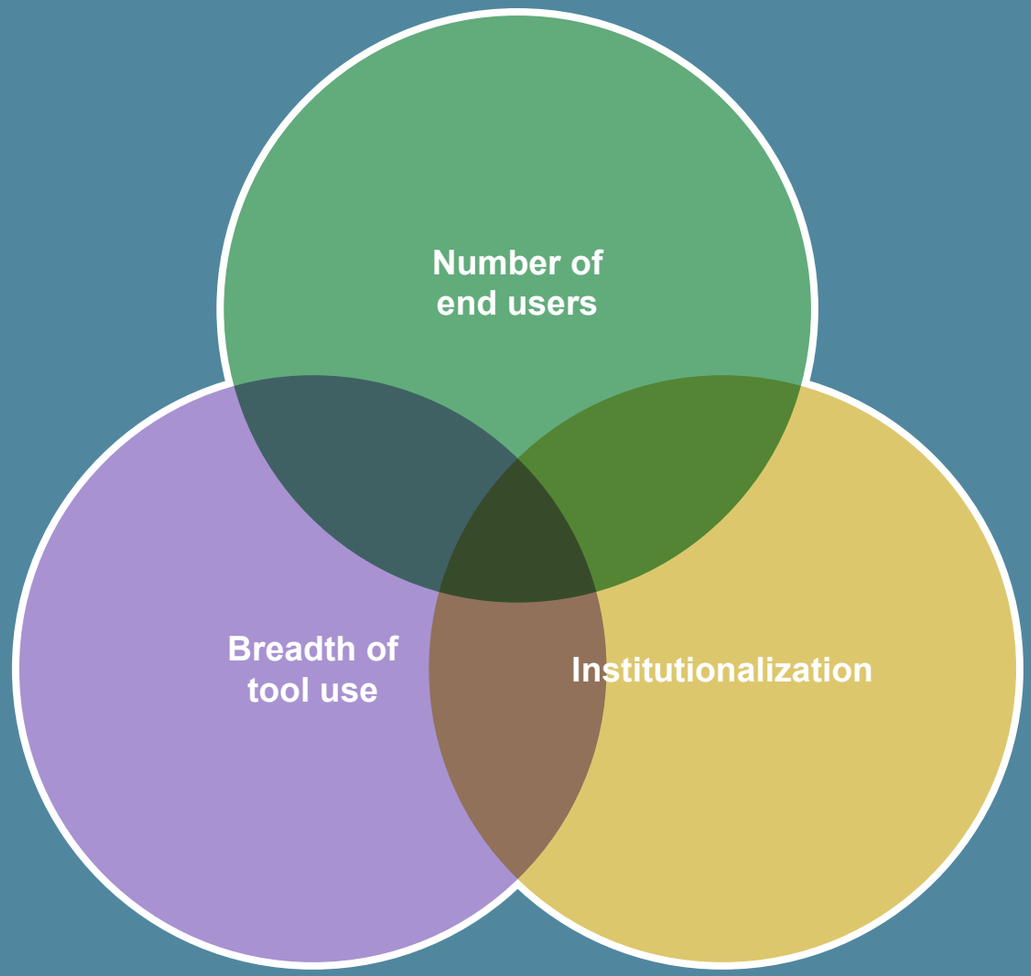
World Health Organization (WHO)'s mHealth Assessment and Planning for Scale (MAPS) Toolkit (2015), is a comprehensive **self-assessment and planning guide** designed to improve the capacity of projects to pursue strategies that increase their potential for scaling up and achieving long-term sustainability.

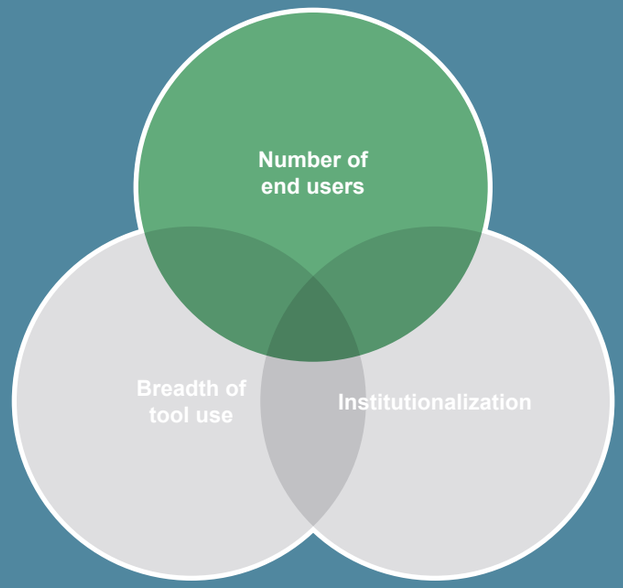
Digital Impact Alliance's (DIAL) Beyond Scale: How to Make Your Digital Development Program Sustainable (2017) details key challenges and potential solutions when scaling and sustaining digital development programs. It explores the processes of scaling through **replication**, where the experience of a digital solution is replicated for more users in more geographies, and scaling through **diversification**, where an organization diversifies its products and services to offer new solutions to achieve scale. This guide is tailored for in-country nongovernmental organization staff supporting digital pilots and has seven modules: strategy, business model, legal policy and regulatory, solution design, rollout, human capacity, and partnerships.

