

Evaluating mHealth Interventions Using Service Design Strategy: *A Case of Kenya*

Presenter: Danny Nyatuka

Faculty of Information Technology(FIT)

Definitions of Concepts

- **mHealth:** medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices (**WHO, 2011**)
- **Underserved context:** communities of lower socio-economic status (SES) hence resource constrained and specifically in low-and middle-income (LMIC) settings (**Botts et al, 2011; Stowell et al, 2018**)

Study Background

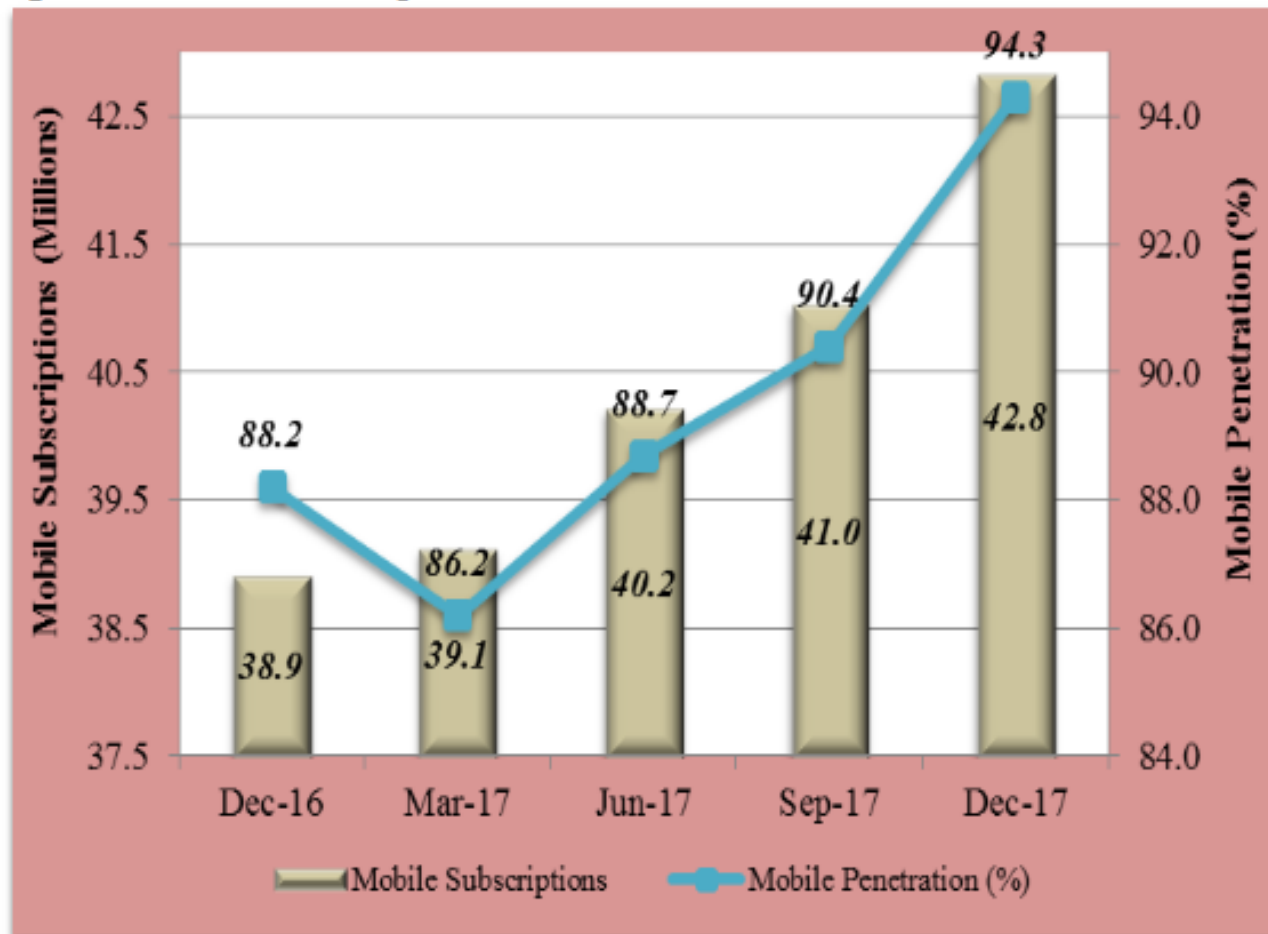
- Mobile phones & smartphones continue to become cheaper and more accessible globally (**Mushamir et al, 2015**)
- Subscription of mobile phones in **Africa** had been projected to go up to 412 million from 79 million between 2012 and 2018 (**Lodhia, 2016**).
- Due to associated benefits including *increased mobility, efficiency, improved quality of care, reduced healthcare costs* and *enhanced governance structures* across health systems (**Njoroge et al., 2017**)
- Has led to increased mHealth interventions particularly in Sub-Saharan Africa in efforts to strengthen health systems Kenya included (**Lodhia et al., 2016; Njoroge et al., 2017**)
- However, underserved communities continue to bear the greatest burden of disease globally, and hence they exhibit the poorest health outcomes due to inadequate infrastructure and healthcare coverage (**Lade et al., 2014**)

