Executive Summary

Utilizing our expertise in Digital Financial Services (DFS), global health, and design and deployment of technologies for emerging markets, University of Washington (UW) in Seattle, Information Technology University (ITU) in Lahore, and Medic Mobile will work together to assess the financial protection means available to resource-constrained and vulnerable users of health care systems, as well as the effects of the digitization of financial protection, healthcare billing, and payments and their correlation with utilization of health services by such populations in resource-constrained environments. Our previous expertise on health system reporting, immunization logistics, medical record systems, and maternal health give us a holistic lens into the global health systems. We have also completed extensive in-depth work to understand the barriers to adoption of DFS, and produced a substantial number of papers that focus on DFS, including DFS and health payments. Our previous work also explains the nuances around technology, family, finances, and health as well as the role of culture, income, society, and gender in ownership, access, understanding, and use of technological, financial and health processes and programs. Along with an exploration of barriers and challenges to DFS adoption with regard to health services, we will articulate the impact of the aforementioned factors on DFS and health services. Our work also shares the use of social collateral and informal savings, selling of assets to provide for financial and health emergencies. Based on our extensive work in DFS and digital health implementations and given the locations in question, we propose to emphasize a context-based approach to understand the impact of socio-cultural, religious, economic, infrastructural and gendered barriers throughout the landscaping project, particularly in the case of financial protection and implementation considerations of DFS in health care. Our work underscores the importance of the context-based approach, and we study the socio-cultural norms and their role in the financial and health service interaction. The consortium team has expertise in mixed-methods research, fieldwork, technology development and deployment in Kenya, Tanzania, Peru, Mexico, Pakistan, India, Indonesia, and the Philippines. UW will lead this landscaping project, in collaboration with ITU in Pakistan and the Medic Mobile's team in Uganda.

Consortium Team

The work will be conducted at the University of Washington, Seattle, and at the Information Technology University, in Lahore, Pakistan. Medic Mobile will offer their expertise in health payments.

University of Washington, Seattle has the leading academic research group in **Information and Communication Technologies for Development (ICTD),** led by professors Richard Anderson and Kurtis Heimerl. The ICTD Lab has a 15-year history of producing top graduates, strong publications, and notable systems including Open Data Kit, Digital StudyHall, Projecting Health, and ReSpeak. The topic of this landscaping project is at the intersection of two of the lab's focus areas: DFS and computing for global health. Under BMGF's Financial Services for the Poor program, our work examined challenges in adopting DFS and included landscaping, literature surveys, assessment of specific mobile money products, workshops, and country case studies. Among the works was the evaluation of the security of mobile money applications on both smartphones and basic phones, digitization of traditional savings products, and identification of barriers to women's financial and technological inclusion. The DFS project has a geographical focus on Sub-Saharan Africa and South Asia. The ICTD Lab has also done substantial work in computing and global health in collaboration with organizations such as the UW Department of Global Health and PATH, with on-the-ground work in India, Pakistan, Tanzania, Kenya, Laos, and other countries. Our work focused on health system reporting, immunization logistics, medical record systems, and maternal

health. The lab's work has led to involvement with multiple global goods software systems including health insurance and case tracking products.

The ICTD Lab has partnered with **Information Technology University (ITU) in Lahore, Pakistan** to found the ITU FinTech Center with funding from Karandaaz. The **ITU FinTech Center,** directed by Lubna Razaq, has conducted collaborative research projects with UW and hosted UW fieldwork. The ITU FinTech Center developed strong ties with the Pakistan fintech industry and will be our core collaborator in the landscaping work in Pakistan. The ITU Fintech center has also led an evaluation of a program to promote women mobile money agents in Pakistan, which was completed for Women's World Banking.

Another partner is **Medic Mobile**, a nonprofit organization founded in 2010 to improve last-mile healthcare. Medic Mobile - which designs, builds, delivers and supports open-source software for frontline health workers and health systems - and UW recently collaborated to study digital payments for community health workers in rural Kenya. This work characterizes the complexities of salary payments through mobile money and bank payments, as well as the relationship between digital payments and health workers' well-being.

