Overview of sustainability literature to identify a framework for the study of the sustainability of the integrated eDiagnostic Approach (IeDA) in Burkina Faso

Version 2.0 17th September 2025 (updated) talia.salzmann@swisstph.ch

Framework overview

ID #	Name	Domains	Authors, date	Created for	Applications	Description	Utility in context
1	mHealth Assessment and Planning for Scale (MAPS)(1) **Rating = 2**	1. Groundwork 2. Partnerships 3. Financial Health 4. Technology & Architecture 5. Operations 6. Monitoring & Evaluation	World health Organization, 2015(1)	This toolkit is for scaling mHealth, with a focus on interventions for women's, children's and adolescents' health.	mHealth in LMIC	The toolkit provides six domains and sixteen sub-domains by which an intervention should be assessed prior to decisions or actions on scaling. Scoring cards and recommendations for planning are provided for each domain.	IeDA is an mHealth intervention for women and children having been scaled in LMIC. This framework is a strong contender for a retrospective assessment. However it is missing: Overarching governance and the notion of Time
2	Beyond Scale – Digital Impact	1. Strategy 2. Business model	Digital Impact Alliance	This guidebook is to support program	"Digital development" in any domain such as	The guide provides recommendations and examples to increase success in preparing,	It concerns scaling of digital interventions in LMIC. However, there is no specific focus on the

	Alliance (DIAL) **Rating = 1**	3. Legal, Policy and Regulatory 4. Solution design 5. Roll-out 6. Human Capacity 7. Partner relationships	(DIAL), 2017(2)	developers, planners and implementers in the process of scaling a digital intervention in LMIC	agriculture, health or education	conducting and maintaining scaling of a digital development program Notes: there is no overarching visualisation.	healthcare sector and it is more of a guidance for implementers than an evaluation framework; it can be useful for planning for the future of IeDA but for structuring the evaluation findings it is not the best fit.
3	[Extended] Unified Theory of Acceptance and Use of Technology (UTAUT2)(3) **Rating = 0**	Technology adoption depends on: 1. Performance expectancy 2. Effort expectancy 3. Social influence Which constitute "behavioural intention", which combines with 4. Facilitating conditions To result in "Use bahaviour". The extended UTAUT includes use of technology outside of	Venkatesh, 2003(4), 2012(3)	This framework was to bring together concepts and constructs from different frameworks for a unified theory on use of technology mediated by acceptance.	Widely used for introduction of new technology, including in the health sector. 2012 publicated cited by 21'738 (!!!) (Google scholar)	UTAUT, and UTAUT2, are validated models to describe and predict use of technology, respectively in an organizational setting and in more generally, including private users. Age, gender, experience are predictors of usage as well as degree to which usage is mandatory in the organizational context (UTAUT only).	This framework is very good for use but does not provide enough granularity for the study of "facilitating conditions" which is an important element to our study, which focusses less on individual-level predictors of use than wider organizational and contextual factors.

		an approximatively mandatory workplace use to include 5. Hedonic motivation 6. Price value 7. Habit All of the above influence behavioural intention and habit also influence use behaviour.					
4	Dynamic sustainability framework (DSF) **Rating = 1**	1. Intervention (components, practitioners, outcomes, delivery platform) 2. Practice Setting (Staffing, information systems, org. culture, business model, training, supervision)	Chambers 2013(5)	Health interventions	Widely used Cited by 1759 (Google scholar)	This framework comprises an onion model of the intervention, the practice setting and the ecological setting and their respective evolution with time, with the lower two adapting to fit the changes to the level above, hence the name "Dynamic*. A key concept underlying this framework is the challenging of two common assumptions; namely that deviation from the original intervention results in reduced effect ("Program drift"), and that	It is a key framework in implementation science and influences the sustainability frameworks that came after. It does not, however, include components specific to technology, and it was developed using literature and case studies from high-income countries, primarily UK/USA.

		3. Ecological system				effect of an intervention decreases with time and maturity phase of the intervention ("Voltage drop")	
5	Sustainability of health interventions implemented in SSA **Rating = 1**	- Intervention - Organizational setting - Socio-cultural and community setting Organized in a Venn diagram, with areas of overlap described further.	Iwelunmor, 2016(6)	Health interventions in Sub-Saharan-Africa	Unknown Coted by 250 (Google Scholar)	The areas of overlap in the Venn diagram between 2 of the 3 main domains of the DSF each have 6-7 sub-domains describing the key factors for sustainability at this intersection, with the central overlap of the 3 circles labelled as Sustainability in time.	Topic (health) and geographic location (SSA) are a match. Additionally, it builds on the DSF (Chambers 2013) and the elements listed resonate with the strengths of the intervention studies. However, it does not include technology, and the framework subcomponents concerning the intervention itself are not sufficient for this evaluation.
6	Seppey Sustainability framework **Rating = 3**	Determinants, contexts, sustainability process, time, outcome (not ordered)	Seppey 2017(7)	Performance-based financing in Mali	Mali, Haïti, Burkina Faso Cited by 70 (Google scholar)	Sustainability framework provides 5 elements for each of 4 domains, with the notion of process, time, and change present across all the framework.	Leverages Chambers's DSF, and Pluye, Moullin. Seems a good fit as builds on DSF but adapting, and it was developed in the context of a health system intervention Mali, matching both

							intervention complexity and Sahel region.
7	Integrative conceptual framework of scale-up and sustainability **Rating = 2**	Interaction of external and internal environments, each including dynamic processes and interactions.	Niang, 2023(8)	Social innovations in Global Health	Based on international literature, applications unknown Cited by 9 (Google scholar)	Systems thinking lens applied to hermeneutic narrative literature review on scaling/sustaining social innovation to generate an elegant representation of a conceptual framework integrating factors and parameters for consideration in understanding and planning scaling and sustainaing. This includes clear purpose for each of 3 non-linear stages, namely social innovation, sustainability and scale-up.	Leverages prior frameworks including some earlier work by Greenhalgh but does not reference NASSS. It is a rich representation of the dynamic nature of sustainability processes and includes most of the elements included in other key frameworks such as Seppey and NASSS. However, it is not focussed on technology not even specifically on health; additionally the complexity of the framework, while intuitive to understand, makes it a bit cumbersome for application in an evaluation.
8	Nonadoption, abandonment, scale-up, spread, and	1. Health condition 2. Technology	Greenhalgh, 2017(9)	Framework "to help predict and evaluate	Has been applied to a wide range of uses of	NASSS framework outlines between 2 and 5 factors for each of the seven domains, that influence sustainability,	This framework is specifically designed for technology in health. It includes the users but

