

Reflections on mHealth

A collection of thoughts and
images from 5 years of
working on the frontlines of
mHealth at the base of the
world socioeconomic pyramid

A PHOTO ESSAY BY

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A group of friends in Delhi, India listen to music being played on a phone while warming themselves by a fire they made in the street



A street vendor in Kampala, Uganda checks her mobile phone.

This photo essay is dedicated to my American family and my Motswana family. My work and these images would not have been possible without their love and support.

Introduction

In January 2010, I took a one-way flight to Botswana to volunteer as a project manager for a mobile health (“mHealth”) project.

mHealth is the utilization of mobile technology in healthcare delivery and public health. As mobile network coverage expands and strengthens around the world, mobile devices are becoming more powerful and less expensive.

mHealth has the potential to make its greatest impact in regions where access to healthcare and public health information is significantly limited.

I have now been in Botswana for over five years, working with diverse groups of international donors, research institutions, tech startups, tech giants, and local academic and governmental institutions to develop mHealth initiatives from the ground up. I have supported over 20 mHealth projects in eight countries including the United States, each project with its own unique parameters, environment, scope, budget, partners, users, software and hardware. I have had the fortune to have worked on projects that have thrived, and I have been equally as fortunate to have worked on projects that have failed.

I also have a passion for photography.

I created this photo essay to share insights and images from my time working on and thinking about mHealth. It is a fusion of images from projects in Botswana and global travels for mHealth work. The content and progression align with key pillars of the field, from designing and developing an mHealth solution from scratch, to capacity building and sustainability.

This is not a comprehensive guide to mHealth, but a small collection of reflections on this young and rapidly growing space where technology, health, and global development overlap.

For more information about my professional mHealth experience, check out [my resume](#).

Peace,
Ryan



A phone shop near a health clinic in Gaborone, Botswana. Shops such as these generally sell airtime and mobile device accessories, but can also offer phone charging and repair services.



A recently-built mobile network tower next to a dilapidated post office in rural Ulongwe, Malawi.



DESIGN

Droplets form on a spider web in rural Matabeleland, Zimbabwe.



Design

Identifying the need for an mHealth solution with local partners can be quite simple.

However, designing an effective mHealth solution for a local setting can be challenging, especially in a complex healthcare environment with diverse users and stakeholders. A poor, or rushed, design approach can lead to unnecessary challenges and potential failure.

[Design Thinking](#) and [Human/User-Centered Design](#) methodologies have proven to be the most effective approaches for designing any new solution from scratch.

Recognizing the growing need to infuse these methodologies in the nonprofit realm, a [Human-Centered Design Toolkit](#) was created specifically to empower social enterprises and nonprofits.

Nurses in a rural hospital in Tsabong, Botswana react after they successfully access national treatment guidelines on a mobile phone over SMS. Doctors, nurses, and medical students contributed to the design, training, and support materials (such as the handouts they are holding) for this initiative.

DEVELOPMENT



Vendors sell diverse produce and goods in an open air night market in Delhi, India.

Development

The software development environment is always changing, and there are many factors to consider when deciding how to approach software development.

Software

- There are seemingly countless [existing tools and platforms](#) that can potentially support a project's needs.
- For basic mHealth projects, freemium cloud-based services exist that are simple to setup and don't require any software development.
- Groups that worked on similar projects or software in the past can provide valuable feedback and guidance. [The GSMA mHealth Tracker](#) is a good place to start to discover such groups.

Budgeting

- When determining a development budget, it is helpful to discuss the technical needs and informal quotes with multiple independent developers.
- If the budget is tight, partnerships with local university computer science departments or startups looking for experience are viable options, but also potentially introduce timeline and quality assurance risks.
- If the budget is big or flexible, conduct a formal request for proposals and cast a wide net.

Open source or proprietary software developed by local or outsourced developers?

- There is no "right" answer, just options based on different combinations, and sometimes fusions, of these options.
- Open source does not mean "free" and utilizing open source platforms does not necessarily lead to a less expensive project.
- Building capacity and engaging local technical groups is worthwhile for long-term sustainability and better support for local users.
- Ultimately the decision is circumstantial and influenced by functional requirements, resources, and technical capabilities available.