Three dimensions used in the Map and Match scale framework

Digital Square looks at scale through three complementary dimensions: number of end users, breadth of tool use, and institutionalization of tool. Digital Square chose the dimensions in collaboration with USAID and other investors to validate data obtained through the Map and Match project. This diagram displays the intersectionality of these three dimensions to understanding scale.

This is not an end-to-end framework for understanding scale, but rather a triangulation tool that the digital health community can use for broader conversations about measuring scale.





Number of end users

Why do the numbers matter?

Measuring scale quantitatively can give a clear understanding of scale, especially to donors, investors, and country governments. For example, it can be powerful to say “85% of community health workers in country X use tool Y to report on antenatal care” to demonstrate the digital tool enables country X to have fairly comprehensive data to support decision-making around this aspect of maternal and child health.

In this context, the digital health community is able to use quantitative measures as part of a strong business development case. Countries can use such data points to choose digital health tools that are tailor-made for their contexts, encouraging tool uptake in a country. These numerical measurements also help define the digital health tool deployment—who are the end users, where is the tool in use geographically, and where are the gaps in end user uptake.

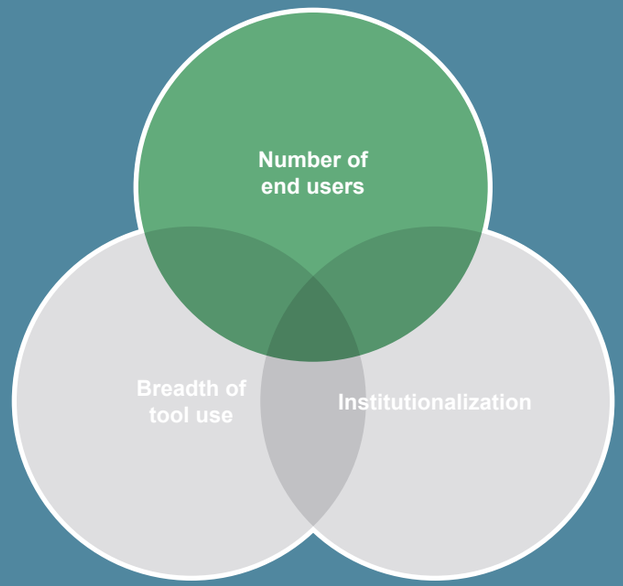
Understanding scale by number of end users can identify both who is using a tool and where. This information can be collected by number of health workers, number of clients, or number of facilities using a tool. Among the global digital health community, debate exists about whether the number of end users matters and about the degree of uncertainty for achieving a measurement of end users. Accurately defining the number of users is challenging, and it becomes even more challenging to understand the number of *anticipated* users and *actual* users in order to develop a percentage measure of scale.

One approach to determine this number is to use WHO’s Classifications of Digital Health Interventions to explore parameters around measurement of scale.

In late 2020, Digital Square created a rubric to assess scale based on number of end users that aligns with WHO’s classifications of digital health interventions with the understanding that scale measurements mean different things across the classifications.

Digital Square shared the rubric with a wide range of investors and digital health stakeholders for feedback.

Digital Square acknowledged that digital tools can be used across many of the classifications based on their adaptations and applications of use (e.g., health provider decision support and health provider training). Digital Square also acknowledged challenges in identifying the correct numerator and denominator when determining scale via these measurement parameters.



How Map and Match measured number of end users

Through its landscape assessment, Digital Square sought to understand ‘number of end users’ via survey questions and key informant interviews and by looking at self-assessed maturity of global goods. Users were asked to respond to the following questions:

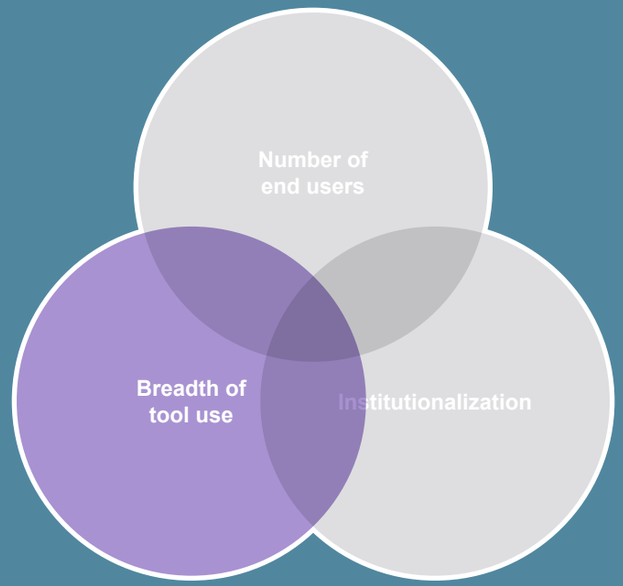
Maturity model assessments for Digital Square global goods

Is this tool used nationally or subnationally?

- What is the percentage of regions the tool is deployed in your country?

How many estimated users use this tool? (as a % of total users)

- Which is the largest health cadre using the tool? (denominator)
- Digital Square designed this question to correlate directly to the health worker information collected by the World Health Organization (WHO). Digital Square used the WHO information to establish denominators to measure ‘end users.’ WHO collects information on the following cadres: medical doctors, nursing and midwifery personnel, dentistry personnel, pharmaceutical personnel, environmental and occupational health and hygiene personnel, medical and pathology laboratory personnel, physiotherapy personnel, traditional and complementary medicine personnel, community health workers, and other health workers.
- What is the estimated number of users of the tool to the best of your knowledge for your largest cadre? (numerator)



Breadth of tool use

‘Breadth of tool use’ assesses the use of the tool across countries and within a country. This measurement informs the scale of a tool because as a tool increases the number of implementations, it also increases the scale of total users, user impact, and community engagement to continuously improve software features.

Influences on breadth of a tool’s deployment

The following categories are useful to assess the breadth of use a digital health tool.

Use of tool across use cases

- Is the tool being used to its complete capability compared with the problem space health workers face? For example, health workers are using Commcare only for data reporting on tuberculosis (TB) when it can be used by those same health workers for more use cases. Commcare is not scaled to the full ‘breadth of tool use.’

Maturity of country implementation

- Mature implementation means the digital health tool has a trained base of users who consistently use the tool for more than one use case.
- The tool design reflects the needs of users and is adapted in country to meet the changing needs of users over the longer term.
- Users understand the health outcomes associated with tool usage.
- Tool has scaled up from pilot/subnational use to national use throughout the country.

Global maturity of tool

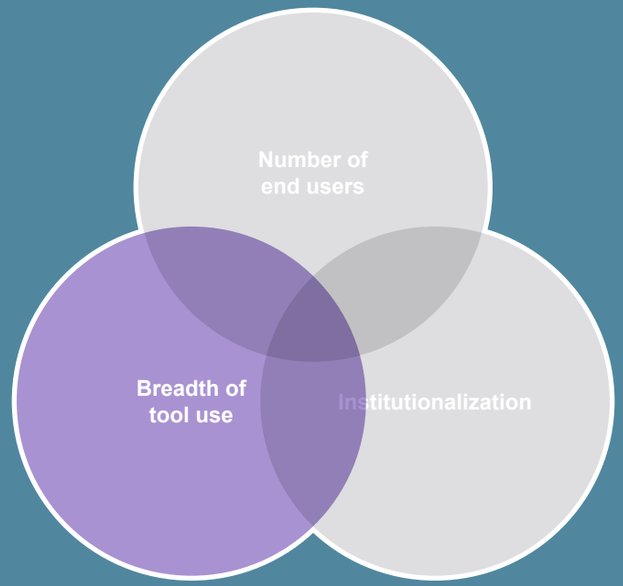
- The tool has a strong user community, robust software (e.g., security, documentation), and global utility.

Product features

- New features can be added simply to address diverse use cases (expanding across WHO’s classifications of digital interventions).
- The tool can be adapted easily for COVID-19 response or future pandemic threats.

Interoperability

- The tool has data exchange standards enabling interoperability with other tools in the system.
- The tool has demonstrated interoperability with other digital tools and meta registries such as a facility or client registry.



How Map and Match measured breadth of tool use

Through our assessment, Digital Square sought to understand the breadth of tool use by collecting information through online surveys for developers and users of digital tools in each Map and Match country. Note: responses to these questions were optional as this information may be difficult to capture.

How many health focus areas are addressed by this tool?

- Count of the WHO health focus areas addressed by the tool

How many Map and Match use cases are addressed by this tool?