	sustainability (NASSS) **Rating = 3**	3. Value proposition 4. Adopters 5. Organisation 6. Wider system 7. Embedding and adaptation over time		success of technology-supported health or social care programs", as well as inform planning and learn from past experience; developed in the United Kingdom	technology in healthcare, primarily in High-Income Countries (HIC) Cited by 2293 (Google Scholar)	and gives importance to the time dimension, including adaptation in time and resilience as key factors. Furthermore, challenges can been classified as simple, complicated or complex. Tools for this classification are also available. Accompanying case studies illustrate the use of the framework.	also a wide range of factors relating to the intervention itself, the wider implementation environment and how the interact; and it incorporates time. It seems like a good fit for the evaluation of IeDA, which provides a wide range of findings on different elements influencing sustainability across a decade, in the context of technology deployment in healthcare.
9	Effective mHealth in the African context **Rating = 0**	- Appropriate project design - Stakeholder participation - Technology and Resources - Integration to the healthcare system These all feed in to "Effective mHealth project"	Aranda-Jan, 2014(10)	Systematic review of mHealth in Africa, analysed through SWOT. The factors identify fall into these 4 categories.	Unknown Cited by 801 (Google Scholar)	The high-level domains don't have subcategories. It is more a classification than a formal framework.	Focus is health, technology and Africa which is a great match. However, the aim was not to provide a framework and while the review will be useful for contextualisation, it does not provide a tool that fits our evaluation.

10	Framework for sustainability assessment in NGO-implemented primary healthcare programs: Child Survival Sustainability Assessment **Rating = 0**	- Health and health services - Capacity and viability of local organizations - Capacity of the community in its social ecological context	Sarriot, 2004(11)	Primary healthcare programs implemented by NGOs for child survival	Unknown Cited by 120 (google scholar)	N/A	The context of PHC-based healthcare facilitated by an NGO in LMIC fits the program under evaluation. However, as well as not including technology, this framework goes beyond the sustainability of an intervention/program to the sustainability of a community's capacity to improve child health, so it is not the right framework.
11	Integrated Sustainability Framework **Rating = 1**	Center: - Inner contextual factors - Processes - Characteristics of the interventionists - Characteristics of the intervention Left: Outer contextual factors	Shelton, 2018(12)	Evidence-based interventions and practices in health and social care	Used in other publications Cited by 774 (Google scholar)	2-4 sub-domains for each of the 5 domains and the program sustainability indicate respectively drivers of sustainability and the 3 elements of sustainability as it is defined by authors namely: - Continued program implementation - Continued health impact/benefits - Capacity building	It is a useful representation of sustainability but does not integrate technology.

		Right: Program sustainability					
12	Clinical Sustainability Assessment Tool (CSAT) **Rating = 0**	- engaged staff and leadership - engaged stakeholders - organizational readiness - workflow integration - implementation and training - monitoring and evaluation - outcomes and effectiveness	Malone, 2021(13)	To assess if a clinical practice (f.ex. new process, new guideline, use of a digital tool= will be sustained and identify vulnerabilites	Unknown Cited by 112 (Google scholar)	Five questions per domain allow to calculate a score and identify areas to strengthen for sustainable clinical practice (similar to routinisation).	It seems like a good tool for a rapid assessment. It does not fit the need of our study for a framework for structuring the evaluation, but it is a tool we could incorporate in the evaluation or in the future "management stack".

Rating: 0 = do not include, 1 = consider for inclusion, 2 = strong contender, 3 = select. Note that the rating concerns only selection for the evaluation in question and not the quality or general relevance of the framework.

Other relevant literature provides insights to the topic but was not included for framework assessment, such as the GIZ Scaling Toolkit(14), UNICEF "Designing digital interventions for long-lasting impact"(15), and WHO Digital Investment guide(16).

Framework visuals

Framework #1: mHealth Assessment and Planning for Scale (MAPS)

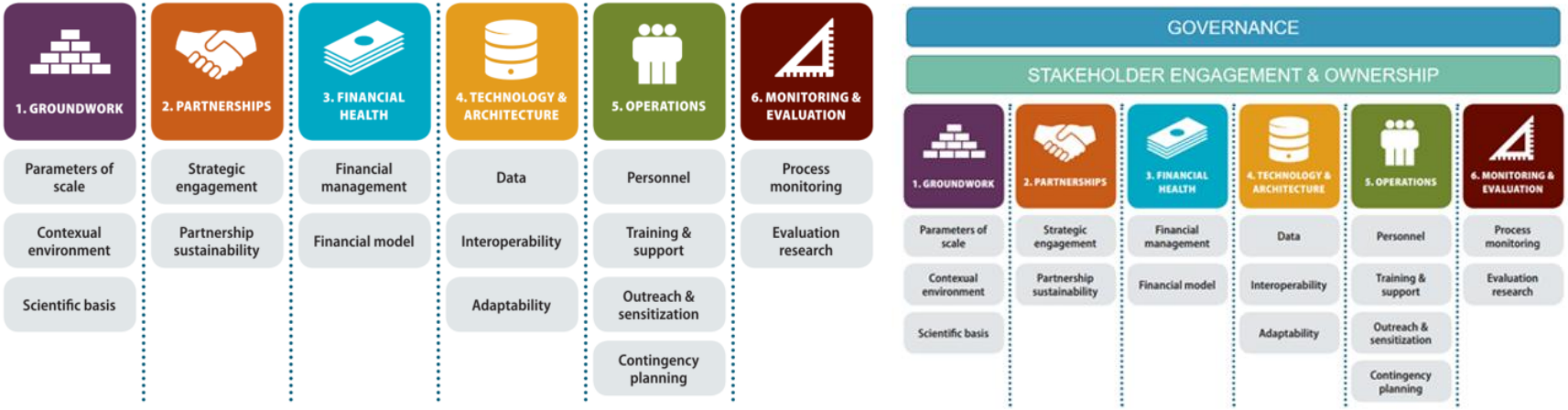

Figure 1 Left: original WHO MAPS framework, right: MAPS framework revised by the author to include overarching domains of governance and stakeholder engagement

There is no framework #2 and DIAL does not have an overarching visualization for “Beyond Scale”.