Approach

Financial Protection: First, we will create **a *conceptualization and classification of the various tools and means available to and used by people to support medical expenditures or to seek financial protection like remittances, savings, insurances or conditional grants.*** We will perform a classification of financial protection mechanisms and establish the various categories of formal and informal instruments (both digital and non-digital) relied upon for financial protection.

Second, we will ***draw comparisons of the results between using digital and non-digital means*** to understand the successes and failures for both. To do this, we will review the existing literature on the results achieved. The scope of this review will be global and not tied to a specific country. We will establish our general conclusions and see their application to the individual focus countries. Broad, global work will thus be validated by country-specific case studies.
Objective: Developing this framework will allow us to understand the sociotechnical foundation for financial protection that further interventions can build upon.

Demand and Utilization: To determine the effects of formal financial protection mechanisms, like universal health coverage initiatives, and utilization of financial services by the poor and vulnerable will require a ***review of existing surveys*** that provide statistically significant conclusions about the existence of any correlation between the two or lack of it. We will study formal, non-digital financial protection initiatives and mechanisms. Because the majority of the microfinance-based community insurance schemes, government grants and subsidies geared toward poor and vulnerable populations have been analog in nature, we expect to find data about non-digital products.
Objective: Understanding the effectiveness of formal financial protection mechanisms will allow us to understand gaps in this space and what can be improved about both digital and non-digital mechanisms.

Health Systems Performance: We will review existing literature to determine if and to what extent digital financial service implementations exist independently or as part of the broader digital health system initiatives. We will explore the range of approaches and scope of digitization efforts in health finance including the government conditional grants for providing financial health protection to populations below the poverty line. After this, we would follow with a review of existing evidence that provides assessment, preferably correlations, of the effects of DFS to the responsiveness of health providers in developing

countries across the globe. Where such evidence exists, then gaps in the literature are to be identified. Objective: Reviewing the literature on the connectedness of DFS into global health systems will allow us to understand gaps in this space and how interventions can appropriately integrate into existing systems.

Implementation Considerations: We will provide a review of the barriers toward the adoption and use of digital financial services based on our extensive domain experience and formative research in the proposed geographies. Based on these activities, we would have project-based milestones and progress-based evaluations for each milestone.

Gender: In this assessment, we will explore the impacts of gender. Women, by and large, have a greater burden to ensure that their families' health needs are met. Women and children are at greater risk to experience poverty, and women often face gendered barriers in accessing and owning technology, accessing finances to cover health services, and accessing information in gender-segregated societies. Our formative work in Pakistan and India shows that women save without the knowledge of their male relatives in order to address differences in spending priorities. We observed that health-related expenditures differ between men and women. For instance, women can anticipate maternal health expenditures and plan accordingly. Many societies associate the role of caregiver with women, who in turn miss work to care for sick family members, compromising income generation while increasing the burden of medical expenditures.
Objective: Exploring the links between gender and DFS will uncover forms of financial inclusion that may benefit women as key decision-makers around health, and characterize the barriers to women's inclusion.

Project Description

The project will deliver a detailed landscape study of the role of DFS in health systems in low and low-middle income countries focusing on both financial protection for individuals and improving health system performance. There will be five components of this project:

- **Formulate a conceptual framework:** A framework will provide a classification of digital financial services, health financial products, and digitalization strategies. This will ensure that the landscaping can build on existing models and scholarships.

- **Literature review:** A review of academic scholarship and gray literature will identify products and services for consideration. Further review of the literature will focus on the evidence base for the impact of digital and traditional financial services on health systems.

- **Stakeholder interviews:** We will converse with a broad range of experts to understand progress in integrating digital financial services into health systems in low and low-middle income countries with a particular focus on health insurance and savings product experts.

- **Country case studies:** We will conduct case studies in two countries to consider DFS for health services in the context of the specific digital financial services and health financial products available. The work will involve visits to countries and in-person and remotely interviews.

- **Production of the report:** A final report will describe methodology, findings, and conclusions. In addition, a version of the report will be produced that is suitable for peer-reviewed publication. Appendices covering the detailed literature review and the frameworks considered will also be made available.

