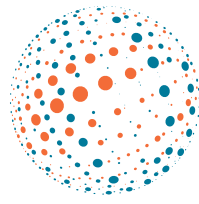




USAID
FROM THE AMERICAN PEOPLE

NETHOPE



FINAL REPORT

GLOBAL BROADBAND AND INNOVATIONS ALLIANCE

October 2010 – September 2020
Cooperative Agreement #AID-CIO-A-10-00001

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I. Executive Summary

In 2010, the USAID Global Development Lab issued a 10-year cooperative agreement to NetHope with these two overarching goals:

1. Extend the reach of broadband, including enhanced mobile networks, into more remote rural areas as key infrastructure for extending the reach of socioeconomic services through USAID's NGO and contractor partners; and
2. Leverage the extension of these networks for delivering network-enabled value-added application support across USAID's development portfolio.

Envisioned as a follow-up mechanism to the Last Mile Initiative (LMI) and the Global Development Commons (GDC), the Global Broadband and Innovations Alliance (GBI) was created to help accelerate the expansion of internet access to the 71% of the global population that was still unconnected at the time. Indeed, in 2010, the global internet user base was expanding at nearly 15% a year, and the value of expanded access was clear. As stated in the original proposal, there is a clear link between economic development and connectivity, with research consistently showing that investment in this field has had a direct positive effect on gross domestic product.¹ Higher-end technologies like broadband networks were shown to deliver the greatest impact:

- » A 10% increase in fixed line tele-density increases GDP by 0.5%.
- » A 10% increase in mobile tele-density increases GDP by 0.7%.
- » A 10% increase in broadband penetration increases GDP by 1.3%.

¹ From ITU Secretary General Dr. Hamadoun I. Toure's Ambassador's Information Meeting speech on March 15, 2010, viewed at www.itu.int/en/osg/speeches/pages/2010-03-15.aspx

Moreover, it was observed at the time that a 10% increase in broadband penetration correlates to a 1.5% increase in labor productivity. The GBI program was specifically designed to deliver such results, and NetHope was identified as a uniquely well-placed organization to deliver on this goal. At once both an NGO implementing partner and sector-based membership organization, NetHope represented 32 of the world's largest NGOs, humanitarian organizations, and environmental conversation organizations. (By 2020, that number has increased to 60.) By leveraging the global footprint of this unique consortium, the GBI program could field-test concepts in a broad range of contexts, leaning on the local knowledge and relationships of NetHope's member organizations. In addition, NetHope has strong, long-term working relationships with major American and European technology companies, and NetHope articulated its intention to incorporate their support in GBI programming. Indeed, while not required by the cooperative agreement, NetHope ultimately secured financial leverage of over \$58 million during the course of the program from companies like Cisco, Microsoft, Adobe, Intel, and Hewlett Packard.

Per the original workplan, the GBI program had five major objectives:

1. Leverage NetHope's Life Cycle piloting methodology for identifying, developing, and deploying innovative ICT-enabled solutions to support and strengthen the global USAID development portfolio.
2. Leverage NetHope's existing (and future) partnerships with private sector ICT companies to facilitate partnerships with USAID that enable the deployment of value-added ICT solution sets across USAID's development portfolio.
3. Leverage the ICT experience of NetHope's member organizations to improve efficiency and effectiveness of field operations via technology support solutions that significantly lower costs and improve organizational effectiveness.
4. Facilitate more cost-effective and efficient leveraging of ICT methods, tools, and partnerships through systematic introduction of common-shared applications and knowledge of best practices to the broader international development community.
5. Leverage financial contributions to NetHope from privately funded organizations.

In the end, NetHope delivered on these objectives and much more, as you will see in the following pages. That said, 10 years is a long time in terms of technology. Consider this – in 2010, the Xbox and PlayStation gaming consoles were only first being introduced, Apple had just released the first iPad, the social networking platform Instagram was launched, IBM's Watson supercomputer went mainstream, 3G mobile networks first came into use, and the mobile smartphone was entering only its third year of existence. A quick comparison to the technology landscape in 2020 highlights the rapid pace of technological progress, and this evolutionary principle applied to the GBI program as well. While the program initially focused singularly on novel approaches to expanding connectivity, it eventually expanded its scope to address regulatory reforms, emerging technologies, and cybersecurity concerns. All arguably have an impact on the scalability of internet access, but the challenges that the program set out to address back in 2010 were eventually expanded over time. That expansion was also likely influenced by significant changes in management over the years. In total, the program had six acting and permanent Chiefs of Party, while there were several changes in Agreement Officers and Agreement Officer Representatives at USAID.

Ultimately, the projects executed under this award fell into three categories – connectivity, applications & services, and capacity building. Subsequently, we have divided the chapters in this final report into sections focused on each of these three categories. In the “*Connectivity*” section, we highlight the various approaches to last-mile connectivity that were tested under the GBI program, including TV White Space, broadband demand aggregation, fiber network deployments, and Wi-Fi solutions. We also highlight numerous policy initiatives, including support for Universal Service Funds (USFs), national broadband plans, and policy interventions in response to the COVID-19 pandemic. Finally, we review various research and assessment projects, including a study on mobile phone use in rural Philippines, research on connectivity in Bangladesh’s Rohingya refugee communities, and ICT assessments in Zambia and Liberia.

In the “*Applications & Services*” section, we highlight mobile phone applications that the program developed, including an application leveraging gamification to increase civic engagement of youth in Jordan and an application to combat the trafficking of persons in Russia and Albania. We also review several online services developed by the program, including the NetHope Solutions Center and the Open Facility Registry Service. We also go into great depth about our extensive programming around digital financial services, cybersecurity, and healthcare services.

Finally, in the “*Capacity Building*” section, we discuss the program’s work on spectrum management and expansion in Afghanistan and Liberia, our brief focus on artificial intelligence and machine learning, our support of broader engagement of women through the Women & the Web Alliance, and our support of consortium activities including the annual ICT4D Conference and the USAID/Mastercard-led Smart Communities Coalition.

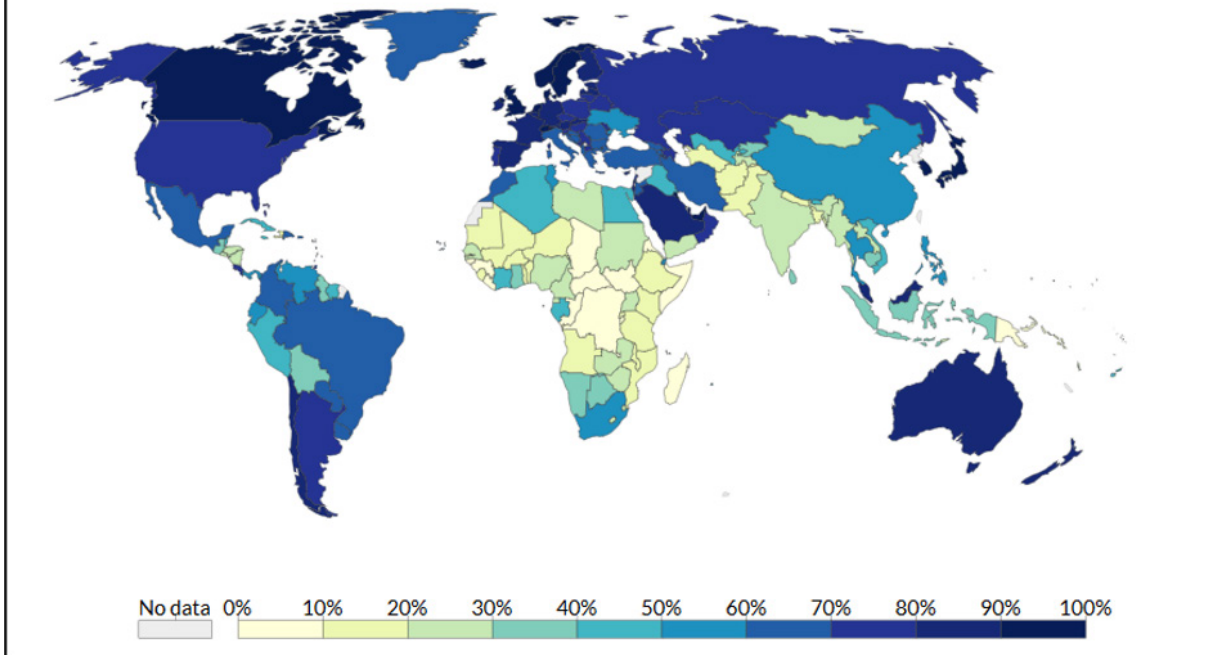
When looking back on these 10 years of programming, it is tempting to suggest a lack of focus. After all, the original hope of the program was to move USAID away from one-up, disconnected projects to a longer-term cohesive approach to expanding connectivity and internet-enabled tools. Instead, the flexibility to adjust focus over these 10 years proved part of the program’s success. Since 2010, leading technologies have changed, the regulatory environment in many focus countries has shifted, some innovative approaches such as TV White Space and USFs have undergone significant revision, and a global pandemic impacted access to stakeholders and fragile networks. The flexibility built into the design and management of the GBI program was ultimately a core strength. Moreover, a brief review of the Table of Contents will show that, while program priorities changed over time, the predominant focus remained last-mile connectivity, policy reforms, development of innovative services and applications, and general capacity building of the sector.

Yet, significant challenges remain. In 2020, global internet penetration is still only around 59%, and the speed of expansion has slowed considerably since 2010. At the current rate of expansion, it could take *decades more* until we near 100% penetration globally.² The world map on the following page clearly shows where the challenges remain.

² GSMA State of Mobile Internet Connectivity 2019 (www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf)

Share of the population using the Internet, 2017

All individuals who have used the Internet in the last 3 months are counted as Internet users. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.



Credit: Our World in Data (<https://ourworldindata.org/internet>)

So, while the GBI program comes to an end, the need for new solutions remains strong. To that end, we have included six exposés throughout this report written by industry experts focusing on key topics of GBI programming in which they express their views on what lies ahead. These include an exposé on the future of TV White Space (page 29), a review of the future of Universal Service Funds (page 69), a look at the upcoming trends in using gamification to engage youth (page 112), an assessment of future trends in digital financial services (page 152), a review of emerging technologies that could potentially have an impact on future international development programming (page 178), and a chapter on the future of women and technology (page 191).

The following pages describe our highly adaptive, heterogeneous, decade-long engagement. Taken together, they illustrate viable solutions to both current and future challenges. In the end, it is clear that there is much work still to be done, and NetHope encourages USAID and its implementing partners to both learn from our experience and imagine new ways to reach the 3.2 billion people globally who still remain unconnected.

II. List of Acronyms

ABP

Africa Broadband Partnership

AI

Artificial Intelligence

API

Application Programming Interface

ASU

Arizona State University

ATRA

Afghanistan Telecom Regulatory Authority

Bappenas

Indonesia Ministry of Planning

BP3TI

Badan Aksesibilitas Telekomunikasi dan Informatika

BTCA

Better Than Cash Alliance

CAK

Communications Authority of Kenya

CaLP

Cash Action Learning Partnership

CCK

Communications Commission of Kenya

CGAP

Consultative Group to Assist the Poor

CHP

Collaborative Health Platform

CLDP

United States Department of Commerce Commercial Law Development Program

CRS

Catholic Relief Services

CSO

Civil Society Organization

CSR

Corporate and Social Responsibility

cTIP

Combat Trafficking in Persons

DCA

Development Credit Authority

DFL

Digital Financial Literacy

DFS

Digital Financial Services

DRC

Danish Refugee Council

ELAN

Electronic Cash Transfer Learning Action Network

FFP

Food for Peace

FSD Zambia

Financial Sector Deepening Zambia

GBI

Global Broadband and Innovations Alliance

GIFEC

Ghana Investment Fund for Electronic Communications

GIS

Geographic Information System

GOA

Government of Albania

GoL

Government of Liberia

GSMA

GSM Association

IBP

Indonesia Broadband Plan

.....

ICT
Information and
Communications Technology

IoT
Internet of Things

IP
Internet Protocol

IPs
USAID Implementing Partners

IRC
International Rescue
Committee

ISOC
The Internet Society

ISP
Internet Service Provider

ITU
International
Telecommunication Union

IYCE
Innovations for Youth Capacity
and Engagement

JMN
Jogja Media Net

LAN
Local Access Network

LBTA
Liberia Broadband Technical
Assessment

LTA
Liberia Telecommunications
Authority

M&E
Monitoring and Evaluation

MCIT
Afghanistan
Ministry of Communications
and Information Technology

MCIT
Indonesia Ministry
of Communications
and Information Technology

ML
Machine Learning

MNO
Mobile Network Operator

MoIA
The Albanian Ministry
of Internal Affairs

Monev
IBP Monitoring and Evaluation
Unit

MoPT
Liberia Ministry of Posts and
Telecommunications

MOU
Memorandum of
Understanding

MPTC
Cambodia Ministry of Post and
Telecommunications

MTC
Zambia Ministry of Transport
and Communications

NBS
National Broadband
Strategies

NCC
Nigerian Communications
Commission

NGO
Nongovernmental
Organization

NRC
Norwegian Refugee Council

OCHA
United Nations Office for the
Coordination of Humanitarian
Affairs

OECD
Organisation for
Economic Co-operation and
Development

PI
Payment Innovations

RATCs
Regional Anti-trafficking
Committees

RF
Radio Frequency

RPJMN
Indonesia's Medium-Term
National Development Plan

SCC
Smart Communities Coalition

TDF
Telecom Development Fund

.....

TLA
Telecom Law of Afghanistan

TNM
Telkom Networks Malawi

TVWS
TV White Space

UAF
Universal Access Fund

UCAF
The Universal Communications
Access Fund of Tanzania

UN
United Nations

UN-Habitat
United Nations Human
Settlement Programme

UNCDF
United Nations Capital
Development Fund

UNCTAD
United Nations Conference on
Trade and Development

UNDP
United Nations Development
Programme

UNHCR
United Nations High
Commission for Refugees

UNODC
United Nations Office on
Drugs and Crime

USAID
United States Agency
for International Development

USAID/DCHA
USAID Democracy, Conflict,
and Humanitarian Assistance

USAID/DCHA/DRG
USAID/DCHA Center of
Excellence on Democracy,
Human Rights, and
Governance

USAID/OFDA
USAID Office of Foreign
Disaster Assistance

USF
Universal Service Fund

USO
Universal Service Obligation

USPF
Universal Service Provision
Fund

VAF
Vodafone Albania Foundation

VoIP
Voice over Internet Protocol

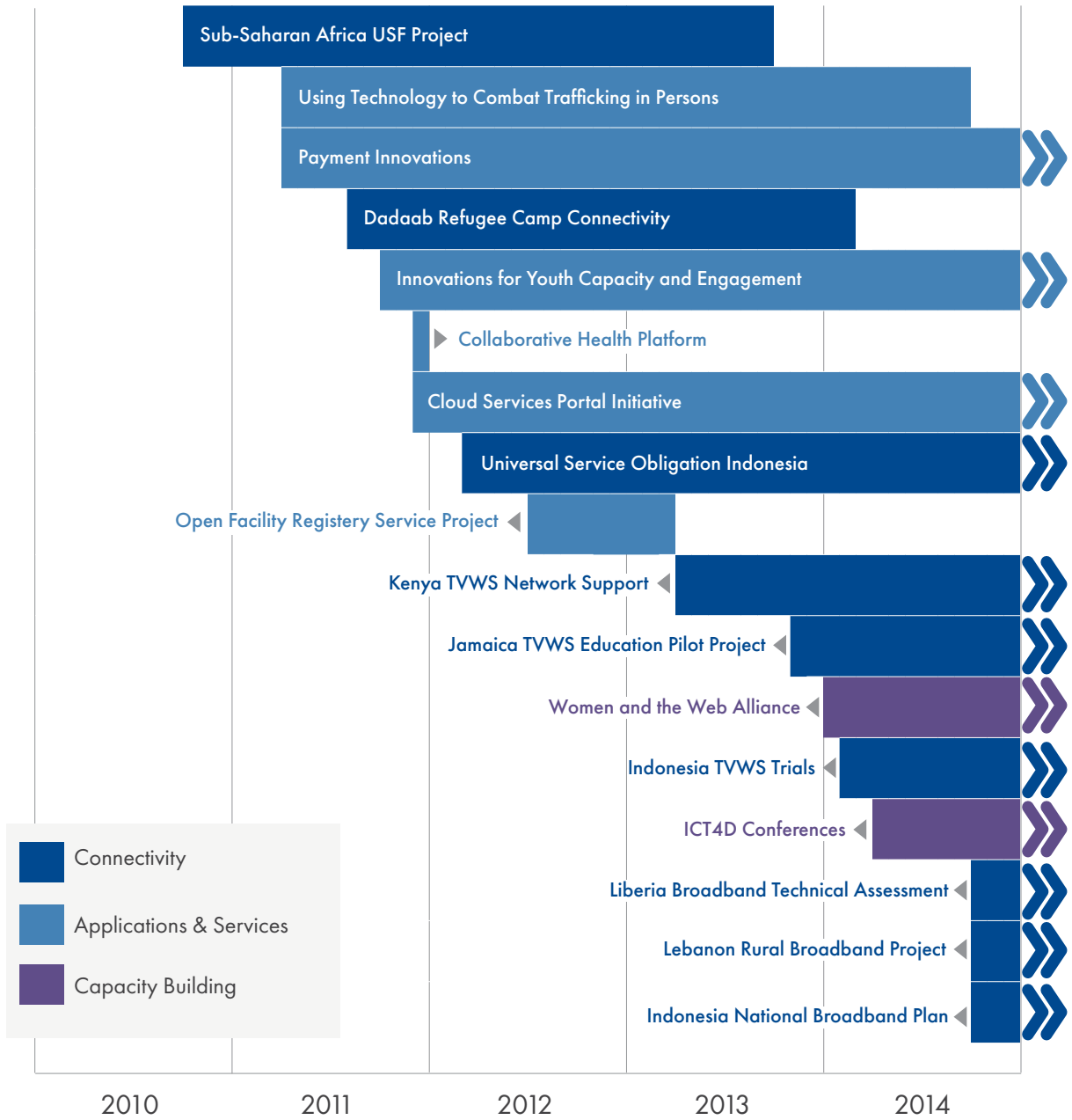
WFP
United Nations World Food
Programme

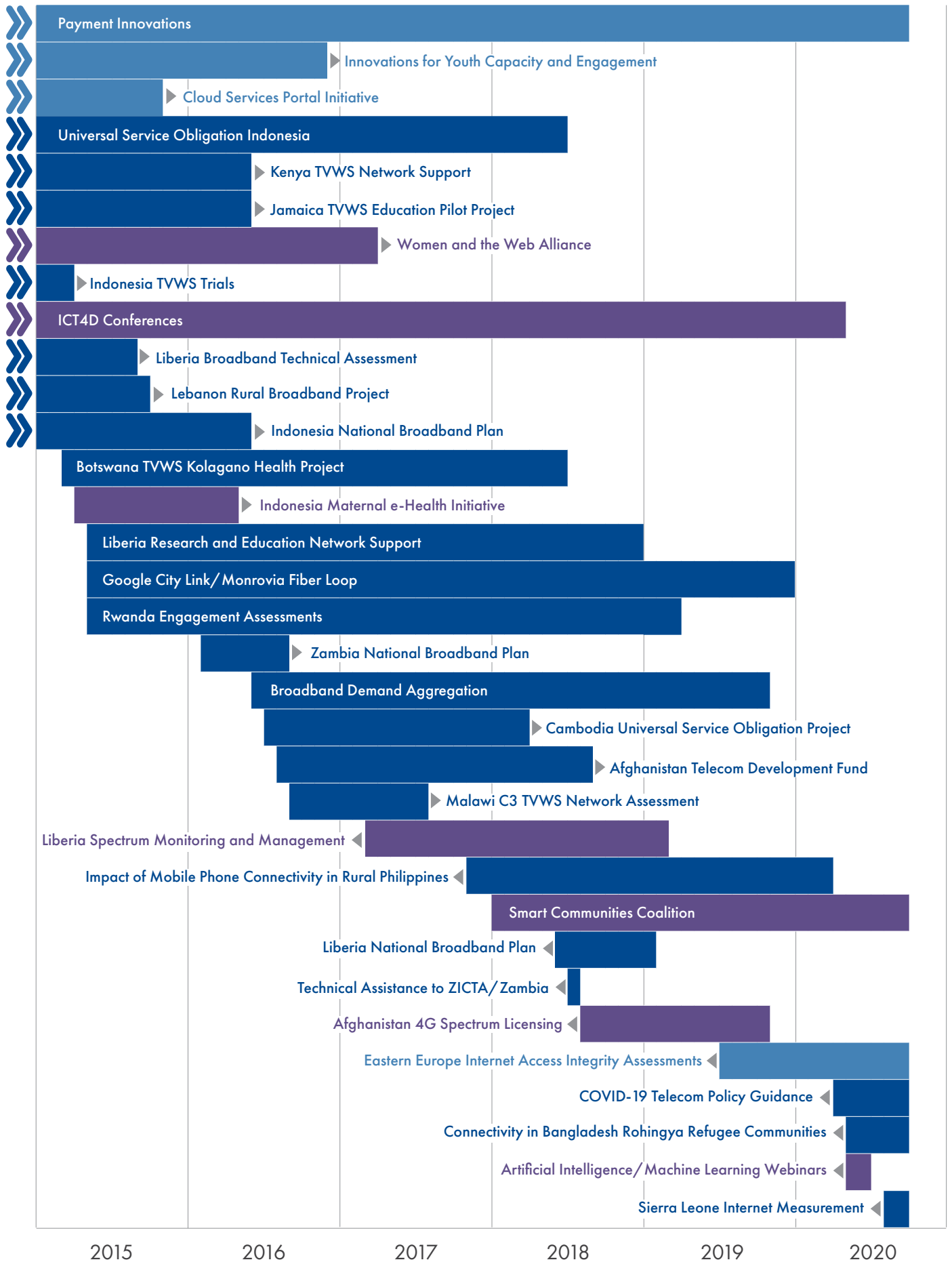
WTWA
Women and the Web Alliance

WVA
World Vision Albania

ZICTA
Zambia's ICT Regulatory
Agency

III. Chronological Table of Projects





IV. Financial Overview

The GBI program initially began as a \$15,096,467, five-year program, with an initial \$2,479,930 obligation. Eventually, it was extended to a 10-year program with a \$25,096,463 ceiling and a final obligation of \$24,888,464. The additional funds were allocated, obligated, and (in one case) *deobligated* 20 different times over the course of the 10 years.

Original Award	\$15,096,467
Increase with Modification 10 (October 2014)	\$4,999,900
Increase with Modification 14 (August 2016)	\$5,040,096
TOTAL AWARD	\$25,096,463

Original Obligation on 9/30/10	\$2,479,930	Co-Agg
Additional Funds Obligated on 9/30/11	\$2,797,074	Modification 2
Additional Funds Obligated on 07/09/12	\$3,102,932	Modification 4
Additional Funds Obligated on 09/28/12	\$450,000	Modification 5
Additional Funds Obligated on 02/19/13	\$1,102,578	Modification 6
Additional Funds Obligated on 04/16/13	\$900,267	Modification 7
Funds Deobligated on 03/13/12	-\$169,505	Modification 8
Additional Funds Obligated on 07/28/2014	\$1,830,000	Modification 9
Additional Funds Obligated on 10/01/2014	\$1,826,188	Modification 10
Additional Funds Obligated on 12/16/14	\$666,000	Modification 11
Additional Funds Obligated on 09/30/2015	\$3,032,098	Modification 12
Additional Funds Obligated on 10/22/2015	\$94,146	Modification 13
Additional Funds Obligated on 08/11/2016	\$2,034,451	Modification 14
Additional Funds Obligated on 09/12/2016	\$1,142,305	Modification 15
Additional Funds Obligated on 03/29/2017	\$2,750,000	Modification 17
Additional Funds Obligated on 01/11/2018	\$250,000	Modification 18
Additional Funds Obligated on 03/12/2019	\$600,000	Modification 19
TOTAL OBLIGATED FUNDS	\$24,888,464	

Total expenditures BY YEAR are found below, broken out by major cost category. FY2010 spending represents approved pre-award spending.

	ACTUALS											TOTAL
	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY10-FY20
Staff	\$0	\$20,670	\$58,974	\$120,685	\$141,703	\$343,337	\$262,192	\$331,409	\$374,821	\$558,608	\$384,306	\$2,596,705
Consultants and Subawards	\$27,834	\$565,650	\$1,889,210	\$2,508,708	\$1,942,519	\$2,463,267	\$1,819,172	\$1,368,168	\$1,200,164	\$520,776	\$487,165	\$14,792,633
Travel	\$0	\$61,149	\$135,362	\$233,222	-\$4,392	\$35,825	\$134,502	\$155,990	\$127,937	\$149,228	\$22,374	\$1,051,198
Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$624,451	\$0	\$0	\$0	\$624,451
Other Direct Costs	\$0	\$8,426	\$49,535	\$189,621	\$511,958	\$420,849	\$183,709	\$216,059	\$54,419	\$27,547	\$15,059	\$1,677,183
Indirect Costs	\$2,867	\$75,791	\$297,384	\$421,994	\$362,684	\$455,880	\$427,121	\$540,749	\$549,451	\$681,647	\$330,727	\$4,146,295
TOTAL	\$30,701	\$731,686	\$2,430,465	\$3,474,230	\$2,954,472	\$3,719,158	\$2,826,696	\$3,236,826	\$2,306,792	\$1,937,807	\$1,239,631	\$24,888,465

Finally, expenditures BY PROJECT are found below. Note that, as of this writing, the financial books for September 2020 are not yet closed, so figures for some projects that extended to the very end of the program include estimates.

PROJECT	BUDGET
Afghanistan 4G Spectrum Licensing	\$641,594
Afghanistan Telecom Development Fund	\$558,407
Africa Broadband Partnership Core	\$920,882
Botswana TVWS Kolagano Health Project	\$149,153
Broadband Demand Aggregation (Malawi)	\$155,790
Broadband Demand Aggregation (Uganda)	\$269,659
Cambodia Universal Service Obligation Project	\$114,900
Cloud Services Portal Initiative	\$331,526
Connectivity in Bangladesh Rohingya Refugee Communities	\$12,767
Core	\$5,010,111
COVID-19 Telecom Policy Guidance	\$29,727

Eastern Europe Internet Integrity Studies	\$244,565
eMitra	\$3,476,151
Indonesia National Broadband Plan	\$146,099
Innovations for Youth Capacity & Engagement (IYCE)	\$1,704,264
Jamaica TVWS Education Pilot	\$288,819
Lebanon Rural Broadband Project	\$183,023
Liberia Broadband Technical Assessment	\$252,883
Liberia Broadband Technical Assessment	\$18,840
Liberia Spectrum Monitoring and Management	\$1,017,257
Liberia/Other Projects	\$797,697
Malawi C3 TVWS Assessment	\$52,798
Open Facility Registry Service Project (FRED)	\$308,883
Payment Innovations	\$4,738,784
Rural Connectivity	\$1,167,603
Rwanda Engagement Assessments	\$27,728
Smart Communities Coalition	\$178,721
Technical Assistance to ZICTA/Zambia	\$130,617
Universal Service Funds	\$356,478
Using Technology to Combat Trafficking in Persons (cTIP)	\$293,334
Women & the Web	\$1,309,405
TOTAL	\$24,888,465

Finally, NetHope secured **\$58,497,250** in *leverage* over the course of the entire award. This represented both cash and in-kind contributions, mostly from NetHope’s private sector partners.

V. Staffing Overview

Over the 10 years of the GBI program, there have been many staffing changes, most notably the Chief of Party. Per the original cooperative agreement, USAID's substantial involvement included the approval of both the Chief of Party and Program Manager for the flagship Innovations for Youth Capacity & Engagement (IYCE) project. The program's initial Chief of Party was **Erin Mote**, and the Program Manager for the IYCE project was **Sherry Youssef**. Within the first two years, Ms. Mote was replaced by **Alison Padget**, who served as Acting Chief of Party until **Jonathan Metzger** was selected and approved as the new Chief of Party. Mr. Metzger was the longest serving Chief of Party, leading the program from FY2012 to FY2017. Upon Mr. Metzger's departure, former Deputy Chief of Party **Revi Sterling** was promoted to Chief of Party. Upon Ms. Sterling's departure to take on a direct assignment for USAID, **Frank Schott** served as Acting Chief of Party until **Ray Short** was selected and approved as Chief of Party. Mr. Short oversaw the program until the end of its 10-year period of performance.

There were other key personnel responsible for program management across the years. In FY2011, **Bill Garrison** was selected as Deputy Chief of Party, with Ms. Padget serving as Interim Operations Manager until **Slobodanka Velickova** was hired in FY2012 for that position. Beginning in FY2012, **Shelley Spencer** and **Hamilton McNutt** took leadership of the GBI program's digital financial services portfolio, while **Malith Gunasekara** and **Fimek Resi** led GBI's eMITRA project based in Indonesia.

In FY2013, Ms. Padget replaced Mr. Garrison as Deputy Chief of Party. Also that year, **Heide Fabiano** was hired to lead all contracts and grantmaking, while **Fredrik Winsnes** led GBI's work on the Cloud Service Portal Initiative. **Emma Schwartz** and **Monica Jerbi** led the program's communications efforts, while **Lauren Holloway** joined the project in FY2014 as Finance Manager. Also that year, **Joey Mendoza** and **Anita Dwipuspita** took over leadership of the eMITRA project.

In FY2015, **Revi Sterling** joined the program as Deputy Chief of Party, and **Forrest Wilhoit** joined, initially as Africa Broadband Coordinator and later as Senior Program Manager. **Robin Black** and **Laura McMillan** replaced Ms. Fabiano to lead the program's contracts and legal support.

In FY2017, Ms. Velickova was replaced by **Hunter Gaiotti**, while **Nan Hall** and **Kristin Kalning** took over the program's communications work. Significant support that year was also provided by NetHope employees **Frank Schott**, **Jenna Groman**, and **Rami Shakra**. In FY2018, **Stephanie Siy** replaced Mr. Gaiotti as Program Manager, and **Brent Carbo** joined NetHope as Global Director of Programs, providing internal oversight over the entire GBI program.

Part of NetHope's business model is the ability to scale up and down based on the needs of its member organizations and donors, and the GBI program was no exception. Over the course of its 10 years, the program employed dozens of consultants with specialized skills and geographic knowledge. Many of these consultants are included in our acknowledgements at the end of this report, and their contributions cannot be overstated.

VI. PROGRAM SUMMARY
CONNECTIVITY





Throughout the GBI program, a critical focus had been expanding internet access to populations with poor, marginal, or high-cost internet connectivity. Even as there have been dramatic changes over the last decade in terms of the reach of communications infrastructure – through the proliferation of undersea cables, fiber networks, wireless, and satellite platforms – significant challenges have persisted. In 2020, there are some three billion people worldwide who remain unconnected. NetHope’s various program interventions sought to address critical barriers to connectivity for these unconnected billions through a multifaceted approach that included:

- Deployments to assess both the technical and commercial viability of innovative low-cost wireless technologies.
- Commercial models designed to incorporate new technologies and complementary service offerings to meet the unique needs of unserved and underserved broadband access markets.
- Improved economics for rural service delivery through demand-side aggregation.
- Legal and regulatory frameworks that more optimally incorporate technology and commercial innovations in national-level planning, administration, and goal setting.
- Analysis to inform policymakers, regulators, and other sector stakeholders and assistance for better, more targeted sector management and priority-setting.

In many cases, NetHope carried out these activities with partners in the technology, health, and education fields, both from the public and private sectors. In some cases, activities leveraged the expertise of NetHope’s membership and partner base and included contributions from a myriad of industry and development experts. This section provides detailed overviews of these activities, outlining key points of implementation, challenges, lessons learned, and impacts.



1. Kenya TVWS Network Support

April 2013 – May 2016

BACKGROUND

During the first half of the GBI program, NetHope carried out a number of program activities that aligned with efforts to implement the technical, business case, and regulatory frameworks required to enable TV White Space (TVWS) technology as a potentially effective rural broadband access technology, especially in developing countries. The core innovation of TVWS technology is its use of unlicensed, low-frequency radio spectrum (that resides adjacent to spectrum used for television broadcast) to send and receive broadband signals over large geographic areas at comparatively low cost.

NetHope's support of Indigo Telecoms (later known as Mawingu Networks) came as a result of a Kenya country evaluation conducted in 2012. Through this project, NetHope sought to demonstrate the commercial and technical viability of TVWS-enabled broadband provision designed to bring internet access to rural communities of Laikipia County, Kenya via low-cost, low-power networks that relied on solar energy generation to power wireless network infrastructure.

Indigo's original business plan included building network facilities to serve schools and health clinics in select rural communities. At the time of the NetHope project inception, Indigo had secured a national operator's license and had recently launched operations at a few pilot test sites. Project objectives included expanding network reach and the use of the internet and related services at the community level, particularly for education, healthcare delivery, and economic and social development, in addition to expanding access to electricity services for mobile phone and computer charging and domestic lighting.



Wireless network infrastructure was powered by solar energy.

Along with delivering benefits associated with the solar equipment transfer and community engagement, NetHope also sought to better understand two key elements through the activity: 1) TVWS' viability as a technology for deployment in terms of technological robustness, cost, and licensing; and 2) rural Kenyan consumer appetites for low-cost internet access.

PROJECT IMPLEMENTATION

NetHope's activity began in early 2013 through advisory support to Indigo in refining their business and fundraising plan. Around the same time, Indigo executed a Memorandum of Understanding with Microsoft East Africa and the Kenyan Ministry of Information and Communications (MIC) to pave the way for the use of TVWS as a network access technology on a trial basis.

By mid-2013, NetHope had committed to supporting the Indigo network through the provision of solar components to power network infrastructure and improve network economics through a reduction of operational expenditures.

Later in 2013, NetHope issued and finalized a competitive procurement for solar electricity equipment, inviting bids from vendors for solar panels, batteries, and controllers to power Indigo network nodes at schools and hospitals in targeted rural communities. In November 2013, Indigo transferred project implementation to a new entity, Mawingu Networks. During the first half of 2014, NetHope granted 158 solar panels, 158 batteries, and 79 charge controllers to Mawingu to support deployment in 50 locations across Laikipia County.

IMPACTS & OUTPUTS

Over the course of the next two years, Mawingu navigated a series of funding and licensing challenges with relative success - proving the technical efficacy of TVWS technology and gradually expanding its network footprint to integrate the NetHope-donated solar equipment. In reports submitted to NetHope following the ownership transfer of solar equipment, Mawingu reflected on a numerous developments and milestones on the path towards improved service delivery and commercial sustainability. These included:

- Installation of public Wi-Fi access points.
- Installation of connectivity and computer labs in local schools.
- Renewed TVWS licensing and expanded scope of license to commercial operations.
- Collaborations with the Kenyan company Steama.co on IP-based smart metering solutions for photovoltaic systems.
- Launch of bespoke network management platform/dashboard to track customer acquisition and retention.
- Assignment of a Mawingu network Autonomous System Number.

- Addition additional fibre POP breakouts.
- Collaboration with Microsoft Research in the use of GPS and network resources to track wild animals on nearby conservancies.

In its final report to NetHope in May 2016, Mawingu Networks indicated that NetHope-donated solar equipment had been partially deployed, with 45 panels, 61 batteries, and 15 charge controllers integrated. Mawingu also reported that 9903 users (5118 men, 4785 women) were receiving broadband services on its network via Wi-Fi nodes located at schools, local government facilities, health clinics, a local library, small & medium enterprises, and retail outlets.

Over the course of its involvement, NetHope's early support of Mawingu Networks proved to be an early precursor for significant follow-on donor, partner, and investor support for the enterprise. Examples include:

- Donation of a 20Mbps backhaul link from Kenya operator Jamii Telecommunications (JTL).
- Donation and installation of a Microsoft Multipoint Server at Mawingu facilities from GreenBridge Computing.
- A grant of 20 TVWS radios from Adaptrum for additional network expansion.
- Continuing financial support from Microsoft, including a gift of a \$20,000 for "Spectrum Observatory," which was used to conduct a Laikipia County-wide spectrum logging exercise.
- \$1.3 million in equity investment in 2015 from INI, African Impact Ventures LLC (Vulcan Capital), and Microsoft.



After the end of NetHope's formal engagement, **Mawingu attracted an additional \$4.1 million loan** from the U.S. Overseas Private Investment Corporation **to support a national network rollout**, and the enterprise continues operations to this day.



2. Jamaica TVWS Education Pilot Project

November 2013 — May 2016

BACKGROUND

NetHope's Jamaica project sought to demonstrate the viability of TVWS technology as an enabler of rural broadband access. In addition to demonstrating commercial and technical aspects of TVWS network deployments, the activity sought to explore legal and regulatory frameworks that would allow the use of TVWS radio spectrum on a pilot basis, with a view towards more permanent regulations and the exploration of TVWS commercial feasibility.

The project sought to leverage innovative technology to support the "[Vision 2030 Jamaica National Development Plan](#)", which focused on expanding affordable broadband into rural communities and consistent with the vision set forth in the Broadband Partnership of the Americas.¹ Additional project objectives were to:

- Identify and implement a pilot TVWS project in a Latin American/Caribbean country where the government and local private sector were interested in partnering and working towards commercialization;
- Formalize a public private sector partnership via a formal MOU between USAID, NetHope, Microsoft, Jamaica Universal Services Fund with support from the Jamaica Minister of Science Technology and Energy, and the United States Ambassador to Jamaica;
- Stand up successful implementation and operation of up to 31 new internet sites in nine of 14 Jamaican parishes;
- Bring internet access to approximately 2000 people;

- Demonstrate a model for dynamic spectrum sharing, exhibiting reliable sustainable high throughput connections.

PROJECT IMPLEMENTATION

After exploratory visits in 2013 confirmed local interest and capacity, work on the project began in earnest in mid-2014, with NetHope convening a workshop for key stakeholders from the Government of Jamaica and the local private telecom sector. The workshop featured participants and presenters from the U.S. Federal Communications Commission, Microsoft, Government of Jamaican Universal Service Fund (USF), Spectrum Management Authority, and USAID/Jamaica. The workshop paved the way for preliminary government approvals to pursue the pilot, and the project was formally launched in early 2015 at a public signing of a Memorandum of Understanding between Government of Jamaica, Microsoft, NetHope, and USAID.

Over the course of the next few months, project partners achieved several critical milestones, including:

- NetHope, Microsoft, and the U.S. Federal Communications Commission (FCC) provided support and technical assistance to the Jamaica Spectrum Management Authority to draft and establish a temporary TVWS spectrum license for the pilot, support pilot implementation, and establish precedent for possible future commercial TVWS licensing frameworks;
- NetHope completed a formal competitive tender

¹ <https://www.usaid.gov/news-information/press-releases/usaid-and-fcc-support-broadband-partnership-americas>

² Dekal was later acquired by FLOW, who assumed responsibility for Dekal's key role as network operator and implementer.

process for project TWWS network equipment which resulted in procurement of network components from Adaptrum, Inc.;

- With input and support from NetHope, the Government of Jamaica selected Dekal Wireless as the local network partner for network deployment and post-pilot management.²



FIGURE 1: Map of FLOW Mobile Cellular Towers

Local staff technical training and network deployment began in mid-2015, with additional in-kind technical support provided by NetHope partner Cisco. By the end of 2015, 39 schools, libraries, and other community locations across the country had been outfitted with broadband equipment and provisioned with educational software and devices contributed through an agreement between Microsoft, the Jamaican USF, and the Jamaican Ministry of Education.

In terms of network architecture, the pilot network relied on nine FLOW Mobile cellular towers with existing broadband backhaul connectivity for siting and installation of Adaptrum TVWS radios, access points, and antennas. Figure 1 shows the nine FLOW towers spread across seven parishes that constituted the pilot’s footprint.

IMPACT

The table below shows the distribution of sites that were successfully connected to these nine TVWS base stations as part of the pilot activity.

In 2015 and early 2016, NetHope handed over responsibility for overall project management and network operations to the Government of Jamaica and FLOW Mobile. At the time of project handover, it was estimated that the network was serving 2,000 individual users. The Government of Jamaica and FLOW Mobile forecast that the network would add approximately 5,000 new rural users online over the following two years.