Framework #3: UTAUT2

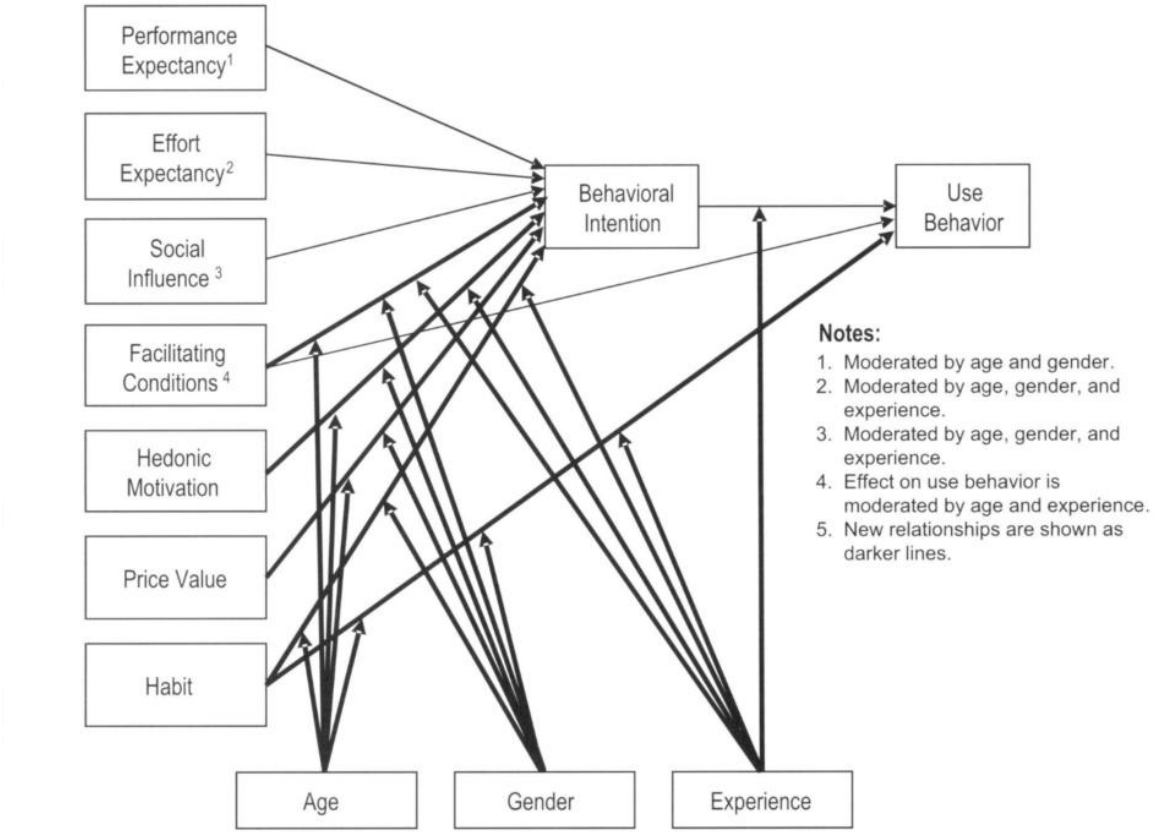

Figure 2 Extended Unified Theory of Acceptance and Use of Technology(3)

Framework #4: Dynamic sustainability Framework (Chambers, 2013)