For country case studies, we will look at Pakistan and Uganda. In each country, we will examine the general questions posed in RFA in the context of the country-specific digital financial services. Uganda and Pakistan present interesting contrasts for this study. Uganda has relatively mature mobile money products

based on the 'Telco' model where financial services are linked to phone numbers and accessed by basic mobile phones. Our consortium's involvement in large scale digital health implementations in Uganda, and working relationship with Uganda's Ministry of Health will enable us to secure targeted input from well-placed local leaders. Pakistan, on the other hand, has a lower penetration of mobile money and has a DFS ecosystem based on a broader range of digital products. The consortium team is well-positioned to work in Uganda and Pakistan. Pakistan study will build on our existing works, conducted by ITU FinTech center and UW graduate student Samia Ibtasam, that took an in-depth look at the digital financial services as well as the traditional financial services utilized by low-income women.

Risk Mitigation

Given the team's previous experience in working in emerging economies, conducting field research, barrier analysis and landscaping, the lead organization and collaborators have the ability to deliver on large scale projects. We do not anticipate any major risks in the progress of the project. Our previous work provides a strong foundation both for understanding how finances and health services are intertwined and for employing sensitivity to the socio-cultural norms that must be considered in this landscaping. We also understand that proactive stakeholder engagement is an important part of risk mitigation; based on our Consortium's prior work with PATH, Digital Square, a range of USAID-funded initiatives, and Ministries of Health of Pakistan and Uganda, we are confident on our ability to work collaboratively and communicate effectively.

We will follow institutional guidelines, including those set forth by the University of Washington's Institutional Review Board, and the regulations as pronounced by relevant local authorities in our focus countries.

High-level budget summary

We will require a total budget of **USD. $169,818** to complete this landscaping activity. The entire proposed project timeline will be **eight months**, including the complete report as well as the production of the framework.

Objectives and activities

The table below explains the activities planned for the project, the sub-activities included at each step (mentioned in the End Product column), the objective of each of those planned activities, and the entity responsible from the consortium members. The deliverable(s) expected from each activity are also outlined in the End Product column. The timeline for these activities is shared in the next section named Schedule.

Activity Name	The Objective of the Activity	Entity Responsible	End Product
Step 1 - Formulate a conceptual framework	A framework will provide a classification of digital financial services, health financial products, and digitalization	The University of Washington, Seattle, USA Information Technology University,	The framework will work to create a landscape of health financing ecosystem in resource-constrained geographies by identifying the typical entities involved in the provision of health financing particularly at the bottom of the pyramid. It will gather statistics on DFS penetration and health care situation for markets of interest. It will contain information

	strategies offered globally. This will ensure that the landscaping can build on existing models and scholarship.	Lahore, Pakistan	about existing digital financial services and health financial products and would classify these offerings. It would also include what are the existing digitization strategies globally as well as how they are being incorporated with different models. This will give the work a strong foundation and understanding of the ecosystem in which this study is situated. This framework will be used to point out areas of focus in step 2 of the literature review.
Step 2 - Literature review	A review of global academic scholarship and gray literature will identify products and services for consideration. Further review of the literature will focus on the evidence base for the impact of digital and traditional financial services on health systems.	The University of Washington, Seattle, USA Information Technology University, Lahore, Pakistan	This output will be a review of the existing global academic scholarship, consultancy, and donor reports covering various products and services. This will take place in the following four sub-steps. 1. First, we will focus on gathering relevant research. The team will gather relevant reports and materials from various sources. We will utilize membership to academic research libraries, contacts in donor organizations to get access to reports, if otherwise unavailable. 2. Second, we will sort the most reliable and high-quality materials into major themes. The framework developed in Step 1 will help in pointing out the areas where literature is available and identify gaps. The statistics on the market may help connect the availability of literature with DFS products and services in health financing. It may also aid us in creating themes of the literature being analyzed. 3. Third, we will conduct a review of the evidence on digital and traditional health financing systems. 4. Fourth, we will consolidate the literature review into a survey paper for industry, health, and DFS practitioners and academics.
Step 3 - Stakeholder interviews	We will converse with a broad range of experts to	The University of Washington, Seattle, USA	Once we have identified global practices and important players in the various health financing products and digital financial services, we would focus on our case studies' countries to conduct the

