DESIGN THINKING FOR GLOBAL HEALTH:

A CRITICAL REVIEW OF SELECTED PEER-REVIEWED AND GREY LITERATURE

A Public Health Analysis Literature Review
submitted to the faculty of the
Graduate School of Public Health & Tropical Medicine
of Tulane University
in partial fulfillment of the requirements for the
degree of
Masters of Public Health
in International Health & Development

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New Orleans, LA
Fall 2017

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SUMMARY

This literature review dives into the world of Design Thinking (DT), or Human-centered Design (HCD), and its effectiveness for solving problems in the field of Global Health and other similar fields. This review will be submitted to the Tulane School of Public Health & Tropical Medicine, and kept as a resource for faculty and colleagues interested in using DT in their own Global Health research and work.

The paper begins with an introduction on what DT is, and how the HCD process is used both in the academic sector, and by organizations in the fields of Global Health and international development. After an introduction covering the merit and usage of DT, the purpose of this literature review is discussed, mapping out where the paper will be going and which questions will guide much of its findings and conclusions. Additionally, the process and methods for constructing and completing this paper are covered, and acknowledgements are given to the academic review and work that was done prior to this analysis. These previous academic searches aided in the cross-examination and assessment of relevant sources on DT for Global Health within this analysis.

Then, will be the findings that have been taken away from selected peer-reviewed and grey literature, regarding DT and its current and potential use in Global Health programs. The findings are organized within three guiding questions, which will be introduced within the paper's purpose section. As well, there will be some findings from an interview conducted with Edmund Okiboko, Managing Director of Uganda Village Project (UVP), and his experience with DT in an East African context. Following these comprehensive findings will be a discussion, covering cross-cutting themes and limitations of DT for Global Health, within the field of 'Social Innovation'.

After much discussion around DT for Global Health, a conclusion will help summarize and tie together the paper's recommendations, perceived limitations in both DT for Global Health, and what some next steps may be for organizations interested in using HCD. DT is a way to approach issues in an empathetic, user-based way, which will be the common theme throughout this literature review.

Finally, this paper includes an appendix with a table of literature, summarizing all articles, cases, and other sources used and classifies them by their authors and type of citation. The appendix also includes an interview transcript from the dialogue with Mr. Okiboko, followed by a Bibliography of all sources used in this paper.

INTRODUCTION

Design Thinking, or Human-Centered Design, is an "empathetic, 'user-centered', creative, iterative process for: 1) solving problems for people and 2) generating new/reinventing products, services, experiences that people desire." DT separates itself from other methods by integrating the "needs of people, the possibilities of technology, and the requirements for business success" (Wyatt and Brown, 2010). At its core, DT focuses efforts on developing solutions to problems through a "human-centered" approach, meaning that the attention is put on the people that are directly affected by a certain problem; this group is called the 'user'.

Based on criteria set by the *International Standards Organization (ISO)*, key principles of human-centered design include:

- The design is driven and refine by user-centered evaluation;
- The process is iterative;
- The design addresses the whole user experience;
- The design team includes multidisciplinary skills and perspectives. (Catalani et. al, 2014)

Design Thinking involves concepts that are easy to grasp, but the specific HCD process draws on "specific language, mindsets, practices, methods that allows for [designed] approaches to problem-solving" (Manzini, 2015). This method is not the traditional definition of 'design', which many people associate with architects, artists or engineers; design in this framework is an intentional process for the generation of solutions which doesn't require advanced knowledge or practice.

As a new, emerging method for social impact solutions, DT has gained a lot of traction and notice in the Global Health and development world, especially because of its close ties with 'Innovation'. Widespread evaluation and review of best practices across many fields are showing an inability for existing structures and policies to solve some of the world's most pressing issues. Climate change, economic inequality, and the global epidemic of chronic diseases are all examples of these complex, socially inhibiting issues.

The HCD process can be carried out in a variety of ways, but there is always a "recognized 'design team'" that is both "multidisciplinary and collaborative" (IDEO, 2017). This group of designers can take on many different forms, anywhere from an expert team led by professionally taught designers, to a participatory-based design team, which implores collaboration with the actual users involved as designers (IDEO, 2017).

Organizations like *USAID*, *Concern Worldwide*, and *UNICEF* are shifting focus towards new, innovative ideas to help solve numerous health issues. Global Health is a field of research and practice that focuses on improving the health and equity for people across the world. Health is so closely tied to other factors such as economic conditions, political stability and environmental sustainability, that approaching Global Health issues can be incredibly challenging. Social innovation, through the process of HCD, is an approach which needs to be further investigated on and backed with funding. DT presents a more directed, integrative way to develop interventions and solutions to Global Health issues, and for all social impact problems.

An article from the *Stanford Social Innovation Review*, written by Lyn Denend, associate director of Stanford University's biodesign program, and other colleagues, discusses the difficult challenges faced while dealing with health-care interventions in resource-constrained regions of the world. The article, "Meeting the Challenges of Global Health", cites a case from South Africa, and an organization called *PlayPumps International*. The group was spawned from a fascinating idea to build a merry-go-round that kids can use, which simultaneously generates energy to power an attached water pump; a 'PlayPump'. The idea sounds great in theory; innovative, creative, and catering to the interests of children. However, the PlayPump team hadn't considered the fact that "a shortage of mechanical energy to operate hand pumps has never been a significant obstacle to supplying clean water in Africa" (Denend et. al, 2014). The PlayPump project eventually dissolved after mixed results; this is an excellent example of well-intentioned design that doesn't take the perspective of end users into account.

This damaging cycle must be addressed; countless Global Health projects provide an 'innovative' solution to a problem, generate funding and momentum, but encounter many obstacles when implementing their prototype and eventually deteriorate without every achieving a desired goal (Denend et. al, 2014). This recurring theme in Global Health has created a widespread demand to change the way organizations develop projects and solutions to social impact issues affecting health.

In response to this, entrepreneurs, or 'social entrepreneurs' have emerged by promising to develop solutions and interventions that are focused on "address[ing] the needs of underserved patients and providers" (Denend et. al, 2014). This field of Social Entrepreneurship (SE) ties directly into DT, as well as the field of Social Innovation. A recurring issue with these new, innovative ideas is the follow-up and sustainability factors, and is something that DT may help to

fix. The HCD process stresses constant iterations of prototypes, and that idea generation should be constantly monitored and changed based on user feedback.

Could DT and a 'human-centered' focus to design interventions and programs be the answer to solving the world's emerging Global Health problems? It is possible; but, there needs to be more proof that DT can be scaled and used by diverse actors and groups around the world.

PURPOSE

DT is a relatively young and developing method in the world of Social Innovation in development, so its potential impact on the Global Health sphere is not yet concluded. This paper will cite examples and find cross-cutting themes for how HCD and innovative processes are being used in Global Health settings. Also, these findings and discussion points will offer more insight on why HCD is being used, potentially in place of other more common practices; conversely, there are also examples of HCD being less effective or not used due to certain limitations. The HCD process may look different depending on who is using it, what their level of experience with the principles are, and for what objectives and issues are being designed around.

Additionally, this paper will highlight examples where HCD is already happening in Global Health contexts, but isn't necessarily classified as 'Design Thinking'. With this, the concept of 'lay design' will be introduced, as well as some discussion on the widespread use of 'participatory processes', and how these may intersect with principles of DT.

Finally, there will be reflections from a personal interview conducted with Edmund Okiboko, an emerging organizational leader in East Africa. His extensive experience in Global Health, coupled by a recent introduction to DT, uncovers some insight on how HCD concepts are used in development in East Africa, but aren't necessarily classified as such. Okiboko works for Uganda Village Project, a grassroots NGO in Uganda, which has an innovative Fistula program that will be used as a supplementary case study.

The Global Health world has not fully adopted DT as a best practice to be used on a wider scale. This is partly due its relatively new development, as well as a lack of proof and justification for DT in certain types of health interventions. Issues of scalability, cost-effectiveness, and

applicability have come into question; these limitations will be referenced with specific examples throughout this paper.

These guiding questions were parameters for much of the research, findings, discussion, and themes drawn from these peer-reviewed cases and other grey literature:

- *How is design thinking (HCD) being used in global health settings and for which health problems (where)? Why? (to what aim)? Where and for whom is it not being used, according to available literature?*
- *How is the process being used and by whom? (i.e. Intensive design sprints? Internal capacity building? Experts leading it all vs. truly participatory? Funding sources? Donor driven?)*
- *How do we see design thinking already happening in global health contexts even when we don't call it design thinking? ("Lay design" in development? Participatory processes in development?) What is new? Critical reflections on the trend of HCD in global health.*

An important subject of this paper is the limitations of DT, as it is used to help approach health and development problems. Another article from the *Stanford Social Innovation Review*, "When Will Design Get Serious About Impact?", poses a challenge to designers everywhere:

> "[you all] should strive to shift the fundamental dynamics of development work by addressing several problems…it will require a very big lift from a relatively small community of designers focused on international development and social impact" (Fabricant, 2014).

Robert Fabricant, co-founder and principal of *Design Impact Group*, cites important issues surrounding the integration of HCD in global health and development, which will be discussed further in the findings and discussion.

This paper helps make a case for the adoption of DT on a broader scale, with better funding, and increased monitoring and evaluation. This integration of DT in the Global Health world will not be easy, as HCD is a very localized process; the sustainably of bringing DT to scale in international organizations and various regions in the world will be a clear challenge.

PROCESS/METHODS

This Public Health Analysis (PHA) paper is structured as a literature review, including current knowledge, substantive findings, and methodical contributions on the topic of DT, specifically regarding its potential impact on the field of Global Health. The research is drawn primarily from peer-reviewed journals and case studies, covering the utility of DT as a viable method aimed at

creating solutions for social impact. Also, various case studies highlight how HCD is being used in real-life Global Health and development work.

Additionally, this paper reviews a lot of "grey literature", which classifies materials and general research created by organizations that are outside of the traditional publishing and distribution channels. Some examples of "grey literature" are unpublished case studies, organizational reports, blog posts, or even websites. These sources provide relevant feedback on real experiences that Global Health groups have had integrating DT into their work.

Prior to writing this literature review, these sources were read and analyzed to determine their merit and relevance toward this paper's subject of DT for Global Health. Based off the cross-cutting themes and subjects brought up within the text, each source was classified under specific guiding questions and distributed in sections throughout the paper.