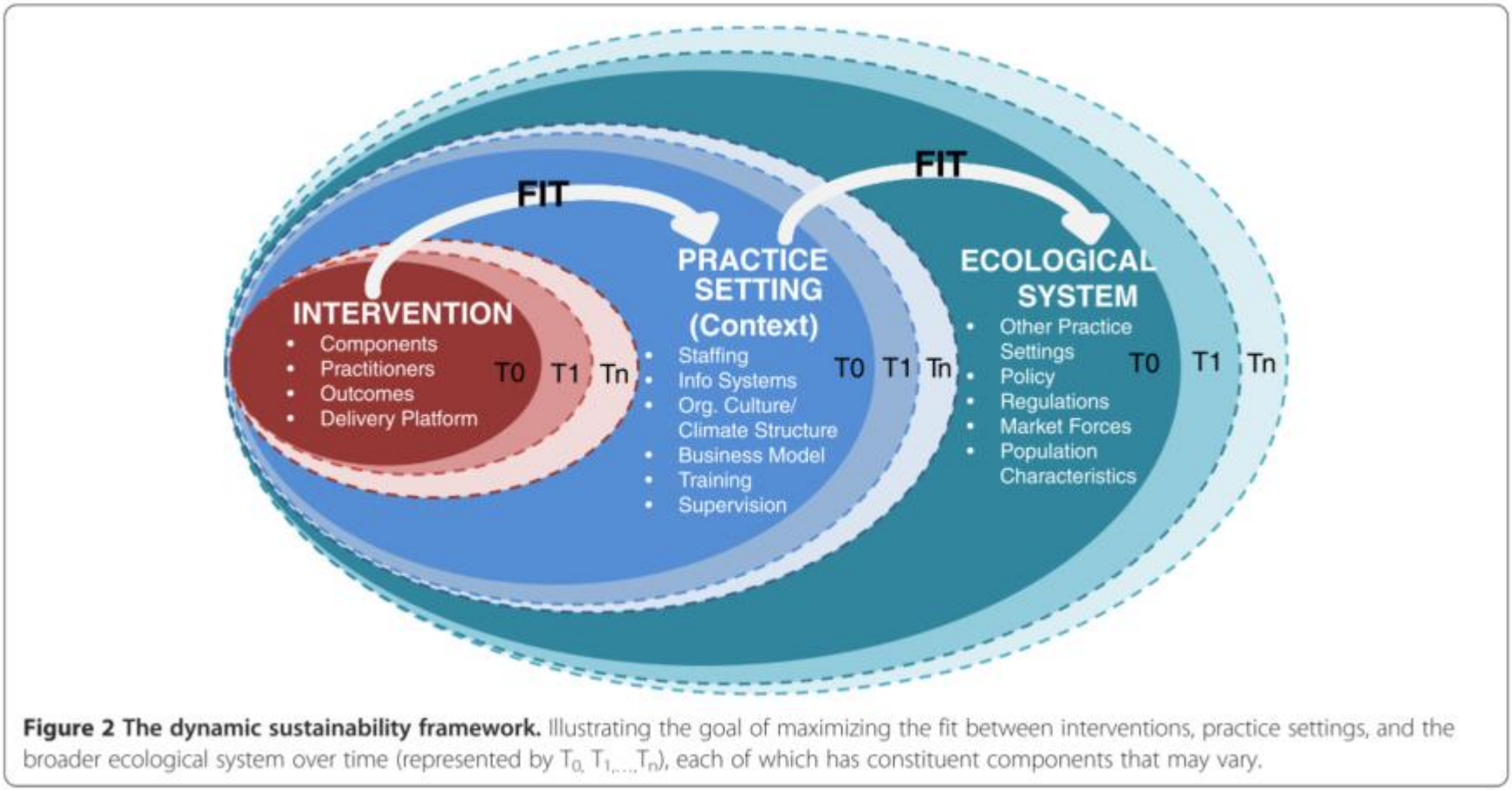

Figure 2 The dynamic sustainability framework. Illustrating the goal of maximizing the fit between interventions, practice settings, and the broader ecological system over time (represented by $T_0, T_1, \ldots, T_n$), each of which has constituent components that may vary.

Figure 3 Dynamic sustainability Framework

Framework #5: Sustainability of health interventions implemented in Sub-Saharan Africa (Iwelunmor 2016(6))

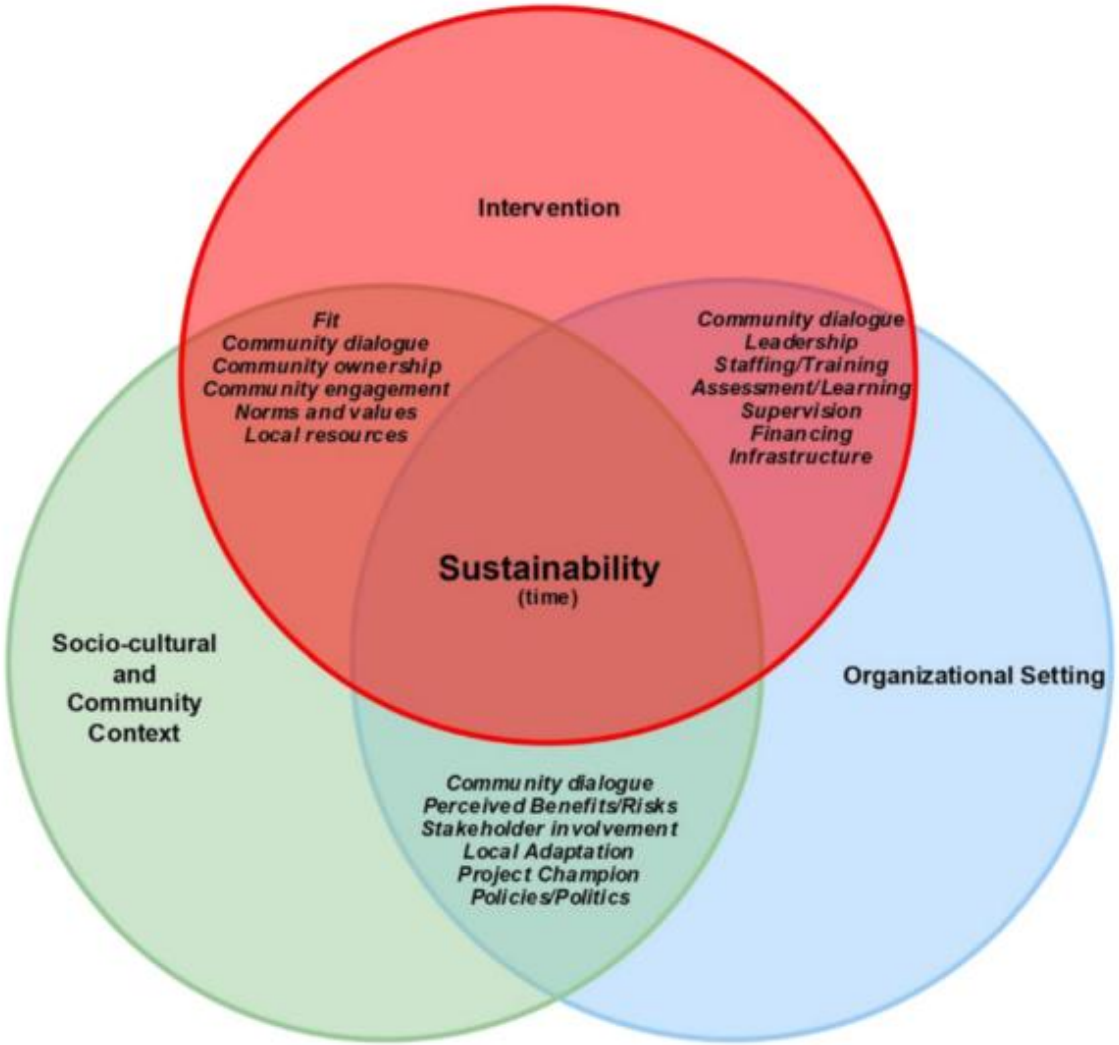

Figure 4Conceptual framework of sustainability of health interventions implemented in Sub-Saharan Africa by Iwelunmor et al.