PARISH	Base Station Towers	Connected Health Centers	Connected Libraries	Connected Police Stations	Connected Schools
Westmoreland	2	1	1	1	3
St. James	1	1	1	1	2
Manchester	2	3	2	1	6
Clarendon	1	1	1	0	2
St. Ann	1	1	1	1	1
St. Mary	1	1	1	1	2
St. Catherine	1	1	0	1	1

FIGURE 2: Connected Locations in Jamaica

² Dekal was later acquired by FLOW, who assumed responsibility for Dekal’s key role as network operator and implementer.



3. Botswana TVWS Kolagano Health Project

March 2015 – June 2018

BACKGROUND

In early 2015, NetHope began collaboration with a group of public and private, domestic and international partners in Botswana (including Botswana Innovation Hub, Microsoft, and the University of Pennsylvania) to initiate a pilot project designed to promote rural health and ICT access - with a focus on clinical telemedicine applications. Additionally, the project sought to demonstrate a new, scalable, and replicable model for broadband internet development by establishing high-speed wireless links over TV White Space (TVWS) and to facilitate efforts to overcome persistent rural internet access barriers including high cost, poor quality of service, and limited network coverage.

PROJECT IMPLEMENTATION

Early project activity focused on coordination with local and international partners in project planning and the entry into an Memorandum of Understanding with project partner Microsoft, which envisioned NetHope support for expansion of the pilot project footprint. NetHope's support was designed to take the form of technical assistance and supply of TVWS network equipment for a "Phase III" network expansion (to build off of Phase I and II expansions, which were funded by non-USAID sources). In March 2015, the project (named "Kgologano", meaning "connected" in Tswana) was launched at a public ceremony in the town of Lobatse, where a ~4km wireless link utilizing TVWS technology was established between the local hospital and a satellite clinic as a demonstration showcase for an audience of government, industry, media, and general public stakeholders. Over the remainder of 2015, NetHope focused primarily on planning and participation in the development of a bespoke clinical telemedicine



Lobatse's Tsopeng Clinic

screening application (led by partners Vista Life Sciences and University of Pennsylvania), the extension of essential fiber backhaul facilities to initial phase hub sites, and the planning for integration of telemedicine techniques into existing clinical workflow via training at pilot sites.

In early 2016, the "Phase I" pilot at Lobatse's Tsopeng Clinic was brought into full-service, with network and devices being deployed to support cervical cancer screening services (via photographic and video image transfer) and delivery of remote health specialist support via video teleconference links between Lobatse's Athlone hospital and the Tsopeng clinic.

With the rollout of the Tsopeng site, preparation and planning for subsequent expansion phases began to accelerate. At "Phase II" sites near Francistown and Maun, work focused on the incorporation of project-supplied end-user devices (including smart phones,

laptops, TV screens/monitors, and application servers). NetHope increased its effort in support of the “Phase III” network expansion planning, which envisioned to network extension beyond an initial 10 pilot sites to additional rural clinics and schools. In anticipation of Phase III, NetHope completed the purchase of Adaptrum TVWS equipment via a competitive tender process and transferred ownership of the equipment to the Botswana Innovation Hub, the local project coordinator responsible for deployment. Over the course of the ensuing months, pilot sites were rolled out at numerous Phase II locations in Maun and Francistown, including:



Maun

- Letsholathebe II Memorial Hospital
- Moeti Clinic
- Boseja Clinic
- Maun Clinic
- Sedie Clinic
- Maun General Clinic

Francistown

- Nyangabwe Hospital
- Donga Clinic

At these sites, the range of telemedicine-supported services expanded to include HIV screenings and consultations, adult and pediatric care, tuberculosis screenings and consultations, and internal medicine consultations. Planning for the Phase III expansion also proceeded through 2016 and 2017, with agreement reached with the Ministry of Education and Skills Development for an initial pilot at three schools in Lobatse and further expansion to additional health, education, and community development initiatives (community information centers) in eight additional remote areas.

As this planning progressed, several complications associated with the Phase I and II cloud networking infrastructure arose, delaying pilot operations and stalling the pilot rollout schedule. To add to complications,

the trial license for operation using TVWS spectrum lapsed due to these delays, and BOCRA (the Botswana Communications Regulatory Authority) put the extension of the license into an indefinite delay. A multilateral effort put forth by project partners, including Microsoft, to renew the trial license (or to put into place more permanent TVWS regulations that would allow for the continuation of the trial) was stymied by lack of will and clarity within the Government of Botswana over issuing TVWS license frameworks that would allow the project to proceed. At the end of the Botswana Innovation Hub’s reporting, discussions regarding license extension had not yet yielded any progress, and the NetHope-supplied equipment remained in the possession of Botswana Innovation Hub in Gaborone.

IMPACTS AND LESSONS LEARNED

While the planned Phase III efforts did not materialize during the NetHope period of performance, the Kgolagano Project pilots provided useful insights into the opportunities and challenges associated with rural telehealth service delivery using TVWS technology. The project’s local ISP partner was able to successfully integrate TVWS hardware into existing broadband networks and deliver signals effectively in line with the technical specifications that the technology’s proponents had asserted. Likewise, project-developed applications designed for clinical end-use proved capable and appropriate tools in caregiving. The clinics that participated in Phase I and II were able to deliver health services at a distance for several months. That said, challenges in scaling cloud-based health database infrastructure proved to be a considerable barrier to pilot development, and prolonged efforts to troubleshoot led to implementation delays that then ran afoul of regulatory uncertainty and bureaucratic infighting. In this sense, Project Kgolagano did not meet its overall potential in terms of impact, but findings from the effort pointed towards potential future successes.



4. Malawi C3 TVWS Network Assessment

September 2016 – July 2017

BACKGROUND

In 2016-2017, NetHope conducted a series of assessments to explore possible support of a rural wireless ISP startup enterprise that envisioned using TVWS technology to support rural health objectives in Malawi. At that time, Microsoft, through grant funding under its Affordable Access Initiative, had partnered with C3, a Malawi-based company committed to deploying a TV White Space (TVWS) network for affordable internet and telephone services in underserved rural areas, as well as e-learning, e-government, and e-health solutions. At the time of NetHope's engagement, the investment partnership had already established provisions to complete funding of the first phase of C3's national broadband build-out plan and was exploring additional funding for phases 2-4 to achieve full-scale nationwide scope. Given the potential benefits to USAID implementing partners and NetHope members with presence in rural Malawi, an effort to more closely examine potential USAID support for C3's expansion efforts was developed and implemented.

PROJECT IMPLEMENTATION

The assessment began with a September 2016 desk review that recapped the overall state of internet connectivity in Malawi. An online survey of large NGOs in-country (primarily NetHope members) proved to be a valuable sample snapshot of current conditions. Twenty-two Malawi-based NetHope member organizations responded to the online survey, and virtually all reported that poor internet quality was adversely impacting the ability to deliver on their mission and programs.

In September/October 2016, NetHope staff, along with USAID and Microsoft, followed up with a fact-finding

mission in Malawi. The purpose of the mission was to:

- 1) validate assumptions made based on desk research;
- 2) engage with the Government of Malawi Ministry of Health (MOH);
- 3) understand the needs of NGOs working in Malawi, and
- 4) meet with potential funders to understand their needs and calibrate their willingness to co-fund the national broadband buildout.

The effort yielded a number of valuable insights regarding the extreme challenges faced by the NGO community and other stakeholders in securing reliable, cost-effective connectivity, especially in rural and peri-urban settings. The team met with NGO health staff to better understand common data flows, gaps, and patterns information transfer, as well as the limitations that come from poor or nonexistent internet access.

The assessment team concluded that improved affordable, reliable, high speed internet access across Malawi would benefit donors, the Ministry of Health, NetHope Member NGOs, and other NGOs, strengthening the health system and improving service delivery. The team further recommended that the Ministry of Health incorporate affordable internet accessibility via a nationwide broadband build-out into the new National Health Sector Strategic Plan to increase funding opportunities aligned with national strategy. Finally, the team indicated that there was a need to conduct additional due diligence on the development of C3 internet capacity, coverage, and quality service. In addition, it suggested that a concept note and proposal for USAID and other potential donors should be developed to secure co-funding for the national

broadband buildout and priority health information system enhancements. In this concept note, NGO members of NetHope and non-member offices and sites would be included for broadband deployment planning with C3.

To build on these findings, NetHope conducted follow-up an assessment in July 2017. The goal of this assessment was to conduct initial due diligence on C3 to specifically:

1. Meet and interview C3's management team.
2. Explore all aspects of the business through in-depth interviews and document review.
3. Understand, encourage, discourage, or challenge strategic and operational approaches.
4. Identify key risks and potential weaknesses for the business.
5. Determine an overall value for the venture, risk adjusted, to include both social and economic impact.

Based on initial discussions with C3 management, in-depth review of C3's strategy and operations, comprehensive technical analysis, extensive analysis and assessment of the Malawi market, discussions with key industry leaders in Malawi, and discussions with customers in Malawi, the assessment concluded that C3 was in an ideal and enviable position in the Malawi ISP market and seemed well positioned to deliver on their goal and objective of building a Malawian national ISP. Further, the assessment scored C3 along several assessment criteria (including, team, operations, corporate governance, financial, risk, and future potential) and identified several recommendations for improved performance.

At the end of the due diligence exercise, project partners opted not to invest further program resources in the enterprise.





5. Indonesia TVWS Trials

February 2014 – March 2015

BACKGROUND AND OBJECTIVES

Recognizing significant challenges in rural access, the Government of Indonesia's 2015-2019 Indonesia Broadband Plan (IBP) included as one of its flagship activities a focus on investigating new classes of technologies that could provide terrestrial wireless broadband connectivity to rural areas and enable the IBP to better meet its usage and affordability targets. Under the auspices of the IBP and with the support of NetHope, Microsoft, Hitachi, the Government of Japan, and local internet service provider (ISP) Jogja Media Net (JMN), the Indonesia Ministry of Communications and Information Technology (MCIT) set out to conduct a pilot TV white space (TVWS) deployment to evaluate the technology's capabilities and potential as a rural access solution. The pilot coincided with a partner initiative of MCIT to consider TVWS' legal and regulatory implications.

PROJECT IMPLEMENTATION

The technical evaluation of TVWS technology took place in the Yogyakarta region of Indonesia between early 2014 and March 2015 and involved three phases. In the first two phases, radio performance was tested in non-deployed, controlled environments. First, JMN conducted laboratory tests on the radios to ensure functionality and test for interference. Second, the evaluation team conducted a test for range. A Hitachi radio was mounted at JMN's Godean base station, and a smaller Hitachi Wireless Regional Access Network (WRAN) radio was mounted to the roof of a car. The car drove away from the fixed position radio and determined the maximum distance at which a connection could be maintained. In the third phase, two trial links using equipment from separate equipment providers were

established, and each was shared between user groups. Rural terrestrial wireless broadband connectivity via TVWS was subsequently provided to a school, a health clinic, a public internet center, and a small agribusiness. Using these links (which were deployed, utilized, and analyzed over a five-month period), the evaluation team conducted numerous tests to measure technical performance, applied key performance metrics to determine parameters of economic viability and cost effectiveness for an operator to install as part of their network, and described the social and economic impact of the links where they were established.

FINDINGS AND IMPACT

The evaluations and pilot deployment yielded several useful findings. Overall, evaluators determined that TVWS would be a facilitative technology for reaching IBP targets for rural connectivity. The evaluation of technical feasibility showed that both links offered the throughputs necessary (8.5 to 9 Mbps) at a range of 12.7 kilometers, making the technology appropriate for use as distribution networks, as well as local access networks in certain rural areas. The links performed within their proscribed specifications, creating no interference in adjacent radio frequency bands.

The financial evaluation proved the ability of TVWS network architectures to support achievement of IBP targets while maintaining sufficient financial flows to the network operator. The pilot assessed financial impacts in three distinct use cases (agribusiness, education, and health) and demonstrated significant positive economic returns for the broadband links at each enterprise type.

Finally, workshops to review trial findings were held to explore the legal and regulatory implications of the trials outlined global practices, establish the framework

within which regulatory options would be discussed in Indonesia, and advance the idea of implementing regulatory regimes to accommodate TVWS deployments.

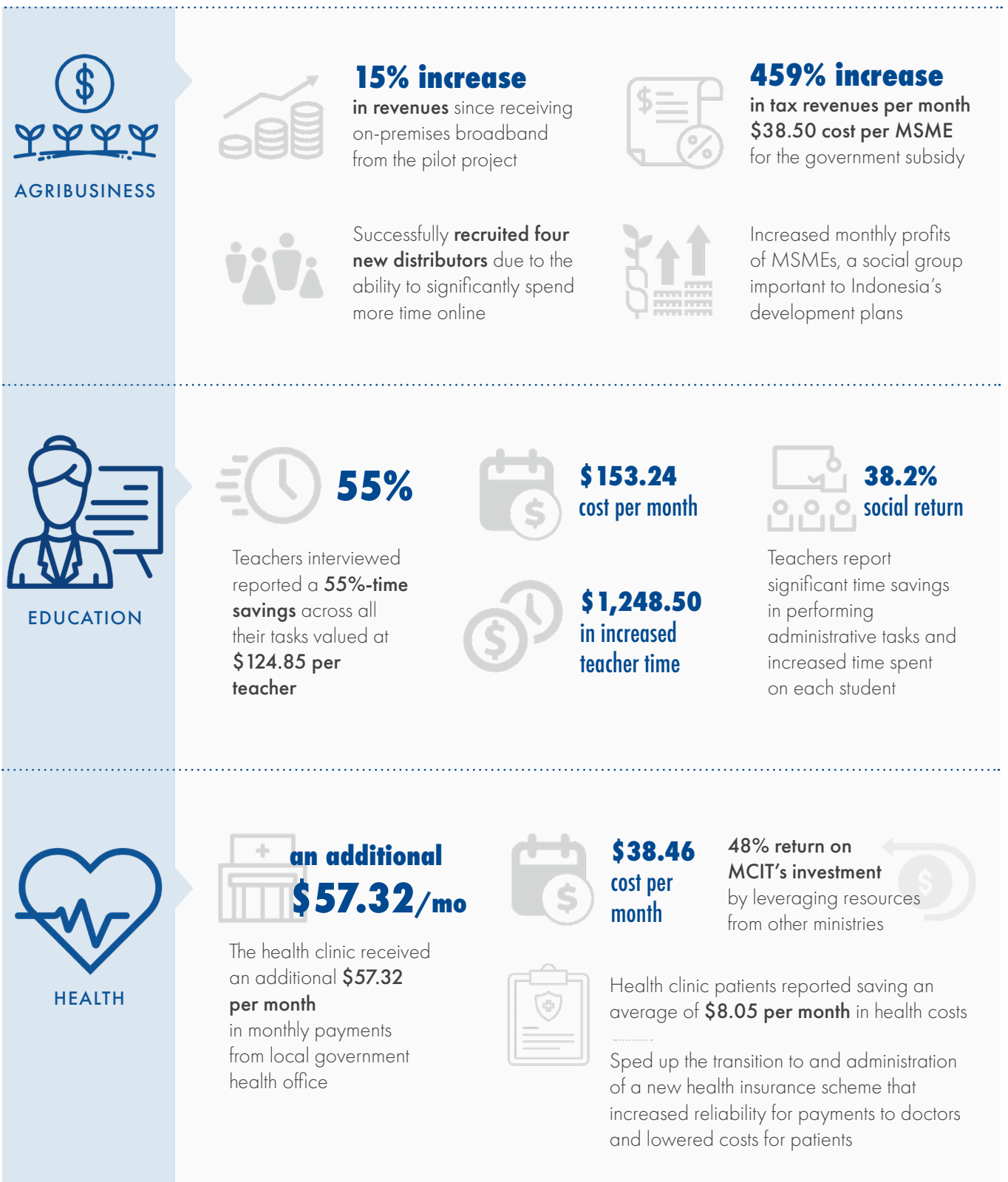


FIGURE 1: Financial, Economic, and Social Impact of TVWS Pilot Project

WHAT'S NEXT: TV White Space, Spectrum Innovation, and the Future of Access

By Paul Rowney, Technical Director, Virtual Technology Services Namibia

*"The transformational impact of broadband on people's lives and global economies is no longer questionable; the remaining challenge is to extend these obvious benefits to the majority of the global citizens and allow them unleash their creative potential to fully integrate in the information driven global economy. This will require new frameworks for global cooperation in areas of investment, research, and technology. The Broadband Commission for Digital Development will work to realize this potential."*¹

- Paul Kagame, President of Rwanda at the 2010 UN Broadband Commission for Digital Development

OVERVIEW

Challenges and Opportunities

In 2010, at the launch of the UN Broadband Commission for Digital Development, Rwandan President Paul Kagame spoke of the power of broadband and its ability to transform economies and human lives. The same year, the International Telecommunication Union's (ITU) development bureau noted in a widely-circulated technical guideline that, *"The transition from analog to digital broadcasting can create great opportunities for the provision of ICT applications and multimedia services including the higher quality of video and interactivity. It will also contribute to the efficient use of spectrum*

*and pave the way for "digital dividends," whereby the released spectrum can be used for promoting wireless broadband communications."*²

By the time, these proclamations were formally issued, the practical work of developing technology solutions designed to both address the challenge and to seize the opportunity had already begun. As early as 2009, Microsoft had initiated one of the world's first trials of an innovative wireless broadband technology on its sprawling campus in Redmond, Washington.³

TVWS as a Solution

This technology, often referred to as TV White Space (TVWS), sought to deliver broadband data over the unused portions of radio spectrum (or *white spaces*) between digital TV channels that were made available due to efficiency gains achieved through the global digitization of television services. Often referred to as a radio spectrum equivalent of prime *beachfront* property, the TV frequencies used to deliver broadband services enable transmission over particularly long distance and non-line-of-sight data links. According to the theory, such physical characteristics, combined with innovative, intelligent radio signal processing technologies and *light-touch* spectrum access regulations, could enable simple broadband network architectures and low-cost infrastructure deployment of wireless data networks, especially in rural, sparsely populated and/or remote areas where low-cost, last-mile broadband infrastructure

¹ Broadband Commission for Digital Development. (2010, 05 10). Goodwill Ambassadors. Retrieved from UNESCO: http://www.unesco.org/new/en/goodwill-ambassadors/news-single-view/news/itu_and_unesco_announce_top_level_global_broadband_commissio/

² Walop, Peter; Doeven, Jan; Hwang, Gu-Yean. (2010, May). *Guidelines for the transition from analogue to digital broadcasting*. Retrieved from International Telecommunication Union Web site: <https://www.itu.int/pub/D-HDB-GUIDELINES.01-2010/en>

³ Microsoft, "Whitespace database – our story", <http://whitespaces.microsoftspectrum.com/>

must meet the metrics of rural affordability and accessibility to be viable.

The emergence of TVWS technology is one of several recent examples of innovation and evolution in the radio spectrum space. As detailed in this report, NetHope’s work has made significant contributions to this process. It is therefore appropriate, at the end of this decade-long engagement, to reflect on the broader context of these innovations and take stock of the status of connectivity and consider implications for future development.

Global Connectivity is Still a Work in Progress

A decade later, the urgent proclamations outlined in 2010 still remain relevant. As noted by the Broadband Commission in its 2019 state of broadband report, “Broadband connectivity underpins national efforts to develop knowledge economies, fostering digital transformation in government services and digital transitions across all sectors, expanding opportunities for enterprises, and providing greater value for citizens and consumers.”⁴ This is a clear indication that the precepts that drove the initial development of TVWS and other dynamic spectrum approaches remain acute to this day, and widespread recognition of the importance of connectivity remains strong.⁵

That said, there are still significant gaps. In 2018, the ITU estimated that 51.3% of the world’s population was online. While this figure represents a massive achievement after years of effort, it is accompanied by sobering insights about future development. As noted by the Broadband Commission, “Fifty years on, the internet’s growth is maturing. Hundreds of millions of new users still are coming online every year, but overall growth is slowing, both as a function of the large existing user base and because of significant challenges in reaching those not yet connected.”⁶

⁴ <https://broadbandcommission.org/Documents/StateofBroadband19.pdf>

⁵ In fact, there is emerging consensus that digital inclusion is a matter of human rights. See United Nations Human Rights Council (resolution A/HRC/20/L.13, 2012).

⁶ Broadband Commission, “The State of Broadband: Broadband for Sustainable Development,” Sep 2019

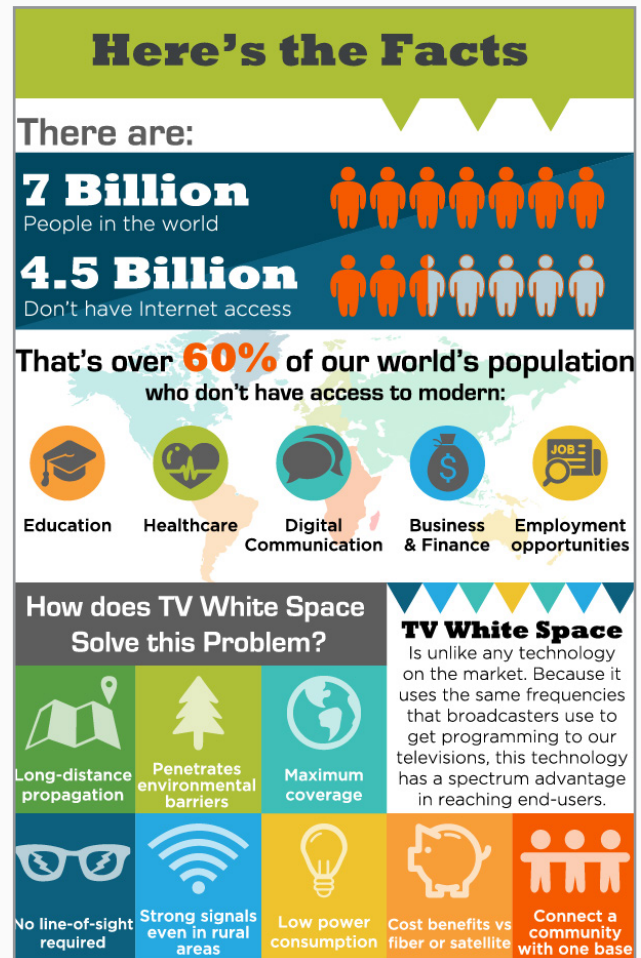


FIGURE 1. Source: Carlson Wireless Technologies.

There is a growing recognition that the challenges of connecting the remaining 48% of the population – many of whom are from the least developed and developing countries – will require much greater commitment to innovative approaches to business models, technology, and sector management. In this new paradigm of digital inclusion, frameworks foreshadowed in the last decade’s evolution of approaches like TVWS technology – and even TVWS deployments themselves - will become ever more important. That said, the challenge of connectivity is no longer simply a matter of extending infrastructure into remote areas. A key reason that many remain unconnected is that internet subscriptions and devices are often unaffordable to the unserved. Furthermore,

large portions of the unserved lack the basics of digital literacy.⁷

So while demand-side issues will persist as key challenges, supply-side factors are also likely to require a shift in approach. It is unlikely that connectivity challenges will be solved through the traditional business models of established, large-scale mobile network operators alone. It will require innovative and new business and regulatory models as well as a hybrid of telecommunication technologies where TVWS is viewed as an important technology for rural connectivity and Dynamic Spectrum Access is expected to unlock unused spectrum for licenced exempt or lightly licenced rural use.

CURRENT STATUS

While the challenge of global connectivity remains and shifts in terms of complexity, what does the recent experience with TVWS and more recent developments in the dynamic spectrum space suggest about current and future potential developments?

While many developing countries have abundant spectrum availability in television and other broadband-friendly radio spectrum bands (especially in rural areas) and technical and commercial trials of TVWS have repeatedly demonstrated promise, the uptake of TVWS networks has been slow and, in some regions, virtually non-existent.

In the early days of TVWS, advocates had hoped for a lightly regulated approach to TVWS utilization guidelines that resembled a technological update of those that helped fuel massive innovation and deployment in unlicensed Wi-Fi bands. Descriptions of TVWS as an incipient *super Wi-Fi* technology that would unleash massive innovation in closing the digital divide were common. This, however, was not to be, as many key hurdles to implementation were commonly underestimated. For example, enabling

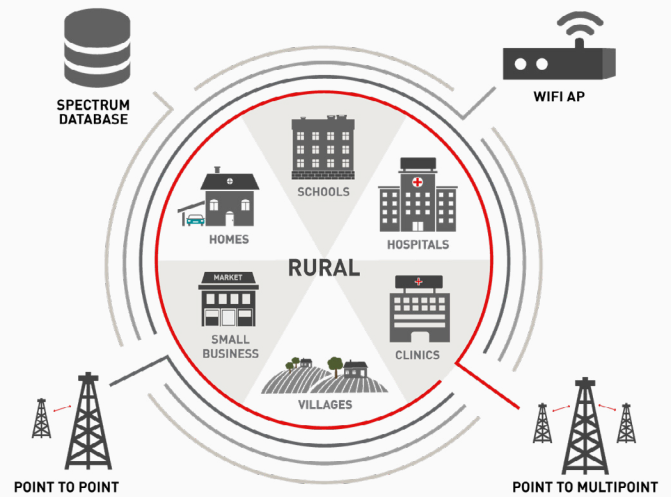


FIGURE 2: TV White Space Network Architecture

regulations in many country contexts explicitly call for the implementation of a comprehensive geo-location databases to map the use of spectrum by the licenced television broadcasters and determine channel availability. In this framework, a White Space Device (WSD) would be required to reference the database for permission before transmitting. The inherent complexity of establishing these systems, even in developed-country settings, has complicated the progress of smaller and less financially equipped regulators. Even as these countries would likely benefit most from TVWS, many have either chosen to focus their resources on other key priorities or have progressed more slowly than anticipated with the limited resources available.

Consequently, this lack of regulatory guidance and dearth of implementation models has largely limited TVWS to pilots and trials and has impeded the full realization of the technology. For example, the Communications Authority of Kenya (CAK) has yet to finalise its regulations, despite seven years of deliberations. Similarly, since the first TVWS trials that took place in the Eastern Cape province of South Africa in 2012, the regulator has yet to conclude its regulatory proceeding.

⁷ Clement, J. (2020, July 8). *Reasons for global offline population aged 22 to 36 years have never used the internet as of February 2020*. Retrieved from Statista Website: <https://www.statista.com/statistics/1131558/reasons-offline-population-worldwide-never-internet/>

LOOKING FORWARD

Evolution of the TVWS Model

There are, however, signs of progress in some countries. Kenya and Nigeria are expected to finalise their regulations in 2020, and South Africa has set April 2021 for the commencement of its Regulations of Use of Television White Spaces 2018.⁸

Even as regulatory barriers are still emerging, the efforts to refine the economic and business case of TVWS have also continued. For example, in 2019, the U.S. Trade and Development Agency entered into an agreement with the Wireless Access Providers Association of South Africa (WAPA) to fund pilots of TVWS networks in three provinces, providing pre-paid internet services to between 1,500 and 3,000 low-income subscribers and delivering a business and finance plan for the scaled deployment of TVWS networks that met the affordability metrics stated in the South African access policies.

The recent product enhancements of TVWS technology has also strengthened its position as a technology of choice for last-mile and rural connectivity. Building on early first-generation equipment, such as that used in the NetHope trials, the emergence of new-generation equipment supporting channel expansion, channel bonding, GPS sync, MIMO, and more have resulted in lower costs and higher speeds.

COVID-19 and Spectrum Policy

Impacts of the COVID-19 pandemic have further highlighted the negative effects of a deeply rooted digital divide and even further complicated the tall task of connecting the *bottom 50%*. For example, with face-to-face learning at schools suspended due to the COVID-19 pandemic, students with access to broadband services were able to continue their education through an online

learning process, while those without internet access were denied access to their education. In the health sector, social distancing increased the use and adoption of telehealth-based care services, locking out those without internet access from using these services. These examples illustrate the enhanced role of connectivity in the COVID-19 era in which telemedicine and e-learning are no longer a luxury but a crucial tool for development. They also further amplify the urgency of innovative spectrum management approaches and related low-cost and innovative technologies such as TVWS. Early signs of this urgency finally being translated into policy have begun to emerge. In South Africa, for example, telecom regulator ICASA has authorised the temporary use of TVWS as part of its national disaster response.⁹

Pathways to Spectrum Innovation

Clearly, to connect and enable the next few billion people, new approaches will be required, and these approaches will necessarily include highly adaptive approaches to affordability and what is now being commonly referred to as *meaningful connectivity*. But what principles might guide this development? Recent experience suggests that there are several approaches to spectrum policy and management that may show significant promise. These include:

- **Dynamic Spectrum Access** makes previously unavailable but under or unused spectrum available for re-use, improving spectral efficiency.
- **Light Licencing** regimes for community network operators enables a simple licencing process without cost for the often smaller and less resourced rural network entrepreneurs.
- **Ease of Access** to the unused portions of spectrum for last-mile and rural operators, granting licenced exempt secondary use rights to the spectrum.

⁸ Independent Communications Authority of South Africa. (2020, August 17). *Commencement Date of the Regulations on the Use of Television White Spaces, 2018*. Retrieved from ICASA Web site: <https://www.icasa.org.za/pages/notices>

⁹ Independent Communications Authority of South Africa. (2020, April 17). *Temporary Radio Frequency Spectrum Issued to Qualifying Applicants in an Effort to Deal with COVID-19 Communication Challenges*. Retrieved from ICASA Web site: <https://www.icasa.org.za/news/2020/temporary-radio-frequency-spectrum-issued-to-qualifying-applicants-in-an-effort-to-deal-with-covid-19-communication-challenges>

- **Open Community GSM** frameworks allow community operators access to GSM spectrum (e.g. 900 MHz) on secondary and unlicensed bases for rural mobile services in unserved areas.
- **TV White Space** on an unlicensed or lightly licenced basis, unlocking the digital potential of the TV bands (e.g., long-range, non-line of sight links) for last-mile and rural broadband.
- **Cognitive Radios** that can dynamically access unused portions of spectrum, detecting channels that are in use and optimizing the use of the available spectrum while minimizing interference to other users.
- Increased **Public Wi-Fi** and connected libraries, particularly in unserved and underserved areas.

Additional Considerations

Even as innovation in the spectrum space evolves, there are several additional technologies and paradigms that will influence the future of access and the strategies and approaches that sector managers and service providers take in coming years. These include:

5G – With the global expansion of 5G networks, the promise of gigabit speeds, low latency, and the ability to connect everything to everyone, some assert that 5G will solve the rural broadband gap. While 5G might play a role, more so in developed countries, 5G has a limited range, requires new 5G-capable devices, and comes at a significant cost, which does not at this time meet the economics of last-mile and rural connectivity. There is also a risk, at least in some countries, of a possible broadening of the digital divide by shifting the focus of already scarce resources toward 5G implementation, regulation, and spectrum management.

LEO Satellites – High throughput Low Earth Orbital (LEO) satellites are raising the profile of satellite technology, dismissed in the past for its low bandwidth, high latency, and high cost. LEO satellites have been touted as providing gigabyte speeds with low latency at

a much lower cost. The role that LEO satellites might play in bridging the digital divide has yet to be determined.

Google Loon – Google’s innovative Loon project uses giant balloons equipped with solar powered 3G or 4G equipment that beam mobile signals to the ground. With more than 30 of these Loon balloons currently in operation in Kenya, the approach is starting to prove the merits of thinking outside of the box.

Community Networks – The role of the community-based network in bridging the digital divide should not be understated. A community network exists to support the community where it operates and where the driving forces behind the networks are often trusted and valued members of the community. They live and understand the impact of not being connected, they are willing to invest their time and energy to build networks, and they are vested in developing digital capacity and literacy within their communities. They also often have access to low-cost and innovative technology such as Libre Router¹⁰ and Open Cellular¹¹ and have the potential to serve as ideal testbeds for new approaches to intelligent networking and spectrum innovation.

CONCLUSION

The wide variety in these emerging trends suggests that emerging approaches to connectivity will not rely on a single technology or regulatory intervention that will connect and enable the next waves of connectivity expansion. Rather, an ecosystem approach will mark future efforts. It will be vitally important to draw from the lessons of the past decade of experience in order to leverage a range of available wireless technologies from TV White Space to mmWave and begin to set the stage for future “fibre to the village” scenarios. This will require the combined resources and collaboration of governments, regulators, mobile network operators, wireless internet service providers, and community network operators. Put bluntly, it will require a new way of thinking and a new way of doing business.

¹⁰ Additional information available at <https://librerouter.org/>.

¹¹ Additional information available at <https://connectivity.fb.com/opencellular/>.



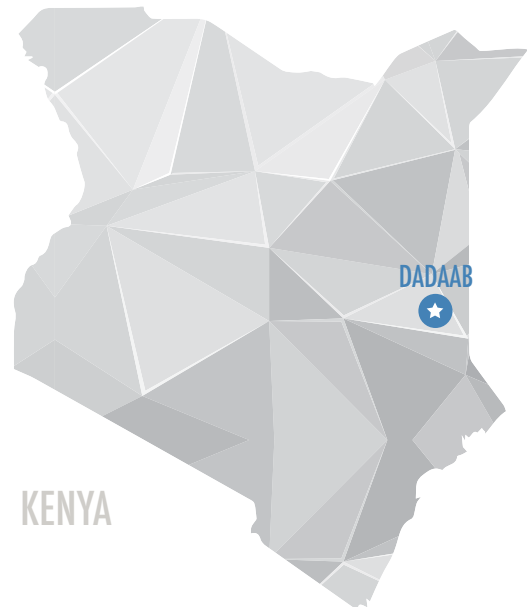
6. Dadaab Refugee Camp Connectivity

August 2011 — February 2014

BACKGROUND

An unprecedented drought and famine across Somalia, coupled with the long-standing civil war, resulted in a massive influx of refugees to Dadaab, Kenya during the summer of 2011 and throughout 2012. During this time, the refugee camp's population spiked from 300,000 to well over 500,000, resulting in a need for humanitarian organizations to quickly ramp up operations. As thousands of refugees crossed the border from Somalia, the number of response agencies and humanitarian workers increased, expanding inter-organizational information sharing and scalability requirements. Given that Dadaab grew to over five times the number of refugees it was originally designed for, there were infrastructure inadequacies and essential service capacity and logistical challenges, all of which could be partially addressed by better connectivity.

Recognizing this critical need, over 16 aid organizations came together behind an initiative by NetHope to deliver high-speed, low-cost internet access via an innovative and replicable network model. With the successful implementation of DadaabNet, aid agencies in Dadaab were provided with the reliable access needed to improve operations and save lives. The high-speed local area network enabled shared resources, collaborative communications and response efforts, and an array of workforce and community development programs. Access to DadaabNet was extended to refugee youth, presenting an invaluable empowering opportunity for education and vocational training and, for some, a first chance to connect to the outside world.



IMPLEMENTATION

In August 2011, USAID asked NetHope to develop a connectivity solution to address the camp's connectivity challenges and attract local service providers to initiate sustainable and scalable internet access. Utilizing funding from Cisco, USAID, Microsoft, and others, NetHope and networking partners Cisco and Inveneo were able to develop an innovative approach to bring affordable and reliable internet connectivity and build an infrastructure network throughout the camp.

Bringing broadband improvements to Dadaab started with early engagement of the local stakeholder community to co-create an innovative network architecture, business model, and support plan. Developing trusted relationships and delivering solution-specific practical training and localized engagements in the initial network implementation were key elements to ensure successful service introductions and ongoing operations.

Kenyan telecommunications companies Orange and Safaricom, with support from local technology experts Dimension Data and Setright, were enlisted as full partners early in the process and invited to participate in engineering and business plan peer review. Preferred reduced pricing and additional capacity based on aggregated NGO demand and projections were negotiated with Orange and Safaricom prior to the onset of the project. The project proceeded in two main phases.

Dadaab Phase 1

The first phase of the project's deployment focused on delivering service to humanitarian responding-agency compounds and offices that were clustered within a 2km radius of each other in a secured compound in the camp.

The primary goals of Phase 1 were to:

1. Increase available reliable and affordable terrestrial connectivity and choices of providers.
2. Establish a reliable high-speed local collaboration network (DadaabNet).

In March 2012, the DadaadNet high-speed local area network was launched, featuring integrated, affordable terrestrial internet services and VSAT failover configurations. Phase 1 network was able to:

- 1. Provide Multiple Broadband Services to the Dadaab Refugee Camp.** The project increased the reliability of service to Dadaab by providing high-speed dual path, multi-vendor terrestrial connectivity with diversity and redundancy to enable mission critical applications and improve camp operations.
- 2. Reduce Internet Costs.** The project negotiated reductions in the cost of terrestrial connectivity by approximately \$500/month per Mb by partnering with both Orange and Safaricom to provide more diverse and reliable network connectivity and increase bandwidth capacity by 50Mb.



Dadaab grew to over five times the number of refugees it was designed for, leading to infrastructure inadequacies and essential service capacity and logistical challenges, which could be partially addressed by better connectivity.

- 3. Leverage Resources and Donations from Multiple Providers.** During the implementation, operations, and optimization periods, more than \$500,000 was invested in equipment and value-added engineering services for network design, training, local partner engagement, and technical support. The combination of additional in-kind and direct donations negotiated by NetHope enabled the technical and program management support needed to successfully complete, expand, and sustain the implementation.
- 4. Ensure Sustainability of Network.** The project's design enabled scalable capacity to ensure a reliable network and repeatable, innovative, and cost-effective last-mile architecture. This was done through the training of technically prequalified Orange and Dadaab information and communication technologies (ICT) staff in Inveneo technologies (Ubiquiti) and Cisco routing and switching configurations. Newly trained engineers were also included on the installation team side-by-side with Ubiquiti experts from Inveneo, local partner Setright, and Cisco's certified local technology partner Dimension Data (with remote configuration support from Cisco).
- 5. Accelerate Migration from VSAT to Terrestrial.** The network deployment enabled aid agencies to

transition mission critical applications from VSAT connections to more reliable and cost-effective terrestrial services, especially given commitments secured from Safaricom and Orange to maintain a 99.95% uptime and share regular performance reports.

- 6. Install DadaabNet High-Speed Configurations for 10 Agencies.** The network enabled better information and collaboration applications between humanitarian organizations including CARE, Catholic Relief Services, Kenya Red Cross, Lutheran World Federation, Norwegian Refugee Council (NRC), Oxfam, Save the Children, United Nations High Commissioner for Refugees (UNHCR), United Nations Children's Fund (UNICEF), and World Food Programme (WFP).

Dadaab Phase 2

Building on these successes, Dadaab Phase 2 was initiated in November 2012 as a partnership between NetHope, USAID, Cisco, and NRC, with local engineering support from Dimension Data, Setright, International Rescue Committee (Ubiquiti training), and the DadaabNet team.

The primary goals of Phase 2 were to:

1. Expand DadaabNet to five local community centers supporting education, medical programs, internet access, and youth related projects. This goal also included the implementation of value-added applications including Voice over Internet Protocol (VoIP), video conferencing, and file services to the target community center.
2. Optimize operations to improve network reliability, sustainability, and scalability by transitioning management to the DadaabNet team and internet service providers (ISPs) and developing metrics to evaluate the lasting impact and value of the project.

Phase 2 results included:

- 1. Extended Connection to Refugee Community and Provided Value-Added Services.** The network established connections to five Dadaab community centers and successfully installed VoIP and value-added services in six humanitarian agencies and two community centers. NetHope engaged Cisco Tactical Operations for VoIP video conferencing and network expansion design and local partners for technical support during the implementation phases.
- 2. Strengthened Security Protocols.** The team utilized Cisco camera-enabled VoIP technology to expand the network and enhance security. As a result, visiting staff was able to enter the humanitarian compound without going to the front gate, using video conferencing to verify guests and credentials.
- 3. Increased Network Capacity and Ensured Customer Satisfaction.** The deployment team ensured that capacity would keep pace with network support and expansion by training additional technically prequalified Dadaab ICT staff in appropriate networking technologies via a NetHope-developed training course in Nairobi. NetHope also supported operations and a positive customer experience by encouraging the exclusive assignment of an Orange customer service representative to the Dadaab link.
- 4. Supported Education Initiatives.** The deployment team enabled the launch of NRC distance learning programs in 2014 by deploying video controller equipment to three NRC Youth Education Pack (YEP) centers.
- 5. Leveraged Resources and Donations from Multiple Providers.** The locally trained DadaabNet engineering team collaborated to enable new applications and network installations and provided operations support based on the overall value of the network. This ongoing work was accomplished without any direct cost to the project. Local training

and engineering staff resources were leveraged to utilize the network and applications benefits in the YEP Dadaab community programs.