A schoolgirl carefully crosses a flooded bridge on her walk home from school in rural Matabeleland, Zimbabwe

IMPLEMENTATION



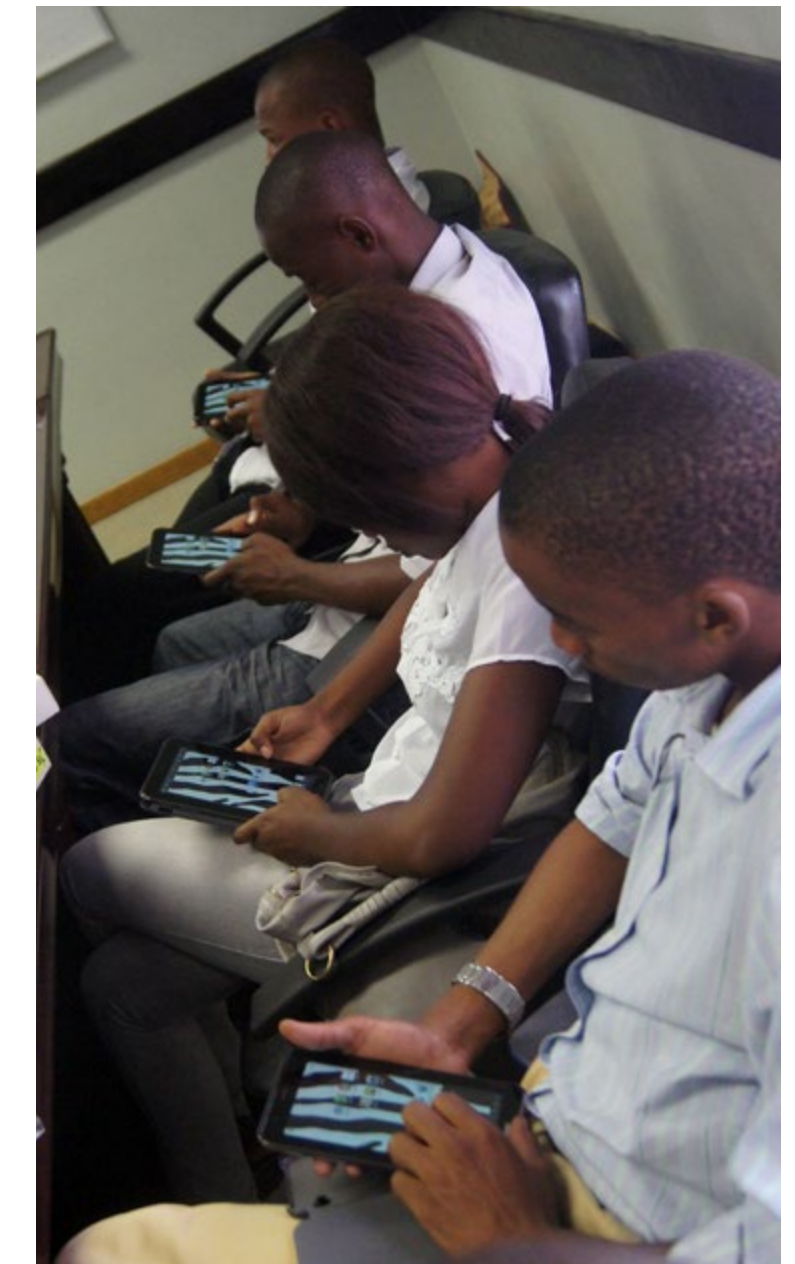
Implementation

Implementing any disruptive technology into a complex system such as healthcare requires intensive preparation and support.

- [Change management](#) must be prioritized, and can mean the difference between a successful or failed implementation.
- It is generally most effective to “train the trainers” in order to build local expertise and capacity.
- Effective trainings are extensive, repetitive, and frequent with detailed, visual, hardcopy and softcopy training materials provided to all users.
- Just because a user does not request support, does not mean support is not needed. If feasible, schedule regular support calls/visits for all users timed between retraining sessions.



University of Botswana librarians load medical and library apps and resources on mobile devices in Gaborone, Botswana. A critical component of the implementation of this project was training the librarians, who then conduct the trainings for the students and doctors.