Framework #6: Seppey's Sustainability framework (Seppey, 2017)

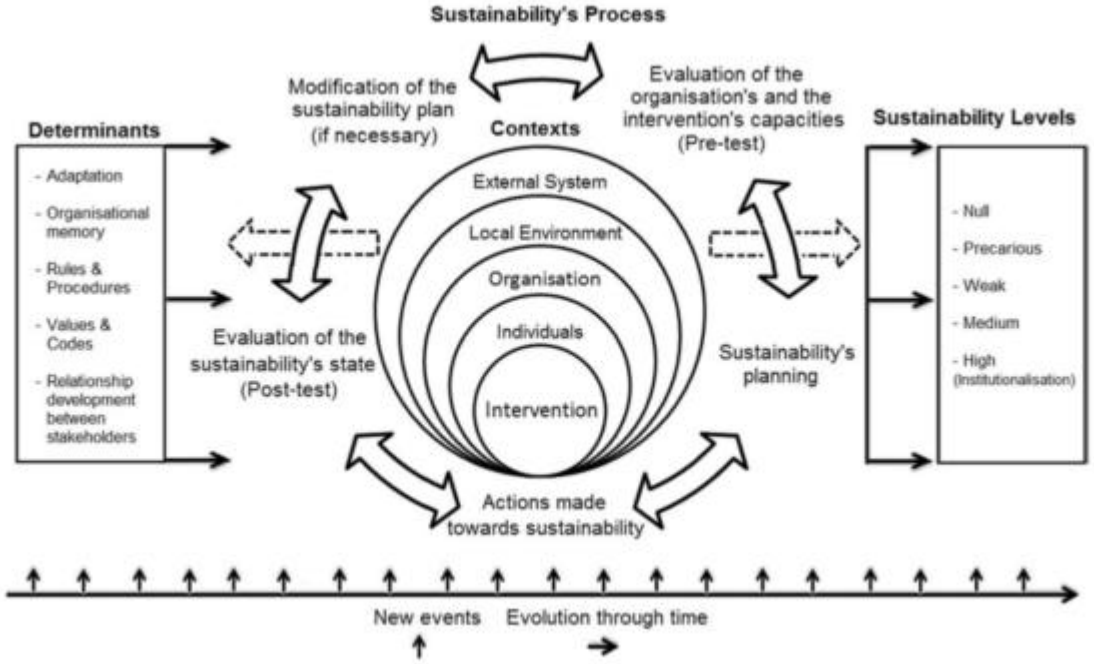

Figure 5 Sustainability framework by Seppey et al. 2017

Framework #7: Conceptualisation of scale-up and sustainability of social innovations in global health (Niang 2023)

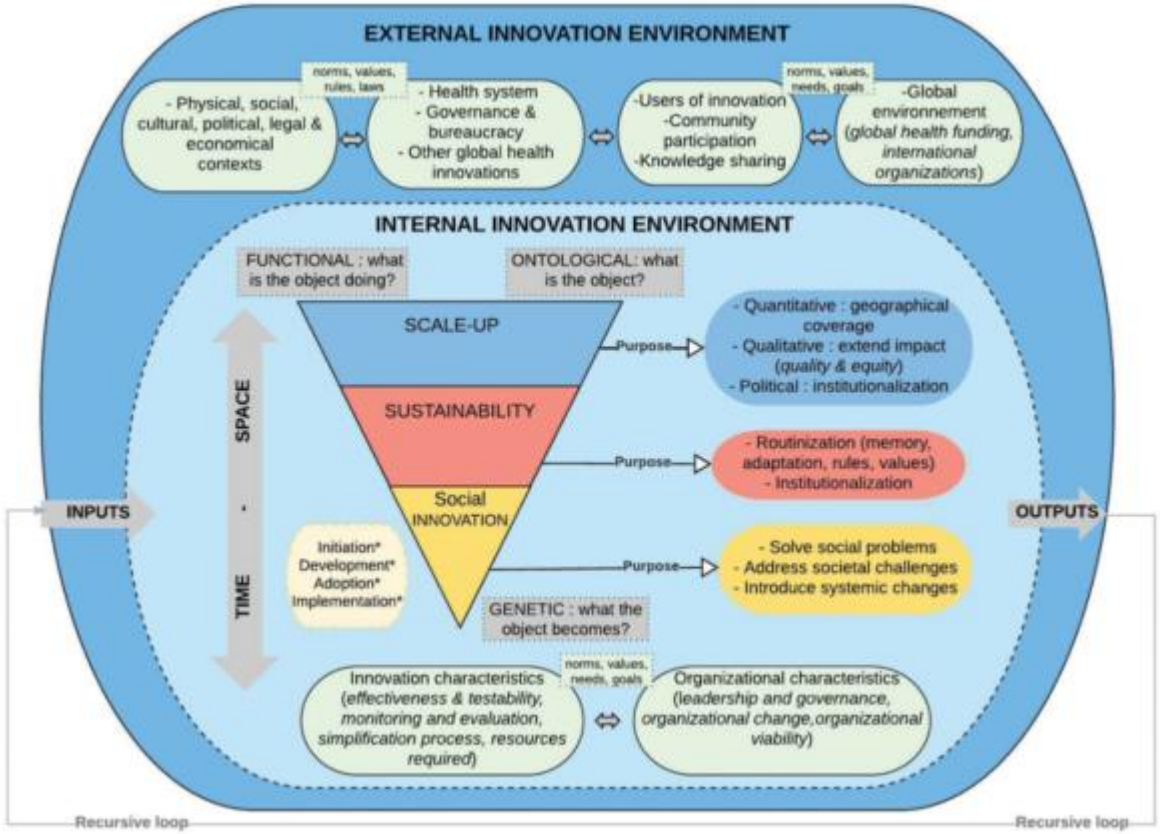

Figure 6 Framework from Niang 2023, in-text caption "Scale-up and sustainability definitions and conceptualisations"

Framework #8 Non-adoption, Abandonment, Scale-up, Spread and Sustainability: NASSS