Much of these sources were provided by Dr. Laura Murphy, through her continued work in DT and social innovation within Global Health, and Dr. Alexandra Bazzano, through her "HCD4health" project. Dr. Murphy is a clinical associate professor at the *Tulane University School of Public Health & Tropical Medicine*, and heads up the DT program at the *Phyllis M. Taylor Center for Social Innovation and Design Thinking* at Tulane. She is a pioneer in the field of HCD, with wide-ranging experience in Global Health & development, and was a key contributor to this paper. Additionally, Dr. Alexandra Bazzano is an assistant professor at *Tulane SPH&TM*, and has extensive experience in maternal and child health (MCH), with a specific focus on using DT for MCH work in southeast Asia, sub-Saharan Africa, and the US. Dr. Bazzano headed a scoping review project of Public Health literature called "HCD4Health", and many of the sources used in this paper draws from her team's previous academic literature search.

The sources came from Drs. Murphy and Bazzano, and were selected due to their relevance to Global Health practice, and the use of DT and HCD processes in health and development work.

Finally, this paper includes an interview that was conducted with Mr. Edmund Okiboko, the Managing Director for Uganda Village Project (UVP), a grassroots Public Health organization in Southeastern Uganda, and an emerging leader in East Africa. This interview was conducted at the UVP organization office in Iganga town, Uganda, by Thomas Karrel, using an iPhone to record. Thomas was working as the International Internship Coordinator for UVP at the time of this interview, and has spent a lot of time discussing and sharing ideas related to DT with Mr. Okiboko.

The Fistula program case study associated with Okiboko's interview was extracted from UVP's website and staff blog posts since 2013.

FINDINGS

From these various peer-viewed case studies and grey literature, there are many takeaways related to DT, and the adoption of innovation, within a development and Global Health context. The findings are outlined using the three guiding questions listed in this paper's purpose section. There is also a section of findings from the interview with Mr. Okiboko, followed by a case study on the "Fistula Ambassador" program from Uganda Village Project.

Guiding Question 1: *How is design thinking (HCD) being used in global health settings and for which health problems (where)? Why? (to what aim)? (And maybe: Where and for whom is it not being used, according to available literature?)*

HCD can be used in many different capacities, and has the potential for numerous uses in the Global Health field. These following cases vary greatly in their chosen direction for DT in programs, and highlight uses for different health problems; HCD is used both to improve people's health directly, and to strengthen capacities to monitor and control population health.

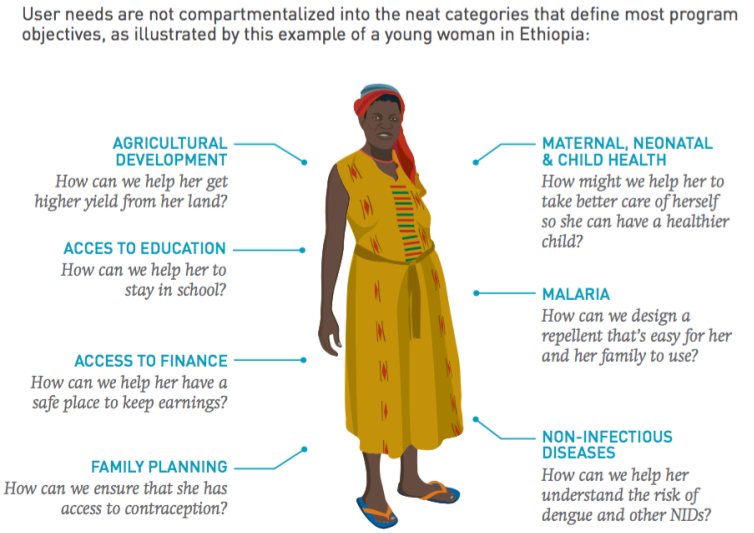
Design Impact Group, a HCD-fueled organization that engages communities and other organizations to design creative social impact solutions, hosted a diverse group of leading stakeholders within the design and development communities to make recommendations to those trying to adopt DT. The collaborative workshop was held in 2014, and identified the fact that "interest in HCD has been growing within the development sector", yet a small number of organizations have figured out how to "integrate design approaches into their work" consistently (Design Impact Group, 2014).

The cohort compiled their insights and recommendations in a presentation, highlighting key areas for investment to strengthen design's role in development. Increased investment in HCD has come from a rising interest in entrepreneurship and market-based approaches, and "low engagement with and adoption of new interventions" in marginalized communities. This

shortcoming is attributed to a failure in understanding target populations and users, which many organizations believe could be reduced with DT (Design Impact Group, 2014).

In terms of Global Health, the group brought up a key issue that many different programs aim to help the same users, yet these implementers often design with assumed expectations and needs of their target populations (Design Impact Group, 2014).

This outline from the group's presentation depicts how a single user can have a wide array of needs, which should be organized into different categories. Specific 'problem statements' can then be matched with each health objective. This portrait of a young woman in Ethiopia is surrounded by a multitude of health and development inequities that she faces. Sorted categories reflect a need to design interventions and innovative solutions around specific problems. For example, when addressing the woman's lack of education access, you may ask: *"How can we help her to stay in school?"* Then, if you are identifying malaria as a key issue for the woman, a logical problem statement might be: *"How can we design a repellent that's easy for her and her family to use?"* (Design Impact Group, 2014). Imploring this type of model to identify specific needs and expectations of users can help Global Health organizations create innovative solutions that are more applicable.



(Design Impact Group, 2014)

A specific example of using innovation in Global Health and development programs comes from Catherine Cheney, the West Coast community development lead for *Devex*. In her article "A human-centered approach to design for development", Cheney identifies the innovation unit of *UNICEF* as an important figure in bringing DT to global development, which "incorporates DT principles across its programs" (Cheney, 2016). Upon further research, *UNICEF's* innovation group is steered by an interdisciplinary team of people working on "identifying, prototyping, and scaling technologies and practices" to strengthen *UNICEF's* work for the world's children (UNICEF, 2017). Some of their projects include innovations in mobile birth registration in Nigeria,

SMS supports to mothers in Mexico, and transporting blood samples in Malawi for early HIV diagnosis in infants using drones. The initiative within *UNICEF* is still new, born in 2016, so the results from much of their work are still yet to be published. This is promising in the HCD world; *UNICEF* has very large financial support, and this could be a breakthrough for DT in Global Health, given the massive funding potential for these projects.

As mentioned in this next case study, HCD has been "[used] in the fields of industrial design and IT for decades" but has been "scarcely used in the health field" (Catalani et. al, 2014). Although DT is still relatively new, particularly within Global Health work, this study on design of a more effective support system for integrating Tuberculosis and HIV care in Kenya provides a great example of HCD in health programming. The study was conducted by Carcia Catalani, a professional from *Innovative Support to Emergency, Disease & Disaster*, and other colleagues representing the 'TB Tech team' from both the US and Kenya. The team used a HCD approach to "facilitate design, development, and deployment processes of new patient-specific TB clinical decision support system for medical providers" (Catalani et. al, 2014).

Previous research and findings reflected major Public Health risks in terms of HIV and TB in Kenya. In the coastal East African nation, over 1.6 million people are living with HIV, and have a 20-times higher risk of dying from TB (Catalani et. al, 2014). The Kenyan government has adopted this as a priority for national health, imploring groups to create innovative approaches to combat these health inequities. The TB tech team implored HCD for TB/HIV technology innovation; specifically, they used a three-stage IDEO approach (*hear, create, deliver*) to design a clinical decision support system that would help integrate HIV and TB care in rural Kenya.

By imploring this three-step HCD approach to their work, the TB team analyzed research data and findings at each stage. With this, findings were cohesive through the iterative process of constantly refining the group's insights. The authors mentioned having a much easier time deploying their system, because they had spent extensive time along the way ideating and testing prototypes prior to the system's implementation (Catalani, et. al, 2014).

The specific process Catalani's team used in practice will be described more in the next section, but some of their findings shed light on how DT can be used in Global Health. Their work raised a lot of concerns from clinicians, like how it was very had to manage TB priorities along with all other work, and that providers were still hesitant to start patients on IPT even with

eligibility confirmed. This was due to mass shortages of medication in Kenyan pharmacies (Catalani et. al, 2014).

The TB team concluded that using HCD helped facilitate the digital innovation process, particularly in a complex and resource-constrained context (Catalani et. al, 2014). This is a promising example of the potential for use of DT for Global Health. The field has been trending towards increasing access through "inexpensive, durable, and simple technologies…" which has "created an opportunity for innovation" (Catalani et. al, 2014). Computerized clinical decision support systems offer an opportunity to support health work in low-resource settings, and the TB team's utilization of a HCD process is very applicable to other at-risk regions.

Published in the *Maternal and Child Health Journal*, a US-based initiative from Jessica Vechakul and two other California-based health and design professionals, called the 'Best Babies Zone (BBZ)' initiative, was implemented in three US cities. This was a multi-year project, that was targeting infant mortality rates, and launched pilot programs in Cincinnati, New Orleans, and Oakland (Vechakul et. al, 2015). The BBZ initiative integrated the DT process into the Oakland, California program.

For the Oakland pilot program, the Alameda County Public Health Department "identified HCD as a promising approach for addressing the social [and] economic conditions that are important drivers of health inequities" (Vechakul et. al, 2015). The BBZ indicated place, positive opportunities, and social determinants of health as important driving factors for having a healthy population; more specifically, health babies. In the Oakland case, the group selected Castlemont as a neighborhood with a high level of need based on high poverty rates (Vechakul et. al, 2015).

The study saw an unmet need of services that address the "long-standing root causes of health inequities." Community assessments with local people uncovered the priorities of Castlemont residents: programs addressing violence, more employment opportunities, and more local businesses and development initiatives (Vechakul et. al, 2015). When thinking about improved infant health, issues of social cohesion and increased support of local businesses aren't usually thought about as implicating factors. However, the team's abilities to gather feedback from the real end-users helped to obtain these insights, and expectantly yield solutions that the community feels are highly relevant.

The team's 12-week "Design Sprint", further described in the next section, implored a HCD mindset to help reduce inequities in infant mortality rates, and uncovered an array of unmet

needs within the community. Based off their experience using DT, the authors claim that the methods helped to enhance community engagement and create "innovative solutions to complex challenges." Also, the authors wrote that HCD can "expedite the timeframe for challenge identification, program design, and implementation" (Vechakul et. al, 2015). This conclusion is a powerful claim that helps strengthen the merit and relevance of using DT within Global Health and development work.