Study Background cont'd

- As at 2017 **49** out of **69** e-health projects in the Kenya were mobile-based, most of which focused on HIV/AIDs and primary care (**Njoroge et al 2017**)

Mobile Subscriptions as at Kenya (Dec 2016-2017)

Figure 1: Mobile Subscriptions



Source: CA, Operators' Returns

Fig.1: Mobile Subscriptions in Kenya during financial year 2017/2018
(Communications Authority of Kenya ,2017)

Study Background cont'd



Fig.2: Kenya's national e-Health Framework (Ogara, 2012)

Challenges facing mHealth in Kenya

Despite mHealth having been incorporated into the national e-health strategy, some key challenges are being experienced:

- ❖ No clear scale-up strategy to guarantee sustenance of mHealth projects
- ❖ Lack of consensus among stakeholders on the requirements for designing these interventions
- ❖ Donor syndrome
- ❖ Over-reliance on mobile apps on smart phones
- ❖ Unstable power supply
- ❖ Dominated mHealth control by private entities
- ❖ Illiteracy & language barrier,
- ❖ Interoperability and compatibility issues
- ❖

(Kenya Healthcare Federation, 2016, Tomlinson et al., 2013, Kariuki & Okanda, 2017)

Research Gaps

- Existing evaluation frameworks are not context-specific and thus poor adoption of mHealth interventions
- The frameworks are insensitive to the role of stakeholders in the **design** and **evaluation** of mHealth interventions
- The frameworks are mainly designed for ***post-implementation*** evaluation without the pre aspect hence they are unilateral rather than bilateral (**Amoako & Rivett, 2015**)

Research Question

- How can a robust framework be designed to guide design evaluation of mHealth services in an underserved context as a healthcare service facilitated by technologies that incorporate mobile technologies?

Specific Objectives

1. To engage relevant stakeholders
2. To establish design considerations for desired situations
3. To design context-specific solutions,
4. To evaluate new services in-practice.