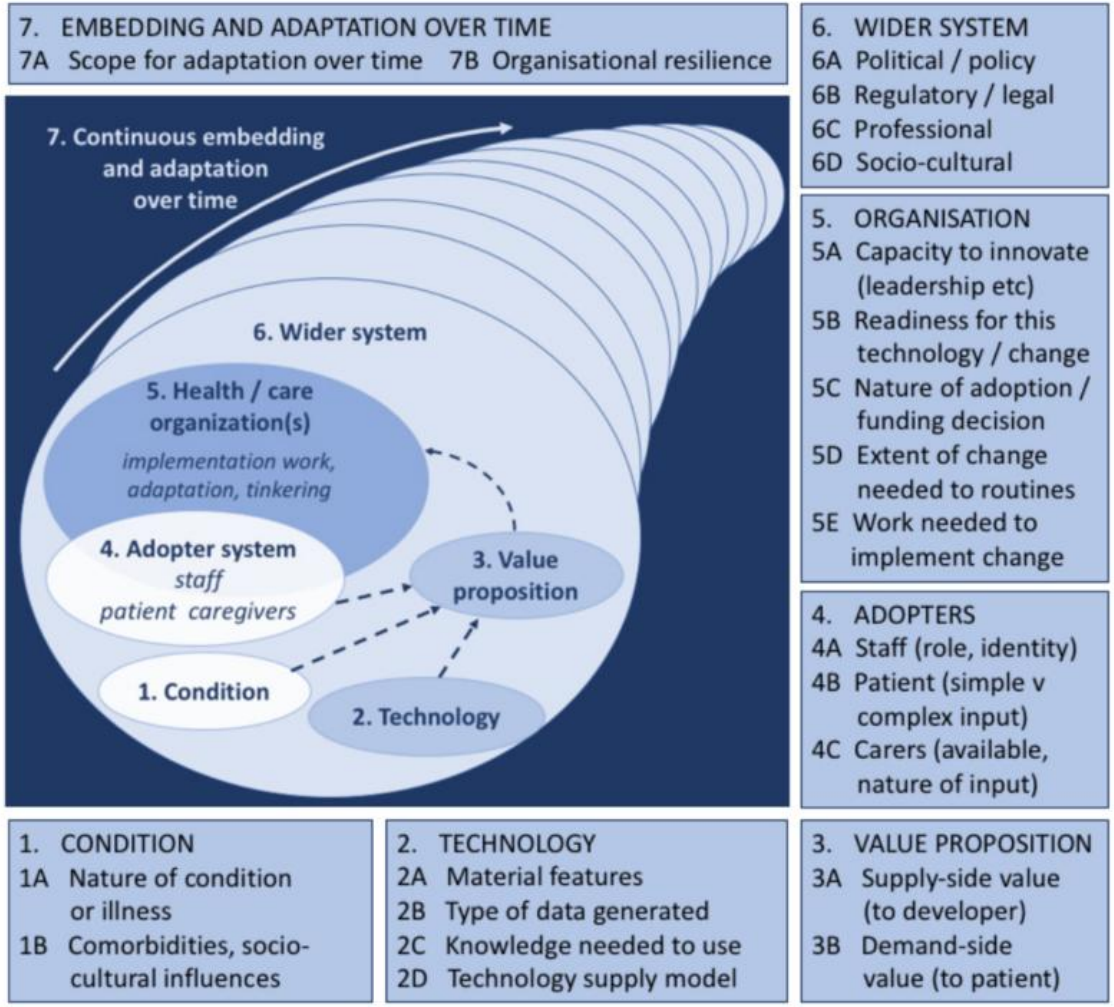

Figure 7 The NASSS framework for considering influences on the adoption, nonadoption, abandonment, spread, scale-up, and sustainability of patient-facing health and care technologies.(9)

Framework #9: Effective mHealth in an African context (Aranda-Jan, 2014)(10)

Figure 8 "Main considerations for an effective mHealth project in the African context" by Aranda-Jan

Framework #10: Child survival sustainability assessment (Sarriot, 2004)

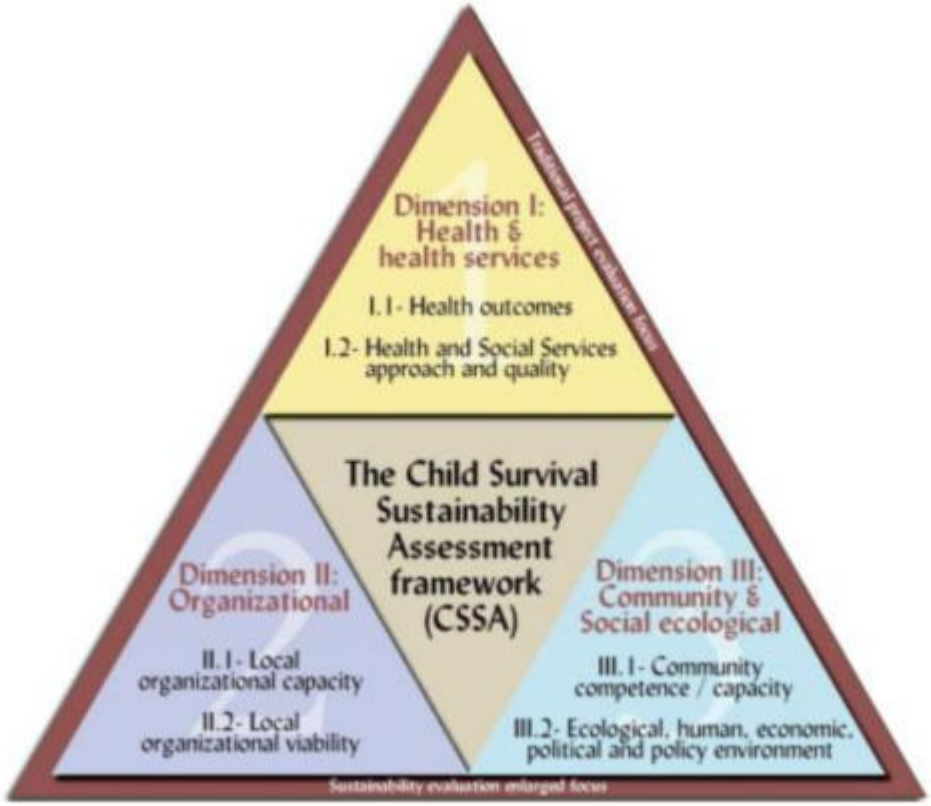

Figure 9 "The three dimensions and six components of the Child Survival Sustainability Assessment framework" by Sarriot