Botswana medical students in Lobatse, Botswana are trained by the librarians on how to utilize the devices when they rotate to remote health facilities.



SECURITY

Security

The transformative mobility of mHealth also introduces security risks and concerns that must be addressed. In the 20 mHealth projects that I have supported, ~14% of mobile devices are accidentally damaged, lost, or stolen in the field.

Physical Security

- Physical security accessories for smart phones and tablets such as screen protectors and protective cases should not be overlooked and will minimize accidental damages.
- Device location applications such as [LookOut Security](#) can be helpful for locating and returning lost or stolen devices.

Digital Security

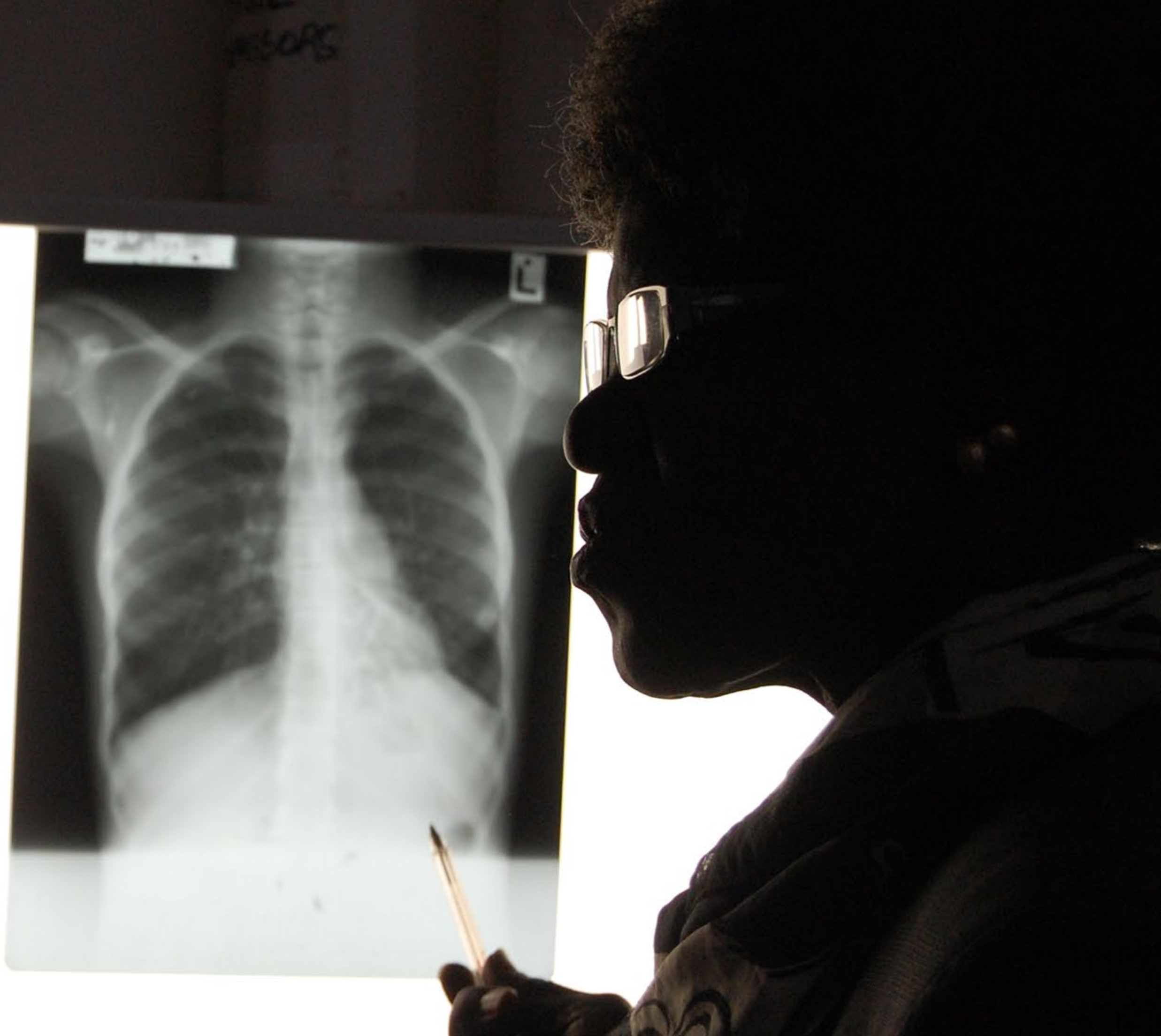
- If a mHealth solution will be collecting sensitive health data, the developers must be aware of technical encryption requirements for meeting security standards, such as [HIPAA](#).
- All devices should have a basic pattern/pin unlock security layer.