Research Approach: SDR Strategy

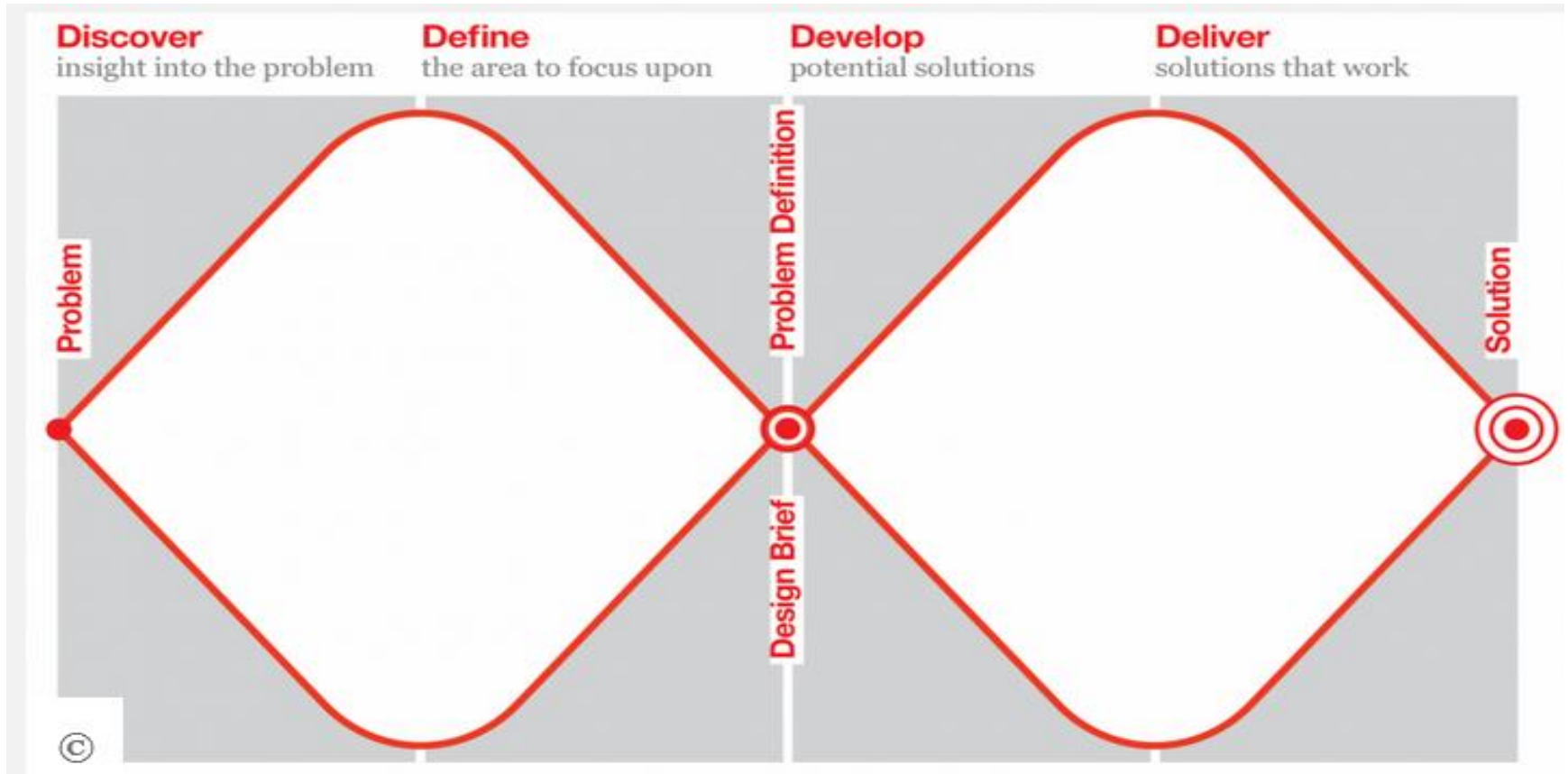


Fig. 3: Value Creation for Stakeholders (**Design Council, 2015**)

SDR emphasize on **creation of purposeful** and **context-specific** innovations for maximum impact (**Moritz, 2005**)

Stakeholder Theory

A stakeholder is *“any group or individual who can affect or is affected by the achievement of the organization’s objectives”*, and that different stakeholders may have either limited or significant influence on a project’s expected outcomes **(Chung & Crawford, 2016)**

Service Design Research

- The focus of SDR approach is *to design new and or improve the current situation* i.e. existing services in order to make them more useful, efficient and effective for organizations