- Count of the pandemic response use cases addressed by the tool

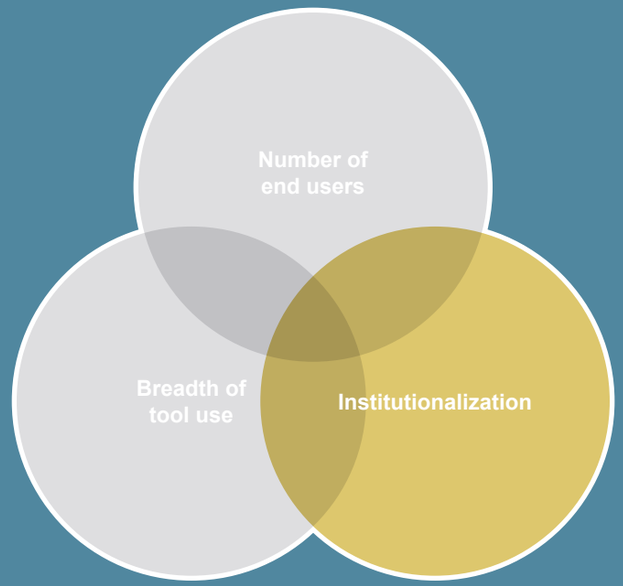
How many data registries are working with the tool?

- Count of data registries

What data standards are using used by the tool?

- Comparing data standard(s used by the tool to the data standards used most frequently in the country
- Data standards pulled from the Digital Health Atlas (DHA)

What is the primary use across WHO’s classification of digital health interventions?



Institutionalization

A tool that has been ‘institutionalized’ at the national or subnational health system level will likely reach scale faster. Institutionalization can mean that the tool is included in a national digital health strategy, in the national budget with dedicated resources, and/or in formal job descriptions as a tool that is necessary for health workers to use.

Institutionalization of a tool can be demonstrated in the following ways.

Governance and leadership

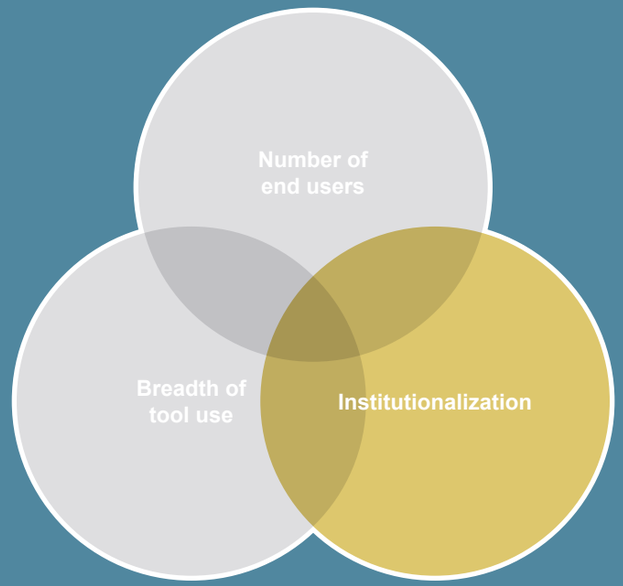
The digital health tool has strong country-level ownership. For example, the tool is included in a national digital health strategy or the tool is incorporated regularly into national stakeholder meetings (e.g., dashboards from DHIS2 are used in quarterly HIV meetings). Similarly, institutionalization can be demonstrated where there are technical working and policy groups who regularly iterate on approaches and guidance to improve use of the tool.

Financial health and partner relations

The digital health tool has a viable economic model. For example, a specific line item in the national budget includes support for maintenance of software and hardware for health workers who use the tool. Institutionalization as a measure of scale is signaled when there is long-term commitment to the implementation of the tool at all levels of the health system. Moreover, institutionalization as a measure of scale can be seen where the national government has a partnership with the tool developers and provides routine feedback to backend software developers to improve core software of the tool.

Workforce/human capacity

A tool can reach scale when users have capacity to use the tool to its full extent, including use data collected from the tool to inform timely decisions that improve health outcomes. A tool can reach scale when users have the appropriate software in hand to use the tool regularly.



How Map and Match measured institutionalization

Through our assessment, Digital Square sought to understand institutionalization through a limited lens, focusing on financing and inclusion of the tool in national strategy, recognizing that institutionalization is broader and more nuanced than these measures. Questions included:

Has the government financially contributed to the development and deployment of the tool?

Options:

- No, they have not yet contributed
- Yes, they are contributing in-kind resources in terms of staffing and/or contribution of time
- Yes, there is partial financial contribution through the government budget
- Yes, the government is fully funding the project
- Don’t know

Organizations/donors who support the implementation of the tool?

- During the interviews, Digital Square asked ministries of health to identify organizations with a long-term commitment to the country. The interview responses were compared with the following survey questions: Which organization led the development of this tool? Who is the lead implementer of the tool in country?
- Tools identified by the ministries of health as having organizational support are considered to be more institutionalized.