The BBZ initiative highlights a vital insight for using HCD in any capacity: "immersion deepens empathy" (Vechakul et. al, 2015). For Ms. Vechakul and her team, immersion in the Castlemont community empowered the team with a familiarity of the social context in their target population. Through informal conversations with end-users during neighborhood walks, the designers acquired a more "balanced view of the community." Those involved in the "Design Sprint" asserted that this kind of immersion can build empathy which "extends beyond statistics about poverty and crime" (Vechakul et. al, 2015). This claim can be applied across Global Health, and for any organization trying to design solutions with a deeper, empathetic understanding of their target population.

The Design Sprint participants gained completely new insights and levels of understanding from informal conversations through neighborhood walks. Conversely, their initial impressions of the physical environment gave them a very limited idea of what Castlemont's people needed (Vechakul et. al, 2015). This experience exemplifies the DT theme of empathy through immersion, and its power to developing more relevant, and useful innovative solutions for end users.

Guiding Question 2: *How is the process being used and by whom? (Intensive design sprints? Internal capacity building? Experts leading it all, vs truly participatory? Funding sources? Donor driven?)*

Within the HCD framework, the actual design process can be used in completely different ways, and by people of varying disciplines, economic levels, and educational backgrounds. One organization may use DT to restructure how their workers consult with HIV-positive patients, while a group of students may prototype a design to make their lunch breaks longer. HCD is

versatile, and has been used in rapid design sprints with large groups of professionals, for internal capacity building, or just for making small changes to an existing model.

Recalling Ms. Cheney's article from the *Devex* journal, she indicates that *Frog* and *IDEO*, both pioneering Silicon Valley design firms, are scaling up their DT focus in their commercial work to application in developing markets. These groups have begun "partnering with NGOs to involv[e] their beneficiaries as designers in developing solutions" (Cheney, 2016). This partnership format reflects a consultancy-type introduction of DT in organizations trying to implore more innovative ideas in their work. *IDEO* empowers their partnering organizations with resources and insight on the applicability of HCD in the programs, trying to build the group's internal capacity for DT (Cheney, 2016).

Population Services International in Dar es Salaam hosted a 'design immersion' in April 2015, targeting a lack of contraceptives with unmarried girls. Their design challenge was: "*How might we inspire medical professional to be more willing, even excited, to provide contraceptive services to unmarried girls*?" (Cheney, 2016). *PSI* brought in 34 design thinkers, and conducted end user interviews and prototype testing with women in Dar es Salaam. An interesting reflection from Susan Mukasa, *PSI's* country director in Tanzania, was that "some of the ideas [they] thought were brilliant were crushed when [they] went out to the field". Mukasa acknowledges this being a very acceptable event, and went on to make a profound point that lies at the core of DT: it's better to fail fast with little harm versus failing much later down the road (Cheney, 2016).

As mentioned in the prior section, the team working on improved support systems for integrating TB and HIV care in Kenya implored an HCD method developed by *IDEO*. This method, (*hear, create, and deliver)*, is a simple, three-stage approach of DT which the team integrated into their plan directly. The group paired each step in the process with qualitative and quantitative research methods. As well, the project had funding from *PEPFAR* and *USAID*, and the funders had no role in the study design, data collection, or analysis, which gave the team a lot of autonomy to use HCD in any capacity they saw fit (Catalani et. al, 2014).

The table on the next page portrays some of the specific research and data analysis methods used by the team at each of the three stages of the HCD process. In the *hear* phase, the designers tried understanding social context and inspiring new solutions by conducting site observation sessions and key informant interviews. This helped the team gather in-depth insights on health-care barriers, as well as existing interventions and their effectiveness. Amazingly, the study

allotted six months to this "hear stage", using an interdisciplinary team of Kenyan clinicians, IT engineers, and health researchers. Carrying out these phases in a slow, and flexible fashion gave the team a plethora of information and feedback that would have been hard to obtain without direct user interaction (Catalani et. al, 2014).

Table 1. Human Centered Design Stages & Research Methods.

HCD Phase	Method	n	Data Type	Data Analysis
Hear	Site observations	9 sites	Qualitative field notes	Grounded theory using Dedoose software (2014)
Hear	Key informant interviews	24 key informants	Qualitative interview audio recordings	Grounded theory using Dedoose software (2014)
Create	Lab simulation testing	217 pseudo patients	Quantitative data reports	Simple descriptive statistics using Excel software (2008)
Create	Clinical usability testing	9 clinicians	Quantitative surveys	Simple descriptive statistics using Excel software (2008)
			Qualitative interview audio recordings	Grounded theory using Dedoose software (2014)
Deliver	Impact evaluation	49 clinics	Quantitative medical record data reports	Cluster-level analysis using unpaired t-test to determine statistical significance with 95% confidence intervals via SAS software (2013).

When it came to the later phases of *create* and *deliver*, the designers had moved from gathering broad understandings of the HIV and TB related problems, to ideating "real-world solutions" (Catalani et. al, 2014). *IDEO* describes this process with "on-going measurement, evaluation, and iteration", which the team used to ensure their delivery system prototypes "stayed grounded in real-world impact and continue[d] to evolve." The TB Tech team rolled out a beta version of their prototype, as well as a "second iteration…" followed by the "team leading an impact evaluation to measure [their] system's effect on the integration of TB & HIV care" (Catalani et. al, 2014). The ability to change and iterate their prototype design allowed for quick implementation and testing to uncover feasibility and sustainability issues which otherwise might not have been found until months later.

Another example mentioned in the previous section, the 'Best Babies Zone' initiative in Oakland, created a DT approach to developing innovative programs for Castlemont's complex community development challenges. The lead agency, a local county health department, created a 12-week 'Design Sprint', using HCD to develop concepts for stimulating a vibrant, local economy in Oakland. The team utilized a virtually identical framework as the group in Kenya; it was a three-phased *(understand, ideate, implement)* model. 14 professionals from 9 different local organizations were brought together for the Design Sprint. Combining government, design, and community and economic development organizations gave the DT process an interdisciplinary foundation (Vechakul et. al, 2014).

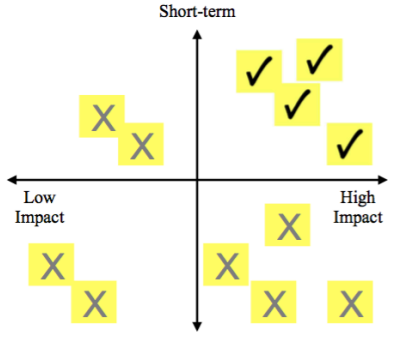
This next picture outlines the 12-week process of their Design Sprint:

Understanding	
Week 1	Orientation and team building
Week 2	Neighborhood walk 1: observe environment and talk with people
Week 3	Form insights from observations. Review community assessments
Week 4	Share top 3 insights
Week 5	Neighborhood walk 2: observe environment and talk with people
Week 6	Synthesis of Understanding Phase
Ideation	
Week 7	Reframe question
Week 8	Brainstorm concepts to address design challenge
Week 9	2 × 2 matrix to categorize concepts by impact and timeframe
Week 10	Select top 4 concepts
Implementation	
Week 11	Prototype concepts. Gather community feedback
Week 12	Group discussion and selection of community market concept

(Vechakul et. al, 2014)

Through the *understanding* phase, multiple neighborhood walks and sharing key insights from those experiences helped form unique problem statements that targeted community issues voiced by real users. Based off these intuitions, the team identified that "stimulating a vibrant local economy in the Oakland BBZ" would help address the original problem of inequities in infant mortality rates (Vechakul et. al, 2014).

One interesting method used by the design team was a '2x2 matrix' that helped categorize each idea by its potential impact and the perceived timeframe of its implementation. With this matrix, identifying short-term, high impact ideas became much easier. Through continued iterations of ideas and problem statements, the team reframed the design challenge from "building a vibrant economy in Castlemont", to determining how they can work with "community members and leverage existing assets to support a visible small win" in the community (Vechakul et. al, 2014). This is another important insight from the BBZ example. DT does not intend to change the dynamic of an entire city, or shift health conditions across millions of people; HCD aims to identify useful, innovative solutions that are tailored to the needs of the end users. This last picture depicts two of the design team's ideas. On the left is a community space to host art events; the right is a baby clothes consignment area at a community market (Vechakul et. al, 2014).



(Vechakul et. al, 2014)

(Vechakul et. al, 2014)

Another avenue for DT is using the HCD process in an academic setting. Dr. Jaspal Sandhu and two other colleagues from the *University of California, Berkeley*, were featured in the *American Journal of Public Health*, discussing their course: "Designing Innovative PH Solutions"

(Sandhu et. al, 2015). Since 2011, this course has been taught at the university to help students acquire skills in systematic innovation and HCD, "while working in small interdisciplinary teams on domestic and global health projects" (Sandhu et. al, 2015). One of the 10 highest-rated courses offered by the university, "Designing Innovative Public Health Solutions" is a semester-long class which places students in groups of three; each team is tasked with addressing an innovation challenge posed by an organizational client brought in by the school. At the end of the curriculum, team's pitch their ideas and two out of every three projects are matched with external funding for the students to continue their work (Sandhu et. al, 2015).

To date, this model has supported 31 projects, pertaining to both domestic and global health. Some examples include:

- 2011: An entrepreneurship model to provide community access to clean drinking water in Mexico;
- 2013: A diabetes risk awareness campaign to lead individuals to take preventive action;
- 2014: A strategy for improving efficiency of mobile produce markets providing free fresh produce to five of the largest food-insecure communities in NYC (Sandhu et. al, 2015).

In conjunction with the team projects, the course invites in 6-8 industry guests each year to come and speak about their experiences with innovation. The course's curriculum mimics the innovation process, with a module for each of the stages in a three-stage HCD process: 1) Understand, 2) Innovate, 3) Prototype. Faculty involved work to adapt the curriculum during the semester in response to student and project needs, through active feedback and evaluation methods. Since its inaugural semester in 2011, "no two iterations of the course have been the exact same" (Sandhu et. al, 2015). Many of these factors have resulted in resounding positive feedback from students.

A major obstacle that course developers encountered was in implementation of the student prototypes. Despite some promising feedback and successful projects, the course still has room for improvement in terms of targeted, reliable funding sources for students and increased diversity in design teams. "Designing Innovative Public Health Solutions" is still a new course, but has done very well to match a "systematic innovation approach" to create sustainable implementation for actual health and development needs around the world. Another crucial insight from this initiative is from the faculty, who claim that "educational transformation is critical to meet[ing] the public health problems we face in this century" (Sandhu et. al, 2015). If transforming education is a key to advancing Global Health programs, then HCD may play a vital role in that change.