A healthcare worker conducts tuberculosis (TB) contact tracing in Gaborone, Botswana. Since TB is so contagious, when a patient is diagnosed with the disease, healthcare workers are sent to their home to screen their contacts for symptoms. [A pilot study](#) equipped healthcare workers with tablets with a HIPAA-secure app to screen the contacts and also collect GPS coordinates to provide real-time surveillance of the disease.

A radiologist explains the details of an X-ray image to a medical student while on an outreach visit in Kanye, Botswana. There is a severe shortage of specialist doctors in Botswana, so specialists based in the capital city regularly travel to facilities around the country to give lectures and train doctors that serve rural areas.

CAPACITY BUILDING





Capacity Building

Since mHealth is a young field, capacity to support mHealth initiatives programmatically and technically varies globally.

Awareness building and sensitization

- The first step towards building capacity is making the local community of stakeholders aware that mHealth technological innovations exist, and the benefits they can provide.
- Sensitization initiatives are most effective when delivered by members of the local community who are familiar with mHealth.

Institutional Capacity

- Sustainability is not possible until local government, academia, telecommunications, and private IT institutions have the capacity to develop and maintain mHealth projects internally.
- Leadership buy-in is essential, as well as programmatic commitment towards mHealth initiatives in the forms of human resources, recurrent budgets, and formal inclusion in institutional strategic plans.

Innovation Competitions and Hackathons

- So long as educational and training components are included, innovation competitions and hackathons are fun and effective capacity building events for building and engaging the local mHealth community, as well as accelerating the growth of potential local mHealth innovations.

Global Capacity Building Via Online Courses

- A plethora of mHealth online courses are offered by both academic and international development institutions, and many more are to come. These are great for individuals curious about the field, as well as mid-career health, tech or mHealth professionals looking to round out their existing professional knowledge. A few notable online courses from my experience:
 - [mHealth Basics: Introduction to Mobile Technology for Health](#)
 - [mHealth - Mobile Phones for Public Health](#)
 - [Mobile Health Without Borders](#)

Nurses and doctors at a mHealth Sensitization and Training workshop for the Ngamiland district in Botswana huddle around a facilitator as she explains how they can access medical information with a mobile phone. The Botswana Ministry of Health funds these workshops as part of a nation-wide rollout of select priority mHealth services.

Construction workers assemble pillars of a building as evening arrives in Delhi, India.

SCALE & SUSTAINABILITY

The image shows a construction site at sunset. The sky is a mix of orange, pink, and grey, with scattered white clouds. In the foreground, the silhouettes of several construction workers are visible as they work on a building's structure. They are positioned at different heights, with some standing on a concrete pillar and others on a network of rebar. The rebar forms a grid-like pattern of horizontal and vertical lines. The overall scene is dramatic and emphasizes the scale of the construction project against the natural light of the evening.