	understand progress in integrating digital financial services into health systems in low and low-middle income countries with a particular focus on health insurance and savings product experts.	Information Technology University, Lahore, Pakistan Medic Mobile, Uganda	stakeholder interviews from these categories. The global perspective gained from the last two steps will form the basis of conversations here. Experts can inform us about the factors contributing to the success or lack of it for digital health financing mechanisms in these markets, or towards the general lack of digital health financing. They can also shed light on the various ways in which digital financial services can be integrated into the existing health models. 1. In the first part of this phase, we will utilize the analysis performed in 'Conceptual Framework Creation' and 'Literature Review' to create a list of topics and deeper points for discussion. 2. Second, we will identify and recruit relevant stakeholders and experts from the ecosystem mapped out in Step 1. 3. Third, we will work with PATH to create discussion points and finalize the list of stakeholders to engage. Some suggested discussion agendas include factors contributing to the successes and failures of introducing integrating health financing with DFS, understanding of the expert's perspectives of current infrastructure, products as well as the potential for future market offerings. 4. A discussion guide will be created based on agreed-upon items. 5. Round tables and interviews will be held in two countries of interest. 6. The main findings from the interaction with experts will be summarized in the report.
Step 4 - Country case studies	Case studies will be conducted in two countries to consider DFS for health services in the context of the specific digital financial services	The University of Washington, Seattle, USA Information Technology University, Lahore, Pakistan	1. We will select and study-specific examples of digital health financing in two countries - Uganda and Pakistan. These case studies will consist of either traditional health financing providers going digital or DFS providers creating health financing products or both. Through interviews with various stakeholders involved in these implementations, we will

	and health financial products available. The work will involve visits to countries and in-person and remotely interviews.	Medic Mobile, Uganda	assess: I. Barriers/challenges were faced in the implementation of DFS II. Success factors III. Reasons and mechanism of incorporating DFS into broader digital solutions. IV. Examples of successful change management processes for digitization (effective approaches to moving from paper-based to digital management systems) 2. The country case studies will be assessed using the various service and user-models (through the stakeholder interviews in Step 3). We will assess the country case studies to formulate a set of recommendations for policymakers, product companies, insurance, and health providers. 3. The country case studies will be in the form of recommendations, and application of the framework (designed in Step 1 to Step 3) to the country-specific findings, and will be a summary of the learnings from the first four steps of the project.
Step 5 - Production of the report	A final report will describe the methodology, findings, and conclusions. In addition, a version of the report will be produced that is suitable for peer-reviewed publication. Appendices covering the detailed literature review and the frameworks considered will also be made available.	The University of Washington, Seattle, USA Information Technology University, Lahore, Pakistan	This will be a consolidation of the outputs of the above-mentioned steps.

Schedule:

Listed below is the plan for the activities divided into sub-activities, listed with pre-requisite activity listing and the months/quarters of each. This table can be seen along with the activities outcome and parties responsible (table listed above).

S.No	Activity Name \ Month (y-axis)	Pre-Requisites	0	1	2	3	4	5	6	7	8
	Confirming and assigning subcontract	-	x								
1	**Formulate a conceptual framework**										
1.1	Landscaping of health financing ecosystem			x							
1.2	DFS and health care landscaping	1.1		x							
1.3	Forming the framework based on the landscaping	1.1 and 1.2			x						
2	**Literature review**	**1**									
2.1	Gathering Relevant Research (existing global academic scholarship, consultancy, and donor reports covering various products and services)			x	x						
2.2	Sorting reliable, relevant and high-quality research	2.1		x	x						
2.3	Review of literature on the evidence of digital and traditional health systems (including information gaps) of the global literature	2.1 and 2.2		x	x	x					
2.4	Consolidation of the literature review	2.3				x	x				
2.5	Production of a survey paper (consolidating literature)	2.4					x	x	x		
3	**Stakeholder interviews**	**1 and 2**									
3.1	Creating a list of topics (based on Framework in 1) and literature review in 2	1 and 2					x				
3.2	Identification of stakeholders for interviews					x					
3.2.1	Recruitment of stakeholders for interviews	3.2				x	x				
3.3	Working with PATH to review/discussion points and finalize agenda	3.1					x				
3.4	Creation of Discussion Guide for the interviews	3.1 and 3.3					x				