The DT process is being used diversely; HCD in intensive design sprints, participatory processes, and even to create an innovative university course curriculum. Additionally, some examples show design experts leading the process, while others show more integrated approaches with actual end-users. Another important factor in the Global Health sphere is the funding source; these examples suggest that stable funding sources which allow for more autonomy in program planning may make it easier to implement HCD throughout a program's entire lifecycle.

Guiding Question 3: *How do we see design thinking already happening in global health contexts even when we don't call it design thinking? ("Lay design" in development? Participatory processes in development?) What is new? Critical reflections on the trend of HCD in global health.*

DT's tenets of empathy, user-based innovation, and adaptive designs are not necessarily new concepts to actors in the Global Health and development realm. However, for many organizations, these principles have never been tied together within at HCD framework. This is not to say that this type of work has not been going on for years, just not classified as "Design Thinking."

Angus Donald Campbell, the head of the *Department of Industrial Design* at the *University of Johannesburg*, is a firm believer that HCD can be carried out by people with any background or education level. Campbell identifies that the title of 'designer' is being limited to those professionally recognized with design education. Campbell coined the term 'lay designer': "a common person who designs without any judgement of inferiority in terms of professionalized knowledge." These 'lay designers' have become disempowered in Campbell's eyes, particularly in "developing contexts" (Campbell, 2017). For years, organizations have striven to design innovative solutions to help eliminate poverty and health inequities, but are often misguided in their attempts. He attributes this knowledge gap to professional designers who develop solutions individually, which may appear well-intentioned but are inappropriate for the intended users (Campbell, 2017). Recalling the *PlayPump* example, the energy-creating merry-go-round was an inventive prototype to solve a problem that was completely shot down upon implementation, due to a lack of applicability to its actual end users.

Campbell argues that design professionals can solve this issue by aligning their skills and expertise with these 'lay designers', who have made highly appropriate attempts have the expertise

and necessary to solve wicked health and development issues. More specifically, there's a concept of 'grassroots innovation' that implores a "low-tech approach consisting of improvised or makeshift solutions born from ingenuity and cleverness by knowledge-rich, economically poor people: 'innovations by the poor for the poor'" (Campbell, 2017).

In his experience throughout Southern Africa, Campbell references project created by 'lay designers' that are born from a lack of economic resources but full of innovation. These prototypes address issues surrounding food, water, shelter, and energy, and all have clear implications to improving Public Health in the respective populations.

(Campbell, 2015)

The pictures above portray just a few examples of innovative solutions to local problems that Campbell encountered in Southern Africa. From a self-watering seedling greenhouse *(top left/center)*, to using recycled items like bed frames and bath tubs to help with agriculture and animal protection *(top right)*; Campbell even found a "'Do-It-Yourself' water pump" made using

branches, bricks, chains, and an old oil drum *(bottom)* (Campbell, 2017). These prototypes and solutions to local problems exemplify everything that DT strives for; real examples, tailored completely around user's needs, and even built using locally-sourced items so that sustainability doesn't become a major obstacle.

Campbell also cites the work of Ezio Manzini, founder of the DESIS network, who presents social innovation and design as something that everyone does. Manzini urges professional designers to rethink their approach to creating their own initiatives by "help[ing] a variegated array of social actors to design better" (Manzini, 2015). In his newest book, Manzini present a challenge within design: "cultural norms and current education systems do not necessarily promote" everyone's inherent ability to be innovators (Campbell, 2017). Everyone in this world has creative potential; leveraged with people's knowledge of their own community, there is great potential to generate amazing, innovative solutions to problems in health, development, and more. This is the foundation for HCD, it just doesn't have the 'Design Thinking' name attached to it.

In a more systematic use of participatory processes, PhD candidate Yaw Anokwa and eight associates designed a story sharing method to compile their various experiences in Human-Computer Interaction for Development (HCI4D) research. Within the collaborators research projects, and the method of collection for their findings, connections can be made to the principles of HCD. Anokwa writes that "user studies are at the heart of HCI research" and that all their projects need users to design, pilot, and evaluate new systems made to alleviate a technological need (Anokwa et. al, 2009).

One specific method in their research methods was an example from Pakistan. The researcher "purposefully left parts of the user study design partially incomplete, and asked the facilitators to help complete them." The examiner concluded that this helped to build end user ownership with the study process (Anokwa et. al, 2009).

The group of HCI4D experts implored their 'method' to be used by other groups of researchers, and classify it as a "mixed method": features both qualitative and quantitative elements. A key feature of the process that aligns in with DT principles is how it is carried out asynchronously, which helps to "accommodate[e] the tight schedules and diverse times zones" of the nine collaborators. The authors attribute the rich, yet manageable data collection to the process's collection of short, calculated stories (Anokwa et. al, 2009).

In this HCI4D collaboration, the hidden HCD techniques lay in both the user-selection and interview methods of the authors, as well as the way their findings were collected. This echoes an important aspect of HCD that exists even without the 'Design Thinking' name: the process of creating innovative solutions can take on any form depending on the problem and end-users.

INTERVIEW WITH EDMUND OKIBOKO

All information from this section was drawn from the source: (Okiboko, 2017).

An interview was conducted on August 21st, 2017, in Iganga, Uganda, with Mr. Edmund Okiboko at the office of *Uganda Village Project (UVP)*. He is the current Managing Director for *UVP*, and an emerging leader in Global Health and development in East Africa who was recently introduced to the world of DT.


Edmund Okiboko

Edmund Okiboko is a native of Tororo in Eastern Uganda, and received his undergraduate degree in Social Work and Social Administration. He went on to study Project Planning and Management for his postgraduate, and is now working on a thesis in Management Science at the Master's level. Okiboko has been working in project design for the last eight years, specifically in livelihood programming and community work; at *UVP*, much of his work will be focused on public health and sustainable development at the community level. He also worked for *Global Health Corps* from 2011-12, as a Global Health fellow placed with a community-based organization in Central Uganda.

Okiboko attended a fellowship initiative in Nairobi, Kenya with the *Young African Leader's Initiative (YALI)*. Hosting emerging leaders from 13 African nations, *YALI* joined Okiboko and many others in Nairobi for one month, participating in rigorous courses and group projects, with an overarching theme of Design Thinking. In the interview, Okiboko mentioned that *YALI* "was [his] first time to interface with the words 'Design Thinking'… even at [his] level, it was [his] first time to come across those words." Being the first time he was exposed to this process and framework, Okiboko said that his "experience at YALI was so immersing," especially because

he is someone that "is engaged in civic leadership, working with the community… [and] [thinks] the concept is very applicable." Okiboko mentioned that DT seemed to be a great way to handle the real needs of the community. Additionally, he thought that community health and development workers that have not learned about the principles of DT might be more likely to spend all their time in the office, "thinking on behalf of the users" instead of spending time immersing themselves with their users' actual needs and expectations.

During the *YALI* experience, Okiboko worked in a small team that was tasked with using DT models "to come up with solutions to problems from different organizations" (Okiboko, 2017). One organization that he worked for was *Riziki Source*. *Riziki* is an online platform which works to connect Persons Living with Disabilities (PWDs), with job opportunities. Interested persons can apply via their online portal by submitting a CV, and then meet with *Riziki* workers to learn soft skills like how to conduct themselves during interviews or network effectively. However, the organization has experienced issues with a small applicant pool, with their application process having just a 50% completion rate.

The design challenge for Okiboko's team was: *"How Might We help Riziki Source raise 1,000 applicants that are fully complete."* Despite having the same supervisor, design challenge, and general HCD process being followed, Okiboko found it amazing that the 10 design groups came up with completely different solutions on how to help *Riziki*. His team had opportunities to interact with different end-users, as well as representatives from the organization, and said that his team gained a lot of interesting feedback and insight from direct communication with the people they were designing for. Okiboko's team's prototype placed 2nd out of all 10 teams, and this ignited his desire to bring HCD into his own work with *UVP*.

When asked about how he saw DT fitting into Global Health work, Okiboko offered his belief that it has a lot of applicability, and addressed a need for "identifying what the problem is in a community, so that [an organization] provide[s] solutions that are really relevant." Additionally, he held that "in Global Health, having that 'user-centered' mindset in programming can enable projects to reach farther in the community."

The question was asked again, but specifically regarding the role of DT within *UVP*; Okiboko supposed that if his organization "continue[s] spending time on innovations, *UVP* will be more vibrant on ground." One example he gave was low turn outs for Family Planning outreach events. Instead of forgetting the issue and continuing the same way with programs, Okiboko says

that "all the attention should be on 'how do we make sure that we get a good turn-up,'" and then "go to the community and try and find what issues must be affecting our turn-up." Simply listening to the end-users, and doing more to understand how things operate in *UVP's* target villages will help make their programs be more impactful.

Regarding limitations of DT in Global Health work, Okiboko mentioned that DT is a slow process, and that it may not always be the most efficient method for program planning. Another interesting point he brought up was how "a lot of [UVP's] programming is determined by donor funding." He provided an example of donor's being interested solely in Shallow Well construction; "if a donor says Shallow Wells and it is no longer the thing you are doing, even when you have innovations that may be more effective… sometimes [they] have to implement on donor pressure." This is a very pertinent issue for *UVP*, as they are a small organization that is primarily funded by independent donors. The transition to implementing DT processes in the organization's health programs may take close collaboration with board members and donors.

Finally, Okiboko was asked if he had witnessed any of the DT principles within Global Health, and *UVP's* programs. At *YALI*, Okiboko mentioned that one of the facilitators was using a "problem tree", which was surprising to him because this is a method that he has used "in project design… when you do the root cause analysis, and come up with objectives, it has always been there [in his work] but there has been less attention given to the whole DT process." Okiboko also mentioned that in Uganda, HCD is commonly associated to "IT-related" issues, and that it is mistaken for a solely engineering concept, "in issues where you have to design an application or physical device, but not in service delivery." He identified this as an area where more knowledge on "how to navigate and engage the thinking in service delivery" needs to be gained.

(UVP, 2017)

Within *UVP's* health programming, Okiboko also mentioned seeing some "innovation in [their] Fistula program, where [they] see complete healing taking place, followed by continued involvement from the former patients… through identification of other patients, and spreading the word [about Fistula] to different communities." Okiboko had a lot more to say on the DT potential in *UVP's* Fistula program, and will be discussed in-depth in the next section.