- 6. Established Indefinite Lifeline for DadaabNet.** The network buildout enabled increased service demand and ongoing network expansion and capacity building to proceed without additional funding and project support from NetHope. This was achieved through an agreement with Orange that sponsored training and equipment replenishment. In November 2013, the project team negotiated a reduction in 2014 bandwidth backhaul prices from \$260/Mb to \$190/Mb.

IMPACT

The Dadaab Refugee Camp Connectivity project was able to successfully bring high-speed internet to the largest refugee camp in Africa, serving more than 500,000 Somali refugees escaping drought and war. The project was able to connect hundreds of refugees to internet-based training and resources, skills, and knowledge needed for professional development and growth. Additionally, humanitarian agencies in Dadaab reported a 20-times reduction in recurring connectivity costs over VSAT links with greater reliability, redundancy, and resiliency. The project enabled local ownership, support, and future development of the Dadaab services by pre-qualifying and training local agency ICT staff to provide first-tier support and diagnostics, improving response time to service needs, and increasing the ICT talents of the local workforce. All of these factors accrued to the effort's future sustainability and impacts. Finally, the project provided a template for future replication in refugee communities worldwide.



With the successful implementation of DadaabNet, aid agencies in Dadaab were provided with the reliable access needed to improve operations and save lives.



7. Broadband Demand Aggregation

June 2016 – October 2019

BACKGROUND

Beginning in 2016, NetHope, the USAID Global Development Lab, and USAID/Uganda conducted a series of activities that sought to improve access to broadband telecommunications services in rural and underserved areas, with a specific goal of improving digital services among international NGOs and other USAID implementing partners.

Initiated in 2018, NetHope concluded a successful collaboration in late 2019 with stakeholders in Uganda to develop and implement a strategy that relied on coordination and collaboration with NGO partners to identify collective needs, to aggregate demand for services, and to leverage economies of scale with the service provider community to improve the economics of private sector rural broadband service delivery.

PROJECT IMPLEMENTATION – UGANDA

Activities that informed the strategy began in mid-2016, with discussion between NetHope, USAID/Washington and USAID/Uganda. In response to the Uganda Mission's desire to more aggressively leverage digital technologies to support an emerging Mission strategic plan, NetHope conducted an in-country market diffusion and affordability study of fixed and mobile broadband in Uganda. The assessment examined rural connectivity and access dynamics, with a targeted emphasis on in the context of the USAID Mission's program portfolio, most specifically the Feed the Future (FtF) program. Furthermore, the activity sought to assess and develop practical strategies to expand broadband affordably and effectively throughout the country, with a particular emphasis on the rural mobile segment.

Following this intervention, NetHope delivered assessment findings and recommendations to USAID audiences in Kampala and Washington. After a period of deliberation, the assessment's recommendation that NetHope and its partners develop and implement a *demand aggregation strategy* became the focus for follow-on activities. This strategy, which NetHope began actively implementing in 2017, was predicated on identifying, organizing, and aggregating demand for broadband internet access services to improve terms of connectivity (pricing, availability, and quality of service) for NetHope NGO members and USAID implementing partners.

At the same time as NetHope was ramping up its implementation of this strategy, it developed a comprehensive guide to document its approach. In March 2018, NetHope published *Better Connectivity, Better Programs: How to Implement a Broadband Demand Aggregation Program*.¹ Designed to inform USAID Mission personnel, NGO practitioners, and other development stakeholders seeking to more efficiently and deeply integrate digital services into their planning and implementation, the guide delves into an applied discussion of key steps and relevant considerations needed to carry out an effective demand aggregation strategy. The guide was strongly informed by the demand aggregation program that was being implemented in Uganda at the time of publication and did much to clarify thinking, understanding, development and application of the concept.

¹ www.usaid.gov/sites/default/files/documents/15396/Better_Connectivity_Better_Programs_April2018.pdf

An overview of the Guide was presented to the public in a session at the USAID Digital Development Forum in March 2018. In addition, the Guide was featured and introduced through a NetHope webinar which was attended by over 150 participants worldwide.

As the effort in Uganda continued, NetHope's outreach to its NGO membership yielded clear indications of urgent needs for improved and lower-cost connectivity access, especially in remote and rural areas. Members confirmed poor and unreliable service, marked by scarcity and high bandwidth costs, providing substantial detail and data. Many NGOs indicated that poor connectivity was a critical barrier to the use of digital platforms in their programs and operations. While such experiences were reported countrywide, consultations revealed that connectivity needs were particularly urgent in the West Nile region of northwest Uganda, where massive inflows of refugees from nearby conflict zones in South Sudan were straining the abilities of the NGO and humanitarian response communities to effectively deliver services.

After a series of negotiations with the broadband service provider community, NetHope signed an agreement with a major Ugandan mobile network operator (Airtel Uganda) in early 2018 that provided NetHope member NGOs and USAID implementing partners access to improved quality bandwidth at significantly discounted rates. Rates negotiated with Airtel represented approximately 50% price discount over Airtel's rates for fixed broadband services at NGO sites at the time. Notably, the arrangement with Airtel provided the NGO community in West Nile improved terms of access to recently-installed fiber backbone infrastructure that had been deployed through a partnership comprised of Airtel, BCS, and Facebook. An initial group of 10 NetHope NGO members in West Nile formed the critical mass required to initiate the Airtel arrangement. As an incentive, these NGOs received advanced Cisco Meraki LAN management equipment donated through NetHope's ongoing partnership with Cisco. With the

Airtel arrangement in place, NGO participation grew significantly over the subsequent year, as news of the Airtel deal spread and as existing supply contracts with lapsed and/or were transferred to the new pricing schedule.

PROJECT IMPLEMENTATION — MALAWI

Building on the successes achieved in the Uganda program, NetHope initiated a similar program in Malawi in 2019 designed to improve terms of connectivity for NGO partners with field operations in Malawi. Like the Uganda project, the Malawi project's strategy was to identify, quantify, organize, and aggregate NGO demand and to both coordinate and negotiate with broadband network operators in order to secure improved service at lower costs.

To achieve project goals, NetHope carried out extensive outreach and consultation during 2019 with local stakeholders, including broadband service providers, USAID implementing partners, NetHope member NGOs, and others. Activities included a thoroughgoing data collection effort, which was conducted locally by Malawian project staff using digital data collection tools and techniques that greatly benefitted from lessons learned in the Uganda process. This dataset became a valuable information resource, yielding key insights into NGO site broadband costs, link capacity/throughput, quality of service, satisfaction with vendors, and contract terms. In total, NetHope collected detailed data from nearly 30 organizations covering over 100 field sites across Malawi.

These data were shared with NGO IT staff in an in-person workshop, and data summaries and other key findings were disseminated among Malawi's six broadband network service providers. This data, along with additional insights gained from NGO staff, provided NetHope with a strong, credible, and specific basis for a negotiation on behalf of the NGO sector as a whole. As 2019 ended, NetHope had secured offers for discounted service from five of six network providers, all

of which represented significant improvements over existing NGO contract terms. In early 2020, however, broadband provider Telekom Networks Malawi (TNM) stepped forward with an aggressive improvement on its original offer, lowering its access price to \$80/Mbps/month to NetHope’s members and USAID implementing partner organizations. For most of NetHope’s member NGO, this represented a cost savings more than 50%. Over the course of the next several months, many of these NGOs initiated contracts with TNM for bandwidth services, and negotiations are anticipated to continue for months to come.

PROJECT IMPACT

At the end of the Uganda project, 13 NGOs had contracted for services with Airtel Uganda via the terms of the arrangement, with connectivity extended to 64 sites countrywide. Total network capacity for all Ugandan sites rose from 20Mbps/month at the beginning of the Airtel agreement to 305 Mbps/month one year later. Total projected cost savings for participating NGOs over the total life span of contracts signed during the period of performance totaled \$596,246.

NEGOTIATED PRICE OF BANDWIDTH (Mbps/mo.)

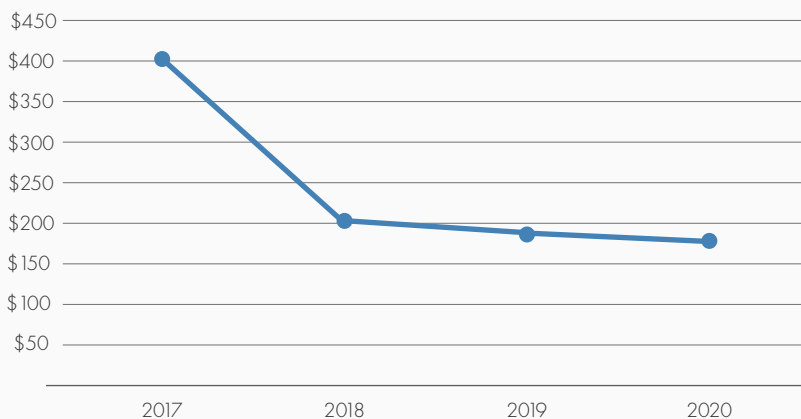


FIGURE 1: Negotiated Price of Bandwidth

In Malawi, seven NGOs signed contracts under the terms negotiated in the NetHope/TNM deal. At the time of this writing, program savings achieved for these NGOs has totaled \$123,108, and the future total value of NGO savings under existing and TNM contracts in the negotiation pipeline is estimated at \$305,008. Given that the terms of the deal will extend until February 2023 and that a number of NGOs are currently either actively negotiating with TNM for new service or awaiting expiration of existing contracts, it is likely that this number will increase substantially even after the end of the NetHope cooperative agreement.

NUMBER OF NGO SITES

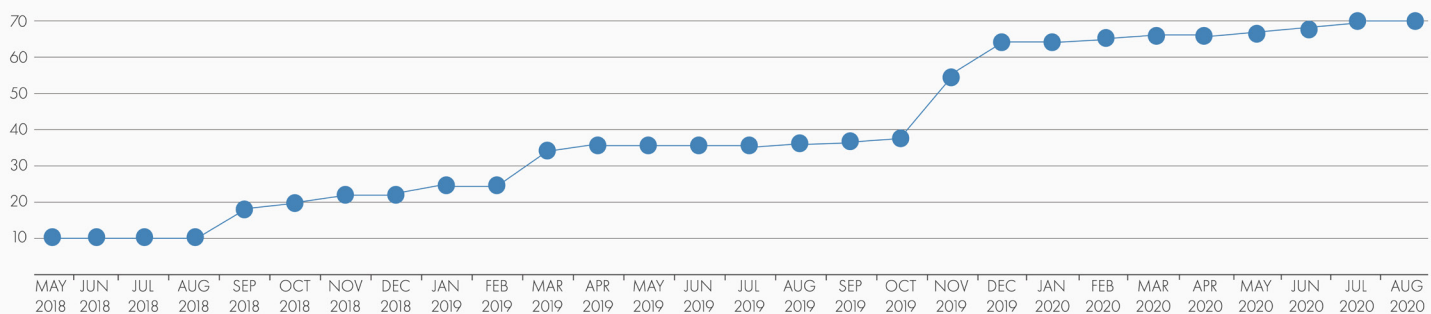


FIGURE 2: Number of NGO Sites

In addition to these quantitative gains, NGOs reported numerous qualitative benefits to the project, including:



The International Rescue Committee (IRC) indicated that improved connectivity has enhanced their ability to gather and analyze data for inclusion in donor reports. Like the Danish Refugee Council, the IRC also reported that enhanced connectivity has helped strengthen its Uganda office’s rollout of a global ERP system. The Uganda office is now seen as an early adopter of important technology within the organization. The IRC also reported that the improved connectivity has helped accelerate the use of tablet devices in field offices, allowing them to be more broadly used for M&E data collection.



Mercy Corps reported significant improvements to service in its Yumbe field office, with network uptime increasing from 56% to 83%. Mercy Corps also reported significant increases in data usage at their Yumbe office, with more rapid turnaround in data collection and analysis, as well as more robust information exchange with the country office.



The Danish Refugee Council (DRC) reported that expanded broadband connectivity improved its operations at a field site in the West Nile region of Uganda. The site was able to fully integrate into the DRC’s cloud-based, global enterprise resource planning (ERP) platform. Furthermore, improved connectivity allowed the office to better utilize monitoring and evaluation systems, strengthening analytical insights, and helping field staff communicate trends with greater speed and precision.



CARE reported significant improvements to the quality of broadband service in its Arua office, noting that there was a decline in technical support requests due to communication network failures.

CUMULATIVE NGO COST SAVINGS (with projections through April 2021)

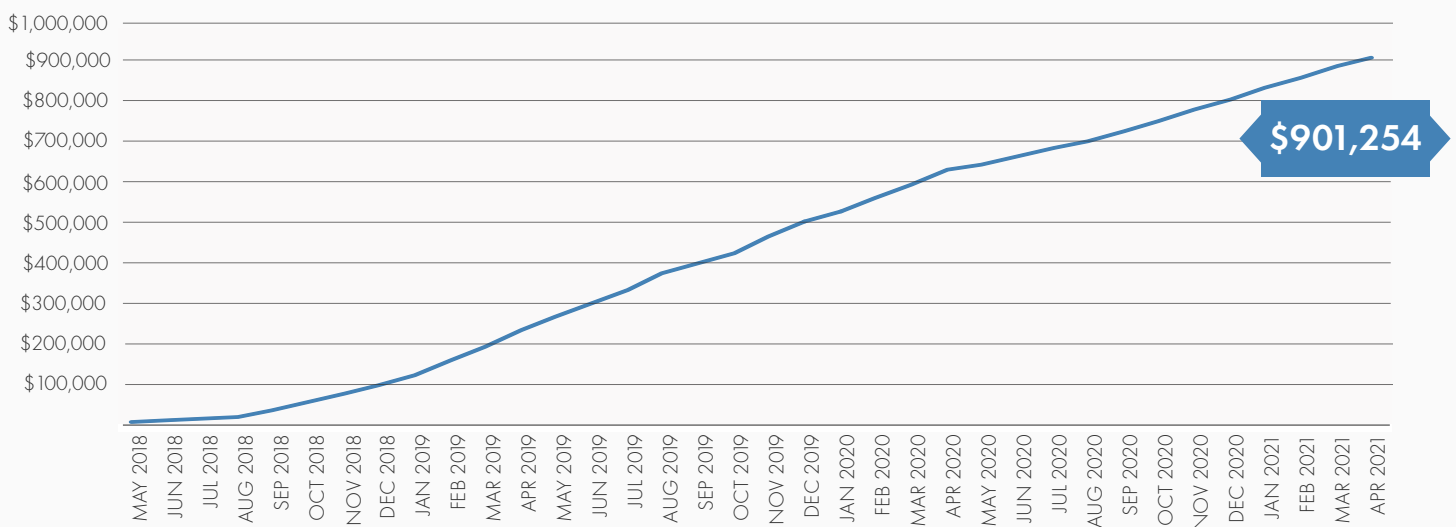


FIGURE 3: Cumulative NGO Cost Savings

Several NGOs suggested additional ways through which activity’s benefits would likely extend into the future, well beyond the life of the program. For example, several NGOs indicated that the successes achieved through the initiative had improved their ability to work collaboratively with broadband service providers to identify and co-develop value-driven solutions, more effectively assure their needs are met in this product development cycle, and negotiate better pricing and service quality. Even after the project’s conclusion, NGOs have continued to negotiate with providers, using discount pricing secured by the initiative as a *starting point* for new negotiations. In this sense, the Broadband Demand Aggregation initiative has helped establish a “new normal” for NGO broadband access in Uganda, Malawi, and beyond.



Network technicians installing broadband hardware at a field office of a USAID implementing partner in Uganda.



8. Lebanon Rural Broadband Project

October 2014 – September 2015

BACKGROUND

The Lebanon Rural Broadband project was initiated with the goal of developing a sustainable, scalable, and replicable technical and business model for low-cost rural broadband service delivery in high-cost, underserved areas. Specifically, its mission was to:

- Provide rural areas in Lebanon with internet connectivity through shared service with public schools.
- Create a school-focused, community-driven access platform for future programs, activities, and applications.
- Create a replicable model that involved relevant stakeholders (including private sector service providers) in creating and sustaining community internet connectivity in rural Lebanon.

To carry out the project, NetHope (in partnership with local association IJMA3) engaged community leaders and private sector internet service providers (ISPs) to design and deploy wireless internet access networks in two rural communities (Ghazza and Sebhel). The project fundamentally supported the populace of both communities through providing Wi-Fi internet connectivity to local secondary schools before and after school hours. The wireless network deployment in Ghazza covered approximately 80% of the village's populated area.

In carrying out the project, both municipalities made significant contributions to the project, donating the use of city facilities for antenna siting and providing community assessments for network design. Successful partnerships between the project's implementers were established with commercial ISP partners in both villages.



PROJECT IMPLEMENTATION

Early in the intervention, NetHope found that the whole area of Ghazza had been facing degrading internet connection, slower internet speeds, and over-usage because of the increasing population in the area due to Syrian refugees. According to the headmaster of the Ghazza school, the population of Ghazza was around 7,000 Lebanese at the time, compared to about 27,000 Syrian refugees who were current residents, which caused real problems regarding available resources. In Sebhel, 90% of school students lived within a 500-meter radius area surrounding the school. The headmaster explained that there was almost no IT support at the school.

NetHope worked on developing relationships with core project partners, including the Lebanon Ministry of Education and Higher Education (MEHE) and the Developing Rehabilitation Assistance to Schools & Teacher Improvement Program (D-RASATI2). Interaction with the Ministry facilitated selection and outreach to the two schools that served as critical network hubs.

TECHNICAL SOLUTION AND DESIGN

NetHope worked in parallel with different ICT private sector companies in Lebanon to provide the equipment and supplies needed for the project implementation. After reviewing different offers, NetHope selected a well-known Lebanese networking solution company (TeleTrade) to conduct network site assessments for both Ghazza and Sebhel and to design a technical solution that enabled the widespread broadcast of wireless internet signals to the community.

TeleTrade designed a solution to cover each of the Ghazza and Sebhel communities via the school sites. Several key factors were taken into consideration when the technical solution was designed, including feasibility, market availability, sustainability, and applicability, given the context of each of the two surveyed sites. The design included establishing access points and broadcasting units on the rooftops of each of the schools as well as in other areas as needed. The technical solution also included a complete connectivity administration tool that managed users of the network and had a wide range of control options such as tracing users' bandwidth and consumption, limiting/controlling bandwidth consumption, password sharing prevention, and monthly subscription management.

The network installation and testing began in Ghaza in March 2015, and the school and the community started receiving connectivity on April 30, 2015. During deployment, a number of revisions to the network architecture were implemented; for example, a network antenna installed on a local municipality building was relocated to the top of a water reservoir overseeing one of the villages. This adjustment improved network coverage of the populated area of the village and more efficient usage of network resources. In Sebhel, NetHope committed to providing internet service to other sites with maximum number of beneficiaries (schools, community centers, youth clubs, etc.). NetHope finalized the procurement of the hardware and installation for Sebhel, and installation was completed in all the project sites.

MOBILIZING PRIVATE SECTOR

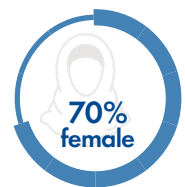
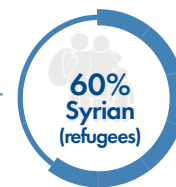
In parallel with site assessments, technical specifications, and solutions designing and development, NetHope focused on mobilizing the private sector to leverage contributions to support the project's activities and its sustainability. NetHope mapped private sector companies that were available in the two areas of Ghazza and Sebhel, as well as other private sector companies that were based in areas nearby, including banks, trading companies, and private enterprises. NetHope created a list of banks and other private sector companies and held meetings with their representatives and well as their CSR (corporate social responsibility) counterparts to discuss their interest in contributing to the project implementation. NetHope also reached out to small businesses in the areas who would be interested in having their name recognized locally through project sponsorship. Appropriate and affordable sponsorship packages were developed for these smaller businesses, considering that their financial capacity was much less than banks or other big companies. These included the naming of the wireless network (SSID) and marketing messages on user cards that carried login details and passwords that one must scratch to view.

ACCOMPLISHMENTS & IMPACT

The project in Ghazza acquired 520 users. Subscriber profiles indicated the following metrics:

320 students

200 non-student
community users



In Sebhel, the network successfully delivered connectivity to Rachel Edde Public School (Primary/Complementary): 230 students, 40 teachers; Assaad Sebaali Secondary Public School (Director Nadia Abi Nehme): 75 students, 15 teachers; and 2500 potential connections across the following sites: Sebhel Community Center, Sebhel Public Library, Sebhel Municipal Stadium, Sebhel Public Square, and the Sebhel Municipality Building.



9. Google City Link/Monrovia Fiber Loop

May 2015 – December 2019

BACKGROUND

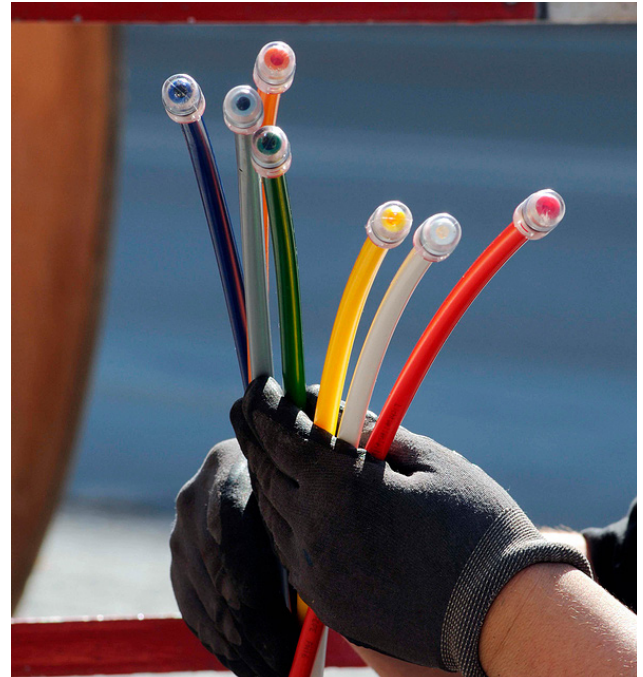
One of the key findings emanating from the May 2015 Liberia Broadband Technical Assessment (LBTA) was the significant disconnect between the robust broadband capacity available through the West Africa Submarine Cable Landing and the limited uptake of broadband connectivity by business, government, and individual consumers. While it was widely understood that a key part of the solution lay in the form of a high-speed fiber loop around metropolitan Monrovia, the design and execution of the loop were hamstrung by a lack of coordination among the multiple stakeholders, led by Libtelco, the former national telecom parastatal. Only Libtelco had authority to run fiber, and by 2015, only 17 kilometers of fiber had been laid, whereas preliminary designs called for a loop close to 200 kilometers.



The objective of the Monrovia Fiber Loop project was to identify an institutional structure that could build, own, and operate (BOO) a metro fiber network capable of delivering cost-based, reliable wholesale broadband to government, businesses, and institutions, and support that institution through the development stages and into financially sustainable provision of broadband.

PROJECT IMPLEMENTATION

Project implementation began during the LBTA, during which NetHope identified the need for improved access and use of broadband by government, businesses, non-profits, and individuals. NetHope noted that provision of high-speed fiber was the mandate of Libtelco, which was struggling to deliver high-speed access with



severe impacts on the national social and economic development needs of Liberia. NetHope further noted that best practices around the world suggested several institutional approaches that were capable of fulfilling the role of broadband fiber provider.

At the conclusion of the LBTA, the USAID Global Development Lab and NetHope recommended approaching Google to replicate its promising City Link program in Liberia. At that point, the Google-led City Link was rolling out metro fiber in Ghana, Uganda, and numerous U.S. cities, based on a consortium of stakeholders in each location to build, own, and operate robust, high-speed metro fiber loops. Two interdependent challenges were identified. First, it was necessary to convince Google to expand its City Link model to an additional country. Second, it was imperative that key Liberian stakeholders such as Libtelco,

the mobile operators, the Cable Consortium of Liberia/ CCL (the owner/operator of the cable landing station), the Ministry of Post and Telecoms (MoPT), and the Office of the Liberian President were convinced to structure and capitalize an independent institutional entity owned by multiple stakeholders and Google to execute the BOO scenario.

By June 2015, NetHope, USAID/Liberia, the Global Development Lab, and the White House approached Google, first reaching out from the White House and the Lab, then followed-up with numerous teleconferences and site visits to Google's headquarters. During these interactions, NetHope provided background on internet development in Liberia and Africa writ large, the potential applicability of the City Links model, and key risk factors and mitigation strategies. In parallel, NetHope made monthly trips to Liberia in support of the U.S. Embassy and USAID/Liberia's efforts to initiate dialogues with key stakeholders such as the Liberian presidency, Libtelco, mobile operators, and CCL regarding the potential impact of a City Link-style approach.

Google signaled its interest in late 2015, dispatching a team of experts to Liberia to explore the idea. Over the next eight months, through mid-2016, NetHope brokered an agreement from all stakeholders, including Google, the Government of Liberia, mobile operators, and USAID to launch a new institution to be called City Link/Liberia and owned in varying degrees by Google, the Liberian government, mobile operators, and the CCL. USAID/Liberia committed \$12 million as seed capital for the activity.

RESULTS

City Link/Liberia now operates as C-Squared Liberia, Google's consolidation of its Africa City Link programs. Through December 2019, it had installed around 180 kilometers of fiber around Monrovia, with 49 of 51 leading government institutions connecting to the fiber loop.

Two other NetHope projects in Liberia (detailed elsewhere in this report) served as significant contributors to the successful roll out of C-Squared Liberia. First stemmed from the Liberian Broadband Telecommunications Assessment which led to converting Libtelco into the Government's ISP, a useful and efficient application of the capabilities existing in the former telecom monopoly. Second, NetHope's Liberia eGovernment project delivered and installed equipment needed to take advantage of the new Monrovia Metro Fiber loop, followed by significant training to help staff take advantage of these new capabilities.

The NetHope C-Squared project served as an exemplary model of a public-private partnership and pointed to potential future collaborations. The Government of Liberia announced that it would seek to apply the C-Squared model to the rollout of fiber throughout the country, with the objective of high-speed fiber between Monrovia and each of its neighboring countries.



10. Liberia Research and Education Network Support

May 2015 – December 2018

BACKGROUND

As NetHope's work in Liberia to develop a revised National ICT Policy evolved, one area of high interest was the creation of a university-level research and education network. Early discussions of a Liberia Research and Education Network (LRREN) envisioned design and deployment of a network to boost research and education in the nation, to promote cooperation and collaboration between the academic and research communities' constituents, to enhance national economic development initiatives, and to connect to other regional and international research education networks.

PROJECT IMPLEMENTATION

Project implementation began during the May 2015 Liberia Broadband Technical Assessment (LBTA), during which NetHope convened a workshop to describe the potential of a broadband-based network for Liberian higher education institutions, linking them together and with research and education networks throughout Africa. The originating workshop explored the conceptual framework, organized principles, and potential next steps, and it was agreed to include the development of LRREN as key recommendation in the LBTA Final Report. Over the course of 2015-2016, NetHope nurtured an on-going dialogue between local stakeholders and the University of Liberia in the West and Central Africa Research and Education Network (WACREN). Over time, NetHope joined a series of discussions between the Liberian Ministry of Posts and Telecommunications, the University of Liberia, Digital Liberia e-Government Project (DLEG), USAID, and numerous tertiary institutions.

In December 2018, key local parties, including a large collection of local universities and colleges, finalized a

Memorandum of Understanding (MOU) to pave the way for the network.

OUTCOMES AND IMPACT

NetHope's contributions to the process that led to the establishment of the MOU helped establish key preconditions for USAID and DLEG financial and technical investments. These investments were essential in expediting the establishment of the LRREN and supported the deployment of a campus network for the University of Liberia (UL), the lead institution in LRREN implementation. In addition, these investments catalyzed an effort to connect all four campuses of the UL (Fendall, Capitol Hill, AM Dogliotti, and Sinje) and train and prepare staff at other Liberian institutions.

The LRREN formally launched April 2019, linking universities, schools, hospitals, and like institutions to robust, affordable broadband internet access.



11. Sub-Saharan Africa USF Project

October 2010 – September 2013

BACKGROUND

Universal Service Funds (USFs) are government entities that play an important role in facilitating access to information and communications technologies (ICT) in underserved areas which are frequently poor and rural. These areas, often too sparsely populated and too poor to offer a commercial network operator adequate return on required infrastructure investment, comprise a significant portion of the African continent. Although mobile phones have become ubiquitous in much of sub-Saharan Africa, coverage can be sparse in more remote and less populated areas (and mobile broadband access can often be almost nonexistent). These services can be vital for development, as studies have shown that access to ICT, including more advanced broadband services, has a significant impact on economic growth. Many countries, both within and outside of sub-Saharan Africa, have addressed these ICT “access gaps” through Universal Service Funds. In Pakistan, for example, in its first two years of existence, the USF created 200,000 working broadband connections in 238 towns that had previously been completely unserved. African countries have begun to take notice and are following suit. Over 25 nations created USFs and looked to replicate the success enjoyed by several Asian and Latin American countries to expand ICT access.

In 2010 in sub-Saharan Africa, however, most existing USFs were not functioning effectively in comparison with world best practices or with the goals they have set for themselves. They were often understaffed, lacked the capacity to evaluate and fund projects, and did not have

strong strategic direction. Many African USFs collected large sums of money that they were not able to disburse. A study conducted by the GSM Association (GSMA) found that in sub-Saharan Africa, almost \$400 million was sitting unused in USF accounts.¹ Even in cases where USF disbursements had been made, the effectiveness and impacts of the funds was often questionable at best. Also, several prominent countries in the region, led by Kenya, had yet to launch a USF.

At the same time, the goals of ICT access and universal services were evolving in all parts of the world, even the remotest corners of Africa. Nearly all governments and stakeholders acknowledged that, beyond mere voice-level telephone service, advanced broadband connectivity, internet access, and e-applications presented a profound opportunity to transform the levels of knowledge, social integration, job creation, and good governance at all levels of society. Even successful USFs redefined their objectives at the time to embrace “universal broadband” as a core priority.

Based upon these considerations, NetHope’s sub-Saharan Africa USF project sought to provide strategic and targeted technical, capacity building support to African USFs, bringing experience, expertise, tools, and innovative ideas to these mechanisms that were only occasionally available. The sub-Saharan Africa USF Project was funded by USAID’s Africa Bureau (AFR/SD/EGEA) and implemented by NetHope through its subcontractor, Integra LLC.

¹ Ladcomm Corporation. (2014, September). *Sub-Saharan Africa - Universal Service Fund Study*. Retrieved from GSMA Web site: https://www.gsma.com/publicpolicy/wp-content/uploads/2012/03/Sub-Saharan_Africa_USF-Full_Report-English.pdf

OBJECTIVES

The sub-Saharan Africa USF Support Project had four broad objectives:

1. Improve the practices and increase the actual use of current and future telecommunications universal service and access funds in sub-Saharan Africa.
2. Accelerate the extension of affordable access to telecommunications services (including broadband internet services where permissible) to those not yet served.
3. Improve Universal Service Fund awareness, capacity, and practices across sub-Saharan Africa, considering telecommunications market dynamics.
4. Capture an expansion based on current practices and promulgate best practices taking place within Africa, while adding to these newer, more advanced models for consideration.

To implement these objectives, NetHope undertook two main activities: (1) providing direct technical assistance to selected African USF institutions and (2) advocating for general USF knowledge and best practices widely among African public agencies and officials. This project was executed in Ghana, Kenya, Nigeria, and Tanzania.

UNIVERSAL SERVICE FUND IN GHANA

Ghana had historically been among the leading African countries in terms of telecommunications sector growth and policy. At over 100 cell users per 100 citizens, Ghana boasted one of the highest cellular penetration rates in the region. However, the country's progress in internet and broadband development was far slower, with only 14% internet penetration as of 2011, less than half that of Nigeria or Kenya. The Ghana Investment Fund for Electronic Communications (GIFEC) was among the most well-established USFs in Africa. Launched in 2005 and strengthened by legislation in 2008, the GIFEC financed a wide range of projects, from new

cell towers to Community Information Centers (CICs) and school computers in rural areas, to electronic fish finders for fishermen.² Nevertheless, GIFEC's activities and spending patterns were inconsistent and was the Fund sought to revise its strategy and reconsider project spending. As of 2011, GIFEC collected around \$26 million from operators while receiving another \$30 million infusion from the World Bank. GIFEC had spent about \$42 million of these amounts. The remaining surplus of approximately \$13 million, plus annual collections in the range of \$10 million per year, was available for spending under the strategic plan.

The Ghanaian Ministry of Communications approached NetHope seeking assistance in strengthening its analysis of the poor development of internet and broadband in Ghana and assessing policy options, including GIFEC initiatives. NetHope worked with GIFEC and the Ministry to conduct a comprehensive broadband ICT market study and policy analysis. The market study collected a wide range of data on ICT supply, demand, usage, costs, and other factors, with particular attention to internet and broadband markets across Ghana. The core task was a major consumer survey, supported by review of secondary data sources. The goal was to identify barriers to ICT growth in Ghana, and ultimately to propose policy responses.

In parallel with this project, GIFEC also used its own resources to engage the Commonwealth Telecommunications Organisation (CTO) as an expert consultant, with two of NetHope's team under a separate contract to assist with preparing GIFEC's strategic plan. This activity was consistent with inputs and findings from NetHope's work and coordinated with the ICT market study.

In February 2012, NetHope provided input on the design of the study and its implementation methods. NetHope prepared a preliminary study report outline, designed

² Utilizing sonar and GPS technology, an electronic fish finder identifies the exact location of fishes with a greater degree of accuracy than traditional methods. It provides information, such as depth, structure, speed, and temperature readings, which help commercial fishermen catch a greater volume.

a comprehensive survey instrument, identified detailed secondary data requirements, and assisted with the terms of reference for the survey team to be contracted by the Ministry of Communications. NetHope maintained close contact with GIFEC, the Ministry, National Communications Authority (NCA), and other agencies to monitor progress and aid with any difficulties that arose.

Although the project launched effectively, the work was later met with substantial delays (associated with the contracting of the survey research institute, Institute of Statistical, Social, and Economic Research (ISSER), and the lack of availability of secondary market data through NCA and other sources). Consequently, the original project completion time frame of August 2012 was extended by nearly one year. While survey was finally launched in May 2013, the delays significantly reduced the scope of time and input that NetHope could provide to GIFEC following the study's completion.

Regardless of the delay, the ISSER survey provided a rich dataset and yielded important and useful information about the status of internet demand in Ghana. Disaggregated survey data by geographic area, age, gender, and other metrics, helped to show uncover valuable insights on the differences between various types of internet users and non-users in the country. NetHope provided recommendations on the final study report, which helped contextualize the analysis and presentation of findings and suggest actionable policy pathways. At the end of the activity, NetHope's final report on the study and recommendations for policy responses were submitted for the review by GIFEC and the Ministry of Communications.

UNIVERSAL SERVICE FUND IN KENYA

In 2010, Kenya recognized the need to expand the quality and coverage of its broadband infrastructure. The government had made significant strides liberalizing its telecommunications sector and was beginning to see progress in expanding broadband access. As of early 2012, there were 6.5 million internet subscriptions and



a total of 11.8 million internet users, up from 7.2 million users in 2011. Of these subscriptions, 98% were through mobile internet/data subscriptions on GPRS/EDGE and 3G networks. A 2010 gap analysis conducted by the Communications Commission of Kenya (CCK) estimated that 11% of the population did not have access to mobile telephone signals, while 72% did not have access to Internet services. The construction of the TEAMS, SEACOM, and EASSy submarine cables was completed in 2012, and with the establishment of these international cable access points and the complementary development and deployment of the National Optical Fiber Broadband Infrastructure (NOFBI), broadband infrastructure development in Kenya began to accelerate. That said, Additionally, the CCK noted that there had also been significant problems in extending the NOFBI backbone into underserved areas and making broadband capacity available outside of major cities.

Recognizing the importance of broadband access to the broader economy, Dr. Bitange Ndemo, who was Permanent Secretary of Kenya's Ministry of Information and Communications noted the digital divide by saying, *"While this phenomenal growth of the ICT sector is envisioned to serve as an engine for economic growth in the 21st century, it may also if not properly managed, create a disparity between those without and those with access to the ICT infrastructure and services."*³ While

³ Kenya Business Daily, August 23, 2011

a legislative mandate to establish a Universal Service Fund under CCK had been established in 2009, various political conflicts over roles and responsibilities had delayed launching the Fund. By 2012, the CCK recognized the need for external technical expertise and resources to develop a comprehensive broadband strategy and to jump start the USF.

Technical Assistance

In response to this, NetHope provided technical assistance to the CCK (which had been renamed the Communications Authority of Kenya (CAK)) in collaboration with the Ministry of Information and Communications, National ICT Board, and the National Communications Secretariat to specifically address the broadband and wider ICT disparity between urban and rural geographies in Kenya. Specifically, the objectives of the engagement were to:

- Analyze and provide recommendations based on international best practices and findings from the 2010 ICT Gap Analysis conducted by the CCK
- Support for the development of a National Broadband Strategy (NBS)
- Assist with the implementation and operationalization of the Kenyan USF

This technical assistance was implemented from March 2012 through September 2013.

National Broadband Strategy

During the engagement, NetHope supported the successful planning, design, and adoption of Kenya's new NBS. The NBS was formally announced and launched on July 23, 2013 at a public forum hosted by the Kenyan Vice President and attended by the U.S. Ambassador. Under the NBS, the Government of Kenya formally committed to budgeting some 5% of its annual budget, or US\$1.1 billion at the time, toward implementation of broadband ICT programs. The strategy also called for leveraging another \$1.7 billion

in private investment, through innovative financing mechanisms and public-private partnerships. Early NBS projects focused on providing computers to schools and expanding fiber backbone access to all newly established county governments. The NBS was widely praised by the World Bank and ITU and continues to provide a framework for government, donor, and private sector initiatives.

Universal Service Fund

NetHope also provided extensive assistance to the CCK on the formal establishment and launch of the country's USF. The USF was authorized in 2009, but was not yet operational at the time of NetHope's engagement; however, the NBS calls for the USF to serve as a key source of funding for many of its goals revitalized its importance as a policy instrument. Following the NBS process, NetHope and CCK worked together to develop core management and operational frameworks for the Fund and to identify pilot projects to expand broadband access within rural and underserved areas.

Impact on Telecom Sector & Broader Economy

Following the operationalization of the USF and completion of a gap analysis to more precisely target USF assistance, the CAK initiated two major projects through the USF. The first was the **Education Connectivity Broadband** program. This program sought to connect more than 800 public secondary schools in 47 counties to the internet at a total cost of 800 million Ksh. Funds from the USF were used to subsidize service providers for both capital and operating expenses. The CAK issued tenders to three service providers to provide connectivity to the secondary schools. The second project was the USD \$15 million **Voice Infrastructure Project**, designed to fill voice and broadband access gaps. A 2015 gap analysis report further identified 418 sub-locations with less than 50% coverage⁴ and 164 sub-locations with no coverage at all. This service gap represented approximately 2.6 million people or 5.6% of the country's total population. Earlier that year, three service providers

⁴ Communications Authority of Kenya defines coverage as 2G service or higher

secured contracts worth USD \$8.3 million to develop underserved coverage slots.⁵ The CAK also noted that while progress in rural areas had been slower than desired, the NBS framework and the unlocking of the USF mechanism had resulted in tangible increases in the quality and availability of broadband infrastructure in underserved areas. Additionally, declining infrastructure costs, new technologies, and growing demand led to gains in closing the digital divide in Kenya. SafariCom, as the leading telecommunications service provider in Kenya, provided a useful example. By the end of 2016, SafariCom had reduced the per Mbps charge for mobile data by approximately 22% and had invested nearly USD \$400 million in coverage expansion and network upgrades. Its healthcare application M-Tiba was incorporated into multiple donor programs, and

its FarmDrive application was also used on agricultural programs.⁶

Impact on Other USAID Programs

NetHope played an important role in supporting the Kenyan government’s efforts to address the digital divide and bring improved broadband infrastructure to rural areas. While establishing direct linkages between these initiatives and the adoption of broadband technologies in other USAID programming is difficult, many USAID programs in Kenya took advantage of ICT applications and leveraged the expanded telecommunications infrastructure. Figure 1 summarizes some important USAID projects in Kenya that relied on broadband connectivity.