Is the tool included in the national digital health strategy?

- Digital Square reviewed national digital health strategies to identify tools.

Strengths and weaknesses of the Map and Match scale framework

Table 1. Strengths and weaknesses of the Map and Match scale framework by dimension

DIMENSION OF SCALE	FRAMEWORK STRENGTHS	FRAMEWORK WEAKNESSES
Number of end users	Opportunity to get exact measure of number of users Thinking of scale in a more contextualized way—how the tool is meant to be used Measurement of number of users benefits advocacy for further scale and investment into the tool	Getting exact, validated number of users can be difficult Denominator may be difficult to calculate or be out of date Difficult to account for multiple use cases and what that means in context of scale
Breadth of tool use	Identifying standards that tools comply with for interoperability Specified use cases related to COVID-19 to determine tool use in response to pandemic Understanding overall tool use with health focus areas can increase the understanding of breadth	Unsure what level of knowledge respondents will have regarding data standards Limiting our use cases to COVID-19 context Respondent knowledge of a tool may be limited to just their use/ context
Institutionalization of tool	Beneficial to learn about funding streams for tools in country Availability of digital strategies to identify tools with government commitment	Not measuring hardware or information and communications technology (ICT) infrastructure, which are part of institutionalization of tools Institutionalization may be fluid and change over time

How Digital Square used the three-dimension framework to define scale for Map and Match

The Digital Square team used measurements from these three dimensions to better understand scale in the context of digital tools deployed in up to 22 countries, recommending that 'scaled' tools are prime candidates for adaptations for COVID-19 use cases including support to the planning, delivery, and monitoring of vaccines.

Table 2. Sample of Map and Match survey questions

SAMPLE SURVEY QUESTIONS	NOT AT SCALE (0)	SCALING (1)	AT SCALE (2)
Number of end users			
Tool used nationally or subnationally	Subnational		National
Percentage of regions the tool is deployed in	<50%	50%–90%	>90%–100%
Estimated users (as a % of total users)	<25%	26%–65%	>65%
Subtotal number of users *Take the average sum of the three questions to get dimension score.*			
Breadth of tool use			
Number of health focus areas addressed by this tool	≤5	6–9	≥10
Number of Map and Match use cases addressed by this tool	1	2–3	4
Number of data registries working with the tool	0		1
Using popular standards (e.g., Aggregate Data Exchange, Fast Healthcare Interoperable Resource Health Level 7)	0		1
Subtotal breadth of users *Take the average sum of the four questions to get dimension score.*			
Institutionalization of tool			
Has the government contributed funding for implementation of the tool?	No	Partial	Fully
Has any long-term implementation partner or donor contributed to implementation and sustainability of the tool?	No	Partial	Fully
Is this tool in the national digital health strategy? (y/n)	No		Yes
Subtotal Institutionalization *Take the average sum of the three questions to get dimension score.*			
Overall scale *Take the average sum of three dimension scores to get overall scale score.*	**0–0.49**	**0.5–1.49**	**1.5–2.0**

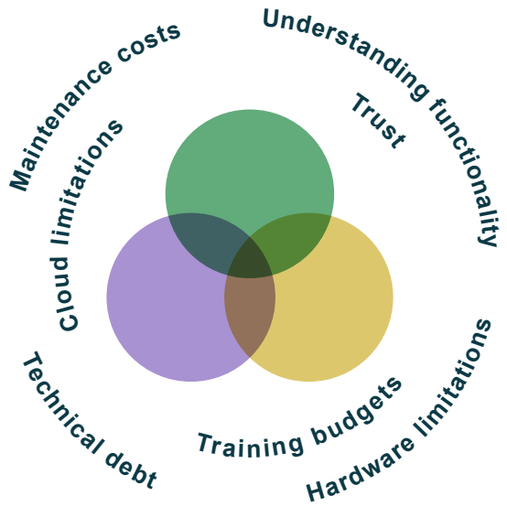
Pathways to scale

Institutionalization, breadth of tool deployment, and a consistent and growing user-base are all indications of the scale of a tool. However, there are other pathways to examine scale of tools that strongly intersect with these growth dimensions including interoperability with other tools, increased adaptation across use cases, and network effect. The following table describes these intersecting pathways and offers strengths and constraints for each in terms of understanding scale.