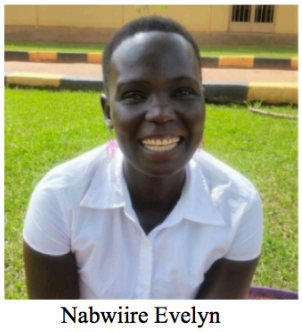
One of the key takeaways from this interview is that Okiboko believes in the value and applicability of DT and the HCD mindset within a Global Health context. Despite it being "a new concept for [him]", Okiboko believes that DT has potential to help "[their] whole organization… and if the concept is scaled up, [he thinks] it is the best thing for organizations" in this field.

CASE STUDY: FISTULA AMBASSADORS – *Uganda Village Project (UVP)*

Referred to several times in the interview with Mr. Okiboko was *UVP's* Fistula program, and how its implementation mirrors some HCD principles. All the following information was collected from *UVP's* website and blog posts written by the organization's staff.

Obstetric Fistula is a highly preventable medical condition caused by neglected, obstructed labor; prolonged impaction of a baby's head against its mother's internal tissue results in a hole (fistula) between either the rectum and vagina or bladder and vagina (UVP, 2013). Due to the side effects of fistula, leakage of urine or feces women with fistula are isolated and are often unaware that it is a treatable condition.


Tumusiime Loy


Nabwiire Evelyn

Uganda Village Project (UVP), is a grassroots public health and development organization based in the Southeastern Ugandan district of Iganga. *UVP's* Fistula program, headed by Reproductive Health Coordinator Tumusiime Loy and Fistula Coordinator Nabwiire Evelyn, is one of largest and fastest growing programs in *UVP* and Uganda. *UVP* works hard to identify patients in districts all over the country and provide them access to repair surgeries through funding and partnership with the *Fistula Foundation*.

Back in 2013, UVP also launched a 'Fistula Ambassadors' program, which brings together former fistula patients for a two-day training. FAs, as they're called, are given knowledge on the causes, prevention, and treatment of Fistula, and learn how to effectively communicate about Fistula in their community. New FAs also attend a fistula outreach, headed by Loy and Evelyn, to gain more experience on how to communicate about this sensitive topic.

(UVP, 2017)

In the newest 2017 FA cohort, *UVP* partnered with *Co-op Uganda*, a bicycle supply company, to provide brand new bicycles to the 30 new FAs. Most of these workers live in a low-resource, rural setting in Uganda, so a bicycle can not only mean the difference in access to health centers and markets, but also empowers the FAs to work in a large area and identify as many Fistula patients as possible.

(UVP, 2017)

(UVP, 2017)

With the continued success of *UVP's* Fistula program through the Fistula Foundation partnership, the *UVP* coordinators have helped develop a "re-integration" program for some of their patients. After surgeries, 6-8 women are selected that show an interest and initiative to gain business, and *UVP* arranges accommodation and meals in a home in Iganga town. Through this re-integration process, the women are given training in tailoring and craft making, as well as entrepreneurial skills and knowledge on how to develop small businesses (UVP, 2013).

The purpose of highlighting *UVP's* Fistula Program in this paper is both due to its relevance to Mr. Okiboko's responses during his interview, as well as introducing another case study where HCD concepts and processes are used in a Global Health setting, but do not claim to be using 'Design Thinking'. *UVP's* Fistula program could benefit with a clearer, drawn-out HCD process when identifying the needs, expectations, and perceived issues from their Fistula patients. The process could be implored for newly identified patients, those undergoing treatment, and patients being 're-integrated' into their communities or those that have worked to become Fistula Ambassadors.


(UVP, 2017)

There is certainly room to grow the program with more technical DT methods, but that does not discount the incredible work already done in this, innovative, user-center initiative. One more unique factor about this program, is that the two fistula program coordinators, Loy and Evelyn, both underwent Fistula operations and treatment, and are inspiring success stories to marginalized women with Fistula throughout Uganda, and the world. This also means that these two women have an incredible ability to empathize with their patients, and can relate to their issues on many levels. Loy and Evelyn carry out follow-ups with all their Fistula patient's multiple times after their treatment, and truly are 'lay designers' and innovators in the field of reducing Fistula prevalence and stigma throughout Uganda.

DISCUSSION

The importance of end users in design process

In an interview with Public Health consultant Anna Schurmann, Carla Lopez, *IDEO* Public Health Specialist, answered questions surrounding DT and its application to Public Health. When asked where the "untapped potential of DT lies," Lopez responded with speaking to "extreme users"

(Schurmann, 2014). Extreme users are those people at the far ends of the target population, and can provide very valuable insights on an issue. If you are working in a Malaria-endemic village and are seeking out why community members are not using mosquito nets, extreme users may be a community health worker in charge of net distribution to villagers. Conversely, a mother with nine children that do not use mosquito nets would be another extreme user.

Identifying, empathizing, and interacting with these stakeholders emphasizes DT's untapped potential. The process requires designers to understand their users who will be utilizing their prototype; this user-centered focus is what gives those innovations more merit and relevance.

In 2014, innovation experts Alice Obrecht and Alexandra Warner wrote: "More than just luck: Innovation in humanitarian action"; this report synthesized findings from 15 case studies regarding innovation for humanitarian action. One section titled "user-centered design and the role of affected people in humanitarian innovation", reaffirms the value that end users have in design. The authors argue that more involvement of affected people is essential, and organizations need to make "greater attempts to address problems and solutions from [the user's] perspective" (Obrecht & Warner, 2014). This reaffirms the importance of end users in the design process, and the implications for limiting their involvement in creating changes.

Obrecht and Warner quote some "tips for user-centered design with affected people" offered by Chelsea Giles-Hansen of the *International Federation Red Cross and Red Crescent*. Giles-Hansen points out that "affected people know their challenges and resources, and what they will actually find useful or will work in their everyday lives" (Obrecht & Warner, 2014). This principle, while seemingly obvious, is forgotten by many organizations in designing solutions to health and development issues. Neglecting the input and feedback from end users can lead to prototypes and ideas that are not feasible or helpful when implemented.

Cost-effectiveness of Design Thinking

DT can be a resource-intensive process that requires much time to develop solutions to social problems. For Global Health organizations and NGOs that operate on tight budgets, financial implications are always at the forefront of programming.

Ms. Lopez argues that level of resource intensiveness that the DT process has for an organization "depends on how it is utilized within [their work]." An advantage about DT is that it

is a "mindset and an approach," so organizations can frame it within their programs and tailor to any financial restrictions (Schurmann, 2014). Using a simple mindset like integrating users into idea development does not have to cost anything. If a Global health organization doesn't have the capacity to completely revamp their program development framework, applying HCD concepts like having workers prototype their ideas multiple times or using participatory methods like 'problem trees' or 'community asset mapping' to reframe their approach to health issues.

In Robert Fabricant's "When Will Design Get Serious About Impact?", he discusses the large impact of changing dynamics in Global Health problems, which come with certain issues for financial sustainability. One issue is a transition from "global to local" work, where Fabricant states:

> "the very promise of HCD relies on a level of intimacy with people and culture, as well as sustained, rich engagement with community… He [recalls] that both IDEO and Frog closed their offices in India in the last few years, because the cost of business was too high without sufficient market demand for integrated design devices" (Fabricant, 2014).

Fabricant is not saying that all design-centered programs and organizations are destined for financial instability, but the amount of organizational investment in DT must be matched with the levels of internal and external financial stability in the specific area. So, an organization intending to bring HCD into their programs should do so at a capacity that is relative to its level of funding. Also, the organization needs to determine if there is a high enough level of demand for innovative design from their stakeholders, and that users will be receptive to this shift (Fabricant, 2014).

Benefits of developing 'prototypes'

In the DT process, using 'prototypes' is a crucial way to gain insight on the effectiveness and feasibility of an idea, and helps to reduce pressure of designing a single, unalterable idea.

The 'prototyping' stage in the HCD process is essentially where ideas get tested by users and fellow designers. As stated in *The Open Book of Social Innovation*, prototyping can be "done through simply trying things out, or through more formal pilots, prototypes and randomized controlled trials" (Murray et. al, 2010). This allows for prototypes to made be at all different capacities depending on financial and time constraints.

Prototyping offers a unique way to refine and test ideas, which is particularly important for gathering important feedback and insights on a given idea's effectiveness. For example, take a

health organization that is designing a more effective way to treat water in low-resource households. The designers can create a basic water filter, or even draw up a way for families to boil their water more efficiently, and pitch these ideas to real users and gauge their level of interest in the prototype. Having a basic, tangible prototype or concept can help better communicate an idea and help uncover other factors which may determine the innovation's effectiveness.

As mentioned, creating prototypes also helps organizations reduce costs in product and program design. Prototypes in DT help to save resources, where designers can test assumptions and questions with users and fellow workers. These prototypes are not meant to be final solutions or sophisticated designs, but simple concepts that communicate an idea to an audience. Prototypes are not meant to yield representative data, but help a designer "see how things might work before you are emotionally invested in the idea" (Schurmann, 2014).

This method can be used to design for one aspect of the problem at a time, rather than trying to create an all-encompassing solution to a multi-dimensional issue. Regarding the use of prototypes in the DT process, Carla Lopez stated, "prototypes are meant to provoke responses – not be the solution" (Schurmann, 2014). Prototypes are key to designing innovative ideas in an effective and natural manner. Through many iterations, the end user and fellow designers can uncover potential issues with an idea and help evolve to altered, or completely new prototypes.

Collaboration is a key to success in the HCD process

DT is an integrative, interdisciplinary approach, and encourages collaboration from all parties involved in changing identified problems.

As stated by Lyn Denend and her colleagues, social entrepreneurs and innovators trying to design for health and development issues "[cannot] do it alone" (Denend et. al, 2014). Effective adoption of the HCD process almost always requires "partner[ing] with experienced individuals and organizations," which helps less-experienced designers to "overcome important hurdles" (Denend et. al, 2014). 'Skilled individuals' do not have to be highly educated design professionals, but also expert users who are knowledge on relevant confounders like culture and lifestyle.

Through collaboration, designers can help "manage [their] expectations and be aware of their internal capacities," so they do not try and overextend themselves, which often results in non-integrated designs with a lack of user focus. From this, "innovators need to become adept at tapping

into informal relationships and working with local power structures" (Denend et. al, 2014). For example, take an organization that is using DT to improve condom distribution among adolescent men in a local township. The group's workers need to create relationships with local health centers, existing organizations working in reproductive health in that area, and most importantly, adolescent men. Collaboration within the HCD process is key to leveraging the expertise of all stakeholders involved.