Framework #11: Integrated Sustainability Framework (Shelton, 2018)

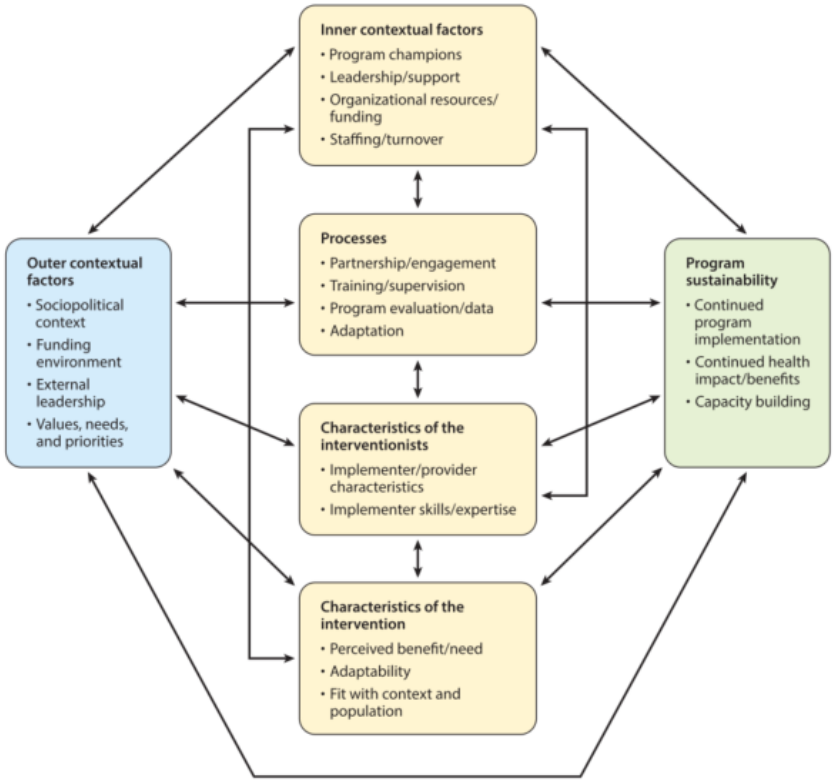

Figure 10 Integrated sustainability framework by Shelton 2018

Framework #11: Clinical Sustainability Assessment Tool (CSAT)

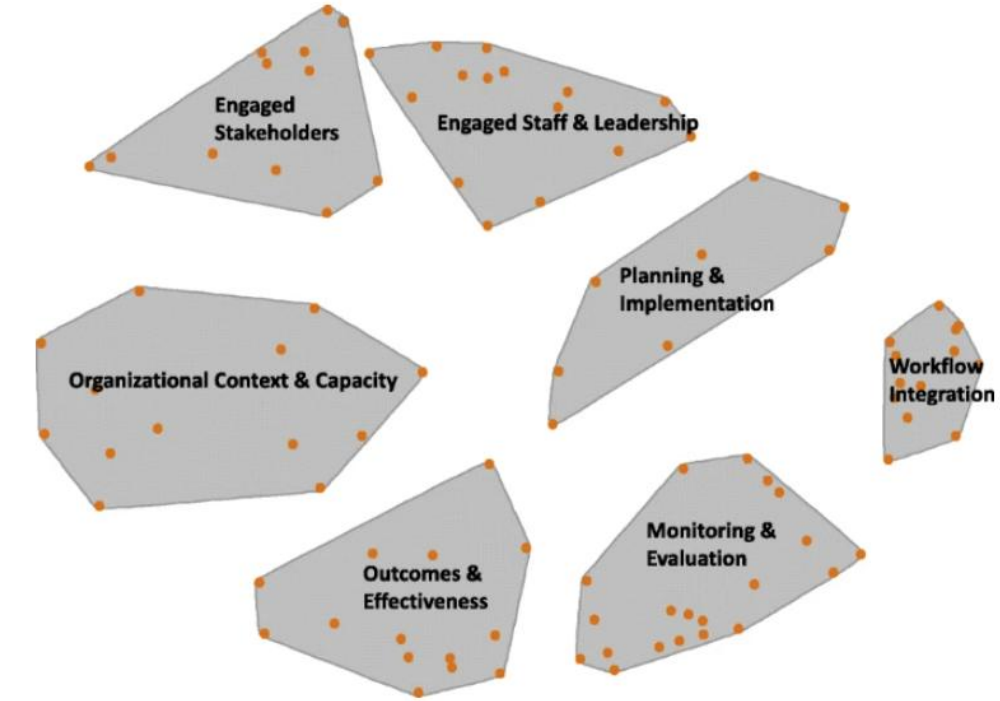

Figure 11Domains of clinical sustainability by Malone

Detailed description of the top two frameworks

Sustainability framework, by Seppey

This framework was developed in the context of Results-Based-Financing (RBF) in Mali. It has also been used in Burkina Faso and in Haïti. Forty-nine (49) stakeholder interviews were conducted in six community health centers and two referral centers selected to represent a range of settings. Participants included healthcare providers and healthcare administrators as well as persons involved at

government-level or in NGOs, that designed and implemented the program. Thematic analysis helped develop the framework, which builds on previous frameworks from implementation science, in particular around routinisation as a key step to sustainability. The sustainability framework includes determinants of sustainability, the intervention in its' layered context, processes of sustainability and, importantly, it includes the dimension of time, through specific events and evolution in time. Lastly, the framework includes a resulting sustainability level, with 5 levels from null to high. Sub-domains are described below.

Determinants (feed in to the ecosystem)

- Adaptation
- Organisational Memory
- Rules & procedures
- Values & Codes
- Relationship development between stakeholders

Contexts (at the center, onion model from out to in)

- External system
- Local environment
- Organisation
- Individuals
- Intervention

Sustainability's process (around the contexts), with bidirectional arrows indicating the dynamic nature of the processes

- Evaluation of the organisation's and the intervention's capacities (Pre-test)
- Sustainability planning
- Actions made towards sustainability
- Evaluation of the sustainability's state
- Modification of the sustainability plan

Time is represented both as an evolving continuum and as a series of events which can impact the rest of the ecosystem.