	OTHER PATHWAYS TO EXAMINE SCALE	STRENGTHS	CONSTRAINTS
NETWORK EFFECT	Direct network effects occur when the value of a product or service to your user increases exponentially with the number of other users using the same product or service. Indirect network effects come into play when the value of your product or service increases due to complementary products or services that add to your platform/business.	A multi-feature well-designed tool will easily serve a high number of users. ***OR*** A high number of users can easily scale the functionality of a tool.	A "good tool" with no users is a waste. ***OR*** A high number of users using a poor tool is also a waste of potential and will require corrective investment in training/methods.
INTEROPERABILITY	Interoperability is the ability of different information systems, devices and applications (systems) to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally.	Strong enabling environment will guide what interoperability needs are required, making prioritization easy. ***OR*** Highly interoperable tools facilitate an enabling environment because they integrate seamlessly with other tools.	Less interoperable or functional tools do not contribute to an enabling environment. ***OR*** A poor enabling environment will lead to tools that are not optimized functionally for their environment.
ADAPTATION	Adaptation of digital tools allows for extended use of existing tools in lieu of developing a new tool from scratch. 'Reuse and improve' is a Principle for Digital Development, recommending stakeholders identify any existing components of digital tools that you can reuse or adapt before undertaking any new development.	A high numbers of users increases the weight and priority of the tool, which fosters a robust enabling environment. ***OR*** A good enabling environment makes reaching 'scale' with number of users easy and effective, because it is appropriately guided and understood.	No strong enabling environment will make tool adoption slow, and the cost high. ***OR*** A small user base is not conducive to spending much time to foster an enabling environment.

Additional constraints to understanding scale

Throughout this framework, Digital Square underscores that understanding scale is very contextual. Although the following factors are not specifically part of Map and Match's framework to understanding scale, these factors can often be constraints to scaling a digital tool in country.



Information and communications technology

- Understanding and measuring network connectivity: Limited network connectivity constrains scale of tools, especially those with no off-line functionality.
- Hardware limitations: It is often difficult to find out if the hardware (e.g., mobile phones, functional desktops) are in the hands of users. Without a detailed assessment, it is challenging to know whether hardware has sufficient memory to manage large datasets.
- Cloud limitation services can impact scale. Without a detailed assessment, it is challenging to gain an understanding of the support/bandwidth to support hosting of the tool.

Financial

- Some countries face challenges in supporting tools deployed, including ongoing support for maintenance of software and hardware and costs of deploying tools at multiple levels of the health system.
- Staff capacity to use tools, especially analytical tools to capture data insights, can be limited if there is no budget for training staff.
- Proprietary systems may be the best tools in some cases, but they require additional budgets to maintain licenses for staff.

Utility

- Often, users of tools are unaware that a specific tool can be adapted for a different use case. For example, how can an immunization registry be adapted to support COVID-19 vaccine distribution and planning?
- Similarly, the full functionality of a single tool may not be understood, especially because many tools are being continuously adapted and improved to take on more analytics and other tasks.

Other

- Poor security measures can cause distrust in potential users. Lack of understanding around data privacy and security is often a barrier to scale a digital tool.
- Mistrust in technology or in a specific tool can be a constraint on scale. A bad experience by one user or one department can tarnish the reputation of the tool.
- Many countries are finding themselves in 'technical debt' meaning that they have not upgraded software or have made workarounds to software to shortcut adaptations for use. This has in turn disabled major software upgrades, limiting scale of the tool.

Example: Understanding scale of OpenLMIS in Malawi

OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system (LMIS) purpose-built to manage health commodity supply chains. OpenLMIS manages the electronic LMIS process at over 11,000 health facilities in nine countries across Africa across all major health programs including vaccines and COVID-19. OpenLMIS adapted its tool so countries can optimize their use of the software to encourage good supply chain management of COVID supplies. OpenLMIS launched a separate, simplified instance called OpenLMIS COVID-19 Edition, which is a lighter weight and quicker start up tool to help countries manage COVID-related commodities based on the WHO product list.

The Map and Match project determined that OpenLMIS in Malawi is 'at scale' with a score of 1.83 based on applying the questions from our three-dimension framework.

Table 3. Completed framework example

SAMPLE SURVEY QUESTIONS	NOT AT SCALE (0)	SCALING (1)	AT SCALE (2)	SCORE	DESCRIPTION
Number of end users					
Tool used nationally or subnationally	Subnational		**National**	2	OpenLMIS is deployed in all districts and the five central hospitals in Malawi.
Percentage of regions the tool is deployed in	<50%	50%–90%	**>90%–100%**	2	OpenLMIS is deployed in all 28 districts. 28/28 = 100%
Estimated users (as a % of total users)	<25%	26%–65%	**>65%**	2	OpenLMIS is used in 657 out of 684 public facilities in Malawi. 657/684 = 96%
Subtotal number of users *Take the average sum of the three questions to get dimension score.*				**2**	**At scale**