PROJECT	YEARS	DESCRIPTION
East Africa Trade and Investment Hub	2014-2019	Created a directory of apparel producers using GIS mapping of factories and capacity. Created the maps and accessing the application relies on the availability of reliable fixed and mobile broadband services.
Kenya Integrated Water Sanitation and Hygiene Program	2015-2020	Used Open Data Kit (ODK) to collect data via mobile device. Developed a spatial data warehouse which hosted web-based geospatial resources, allowing users to discover, view and access geospatial information and services made available by the KIWASH team. Planned for smart meters that can be read and processed remotely by mobile phones.
Mobile for Reproductive Health (m4RH) project	2009-2012	Used mobile phones to disseminate family planning information to the public, as well as information on the nearest clinic that offered required services. m4RH was one of the few text-messaging services globally that provided family planning information as a means of education and behavior change communication.
Cross-Border Health Integrated Partnership Project (CB-HIPP)	2017	Extended and provided quality integrated health services in strategic border areas and other transport corridor sites in Kenya. The project used ODK and mobile devices to support M&E activities.
Four Pillars Plus Project	2018-2015	The Four Pillars PLUS approach used scholarships, teacher professional development, mentoring of girls and community participation to improve the quality and relevance of education for orphans and other vulnerable children, especially girls, in primary and secondary school. The project taught digital skills and used a hands-on approach by providing students with technology and connectivity.

FIGURE 1: Impacted USAID Programs

⁵ Service slots are geographic areas designed by the CAK. The slots may cross traditional government/administrative boundaries and are designed to present attractive concessions to service providers.

⁶ SafariCom Annual Report and Financial Statements 2017 – Where will we go next?

UNIVERSAL SERVICE FUND IN NIGERIA

Nigeria is the most populous country in Africa and has a robust and competitive telecommunications market. Liberalization of the market began in 1992 and has resulted in substantial innovation and coverage expansion. By 2007, urban areas had achieved a high-level of mobile coverage, and ISPs were offering a range of broadband products. In contrast, the large rural population has persistently been difficult to serve with many areas lacking a viable business case for commercial providers.

The Nigerian Communications Act of 2003 addressed the concept of universal access and universal service and provided guidance to the Nigerian Communications Commission (NCC) on the development of universal access/service policies. The Act explicitly directed the establishment of a Universal Service Provision Fund (USPF), which was established in 2007. Before the creation of the USPF, an Annual Operating Levy (AOL) had been collected by the NCC for universal service programs. Based on the 2007 regulation, the NCC made financial contributions to the USPF (approximately 40% of the 2.5% of operating revenue paid annually by licensed service providers). This funding provided a financial platform for the USPF to develop and implement programs that would help bridge the broadband access and connectivity gap between urban and rural areas in Nigeria. Although a core funding stream had been established, the USPF lacked technical expertise and clear direction on how best to implement programs. While there was some limited success between 2007 and 2013, USPF's new manager appointed in 2011 determined that the USPF would benefit from targeted technical assistance from USAID.

Technical Assistance

From February 2012 to January 2013, NetHope provided support to the USPF in the development of its new Strategic Management Plan 2013-2017 (SMP). NetHope led in an intensive two-day senior management planning session, which included the

Minister of Communications and CEO of the NCC. The purpose of the planning session was to help develop and adopt a new strategy and focus for the USPF. The programs incorporated into the SMP were directly based upon NetHope's recommended framework and involved a critical change in direction for the Fund toward financing integrated broadband access projects, as well as greater accountability and efficiency in USPF operations. As a direct result of this new strategic process, USPF allocated \$82.8 million in FY2013 toward new programs and projects, particularly in extending fiber backbone and mobile network coverage. This represented a 50% increase in the Fund's budget over FY2012, substantially reducing the surplus that had built up in recent years. One of the first projects awarded was a set of contracts totaling \$22 million for the construction of 3,500km fiber backbone.

Impact on Telecom Sector & Broader Economy

The USPF's portfolio consisted of a group of related projects designed to provide universal access and service to underserved and unserved groups and communities across the country. Following completion of the SMP, the Fund's programs were streamlined to focus on two broad areas – Access, and Connectivity.

The Connectivity Program included telecommunication infrastructure projects that were implemented through a Public Private Partnership (PPP) model. They were subsidized by the USPF but implemented, owned, and operated by private operators and service providers.

- The **Rural Broadband Initiative (RUBI)** project used USPF provided subsidies to operators for the deployment of network infrastructure to support the establishment of core delivery mechanisms for broadband services in the rural/semi-urban areas of Nigeria.
- The **Backbone Transmission Network (BTRAIN)** project facilitated the connection of rural and semi-urban areas to the National Transmission Backbone Infrastructure via fiber branch network infrastructure.

The USPF implemented projects through PPP mechanisms whereby organizations competed for subsidies.

- **University Inter-Campus Connectivity UNICC** was a support project to the National Universities Commissions' Nigerian Research and Education Network (NgREN) project. The UnICC Project was designed to seamlessly connect the networks of the main campuses of selected universities to the networks of their corresponding medical colleges and teaching hospitals through the deployment of fiber optic cable and its associated equipment.
- The **Base Transceiver Stations (BTS)** project involved the granting of subsidies to network operators for the deployment of BTSs and other passive infrastructure in underserved and un-served communities that were not commercially viable without support. The deployed infrastructure supported the extension of voice and broadband services to the beneficiary communities.

The Access Program was implemented through grants and was designed to create demand and promote usage of ICTs in unserved and underserved communities and groups. The projects involved the provision of end-user devices to complement the telecommunication infrastructure that was deployed under the Connectivity Program.

- The **Tertiary Institutions Knowledge Center (TIKC)** facilitated broadband connectivity through deployment of optic fiber cable and installation of ICT devices and peripherals in selected tertiary institution. Each beneficiary institution received 100 computers, ICT furniture, 2 printers with network facilities, and firewalls with broadband internet connectivity.
- The **Information Resource Center (IRC) Project** is an intervention by the USPF to establish digital libraries in the existing public libraries to enable sharing of information and other resources as well as connect and share resources with libraries outside the country.

- **Community Resource Centers (CRC)** worked with local entrepreneurs and community-based organizations to extend voice, internet, ICT training, and other e-services to unserved communities on shared basis.

Impact to Other USAID Programs

NetHope's support for the USPF helped focus the organization on key priorities and improved the distribution and management of USPF funds. While the broadband access gap in Nigeria stood at about 47% (90 million people), since 2013, USPF programs have greatly extended infrastructure and brought broadband services to hundreds on unserved communities. This expanded availability and access directly benefited USAID programs and enabled a wide range of projects to employ ICT and digital tools enhancing the impact of program dollars. The box below highlights an important USAID project in Nigeria that relied on broadband connectivity.



FOUR PILLARS PLUS PROJECT 2018-2015

The Four Pillars PLUS approach used scholarships, teacher professional development, mentoring of girls and community participation to improve the quality and relevance of education for orphans and other vulnerable children, especially girls, in primary and secondary school. The project taught digital skills and uses a hands-on approach by providing students with technology and connectivity.

UNIVERSAL SERVICE FUND IN TANZANIA

The Universal Communications Access Fund (UCAF) of Tanzania was established under legislation passed in 2006 and regulations adopted in 2009 but did not immediately begin operations. UCAF had access to a core budget of \$30 million, but none had been spent on projects as of 2011. At the time of NetHope's engagement, the UCAF had only one employee - its director - who had been working to develop pilot project

plans in coordination with the World Bank. The World Bank had initially sponsored focused technical assistance in setting up the UCAF and attempted to implement an initial pilot project. However, the bidding process failed to produce an acceptable project, and the pilot had to be rebid with a smaller scope in 2012.

NetHope initially reached agreement with UCAF to assist with its establishment and operationalization and creation of a strategic plan. In addition, NetHope assisted the UCAF director on the review and revision to the World Bank pilot project. This engagement was made contingent upon UCAF hiring core management staff in a timely manner, so that NetHope could work with its staff and build capacity through the planning process.

NetHope worked with the UCAF director during the early stages of this engagement to identify plans, ideas, data requirements, and procedures for establishing a strategic plan for the UCAF, and ultimately to provide technical assistance and training once its staff was on board. This work included preparation of a framework for the development of the strategic plan and a market assessment.

However, the process for hiring support staff ran into significant administrative delays. With no assurances on the timing for hiring staff forthcoming, NetHope suspended its engagement with UCAF in May 2012. UCAF was eventually able to hire five management staff employees in May 2013. However, as this was near the end of NetHope's project in sub-Saharan Africa, and it was too late for NetHope to re-engage. As a short-term workaround, the UCAF staff participated in NetHope webinars on USF policy and attended the final NetHope USF workshop in Zanzibar.

Capacity Building Activities

A core objective of the project was to provide capacity building information, training, experiences, and resources to sub-Saharan Africa USFs, through a variety of mechanisms. The following were capacity building activities undertaken throughout the course of the project.

Workshops

The project requirements included conducting two regional workshops on USF practices and knowledge sharing. NetHope exceeded the original scope and completed three workshops, as an opportunity emerged to coordinate NetHope's participation with regional events sponsored by partner organizations on the same topics. The activities of these workshops are summarized below.

Tools and Modules

In developing capacity building and training resources for USFs, NetHope prepared a series of four formal USF Capacity Building Modules for distribution among all interested governments and stakeholders. These modules incorporated extensive information on best practices and innovative ideas concerning USF operations, as well as practical tools, examples, and templates for USF management to study in support of their internal needs. The modules were made available to government officials at more than a dozen African USFs and were utilized in both the workshops and the webinars (see below) delivered under this project. The following are summary descriptions of each of the USF Capacity Building Modules.

Module #1: USF Strategic Planning

This module provided USF administrators and planners with practical information and tools to help facilitate the strategic planning process. It described the basic framework for what a strategic plan should look like, the elements it should include, and the procedures for creating it. It consisted of five components:

- *Component 1 = Strategic Plan Overview, Outline, Key Concepts:* Introduced USF strategic plans. Included an indicative outline of the main contents of a USF strategic plan. Offered definitions of the most important concepts and terminology used in this module and in the USF strategic planning process in general.
- *Component 2 = Planning Process:* Described the key steps and activities of the strategic planning

process. Identified appropriate planning team members and activities. Offered an illustrative timetable of planning tasks.

- *Component 3 = ICT Market Assessment:* Explained the market research and analysis needed to support the planning effort. Described the role of a gap analysis. Highlighted the need for financial forecasts to support planning and budgeting.
- *Component 4 = Setting Objectives and Targets:* Described the process of determining the main objectives of USF. Explained the distinction between long-term and short-term targets for USF outcomes. Provided examples of potential objectives and targets.
- *Component 5 = Defining Programs and Projects:* Presented the requirements for USF program definitions and determining program priorities and USF allocation. Described the process for defining USF projects to implement programs, and for setting priorities among candidate projects.

Module #2: USF Program Concepts

This module provided a set of prototype concepts for the development of USF operational programs. These were designed to address typical gaps in national level access to basic and advanced ICTs, through a coordinated and comprehensive set of initiatives. The program descriptions were presented in a structure that allowed them to be adopted directly by a USF as part of a strategic plan or modified in any manner consistent with the USF's mission. In summary, the programs described in the module included:

- *National Backbone Network Expansion:* Expanding high capacity national backbone networks to reach remote and unconnected regions of the country.
- *Community Broadband ICT Access:* Extending broadband connectivity directly into target unserved/underserved towns and villages. This program had four main elements, ideally to be implemented together in each locality – Broadband

Network Access, Community ICT Centers (CICs), Institutional Connectivity, and Public Broadband Communication Services.

- *Community ICT Center Operations:* The functions of managing CICs within each town after they have been built and equipped.
- *Universal Basic Telephone Service:* Extending coverage of basic telephone networks to reach the most remote unserved locations.
- *ICT Content and Applications Development:* Support for development of locally relevant and valuable content and applications to stimulate demand and enhance the benefits of ICT services.
- *Affordable ICT Devices:* Support to reduce costs of computers, smart phones, tablets, and other end-user devices to help make them more affordable to lower-income users.

For each program, the module provided an overview discussion, a description of the expected outputs to be achieved by the program, and a summary of potential business models that could be employed to implement the program.

Module #3: USF Monitoring and Evaluation

This module provided USF administrators and staff with information, advice, and recommendations regarding the role of monitoring and evaluation (M&E) as a key component of the operations. It highlighted the importance of M&E in a project procurement cycle and described the high-level contours of recommended M&E functions for USFs.

Module #4: USF Data Collection and Market Analysis

This module provided information and recommendations on the data collection and ICT market analysis functions of a USF. It addressed the critical need for USF administrators to maintain effective databases and studies of the status of the ICT sector in areas where the USF is mandated to support development. Key topics covered data collection,

database development, market analysis, gap analysis concepts and methods, and Digital Divide market studies.

Webinars

NetHope conducted three webinars for African USF officials, presenting the core material of the Capacity Building Modules in real time to participants joining. Webinar topics included Strategic Planning for USF conducted on October 12, 2012; USF Program Concepts conducted on November 29, 2012; and USF Monitoring and Evaluation conducted on April 16, 2013.



LESSONS LEARNED

Among the overriding objectives of the project was to assist USF administrations and other stakeholders in gaining a better understanding of the factors that affect the performance of USFs in sub-Saharan Africa. Beyond the focused technical support and immediate results derived from NetHope’s interventions, the following findings and lessons could help provide a longer-term platform for improving the overall outcomes generated by USFs.

First, the original quantitative targets for spending and new users were often not unreasonable projections for the ultimate impacts of USF operations benefiting directly from NetHope’s assistance. In most cases, the timing of this impact was overly optimistic, and, as such, achieving the expected results came much later than expected. In the case of Nigeria, increased spending was indeed already underway, but in Kenya, the launch of the USF was postponed to accommodate the National Broadband Strategy.

There has been a widespread and dramatic shift in the objectives and priorities of USFs in recent years. Whereas past programs focused on basic public telephony and later on filling gaps in cellular network coverage, nearly all governments were focused on broadband access as their ultimate target. The focus of USF financing toward this end tended to vary from fiber backbone networks to broadband community centers to institutional connections. Overall, USFs across sub-Saharan Africa embraced the goal of universal broadband. This raised new challenges for governments, as they had to reevaluate gap analyses, design new types of projects, and coordinate more effectively with multiple public and private stakeholders.

Linked to the above, most African governments were developing comprehensive National Broadband Strategies (NBS) to address the goals of full-scale access to the broadband ICT ecosystem for all citizens. This process was time-consuming and required intensive involvement by stakeholders throughout the country – officials involved with education, health, agriculture, finance, and e-government services and private firms focused on telecommunications, hardware, software, financial services, and other sectors. The process that NetHope helped design and implement in Kenya was exemplary, as all interested parties had a chance to contribute, and the resulting strategy was widely embraced and endorsed at the highest levels of government.

The role of the USF must be clearly defined as one financing mechanism and partner in a coordinated and dynamic society-wide process. Ideally, the USF should provide seed financing and essential subsidies in areas that most need support, while stimulating sustainable broadband market expansion. A clear lesson from NetHope's experience was the importance of coordinating USF planning among stakeholders and ensuring support from high-level officials. As mentioned, the Kenya NBS process benefited from these advantages. Similarly, NetHope's work with the Nigeria USF was greatly helped by the personal intervention of the Minister of Communications and the head of the National Communications Commission.

By contrast, the slower progress in Tanzania and Ghana and the initial long delays in establishing the USF in Kenya can be attributed to a lack of effective coordination across agencies and a sense of indifference, or at least lesser involvement, by higher officials for an extended period. These problems are symptomatic of the barriers and challenges that have often hindered many African USFs from performing more effectively, which were often deeply rooted in the political and bureaucratic difficulties that afflict these countries more broadly. Seemingly simple decisions such as hiring staff (Tanzania) and appointing oversight boards (Kenya) ran into unexplained resistance within government hierarchies. These impediments may have resulted from ICT industry pressure to delay or minimize USF collections, rivalries among government power brokers, or simply excess workloads and distractions for inexperienced or understaffed officials themselves. The net result was that launching, staffing, managing, and implementing a USF, even where a clear legislative and government mandates had been established, was often a slow and indirect process.

With very few exceptions during NetHope's engagement, USF administrations in Africa were burdened by a lack of capacity, experience, and tools to conduct their operations according to world best

practices. Most USFs were understaffed, with some having only one or two employees to manage millions of dollars in assets. Even functioning USFs have tended to spend money based on loosely designed strategies and procurement procedures, which are themselves often heavily influenced by the companies that both pay and receive the subsidies. In these cases, there was little institutional experience with market and gap analysis, strategic planning, project design, and M&E. While the leaders and top officials of most USFs were dedicated, well-qualified people, they often had to operate with inadequate support, staff, advice, and authority.

One area of especially critical need was M&E. NetHope consistently found that both established and new USF administrations throughout the region placed minimal emphasis on M&E functions as part of their operations. Oversight, follow-up, and review of projects implemented with USF money were often an afterthought, with little staff time or budget allocated to these roles. The results were both a lack of reliable data on the performance of past projects and an inability to make new plans based on understanding of what works and what does not. USF staff recognized these deficiencies and were eager to develop effective M&E functions but typically lacked the technical expertise to implement them on their own.

Based upon the above observations, a clear learning from NetHope's work was that any strategy to fundamentally reform and assist African USFs must focus primarily upon *institutional strengthening on multiple levels*. Fund managers require a wealth of information, demonstrations of effective procedures, training in key tasks, hands-on assistance with strategic and operational planning exercises, and practical tools and resources that could be employed repeatedly as the USF progressed toward its goals. The technical assistance under this project demonstrated the compelling need for and value of this type of close, interactive collaboration with USF officials.



12. Cambodia Universal Service Obligation Project

July 2016 – March 2018

BACKGROUND

The Cambodia Universal Service Obligation project was launched in July 2016. This project was based on close dialog and support from USAID/Cambodia, the U.S. Embassy in Phnom Penh, and the Cambodian Ministry of Post and Telecommunications (MPTC). The focus of the project was to help establish and operationalize a Universal Service Obligation (USO) Fund in Cambodia, a long-standing, high-priority objective of the Government of Cambodia. Once fully operational, the USO Fund was projected to collect and disburse \$20-25 million annually, growing to more than \$50 million within five years. To achieve this target, the MPTC requested assistance from USAID in preparing a five-year Strategic Plan and near-term Action Plan for the operation of the USO Fund.

The primary objectives established for the project were to: (1) support MPTC in completing the planning and initial implementation of USO Fund operations in the near to medium-term, and (2) support USAID/Cambodia's activities that would benefit from improved access to telecommunications services and capabilities in the field. USAID/Cambodia's focus sectors included food security, ICT skills, and democracy and governance.

TECHNICAL ASSISTANCE

To support the planning and development of the USO Fund, NetHope and USAID conducted several informational and capacity building workshops on USO issues with MPTC representatives between September 2016 and May 2017. The first workshop coincided with the US-ASEAN ICT Cooperation Spectrum Workshop in

Thailand, where USAID formally provided their approval for NetHope to assist MPTC in designing a national broadband deployment strategy using USO Funds.

The US-ASEAN ICT Cooperation Spectrum Workshop was held in Bangkok, Thailand on September 27-29, 2016. The workshop was part of the US-ASEAN Connect¹ effort, a White House initiative launched in February 2016 with a focus on strengthening strategic partners for sustainable and innovative economic growth. The objective of the workshop was to advance the understanding of the regulators and spectrum policy-regulatory staff, to help improve their management of spectrum, and to ensure regional consistency essential for border areas between several of the Association of Southeast Asian Nations (ASEAN) member countries. In collaboration with the U.S. Department of State and the USAID Global Development Lab, NetHope planned, presented, and provided technical expertise from the private sector, including Facebook, Cisco, and Microsoft, in the development of the workshop. In addition, NetHope met with ASEAN delegations to discuss key challenges and identify projects for potential follow-on support from U.S. Department of State, Federal Communications Commission (FCC), and USAID. At the workshop, USAID formally approved a technical assistance intervention to assist the Ministry of Post and Telecommunications (MPTC) in Cambodia to design a national broadband deployment strategy using a Universal Service Obligation (USO). Cambodia had been investigating Long-term Evolution (LTE) and TV White Space technology and was determined to be a good candidate for the intervention.

¹ The White House Office of the Press Secretary. (2016, September 8). *Fact Sheet: U.S.-ASEAN Connect*. Retrieved from The White House Web site: <https://obamawhitehouse.archives.gov/the-press-office/2016/09/08/fact-sheet-us-asean-connect>

NetHope provided advisory services to MPTC on creating policies for the establishment and operation of the USO Fund. This included case studies from other countries and contributions to workshops and internal deliberations about defining the legal basis for the USO Fund. In July 2017, the Cambodia Prime Minister Hun Sen signed the official sub-decree launching the USO Fund and mandating operator contributions.

Once officially launched, NetHope began the work to assist MPTC in planning the implementation of the USO Fund, including identifying the projects to be financed and priority locations. USAID/Cambodia was also consulted to identify locations of USAID programs that could benefit from access to 3G mobile phone and internet connections. NetHope also helped MPTC to:

- Define its action plan for using the USO Fund for the 2017-18 fiscal year.
- Establish monitoring and evaluation procedures.
- Support the overall strategic planning of the USO Fund's activities over the following five years.

In November 2017, NetHope visited Phnom Penh to identify the next stage of objectives and tasks for the engagement. A Fund Secretariat was established, and operators began the process of identifying projects that they sought to gain approval for fund credit. The Fund Secretariat sought assistance from NetHope to define the criteria for selecting projects, review proposed expenditures, and plan longer-term assistance.

In March 2018, NetHope and the MPTC USO Fund Secretariat met at a workshop in Myanmar on Universal Service hosted by USAID and ASEAN. MPTC presented the accomplishments of the USO Fund, and the parties discussed the scope of ongoing assistance needs, particularly with monitoring and evaluation of new operator projects.



Ultimately, all USAID programming, including NetHope's assistance, was halted in FY2018 due to the anti-democratic direction of the Government of Cambodia.²

LESSONS LEARNED

A key lesson learned was to ensure that political and bureaucratic processes were considered and incorporated into the project plan and design of technical assistance. MPTC lacked experience with managing a USO Fund, including logistical, administrative, and analytical tasks involved in overseeing and reviewing operator plans and fund projects. Similar interventions in the future should also provide capacity building for the MPTC staff. The project team at MPTC had a heavy work demand and limited English-speaking skills, so collaboration was challenging. There was also difficulty in obtaining necessary data, particularly on cell site locations and related infrastructure.

² The White House. (2018, February 27). *Statement from the Press Secretary on Reduction in Assistance to the Government of Cambodia*. Retrieved from The White House Web site: <https://www.whitehouse.gov/briefings-statements/statement-press-secretary-reduction-assistance-government-cambodia/>



13. Afghanistan Telecom Development Fund

August 2016 – August 2018

BACKGROUND

The Telecom Law of Afghanistan (TLA) of 2006, as amended in 2011 and 2017, established the Afghanistan Telecom Regulatory Authority (ATRA) and charged it with, among other responsibilities, providing access to modern telecommunications services and ensuring their availability, particularly for rural and vulnerable populations in areas left unserved by the commercial operator and service providers.¹ The TLA further established the Telecom Development Fund (TDF) as a policy instrument designed to collect mandatory contributions from the commercial network operators and service providers and to redistribute those collected funds in order to underwrite investments to achieve universal access objectives.²

Since its inception in 2008, the TDF³ has significant accomplishments to its credit, beginning with the Rural Telecom Development (RTD) program that has facilitated the spread of cellular service to many thousands of subscribers in hundreds of rural communities. In addition, its Institutional ICT Support program has helped to bring broadband connectivity and equipment to universities, secondary schools, and health facilities. TDF support has also strengthened rural emergency response capabilities and deployed village-level satellite telecom services, among other accomplishments.

During the TDF's nine annual programs, the telecommunications sector has steadily evolved, with myriad innovations and transitions taking place across



policy, technology, and commercial market arenas. Around the world, mobile broadband and low-cost smartphones have become more available, affordable, and useful, especially to low and moderate-income populations. From a commercial perspective, network provider business models have been forced to evolve, with the rise of digital services and the steady diminution of revenues gained through the delivery of traditional voice services.

Considering these changes and the importance of its core mission, the Afghanistan TDF project recognized the need to update its approach and sought USAID and NetHope for assistance to make this transition.

PROJECT OVERVIEW

The Afghanistan TDF project was comprised of an initial virtual engagement and four in-country engagements, with virtual connections during the periods between trips.

¹ TLA Article 47: Provision of Universal Access

² TLA Article 48: Telecom Development Fund (TDF). ATRA currently collects a 2.5% levy on operator and service provider revenues for the TDF.

³ Although the title in Afghanistan is occasionally the "Universal Access Program," it is widely known as the Telecom Development Fund (TDF) and will be referred to as such throughout this document.

practices manifested by world-class universal access programs. These were grouped into three lines of effort:

- Increasing transparency of governance and operations.
- Assuring consistent strategic and operational planning.
- Maintaining an effective project cycle (including project design, oversight & monitoring, and reporting & evaluation).

Engagement 2 – Scoping Mission

NetHope conducted a 14-day mission to Kabul to present the three lines of effort and meet with a wide variety of stakeholders and experts. NetHope was able to ground truth the three lines of effort and gain a clear picture of the procedures, accomplishments, and shortfalls of the TDF program as it neared its tenth anniversary. The NetHope team observed that:

- ATRA had an effective and internally accountable annual project planning cycle, with appropriate policy oversight from the ATRA Board and the MCIT Ministerial Council (Justice, Economy, Commerce, Finance).
- ATRA appeared to have accurate program and financial information, with approximately 1200 rural base stations contracted (600 operational and 400 dormant due to insecurity) and 200 in progress. Approximately \$200 million had been collected by the fund since its inception, with more than \$100 million remaining in the fund, held in interest bearing accounts among four Kabul banks.

The team also outlined the reforms that were necessary:

- The transparency of ATRA’s governance and operations was identified as weak. ATRA had a Code of Conduct signed with the MNOs but had failed to meet significant obligations contained in the code (including long-promised semi-annual audits). The ATRA website was deemed woefully out of date.

- ATRA’s program and project design were well behind the times, with ATRA often struggling to implement its programs and projects.
- ATRA’s Universal Access Policy needed updating, as programs were limited to investments in rural telecom tower construction and health and education.
- ATRA badly needed a revised strategy.
- The existing core TDF documents – Policy, Manual of Operating Procedures, etc. – were written by consultants in 2008 and needed to be updated.

This scoping mission concluded on a striking note, when the NetHope team was brought into a high-level meeting at the Presidential Palace co-chaired by the President’s Senior Economic Adviser and USAID/Kabul and attended by the Minister of MCIT and the ATRA Board. USAID announced that it was suspending all technical assistance to ATRA over ATRA’s failure to undertake several steps needed to clear the way for issuing fiber optic licenses and failure to pursue regulatory independence from MCIT oversight, as promised by President Ghani.

NetHope subsequently focused on the audit, the five-year strategy, revising the Universal Access Policy, revising the Manual of Operating procedures, and reviewing the potential for providing subsidies for network operator operational expenditures, in addition to capital expenditures for rural cell site deployment. Shortly after this meeting, the ATRA Chairman indicated to NetHope that his attention going forward would be exclusively focused on regulatory independence and that little support would be forthcoming from him for the next few months.

Over the ensuing 90 days, the NetHope team delivered the initial draft of the Audit SOW and laid extensive groundwork for the five-year strategy process.

Engagement 3 – Launching the TDF Modernization Program

In launching the TDF modernization project, ATRA had

received explicit and urgent direction from President Ghani to issue the TDF Audit RFP and to launch a tender for a nationwide second fiber license, a major step forward in the Open Access Policy.⁴

NetHope worked extensively with the ATRA Board Member overseeing TDF operations, along with its procurement staff to finalize the TDF Audit Scope of Work and forward it to the National Procurement Authority for processing. NetHope also helped ATRA procurement officials adapt the Scope of Work to fit the NPA process, beginning with a Request for Expressions of Interest. NPA formally published the request in September 2017.

NetHope also worked with the Deputy ATRA Board Chair and the lead ATRA Board member for data to launch the ATRA Strategic Planning Team and hold its initial meeting. During the meeting, NetHope introduced the three analytic steps needed for strategic planning (Market Analysis, Gap Analysis, and Financial Forecast) and developed a master calendar, scheduled meetings, laid out a process for documenting the team meetings and tracking progress and problems, and finalized a plan to acquire the data necessary for an effective strategic planning process. During August 2017, the ATRA Data team delivered the bulk of the information needed to begin the Gap Analysis component of the strategy process.

NetHope began work with ATRA to modernize the Universal Access Policy, the first step in transforming ATRA from an overtaxed project implementer (purchasing computers, installing LANs, etc.) to that of program designer, funder, overseer, and evaluator. In addition, NetHope helped ATRA update the RFP for the Rural Telecom Development program, specifically with clauses related to *Force Majeure* and termination for non-performance and reviewing the draft RFP for Optical fiber licenses.

Engagement 4 – Building the Five-Year Strategy

Almost one year to the day after USAID suspended all technical assistance and capacity building support to ATRA over failure to perform, NetHope and ATRA documented several notable achievements. These included:

- Issuing five fiber optic cable licenses that were expected to generate an estimated \$200+ million in foreign direct investment.
- Launching negotiations to renew Afghan Wireless Communication Company and Roshan licenses.
- Revising the Telecom Law of Afghanistan to:
 - » Grant independence to ATRA.
 - » Broaden the TDF Institutional ICT program beyond Health and Education to encompass multiple ministries, agencies, and vulnerable populations.
 - » Establish a second Deputy Chairperson position on the ATRA Board to focus on administration and management.
 - » Establish and fill five senior technical positions to provide the ATRA Board with much stronger analytical and policy capacity.
- Contracting and launching the first-ever financial audit of the TDF.
- Launching first-ever TDF five-year strategic planning process to guide the TDF transition from voice telephony to broadband.
- Tendering TDF Rural Telecom Development (RTD) #9, which included \$32 million for 250 cell towers across 200 districts.

This work focused on moving key ATRA priorities along all three lines of effort, including the financial audit, the five-year strategy, and the strengthening of the program/project cycle. Subsequently, NetHope met with financial audit contractors to review and comment on workplan and related issues related to transparency, determining that audit contract calls for projects would be completed

⁴ Both actions were high priority benchmarks in the U.S. – Afghanistan Strategic Partnership.

by early June 2018. It was further determined that ATRA had fulfilled its responsibility to provide secure workspace and access to telephone and Internet. More importantly, NetHope determined that ATRA was using the TDF audit template to conduct an agency-wide audit, the first of its type in ATRA history.

NetHope also delivered a 12-hour strategic planning workshop for 20+ senior and professional ATRA staff. During the session, the group:

- Explored the three Strategic Plan analyses (Market Assessment, Gap Analysis, and Financial Forecast) and laid out an illustrative strategic structure, objectives, and remaining intermediate steps.
- Reviewed strategic objectives and programs of leading Universal Access programs around the world.
- Scheduled and rehearsed the strategy consultation process.

Finally, NetHope developed and submitted a draft of the Universal Access Policy (UAP) document and launched the Program/Project Design support project focusing on TeleHealth.

Engagement 5 – Completing the TDF Modernization Program

NetHope focused on wrapping up efforts under the three lines of effort. NetHope and the ATRA Board members reviewed the financial elements of the audits and found no exceptions. TDF funds were where they were supposed to be and in amounts expected. In the “Management Letter” component, the auditors proposed findings related to the tracking of the onward use of computers and other ICT equipment purchased and turned over to schools. This finding underscored the need for ATRA to modernize its role from implementer to funder and overseer, a change codified in the revised Universal Access Policy. More importantly, the auditors determined

that upgrades in both the TDF and ATRA-wide accounting systems were required to properly manage and track financial and program resources. ATRA announced a program to accomplish this upgrade forthwith. Given the lengthy audit process (15 months between the drafting of the initial scope of work and the completion of the audit), ATRA began procurement for a multi-year audit services contract.⁵



NetHope and the ATRA Strategy Teams met numerous times to work out contentious issues raised by the strategy process. For example, the strategy process recommended a revised organizational structure to assure direct supervisory control of staff and strengthened accountability upward to the ATRA Board. The enhanced accountability proposed by NetHope ran somewhat counter to Afghan government traditions and was only resolved through several hours of discussions. NetHope subsequently worked closely with the ATRA Board and its technical advisors to lay out the tenets of program design and codified ways for the Board to oversee the transformation of the TDF to that of a funder/donor (including designing programs, soliciting proposals, awarding agreements, monitoring implementation, and evaluating results). These tenets were soon put to

⁵ The Audit results were posted to the ATRA web site in January 2019, a major step forward in transparency.

practice, as ATRA subsequently signed MOUs with more than a dozen Afghan government entities to establish public access computer facilities for use by underserved communities throughout the country.

LESSONS LEARNED

As highlighted elsewhere, developing country regulatory agencies are complex, often challenged organizations with myriad responsibilities, authorities, and stakeholders in and out of government. ATRA is no exception. It plays a key role in Afghanistan, both currently and in its prospects for the future. Currently it oversees an economic sector approaching \$1 billion annually, which makes it the second largest contributor of tax receipts to the Afghanistan government.

ATRA's Universal Access Program and the funds flowing into the TDF to execute it are a critical component of the regulatory function, one that could be easily compromised. That said, to date ATRA has accountably managed more than \$200 million, and successfully overseen the provision of cellular services to tens of thousands of rural Afghans and broadband to thousands more at universities throughout the country. Its current Five-Year Strategy will face plenty of obstacles in its implementation, but it strengthened the Afghan Government's promise of making broadband accessible to more than half of all Afghans, up from less than 10% in 2019.

Moreover, a successful TDF which is transparent, accountable, and programmed to responsibly use Afghan government revenues has the potential to serve as a model for the many other Afghan agencies with a public service mission. At the outset of this project, many stakeholders and interlocutors suspected that the TDF resources had been wasted at best or misappropriated at worst. The annual audit and upgraded accounting systems developed directly from NetHope support were able to effectively dispel those suspicions. With these controls in place, the TDF is now a model of how all Afghan government entities should perform.

Finally, regarding the NetHope "Learn-by-Doing" approach, ATRA had historically turned to consultants to perform the bulk of its specialized work. The TDF was still operating off antiquated guiding documents prepared by consultants back in 2008 (including its Universal Access Policy, Manual of Operating Procedures, etc.). The NetHope team proposed that all TDF support activities be led by ATRA staff, with specialized support being provided by NetHope on an "as required" basis. The Five-year Strategy process was led by a broadly representative group of ATRA staff. NetHope delivered an intensive strategic planning training seminar, and conducted the specialized gap, market, and financial forecasting analyses, but the bulk of the inputs, discussions and decisions were taken by the strategy team as a group. In this way, NetHope advanced the notion that ATRA's ownership and ability to operate with less assistance will endure.



14. Universal Service Obligation in Indonesia

March 2012 – June 2018

BACKGROUND

By any measure, the telecommunications and broadband sector in Indonesia underwent a dramatic transformation since government-initiated sector reform initiatives in 2000. While the number of Indonesians using the internet followed an upward global trend, increasing sevenfold from 8.1 million in 2005 to 56.6 million in 2015, Indonesia's internet penetration remained only around 25%, with around four-fifths of the country's internet users located on the islands of Java and Sumatra. As it developed, the sector delivered uneven infrastructure quality with geographic location determining availability, speed, and cost. For communities in disadvantaged regions, the infrastructure and media for digital communication and information were underdeveloped or unavailable. To address this situation, the National Development Planning Agency (Bappenas) in partnership with the Ministry of Communications and Information Technology (MCIT) committed to developing mechanisms to improve digital access in rural and less developed areas of Indonesia.

TECHNICAL ASSISTANCE

In October 2014, the Government of Indonesia initiated the Indonesia Broadband Plan 2014-2019 (IBP) to address the need for affordable broadband across the country's 18,000+ islands. The IBP was developed with technical assistance from NetHope. With a significant resource commitment of over \$22 billion, the plan addressed the institutional and regulatory reforms required to maximize the benefits of broadband. The plan included six unique flagship programs:

- Palapa Ring (Expansion and Financing)
- E-government Networks and Data Center

- Passive Infrastructure and Shared Ducts
- Rural Wireless Terrestrial Broadband
- Universal Service Obligation (USO) Reform
- National Digital Literacy

The activity built directly upon earlier project work that NetHope had conducted for Bappenas and the USO Fund administration, managed by Badan Aksesibilitas Telekomunikasi dan Informasi (BP3TI). The general purpose was to work closely with BP3TI management and staff to assist with reforms to internal plans and processes needed to adapt the fund's operations to new mandates. Specifically, this included conducting an assessment of the current status of fund operations and advising on improvements and changes relating to the expansion of the fund's mandate to support both infrastructure and broadband "ecosystem" related projects. Through these reforms, the IBP anticipated covering 49% of rural households and 70% of urban households by 2019.

In addition to the involvement of several Indonesian ministries, significant contributions were anticipated from the telecom sector, with major service providers bidding on specific project elements. The USO, administered by the MCIT, was provided with substantial resources to support the implementation of the IBP. However, as a new organization, the USO recognized that before they funded projects, they needed to identify key sector issues, comparing their policies to international best practices and recommend structural and organizational reforms. NetHope assisted in developing the operating strategy. Assistance focused on three key areas – a new strategic plan, oversight and management changes, and a new

investment plan. To facilitate these changes, NetHope recommended that the fund's governance be revised to streamline decision-making. NetHope recommended that resources be set aside to build the capacity of the individuals administering the fund. The fund's monitoring and evaluation functions were also improved to ensure that projects were being properly financed and implemented. Lastly, collaboration with other government agencies and the private sector was key to improving the fund's performance.

In June 2015, the new Ministry Decree No 25/2015 on USO was issued, under which the USO fund was given authority to support infrastructure as well as other ecosystem components. During the period of July-August 2015, NetHope collected information regarding implementation constraints under the previous USO procedures relative to non-infrastructure, ecosystem programs as mandated by new decree. Following consultations with BP3TI staff, the Ministry of Finance, and Parliament officials, NetHope produced an assessment report on the progress of USO and USF reform.

RECOMMENDATIONS

- NetHope recommended that the main orientation of the USO project, like other such funds around the world, should involve promoting market development objectives and universal service provision for the unserved or underserved areas and community groups.
- The programs outlined in the decree recognized the above objective by the establishment of the Broadband Ecosystem category of projects. However, there were concerns regarding the sustainability of some programs, so NetHope recommended that the priority for ecosystem projects be expanded.
- NetHope indicated that the program should allow establishment of new local internet service providers, provided with sufficient revenue to reach a reasonable level or return-of-equity. To ensure sufficient levels of revenue, NetHope recommended establishing the Indonesian government as a model (or "anchor") user.

- At the policy level, NetHope recommended that all of the operations follow pro-competitive and shared-resources principles.

In 2016, these USF reform recommendation that previously established by Ministerial Decree 25/2015, began to be implemented.



IMPACT

The adoption of the IBP and enhanced capabilities of the USO dramatically increased the level of infrastructure investment in Indonesia. Projected initiatives under the IBP included:

- \$23 billion in investments.
- Approximately 140,000 schools and 5,000 health clinics connected to high speed internet
- \$460 million from the USO fund used for infrastructure improvements and broadband connectivity.
- More than 1,600 rural fishing and farming villages provided broadband internet access.