Sustainability levels (resulting from the rest)

- Null
- Precarious
- Weak
- Medium
- High (institutionalisation)

Nonadoption, Abandonment, and challenges to the Scale-Up, Spread, and Sustainability of health and care technologies (NASSS)

This framework provides seven domains across which there are factors influencing the sustainability of technology in the context of health. These seven domains, and their subdomains, are:

1. Health condition
    a. Nature of condition or illness
    b. Comorbidities, socio-cultural influences
2. Technology
    a. Material features
    b. Type of data generated
    c. Knowledge needed to use
    d. Technology supply model
3. Value proposition
    a. Supply-side value (to developer)
    b. Demand-side value (to patient)
4. Adopters
    a. Staff (role, identity…)
    b. Patient

    c. Carers
5. Organisation
    a. Capacity to innovate
    b. Readiness for this technology / change
    c. Nature of decision on adoption/funding
    d. Extent of change requires to routines
    e. Work needed to implement this change
6. Wider system
    a. Political/policy
    b. Regulatory/legal
    c. Professional
    d. Socio-cultural
7. Embedding and adaptation over time
    a. Scope for adaptation over time
    b. Organisational resilience

This framework was established using systematic literature review and 6 empirical case studies. These case studies were conducted using longitudinal ethnography across more than 20 organization, over up to 3 years, with data collected at individual, organisational and context level. Case studies included" 400 hours of ethnographic observation, 165 interviews and 200 documents". The framework development integrated learnings from 28 prior implementation science frameworks and was also circulated to others for feedback before refinement. It is designed for academic analysis of interventions or programs using technology for health. It was developed in England using case studies from the United Kingdom and Norway, and has been used to analyse interventions in many countries including in a mixed methods retrospective analysis of digital tool for reproductive health in Sierra Leone(17).

The challenges identified across the different domains can be further distinguished as simple, complicated or complex. A complicated intervention can be broken down into different components that can be handled with the right expertise, in a linear way and replicable in different settings. A complex situation stems from interaction between multiple components which are context-dependant. A complex

situation is unpredictable, more challenging to implement and has less chance of sustainability. The framework has an optional accompanying set of tools to assess complexity (Complexity Assessment Tools, CAT) which we could use to complement the analysis with a view to recommendations for the future(18).

Comparison:

Both frameworks are quite comprehensive in addressing factors influencing sustainability of an intervention. The "Determinants" section of the Sustainability framework is similar to the "Organisation" section of the NASSS. Both frameworks give "time" and "change in time" importance. The Sustainability framework was developed in the Sahel, making it more geographically relevant than the NASSS. However, the NASSS framework unlike the Sustainability framework, is specifically for technology and incorporates technology as one of the 7 key domains. In the context of IeDA this is valuable as the use of digital tools is key to the intervention, and specific challenges relating to technology do arise. So, I suggest the use of the NASSS framework for reporting the results of this study.

References

1. Organization WH. WHO mHealth Assessment and Planning for Scale toolkit (MAPS). https://wwwwhoint/publications/i/item/9789241509510. 2015.
2. (DIAL) DIA. Digital Impact Alliance (DIAL): Beyond Scale. 2017.
3. Venkatesh, Thong, Xu. Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly. 2012;36(1).
4. al Ve. Unified Theory of Acceptance and Use of Technology (UTAUT). MIS Quarterly. 2003;27(3):425–78.
5. Chambers DA, Glasgow RE, Stange KC. The dynamic sustainability framework: addressing the paradox of sustainment amid ongoing change. Implement Sci. 2013;8:117.
6. Iwelunmor J, Blackstone S, Veira D, Nwaozuru U, Airhihenbuwa C, Munodawafa D, et al. Toward the sustainability of health interventions implemented in sub-Saharan Africa: a systematic review and conceptual framework. Implement Sci. 2016;11:43.
7. Seppey M, Ridde V, Toure L, Coulibaly A. Donor-funded project's sustainability assessment: a qualitative case study of a results-based financing pilot in Koulikoro region, Mali. Global Health. 2017;13(1):86.
8. Niang M, Alami H, Gagnon MP, Dupere S. A conceptualisation of scale-up and sustainability of social innovations in global health: a narrative review and integrative framework for action. Glob Health Action. 2023;16(1):2230813.

9. Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, A'Court C, et al. Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies. J Med Internet Res. 2017;19(11):e367.
10. Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S, Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S. Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. BMC Public Health 2014 14:1. 2014;14(1).
11. Sarriot EG, Winch PJ, Ryan LJ, Bowie J, Kouletio M, Swedberg E, et al. A methodological approach and framework for sustainability assessment in NGO-implemented primary health care programs. Int J Health Plann Manage. 2004;19(1):23-41.
12. Shelton RC, Cooper BR, Stirman SW. The Sustainability of Evidence-Based Interventions and Practices in Public Health and Health Care. Annu Rev Public Health. 2018;39(1):55-76.
13. Malone S, Prewitt K, Hackett R, Lin JC, McKay V, Walsh-Bailey C, et al. The Clinical Sustainability Assessment Tool: measuring organizational capacity to promote sustainability in healthcare. Implement Sci Commun. 2021;2(1):77.
14. GIZ. Scaling Toolkit (GIZ). 2024.
15. UNICEF. Designing digital interventions for long-lasting impact.
16. Organization WH. Digital Implementation Investment Guide (DIIG): Integrating Digital Interventions into Health Programmes. 2020.
17. Bright S, Moses F, Ridout A, Sam B, Momoh M, Goodhart V, et al. Scale-up of a novel vital signs alert device to improve maternity care in Sierra Leone: a mixed methods evaluation of adoption. Reprod Health. 2023;20(1):6.
18. Greenhalgh T, Maylor H, Shaw S, Wherton J, Papoutsi C, Betton V, et al. The NASSS-CAT Tools for Understanding, Guiding, Monitoring, and Researching Technology Implementation Projects in Health and Social Care: Protocol for an Evaluation Study in Real-World Settings. JMIR Res Protoc. 2020;9(5):e16861.