Stakeholder Theory cont'd

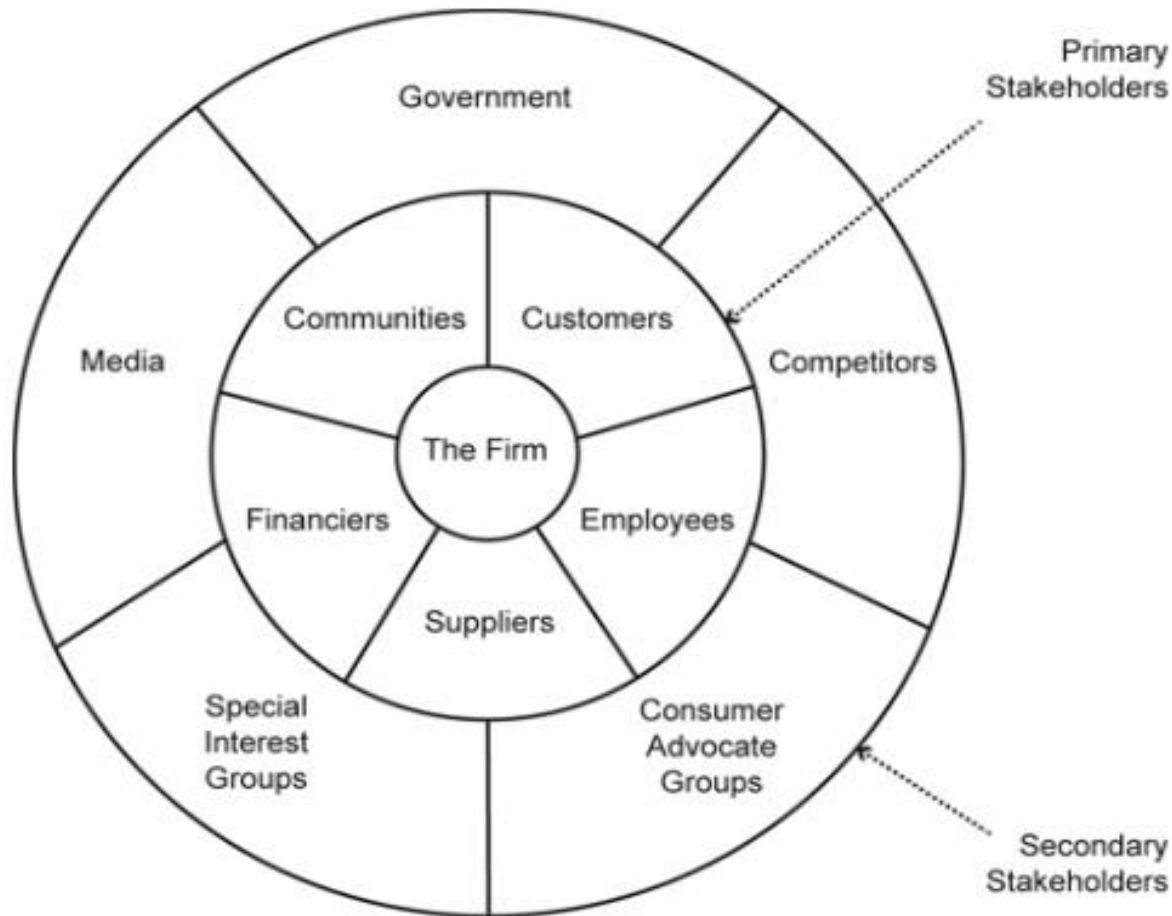


Fig. 4: Value Creation for Stakeholders (**Chung et al., 2016**)