One key area of focus was the development of the Palapa ring, a backbone fiber infrastructure development initiative divided into three packages:

- **Southwestern package:** This covered an area of Riau and Riau Islands (up to Natuna Island) with total length of fiber optic cable around 2,000 km. The agreement was signed with a private consortium on February 29, 2016 and construction started in August 2016.
- **Central package:** This covered Kalimantan, Sulawesi, and North Maluku, with a total length of fiber optic cable about 2,700 km. The agreement was signed in March 2016 and construction began in September 2016.
- **Eastern package:** This covered East Nusa Tenggara, Maluku, West Papua, and Papua, with a total length of fiber optic cable over 8000 km. The agreement was signed in September 2016 and construction started in March 2017. A special business entity, called PT Palapa East Telematics (PTT), was formed by the government to be the executor of Eastern Palapa Ring Project.

The project maintained high level government support, with President Joko “Jokowi” Widodo publicly stating that the Indonesia’s Palapa Ring project would provide high-speed internet services and connect 17,000 islands throughout the country by 2019. Supplementing the Palapa Ring initiative was a push to expand 4G coverage throughout Indonesia. Collectively, the increase access and proliferation of fiber and expansion of the mobile broadband network dramatically increased the availability of reliable broadband in Indonesia.

LESSONS LEARNED

Specific lessons learned from this project included:

- **Reform Process**
In addition to the uncertainty of structure and senior officer assignment, other organizational changes occurred at the level of the USF authority (BP3TI). One triggering factor was the adoption of NetHope’s previous recommendations on USO reform. The recommended shift of BP3TI from a structural unit into

functional body took a very long time to implement. After the decision to create a functional body, the appointment of its CEO took more than 1.5 years. In the absence of a CEO, all strategic decisions and execution were slowed down.

- **Governmental Transition**

It was typical that a new administration would introduce new policies and changes to programs, as it occurred with the new president and internet broadband plan. The purpose was to distinguish clear cut accountability of the new administration from the role of the previous. This policy, however, also brought a risk of discontinuing some successful established models, while taking time and effort to “reinvent the wheel,” let alone rebranding with a new name.

- **Political Interference**

Learning from the previous project, MCIT pushed forward the bottom-up process of planning. While beneficiary commitment could potentially have enhanced the chance of increasing utilization of new ICT projects, there was also a degree of intervention of top-down process from ministry’s inner circle. This type of intervention was found in other countries or regions; therefore, it was important to mitigate the potential risk of derailing or slowing a project’s implementation versus ignoring key stakeholder interests.

- **Development Model**

During the planning process and outcome evaluation, NetHope observed that a sequential process for creating a development model should be considered for design and implementation of USF programs. The approach should establish a sequence of priority actions. The first step was determining the facts regarding development objectives and constraints. Then, based on this knowledge, a planning model should be developed. Based on this model, a regulatory framework was required for securing the resources and defining the impact of the program. Moreover, a skill network also had to be prepared to ensure the sustainability of the project. The last factor was availability of the technology and solution for the addressing development challenges.

WHAT'S NEXT: Universal Access Funds – Toward Global Broadband 2.0

By Daniel Espitia, Cofounder & Director, Millennium International Limited

CURRENT STATE OF BROADBAND ACCESS

How connected are we today? And what are we connected to? The focus of universal access policies 20 years ago was the extension of basic telephony services. While mobile technology had already been firmly established in developed-country contexts and was rapidly making inroads in developing countries, many of the underpinnings of universal access policy were still largely rooted in the era of fixed-line telephony. Since that time, rapid technological advances have swept the landscape, and new approaches were developed to meet ever-changing conditions.

From its inception, the high adoption rate of mobile technology has made it a uniquely capable platform for extending the reach of networks in pursuit of universal access policy objectives. At the end of 2002, twelve years after the inception of second generation (2G) mobile technology, mobile subscribers surpassed fixed subscribers for the first time, and much of the world

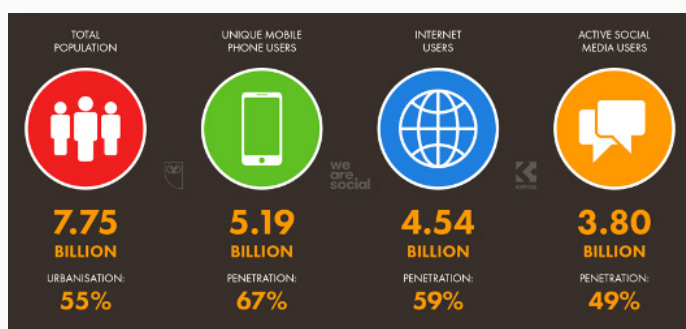


FIGURE 1: Digital Around the World in 2020, Source: HootSuite

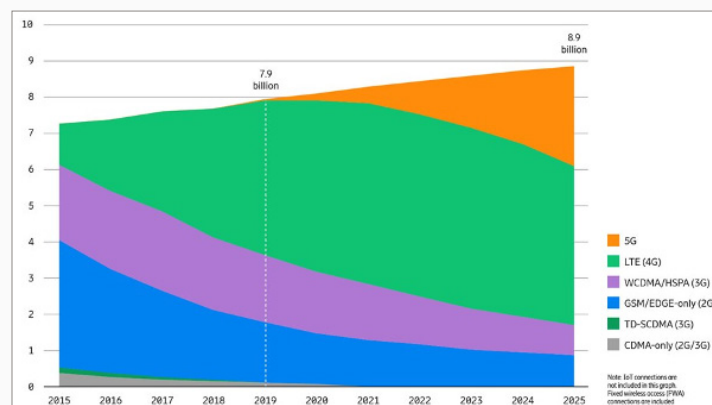


FIGURE 2: Adoption of Mobile Technology, by Generation

had completed the transition from first generation and analog to 2G digital cellular networks. That year, there were some 788 million GSM subscribers on 467 networks spread across 169 countries, and analog users accounted for a mere 3% of all mobile subscribers.¹ 3G technology was introduced around the same time, and today it is estimated to encompass 4.2 billion subscribers worldwide.² 4G, which was introduced at the end of 2009, today accounts for 1.8 billion subscribers globally.³ Last year, 5G was introduced, and the current, early-adoption baseline is 70 million subscribers and is expected to reach 1.8 billion by 2025. If these projections are met, the adoption cycle between generations of mobile technology will have shortened from 12 to five years, with most existing subscribers eventually migrating from one platform to the next, driven by value generating opportunities that accompany increased data speed and capacity. From a

¹ ITU. The evolution of 3G mobile. <https://www.itu.int/itunews/issue/2003/06/thirdgeneration.html>

² Statista <https://www.statista.com/statistics/226094/global-3g-mobile-subscriber-forecast>

³ Statista <https://www.statista.com/statistics/226101/global-4g-mobile-subscriber-forecast>

wide perspective, it is estimated that there are 4.54 billion internet users today, connected mostly to 4G LT. This represents a 59% global penetration rate.

From Universal Access to Digital Inclusion⁴

According to the International Telecommunications Union (ITU), the conventional enablers of universal access are availability, accessibility, and affordability,⁵ defined as:

1. **Availability**, or infrastructure coverage, which is estimated to be 100% in the course of this coming decade.
2. **Affordability**, or how much the consumer actually pays for a device and data in terms of his/her available income.
3. **Accessibility** in terms of consumer readiness to skills, devices, and opportunities and local and relevant content and services, including online security.

The World Bank framework for facilitating broadband is defined as an enabling ICT platform that influences the economy because of the associated gains in productivity. It further defines the broadband ecosystem as a dual system – supply (that is availability) and demand (driven by affordability and accessibility as above). To achieve this, “governments will have to design various policies and programs focused on different components of the ecosystem.”⁶

These precepts, along with the rapid increases in technology noted above, demonstrate a new approach to universal access, one that seeks to embrace a broader notion of *digital inclusion* by shifting focus to address these questions of affordability and accessibility head-on over the next decade.

Identifying Critical Gaps in Digital inclusion

There are reasons to be optimistic, yet the previous analysis suggests that four important gaps remain insufficiently addressed – usage, gender, rural, and poverty.

- **The usage gap** – It is estimated that approximately 3.3 billion people who live in areas currently covered by mobile broadband networks do not use internet access.
- **The gender gap** – It is estimated that 23% more women than men use mobile internet access.
- **The rural gap** – There is a persistent rural-urban gap in low- and middle-income countries (LMICs) of about 40% of the rural population that is less likely to use mobile internet access.
- **The poverty gap** – In less than half LMICs, the cost of an entry level internet-enabled device is more than 20% the average monthly income.

These four gaps offer insights into the magnitude and extent of the challenge to digital inclusion that lies ahead. Accepting a definition of digital inclusion that requires being equally included in the social and economic opportunities that ICTs offer suggests a level of engagement that extends beyond simply owning an internet-connected device, an internet connection, an email account, or a WhatsApp account.

Digital inclusion means a further democratization of access to ICTs as they are integrated with key systems or institutions of government and the private sector, not as a mere side dish. What are these key systems, sectors, or institutions? They are, at the very least education, health, and government services.

⁴ The concept of Digital Inclusion has been promoted by the ITU since 2013 and it is further embedded in subsequent studies, including USAID’s Digital Strategy 2020-2024

⁵ Based on the enablers proposed by GSMA-State-of-Mobile-Internet-Connectivity-Report-2019

⁶ Building Broadband: Strategies and Policies for the Developing World, Kelly, Tim, et al. World Bank (2013)

State-driven universal access strategies typically rely on several institutions for implementation, and standard approaches look to ministries that formulate policy and regulators that oversee standards, protect the consumer, and promote competition. To achieve the digital inclusion goals of the future, it will be essential to revisit those functions and include a wider set of stakeholders to enable the further democratization of ICTs. This goes beyond putting an intelligent smartphone in someone's hands. It suggests a more integrated approach to the betterment of the broadband ecosystem, including the integration of education, health, and government services. In addition to issues of affordability, these approaches will require focus on gender, rural, and poverty gaps. Strategies, such as the USAID Digital Strategy 2020-2024,⁷ that acknowledge an ecosystem approach to digital inclusion, are likely to lead the way in this updated approach.

LESSONS LEARNED

Universal service funds (USFs) have played an important role in driving access over the last two decades, and the record of implementation reflects a varied experience. The underlying logic of the USF concept is to address market gaps and apply subsidy mechanisms to make a business case where it might otherwise not be viable. This includes investing in infrastructure and focusing on new technologies that deliver connectivity more efficiently and economically.

Earlier in this report, a review of USF design and implementation projects that NetHope undertook over the past decade noted key areas of intervention – strengthening of (1) universal access policy and regulation; (2) fund institutional design, programming and management; and (3) other related issues. There are a number of relevant lessons in the broader USF experience to consider as we look toward future approaches:



GOAL OF THE USAID DIGITAL STRATEGY

To achieve and sustain open, secure, and inclusive digital ecosystems that contribute to measurable development and humanitarian assistance outcomes and increase partner countries' self reliance.

- **Universal access policy** continues to be an important policy mechanism and focus for technical assistance and support in the access space. Experience with broader statements of policy, such as national broadband policies (which are typically less specific about implementation details and mechanisms), can be often lacking, non-actualized, or in some cases non-existent. Legislation and formation of implementation bodies tend to move slowly.
- **Greater integration among key sectors.** Aspects of ICT policy within the key sectors of education and health often move at different speeds, different priorities, or simply as a reaction rather than as an expression of commitment. Therefore, although there is significant success in policy design for ICT within infrastructure institutions (such as ministries and regulators), key sectors of the economy need to synchronize and integrate more effectively.
- **USF institutional design.** One key intervention in policy is design of USFs, which are typically hosted either at the ministry, the regulatory agency, or as a separate autonomous and independent entity.⁸ Experience suggests that none of these hosting models provide an advantage in making a USF more or less effective. Rather, effectiveness of any given USF rests more on the quality of its strategy, programming, management, and transparency.

⁷ <https://www.usaid.gov/usaid-digital-strategy>

⁸ For example: Nigeria, Pakistan, Thailand. ITU Universal Service Fund and Digital Inclusion for All (2013)

Further Lessons of USF Strategy Design

Perhaps the most important technical assistance intervention provided has been the refinement of USF strategy design. USF strategies typically rely on a five-year plan with investment targets in supply (infrastructure, computers, equipment) and demand (connectivity, training, services, applications). In most cases, the emphasis has been given mostly to the former. On top of this, USF investments are often focused more on capital expenditures than operating expenses, the former accounting for three to four times the investment in operating expenses for a project. Experience has shown that investment in operating expenses is key for medium- and long-term project and program sustainability.

USF strategy design is typically established after a one-time study is conducted by specialized consultants. The recommendations that lead to strategy formation are often guided by the use of gap analysis and econometric tools to assess development differentials access enablers. Strategic outputs are often biased towards supply-side interventions and broad in scope. Very few funds today include special inclusions for persons with disabilities, women and girls, youth, and children.

These strategic plans often become quickly out-of-date from the onset and can easily become out of step with reality by the end of their first year of implementation. Strategic planning should become more dynamic and integrate geospatial analytical tools with closer to real-time diagnostic and assessment of the state of ICT access in the country at any particular moment.

Programming and Management

A typical USF five-year strategic plan includes broad budgets and target projects, all of which require skilled professional and specialized human resources, ongoing training, good communication with government entities, and excellent relationships with industry. Strong USF institutional design should emphasize bringing in

specialized personnel and improving public relations and stakeholder engagement. USF's tendencies towards bureaucratic insularity and reactive isolation require proactive approaches to remedy.

Transparency

Information flow by USFs to the public is often lacking or outdated, such as in websites, access to the public, and limited communication with its stakeholders. This is an area of institutional design that needs to be emphasized and strengthened. Annual fund financial reporting is often lacking or incomplete, even though it is essential for stakeholder participation and engagement.

Management and Private Sector Engagement

Implementation of USF projects often relies on vendor contracts assigned through competitive bidding. While competitive bidding has been a success in procurement for many USF projects, especially with the use of least-cost subsidy, there is a need to engage the private sector, large operators, and small firms on a more equitable and wholistic basis.

Accountability through Monitoring and Evaluation (M&E)

M&E has often lacked in USF programming and management, and both large and small USF investments are often not tracked after disbursement. It is important to develop a stronger focus on M&E as an intrinsic part of the USF management, including a minimum set of standardized key performance indicators (KPIs).

Fund Resourcing

Some USFs are larger than others and are the result of contribution requirements placed on ICT operators, which are typically between 1.0% and 2.0% of gross revenue. There are outliers whose contributions are less than 1.0% and those whose contributions are made from *net* revenues.

⁹ Statista. Global telecommunications services market value from 2012 to 2019, by region.

The global revenue derived from telecom services was expected to reach almost \$1.42 trillion in 2019.⁹ If contributions to USFs worldwide were between 1% and 2% annually, between \$14.2 and \$28.4 billion would have been available for potential investment towards *digital inclusion*. However, contribution to USF is often a point of contention for service providers, especially in developing countries. Because contributing service providers often perceive little benefit from these levies, they are often simply viewed as a tax rather than an investment.

Toward “Global Broadband 2.0”

Given these observations, there are two key areas that should drive the next generation of technical interventions to support digital inclusion – 1) strengthening policy and regulation frameworks directed towards the goals of digital inclusion, and 2) strengthening the USFs as a strategic tool.

Strengthening Policy and Regulatory Frameworks

ICT *digital inclusion* policies need to have a stronger strategic demand-driven emphasis on affordability and accessibility.

- **Affordability.** From the citizen’s perspective, access depends on having an affordable device with which to connect to affordable connectivity (data). The former relies on a one-time investment, while the latter is an ongoing cost. Operators’ focus on charging for data is equivalent to charging per minute during the bygone era of telephony in which metered billing was a norm, even though this is a sunk cost. This approach has become anachronistic. Could a video conference call on Zoom really be affordable at per-minute pricing for every single participant? Clearly not. Data costs assessed on this basis are still prohibitive to many and highlight the need for policy interventions that push operators towards single-price, unlimited data models. Such innovations would likely stimulate demand in the device market.

- **Accessibility.** The utility of affordable access relies heavily on what users can do with it, the value they can receive from it, and the services that they can get, whether in terms of education, health, or government services. These applications, services, and relevant local content are the foundation of an improved, demand-driven digital inclusion strategy. The key drivers start with government service-delivery systems – education, health, and e-government. These tools do not need to be developed every time at great cost. Instead, template models can be customized and be more economically effective and quicker to implement in most countries. The private sector will tend to follow these investments to be part of the implementation process and offer complementary solutions.

Accessibility in the past has been driven by kiosks, telecentres, and computer labs. The past decade has shown that “innovation centers of excellence,” especially those linked with an educational facility or university, are more capable drivers of demand-driven innovation and local adaptation. These models often bring creative groups together, including students and start-ups/small entrepreneurs to develop solutions, applications, and services that are responsive to local needs and which incorporate locally relevant content.

Strengthening USFs as a Strategic Tool

The future of global broadband development will rely heavily on updated USF designs that place a greater emphasis on principals of digital inclusion and acknowledge the foundations of usage, gender, rural, and poverty gaps. Increased deployment of infrastructure via fiber and wireless links and installation of mobile base tower stations will remain an important component of any digital inclusion strategy. Next-generation USF supply-side strategies are also well positioned to build on their existing forms and legacies to carry on this agenda and form the necessary partnerships with private sector network and service providers that can

DIGITAL INCLUSION FUND	
Model Board/Stakeholders	Unit within Ministry/Stakeholder
ICT/Telecoms Regulatory Agency [REG] Ministry of ICT/Comms [ICT] Ministry of Education [EDU] Ministry of Health [HEA] Ministry or agency in-charge of e-Government [EGV] ICT/Telecoms Industry [IND] Other Private Sector [PRV]	DIF unit

FIGURE 3: Organizational Framework for Digital Inclusion Fund

help scale viable solutions. Given the nature of the most significant and persistent gaps in digital inclusion that exist today, the focus of USFs should be redirected towards demand-driven strategies in the coming decade, focusing on the four main usage gaps.

In order to do this, USFs must coexist more closely within key sectors of the national economy, including education, health, and government service-delivery systems, where already significant existing gaps impede the synergy necessary for social and economic development. This means a new institutional design that limits the isolation of USFs within other institutions and re-envision USFs as independent and professionally well-resourced corporations. The next-generation USF will require more specialized management, engineering, legal, and economic professionals within its ranks and will require the participation of more seasoned professionals with deeper insights into the formation and promotion of inclusive digital ecosystems.

Operationally, these USFs should place a greater emphasis on engaging stakeholders across government, service providers, and the private sector while still reporting to government *digital inclusion* implementation bodies (see Figure 3). Ideally, USFs should use advanced management software tools, including geographic information system (GIS) technology that can

provide real-time information to guide other public policy decisions and assist in performing timely through periodic financial and technical results. This would produce standardized KPIs that would be globally comparable and therefore more transparent and accountable to the public.

CONCLUSION

The challenges that will characterize the next phase of universal access policy implementation require a shift toward the *digital inclusion* agenda. Revised perspectives on affordability and accessibility must be incorporated within new policy designs and accompanying implementation mechanisms. In this sense, a well-founded and well-executed USF concept is also ripe for reinvention.



15. Zambia National Broadband Plan

February 2016 – August 2016

BACKGROUND

Given the numerous challenges facing information and communications technology (ICT) development in Zambia, the Government of the Republic of Zambia (GOZ) initiated a top-level policy process designed to create and implement a formal National Broadband Strategy (NBS) in 2014. The Ministry of Transport and Communications (MTC) requested USAID's and NetHope's assistance and inputs to the development of the NBS, in particular with respect to elaboration of the monitoring and evaluation (M&E) component, as well as overall strategic objectives and approaches.

Given NetHope's experience in carrying out support requests of similar nature in multiple countries, and the Zambian request aligned well with the purview of the NetHope's cooperative agreement, as well as the framework for promoting enabling legal/regulatory environments outlined in the Africa Broadband Partnership (ABP) charter documentation.

USAID/Zambia and the Educational Context

The combination of plummeting global copper prices and drastic currency devaluation decimated the Zambian national budget in 2015 and exacerbated numerous structural challenges across public institutions. For example, several key government agencies were forced to make drastic budget cuts, including the Ministry of Education (MOE), which saw a 41% reduction of their programs budget in the prior budgeting year. These fiscal stresses compounded existing weaknesses within the education sector in a country that has one of the lowest literacy and numeracy rates in the world.

For years, USAID/Zambia has delivered targeted support to the education sector. At the same time, it also has been a distinctly *ICT-friendly* mission since the late 1990's, when it played a pioneering role in support of the USAID Leland Initiative. Continuing in this tradition and recognizing that ICTs reduce overall program costs and increase program effectiveness with regard to information collection, sharing, and utilization, the Mission actively sought to integrate ICTs into multiple areas of its portfolio, most notably within the fields of their two key priority sectors, education and health.

Objective

The objective of the project was to promote broadband diffusion in Zambia through a country intervention designed to: 1) strengthen GOZ efforts to develop and implement a national-level broadband policy environment; and 2) demonstrate the effectiveness of rural broadband last-mile configurations that incorporate low-cost/innovative access technologies and leverage significant local investments in an ICT-enabled pedagogy model.

Technical Assistance

In February and March 2016, NetHope conducted a series of trips to Lusaka, Zambia to meet with the MCT, local organizations, and USAID/Zambia to develop the scope of work for support of various connectivity and regulatory technical assistance initiatives. The MTC had been working on the NBS since late 2014 and had produced several iterations of the NBS to date. The MTC subsequently required assistance to complete select components to finalize the NBS. The MTC cited the following as impediments to the completion of the

NBS: 1) an unfinished M&E plan to ensure that the document translated to action and impact; and 2) a lack of understanding of technical and regulatory implications of innovative spectrum approaches, including the use of TV White Space (TVWS) as an emerging rural access solution.

In February 2016, NetHope also evaluated the education sector linkages to NetHope's two core program areas – access and applications. As ICT needs were not limited to any one sector, however, most of the USAID/Zambia portfolio stood to benefit from a more robust, extensive, and affordable broadband internet environment. In this respect, strengthening USAID's education sector activities was seen as a prototype for expanded ICT integration across the broader Mission portfolio and easily gained support from the Mission.

In the second half of 2016, NetHope delivered technical assistance to key public sector stakeholders as part of a broad effort to modernize and reform key elements of Zambia's ICT policy environment. The first phase of the technical assistance focused on developing a formal request from Zambia Information and Communications Technology Authority (ZICTA) to submit recommendations to a consultation paper issued as part of a formal review of the ICT licensing framework. NetHope's recommendations underscored the importance of aligning sector licensing regulations to modern market and technical conditions, with a clear emphasis on enabling widespread, diverse, and innovative ICT development through competition, investment, and innovation among a broad section of industry participants.

In July 2016, NetHope initiated the technical assistance for the review, revision, and dissemination of the NBS. The technical assistance focused on completing the final components of the NBS, including developing a monitoring and evaluation plan to track implementation and forming a coherent approach to innovations in technology and policy. A series of in-person meetings were conducted in Lusaka, after which NetHope

delivered several strategic recommendations regarding plan implementation, including the development of a roadmap designed to integrate NBS implementation across multiple sectors.

Recommendations to the National Broadband Strategy

Overall, NetHope found the NBS document to be strong, and the process that the MTC followed to conduct consultations and incorporate inputs from various stakeholders was commendable. NetHope's recommended changes to the NBS included the following:

1. ZICTA Universal Access Fund

NetHope recommended that ZICTA should enhance and strengthen the Universal Access Fund (UAF), to make the fund a more transparent and effective mechanism to support funding of the National Broadband Strategy goals. NetHope recommended that such a project should involve review of the UAF's past and current activities, procedures, and performance, diagnosis of areas needing adjustment or improvement, and development of a new strategic plan for the UAF within ZICTA.

2. Broadband ICTs in Education

The MOE took several steps to incorporate ICT in Zambia's education system, but they were relatively small programs with limited results. NetHope recommended that the NBS include a wider approach to establishing a comprehensive national e-Education strategy, incorporating elements of school connectivity, ICT devices and facilities, e-curriculum, teacher training, online classes, an education management information system (EMIS), administrative record-keeping, and more. Details of the strategy would be developed by the MOE with assistance and collaboration from the MTC and others, as part of the overall NBS implementation process.

3. Broadband ICT in Healthcare

The draft of the NBS document did not explicitly contain reference to the healthcare sector, beyond mention of some potential applications. Given the importance and potential impact of incorporating broadband ICT within all facets of public health to improve health services and health outcomes, NetHope recommended including a new sub-program on e-Health, similar to the e-Education component recommended above. The e-Health initiative would focus on several objectives and activities, while building on work in the sector, particularly in connectivity for rural health clinics, such as the pilot e-Health network of the Churches Health Association of Zambia (CHAZ) and Nexus Mundi Foundation.

Recommendations to the NBS Implementation, Monitoring, and Evaluation

The MCT requested that USAID and NetHope provide inputs and recommendations specifically to M&E requirements for the NBS. Based on these discussions and related initiatives, NetHope developed a preliminary set of recommendations for the parameters of an expanded implementation and M&E plan to be added to M&E section of the draft NBS.

1. Institutional Framework

The section addressed the institutional roles and responsibilities for oversight and monitoring of the NBS' implementation. NetHope recommended that an NBS office should be created within the MTC to be staffed with personnel with dedicated and more direct responsibility for oversight of NBS implementation.

2. Implementation Action Plans

The section identified the need to prepare detailed action plans for each NBS program or distinct projects to be undertaken within the NBS framework. NetHope proposed several Implementation Action Plans that would provide sufficient information for

MTC and other stakeholders to understand the specific expectations for each project, the tasks that would be required to achieve their identified target outcomes, the resources involved, and the associated timeframes. These Implementation Action Plans represented a crucial first step in the process of implementing the NBS, project-by-project.

3. Integrated NBS Implementation Bootcamp

The third major component of the Implementation Action Plans involved preparation of an Integrated Roadmap for the overall NBS, combining key elements of the Implementation Action Plans, and reconciling matters of project timelines, milestones, budgets, and responsibilities. The goal was to conduct a second reality check on the full scope of plans and needed activities and resources, to reinforce the NBS, and enhance the likelihood that all of its targets could be achieved as planned.

4. Progress Reports

This section and those that follow addressed the specific M&E tasks associated with NBS implementation. These inputs were intended to build upon the framework already included in the draft NBS document in the M&E section. While the existing language and illustration depicting the Monitoring Framework were quite good, NetHope proposed additions to include more specificity regarding the responsibilities and timing of data collection and progress reporting.

5. Evaluation Reports

This section addressed the requirement for the evaluation of NBS project results and outcomes, beyond the initial stages of basic monitoring and progress reports. Evaluation reports provided a more in-depth level of analysis of the effectiveness and impacts of NBS implementation over time, once projects have been launched. The evaluation process allowed for the review of the NBS high-level objectives in relation to real-world results. It also

supported assessment of the NBS development, management, and implementation processes themselves. Findings from these reports assisted MTC in further refinement and follow-up of the NBS.

6. Strategy Review and Revision

The final component of the recommended Implementation Action Plans was to conduct a complete mid-term review and revision of the full National Broadband Strategy after completion of the Year-2 evaluation studies. The goal was to assess the full Strategy, considering interim results and other recent trends and developments, and to consider potential adjustments and revisions to its objectives, plans, and programs.

RESULTS

NetHope's recommendations to the NBS document and the NBS implementation, monitoring, and evaluation were well received and were sent to the National Cabinet for review and approval. The planned second phase of the technical assistance focused on the incorporation of the recommendations into the final NBS document. The tumult of the Zambian general elections in 2016, however, shifted priority and focus away from the final review and approval process of the final NBS document and subsequently ended NetHope's assistance.



16. Indonesia National Broadband Plan

October 2014 – May 2016

BACKGROUND

NetHope developed the framework for the structure of many components of the Indonesia Broadband Plan (IBP) and took the lead in obtaining stakeholder inputs to the IBP from key sector stakeholders (government, education, health, logistics, and procurement). NetHope helped draft the main elements of the IBP that addressed target outcomes and strategies for each of these sectors.

NetHope also worked with the Indonesia Ministry of Planning (Bappenas) to define several core flagship programs under the IBP, which were cross-cutting activities that represented the most visible and high-priority elements of the IBP:

- **Palapa Ring:** The national fiber backbone infrastructure initiative was expanded and financed under terms of the IBP and BP3TI (Badan Aksesibilitas Telekomunikasi dan Informasi) reforms.
- **Shared Ducts:** Policy on passive infrastructure sharing to ensure efficient deployment of underground fiber cables and other transmission media.
- **Rural Terrestrial Broadband:** Initiative to deliver broadband access to local communities in rural areas using innovative terrestrial network technologies, including TV White Space (TVWS).
- **e-Govt Networks & Data Center:** A broad national program that linked all e-government networks and services via a shared data center and common platforms and interfaces.
- **USO Reform:** The recommended reforms to the USO Fund were elevated to the level of a flagship program to ensure their priority implementation under the IBP.



- **National Digital Literacy:** Introduction of a program to promote digital literacy among the Indonesian population to provide capacity building and outreach in understanding and use of advanced ICT capabilities for all citizens.

Following development of these inputs to the IBP, NetHope continued to assist Bappenas with the finalization of the IBP. This included further consultations with relevant ministries and stakeholders, development of budget projections, and assistance with drafting of the Presidential Decree, which was officially signed in September 2014.

CAPACITY BUILDING

The focus of the capacity building was to provide support to Bappenas implementation of the IBP. NetHope support focused on aiding Bappenas in developing a set of implementation and monitoring procedures, protocols, and institutional arrangements. The goal was to help Bappenas to align the implementation of the IBP's flagship and sector priority projects with the President's

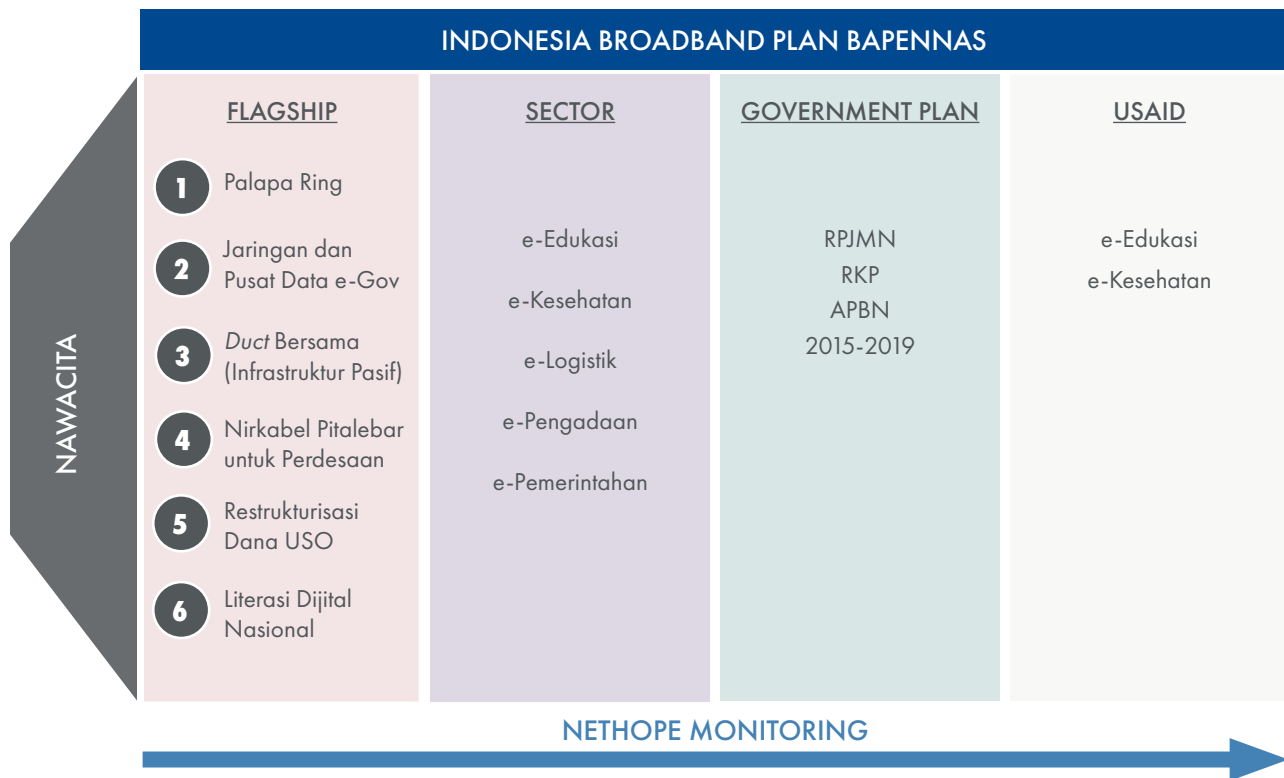


FIGURE 1: Summary of the Monitored Activities

National Vision (NAWACITA), Indonesia’s Medium-Term National Development Plan (RPJMN), and the Ministry Strategic Plans (Renstra), as well as with USAID’s local programs and objectives. Figure 1 summarizes the monitored activities.

Bappenas planned to establish an in-house team, which would form the beginnings of an IBP Monitoring and Evaluation (Monev) Unit, and the provision of funds in its budget for Monev Unit activities. While waiting for Bappenas to form its in-house team, NetHope prepared a preliminary IBP monitoring framework.

Some of the key steps of that framework were:

- IBP Plan elaboration in a logical framework;
- Development of a monitoring instrument;
- Alignment of the monitoring framework with the Monitoring Template of the Presidential Office.
- Development of a list of documents to be collected from the line ministries, used for the alignment, to be included as an annex to the framework.

In addition, NetHope obtained and reviewed the Government’s Strategic Plans for e-Health and e-Education for 2015-2019 to provide a basis for the monitoring and evaluation trial. The review was support of a prototype annual e-Health and e-Education sector evaluation report. The review indicated that:

- The two main indicators for connectivity in support of e-Health were 1) percentage of district hospitals that reported establishing a prioritized health data (baseline was 20% in 2014 to 70% in 2019) and 2) data connectivity dedicated to district hospitals (baseline was 0% in 2014 to 50% in 2019).
- The target connectivity in support of e-Education was 540 schools to be ready for the national on-line exam. At the time, the status of broadband deployment under the USF was only 356 schools reached.

The formation of an in-house team within Bappenas was critical to the establishment of the Monev Unit. Unfortunately, due to several organizational changes at

the Ministry level, including relocation of the Deputy and Directorate, this critical prerequisite was not available. With the position of Deputy of Infrastructure left vacant, no budget decision could be made. Therefore, further activities were put on hold pending assignment of that position. In May 2016, with concurrence from USAID, NetHope terminated further activities in Indonesia.

LESSONS LEARNED

After successful work on USO reforms in 2013 and IBP development in 2014, the capacity building for IBP implementation, monitoring, and evaluation represented a strategic follow-up project. However, due to the organizational changes that occurred in the Ministry, the establishment of a Monev Unit was not completed.

An important lesson learned was that the transition period of a new government administration must be carefully considered when establishing objectives, deliverable targets, and project timelines for similar capacity building activities. The capacity building activity for Bappenas was initiated at the beginning of a new presidential period. The IBP Presidential Decree was issued at end of the administration of President Susilo Bambang Yudhoyono, while the implementation was executed under his successor, President Joko Widodo. Even though the new president was a strong supporter of IBP, the transition between administrations created much uncertainty in the structure and appointment of senior officers in the ministries. Slow decision-making during the transition created uncertain institutional settings, structure, functions, budget allocation, and organizational relationships.

Upon reviewing public documents for monitoring and evaluation, such as the RPJM (Indonesia Medium-Term National Development Plan), NetHope learned that the published five-year plan of the line ministries did not cover all IBP flagship and priority programs. This discovery revealed that a policy or planning document, such as IBP, must be issued at least two years before RPJM formulation, which would leave enough time for

the line ministries to align their programs with the IBP direction. If any associated programs were found in the IBP and RPJM, those were mainly channeled by the officer who was involved in the previous work of IBP formulation. A collaborative, inter-ministerial forum, as was used during the IBP formulation process, has the potential to effectively build commitments for future action.

The IBP implementation required intensive intersectoral collaboration. However, regulations at the time were mostly aimed at serving sector-specific activities. Therefore, many options for establishing intersectoral programs were overlooked. Even within one ministry, several silo activities made the prospect of some cross-cutting programs difficult to establish. Hence, to accelerate IBP implementation, some form of inter-ministerial decree was needed. Especially important, these regulations should be based on the grand design of a program with specific task distributions, emphasizing the need for accommodating the interests of all parties. At the time, it was more common that such regulations were formulated based primarily on bureaucratic considerations.

During the development of the monitoring framework, NetHope collected a substantial volume and variety of datasets from line ministries. NetHope discovered that, even if the Monev Unit had been established, the unit would likely face huge challenges on data collection. For example, within the ministerial database system, it was very difficult to find classifications of accounts at both the aggregated and disaggregated level, which made it difficult to associate information with each of the IBP targets. NetHope disclosed the database ontology issue to Bappenas during the design of the monitoring dashboard that was supposed to be jointly developed with the National ICT Council, Dewan TIK Nasional (WANTIKNAS).



17. Liberia National Broadband Plan

July 2018 – January 2019

BACKGROUND

As part of its post-Ebola interventions in Liberia, NetHope supported Liberian efforts to reform and modernize critical elements of its national ICT policy framework. Liberia's National ICT Policy of 2011 sought to create an enabling environment and improve institutional capacity to address access to basic services, ensuring that all Liberians benefit from new services and that ICT is actively used to meet the development goals of the country. While the 2011 policy framework focused on addressing inequalities in access to basic services, the revised National ICT and Telecommunications Policy of 2018 ("revised policy") sought to update and enhance regulatory approaches to core and critical emerging issues in the ICT ecosystem of Liberia such as infrastructure, services, applications, universal access, cyber security, ICT skills development, among others. Liberia's vision was to implement a new policy that is dynamic and broad and advances sector strategies to create a vibrant Liberian information society.

PROJECT IMPLEMENTATION

In 2018-19, NetHope worked in collaboration with local stakeholders and the Alliance for Affordable Internet to provide technical assistance in support of a Government of Liberia plan that sought to finalize the development of the revised policy and present it to the Liberian Executive Cabinet for formal adoption. In June 2018, the Ministry of Posts and Telecommunications (MoPT) circulated a draft policy to relevant stakeholders within Liberian government agencies and non-state actors, conducted high-level policy briefings, and held a working session to integrate inputs. In August 2018, NetHope supported and provided expert technical assistance to a working session convened by the MoPT that served as a forum

for the presentation and integration of stakeholder inputs into the initial draft policy. Following this working session, NetHope facilitated preparation and stakeholder dissemination of a second revised draft policy document and shared the updated text with stakeholders.

OUTCOMES AND IMPACT

In late 2018, NetHope worked with the MoPT to finalize the draft policy with inputs from these dialogues, workshops, and consultations. In January 2019, the written final draft was delivered to the Prime Minister's Cabinet for next steps.



18. COVID-19 Telecom Policy Guidance

April 2020 – September 2020

BACKGROUND

Following the onset of the global COVID-19 pandemic in early 2020, NetHope carried out a project designed to help telecommunications and ICT regulators better understand policy options and implications to sector management and crisis response to the COVID-19 pandemic. The project's goal was to engage policy subject matter experts to develop resources, conduct analysis, and deliver content in a series of public events with regulators, policymakers and other interested stakeholders. The project sought to give particular attention to bridging the gaps between information gathering, dissemination, and evidence-based actions that can be taken by sector managers.

PROJECT IMPLEMENTATION

In May 2020, NetHope joined a consortium of organizations to begin planning a series of webinars designed to help telecommunications and ICT regulators in Africa better understand policy options and implications in sector management and crisis response to the COVID-19 pandemic. In subsequent months, the consortium (composed of the African Telecommunications Union, African Union Commission, Internet Society, Association for Progressive Communications, Mozilla, and NetHope) planned and executed the webinar series. Billed as the "*Africa Internet Resilience*" series,¹ webinar topics included:

- Shared spectrum strategies
- Cybersecurity
- Measuring Africa's internet resilience
- Complementary Access Models

- The Role of Fiber Optic Backbone Infrastructure in Affordable Access

NetHope contributed planning and execution support for the webinars, including the lead role in organizing the session related to fiber optic backhaul.