Table continued on next page

Table 3. Completed framework example, *continued*

SAMPLE SURVEY QUESTIONS	NOT AT SCALE (0)	SCALING (1)	AT SCALE (2)	SCORE	DESCRIPTION
Breadth of tool use					
Number of health focus areas addressed by this tool	≤5	**6–9**	≥10	1	OpenLMIS addresses seven health areas in Malawi: essential medicines, malaria, reproductive health, tuberculosis, HIV/AIDS, nutrition, and a new COVID program (e.g., commodities/personal protective equipment).
Number of Map and Match use cases addressed by this tool	1	**2–3**	4	1	OpenLMIS addresses three Map and Match use cases: event-based surveillance, supply chain, and vaccine delivery and planning.
Number of data registries working with the tool	0		**1**	2	OpenLMIS is included in the product registry.
Using popular standards (e.g., Aggregate Data Exchange, Fast Healthcare Interoperable Resource Health Level 7)	0		**1**	2	OpenLMIS uses two popular standards: GS1, HL7 FHIR.
Subtotal breadth of users *Take the average sum of the four questions to get dimension score.*				**1.5**	**At scale**
Institutionalization of tool					
Has the government contributed funding for implementation of the tool?	No	Partial	**Fully**	2	The Ministry of Health implements OpenLMIS along with support from donors, implementers, and projects including USAID, Gates Foundation, VillageReach, and the USAID Global Health Supply Chain Program-Procurement Supply Management project.
Has any long-term implementation partner or donor contributed to implementation and sustainability of the tool?	No	Partial	**Fully**	2	
Is this tool in the national digital health strategy? (y/n)	No		**Yes**	2	OpenLMIS is included in *Malawi's Monitoring, Evaluation, and Health Systems Strategy, 2017–2022.*
Subtotal Institutionalization *Take the average sum of the three questions to get dimension score.*				**2**	**At scale**
Overall scale *Take the average sum of three dimension scores to get overall scale score*	**0–0.49**	**0.5–1.49**	**1.5–2.0**	**1.83**	

Apply the three-dimension scale framework to understand scale of a digital tool in a country

Any country, donor, or project can apply the Map and Match triangulation framework to better understand scale of deployed digital tools. The framework enhances understanding of scale by providing guiding questions that fit into the three framework dimensions.

Identify the number of end users.

- What is the name of the tool? Who uses this tool (e.g., clients, health system managers, health workers)?
- What is the priority use case/intervention? For what health area(s) are the end users utilizing the tool?
- How many end users are touching/using the tool regularly?
- What is the denominator? To determine the denominator, think about whether you are measuring by number of government health workers, number of community health workers, number of health facilities, etc. If the tool is client-facing, is the end user the entire population, only women, only pregnant women, etc.?
- Calculate current scale. What does this number tell you about national scale?

Map out the breadth of the tool deployed in a country.

- Does the tool have multiple use cases or fit across multiple interventions?
- How many of those uses or health verticals are using the tool?
- Is the tool interoperable with other tools?

Understand the extent of institutionalization of the tool in a country.

- Is there funding to continue to support country implementation of the tool?
- Do the users have the correct devices/hardware to use the tool?
- Is there ICT infrastructure (e.g., mobile network coverage, hardware) to use the tool where it is deployed?

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Appendix: Excerpt of Map and Match survey instrument on scale

The table below shows the survey table with dropdown options that relate to the three dimensions in the Map and Match scale framework.

DIMENSION OF SCALE	SURVEY QUESTION	DROPDOWN OPTIONS
Number of end users	Tool used nationally or subnationally	National, Subnational
	Percentage of regions the tool is deployed in	Enter Integer
	Estimated users (as a % of total users)	Enter Integer (for the numerator) We also ask which is the largest health cadre using the tool (the cadres correlate to health worker information that WHO collects). We will use this for a denominator. Select one: Medical doctors Nursing and midwifery personnel Dentistry personnel Pharmaceutical personnel Environmental and occupational health and hygiene personnel Medical and pathology laboratory personnel Physiotherapy personnel Traditional and complementary medicine personnel Community health workers Other health workers

DIMENSION OF SCALE	SURVEY QUESTION	DROPDOWN OPTIONS
Breadth of tool use	Number of health focus areas addressed by this tool	Count of the number selected, below: Adolescent and youth health Civil registration and vital statistics Crosscutting Environmental health Humanitarian health Infectious diseases (non-vector borne) Injury prevention and management Maternal health Neglected tropical diseases (NTDs) Newborn and child health Noncommunicable diseases Nutrition and metabolic disorders Other chronic conditions and disabilities Sexual and reproductive health Vector-borne diseases (not listed under neglected tropical diseases [NTDs]) Violence Water, sanitation, and hygiene (WASH) Wellness and mental health Don't know
	Number of Map and Match use cases addressed by this tool	Count of the number selected: **Risk communication and community engagement:** System for channeling messaging and communication to public to promote public awareness, counter misinformation, encourage treatment seeking behaviors, and encourage citizens to take appropriate actions to promote health. **Event-based surveillance** (including rapid response teams, case investigation): System with functionality or ability to monitor patterns indicative of infectious disease epidemic outbreak, systems to detect and document cases of emerging disease threats, investigate those threats, identify cases, and manage the response.