Scale & Sustainability

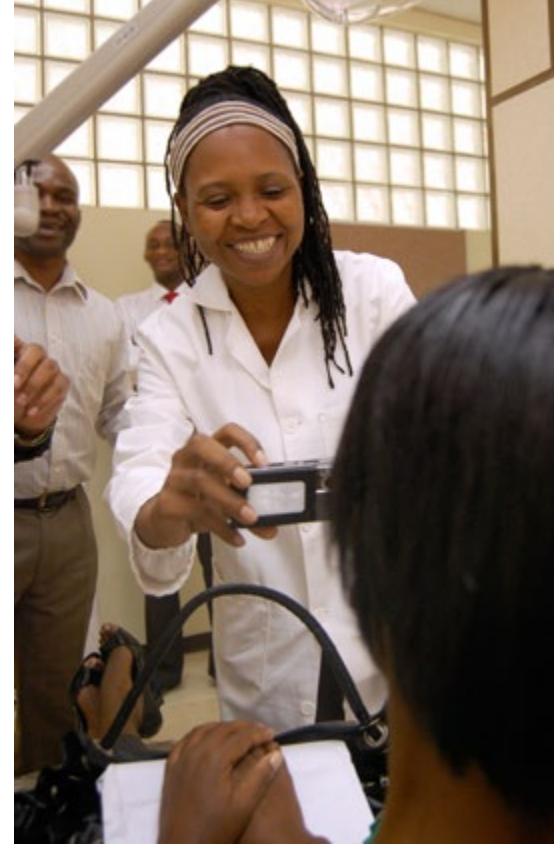
Scale and sustainability for mHealth is highly sought after, but rarely realized, for a multitude of complex reasons. True sustainability takes time (more than most expect), focused capacity building, and unwavering commitment by multiple partners.

Local Ownership

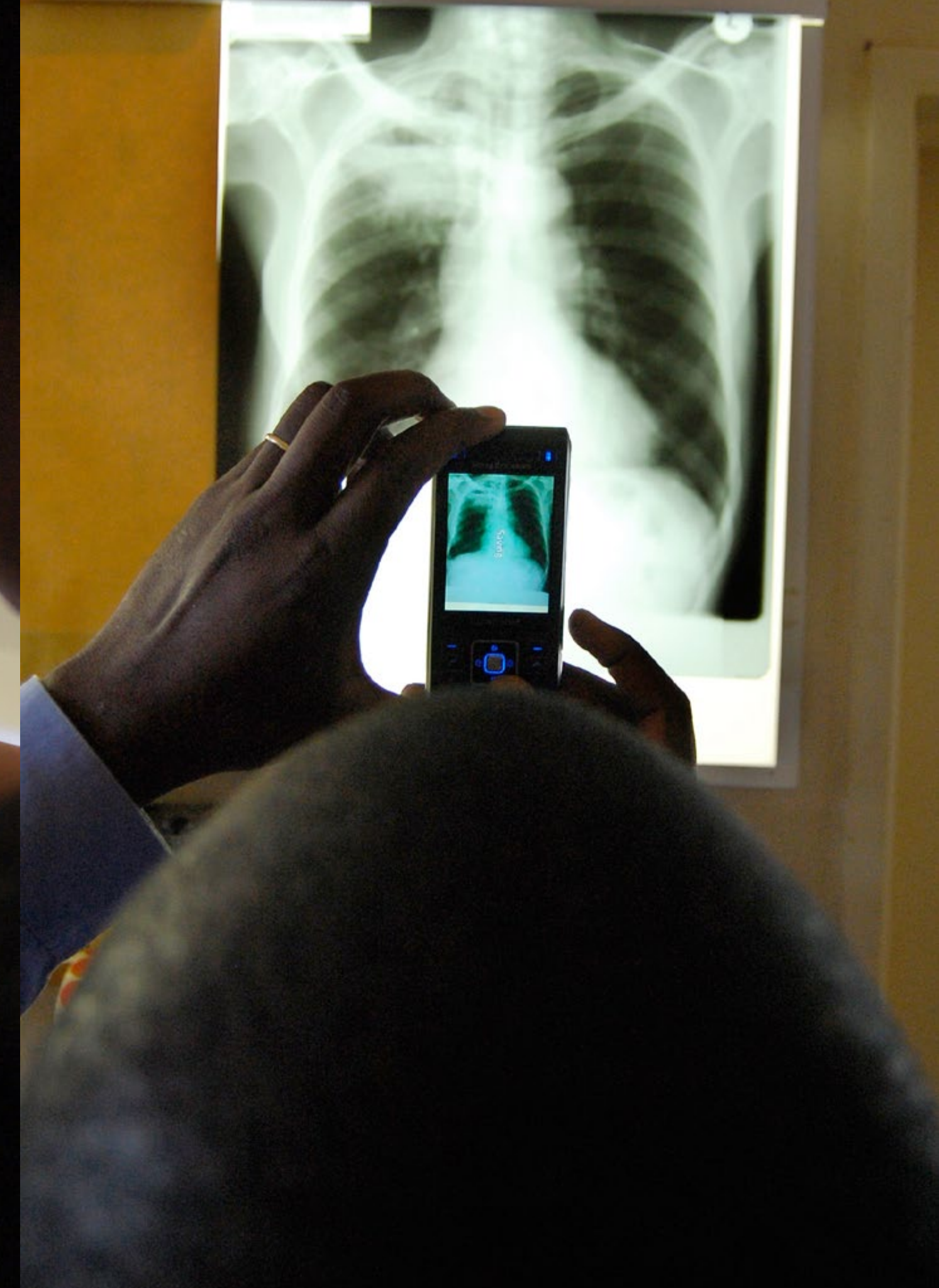
- No mHealth initiative is sustainable until it is owned, managed, and driven locally.
- It is helpful to agree on “sustainability milestones” with local partners, to ensure that funding or operational tasks performed by international partners initially are transitioned to a local entity eventually.