In addition, NetHope commissioned and published policy brief/white papers to complement three of the webinars (internet measurement, fiber backhaul, and complementary access networks). The papers sought to provide insight and guideline for sector stakeholders seeking to institute regulatory shifts in the context of the pandemic crisis and emphasized practical implementation next steps for the regulatory community. Webinar recordings, summaries, and white papers were all hosted on a dedicated page on the Internet Society's (ISOC) website.

¹ www.internetsociety.org/events/african-internet-resilience



19. Sierra Leone Internet Measurement

August 2020 – September 2020

BACKGROUND

NetHope's engagement in Sierra Leone grew out of its webinar and white papers outlining possible interventions African telecom regulators could take in response to the COVID-19 pandemic (see Chapter 18). This led to discussions between NetHope and the Sierra Leone Telecommunications Regulator (NATCOM). NATCOM expressed interest in gaining better insights into countrywide internet performance and building capacity for improved performance measurement.

PROJECT IMPLEMENTATION

During this brief engagement, NetHope worked with NATCOM and local sector stakeholders to develop an overview and roadmap to help guide future network development. The project team sought to develop key insights through desk research of publicly available information and questionnaires designed for stakeholder input. Participating broadband internet suppliers and select end-users conducted and shared self-administered internet measurements of their respective networks. The project also sought to identify challenges that internet service providers faced in enhancing their operations and identify remedies to manage these challenges in ways that would increase overall internet resilience and service availability in Sierra Leone.

OUTCOMES

NetHope delivered a report and presentation of findings to NATCOM in September 2020 that included detailed information on network performance from various perspectives, including comparative measurements from other countries in the region. The report further identified key barriers to national broadband development, including lack of infrastructure policy coordination,

duplicative infrastructure, overreliance on microwave backhaul systems, significant demand-side constraints. The report emphasized the importance of establishing regulatory measures to empower NATCOM's effort to drive improved performance levels by encouraging or even requiring network operators to conduct and submit periodic internet measurements with NATCOM. The report further illustrated proposed activities, key performance indicators, and milestones that NATCOM could apply in establishing appropriate internet measurement programs in the future.



20. Rwanda Engagement Assessments

May 2015 – March 2019

BACKGROUND

At three times during project implementation, NetHope conducted assessments to explore potential engagement in Rwanda in support of USAID Mission objectives. In recent years, Rwanda has placed digital development as a high national priority and the centerpiece of the national vision for development. As such, there had been significant interest at USAID/Rwanda in aligning its programs and activities to these national trends.

PROJECT IMPLEMENTATION

In May 2015, Rwanda hosted the Intel Africa Broadband and USF Leaders Forum, an event that was supported by NetHope and attended by representatives of 10-12 African countries. At the time of the event, USAID Mission personnel indicated a generalized interest in developing an agenda with NetHope to include support to help advance information and communications technology (ICT) sector initiatives in Rwanda. This expression of interest was reiterated in October 2015 during a visit to Washington by a key representative of the USAID/Rwanda Program Office.

NetHope staff traveled to Kigali in November 2015 to meet with local stakeholders and assess possible areas of intervention. Following this visit, NetHope submitted findings and a proposed Scope of Work for activities to support Rwanda's *Smart Rwanda Master Plan* and enhanced integration of ICT initiatives in mission education, including agriculture and health programming. Soon after receipt of this proposal, key Mission personnel supporting this work departed, and plans were shelved.

In February 2017, a team comprised of NetHope and the USAID Global Development Lab staff traveled to

Rwanda to refresh the 2015 scoping assessment, to update the status of key sector reforms, and to develop a more detailed understanding of the role and potential of connectivity in mission programs. While in Kigali, the team met with a cross-section of stakeholders including public and private sectors, USAID implementing partners, donor counterparts, and Mission staff. The visit identified several possible engagements, and NetHope submitted a proposal for activity, which included a broadband demand aggregation activity and ICT program support for the Mission's education office.

Finally, in March 2019, NetHope traveled to Kigali to conduct exploratory preliminary conversations with ICT for Education (ICT4E) Mission staff and government stakeholders to gauge interest in developing a systematic approach to measuring sector progress in response to ICT investments. During these discussions, several respondents (including several of those who were active participants in the Rwanda ICT in Education Workgroup) indicated interest in a formal analysis aimed at assessing the implementation and impact of ICT4E interventions that had been undertaken as part of Rwanda's recent national ICT strategy implementation. Follow-on discussions, however, revealed significant challenges related to activity implementation timeline and methodology, and the activity was not pursued further. In the end, while USAID/Rwanda expressed appreciation for the continued engagement, no follow-on projects were ever realized.



21. Impact of Mobile Phone Connectivity in Rural Philippines

November 2017 – March 2020

BACKGROUND

Over the past decade, over two billion individuals in developing countries have started using mobile phones for the first time. A further 710 million subscribers are projected to adopt mobile phones by 2025.¹ The vast majority of new mobile phone subscribers will live in developing countries, and more than half will be in the Asia Pacific region.² Despite this rapid expansion, roughly 10% of the world's population still lives without mobile phone coverage. Bridging this “last mile” connectivity gap requires innovative technological solutions and new business models, since commercial operators do not see service provision to these marginalized communities as commercially viable.

To address this “last mile” connectivity gap, researchers at the University of California, Berkeley developed a new mobile phone technology — the Community Cellular Network (CCN) — that provides local coverage at one-tenth of the cost of traditional mobile towers. The CCN was explicitly designed for rural settings with intermittent power and is intended to be owned and maintained by local community members with modest technical training.³ Over the past several years, the developers of the CCN and researchers at the University of the Philippines-Dili

man have deployed CCNs in several remote and isolated villages in the Philippines.

A fundamental premise of the concept is that CCNs have the power to unlock economic opportunities and reduce the economic vulnerability of historically marginalized populations. CCNs brought affordable mobile connectivity to rural, isolated regions of the world. The CCN technology, in turn, created options for people to develop and expand their social connections within and outside of the community. With more robust social networks, these individuals might access new opportunities for social and economic interaction, including better access to information about employment and migration, entrepreneurial activities, civic engagement, and early warning about predictable adverse shocks. Platforms, products, and services built on top of cellular connections could amplify these impacts.

This particular theory of change was motivated by results described in academic research literature. Aker and Blumenstock summarized much of this literature.⁴ In short, prior work had mainly focused on how mobile phones impact the flow of information in agricultural markets.^{5,6,7}

¹ GSMA (2019). *The Mobile Economy 2019*. GSMA Intelligence.

² GSMA (2018). *The Mobile Economy: Asia Pacific 2018*. GSMA Intelligence.

³ Heimerl, Kurtis and Eric Brewer (2010). “The Village Base Station”. *Proceedings of the 4th ACM Workshop on Networked Systems for Developing Regions*. NSDR '10. San Francisco, CA: ACM, 14:1{14:2}.

⁴ Aker, Jenny C., and Joshua E Blumenstock (2015). “The Economic Impacts of New Technologies in Africa”. In: *The Oxford Handbook of Africa and Economics: Policies and Practices*. Ed. by Celestin Monga and Justin Yifu Lin. Vol. 2. *The Oxford Handbook of Africa and Economics*. Oxford University Press.

⁵ Aker, Jenny C. (2010). “Information from Markets Near and Far: Mobile Phones and Agricultural Markets in Niger”. *American Economic Journal: Applied Economics* 2(3): 46{59}.

⁶ Jensen, Robert (2007). “The Digital Divide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector”. *The Quarterly Journal of Economics* 122(3): 879{924}.

⁷ Muto, Megumi and Takashi Yamano (2009). “The Impact of Mobile Phone Coverage Expansion on Market Participation: Panel Data Evidence from Uganda”. *World Development* 37(12): 1887{1896}.

These studies thus generally indicated a positive impact of mobile phones on the efficiency of agricultural markets, and a related body of research has emerged around the economic impacts of mobile financial services. However, very little work had been done to understand how connecting communities affects social networks and broader economic activities of households.

While previous research suggested that access to mobile phone technology strengthened social ties, increased access to information, and improved economic outcomes, rigorous evidence on this topic was still somewhat limited. While mobile phones were widely used in the Philippines, some isolated rural areas still did not have network coverage. In Aurora province, for example, field visits found that many households owned mobile phones, but residents often had to travel several hours away to place calls or texts. Most people in Aurora province relied on subsistence agriculture, and many received remittances from outside family and friends. By leveraging this new, low-cost technology and by cultivating strong local relationships, researchers created a truly unique opportunity to conduct a randomized control trial of CCNs in a set of 14 geographically isolated villages in the Aurora province of the Philippines. The randomized control trial had two stages. The first was a village-level treatment, where a “staggered roll-out” design randomly determined which seven of the 14 villages received a CCN between September 2017 and September 2019, as well as the timing of each installation. The second stage was a household-level treatment executed by Innovations in Poverty Action (IPA), through which we reduced the cost of making phone calls and sending text messages to specific households.

EVALUATION CONTEXT

Starting in November 2017, NetHope provided support to IPA to continue their multi-year, randomized trial to measure the social and economic effects of such first-time access to the mobile phone network in rural Philippines. In partnership with a team at the University of the Philippines that designs, tests, and deploys rural



NetHope/IPA Research Team in Luzon, Philippines

mobile phone technologies, IPA researchers conducted a randomized evaluation to test the impact of installing cellular towers and providing free SIM cards for mobile phone use on communication activity and frequency, social ties, access to information, migration and labor market outcomes, bargaining power and market prices, and income and employment decisions. Without mobile-phone connectivity, people in these communities had a harder time learning about employment opportunities, including working for wages and where to sell agricultural products. They also had difficulty receiving remittances from their outside family and friends, whom they were unable to contact in case of financial emergency.

Fourteen sites in the northern Philippines were randomly assigned to one of two groups. The treatment group received cellphone towers (and the residents of these sites receive free SIM cards), while the comparison group did not receive cellphone towers or free SIM cards at the

time of the study. The research team conducted an initial survey in 2016 and a follow-up survey in 2019.

RESULTS AND POLICY LESSONS

Overall, according to preliminary results,⁸ community cellular networks increased access to communications, which led to increased social connectedness (especially among people living nearby) and higher incomes and expenditures.

The research team measured the impacts of CCNs and found that community cellular networks increased access to communications. Second, they found that social connectedness, in particular *local* social connectedness, increased in treatment areas. Third, and most importantly, they found that a large and statistically significant increase in income and expenditures. For the rest of the research's hypotheses, they did not find clear evidence of an impact of the cellular network. These included long-distance social connectedness, informedness, disaster preparedness, market access, migration frequency and duration, remittances and risk sharing, and subjective well-being.

These results fit the popular narrative that mobile phones are transforming developing countries. In a short amount of time, households given the ability to place a phone call from their house found themselves more connected to other households, richer, and less food insecure. While pre-specified research had not found a clear mechanism for these dramatic changes, the richness of the data that was collected allowed for much deeper analysis, including:

Access to Communications: Communication access increased by around 0.4 standard deviations. For example, more than double the households in areas with cell networks reported that they could place a call from their home compared to comparison areas.



Social Connectedness: Social connectedness increased, mainly among people living in the same area because of the community cell networks. Impacts on long-distance social connectedness were smaller (and estimates were weaker).

Economic Outcomes: Income and expenditures increased by around 0.09 standard deviations. In treatment areas, household income in the previous year was around 15% higher than in comparison areas. The proportion of households reporting they had adequate food in the last month was around 73% in treatment areas compared to 66% in comparison areas.

Pricing Results: Finally, households were price-elastic. When offered a discount on cellular network use, they responded by increasing their use of the network. In sum, results supported the notion that connectivity provided by mobile phone coverage was indeed leading to positive economic outcomes.

⁸ Keleher, N., Barela, M. C., Blumenstock, J., Festin, C., Podolsky, M., Troland, E., . . . Heimerl, K. (2019). *Connecting Isolated Communities: Quantitative Evidence on the Adoption of Community Cellular Networks in the Philippines*. New Haven: Innovations in Poverty Action.



22. Technical Assistance to ZICTA/Zambia

July 2018

BACKGROUND

Every two to three years, Zambia Information and Communications Technology Authority (ZICTA) undertakes a nationwide survey to better understand information and communication technology (ICT) usage in Zambia. This survey was carried out in 2013 and 2015 and included a sample size of around 30,000 people across Zambia's 10 provinces. Following the 2017 publication of USAID's *Gender & ICT Survey Toolkit*,¹ ZICTA requested USAID's assistance in ensuring that the 2018 survey incorporated appropriate gender and digital financial services (DFS) metrics and considered incorporation of qualitative aspects. In response to this request, NetHope provided consultative and support services to ZICTA to help it understand how to redesign the 2018 survey to better align with recommendations in the *Toolkit* and better understand the importance of gender data, in particular qualitative gender data.

PROJECT IMPLEMENTATION

In July 2018, NetHope met with ZICTA staff, the Zambian Central Statistics Office (CSO), and other vested partners in advance of the survey. NetHope conducted a workshop with 10 members of ZICTA and the CSO on collecting gender data on ICT and DFS usage. NetHope gave an overview of the *Toolkit*, outlining the rationale for its creation, the importance of gender data around ICT access and usage, and the differing (and equally important) roles of qualitative and quantitative data. Following the workshop, NetHope met with several organizations to understand:



- a. How they used data from previous surveys.
- b. If they collected gender data (and if so, how they used it).
- c. What, if any, additional data would be useful to collect in the 2018 survey.

Consultations were held with United Nations Capital Development Fund (UNCDF), Zamtel, MTN, Airtel, Zoono Inc., and Financial Sector Deepening Zambia (FSD Zambia). Key themes that emerged included:

- The ZICTA 2015 survey data was not well utilized. At best, some high-level data was used in annual reporting.
- While most organizations collected some gender metrics, this data was rarely used to inform the design of women-focused products and services.
- The organizations interviewed varied widely on their perceptions of the gender gap. Some thought it was more pronounced in rural areas, some in urban areas, while others felt it was solely due to low literacy levels.
- Only two organizations indicated that low mobile ownership was related to social norms or agency.
- Several organizations noted that better data could inform the business case for better reaching marginalized communities.

¹ Highet, C., Skelly, H., & Tyers, A. (2017). Gender and Information Communication Technology (ICT) Survey Toolkit. Retrieved from United States Agency for International Development Web site: https://www.usaid.gov/sites/default/files/documents/15396/Gender_and_ICT_Toolkit.pdf

OUTCOMES

NetHope offered several suggestions ahead of the 2018 survey, including incorporating feedback from key stakeholders. These suggestions included:

- Reducing the survey length by approximately half.
- Rephrasing questions to make them less leading.
- Where multiple choice answers were offered, consolidating answers and reducing repetition.
- Reducing repetition in general.
- Introducing ranges for sensitive questions, such as those involving money.
- Introducing visual aids where brand recognition was strong (for mobile network operators and DFS providers).

These suggestions and others were included in an edited version of the survey, shared with ZICTA and USAID in the latter half of July 2018. In addition, NetHope put together a qualitative guide (drawing from the *Toolkit*) to assist ZICTA if they were successful in procuring funding for this additional research. The qualitative guide was broad, as ZICTA's thinking was that the guide would be refined following the national survey.

It was determined that, given the limited understanding of gender barriers to ICT use in Zambia and the role of power constructs in women's usage and access of ICT, qualitative data would be highly beneficial. Without this research and understanding, it was difficult to imagine real progress in a Zambian woman's ability to both access and use emerging technologies.





23. Connectivity in Bangladesh Rohingya Refugee Communities

May 2020 – September 2020

BACKGROUND

In mid-2020, NetHope assessed member nongovernmental organizations (NGOs) connectivity needs in the Rohingya refugee communities in Bangladesh. Developed through NetHope member consultations over the previous year, the assessment sought to explore the challenges related to recent changes in Bangladeshi public policy that had removed refugees’ access to communications services and subsequent impact on infrastructure and NGO use of digital tools. Finally, the assessment sought a better understanding of the outlook for creative approaches to improving NGO connectivity.

PROJECT IMPLEMENTATION

To achieve these goals, NetHope carried out a series of dialogues with staff members of member NGOs active in Bangladesh Rohingya response and closely familiar with on-the-ground activities. NetHope conducted a series of semi-structured personal interviews, team discussions, and exchanged email correspondences with key personnel. Organizations consulted included:

- ActionAid
- CARE
- Catholic Relief Services
- Christian Aid
- Concern Worldwide
- Medair
- Plan International
- Save the Children
- VSO
- World Vision International

In addition to these consultations, NetHope reviewed a number of secondary sources in order to gain a deeper perspective into dynamics related to the crisis; the response of other USAID implementing partners; the method, scope, and scale of activities of international humanitarian organizations; and the Bangladeshi telecommunications and internet sectors.

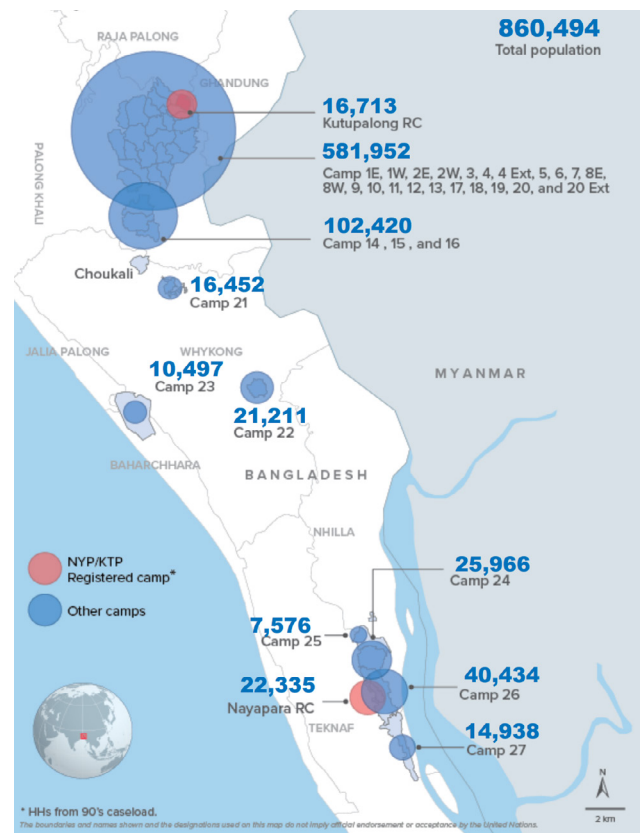


FIGURE 1: Population distribution in the camps south of Cox’s Bazar

OUTCOMES

Delivered to USAID in September 2020, the resulting research provided a snapshot of NetHope member

experiences with connectivity and reviews some of the most common and critical use cases of connectivity as part of the humanitarian and NGO response. The report reflected an especially difficult situation in terms of operations, given the fact that NetHope members involved with the Rohingya response were essentially forced to operate without the ability to use digital tools for real-time communications, data collection, health, and education programs for the better part of 2019-20. The report went in-depth to discuss this experience, examined the existing status of infrastructure in the camps, and outlined possible approaches to improving the situation, including buildout of unlicensed wireless network infrastructure to serve NGO clients on a dedicated basis. As the report was in its final phases of completion, it was announced that the UN's Emergency Telecomm Cluster had received USAID support to build out a private network to connect UN and NGO Internet Protocol (IP) sites. At the time of writing, the Government of Bangladesh announced that the year-long suspension of mobile broadband services in the Rohingya camps was being lifted.



24. Liberia Broadband Technical Assessment

October 2014 – August 2015

BACKGROUND

From spring 2014 through mid-2015, Liberia and the West Africa region suffered the rampages of the Ebola Virus Disease (EVD) epidemic, at a cost of 10,000+ lives lost, destroyed societies and economies, and inflows of billions of dollars of aid from the international community. At the height of the epidemic, USAID requested and NetHope executed a rapid desk study of the role of ICT in the EVD epidemic response. The desk study examined Liberia's telecommunications infrastructure, data networks and usages in the crisis response, and the state of digital financial mechanisms. The study was widely disseminated within the U.S. government, Government of Liberia, donors, NGOs, and humanitarian response community to help decision makers and practitioners make more informed decisions. Among the key findings of the study was the recognition that poor ICT access was dramatically hampering the epidemic response while also magnifying the epidemic's negative social and economic impacts. The study concluded that a substantial effort to increase access to and use of ICTs would serve as a major force multiplier in the post-epidemic recovery.

In early spring 2015, as the epidemic was slowly being brought under control, USAID once again turned to NetHope to conduct a baseline analysis for a proposed multifaceted program *to strengthen access to and use of modern digital technologies in Liberia*, with three overarching goals:

- Serve as a priority response tool to mitigate future Ebola and other health disasters.
- Function as an engine underpinning the recovery of the regional and national economies.
- Become a powerful tool for improving government performance, effectiveness, and accountability.

PROJECT IMPLEMENTATION

To meet this objective, NetHope executed the Liberia Broadband Technical Assessment (LBTA), a comprehensive and participatory examination of the three core elements of a modern ICT4D economy – policy, infrastructure, and applications. The LBTA process identified more than 40 near- and long-term recommendations across these three core elements. It laid out plans for a proposed national broadband network, along with multiple costing scenarios and strategies for implementation, and identified the potential impact of policy reforms such as “dig once” (e.g., layering broadband conduits on top of planned transport and energy investments). After the completion and wide dissemination of the report, NetHope organized and convened a two-day workshop attended by key stakeholders in the Liberian government, private sector companies, and donor and civil society communities. During the workshop, participants discussed recommendations and possible pathways forward.

OUTCOMES AND IMPACT

The findings that emerged from the LBTA and associated activities formed the basis for a number of follow-on interventions in Liberia which are detailed throughout this report.

In addition to implemented projects (which supported the Monrovia metro fiber deployment, radio spectrum policy monitoring and management, national broadband planning, and the establishment of a national research and education fiber network), the LBTA led to proposals for future actions, including:

- NetHope designed a \$7M eGovernment program that envisioned equipping and training a substantial

number of government ministries, agencies, commissions, and thousands of staff to access and use digital tools. The design concepts in this analysis formed the basis for a follow-on USAID-financed program that strengthened the use of broadband to bring Liberians directly into the governance process, deliver better and more accountable public services, and improve internal government communications and operations.

- NetHope delivered a research template used for gap analysis on three critical elements of an effective and efficient response to health crises such as the Ebola Virus Disease. The template was designed to explore:
 - » The reach and scope of the national telecom and internet connectivity infrastructure.
 - » Availability of a digital Health Information Systems (HIS) to optimally counter EVD.
 - » Availability of a national digital payment system as a solution to challenges of paying for critical counter-EVD goods and services.

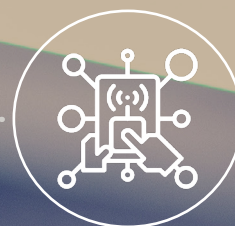
Finally, numerous recommendations and downstream activities grew out of the above activities. For example:

- The Liberian Telecom Regulator (LTA) announced an initiative, modeled on the C-Squared metro fiber ring project, to facilitate the deployment of an East-West fiber backbone connecting Liberia to its neighboring countries and creating critical redundancies in the national network.
- LTA revitalized plans to implement a universal access program that explored dynamic spectrum advances (“TV White Space”) as one potential option to extend broadband from the growing national fiber backhaul networks to rural communities, health centers, and schools.
- The Liberian government revisited plans to transition Libtelco, its former national telecom monopoly into an Internet Services Provider, with potential focus on delivering services to the government as a primary beneficiary and anchor tenant.

- The Liberian government renewed an exploration of privatization of the Cable Consortium of Liberia, the owner/operator of Liberia’s primary submarine cable landing facility.

VII. PROGRAM SUMMARY

APPLICATIONS & SERVICES





From the outset, the GBI program acknowledged the essential complementarity of access and applications, with penetration and adoption of internet connectivity in rural and underserved areas likely accelerated with meaningful accompanying contexts to address key socioeconomic and development challenges.

While rich, relevant application ecosystems can help provide utility and value to end-users (enhancing the *meaningfulness* of delivered connectivity), assisting network operators in validating new business models around diversified product offerings can help facilitate network investment in new markets and help offset declining revenues in voice services. Building on these insights, the program carried out a number of activities designed to explore new frontiers in broadband applications and help accelerate new approaches. One critical topic was the use of mobile networks to deliver financial services. Efforts to advance these *Payment Innovations* represented a persistent theme throughout the arc of the program and laid important groundwork for future work on mobile money and contactless payments. The COVID-19 pandemic has only increased this relevance.

Application projects also sought ways to use connectivity in support of development sectors such as health, humanitarian response, democracy and governance, economic growth and digital inclusion, gender equality, and education.

Finally, applications-related program activities sought to leverage cloud-based platforms to address critical issues of information dissemination among development practitioners, especially among USAID implementing partners.



25. Innovations for Youth Capacity and Engagement

October 2011 – November 2016

BACKGROUND

The Innovations for Youth Capacity and Engagement (IYCE) project was identified in NetHope's original cooperative agreement as one of the main project areas. Specifically, NetHope would "... support the development, identification, and deployment of a youth-focused ICT pilot(s) for the IYCE gaming program." In late 2014 and early 2015, NetHope piloted a free Arabic- and English-language "city building" Facebook game called OurCity in Jordan, aimed at connecting with young people while building their skills in civic engagement. To enhance learning, OurCity was designed to provide opportunities for players to apply their virtual experience through real-world engagements, such as volunteer opportunities and service-learning activities organized by local nongovernmental organization (NGO) partners. In return for participating, players were awarded with redeemable codes to unlock premium content. IYCE was expected to provide a key opportunity to provide evidence of the applicability of the serious gaming technology in youth programs and its impact on developing objectives.

The following were goals and objectives established for IYCE:

- Explore the use of innovative gaming technology in youth focused USAID programs through the implementation of a youth and gaming pilot through the IYCE activity integrated into an existing USAID youth development program (NetHope Objective #1 – Piloting for Scale).
- Identify, implement, and pilot a youth and gaming program in one to two target countries to explore the effectiveness of the IYCE concept and demonstrate



scalability and replication of the solution to lower delivery costs and improve effectiveness in engaging youth in traditional USAID development programs through gaming (NetHope Objective #3 – Driving Implementation).

- Develop a lessons-learned and best practices document focused on the IYCE pilot program(s), which includes a strategic plan for rolling out the program to more countries, as well as a sustainability plan for an independent Youth and Gaming Alliance. The lessons learned and best practices will be shared at international development conferences on youth and civil society and other such forums and will include a case study of the completed IYCE pilot (NetHope Objective #4 – Reuse-Replication-Refinement).
- Identify and work with USAID to recruit private sector partners to support the IYCE pilot. Partners include a mix of NGOs (with interest and/or experience in serious games), foundations, large corporations, and small gaming businesses, among others. The INGO participating partners are likely to be members of NetHope, but it is not required (NetHope Objective #5 – Multi-Sectoral Alliances).

Jordan was chosen for the pilot because about 85% of the population had Internet access; more than half of Jordanian youth were on Facebook; and, like many countries in the Middle East, more than 60% of Jordan's population was under the age of 30. Relatively high Internet and Facebook penetration, very low levels of civic awareness and engagement, and a significant youth bulge made Jordan an ideal country to test the value of a serious social game harnessing the time young people spend on Facebook.

At the end of the pilot project, NetHope accomplished the following:

- Delivered to USAID a one-of-a-kind pilot game in English and Arabic, positioned for scale and replicability, which attracted about 50,000 users at the time of the IYCE final report's publication.
- Improved local capacity of a core team of Jordanian partners to understand, design, and develop serious games for social impact, adhering to the *USAID Forward*¹ reform agenda.
- Identified and secured a little over \$1 million in leverage invested into the project.
- Identified potential handover partners to assume and build upon the pilot project.

In accordance with the NetHope model, OurCity was piloted in Jordan through public-private partnerships. A cross-sector team in USAID conceptualized the project, including representatives from USAID's Democracy, Conflict, and Humanitarian Assistance (DCHA), Global Health (GH), and Economic Growth, Education, and Environment (E3) Bureaus. DCHA's Center of Excellence on Democracy, Human Rights, and Governance (DRG) served as the lead. NetHope engaged a US-based company, E-Line Media, for the game's design, development, and production, and a Canada-based company, Social Games Universe (SGU), assisted

with game development. Local Jordanian companies and NGO partners included Al Nasher, Gate2Play, Curlstone Studios, Jordan Gaming Lab, Jordan Education for Employment, Jordan Green Building Council, Royal Society for the Conservation of Nature, Jordan River Foundation, and Partners Jordan. NetHope provided civic education content. Arizona State University's (ASU) Center for Games and Impact implemented monitoring and evaluation (M&E) for the pilot.

As a first-of-a-kind pilot, there were numerous challenges during the planning, implementation, and M&E stages, especially in terms of building local capacity, budgeting, partnerships, and synchronizing multi-stakeholder timelines. OurCity formally closed on November 8, 2016, as indicated in a post on its Facebook page.



SERIOUS SOCIAL GAMING AND YOUTH ENGAGEMENT

At the beginning of the IYCE project, serious social gaming was identified as an emerging technology in harnessing the potential of gaming in youth empowerment in developing countries. A growing body of research highlighted the enormous potential of games to help address some of the most pressing social, cultural, scientific, and economic challenges of the 21st Century. Well-designed games and game-infused experiences offered a delicate balance of challenges and rewards that drove deep levels of engagement and time-on-task, enabling players to advance at their own pace while succeeding or failing in a safe and supportive environment. They even enabled players to step into different roles, confront a problem, make meaningful choices, and explore the consequences. page 112 provides a deeper look into current applications of gaming in increasing youth participation in civic engagement, challenges in developing games, and the future of gamification.

¹ The USAID Forward reform initiative ran from 2010-2016. USAID Forward improved the way that USAID delivers foreign assistance by embracing new partnerships, investing in the catalytic role of innovation, and demanding a renewed focus on results. More information available at <https://www.usaid.gov/usaidforward>.

THEORY OF CHANGE

In close consultation and collaboration with IYCE’s stakeholders, NetHope developed a theory of change for the potential of serious games to increase knowledge and build youth’s skills in civic engagement. Figure 1 shows the approved theory of change.

*This project explores how **social media**, and in particular **social games**, can help youth understand how they can participate in building/re-building a **vibrant society***

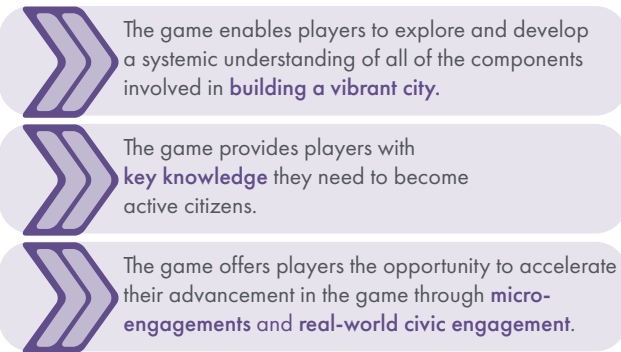


FIGURE 1: OurCity Pilot Theory of Change

IYCE’s theory of change was not fully implemented due to a wide variety of challenges and constraints and natural tensions among some aspects of the theory of change:

- The relative priority of creating more quests with extensive learning goals in core game loops **versus** ensuring a minimum number of digital and real-world civic engagement opportunities to experience key points in the virtual and real world.
- The relative priority of adding more content **versus** enabling more time to optimize existing content.
- Striking a balance between keeping the game fun and exciting and the ability to attract players in their discretionary time **versus** ensuring a certain level of deep learning took place.

In the end, the priority was placed on fostering online civic knowledge rather than real-world engagement largely due to budget and time constraints, which resulted in delays in getting the game to market. IYCE was only able to incorporate and implement two real-

world engagements towards the end of the pilot which prevented the time available to conduct an impact assessment and evaluation.

PROJECT STRATEGY, DESIGN, AND DEVELOPMENT

At the core of the pilot was a set of learning and impact objectives. The game design, content creation, and player targeting were done to reinforce the learning pillars outlined. Designing and obtaining multi-stakeholder approval of OurCity’s learning pillars was a challenge because each stakeholder had a different perspective on the depth of learning and desired impact. USAID, OurCity’s main funder, was in favor of deeper learning (a *pathway game*), while IYCE’s executive producer and developer was in favor of creating a *sticky game* that was first and foremost fun and that learning came a consequence of the fun nature of the game (a *gateway game*). In the end, the approach implemented was a hybrid of both game types. OurCity’s was designed to fire the imagination of players, introduce new ideas, and provide *gateways* to learning.



FIGURE 2: OurCity’s Levels of Learning and Impact

In addition, IYCE created learning pillars and impact objectives for a very diverse group of players with a broad range of civic awareness, knowledge, and experience. The result was a set of learning pillars and impact objectives where the game worked on three main levels of knowledge, skills development, and behavior changes all with a set of impact objectives. The levels of learning and impact built into OurCity is shown on Figure 2 while the expected key learning outcomes for OurCity is shown in Figure 3.

OurCity addressed civic knowledge (the lowest level of engagement), civic skills, and civic behavior (the highest level of civic engagement). Through these tiered engagement experiences or levels, it was expected to achieve the above-listed impacts in terms of civic knowledge, civic skills, and civic behaviors. Once the civic engagement learning pillars were defined and approved by USAID, NetHope translated the civic engagement learning pillars into the different areas of engagement players were presented throughout the

game. NetHope ensured that the content was relevant and understandable in the Jordanian context.

Game Theme, Platform, and Genre

NetHope, together with USAID and outside technical experts, conducted a scoping mission to Jordan in September 2011 to explore, test, and validate a variety of approaches to harnessing the power of games to engage and empower youth in Jordan.

NetHope considered five sectors for the IYCE pilot, including workforce development, civic knowledge and engagement, water sustainability, financial literacy, and engineering skills development. Civic engagement was selected due to: 1) its potential to address multiple themes through a civic engagement lens while providing an opportunity to engage various sectors (e.g. health, education, etc.); and 2) the funding originated from the USAID DCHA's Center for Excellence on Democracy, Human Rights, and Governance.

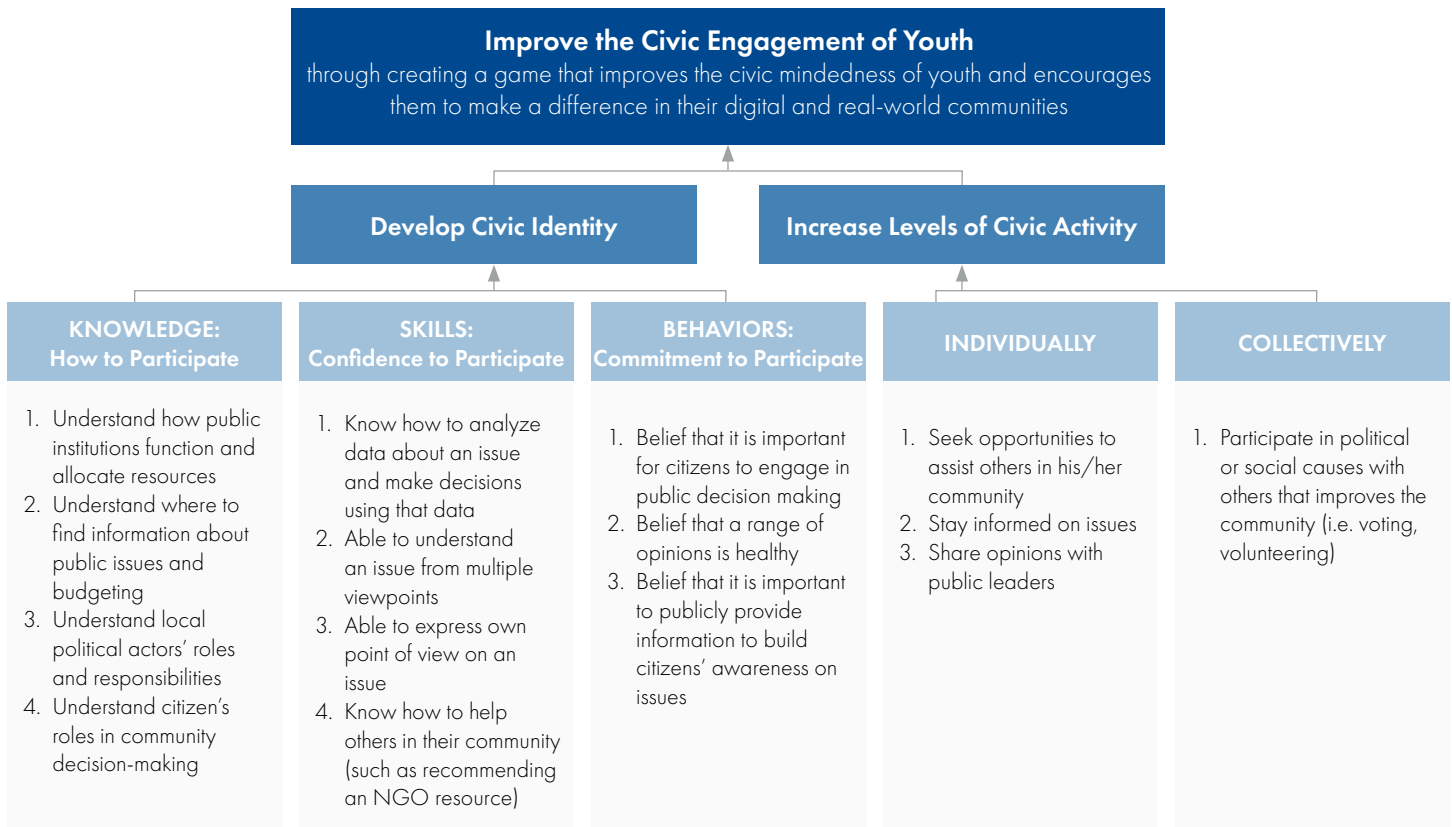


FIGURE 3: OurCity's Key Learning Outcomes

The Facebook desktop platform was selected due to the high number of Jordanian youth using Facebook and low penetration of smartphone market at the time. Youth focus groups revealed that many young people were accessing the Internet through gaming labs or computer centers (primarily young men) or at home via their friends' computers (primarily young women). Facebook was selected given the rising usage and adoption of Facebook in Jordan at the time, the familiarity of the target population with the platform, and the fact that it was the only social media platform that could support a city-building game. Another key benefit of Facebook was its social features, a force multiplier in terms of reach and organic growth over time. While some of these social features were integrated into the game (e.g. ability to post updates on the player's wall), other key social features (e.g. the ability to see other players' cities, receive gifts from player friends, give gifts to player friends, help or collaborate with player friends, etc.) were not fully leveraged or implemented due to budget and time constraints.

In the early stages of the pilot, mobile games were becoming increasingly popular. As such, NetHope considered mobile as a possible platform. IYCE's executive producer and developer advised that the selected game genre, a city-building game with numerous quest narratives, was not possible on mobile and that higher-end smart phones did not have a form factor capable of supporting the genre beyond mobile updates and extensions (rather than game loops). It is worth noting that popular city-building Facebook games, such as CityVille and Farmville, both released mobile versions during OurCity's development.

Based on the findings from the scoping mission and technical recommendation from IYCE's executive producer and developer, NetHope built a game for a desktop platform with a goal of using a mobile platform should USAID or another partner decide to assume and expand the OurCity game to more users in Jordan or to implement in other countries.

Game Content

When developing the game's content, NetHope recognized the importance and value of culturally relevant content to successfully engage Jordanian youth. NetHope worked closely with a team of experts comprised of a Jordanian civic engagement expert, a U.S.-based serious gaming consultant engaged by USAID/Washington, local youth-focused NGO partners, the ASU's Center for Games and Impact, USAID/Washington, and USAID/Jordan. As previously noted, a major challenge in the game's content was managing and aligning a diverse range of stakeholders with varying (and sometimes conflicting) objectives. Balancing the amount of learning embedded in the quest content resulted in multiple and extensive reviewing of quest narratives and several rounds of approval cycles.