DIMENSION OF SCALE	SURVEY QUESTION	DROPDOWN OPTIONS
Breadth of tool use	Number of Map and Match use cases addressed by this tool, *continued*	**Routine surveillance:** System to manage health data and track trends on an ongoing basis, regardless of whether there is an outbreak or epidemic. Systems usually include aggregate data. **Contact tracing:** Identification and follow-up with people who have had high-risk interactions with infected persons. **One Health:** Monitoring zoonotic diseases across human and animal populations, could include tracking infectious diseases in wildlife, livestock, or vectors (e.g., ticks, mosquitoes). Often incorporates data sharing between human and animal sectors. **Points-of-entry:** System to strengthen border health security, screen, and follow up with suspected infected persons at ports of entry and other border entry points. **Laboratory systems:** System with functionality to order lab tests, follow progress of client samples, and receive test results (confirm suspected case). **Diagnostic tools:** Diagnostic tools with digital connectivity to support monitoring, documentation, and reporting of diagnoses. **Case management:** System for documenting client details and clinical interactions. **Vaccine delivery:** Systems that can track and monitor the deployment of vaccinations to clients. **Infection Prevention and Control:** Systems that support triage, isolation, water sanitation and hygiene, and waste management to prevent transmission to staff, other clients, and the community. **Coordination & operations** (including emergency operating centers): Systems to support cross-coordination for multisectoral response, emergency operating centers, and executing response plans. **Health facility and provider administration:** System for managing facility accounting and human resources. **Supply chain:** System for monitoring facility readiness and stock levels. **Learning and training:** Systems or tools that deliver new content or reinforce learning using mobile phones, tablets, or computers, including localized e-learning solutions for health workers and others.
	Number of data registries working with the tool	Count of below: (No, I don't know = 0) No Facility registry Health worker registry Client registry Product registry Other registry I don't know

DIMENSION OF SCALE	SURVEY QUESTION	DROPDOWN OPTIONS
Breadth of tool use	Using popular standards	Count of below, across all tools in country, compare each tool's standards with the ones that are used most often. ADX – AggregateData Exchange ATNA – Audit Trail and Node Authentication CDA – Clinical Document Architecture BPPC – Basic Patient Privacy Consents CIEL – Common Interface Exchange Language CPT – Current Procedure Terminology CSD – Care Services Discovery DICOM – Digital Imaging and Communications in Medicine GML – Geography Markup Language GS1 – Global Standards One HL7 FHIR – Health Level 7 International, Fast Healthcare Interoperability Resources HL7 v2 – Health Level 7 International, Version 2 HL7 v3 – Health Level 7 International, Version 3 ICD-10 – International Classification of Diseases, Tenth Revision ISCO 08 – International Standard Classification of Occupations (2007) ISCO 88 – International Standard Classification of Occupations (1987) ISO 3166 – International Organization of Standardization 3166 (Official name of standard: Codes for the representation of names of countries and their subdivisions) JSON – JavaScript Object Notation LOINC – Logical Observation Identifiers Names and Codes mACM – Mobile Alert Communication Management MHD – Mobile Access to Health Documents PDQ or PDQm – (Mobile) Patient Demographics QueryPIX or PIXm – (Mobile) Patient Identifier Cross Reference RxNORM – Prescription for Electronic Drug Information Exchange SDMX – Statistical Data and Metadata Exchange

DIMENSION OF SCALE	SURVEY QUESTION	DROPDOWN OPTIONS
Breadth of tool use	Using popular standards, *continued*	VS – Sharing Value Sets XDS – Cross-Enterprise Document Sharing XForms XUA – Cross-Enterprise User Assertion
Institutionalization	Government funding for implementation of the tool	No, they have not yet contributed Yes, they are contributing in-kind people or time Yes, there is partial financial contribution through the government budget Yes, the government is fully funding the project Don't know
	Long-term implementation partner or donor contribution to implementation and sustainability of the tool	Asked during interviews with the MOH compared with a question that reads: Which organization led the development of this tool? Who is the lead implementer of the tool in country?
	Tool inclusion in the national digital health strategy	We are reviewing national digital health strategies to identify tools.