Public-Private Partnerships

- mHealth is multidisciplinary by its nature, which lends itself to public-private partnerships that feature government, academia, telecommunications, and private technology groups.
- A mHealth project is more likely to succeed if there are multiple diverse partners committed to its success. It will take time and the project will move slower, but its worthwhile to have all partners document their partnership commitments for the long-term success of the project.



Dr. Neo Mohutsiwa-Dibe is a Dental Officer and local champion of the Botswana Ministry of Health's Kgonafalo Telemedicine mHealth project. After spearheading the pilot study and training workshops for the Oral Medicine specialty, the Botswana government sponsored her to pursue a Masters degree in Public Health in Europe, where she concentrated her studies on mHealth in sub-saharan Africa. After completing her graduate program, Dr. Mohutsiwa-Dibe returned to Botswana where she assumed a leadership role directing the trainings and implementation of the nation-wide rollout.



A radiographer photographs an x-ray image and a dental officer photographs an oral tumor to send to remote specialists for consultation as part of the Botswana Ministry of Health's Kgonafalo Telemedicine mHealth project. This project is a public-private partnership between the Ministry of Health, Orange Botswana (a telecommunications company) and the Botswana-UPenn Partnership. Over the course of five years, this project grew from a series of pilot studies in four medical specialties (Dermatology, Radiology, Cervical Cancer Screening, and Oral Medicine) to a nation-wide rollout funded and operationally supported entirely by local partners.



WHAT'S NEXT?...

A group of giraffe on the outside edge of a desert pan in the Central Kalahari Game Reserve in Botswana.

What's Next?...

The mHealth projects featured in this photo essay represent a small fraction of the types of mHealth applications that can make a huge impact globally.

The mobile technology and Internet connectivity landscape is constantly improving and evolving, presenting more opportunities for innovations in the parts of the world where technology makes the biggest impact.