	Round tables and interviews (two countries of interest)						x	x			
4	**Country case studies**	**3**									
4.1	Selection and study of examples of digital health financing (in case-study countries)						x				
4.2	Assessment of Country case studies (services and user models)	4.1					x	x	x		
4.3	Generating a list of recommendations and application of the framework (from step 1) to the country-specific examples and findings	1 and 4.2						x	x		
5	**Production of the report**	**1, 2, 3 and 4**									
5.1	Consolidation of the literature review, landscaping, stakeholder interviews and country case studies	1, 2, 3 and 4									x

Proposed Team:

Richard Anderson:

Professor Richard Anderson will direct this project. He has been a professor of Computer Science and Engineering at the University of Washington since 1986. His research focuses on Information and Communication Technologies for Development (ICTD) with multiple initiatives in global health and digital financial services. Relevant experience for this project includes being an academic leader in Digital Health for more than a decade and leading a BMGF funded initiative that addressed challenges faced in adopting digital financial services.

Work in digital health includes Projecting Health, an innovative behavior change project utilizing community-led video education, the Mobile Wellness Toolkit, an NSF funded project looking at mobile devices for health care, and Cold Chain Equipment Inventories with developed technologies for supporting the global immunization cold chain. Much of the digital health work was done in collaboration with PATH, where he had a formal relationship through 2018. In addition, he has managed the Open Data Kit project under USAID funding, at the University of Washington since 2015 as it transitions to an open-source project. Professor Anderson directs the UW Digital Financial Services Research Group (DFSRG), which was funded by BMGF's Financial Services for the Poor program. The research group studies the technological, economic, and social challenges in deploying mobile financial services. These challenges include security, privacy, user experience, identity, infrastructure, and financial knowledge. The research group has produced over twenty papers, including papers on SMS fraud, barriers to adoption of mobile payment systems in India, and women's technological inclusion in Pakistan. One of the focus countries for DFSRG is Pakistan, where Information Technology University (ITU) established a FinTech center to partner with UW.

Lubna Razaq:

Lubna Razaq is a financial technology professional and Director for FinTech Center at Information Technology University in Lahore, Pakistan. She has seven years of experience in FinTech. Focus areas of the FinTech center include studying opportunities and barriers to DFS adoption and developing DFS solutions

for low literate and low-income populations in general and women, in particular, starting with qualitative explorations and leading to solution design and testing with focus segments. FinTech Center's work has been funded by Karandaaz Pakistan and Women's World Banking and includes digitization of traditional savings products, qualitative assessment of women mobile money agents, frauds in DFS, and study of the design opportunities for microentrepreneur women. FinTech Center has strong industry linkages for the identification of problem areas for research, gathering research data, carrying out interventions, testing systems, and translation of research. ITU FinTech Center works to support the research agenda of both DFSRG and FinTech Center through industry and research collaborations and on-ground support.

Lubna previously was a consultant with FinSurgents, a Singapore-based company working in Pakistan, where she led studies for Karandaaz Pakistan (a Bill & Melinda Gates Foundation private company in Pakistan) to suggest a road map for FinTech ecosystem development in Pakistan and for Centre for International Private Enterprise to recommend policy changes for E-commerce in Pakistan regarding consumer protection laws, digital payment systems and human capital development in the online commerce industry. She has also been part of the team informally advising the State Bank of Pakistan on the recommended FinTech regulatory practices. She has authored consultative papers to date for SBP on regulations regarding Digital payments, P2P lending, FinTechs, and Regulatory Sandboxes.