Collaboration will become even more important if DT is going to be scaled up throughout the world. To make this possible, Global Health organizations need to "contextualize design within a broader model of analysis and strategic planning", by working with various partners. If a small health organization wants to scale up their programming using DT, they need to work with those that have experience in using "strategy, finance, operations, and [monitoring and evaluation]" approaches that have proven value in social impact work.

Finally, consistent collaboration within HCD helps to address a key challenge: measuring the success of the innovation process. This ties into a question at the root of all Global health work: *What is the best way to measure sustainability and impact?* There is no one answer to this question. The most accurate answer is: a multitude of methods and approaches which are dependent on the issue and population being designed for. Through collaboration with users, local stakeholders, and other partners, organizations can help better assess their impact through the HCD process.

Embracing the "Integrated Approach" of HCD

Overall, the adoption of DT is contingent on widespread acceptance of the value and merit of using HCD to create solutions to the world's problems.

DT needs to be taken seriously as a method for innovation and change making, and large-scale organizations need to "look past design as a new shiny entrant on the development sector" (Fabricant, 2014). Designers need to create approaches and methods that stand out from ineffective, non-user focused practices, and funders reluctant to accommodating DT must reframe their approach in how they perceive design. DT should be incorporated as complimentary to conventional methods, and its benefits in that capacity need to be embraced by all stakeholders.

In the 'Best Babies Zone' case from Oakland, CA, a simple Design Sprint had impacts of increasing participants' capacity in HCD. Specifically, some of the designers in the study remained

involved with the Castlemont market, and continued using DT in their different organizations. The group's idea for bringing a 'small win' to this East Oakland community "represents a paradigm shift in the field of HCD", and reaffirms the notion that "anyone can design" (Vechakul et. al, 2015). Embracing this integrated, user-center process of HCD by more organizations and groups will help to build the method's report and effectiveness in the Global Health community.

LIMITATIONS OF DESIGN THINKING

Despite a high potential for successful implementation of DT in Global Health programs, many limitations exist in its use. These limitations are either from the feedback of groups using HCD in their programs, or are perceived limits of DT based off industry knowledge and experience.

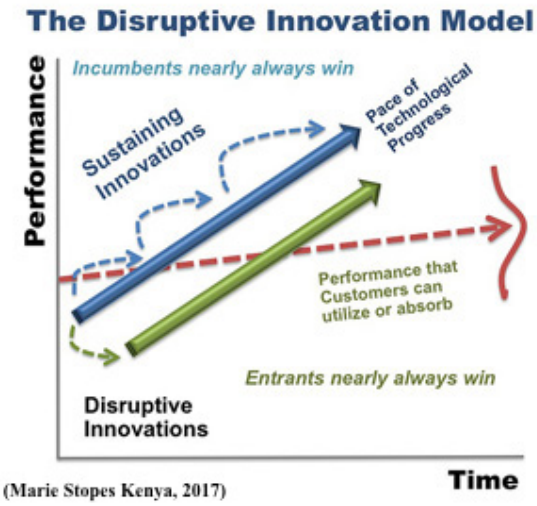
In Catherine Cheney's article cited previously, she quotes a statement from Pam Scott, a philanthropist focusing on the intersection of design and impact. Scott points at that HCD has become somewhat of a "buzz term". She urges organizations and groups practicing HCD to demonstrate that this approach has clear relevance to the social sector, and they need to be very careful when positioning DT in their programs (Cheney, 2016). DT should not be introduced as something entirely new; the social sector has brought "rigor… empathy… and creativity" to the world which should not be devalued. Scott reaffirms that designers should seek to bring HCD in as a complementary approach to what programs are already doing (Cheney, 2016). With this, organizations can mold the process into something unique to their mission and goals, which exemplifies the adaptable principles of the HCD process.

These insights bring both promise and obstacles for DT implementation in health and development programs. On one hand, Scott does urge organizations to utilize HCD and help demonstrate the importance it has for social innovation. Conversely, the fact that DT may be more of a 'complementary approach' could pose challenges for many organizations. Global Health program planning can be very standardized and calculated, especially for large organizations like *WHO* and *USAID*. Thus, the integration of the DT process into long-term programs may be an obstacle. Additionally, organizations and programs which rely on specific, allocated funding could find trouble in using new methods that don't necessarily line up with donor interests. The adaptive

nature of HCD makes it very desirable for some organizations, contingent on the fact that the methods are carried out with the right mindsets and framework.

Some clearer organizational challenges with using HCD for international NGOs comes from *Marie Stopes Kenya*, a national branch of one of the largest international Family Planning organizations in the world. The Kenyan branch of *Marie Stopes* discussed some of the challenges their organization faced when implementing social innovation and DT into their programs.

The group discusses difficulties adopting innovation in their programs, specifically when using the 'Disruptive Innovation Model'. This model refers to an innovation that creates a new market through provision of a different set of values (Marie Stopes, 2017). Through their work, *Marie Stopes Kenya* saw that the model "disrupt[ed] all normal work flow", and they could tell this by the confusion among workers of the method's perceived value. This may also have been a result from ineffective introduction of the innovation method, but they saw "obvious tension between implementers and programs" (Marie Stopes Kenya, 2017). The organization found it very difficult to plan when you do not know the outcomes, which is an inevitable part of the HCD process. DT calls for constant iteration, and is a gradual process to develop innovative solutions to social impact problems. With that, comes a level of ambiguity in a design's outcomes, which can make it harder for an organization to plan for evaluation and implementation.



(Marie Stopes Kenya, 2017)

Marie Stopes workers also mentioned having "anxiety about how the results will change [their] current way of working", and attributed a slight "fear of the unknown" with using new, innovative methods (Marie Stopes Kenya, 2017). A given organization may have workers who have been specializing and operating in one role for many years. This may bring reluctance to adopt changes that come with adopting DT. This is not to say that HCD is not an effective and beneficial direction to move in within Global Health programming, but some resistance from experienced workers will be an inevitable obstacle and limitation for this transition.

Another drawback of DT for Global Health organizations is the implications this change may have with donors. In Global Health, donors and outside funding sources make up a big part

of funding, especially within small organizations. Donors may have a lack of understanding of HCD and its relevance, and question the immediate tangible results. Given that the process can be slow, and involves constant iterations and more on-the-ground work, some funders may not see this as a 'cost-effective' method. Mr. Okiboko cited this as a potential issue with DT adoption in *UVP's* health programs. He mentioned that some donors may be more interested in immediate, tangible results like the construction of a new water source or a certain number of HIV tests conducted (Okiboko, 2017). Even with a clear understanding of HCD and its processes, a different perception of program impact on health outcomes may skew donor's priorities and interests.

Along with this similar theme of stakeholder collaboration, *Marie Stopes Kenya* discussed some challenges from their partner organizations. Given that DT is a still new process in Global Health, the "coordinat[ion] and synergy" of using HCD between organizations poses some obstacles (Marie Stopes Kenya, 2017). They mentioned a clear excitement for the possibility of change among their organizational partners, but that it was difficult to coordinate and keep all operations synergistic between stakeholders. The DT process is very immersive in nature, so bringing in participants from all partner organizations may be difficult on a long-term basis.

Marie Stopes Kenya also discussed feedback from some communities. Community members were very excited about a "new approach", but the organization found difficulty in managing those expectations (Marie Stopes Kenya, 2017). For better or worse, 'Change' and 'Innovation' have become buzzwords. Therefore, introducing those concepts can sometimes distort expectations within target populations.

This reflects a major limitation to DT for Global Health programs, that is culture, and a natural resilience to change on a community level. Certain cultural practices or taboos may not allow for stability of adverse methods, like rapid prototyping or user involvement in design. Similar concerns are brought up by the *Design Impact Group*, who attribute "cultural bias [and] skepticism about feasibility" and a "lack of clarity around HCD definition and strategic purpose" as limitations for DT adoption in health and development programs (Design Impact Group, 2014). Culture is an all-encompassing factor within Global Health and development programs, and the adoption of new methods and changing certain behaviors is never a simple process.

Again, a lot of these limitations and barriers are dependent on how a given organization or group implements the DT process, and in what way they communicate the benefits of a HCD

approach to solving social issues. This is easier said than done, as many "implementers often [lack] a holistic picture of their [user's] needs and expectations" (Design Impact Group, 2014).

With all of this, the issue remains that "lessons about the obstacles that limit Global health innovation and the approaches that can overcome those obstacles are not readily available" (Denend et. al, 2014). Success stories about innovators in Global Health are common, but do not highlight the risks faced by these entrepreneurs, and rarely include cases of failure (Denend et. al, 2014). Experts from the *Stanford Social Innovation Review* have been working on compiling feedback from practitioners, funders, and others involved in Global Health innovation to highlight varying challenges they have faced. Published findings regarding DT failures and limitations in a Global Health context is lacking, but is needed to steer organizations and other groups interested in bringing HCD into their programs.

Finally, a common issue spanning across every aspect of Global Health programs is 'Sustainability'. Are these methods, toolkits and HCD design processes enough to build long-term, DT capacity within an organization? Clear challenges exist with integrating these new methods into a large-scale health organization. DT may be the right direction to improving Global Health program implementation, but adoption of any new planning method comes with questions about sustainability and feasibility. Proper mobilization of DT resources and training is key to replicating HCD processes, and active communication and evaluation is vital to scaling up these models to target larger issues. Finally, the transfer of skills from design professionals (i.e. *IDEO, Dalberg*) to local-resource teams and even inexperienced users is not easy. If knowledge dissemination is not carried out sustainability, this adds another element of negative implications for DT adoption.

These potential limitations and barriers to investment and adoption in HCD within the Global Health sector ties back to an overarching question: "How do we measure sustainability and impact?" The way this question is answered has implications on how effective DT can be for any organization. If someone sees short-term gains and cost-effectiveness as priorities in Global Health programs, DT may not be viewed as an ideal method. Conversely, those have built empathy and report with their end-users may feel that HCD is a spark for innovation and sustainable health and social change.

Design and impact expert Pam Scott explained that at any NGO, the workers need to view their role as serving "human beings rather than data point[s] on a spreadsheet" (Cheney, 2016). Whether this is feasible for large-scale, international organizations is another question, but the point is that anyone working in the social sector needs to remember who they are serving. This seems logical and straightforward, but many organizations spend so much time working far away from the people they promise to aid, and they "no longer have the human connection vital to seeing real needs, wants and aspirations" (Cheney, 2016).