Theoretical Framework

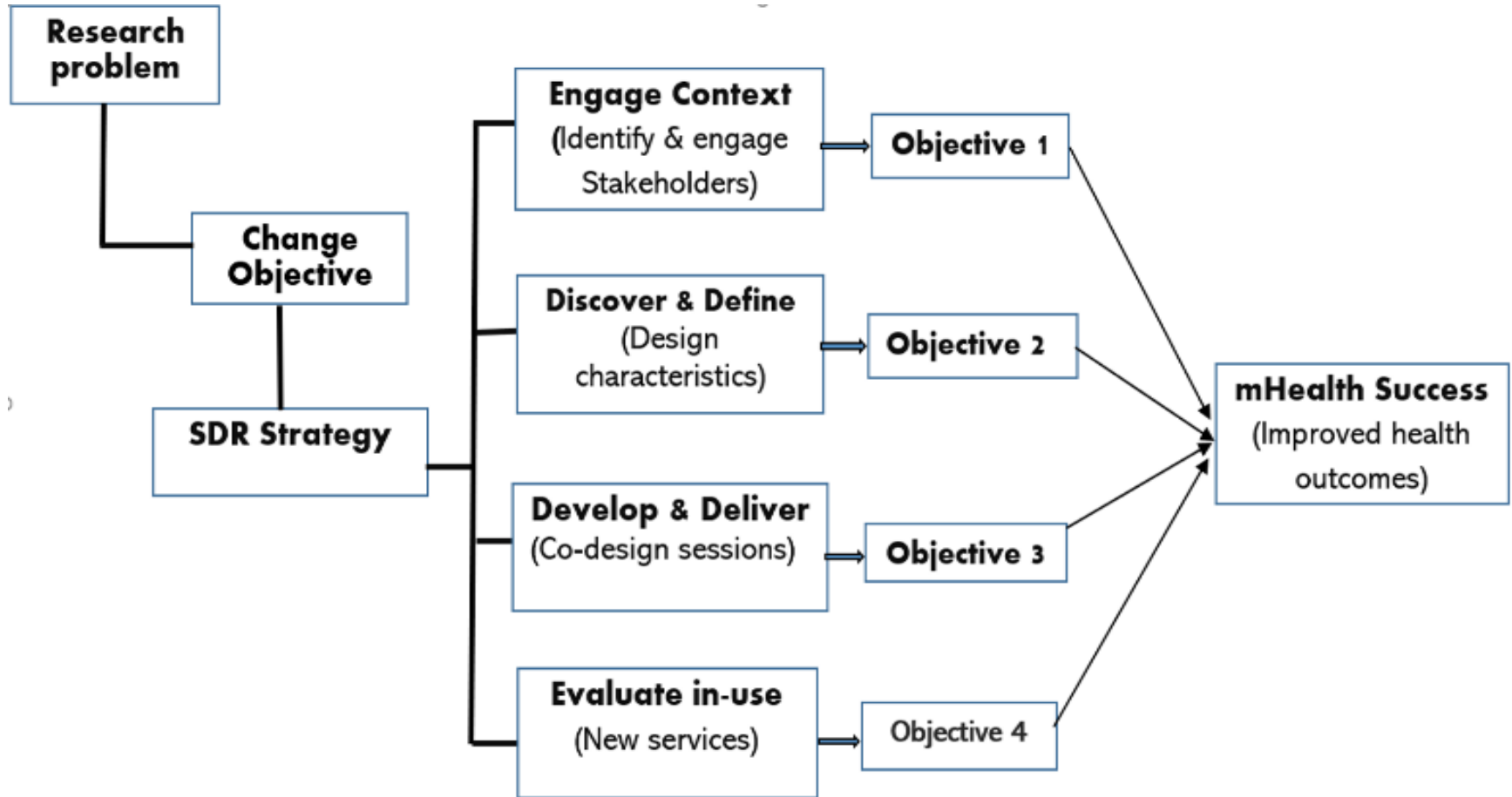


Fig.4 :Proposed Research Model

In doing this, the study extends and complement existing mHealth evaluation literature and thus contributes to existing body of knowledge regarding designing of healthcare services in an underserved context.

Validation of the model

Participative evaluation (**Carcary, 2010**) was used to determine the **empirical validity** of the new model with fifteen (**n=15**) participants (academic experts, ICT manager, healthcare consumers, health professionals and mHealth developers).

Table 1: mHealth success dimensions and parameters

Success Dimensions	Corresponding Parameters
Research problem	• Research questions
Change objective	• Research objectives
Engage context	• Relevant stakeholders • Opinion, perception, ideas, attitude and propositions of stakeholders
Discover & define	• Problem domain • Requirements • Design characteristics
Develop & deliver	• Potential solutions • Ideal solutions • Co-design sessions • Desired services
Evaluate in-use	• Consumer feedback
mHealth Success	• Health outcomes

Validation of the Model cont'd

Table 2: Validation Scores

S/N	Participant	Score/5
1	Academic Expert 1	2.6
2	Academic Expert 2	3.7
3	Academic Expert 3	5.0
4	Academic Expert 4	3.0
5	Academic Expert 5	3.4
6	ICT Manager	4.7
7	Health care Consumer 1	4.3
8	Health care Consumer 2	3.8
9	Health care Consumer 3	3.5
10	Health Professional 1	5.0
11	Health Professional 2	4.0
12	Health Professional 3	3.7
13	mHealth App Developer 1	3.5
14	mHealth App Developer 2	3.8
15	mHealth App Developer 3	3.6
Average Score/5		3.84