OurCity included the following game mechanics to meet its learning pillars and impact objectives:

1. Civic Knowledge

- a. **City Hall** – Key to maintaining an essential relationship between citizens and decision-makers. The mayor met with citizens. Also, citizens gathered to express their opinions to public officials.
- b. **Inclusion** – Diverse citizen characters were created. Issues within quests also addressed different groups within the citizenry, such as handicap access, women's employment, youth's need for public spaces, youth-friendly venues, and religious spaces.
- c. **Media** – The media was used to resemble a two-way communication between citizens and the mayor.
- d. **Citizen Approval Rating** – Measured the satisfaction level of the citizens to visualize relationship between the citizens and the mayor.
- e. **Civic Tools** – Within quests, participation tools were embedded as an integral part of solving the quest:
 - i. *Talking to Citizens* – Asked the player

- to speak with the citizens to gather their thoughts and opinions on the topic at hand. Each citizen offered different perspectives on the matter, stating their circumstances and how the decision affected them.
- ii. *Town Hall Meetings* – Asked the player to convene with the citizens at the city hall to gather their thoughts and opinions on the topic at hand, and in some cases to form a committee to oversee special projects.
 - iii. *Public Approval* – Functioned as a measuring stick by which the player could understand how his/her decisions were perceived by the people and was used when the player performed an action or made a decision that revolved around citizen inclusion. Unpopular actions, such as ignoring requests from citizens or excluding citizens from decision-making, resulted in a public approval loss.
 - iv. *Social Media* – Asked the player to post a pre-constructed statement on a fictitious social media site.
 - v. *Idea Gem* – Asked the player to assist in spreading the word about an event or activity in the city. Idea Gems aimed to improve the quality of life of the community. The goal of Idea Gems was to show players that they could affect positive change in their communities, and that their ideas were worth sharing.
 - vi. *Micro-Engagements* – Instead of having micro-transactions present in traditional Facebook games, players engaged through micro-engagements to unlock premium currency/assets allowing them to progress faster in the game. Some were required as part of quest tasks, while others were optional for players to engage. Micro-engagements reinforced the learning content and, in some cases, attempted to show what was happening in Jordan or other parts of the world.
 - vii. *Videos* – Asked the player to view a short video, typically one to five minutes long. The videos covered several social, ecological, and political topics, depending on the local NGO partner that provided the video. The goal was to provide ideas and real-world information to the player in a short, engaging, and easily consumed format. Players were rewarded with premium currency.
 - viii. *Did You Know Moments* – Specific short facts were embedded in some quests to encourage players to make informed decisions. This also placed the game in the context of Jordan and helped garner a sense of agency within the players, a way to overcome apathy. Did You Know Moments also served an important function of reinforcing the abstract civic learning in the game by connecting it to real-world examples.
 - ix. *Surveys* – Used to measure the impact on learning. A survey appeared at the beginning, middle, and end of the game.
 - x. *Talk to the Media* – Asked the player to contact the local television station to raise awareness about an event. Like Idea Gems, these events generally carried a message of positive change. It showed players the number of avenues available to affect change in the wider community.
 - xi. *NGOs Headquarters* – Actual presence of the five local, youth-focused NGO partners in the game. Encouraged players to seek out information outside the game and make connections with relevant real-world issues and organizations.
- 2. Civic Skills Critical Thinking** – Managing a city required players to analyze and evaluate available resources and weigh the benefits of introducing new facilities or investments. For this reason, OurCity incorporated multiple choice decision quests. In

these quests, there were no right or wrong decisions. Rather, this was an exercise where players were encouraged to critically evaluate the pros and cons of each option and to practice their capacity to engage in a cost-benefit analysis.

- 3. Civic Behavior** – By driving players to commit to real-world engagement, OurCity aimed to affect how they can participate in real life initiatives through pop-ups advertising NGO activities and volunteer opportunities. In return for participating, players were awarded with redeemable codes to unlock premium content. Not every player was expected to be able to engage with this type of opportunity. Therefore, there were other means for advancing built into the game (e.g. participating in micro-engagements).

REAL-WORLD ENGAGEMENT

To enhance learning, OurCity provided opportunities for players to apply their virtual experience offline through *real-world engagements*, such as volunteer and service-learning activities organized by Jordanian NGO partners. This made OurCity a unique platform for both virtual and real-work civic engagement as a means of stimulating behavior change. Moreover, real-world engagements were a significant attraction in all potential partner discussions.

IYCE stakeholders decided to prioritize fostering online civic knowledge versus real-world engagement in the pilot phase due to time and budget constraints that led to delays in getting the game to market. As such, the pilot featured only two real-world engagement implementations which occurred towards the end of the pilot, restricting time available for an impact assessment and evaluation. The game developer built-in *hooks* to accommodate real-world engagements in preparation for another organization to improve and/or replicate the game. NetHope recommended that future implementers of a similar game concept should assure the necessary

time and capacity to engage this component to effectively implement real-world engagements. This will require that a system be in place for tracking players who participate in real-world engagements and verify that they receive the codes allocated during the events to be inputted into the game to receive their rewards.

MARKETING AND COMMUNITY ENGAGEMENT

Although it can take longer and cost more, it is common for commercial games to launch with a very active and often costly community management and marketing campaign, both pre- and post-launch. Despite the modest marketing and community management efforts put in place after OurCity's initial launch, there was a steady growth in the number of players and Facebook fan page likes. Due to the Facebook algorithm changes detailed below, budget constraints, and a key NGO partner's last-minute request to have its videos excluded in Facebook postings, the post-launch community plan was not executed as originally envisioned. There was also no dedicated customer support mechanism beyond the Facebook fan/community page and reporting problems directly to Facebook. Nevertheless, users occasionally posting their customer service issues directly to the Facebook fan/community page as well as via private Facebook message. This did not seem to have caused a negative impact on community building.

Pre-Launch Campaign

The originally envisioned pre-launch plan for OurCity was comprised of a Facebook fan/community page and Twitter account to raise awareness about the game and its features. The idea was to cultivate a player fan base on Facebook for free (excluding labor) and the resulting *buzz* would catch the eye of fans' Facebook friends in their news feeds. They too would become fans and players, and so on. Facebook algorithm changes in 2014², however, significantly curtailed the initial plan to build a fan base, as the algorithms changed the way Facebook determined which content users see high

up in their news feeds. This meant that any posts from Facebook fan/community page would reach very few Jordanians other than OurCity partner employees and their friends and families. Even if Jordanian partners cross-posted on their Facebook fan/community pages, the likelihood of Facebook page posts getting a launch message out was small.

Public outreach through Twitter proved to be ineffective as well. The OurCity Twitter account was small and grew at a slow rate (only 26 followers after three months). As such, NetHope utilized a Thunderclap campaign. Thunderclap is a website allowing supporters of a product or issue to contribute to a Facebook update, Twitter tweet, or Tumblr post with all the contributed social media posts programmed to go out at the same time to create a wave that rises above social media noise and gets noticed. A key advantage was that donated social media posts largely came from individuals with closer personal ties to their followers (and therefore had more influence) versus institutional accounts. Thunderclap significantly helped grow OurCity's Facebook fan/community page from 67 by January 2015 to 823 by February 2015 and 1,015 by April 2015. The Thunderclap campaign proved to be ineffective with Twitter, increasing followers by only 17 users.

Post Launch Campaign

Select social media posts from the pre-launch campaign were repurposed and reworked to create a post-launch social media/community management plan. Additional posts featuring Jordanian partner videos were also added, since Facebook posts with videos had the highest fan engagement levels. In addition, the post-launch social media/community management plan included paid Facebook advertising, reflecting the realities of changes to Facebook's algorithms. A minimal investment of \$80 was made for paid Facebook advertising. These ads invited users to play OurCity and targeted Jordanian youth between 15 and 24, who were fans of CityVille,

SimCity, and other builder games; who cited online gaming as an interest; or whose Facebook profiles indicated gaming was one of their behaviors.

SUSTAINABILITY PLAN

Scalability and sustainability were among the objectives set for the IYCE pilot project. Two approaches were used to ensure the continuation of OurCity beyond the pilot – a handover to a local partner and in-game sponsorship. OurCity's game developer built in key hooks and models in the game to support multi-tiered sponsorship packages. At the same time, NetHope cultivated relationships with potential local partners that could eventually take over the game. NetHope received plenty of interest across different industries. A potential partnership with NDI and UN-Habitat was the most promising among the discussions that took place. Unfortunately, in-game sponsorship and the partnerships with NDI and UN-Habitat did not come to fruition. OurCity officially closed on November 8, 2016. The following details the steps NetHope took to secure continuity of the OurCity game.

Local Partners

NetHope approached a total of 46 potential local partners in a broad range of industries, including media, real estate, NGO, advertising, and trade association. While many expressed deep interest in the OurCity concept, a handover plan was unable to be finalized prior to the pilot's completion. The King Abdullah II Fund for Development was close to taking over the game for a period. However, the organization then underwent a major change in management. A review of the IYCE partnership was conducted. The new management as well as budget constraints prevented the partnership to close. At the completion of the IYCE pilot, discussions were ongoing with NDI and UN-Habitat to provide funding for the IYCE program and support the transition of the OurCity game. NDI/Jordan expressed its desire to take over the game and to integrate it into its existing youth engagement programming throughout Jordan.

² Hoffmann, M. (2014, March 20). *Facebook Reportedly Slashing Organic Reach for Pages: Is social net trying to force bigger ad spends?* Retrieved from Adweek: <https://www.adweek.com/digital/facebook-reportedly-slashing-organic-reach-pages-156417>

UN-Habitat planned to incorporate OurCity into their urban city and youth programs. In the end, neither came to fruition.

In-Game Sponsorship

In-game sponsorship models were a common strategy for building partnerships in games. It provided increased localization through local branding, making the game look and feel even more local. Importantly, it created a potential revenue stream for the game. The plan was for in-game sponsors to contribute to the game through multi-tiered sponsorship packages that would provide revenue to sustain the game. The game development team designed and integrated key hooks and models for sponsorships into the game. However, the timing and available resources did not allow for the finalization of such sponsorships. In addition, securing game partnerships was a challenge due to the lack of a prototype assisting potential partners in fully understanding the game. Another challenge was the inability to know in advance the demographic the game would actually reach. Figure 4 shows some of the models that were designed for in-game sponsorship.

MONITORING AND EVALUATION

The ASU Center for Games and Impact conducted the monitoring and evaluation (M&E) assessment for OurCity. The M&E assessment focused on the patterns of decisions over time as a whole and within subgroups, with the assumption of a connection between decisions made and civic knowledge. The assumption was that players would make in-game decisions according to models of good governance, which the game was designed to convey, and that they would better recognize such decisions over time. The M&E assessment analyzed the results of about 2,400 players based on data extracted in early March 2015, about three weeks after the Thunderclap launch and before the end of the pilot game’s debugging period. The main findings were that:

- Players tended to make civically minded decisions overall.
- Players tended to make fewer civically minded decisions over time.
- Player retention was low.

SPONSORSHIP TYPE	IN-GAME EXAMPLE
<p>Branded daily “News bulletin”:</p> <ul style="list-style-type: none"> - Core mechanic: Sponsor-branded in-game daily Newsfeed bulletin. - Game: Player gets tips, latest news on items and activities. - Benefit: Sponsor awareness and engagement with relevant product/service. 	
<p>Branded in-game decoration:</p> <ul style="list-style-type: none"> - Core mechanic: Gifting sponsor branded virtual goods for decorative purposes. - Game: Personalize player’s virtual space. Item doesn’t directly affect gameplay. - Benefit: Sponsor awareness potentially tied to relevant product/services. 	
<p>Branded “special edition themed” quest:</p> <ul style="list-style-type: none"> - Core mechanic: Sponsor themed missions (aligned with the game’s core values), rewards, collection items, facts, videos. - Game: Player complete quest to get access to premium content/bigger in-game rewards. - Benefit: Drive deeper engagement with sponsor product/services. 	

FIGURE 4: In-Game Sponsorship Models

Overall, the data suggested a potential within this game genre to engage youth and structure their participation such that they can play with civically minded choices that are consistent with the types of choices and dilemmas that occur in the real world. Limited time and budget did not allow for fulfillment of the original vision or ongoing optimization of the design post launch. Additional resources would have allowed for building experiences that players found more compelling and worth pursuing, along with the social interactions and nuanced development necessary to ensure the in-game consequences positively transformed the players' out-of-game behavior.

Limitations of Data

Not only was the data very preliminary (representing only the first three weeks after the Thunderclap launch), its quality was limited. This was due to the short period of project implementation, issues with analytics reliability, and poor integration of data collection tools into the game. Survey responses were optional and response rates were extremely low, with a segment of the survey data set lost due to a saving error. Additionally, because qualitative responses were optional and somewhat outside the game flow, there was likely to be a selection bias. This assumed that people who responded were more interested in displaying civic knowledge and thus would respond more positively. Similarly, all data around the game, from Facebook activity and player feedback, was extremely thin and virtually unusable. A post-launch community management and social media plan was enacted but was not reflected in the data used for the assessment. Player demographics and decision quest answers, however, were found to be reliable and thus served as the backbone of the analysis.

Moreover, due to OurCity's Privacy Policy restrictions, user interviews were not possible, as researchers from the ASU Center for Games and Impact could not connect to individuals to review who was independent from game partners. Furthermore, some analytics did not yield data, including Did You Know Moments and redeemed codes

from community civic engagements. Did You Know Moments did not produce data as part of unreliable analytics. Finally, due to management resource reduction at the end of the pilot, redemption codes were not implemented at the time of data extraction used for the M&E assessment.

Survey Response

As indicated, most survey responses were discovered to not be saving correctly and thus lost. Additionally, the response rate was very low and unreliable. M&E data should be considered biased since those responding would have been predisposed to answering more positively. These data were not analyzed systematically to inform the results.

Responses generally supported the learning objectives of the game. For example, when asked *Why do you think it is important (or not important) to participate in efforts to improve your community?* responses included:

- *If everyone does a little something, we will have a great place to live in.*
- *It's important because it helps everyone out in the community one way or another. Whether people appreciate it or not*
- *Because the betterment of society is not hard, and one must be cooperation of all parties to make it a success.*
- *It is important because if you don't participate then it is possible that the changes you want might not happen.*
- *It's important because as a local resident I am aware of the problems and I have some ideas on what we can do.*

While these examples illuminated the potential of the game, given the dearth of qualitative data and the loss of some responses, NetHope viewed these more as illustrative of what the medium could achieve and not characteristic of what was realized in this particular instance.

Game Design Analysis

The user retention rate was low compared to games of the same genre. ASU's Center for Games and Impact stipulated that many players used to commercial Facebook games may have quickly judged the overall game based on the initial experience, and thereby deemed it not worth the time investment. It is unclear whether and how much budget and time limitations impacted the production value, narrative experience, quest content, and other game design elements of OurCity. The ASU Center for Games and Impact was unable to identify causes of player attrition because inadequate data prevented deeper investigation into the issue.

Decisions in the game were generally positioned for players to revolve around doing what was right for good governance and solid civic engagement behavior rather than more focused decision-making, such as budget choices between saving money versus raising it from businesses. With additional time and resources, the *ethical versus business* decision framework would have been supported by mechanics that aligned civically minded decisions with the best payout long term, but such an alignment was not possible, and the game experience could not fully convey that business-minded decisions were best.

A few of the planned features could have addressed these issues. For example, the popularity screen did show impact on the city population through either a visual of happy or sad citizens or a popularity meter (positive results of making good decisions or negative results of business decisions). The popularity meter went up over time and happy people on the screen would increase. However, the meter only gave visual and narrative feedback and did not unlock anything or provide extra bonuses. Several such mechanics that would have provided consequential feedback were discussed, and some were partially designed but never implemented due to budget constraints. This would have potentially created a direct feedback loop and possibly better

informing player decisions to convey a model of good governance and thereby influencing players to make more civically minded decisions over time.

The findings of the monitoring and evaluation assessment showed that players generally made civically minded decisions throughout gameplay, despite it not being in their best interest for maximizing success in the game. This indicated that players had at least some sense of in-game intentionality in acting as mayors. While it is likely the lack of clear consequences that would have contributed to mitigating the downward trend, given the lack of consequentiality in decisions, such persistence of overall civically minded decisions can be seen as some measure of success.



RECOMMENDATIONS FROM ASU'S CENTER FOR GAMES AND IMPACT

ASU's Center for Games and Impact's central recommendation for future project was to be very clear about program goals, align the appropriate project design to that (e.g. choice of game genre, model for working with NGOs, etc.), then adequately resource the project so that designs can come to fruition. The OurCity pilot had very large goals and was likely trying to accomplish too much. In addition to lacking the necessary funding for the ongoing and continued optimization that would have allowed the vision to be

realized, a potential lack of alignment between program goals and program design resulted in inefficiencies and the stretching of an already tight budget and timeline.

Other recommendations included:

- **Provide meaningful choices in any game designed for learning or impact.** There was plenty of potential to leverage standard genre mechanics to create consequential decision loops, even in social features, but this was severely limited due to budgetary and time limitations. ASU's Center for Games and Impact could not overstate the importance of players feeling like they had meaningful choices and that they started to develop an appreciation for the relationship of particular actions to particular consequences.
- **Forge stronger connections with real world opportunities to encourage out-of-game civic behavior, anticipating the barriers to local participation.** This was one of the main value propositions of the game, and there was deep interest from local Jordanian NGOs in this feature. NGOs did have the ability to reward players for participating in real-world activities with the redemption code system to unlock premium in-game currency, but redemption codes were not implemented at the time of the data extraction used for the M&E assessment.
- **Create more in-game and Facebook fan/community page funneling.** ASU's Center for Games and Impact suggested building quests around specific opportunities hosted by NGOs, even if only online, so that players could be directed to engaging in civic behavior and be rewarded with in-game currency, thereby creating a strong loop. However, such a feature was also very difficult to implement given its intertwined dependencies between game content and NGO realities. Part of this difficulty extended from OurCity being a live game environment that could accept players anytime.
- **Leverage social media as a force multiplier for in-game learning content.** In the city-building game genre, one incentive that drove increased participation was the social interaction, whether interacting with players and sharing earned items that allowed other players to level-up or simply exploiting accomplishments for personal recognition. Even leveraging standard social mechanics like winning rewards, seeing other cities, and aiding other players would have helped create a richer social experience. Adding in the possibility for collaborative play or collective action requiring coordination among players was another possibility.
- **Optimize OurCity further.** A key feature of these types of games was the ongoing community management and local integration, even treating the game less as a product and more like a service. This required ongoing data monitoring with direct community support, exploiting and enhancing desirable features, and iterating or removing features that seem to alienate players. For an impact game, this also included working on-the-ground with stakeholders to better determine how they can leverage the gaming experience as part of a larger set of practices targeted toward promoting deeper civic engagement.
- **Increase attention to localizing the game.** Strongly localizing of a game is key – specifically how a game looks, feels, and reads, but also how it connects into the local landscape as a connected gateway experience. The game would have additionally benefited from a local content writer who was versed in creating a playful narrative and provocativeness. Due to a mix of writers and input from stakeholders that focused on deeper learning, the narrative and quest content felt somewhat heavy handed and less entertaining. A local content writer who had an ear to the ground would have known better what resonated with the player base.

LESSONS LEARNED

The IYCE project was developed as a learning experience for USAID with an objective of proving a theory of change around the effectiveness of serious gaming for increased youth engagement. NetHope was successful at meeting this challenge and delivered a one-of-a-kind pilot to USAID. As a pioneering effort, NetHope realized several critical lessons learned that should be key to the success of similar efforts in the future.

1. Securing leveraging and partnerships for pilots without proof of concept is challenging. Not only was the pilot the first USAID-funded project demonstrating the power of social games for more effective youth engagement, it also represented one of the first times, if not the first, that a serious social game was developed with USAID funding through a private-public partnership funding model like NetHope's. Moreover, the OurCity pilot was based on a theory of change of game-as-service with real-world integration requiring a certain amount of partnership with local NGOs to execute. The lack of a prototype for a very new and unproven concept was a very hard to sell to potential partners. When the project team approached potential partners with the concept and its structure, potential partners expressed interest. However, many potential partners needed a proof of concept before making a formal commitment to the partnership. Additionally, many wanted some preliminary data on the impact and reach of the game, which, of course, was unavailable in the early stages of the pilot.

The lack of dedicated resources and time for cultivating partnerships was also a challenge. While resources were earmarked at the beginning of the project for developing partnerships, the emphasis on this component of the effort diminished as the primary concern became getting the game to market. Furthermore, due to the novelty of the project and the partners' inability to accurately predict and forecast its budget, all partners were stretched thin, leaving

less level of effort available that could have been put into sourcing and building partnerships.

2. Multi-stakeholder projects are complex and require extensive project management. The OurCity pilot attempted to execute against a very ambitious theory of change with more than 15 different partners spread across several continents. Aligning diverse expectations, roles, and responsibilities was extremely challenging on many fronts. Challenges were not only in terms of logistics across time zones and continents and developing systemic coordination and administration, but also in terms of desired outcomes and business cycles. Commercial business roles and cycles (namely, the game producer and developer), international donor cycles, and process and approval procedures made for a very complex and often misaligned decision-making process. This challenge often manifested itself in missed deadlines, decision-making debates, and protracted timelines, all of which were a consequence of the pilot being the first of its kind. While part of this was the learning curve of a new game, the need to align objectives, timelines, and desired outcomes early on in project and ensure adherence to them was a key lesson learned.

In addition, ensuring a more inclusive development process with local stakeholders was very important, and allocating sufficient resources for face-to-face meetings was critical. Of note, in some early stakeholder meetings, financial literacy and workforce development were cited as two highly appealing themes. For this reason, the game executive producer, E-Line Media, felt the IYCE pilot should take one of those routes versus a civic engagement theme, which it predicted was going to be too complex given the unproven territory the game was aiming to cover. While the complexity of the endeavor was acknowledged, the agreed-upon decision was to pilot a civic engagement game.

3. **Designing games balancing and *fun* is tricky.**

Balancing USAID's deep learning requirements with the realities of keeping the game *fun* and attractive was challenging. In the end, the game may have been a bit of a hybrid, sitting somewhere between a *gateway* entertainment game that includes learning and impact objectives and a *pathway* game clearly designed and positioned for learning. To use resources more efficiently, the game design should have been either a *gateway* or *pathway* game, but not both. Further exploration of this issue is needed given the data limitations of the M&E assessment.

4. **Deciding on the optimal platform is critical.**

Extensive time was dedicated to debating whether the pilot game should be desktop computer- or mobile-based. Some of the most heated debate took place well into the game development process after the game concept had already been developed. Fully understanding and analyzing the local and relevant technology landscape prior to any game design or development is essential. The major challenge with the IYCE project on this front was that the game development process took much longer than expected, which meant that the technology landscape shifted during that time. Not revisiting the platform could have saved time and resources. While the IYCE project succeeded in piloting a desktop-only Facebook game, there was still a question as to whether the mobile platform would have worked just as well. Popular city-building games, such as *CityVille* and *Farmville*, both released mobile versions during *OurCity's* development. NetHope was unable to verify whether the desktop-only decision was the best course given the constantly changing technological landscape.

5. **Designing a highly localized game makes a game unique and appealing.** A key component in the success of the *OurCity* pilot and the game's appeal

was the exception local look, feel, and content of the game. This was by far the most consistent feedback received from all beta user testing, as well as in post-launch feedback. The unique and appealing local look and content were accomplished through the strategic identification of key local partners. Additionally, the game's in-country manager was key to validating all steps of the process through local focus groups. The in-country manager was also the lead liaison with all local NGO partners. Finally, the local community manager ensured that the social media content developed would attract a local community. ASU's Center for Games and Impact, as part of the M&E assessment, indicated that the game could have been more playful and provocative with even more localized content.

6. **It is important to anticipate and plan for local capacity constraints.**

OurCity's excellent local partners were key to the game's appeal and its exceptional local look, feel, and content. Using a local Jordanian game developer in the first phase of the project, however, proved to be too ambitious. A local Jordanian game developer was contracted due to its apparent expertise in the Facebook city-building genre and the belief that the company had the capacity, vision, and cultural experience to develop a successful game. Moreover, having a local developer would innately ensure future sustainability of the game and develop local capacity in this space. Within USAID, there was considerable debate as to whether that was the goal, with some feeling it was more important to get a good game. Unfortunately, as a small developer, the Jordanian company was thinly capitalized and was ultimately not able to execute and meet project deliverables. This was largely due to the mismatch between the business cycle of a small local technology company and a multi-stakeholder project. Furthermore, local capacity was built in many ways other than engaging a local game developer, which was an initial focus of the selection

process. The game's strongest quality was its local look and feel which was secured through a local digital art and animation studio and other local partners, not a local game developer.

- 7. A flexible and responsive social media strategy is necessary in the face of constantly changing Facebook algorithms.** Facebook made multiple changes in 2014 to its algorithm for determining which content people see in their news feeds. The originally envisioned OurCity pre-launch plan involved using a Facebook fan/community page to raise awareness of the game and its features, and Facebook's algorithm changes made the success of the original plan unlikely. The inability to course-correct rapidly could easily have not ended so well. The constantly changing social media landscape needed to be continually monitored and marketing and community building strategy adjustments needed to be flexibly made to reflect current realities.

- 8. Carefully calibrated strategic social media-based marketing work for serious social games.** OurCity was effectively launched using low-cost, social media-based marketing methods to jumpstart its viral organic growth. Thunderclap was chosen as the primary launch outreach platform given the Facebook algorithm changes described above and the realities of OurCity's online community at the time. With relatively low cost, the Thunderclap launch resulted in a social reach of about 1.1 million. Social media marketing and community building needed to be planned and executed reflecting current realities, not what other online communities could do.

A related issue was paid Facebook advertising. Both the launch and post-launch were buttressed through a very small amount of paid Facebook advertising. This advertising demonstrated the cost-effectiveness of Facebook application install ads for reaching potential players in Jordan. It would be very easy



for organizations in the near-term to cost-effectively target very specific audiences by replicating and improving upon this approach.

WHAT'S NEXT: *Would You Like to Play a Game?*

By Seth Corrigan, Senior Director of Assessment and Game-Based Learning,
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INTRODUCTION

This chapter is designed to inform USAID and USAID implementing partners of promising developments in the use of games and gamification to support civic engagement. As communities come to increasingly face volatile, uncertain, complex, and ambiguous decision-making environments, games and gamified experiences will have a growing role in informing and gathering input from the public, provide means for engaging citizens in fruitful deliberation, establishing supportive norms for civic engagement, and forming social ties valuable for public participation. Youth engagement is emphasized throughout. Also discussed is the current evidence base for use of games and gamification to support public understanding of complex systems and issues, civic engagement as well as key opportunities and barriers to their use for that same purpose. Existing games are described with references provided for those who wish to learn more. Games and gamified experiences supported by USAID and its implementing partners are also noted.

DEVELOPMENTS IN GAMES AND GAMIFICATION

Four major developments have impacted the world of games and gamified experiences. First is a growing sophistication in game design regarding players' needs. Designers are becoming increasingly aware of the importance of making games that are developmentally appropriate for the intended audiences. Game design practices are also beginning to better reflect current science of human motivation and behavior as those practices increasingly come to emphasize the social and

broadly relational aspects of learning and behavior change. Second, role playing games – both digital and board-based role-playing games – are gaining recognition for their capacity to support effective deliberation and planning among community members. Examples of games and gamification efforts are discussed throughout. Third, while gamification of e-participation is not new, current uses often leverage the approach to engage community members in idea generation, sensing activities as well as city planning and policymaking. Lastly, newsgames are also noted for their ability to support the critical understanding of complex systems and events; increasingly the focus of policymaking in environments that are volatile, uncertain, complex, and ambiguous. Themes associated with civic engagement for youth, as well as USAID programs and their implementing partners, are emphasized.

Growing Awareness of Human Development and Social Relations

Use of simulations, games, and gamified experiences is well established in fields as diverse as business planning, policy making, military planning, medicine, public health, and education, among others. Over the last two decades, their design and use have increasingly reflected sophisticated approaches to teaching and learning, deliberation, and behavior change. Specifically, there has been a consistent transition to *developmentally appropriate* approaches to learning and *relational approaches* to deliberation and behavior change.

Developmentally appropriate approaches to learning

purposefully account for the age-appropriate needs of targeted users. Over the last two decades, awareness of the importance of meeting the developmental needs of young adolescents and young adults in the context of civic engagement and education has been increasingly recognized.¹ That awareness has been reflected in game and gamified experiences that are designed to meet the intellectual, social, and psychological needs associated with different stages of development.

Exemplary attention to child and youth development is exhibited in **Worm Attack!**, **Family Choices**, and **9-Minutes**, well recognized educational mobile games funded in part by USAID and developed as a part of the Half-the-Sky movement that are targeted to young adolescents. Another example is **Cards Against Calamity**, sponsored by the National Oceanic and Atmospheric Administration and the Wilson Center.



Relational approaches to deliberation and behavior change reconceive of the targeted user from lone rational actor to networked individual immersed in and motivated by social interactions and social currents within sets of friendships and acquaintances. Connected learning,^{2,3}



for example, is a new theory of learning that aims to create consequential connections between youth interest driven cultural participation, learning, and civic action.⁴ It has been leveraged by researchers and designers in game design and development efforts conducted at the Institute for Play, GlassLab Games, and broadly among members of the Connected Learning Alliance.^{5,6} Relational approaches to deliberation and behavior change are backed by a growing body of evidence regarding the importance of network dynamics in individual decision making and action in general. Current research views social networks as dynamic systems in which behavior change can be viewed as a form of complex contagion, with multiple recommendations may be needed from contacts in order to initiate and maintain new behaviors.⁷ Importantly, network dynamics also appear to exhibit tipping point behaviors that may allow behaviors or beliefs among a minority to influence those of the majority.^{8,9} Evidence for the contagion perspective

¹ Obradović, J., & Masten, A. S. (2007). Developmental antecedents of young adult civic engagement. *Applied developmental science, 11*(1), 2-19.

² Ito, M., Martin, C., Pfister, R. C., Rafalow, M. H., Salen, K., & Wortman, A. (2018). *Affinity online: How connection and shared interest fuel learning* (Vol. 2). NYU Press.

³ Wortman, A., & Ito, M. (2019). Connected Learning. *The International Encyclopedia of Media Literacy*, 1-18.

⁴ Ito, M., Soep, E., Kligler-Vilenchik, N., Shresthova, S., Gamber-Thompson, L., & Zimmerman, A. (2015). Learning connected civics: Narratives, practices, infrastructures. *Curriculum Inquiry, 45*(1), 10-29.

⁵ Ito, M., Soep, E., Kligler-Vilenchik, N., Shresthova, S., Gamber-Thompson, L., & Zimmerman, A. (2015). Learning connected civics: Narratives, practices, infrastructures. *Curriculum Inquiry, 45*(1), 10-29.

⁶ Kafai, Y. B., & Burke, Q. (2016). *Connected gaming: What making video games can teach us about learning and literacy*. MIT Press.

⁷ Pinheiro, et al., 2018 - Pinheiro, F. L., Vasconcelos, V. V., & Levin, S. A. (2018). Consensus and polarization in competing complex contagion processes. *Unpublished Preprint (arXiv)*.

⁸ Centola, D., Becker, J., Brackbill, D., & Baronchelli, A. (2018). Experimental evidence for tipping points in social convention. *Science, 360*(6393), 1116-1119.

⁹ Andreoni, J., Nikiforakis, N., & Siegenthaler, S. (2020). *Predicting Social Tipping and Norm Change in Controlled Experiments* (No. w27310). National Bureau of Economic Research.

on behavior change and tipping point dynamics have relevance for games designed to initiate social change¹⁰ as they suggest the importance of social interaction and social network structure. Many of these findings are increasingly reflected in social networking games.

Social networking games are online games that are hosted and accessed via one or more networking services such as Facebook, MySpace, Discord, Reddit, Steam, or Twitch. They support asynchronous play, casual multiplayer involvement, and some form of competition that combines a need to collaborate with other players while also trying to maximize outcomes for oneself.¹¹ Social networking games have been attributed to development of social capital within the game environments themselves.¹² In some cases, social networking games have also been identified with development of social capital outside the game environments that is thought to advance real world civic engagement.¹³ Counter evidence exists for both of these claims.¹⁴

Popular social networking games require popular networking sites for their environment in addition to the many characteristics that make for a successful game. Social networking sites that have achieved notoriety outside of the Global North include Orkut (Brazil), Hi5 (India and International), RenRen (China), Kaixin001 (China), Weibo (China), Skyblog (North Africa), and Gnaija¹⁵ (Nigeria).

Current, popular social networking games in the Global North that exemplify the category include **Farmville**,

Criminal Case, **Farm Heroes Saga**, **YoVille**, **Pet Society**, and **Vector**. Popular social networking games outside of the Global North include **EVOKE**, published in Africa and funded by the World Bank to engage participants in solving challenges associated with economic development; Tunisia's **League of Legends** community is one of the largest in Africa with approximately 30,000 members.



Cooperative Role-Playing Games for Fruitful Deliberation

Carefully designed cooperative role-playing games engage participants with opportunities to assume alternative identities, roles, and interests in ways that avoid positional bargaining and stalemates and facilitate discovery of creative solutions and pathways to consensus in spite of differences in resources and interests.¹⁶ Players in role-playing games are typically tasked with accomplishing one or more goals by moving about in dangerous or unfamiliar environments and by overcoming challenges with the help of objects or resources within the game. Players' primary tools in serious role-playing games are their abilities to assume new perspectives on the problem(s) at hand, create new policies, or develop agreements with others. A creative player may use resources in novel ways or patch

¹⁰ Centola, D., Becker, J., Brackbill, D., & Baronchelli, A. (2018). Experimental evidence for tipping points in social convention. *Science*, 360(6393), 1116-1119.

¹¹ Konert, Johannes. *Interactive Multimedia Learning: Using Social Media for Peer Education in Single-Player Educational Games*. Springer, 2014.

¹² Molyneux, L., Vasudevan, K., & Gil de Zúñiga, H. (2015). Gaming social capital: Exploring civic value in multiplayer video games. *Journal of Computer-Mediated Communication*, 20(4), 381-399.

¹³ Williams, D. (2006). On and off the Net: Scales for social capital in an online era. *Journal of computer-mediated communication*, 11(2), 593-628.

¹⁴ Zhong, Z. J. (2011). The effects of collective MMORPG (Massively Multiplayer Online Role-Playing Games) play on gamers' online and offline social capital. *Computers in human behavior*, 27(6), 2352-2363.

¹⁵ Africa: Tracking Internet Progress, 2009 <https://www.oafrica.com/uncategorized/african-social-networks>; accessed September 14, 2020.

¹⁶ Bagley and Shaffer, 2011 - Bagley, E. A., & Shaffer, D. W. (2011). Promoting civic thinking through epistemic game play. In *Discoveries in gaming and computer-mediated simulations: New interdisciplinary applications* (pp. 111-127). IGI Global.

together agreements that help everyone achieve the game's goals.

When cooperative role-playing games are designed to engage players with complex policy or development challenges that sufficiently mirror reality outside the game, players' solutions can become resources for policy makers. Participants can also gain insight into the complexities of the problems faced by other social groups, policy makers, or government officials,¹⁷ leading to what has been termed *augmented deliberation*,¹⁸ dampening effects of personal interests and supporting more productive dialogue.

Interesting role-playing games are stimulating and mind expanding. Players learn through simulation that allows them to try out different sets of priorities and actions in an ad hoc fashion and experience their consequences. The notions of *bricolage and tinkering*¹⁹ have been used to describe how players typically assemble solutions to complex problems in role-playing games, doing so in a piece-meal and iterative fashion as they come to see the strengths and weaknesses of various proto-solutions en route to assembling more comprehensive, broadly acceptable responses. As a result, role-playing games can be effective environments for practical and productive social experimentation,²⁰ allowing participants to separate themselves from their typically held beliefs and orientations, in order to find value in alternative solutions and perspectives. In turn, players may come closer to deliberating alternative solutions in a more neutral fashion better aligned with the *original position* and *veil of ignorance*.²¹

Several exemplary role-playing games have been developed to support policy making, city planning, and international development in ways that support civic engagement. A small number are described here.

OurCity is a role-playing game funded by USAID and developed in a partnership between NetHope, Arizona State University, and e-Line media. The game is modeled after Electronic Art's **SimCity**. Players take on the role of mayor and build their online Jordanian city while managing budgets, constructing buildings, and taking responsibility for decisions over energy sources, education, healthcare, and sustainable growth. Importantly, the game also connects players for real world service learning and volunteer events. **Tradeoff** is a role-playing game for seven to 15 players with one group assuming roles as property developers and a second as planning commissioners. Developers work to get city development projects underway but must do so while minimizing their environmental impacts. **Rezone**,²² developed in the Netherlands, is a similar, though more recent, game that casts players as developers, local officials, engineers, and citizens who must draft and pass a city plan and related policies. **Participatory Chinatown**²³ is a role-playing game that involved participants in deliberations over city planning exercises. The game has successfully engaged nontraditional participants in planning, as participants tended to be younger without previous experience with participatory planning. Players reported the game made them understanding more of their characters' needs. **Community PlanIt** by Engagement Game Lab in Boston is a role-playing game that utilizes location-aware mobile applications and hyperlocal social networking to involve neighbors in city planning exercises. While

¹⁷ See Shaffer (2006) on *epistemic games*.

¹⁸ Gordon and Manosevitch, 2011 - Gordon, E., & Manosevitch, E. (2011). Augmented deliberation: Merging physical and virtual interaction to engage communities in urban planning. *New Media & Society*, 13(1), 75-95.

¹⁹ Innes and Booher, 2000 - Innes, J. E., & Booher, D. E. (1999). Consensus building as role playing and bricolage: Toward a theory of collaborative planning. *Journal of the American Planning Association*, 65(1), 9-26.

²⁰ Turkle, 1996 - Turkle, S. (1996). Working on Identity in Virtual Space. *Constructing the self in a mediated world*, 156.

²¹ Rawls, 1999 - Rawls, J. (1999). *A Theory of Justice*, rev. ed.

²² de Lange, M. (2019). 18. The playful city: Citizens making the smart city. *The Playful Citizen*, 349.

²³ (Gordon and Schirra, 2011) - Gordon, E., & Schirra, S. (2011, June). Playing with empathy: digital role-playing games in public meetings. In *Proceedings of the 5th International Conference on Communities and Technologies* (pp. 179-185).

the explicit goal of the game is to generate locally developed neighborhood plans, it is also expected that participants will develop stronger social connections through the game. The USAID-funded **Crop Insurance** game developed by Columbia University's Earth Institute as a part of the CGIAR research program on climate change is notable here as well. The game is designed to initiate deliberation among local farmers in areas prone to drought. As a key outcome of the game play, farmers articulate their preferred specifications for insurance products that would best meet their needs. The game has led to several community-designed and community-run insurance programs designed to protect local agriculture from intense droughts. Use of a role-playing game focused on **Irrigation Systems** has been successful in the Moroccan context as small hold farmers played through multiple roles and scenarios in order to plan how their communities should leverage new irrigation systems and water use policies.²⁴ **The Migrant Trail** is a simulation game modelled after **The Oregon Trail** game where players can assume the role of several characters in the game, including migrants as well as border police.

Gamification of e-Participation for Civic Engagement

e-Participation utilizes information and communication technologies to foster civic engagement and participatory governance with a special focus on deliberation and decision making. While e-participation has an established history, researchers have noted that eliciting broad use of such systems and programs has been difficult.²⁵ Gamification of e-participation has been one popular solution to the lack of engagement. Broadly put, gamification of e-participation is the design and implementation of systems, services, and processes



In Stockholm, Sweden, the Speeding Lottery introduced a lottery linked to safe driving which led to reductions in speeding tickets.

that provide positive, engaging experiences for users similar to those of a game while users carry out activities associated with governance and policy making.