If DT is utilized in an integrated manner involving all stakeholders, especially end-users, it does have massive potential for strengthening Global Health interventions. Although *Marie Stopes Kenya* offered several limitations with using DT for Global Health, they concluded that "if [organizations] can overcome some of these challenges – [Design Thinking] is a game changer" (Marie Stopes, 2017). Global Health groups must learn how to adapt and fine-tune the DT methods and toolkits to tailor their organization and target population. With this, DT has huge potential for improving Global Health programs and provoking increased innovation in any health intervention.

CONCLUSION

Design Thinking, or Human-Centered Design, "is a process for creating innovative products, services, and strategies that prioritiz[e] the needs of the intended population" (Vechakul et. al, 2015). This paper has analyzed existing uses of HCD in Global Health and other related fields, and discussed some cross-cutting themes and limitations of adopting DT for various organizations. Numerous peer-reviewed and 'grey literature' sources helped portray how DT is being used in varying complementary capacities, and in shorter, calculated immersion experiences such as 'Design Sprints' or 'Design Challenges'.

Additionally, DT principles are only part of a much broader toolkit for health and development work, and should be incorporation more into that framework for widespread use (Vazdev, 2013). DT offers improvements in any capacity, from a full-fledged HCD process carried about by design professionals, to slight changes in health programs where researchers altering their user interview methods to address issues and challenge assumptions. While some experts believe that DT does not have a place for all projects, Chris Vein, former CIO for Global Technology

Development at the *World Bank*, argues that "anything that involves people requires some amount of Design Thinking" (Vazdev, 2013). More specifically, DT highlights a 'user-centered' focus in its principles, a mindset which should be carried out in all programming aimed at creating change for social impact.

DT has limitations in terms of cost-effectiveness, sustainability, and an overall lack of information on how HCD has previously failed in practice. For aspiring entrepreneurs, awareness of challenges faced by health innovators who have been implementing designs is crucial insight. Organizations using DT need to properly set expectations, and have a clear understanding that turning an innovative idea into a widely-accepted solution takes a lot of time (Denend et. al, 2014).

Words like 'innovation' and 'change' are now sought after by many organizations, and the "number and variety of potentially life-changing health innovations that appear every year are truly inspiring" (Brown & Wyatt, 2010). However, implementing the HCD process for Global Health organizations will take a lot more than passion and enthusiasm.

There is enormous potential for DT in Global Health organizations and programs, but all 'designers' need to understand the obstacles that stand between an innovative idea and successful, sustainable implementation. More findings are needed to make a complete assessment on the successfulness and merit of DT for Global Health, but several existing cases show promise for the method's use in the field. From an international Global Health organization, to an individual with a passion for instilling change, HCD can be used in numerous capacities as a catalyst to improve the state of Global Health.

APPENDIX A: TABLE OF LITERATURE

Source	Who	When	Where	What
Stories from the field: reflections on HCI4D experiences	Anokwa et. al	2009	*IT & International Development*	Peer-Reviewed Journal
Design Thinking for Social Innovation	Brown & Wyatt	2010, Winter	*Stanford Social Innovation Review*	Topic Review Article
Lay designers: grassroots innovation for appropriate change	Campbell	2017	*Design Issues*	Peer-Reviewed Journal
A clinical decision support system for integrating TB and HIV care in Kenya: a HCD approach	Catalani et. al	2014	*PLOS One*	Peer-Reviewed Journal
A human-centered approach to design for development	Cheney	2016, April 11	*Devex*	Topic Review Article
Meeting the challenges of global health	Denend et. al	2014, Spring	*Stanford Social Innovation Review*	Topic Review Article
Making the case for design in the development sector	Design Impact Group	2014, December 1	*Dalberg Offices NYC*	Lecture
When will design get serious about impact?	Fabricant	2014, December 8	*Stanford Social Innovation Review*	Topic Review Article
IDEO Website	IDEO	2017	---	Website
The field guide to HCD: design kit	IDEO	2015	*San Francisco: IDEO*	HCD Design Kit
The little book of design research ethics	Kelly & Suri	2015	*San Francisco: IDEO*	Book – Research Design
Design, When Everybody Designs: An Introduction to Design for Social Innovation	Manzini	2015	*MIT Press*	Book

Challenges with HCD - international NGO's	Marie Stopes Kenya	2017	*Marie Stopes Kenya Offices*	Lecture
The open book of social innovation	Murray et. al	2010	*Great Britain: NESTA*	Book – Social Innovation
More than just luck: innovation in humanitarian action	Obrecht & Warner	2014	*London: HIF-ALNAP*	Research Report
DT for GH: review of YALI conference in Nairobi, Kenya and other personal experiences	Okiboko, Edmund	2017, August 21	*UVP Office – Iganga, Uganda*	Personal Interview – UVP Managing Director
Solutions that stick: activating cross-disciplinary collaboration in a graduate-level PH innovations course at the UC Berkeley	Sandhu	2015	*American Journal of Public Health*	Peer-Reviewed Journal
DT and PH: an interview with IDEO Public Health Specialist Carla Lopez	Schurmann	2014, April 5	*Public Health Consultant Blog – Anna Schurmann*	Interview – IDEO Public Health Consultant
UVP Website	Uganda Village Project	2013	---	Website
2017 Program Photos	UVP Staff	2017, Spring/Summer	*Iganga District, Uganda*	Photos
UNICEF Innovation Unit	UNICEF	2017	*UNICEF Website*	Website
Development by design: leveraging DT for improved aid effectiveness	Vasdev	2013	*Georgetown University*	Master's Thesis
HCD as an approach for place-based innovation in PH: a case study from Oakland, CA	Vechakul et. al	2015	*Maternal Child Health Journal*	Peer-Reviewed Journal

APPENDIX B: INTERVIEW TRANSCRIPT – EDMUND OKIBOKO

Interview with: Edmund Okiboko (EO), Managing Director, Uganda Village Project (UVP)
Conducted by: Thomas Karrel (TK), International Internship Coordinator, UVP

21 Aug. 2017

***TK**: Welcome, Edmund, thanks for agreeing to sit down for this interview.*

EO: You are welcome, Tom. I am excited to share on my little experience with Design Thinking.

***TK**: So, we can start with some of your background: where you're from, what kind of education you've had, and your work experience.*

EO: My background is in social work & social administration. That's what I studied in my undergraduate. I went on and studied Project Planning & Management at the postgraduate level. Afterwards, I'm working on my thesis in Management Science at the Master's level. And that is technically how I've been in terms of my qualifications, and I've been working in Project Design for the last 8 years, working in livelihood programming, and community work.

***TK**: And you also spent some time with Global Health Corps?*

EO: Yes, I was a GHC fellow in the year 2011 to 2012, and being a fellow in the Global Health field, my task was basically to support a community-based organization in Central Uganda; in terms of improving their programming, in terms of building the capacity of their staff, and doing lots of baseline surveys.

***TK**: That's great. So now you're working with UVP, and you came on as the Managing Director a few months ago? How are you finding the experience? Do you feel like you've been able to apply a lot of your experience?*

EO: One thing I love with the current work is that UVP, as an organization, is open to learning. So, working with a "learning" organization, where everybody is free to put on the table what innovation they have to make the organization run, is really an interesting field, and an interesting position; because it's a place where structures are just being built in. So, every staff has really a lot of input, and seeing these guys passionate about the community is my driving force, and that's what motivates me and keeps me going.

***TK**: I wanted to use this interview to highlight Design Thinking; I know you mentioned to me that Design Thinking was sort of a theme within the YALI (Young African Leader's Initiative) conference that you attended in Nairobi, so I was wondering if you could talk a little bit about the YALI experience, and how Design Thinking was used in the program.*

EO: It was my first time to interface with the words "Design Thinking", and I looked at it as if it came late, but I had to console myself that it is the right time. Traditionally, I was closed to Design Thinking; even at my level, it is my first time to come across that word, so the experience

at YALI in Nairobi was so immersing to me, because as somebody who is engaged in civic leadership, working with the community, I thought it is really a concept that is very applicable. Particularly in terms of being able to really handle the needs of the community. Most times, people that have not gone through the Design Thinking sort of school, will be sitting back here in office, and thinking on behalf of the users.

During that space of being in Nairobi for one month, we were tasked to using the Design Thinking models to come up with solutions to problems for different organizations. And one organization that I worked for to find a solution was Riziki Source: it's an online platform that tries to connect jobs to the disabled people in Kenya. The model is, it's an online platform where persons with disabilities can log in with their CVs, and train them on soft skills for how to do interviews. And through that they're able to be connected to formal employment. So, you just bring your CV and talk to the team that is on ground; and so, the challenge with the organization was that they had issues where their target beneficiaries, the PWDs, were not completing the application process. So out of 5,000 submitted, you'll find 50% completion rate, and therefore it was challenging for them to look for jobs for people whose applications were incomplete. An employer will log into the system, and fails to locate who this person is – therefore this was the struggle with the organization.

Our team and others were tasked to find out "what was the reason?" and "what must be the problem", and "How Might Me help the organization raise 1,000 applicants that are fully complete. So, using the DT process, it was so interesting that 10 groups came up with different solutions on how to help the organization, and that is how I saw how applicable DT was. Because, from ex-pats view we found our own issues when we went to the end users, who we were also able to interact with, and share the experience on the platform. Through that, we were able to come up with certain solutions; and I'm glad to say my group was number 2 out of 10 in that assignment.

***TK**: Wow, that's sounds like a really cool project, and I like how they brought in the target population and you were able to interact them, because that's really what this process is all about. That sounds like an excellent experience. Another question I had is, in my paper I'm really trying to take some case studies and literature about how DT is used and how it could be used in the Global Health field. So, my next question is, what are some specific ways or ideas you have about how DT could be used in Global Health and in UVP?*

EO: I think within the current programming, for it to be effective: 1) we have to consider the end user; I have always interacted with colleagues here that are program coordinators, and always teased them that even when we're doing these malaria campaigns in the village, have we sat back to think about why is there still malaria within the community? I think for the success of Global Health, our thinking should be now to really engage the end user, to get: "what is their view?". Is it the mosquito nets that they lack?