Validation of the Model cont'd

Table 3: Scorecard validation

Overall average score	Interpretation	Meaning of result
4.6 and above	Exceeds Expectations	Potential to perform beyond expectations
3.6-4.5	Meets Expectations	Potential for sustained performance to meet the organization's goals
2.6-3.5	Satisfactory	Potential to meet most of the requirements while missing a few by a small margin
2.5 and below	Unsatisfactory	Performance below the standard in meeting the requirements

Validation Results

- The average validation result was 3.84 hence **'Satisfactory'** hence the proposed model **Meets Expectations**
- This imply that the model has potential to achieve sustained performance to meet organizational goals

References

Amoako, G., and Rivett, U. 2015. Towards the development of sustainable ICT projects in Africa—A Review and Synthesis of Evaluation Frameworks. In *Proceedings of the 2015 ACIST Conference (Accra, Ghana)*.

Botts

Carcary, M. 2010. Evaluating a Student MIS in the Tertiary Education Sector: Addressing Functional-Operational Misalignment through Continuous Participative Evaluation. *Journal of Service Science and Management*, 3,1, p. 33.

Communications Authority of Kenya. 2017. Second quarter statistics report for 2017/2018. CA, Nairobi.

Chung, K., and Crawford, L. 2016. The role of social networks theory and methodology for project stakeholder management. *Procedia-Social and Behavioral Sciences*, 226, pp. 372-380.

Design Council. 2015. The Design Process: What is the Double Diamond?.

Design Council, (March 2015). DOI= <https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond>.

References

Kariuki, E., and Okanda, P. 2017. Adoption of mHealth and usability challenges in mHealth applications in Kenya: Case of Uzazi Poa mHealth prototype application. In *AFRICON, 2017 IEEE* , Cape Town, South Africa.

Kenya Healthcare Federation.2016. Kenyan Healthcare Sector: Market Study Report-Opportunities for the Dutch Life Sciences & Health Sector.

Netherlands Enterprise Agency, Nairobi.

Lade,V., Jaitpal, S., and Chitnis, S. 2014. A Review of Cloud-Based Healthcare System. *International Journal of Enhanced Research in Science Technology & Engineering*, 3,10, pp. 22-26.

Lodhia, V., Karanja, S., Lees, S., and Bastawrous, A. 2016. Acceptability, usability, and views on deployment of peek, a mobile phone mHealth intervention for eye care in Kenya: qualitative study. *JMIR mHealth and uHealth*, 4,2, e30.

Moritz, S. 2005. Service design: Practical access to an evolving field, Cologne, Germany: Köln International School of Design.

References

- Mushamiri, I., Luo, C., Iiams-Hauser, C., and Amor, Y. 2015. Evaluation of the impact of a mobile health system on adherence to antenatal and postnatal care and prevention of mother-to-child transmission of HIV programs in Kenya. *BMC Public Health*, 15,1, p. 102.
- Njoroge, M., Zurovac, D., Ogara, E., Chuma, J., and Kirigia, D. 2017. Assessing the feasibility of eHealth and mHealth: a systematic review and analysis of initiatives implemented in Kenya. *BMC research notes*, 10,1, p. 90.
- Ogara, A. 2012. Kenya National e-Health Strategy Framework 201-2017. Ministry of Health, Nairobi.
- Stowell, E., Lyson, M., Saksono, H., Wurth, R., Jimison, H., Pavel, M., and Parker, A. 2018. Designing and Evaluating mHealth Interventions for Vulnerable Populations: A Systematic Review. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, (Montreal QC, Canada, April 21 - 26, 2018). ACM.
- Tomlinson, M., Rotheram-Borus, M., Swartz, L., and Tsai, A. 2013. Scaling up mHealth: where is the evidence?. *PLoS medicine*, 10, 2, p. 1001382.

Thank You!