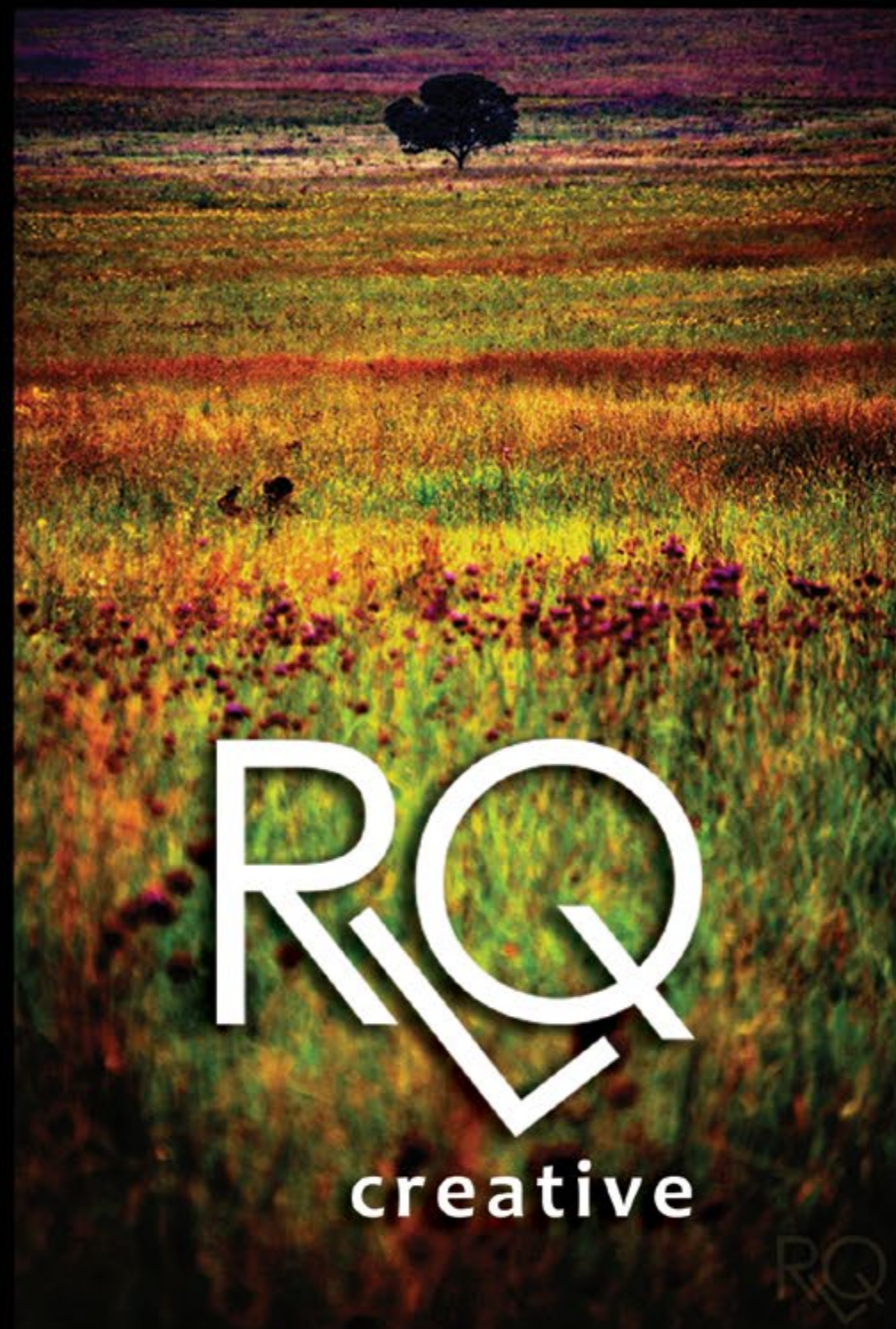
Hundreds of millions of dollars have been invested in research, development, and implementation of mHealth initiatives. Countless more millions are expected in the coming years. Additionally, more and more mHealth stakeholders are being sensitized to the benefits of mHealth and committing to bringing them to fruition in their respective communities.

Despite all of this, mhealth is still very much in its infancy, attempting to find its footing in the diverse healthcare systems around the world.

One thing that is certain about the future of mHealth is that it has the potential to bring improved healthcare to the portion of humanity suffering the most. The efficiency and efficacy of how this can be realized depends on us.



University of Botswana medical student records a Health Informatics lecture on her personal mobile device in Gaborone, Botswana.



Acknowledgements

My work and this photo essay would not have been possible without the support of the following amazing colleagues and institutions:

Dr. Carrie Kovarik
Kagiso Ndlovu
Dikai Zambo
Cynthia Antwi
Dr. Tony Luberti
Jonathan Crossette
Dr. John Holmes

University of Pennsylvania
Botswana-UPenn Partnership
University of Botswana
Botswana Ministry of Health
CDC Botswana
PEPFAR
Orange Botswana
Botswana Innovation Hub
Southern African Innovation Support
National Library of Medicine - National Institutes of Health
ManGoes Mobile
DuoChart
PING
ClickDiagnostics
Nextel Botswana

An additional special thanks to:

Michael Saldarriaga
David Boucher
Sophia Sibiya
Nash Islam
David Luo
Dr. Tshiamo Motshegwa
Baboloki Mabophiwa

If you are interested in seeing more of my art, check out rlqcreative.com



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