Isaac Holeman:

Isaac Holeman is a Clinical Assistant Professor and Chief Research Officer at the Medic Mobile. His experience designing, implementing, and studying digital health interventions in Africa and Asia makes him distinctively well suited to serve on the proposed research project. As a co-founder and Chief Research Officer at the non-profit organization Medic Mobile, he has contributed to over 80 digital health implementations in Africa and Asia. Medic Mobile serves as the steward of the Community Health Toolkit open source project, which as of July 2019 powered digital health applications that are used by over 25,000 health workers to provide over 1 million software-supported health services every month. This work has been covered in most national news outlets and has received the most competitive global awards for social innovation, including Echoing Green and Ashoka fellowships, a Gates Cambridge Scholarship, and a Skoll Award. The Community Health Toolkit has been widely studied by digital health researchers, and Isaac recently joined the Department of Global Health at the University of Washington to further facilitate this program of research. The three streams of research activity include continuing to build a digital infrastructure for innovations in health care delivery and medical science, conducting rigorous ethnographic research to inform a more human-centered approach to digital health, and offering design insights to support randomized trials and literature reviews of digital health interventions.

From mid-2009 to mid-2012, he lived in Malawi and Kenya, implementing open source software and conducting fieldwork to inform the design of new digital technologies. As an ethnographer and a practitioner of human-centered design, Isaac is able to offer a highly complementary perspective and skill set to researchers with primary expertise in randomized trials. As a co-investigator in a prior R21 grant with PI Caryl Feldacker, his contributions to system design, usability, and implementation complemented the PI's focus on conducting a highly rigorous evaluation of impacts on patient safety, adverse event identification, and cost-effectiveness.

Samia Ibtasam:

Samia Ibtasam is a third-year Ph.D. student in Computer Science & Engineering at the University of Washington. With ten years of experience in ICT4D research including Maternal, Neonatal, Child Health, Agriculture, Financial Inclusion and Human-Centered Design, her current research focuses on the

intersection of gender and its impacts on technological and financial inclusion, especially for women in emerging economies. She has explored various mobile-money applications and their learnability for low-income users in Pakistan. She has led research to analyze the gendered barriers in the readiness for and adoption of Digital Financial Services. In her work in Pakistan with low-income women around financial and digital inclusion, she has conducted in-depth qualitative interviews with over 100 women. She has also studied the role of family members in women's technological and financial inclusion, as well as the impacts of the learnability of applications in the adoption of new financial systems.

Before joining UW, Samia worked as a faculty member at the Information Technology University in Lahore, Pakistan and co-founded the Innovations for Poverty Alleviation research lab (IPAL) where she worked to design solutions for Maternal, Neonatal, and Child Health (MNCH) including information systems for expectant mothers, and diagnosis applications for IMCI protocol, delayed children. She taught courses in Design Thinking, Human-Centered Design, Design for Development, and Technology for Global Development. She led a research grant by DFID and worked with the Government of Punjab, Pakistan to redesign the Immunization card and create digital health records for the province of Punjab, Pakistan in what is now implemented province-wide as eVaccs-3.

Naveena Karusala:
Naveena Karusala is a second-year Ph.D. student in Computer Science & Engineering at the University of Washington. Her research focuses on communication in healthcare contexts in underserved settings. She has led work in partnership with Medic Mobile on the use of digital payments for paying community health workers in Kenya. This work reveals the complexities of payments through both mobile money and bank payments, as well as the nature of the interplay of digital payments, payment delays, and well-being of health workers. She has also conducted or published numerous studies that explore the domains of health, gender, language, and data-driven decision-making.

Jennifer Webster:
Jennifer is the project manager for UW DFSRG. She has collaborated on a number of research projects and papers that focus on ICTD, especially in the areas of financial inclusion and gender, technology and global health, and digital financial services. She has experience in managing international research and consulting projects, including collaborative efforts with Women's World Banking and the ITU Fintech Center. She holds a Ph.D. in History, and her previous research explores the intersection of gender and religious identity in the lives of women in remote and rural areas of Central Asia. Her work further explores the conflicts between indigenous healing and institutional medical practices. She has expertise in both qualitative and quantitative research methods, a robust higher education teaching background including the development of a course on Gender and Technology, and over 20 years' experience writing for academic and policy purposes.