So sometimes, because the resources are few, my thought in Global Health is for us to spend time on really identifying what the problem is in the community, so that we provide solutions that are very relevant. And I think now, with this thought of DT, most of the community solutions are going to be sorted out. For example, just imagine someone designing a simple filter

where you just put sand, and you are able to solve a lot with water-related illnesses. For me, that is far cheaper than importing drugs to treat Typhoid and other health problems. So, there is need to focus our programming and always be flexible to change it. This morning I had an interaction with staff, telling them that the way we programmed for 10 years is not the same way we should run programs now. In that, if something was used to treat an issue, it might not be useful to treat that now.

Also in Global Health, having that mindset in programming can enable our projects to reach farther in the community; it's not that someone is just doing Fistula work. And one thing I love here is the initiative of the Fistula Ambassadors, for me that's an innovation where you really get the agents themselves to speak about the issue on the ground.

With different programs, if we continue spending time on innovations, UVP will be more vibrant on ground. For example, we go to the field for a Family Planning outreach and we don't get a good turn-up; for me, all the attention should be on "how do we make sure that we get a good turn-up", and we go to the community and try and find what issues must be affecting our turn-up. Those people have their ideas, and they know things operate in the community, and just listening to them will make our programs more impactful.

***TK**: Well said. One thing I'm trying to dive into is, giving that DT is a pretty new sub-field, and toolkit/practice, and one of the guiding questions of my paper is where might DT already be used, with the same principles, but maybe it's not called "Design Thinking" or "Human-Centered Design". Now I wanted to ask you if had some thoughts on the UVP Fistula program with the Fistula Ambassadors, because the idea of empowering the fistula patients as they're recovering, to be entrepreneurs and teach them useful skills, seems similar to a lot of DT principles. Do you see any DT principles within that program within UVP?*

EO: Again, as I said, DT is a new concept in our setting here, but it has been on in different places. I was even engaging with one of our facilitators at YALI, and he was talking about a "problem tree", Well, this is what I do in project design, so when you do the root cause analysis, and come up with objectives, it has been there but there has been less attention given to the whole process. Organizations maybe have been reluctant to take on the real principles of DT.

To give an example, for our organization here where you see innovation in our Fistula program, where we see complete healing taking place and involvement from the former patients; in terms of identification of other patients, in terms of spreading the word to different communities. For me, that is partially part of the innovation that almost fits within the DT process. Again, it is a new concept; in the whole organization, I can say that you and I (referring to Thomas Karrel) are the two people that can speak about DT, and so if it the concept is scaled up I think it is the best thing for organizations here.

Within our country, it has been made to be "IT-related" issues, and DT has been mistaken to be an engineering concept, and much in issues where you have to design an application or physical device, but not used much in service delivery. So that is where we need to learn much on how to navigate and engage the thinking in service delivery. Understanding an innovation in our country, somebody must see a stand where you're demonstrating an app like Uber; for instance,

in the health services they introduced an issue for a doctor that needs to curb absenteeism, you have to check in the morning and check in the evening; so that helps to know if the person is still within the system.

***TK**: I like the point you made that it can be difficult, but important, to shift the mentality from an experienced engineer or architect using DT, to DT being used for simply coming up solutions in the form of different mindsets or frameworks. And seeing that as a prototype too, and not just a physical machine, is really important. Another question I have is, in your experience with Global health programming, and seeing how programs are carried out and developed, do you see some limitations with using DT in some organizations; maybe in bigger projects?*

EO: To find ourselves using DT, first it is a slow process. And, basing on the fact that sometimes most of our programming is determined by donor funding. For example, if a donor say Shallow Wells and it is no longer the thing you are doing, even when you have innovations that may be more effective than Shallow Wells, sometimes we implement basing on donor pressure. And also, I think when organizations conduct baseline surveys, go through the process of program design, and share with the beneficiaries, the concept of DT will be included in the programming.

But we also find a situation where we hire experts to do baseline and to do strategic plan, and we don't share with the end user. This thing has come up in programming with different organizations. For example, an organization will come with a very good livelihood program, and maybe decides to give animals to the villagers. But when you go after two months to follow up, they will tell you that they don't have them; maybe they have died. So, it's seen where lots of resources are pumped into the community, but the community has not "owned" the program. And I think that has resulted in another development concept called: the "demand-driven approach", the CDD programming, which has replaced the previous program where the government just comes and gives animals. They will say "Museveni's animals have died". The things are not within the needs of the community, and sometimes you get a cow that thrives in Western Uganda, and it's the same one they supply to Eastern Uganda, which has a harsh environment.

We've seen projects fail completely because the people's needs were not taking into account with planning and implementation. And therefore, I see DT or the design process as the best one, and the CDD approach is more demand driven. We expect the community to voice their needs, and that maybe it is a school that is the problem not the road. Although, it is a slow process for an organization to do DT, because it must create time; but some organizations may program for one year, and they don't have much time to go out into the field, and to be more informed when it comes to planning.

For me, Global Health projects should be owned by the community. So, for future sustainability, there is a need to engage the community, and at least share with the community what you're trying to accomplish there and how you can best help. Community expectations is also a bit challenging; you will go for a meeting with the community, but you will not reconcile their interests. For example, in malaria programming, is it really mosquito nets that they need? If you go and you decide to hold a community meeting, you will get divergent views, and that might delay the process of coming up with this good solution. At least that is more owned than just

taking mosquito nets to them blindly. For one of our launch villages this year, a community member asked if we were going to come and remove the swamp! So even when we bring mosquito nets, there is still another major problem. For engaging the community, that was a nice, and challenging issue; asking if there's anything we can do help preserve that swamp but also make it to be something that humans can live along with.

At YALI we heard the Ted Talk about a boy that developed "Lion Lights". He's a young boy from Masai in Kenya, who had a challenge with lions coming to eat the animals; and when in Masai, where you're 9 years old you are already a "man". You are in charge of the cattle crowd, to make sure the lions don't come to eat your family's animals at night. So, this boy was sharing on his Ted Talk, that he grew up knowing that if you put on light, you know the lions won't come. But, in actuality, when you put light that's when the lions come, because they are able to see there is no one there. So, after some time, the boy thought about this issue, and tried flashing a torch, and discovered that it scares away the lions. And he continued reproducing something until he made a prototype with an indicator to look like a motorcycle, so it's blinking and worked to keep the lions away.

For us, this young boy at 9 years, you watch him as the keynote speaker at a political address, and you think: "wow, this is real innovation at work." It is very possible, and when you take time to define the problem and find out the right solution, the possibilities are endless. That boy is now flying, and says his lights are everywhere. They couldn't kill the lions because they lived near a game park, but they couldn't have the lions eating their animals, their livelihood. So that now, they can coexist in their environment, and all those animals can coexist.

***TK**: Wow, and that's such a unique problem to the community and for that boy, and the fact that he created that is so perfect.*

EO: Yes, that was really a nice example and experience to see DT in real use.

***TK**: Well that's really all I had, you've given me a lot of great information. Do you have any questions for me, or about the paper?*

EO: My question now is, in your experience studying DT, and your experience working in a resource-constrained environment, being in Iganga and the village, and having programmed for UVP, what is your thought on DT? Is it something that can be marketed?

***TK**: Yes, I really think it is. That's a question I've been asking myself constantly, because I learned about the process from people who are very experienced with the process. Have worked with people from IDEO. Something I've noticed is that during the process, there's a point where they'll make a statement that is so simple and makes so much sense and is so obvious, but sometimes it takes so long to get to that point. With all of my experience here, I think it really is possible.*

I see it very much in a supplementary capacity, because on big-scale Global Health programs, take USAID for example, grants for millions of dollars, it's tough to say: "implement something, and then rework it and do it again." But on smaller levels, I think that DT on a consulting basis

to come in, and run a 1 or 2-week design sprint to help evaluate a program. DT even seems like a good evaluation tool; you can get feedback from it, and help existing programs. For organizations that don't have the funding, or the concrete experience in design, in could be a great thing to add to existing programs. It doesn't have to change everything, but there's some principle in the DT toolkit that can be used in the normal program processes.

EO: We also have a program within the GHC fellowship, where alumni are encouraged to come together and there is the "D-Prize" that alumni compete for. Through this D-Prize, they offer $10,000 for any innovation that alumni in a country have come up with. There are thematic areas; one might be Fistula and another might be in terms of reducing blindness. If it's at that level where you make it a project and there's a pool of funds for people with innovative ideas.

It becomes tricky for big organizations where their focus is so big, and I would expect USAID to introduce that model to their sub-contractures and say, "hey there is this $5,000 prize to compete for, could you find a solution to a problem in a specific area of interest?" then people can work with DT to come up with a solution and help answer those bigger questions for the organization. So, even when USAID is big, it works with small organizations and they are the ones that know the community and can be in touch with them to take lead in designing the solutions.

***TK**: It can even be used by anyone. And maybe it takes one person with more experience to facilitate the process, but once you encourage people to have user interviews, and collect feedback, and do a storyboard, and prototype, and iterate, things like that everyone can do. It's what you do as a kid! So, in my experience, it can maybe just take someone or a group of people to launch the DT process, and from there anyone can be a "designer".*

EO: And it was good experience coming up with a new user-interface for university students. We had interactions with the students at the Empathy stage, and were able to show them what we came up with, and get their thoughts on it. Also, it was important to have them look at the prototype as if it were real, and I remember we deigned a website for a university, and were able to show them their prototype on cardboard, and could translate our thoughts and hear them discuss its utility for their own lives… it was just nice. Really pitching those prototypes to the end user created a feeling of our idea being a real item.

***TK**: And it's amazing how you start with one design challenge or problem, and your mind jumps to a solution. But then you run through this process and you get so consumed in the details and everything about the user, and all the different mindsets and pathways, and it all changes, and you're so consumed it in, that by the end you wonder: "how did I think this was so simple?" There's so much going on in the DT process.*

EO: Yes; it may be a simple problem but you look at people that have different solutions. For me, I was humbled when they posed that question, "How Might We help **Riziki Source** add 1,000 applicants that are complete?", and got solutions that were all unique. We were all taught by the same facilitator, but the people came up with unique solutions. It's that openness in DT; oh 20 minutes, can you ideate 100 words on the problem statement. I really saw it increase people's esteem and everything.

***TK**: And you don't need thousands of dollars and years to do it, you can just draw and build, and its quick and simple.*

EO: Yeah, it's just easy to do that, and it should be the way to go. Thank you for your time, and we should always link up on DT.

***TK**: Absolutely, I really hope to stay involved with UVP and help to bring DT principles and thinking to its programs. Thank you very much, Edmund, and thank you for all your work with UVP, with DT, and in the field of Global Health.*

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