Notable examples of gamification in e-participation reveal a range of approaches to using games as a means to increasing community members' civic engagement. Examples of gamified e-participation to engage community members in idea generation, sensing activities as well as city planning and policy making are currently prevalent. Some current examples are provided here. The United Kingdom's Work Pensions Department developed an **Online Marketplace for Ideas** where employees are able to suggest ideas for new workplace policies with their colleagues trading virtual stocks in those ideas in order to signal the extent of their support.²⁶ In Stockholm, Sweden, the **Speeding Lottery** introduced a lottery linked to safe driving which led to reductions in speeding tickets. Portions of speeding tickets were added to the lottery winnings with safe drivers entered into the lottery pool to compete for the funds.²⁷ **CityCare**²⁸ introduces a point system on top of

²⁴ Dionnet, M., Kuper, M., Hammani, A., & Garin, P. (2008). Combining role-playing games and policy simulation exercises: An experience with Moroccan smallholder farmers. *Simulation & Gaming*, 39(4), 498-514.

²⁵ Bista, S. K., Nepal, S., Paris, C., & Colineau, N. (2014). Gamification for online communities: A case study for delivering government services. *International Journal of Cooperative Information Systems*, 23(02), 1441002.

²⁶ Agbozo, E., & Chepurov, E. (2018, January). Enhancing e-Participation via gamification of e-Government platforms: A possible solution to Sub-Saharan African e-Government initiatives. In *CEUR Workshop Proceedings* (Vol. 2145, pp. 83-86). CEUR-WS.

²⁷ Arakawa, Y., & Matsuda, Y. (2016). Gamification mechanism for enhancing a participatory urban sensing: Survey and practical results. *Journal of Information Processing*, 24(1), 31-38.

²⁸ Bousios, Gavalas and Lambrinos, 2017 - Bousios, A., Gavalas, D., & Lambrinos, L. (2017, July). CityCare: Crowdsourcing daily life issue reports in smart cities. In *2017 IEEE Symposium on Computers and Communications (ISCC)* (pp. 266-271). IEEE.

an existing application that allows community members to document issues with public roadways, transit, and other structures and services. **Game of Drones**,²⁹ developed and implemented in the UK, allows community members to fly drones in support of local police enforcement at the convenience of the community members. Finally, **BlockbyBlock**³⁰ utilized Minecraft to successfully engage youth in city planning exercises.

Use of Newsgames in Supporting Informed Publics

Literacy broadly conceived and more specifically, critical literacy has been broadly recognized as a foundation of effective civic engagement and participation. While several games and gamified experience have been found useful contributors to youth literacy for civic engagement, newsgames have come to play a prominent role in supporting awareness and critical understandings of current and historical events.³¹ Newsgames integrate journalism with game mechanics to provide alternative means for informing publics of current and historical events. They are particularly powerful in conveying complexities of systems or policy issues such as drivers of climate change, approaches to single payer health insurance, or bias in applications of artificial intelligence. While their popularity has been described as declining in the Global North,³² newsgames form an important genre for their potential role in creating critical and informed communities as required for effective civic engagement.

Newsgames can be designed to meet the needs of specific youth demographics through selection of appropriate topics, design for appropriate reading levels, and use of appropriate game mechanics native to the genre. Importantly, because of their typical reliance on narrative and text, they place manageable demands with regard to hardware and data, making them good candidates for mobile platforms.

Well-known newsgames include **Endgame: Syria**, **NarcoGuerra** (Mexico's drug war), **Darfur is Dying**, **Jogo da Mafia** (Brazilian Mafia), and **Budget Hero** (policy setting). Newer examples include the **AI-COMPAS** game developed at MIT in which players are challenged to learn about and find an approach to automating sentencing that exhibits less bias than the behavior of a courtroom judge; **The Ocean Game** in which players learn the intricacies of climate change in order to save a fictional coastal town; **The Uber Game** developed by the Financial Times to diversify its readership and inform the public about the hardships associated with becoming an Uber driver; **Pirate Fishing** was developed to inform players about the illegal practices of fishing in protected waters, pursuing endangered and protected species, or using illegal means such as destructive trawling. The game also involves player engagement by providing means for them to track and document real-time observations of illegal practices. More comprehensive lists of newsgames can be found online.



²⁹ Lindley, J., & Coulton, P. (2015, October). Game of drones. In *Proceedings of the 2015 annual symposium on computer-human interaction in play* (pp. 613-618).

³⁰ Rexhepi, A., Filiposka, S., & Trajkovik, V. (2018). Youth e-participation as a pillar of sustainable societies. *Journal of Cleaner Production*, 174, 114-122.

³¹ Bogost, I. (2020). Curiosity Journalism, or the First Decades of Newsgames. *Convergence*, 26(3), 572-576.

³² Plewe, C., & Fürsich, E. (2020). Producing newsgames beyond boundaries: Journalists, game developers, and the news business. *Convergence*, 1354856520918076.

EFFECTIVENESS OF GAMES AND GAMIFIED EXPERIENCES

The efficacy and effectiveness of games for learning has been under scrutiny over the last decade leading to an initial understanding of their impact on learning for a broad range of knowledge types.³³ In parallel, *methods* for evaluating the impact of games and gamified experiences have improved as well.³⁴ Often, cross sectional designs and pre-post designs are used with hard-copy or digital out-of-game measures. Though, as in other domains, randomized control trials remain the gold-standard for their support of causal claims.

As the practice of instrumenting digital experiences to gather data on players' activity within games becomes more common, it can be expected that the prevalence of time-series and longitudinal designs will increase. In these cases, assessment relies on data gathered in-game. Across the fields of learning science, evaluation, and measurement, there is also a growing interest in utilizing players' process data and not just their test results or success and failure in games challenges to measure changes in players' knowledge or level of facility.³⁵ Whether or not assessment takes place outside of or within the game experience, it should be expected that researchers utilize some form of principled design³⁶ when constructing the measures to be used.

Understanding the impact of games and gamified experiences on players' beliefs, attitudes, and participation in civic engagement is less well understood. A great deal of work has been done to develop consensus over the constructs associated with civic engagement and their operationalization.³⁷ Importantly,

while use of learning analytics and educational data mining have grown in the context of digital experiences over the last 15 years, it is not clear that the analytical tools associated with those fields are appropriate for evaluations of programs or interventions, though it should be noted that there are many within the learning analytics and educational data mining fields that would contest this. In the main, rigorous assessment tools employing well-formed scales and capable of reliably detecting change are required. Multi-level and Item Response Models (IRMs) are most often employed. Such requirements have tended to steer evaluation efforts toward established measurement science, econometrics, and psychometrics.

OPPORTUNITIES AND BARRIERS TO IMPLEMENTATION AND ADOPTION

Several opportunities and barriers exist for use of games and gamified experiences for civic engagement. Given the merits of games and digital experiences that reflect local customs and aesthetics, the rise of non-Global North game studios is notable. With regard to barriers of the use of games for social good in general, the growing prevalence of online social media surveillance is also noteworthy. The growing availability of platforms for publishing games that are based in the non-Global North is an important signal of a rising gaming ecosystem. Game studios and publishers based in the non-Global North are also growing in number, developing games that reflect local interests, aesthetics, and mores. In some cases, these studios are developing games for both their local markets and international markets as well. Game Cooks for example, a studio based in Lebanon, has developed more than 14 games on iOS and Google

³³ Backlund, P., & Hendrix, M. (2013, September). Educational games-are they worth the effort? A literature survey of the effectiveness of serious games. In *2013 5th international conference on games and virtual worlds for serious applications (VS-GAMES)* (pp. 1-8). IEEE.

³⁴ Mayer, I., Bekebrede, G., Hartevelde, C., Warmelink, H., Zhou, Q., Van Ruijven, T., ... & Wenzler, I. (2014). The research and evaluation of serious games: Toward a comprehensive methodology. *British journal of educational technology*, *45*(3), 502-527.

³⁵ de Klerk, S., & Kato, P. M. (2017). The Future Value of Serious Games for Assessment: Where Do We Go Now? *Journal of Applied Testing Technology*, *18*.

³⁶ Ferrara, S., Lai, E., Reilly, A., & Nichols, P. D. (2017). Principled approaches to assessment design, development, and implementation. *The Handbook of Cognition and Assessment, Frameworks, Methodologies and Applications*, 41-74.

³⁷ National Research Council. (2014). *Civic engagement and social cohesion: Measuring dimensions of social capital to inform policy*. National Academies Press.

Android platforms to date. Kiro'o Studios, a game and animation studio started in 2003 and headquartered in Yaounde, Cameroon, has published the role-playing game **Aurion: Legacy of the Kori-Odan**, now available on the U.S. platform Steam. With support from the International Game Developers' Association (IGDA), game designers in Senegal have developed several titles for international markets including **Ha Buggy** and **Cross Dakar City**. The IGDA has six chapters operating in Egypt, Tunisia, Ghana, Nigeria, Senegal, and South Africa. Arrival of games conferences focusing on local game developers provides further evidence of a growing ecosystem of game design, development, and publishing in Africa and the MENA region, with Africa Games Week and the Mena Games Conference serving as examples.

While motivations to engage youth in online game-based and gamified experiences that support civic engagement may be justified, concerns over data privacy should be noted. This is particularly important when games are published on social networking sites and where telemetry on players' activities is gathered for evaluation or assessment. Online games or gamified experiences such as those found in e-participation applications can be instrumented to gather and store detailed demographic and activity data. Observations of discrete behaviors, comments, images, and in-game actions for example can provide direct evidence of players' beliefs and sentiments. Similar data gathered over time can also support inferences about person characteristics, likely activities, plans, and personal networks³⁸ through use of human review and machine-learned models. In cases where public and private boundaries are not clearly defined or reliable, gaming and social networking data can be targeted by governments and used in ways that put individual freedoms at risk, support social sorting and

discrimination, and erode due process.³⁹ Evidence is available that both government-based and corporate actors are involved and continue to invest in surveillance of social media activity.⁴⁰

³⁸ Bedi, P., & Sharma, C. (2016). Community detection in social networks. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 6(3), 115-135.

³⁹ Freedom House (2019). Freedom on the Net: Governments harness big data for social media surveillance. <https://freedomhouse.org/report/freedom-on-the-net/2019/the-crisis-of-social-media/social-media-surveillance>.

⁴⁰ Ibid



26. Using Technology to Combat Trafficking in Persons

April 2011 – September 2014

BACKGROUND

Through the Combat Trafficking in Persons (cTIP) project, NetHope leveraged the reach and experience of its membership to call attention to trafficking in persons (TIP), designed a technology-based pilot to address it, and gathered multi-level stakeholders to implement broad anti-trafficking activities. The following objectives were established for this project:

1. Identify key challenges facing civil society organizations (CSOs) working to combat human trafficking and potential technology applications to address these challenges.
2. Conduct an application design contest for entrepreneurs, local software developers, and organizations to develop technology solutions to combat trafficking.
3. Implement winning technology through a local organization.
4. Develop a sustainability and scalability plan.

The original place of performance for the cTIP project was Russia. However, project activities in-country were terminated as USAID ended most of its operations in Russia in October 1, 2012.¹ Following USAID's departure from Russia, NetHope worked with USAID's Democracy, Conflict, and Humanitarian Assistance (DCHA) Bureau to identify and select a new country to implement the project. NetHope conducted its search based on the following criteria: (a) sufficient market penetration of mobile phones; (b) availability of services for victims of

trafficking; (c) a partner with sufficient local capacity and willingness to implement an application; and (4) USAID approval to operate. In January 2013, NetHope and World Vision submitted a concept note to USAID/DCHA outlining a partnership to pilot an application as part of an existing World Vision anti-trafficking program (A-TiP). In late March 2013, USAID/DCHA, with concurrence from USAID/Albania, approved NetHope's proposal to pursue the partnership with World Vision in Albania. Shortly after receiving USAID's approval to implement the cTIP project in Albania, Albania was replaced on the Tier 2 Watch List for Trafficking.²

RUSSIA IMPLEMENTATION

NetHope initially implemented a project to design and pilot a technology solution to assist CSOs in combating TIP in Russia. NetHope completed the objectives established for Year 1 of the project, as described below. Given the departure of USAID from the country in 2012, NetHope ceased activities in Russia and therefore did not complete the objectives established for Year 2 (cTIP Objectives 3 and 4).

Objective 1: Identify key challenges facing CSOs working to combat trafficking in Russia and potential technology applications to address these challenges.

NetHope assessed anti-trafficking CSOs in Russia in May 2011. Fourteen Russian CSOs completed an online survey designed to ascertain the types of anti-trafficking work being conducted, major obstacles faced,

¹ Mohammed, A. (2012, September 18). *USAID mission in Russia to close following Moscow decision*. Retrieved from Reuters Web Site: <https://www.reuters.com/article/us-usa-russia-aid/usa-id-mission-in-russia-to-close-following-moscow-decision-idUSBRE88H11E20120918>

² Tier 2 ranking reflects countries whose governments do not fully comply with the Trafficking Victims Protections Act of 2000 minimum standards but are making significant efforts to bring themselves into compliance.

and the types of technology used by the organizations in their work. An expert on TIP in Russia interviewed representatives from seven Russian CSOs to get a more in-depth perspective on the survey responses.

The assessment found that the focus of CSOs tended to be on raising awareness of human trafficking in the public and among vulnerable populations. Several CSOs provided services to victims, but actively rescuing victims was quite rare. The broad themes identified in the survey and follow-on interviews suggested that the technology to be developed must raise public awareness, deliver services to victims, improve coordination among service-providing agencies, target prevention messages to vulnerable populations, and/or improve reporting and data collection about TIP in Russia. With respect to technology use, most CSOs used relatively new computers, had internet capability, were familiar with social media, and broadly used mobile phones. The use of smartphones was not common at the time.

Objective 2: Conduct an application design contest for local entrepreneurs, software developers, and organizations in Russia to develop technology solutions to combat trafficking.

NetHope implemented a mobile application development contest from June to August 2011 to encourage developers in Russia, Eastern Europe, and Central Asia to generate ideas for mobile applications to combat trafficking in Russia.³ The Demi and Ashton Foundation (DNA) contributed the cash prize for the contest. The contest was advertised through existing developer networks and contacts in the region, press releases, USAID blogs and Missions, Facebook and Twitter campaigns, and Google AdWords. A total of 30 entries were received in the form of YouTube videos, 11 of which met the contest criteria. After a week-long period in which the public was invited to vote, an expert panel of judges including representatives from USAID,

DNA, the U.S. Department of State, and World Vision evaluated the entries and selected the top two finishers. The first prize went to a developer from Poland, who received a cash prize of \$20,000. The second prize went to a developer from Romania, who received a cash prize of \$15,000. The contest was featured on the *CNN Freedom Project* broadcast on November 17, 2011.⁴ The original plan was to bring the two contest winners to the Clinton Global Initiative (CGI) offices in September, a follow-on to DNA's commitment to CGI in 2010. Travel for the contest winners was cancelled due to difficulties in obtaining visas and the withdrawal of DNA's participation in CGI. The cash prizes were increased to offset the savings in travel costs for the winners.

Because the application ideas from the contest winners were not market-ready, the cTIP Working Group further refined the concepts and developed a list of user requirements for the final application. Google IdeaLab developed the final mobile application, called *Safe from Sale*. The application, based on a geographic information system (GIS) technology, featured mapping to services for victims of trafficking, a panic button that alerted the user's emergency contacts and an anti-trafficking CSO to the user's location in case of emergency, and educational materials about human trafficking. The mobile application was made available for free on the Google Android platform.



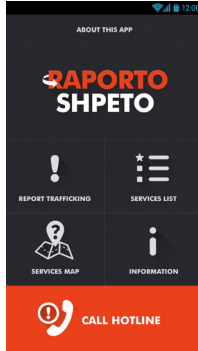
NetHope also engaged the Perm Center for Assistance to Victims of Violence and Human Trafficking to: 1) create a database of all services for victims of human trafficking in Moscow; 2) develop educational materials; 3) assist with naming the mobile application; 4) translate the application's user interface into Russian; and 5) create a marketing plan.

³ Mendelson, S. (2011, June 28). *Stop Human Trafficking App Challenge*. Retrieved from United States Agency for International Development Web site: <https://blog.usaid.gov/2011/06/stop-human-trafficking-app-challenge>

⁴ CNN. (2011, November 17). *'Stop human trafficking' app takes off*. Retrieved from CNN Web site: <https://edition.cnn.com/videos/bestof/2011/11/17/russian-app-challenge.cnn?ref=allsearch>

ALBANIA IMPLEMENTATION

NetHope worked with World Vision Albania (WVA), the Albanian Ministry of Internal Affairs (MoIA), and Vodafone Albania Foundation (VAF) to adapt, launch, and increase awareness of human trafficking in Albania through the mobile application *Raporto! Shpeto!* (*Report! Save!*). The application was made available for use by the wider public in Albania. The project accomplished the following major activities:



- Adapted the mobile application to the local context and finalized smartphone and simple phone solutions to report trafficking through the application, calls to the national hotline, or short message service (SMS) reports.
- Completed the pilot phase with the participation of 58 users to test and provide feedback on the mobile application.
- Launched the application, *Raporto! Shpeto!* and the new national hotline (116006), which were available free of charge to the Albanian public as part of a national awareness campaign.
- Conducted trainings on the use of the application and national hotline for regional anti-trafficking committees (RATCs) in six regions of Albania (Shkodra, Lezha, Kukes, Tirana, Elbasan, and Durres).
- Implemented public awareness campaigns, including:
 - » Posting two billboards at Morine and Kapshtice Borders, six citylight billboards in Durres, and one citylight billboard at Rinas-Tirana Airport, and about ten television screens in popular bars

and public spaces in Tirana.

- » Promoting *Raporto! Shpeto!* through television programs, passing out posters, and social media (Facebook).
- » Publishing 26 articles through written media.
- » Securing a broadcast television spot 135 times during July to September 2014.

During the awareness campaign period between June and September 2014, 879 new users downloaded the mobile application *Raporto! Shpeto!* to their smartphones, and 660 reports⁵ were submitted through the application and SMS reports.

Outcome 1: Smartphone application piloted and linked to WVA's A-TiP response.

Project implementation started by adapting the application to the local context and equipping it with the following features:

- **Call 116006** – provided a direct link to the national anti-trafficking hotline.
- **Report Trafficking** – allowed a user to send a message about suspected trafficking to the National Referral Mechanism of Albania.
- **Information** – delivered educational materials on human trafficking.
- **Services Map** – mapped social services nearest to the user's location.
- **Services List** – provided a listing of social services and locations while offline.

A key highlight was the establishment of the national hotline, which was an important feature of the application. NetHope worked with WVA, the MoIA,

⁵ This number represents the number of reports that were submitted through the application and SMS and is based on data obtained from the MoIA's server. Please note the following:

- a. This is the number of trafficking cases and suspected trafficking cases that were reported by individuals and may be higher than the number of actual trafficking cases.
- b. It was not possible to obtain data from MoIA that disaggregated test reports from actual reports; and
- c. This data represents the latest data NetHope obtained from the ministry from June to August 2014.

VAF, and all major mobile phone companies in Albania to build the hotline from the ground up. This involved coordination to determine what the number would look like, what technical resources were needed to establish the hotline, who would respond to the calls, obtained necessary approvals, and negotiated with mobile companies to provide a free service for the use of the hotline number to all Albanians.

Once the mobile application was completed, 58 users tested its functionality and relevance to the Albania context. VAF contributed smartphones to the 58 pilot users. Pilot users were representatives from CSOs, shelters for victims of trafficking, RATCs, the MoIA, the Ministry of Health, university students studying social work, members of the National Referral Mechanism, and the Albanian National Coalition United for Child Care and Protection (the BKTF Coalition). Users were identified in coordination with the MoIA and were chosen because they were considered key stakeholders in the anti-trafficking response.

Over a period of two months, pilot users tested and participated in various meetings to provide feedback on the functionality and relevance of the application and national hotline. Pilot users were also encouraged to promote the application within their organizations as a tool to report trafficking and expedite the response to trafficking cases. Based on the most conservative estimations from beta testers, the application was shared with more than 200 individuals in each pilot user's sphere of influence.

Output 1.1: Smartphone application adapted for local context.

The first stage in the project was to adapt the application for the local context. The application was renamed to *Raporto! Shpeto!*, translated to Albanian, and adapted for all features to match the local context. Adapting the application was a longer process than originally anticipated. It took some time for project partners, WVA, VAF, and MoIA, to fully understand all technical

processes and infrastructure that needed to be in place to support the application and ensure its operability. Second, political turnover after the national elections in 2013 resulted in change of key staff within the MoIA. It took time to bring the new staff on board and gain their buy-in to support the project.

Despite being outside of the original scope, NetHope developed a national hotline for the mobile application. NetHope worked with the Autoriteti i Komunikimeve Elektronike dhe Postare/AKEP (the Electronic and Postal Communications Authority), the institution responsible for issuing the hotline number, to issue a shortcode which linked the hotline directly to the mobile application to be compatible with mobile phones and landlines. It was previously only functional through landlines. A new hotline number (Pan European number 116006) was created to make it easier and faster for the public to use. At the time, Albania did not have a functional trafficking hotline that could easily be linked with the smartphone application feature.

The SMS reporting feature was improved in close collaboration with and support from the application developer and VAF IT staff. During the pilot phase, it was discovered that SMS reports were not being sent as a full report, but in separate reports. As a result of the improvements made, reports received through SMS were directed to the hotline number, saved in police servers, and forwarded to the responsible authorities' numbers at the same time.

Output 1.2: Generated guidance on integrating the smartphone application into existing referral mechanisms.

NetHope gathered data and recommendations from pilot users, who participated in five learning events. One hundred and twenty-four individuals provided feedback through a survey. Of these, 34 (27.5%) had proximity to individuals vulnerable to trafficking (either worked with victims or other vulnerable individuals on at least a monthly basis, felt some sense of personal vulnerability, or

had a relationship with someone that they perceived to be vulnerable). The pilot phase concluded in May 2014.

NetHope implemented the following changes to the application based on recommendations obtained from pilot users:

- Replaced the initial hotline number, 08001212, with a six-digit number assigned for the hotline to be more practical and easier to use. The hotline number was free for subscribers to access and was compatible with voice calls and SMS delivery.
- Changed the trafficking stories included in the educational content to stories of Albanians for the information to be easier for the public to relate to.
- Added the term *anonymous* to the report button to emphasize the confidentiality of the reporting function.
- Included more stories of victims of trafficking in the educational content/information rubric to make it more concrete.
- Added a *Search* option for users trying to find social services available in a specific area.
- Retained the location and description of the incident and removed the title of the incident as it was deemed unnecessary.

Finally, NetHope worked on the inclusion of the mobile application into the Government of Albania's (GOA) Standard Operating Procedures (SOP) as an official means to report trafficking.

Output 1.3: Developed a SMS/USSD (simple phone) solution to link with the application.

The SMS reporting feature through the application was

publicly launched and rolled out during the application and hotline launch event in June 2015. NetHope negotiated with major mobile operators in Albania to operationalize a free SMS reporting function for both smartphones and simple phones that was linked to the national hotline. Each mobile operator, VAF, AMC, Plus

Communication, and Eagle Mobile charged an annual fee to the MoIA to cover the cost of the SMS that were sent. The United Nations Office on Drugs and Crime (UNODC) covered fees until the MoIA was able to cover the fees on its own.

Outcome 2: SMS/USSD technology increased public access to government social services.

Output 2.1: European Anti-trafficking Day Event (October 19, 2013)

The project gained attention from the Albanian government and other stakeholders even before the application was officially launched. The project was presented in the National Conference on the European Anti-Trafficking Day on October 19, 2013, which was attended by international, national, regional, and local actors on the effort to fight human trafficking in Albania. The Prime Minister of Albania and Minister of Internal Affairs provided remarks at the conference and affirmed their commitment to addressing human trafficking issues in Albania.

Output 2.2: Application and National Hotline Launch Event (June 16, 2014)

After the conclusion of the pilot phase, NetHope worked closely with WVA, MoIA, and VAF to organize a conference to launch *Raporto! Shpeto!* application and the national hotline. The awareness campaign launched on June 16, 2014 with high coverage from local media. One-hundred and fifty people participated in the conference representing the local and international community from government, international agencies, and NGOs, including representatives from pilot users. The main speakers in the conference were the Prime Minister of Albania Edi Rama, U.S. Ambassador Alexander Arvizu, and the Head of the EU delegation in Albania, Clive Rumbold.

Output 2.3: Awareness Campaign Activities

Between June and September 2014, 879 users downloaded the application due to promotion through the media awareness campaign and face-to-face meetings, with peak downloads occurring after television program broadcasts.

- **Television Promotion:** A television spot was broadcast a total of 135 times between July and September 2014. Three television programs on major television networks were organized to raise awareness on the issue of trafficking in Albania and the *Raporto! Shpeto!* mobile application and hotline. An analysis showed that the peak periods for application downloads corresponded directly with the broadcast dates of the television programs. This indicated that the television programs were an effective awareness campaign activity leading to increased downloads.
- **Billboard/Citylight Promotion:** Two billboards were posted in the Kapshtice and Morina border areas to encourage people to report trafficking cases through the application and national hotline. One citylight billboard in the entrance/exit of Tirana International Airport in Rinas, six citylight billboards in the Durres port, and 24 digital screens were also posted for two months from September to October 2014.
- **Written and Social Media Promotion:** Twenty-six articles were published in newspapers and magazines. WVA promoted the project and mobile application on WVA's official Facebook page between August and September 2014. The advertisement urged Facebook users to download and learn more about the application by posting links to the television spot, newspaper, and magazine articles related to the project.

Output 2.4: Regional Anti-trafficking Meetings

The awareness campaign included meetings with RATCs, which were composed of representatives from the Prefecture, State Social Services, Child Protection Units, NGOs, shelters, police, legal representatives, Regional Education Directories, and others. The meetings were held to inform RATCs of the purpose of the application, how it was applicable to their jobs, and how to use it. Four events were organized with RATCs in September 2014 in six regions of Albania including Tirana, Elbasan, Durres, Lezha, Shkodra, and Kukes. The meetings

generated valuable discussions around integrating the application into the GOA SOP.

After the RATC meetings in Durres, Elbasan, and Tirana, the Regional Directorate of Education (RED) representatives from high schools, who participated in RATC meetings, were so excited about the application that they requested posters and leaflets on TIP, the mobile application, and the hotline, so that they could organize their own awareness raising events with high school students.

CHALLENGES AND LESSONS LEARNED

Despite ultimately being successful in accomplishing most of its proposed activities, the project faced some challenges during implementation due to delays in the pilot phase, a short period for implementation, local government transition, and limited technical expertise. The following were final recommendations that may be applicable to similar projects in the future:

- VAF's late delivery of the smartphones delayed the start-up of the pilot phase and resulted in a need to shorten the length of the pilot phase and delayed the start of the awareness campaign. When working with private sector partners who are not bound to donor deadlines, projects should build more time in the start-up phase for unexpected delays.
- The project could have benefited from additional time and technical expertise to fully understand the specifications of the mobile application and infrastructure needed to be in place before the application could be developed and integrated with the GOA's existing referral mechanism. It took some time to coordinate with the MoIA, VAF, and other mobile operators to put all the infrastructure in place for the application to function. A full-time ICT specialist would have been able to manage these processes.
- One year was a very short period of time to accomplish an ambitious set of activities that involved

adapting, piloting, and testing a new product while at the same time coordinating with the government, private sector, and others at a national level to modify government procedures for reporting and responding to trafficking cases. Future projects of this type might benefit from a full two years to implement activities.

- The project proposed that, in less than a year, it would be possible to integrate the application into the GOA's SOP. Changing a government policy requires a lot of time and effort. While the MoIA was very enthusiastic about the application, they needed more time to track the use and effectiveness of the application to determine if it would achieve the results for which it was designed.
- Finally, while the close relationship with the MoIA and VAF was a critical component to the project's success, it also led to some challenges. Coordinating with both partners on all project activities and decisions was time-consuming, and it proved difficult to hold partners accountable to deadlines.



27. Cloud Services Portal Initiative

December 2011 – October 2015

BACKGROUND

The overall goal of the NetHope Cloud Services Initiative was to assist NetHope members navigate the transition to cloud computing. As part of this project, NetHope created the NetHope Cloud Services Portal (CSP), a space where NetHope members and like-minded organizations in the socioeconomic sector, could find and collaborate on information and communications technology (ICT) solutions to a full range of business problems and field challenges. Target audiences included nongovernmental organizations (NGOs), non-profit organizations, innovators, solutions and cloud service vendors, donors, volunteers, and others engaged in the socioeconomic sector globally. The goal was to provide education, discovery, collaboration, shared learning, and opportunities to documented impact from the implementation of suitable ICT tools.

Based on a series of workshops in 2011, NetHope determined that building a marketplace where cloud services and solutions could be cataloged and found by users should be prioritized as part of the NetHope Cloud Services Initiative. At the NetHope Global Summit in

Ireland in December 2011, an early prototype of a cloud services marketplace was showcased and well-received. As a result, USAID expressed interest in providing co-funding for the initiative. Funding began in January 2012. In addition to USAID, support NetHope received substantial cash and in-kind support for the initiative from Accenture, Cisco, HP, and Microsoft. USAID's funding was leveraged 1:5.

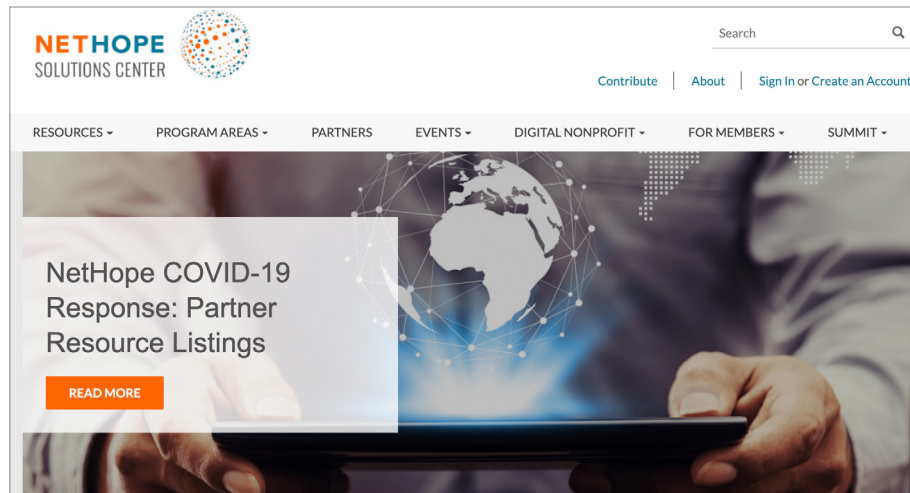


FIGURE 1: NetHope Solutions Center homepage

PROJECT IMPLEMENTATION

Phase I

In March 2012, the designing and building of the cloud services marketplace began, based on Microsoft's SharePoint architecture and hosted on the Microsoft Windows Azure platform. During early 2012, it became increasingly clear that NetHope was not in the best position to host a cloud services catalog/marketplace and discussions with GetApp.com/Nubera, a commercial cloud services marketplace, began. GetApp was a good vendor candidate because it had a catalogue of 4,700+ cloud service offerings, existing processes in place for customer acquisition and relationships management, and a solid business model for monetization.

At the same time, the scope of the NetHope Cloud Services Initiative was expanded to include a set of activities illustrated in Figure 2. The expanded scope accommodated NetHope members' different stages of adoption, ranging from exploration and self-assessment



FIGURE 2: The Five Pillars of the NetHope Cloud Services Initiative

to implementation and on-going support. Thus, activities to accommodate education efforts and sharing lessons learned were added. Throughout March to September 2012, regular meetings with members and supporters were conducted and prototyping of the portal continued. In October 2012, Expression Engine was selected as the web and knowledge base platform for the CSP. Accenture and Accenture Development Partners were engaged on a pro bono basis to finalize the architecture and design for CSP. A rapid development methodology was implemented, and the following core services were showcased to NetHope members and supporters in December 2012 and January 2013:

- An embedded Nubera/GetApp product catalog.
- A native product catalog for products of interest to the development sector and typically not included in commercial cloud services catalogs, like Nubera's GetApp. A vendor registration and self-service capability was later released in March 2013.
- Blog posts for newsworthy content.
- A library of case studies focused on the development sector from NetHope members and vendors.
- Support for a webinar series along with a collection

of collateral and recordings from past webinars.

- Discussion forum, product ranking, and feedback/comment capabilities for all content types above.
- A list of external resource references.
- Dedicated pages describing and referring to the five core NetHope programs.
- All content extensively indexed, cross referenced and accessible through comprehensive search methodologies.

In November 2012, the World Bank and Profor expressed interest in a partnership to host their content of mobile tools (mTools) for monitoring and evaluation (M&E). With a set of design enhancements, this was accomplished in March 2013. NetHope hired an editorial team tasked with growing the content base. The new CSP was launched in January 2013, publicly and internationally at the Catholic Relief Services ICT4D conference in Accra, Ghana in March 2013, and with the World Bank in Washington, DC on in late March 2013.

In October 2013, it was decided that the original name "Cloud Services Portal" should be rebranded the "NetHope Solutions Center" based on feedback

from multiple stakeholders indicating that the original name was too closely affiliated with and restricted to cloud-based solutions. Stakeholders believed this new name was an appropriate fit for the platform’s growing knowledge base and its solutions-inclusive approach. A new tagline – *Technology in Development: Find, Learn, and Share* – was adopted to underscore the value the site delivered for all stakeholders.

Phase II

During Phase Two, NetHope worked to redevelop and refresh the site. The new site leveraged its growing content repositories and provided a more strategic and cleaner user experience that encouraged participation and better met users’ interests and needs. The new user-friendly design improved navigation, which allowed users to quickly discover the latest and most popular content and discussions. The upgraded platform also facilitated the creation of community pages to accommodate special interest groups’ efforts (for example, use of unmanned aerial vehicles in development) to develop niche communities, curate content, facilitate online discussions, and organize virtual meetings and webinars. The goal was to generate a multitude of communities, where focused collaboration and meaningful, in-depth conversations could take place around the impact of technologies in very specific areas of international and economic development, humanitarian assistance, and conservation efforts around the world. The development and deployment work on the site update was 100%-funded by leveraged funds secured prior to 2014. In addition to the redesign, NetHope worked to grow and develop content and marketing for the portal. The redesigned NetHope Solutions Center was launched in October 2015.

IMPACT

Since the inception of the NetHope Cloud Services Portal in 2013, the NetHope membership has grown to nearly 60 leading global nonprofits, collectively representing between 60-65% of all international aid annually. The NetHope Solutions Center has become a rich resource

and collaboration center available to the nonprofit sector at large, with webinars, case studies, and articles hosted regularly.

The Solutions Center continues to publish and share articles, blogs, and case studies as well as host webinars. It also enables the NGO community to convene, share, and discuss challenges and solutions through working groups and chapter meetings.

The Solutions Center was built with the financial and in-kind support from USAID and private sector partners. In FY2015, NetHope expected that the NetHope Solutions Center would continue to rely on grant funding for continued operation. Today, NetHope fully supports the operations and continued development of the Solution Center.

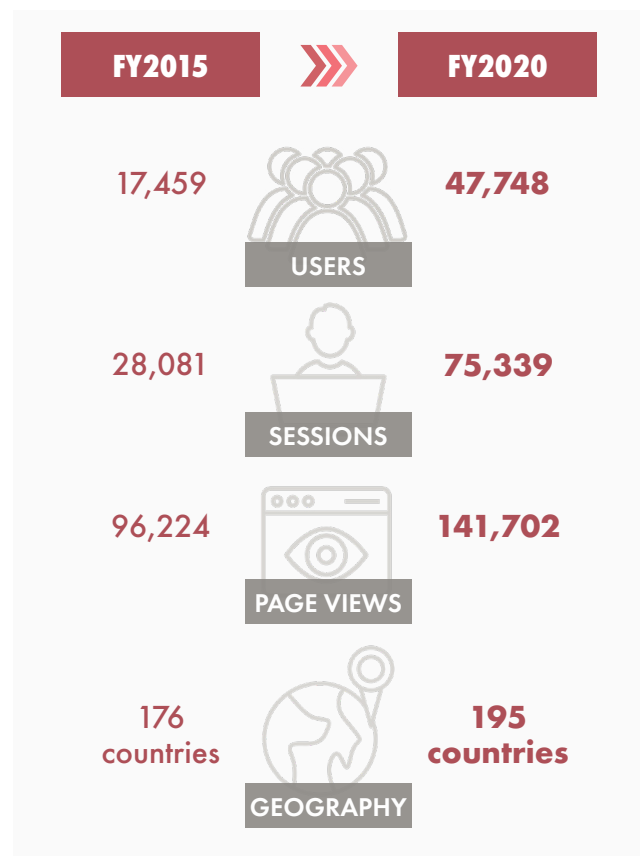


FIGURE 3: NetHope Solutions Center Metrics



28. Open Facility Registry Service Project

July 2012 – March 2013

BACKGROUND

A tremendous expansion of the use of m/eHealth in developing markets has led to the dramatic proliferation in pilot projects. At the same time, technical sophistication greatly improved due to the broadening range of handheld device platforms supported combined with cloud-based services, which simplified deployment and field operation. Despite such technical progress, pilots and one-off solutions dominated the landscape. Scalability and sustainability eluded many of these deployments. In the hope of achieving national-level scale, interoperability between disparate systems was required. Moreover, national agencies demanded adherence to national regulations, policies, and implementation standards. Such national norms were required not only to allow these systems to scale, but to realize the benefit these technologies can deliver in terms of true breakthroughs in healthcare delivery.

At the request of USAID's President's Emergency Plan for AIDS Relief (USAID/PEPFAR), NetHope worked with a series of m/eHealth industry players, including the Earth Institute at Columbia University, OpenMRS, District Health Information Software (DHIS), Mohawk College of Applied Arts and Technology, and a select set of target countries to define, develop, and implement a reference platform for a healthcare facilities registry service. This was a follow-on project to the m/eHealth interoperability framework document, called the Collaborative Health Platform (CHP) Design Specification & Analysis Report,¹ NetHope developed for USAID/PEPFAR with Mohawk College.

At the request of USAID, NetHope helped develop the Open Facility Registry Service Project or Facility Registry Expansion Development (FRED). NetHope also designed and implemented a reference model and facility registry application programming interface (API) for host and client reference implementations for a universal facility registry service. Based on the Rwanda Health Enterprise Architecture (RHEA), the API and reference implementation enabled the adoption and customization of an electronic facility registry service by multiple countries. This supported the use of broadband internet access to enhance programs.

A facility registry is a centrally managed database containing comprehensive master reference information about facilities, sites, or places important to health service delivery or administration. Registries maintain information about people, location, and services within the health system, such as contact information, services, and programs. Registries support the coordinated interaction of multiple systems. They can be used to link information across other healthcare databases. This enables the integration and analysis of information across the health system for service delivery, program planning, and resource monitoring. To achieve sustainable and replicable impact at scale, a National Health Information System (NHIS) requires interoperability and standards. Yet, health system stakeholders have different ways of organizing information about facilities, patients, care providers, and services. As a result, health stakeholders are sometimes challenged in accessing and combining high-quality information. A standard system infrastructure

¹ Fyfe, J. (2011). *Collaborative Health Platform Design Specification & Analysis Report*. Washington, DC: NetHope.

across countries can lower costs, ease implementation, and improve interoperability. However, a NHIS needs to be adapted to local clinical and business needs while attaining standardized requirements.

The goals established for FRED were to:

1. Design and develop a reference implementation and documentation of a facility registry service.
2. Adopt an open, standards-based, and repeatable approach to the implementation of a facility registry service that can be replicated across multiple countries.
3. Engage developers from multiple countries to generate buy-in for API adoption.
4. Create a foundation for growing the facility registry community within the context of the larger Open Health Information Exchange (OpenHIE).

PROJECT IMPLEMENTATION

NetHope served as the project management office for FRED, in alignment with the leadership of the Regenstrief Institute and Innovative Support to Emergencies, Diseases, and Disasters (InSTEDD). NetHope engaged technical experts from Columbia University, Mohawk College of Applied Arts and Technology, and Dimagi. In line with FRED's collaborative approach, NetHope invited API input from other informal partners and community members, such as the University of Oslo and ThoughtWorks.

NetHope defined and established the process for the design and development of the reference implementation of FRED, and NetHope worked with project partners to build a FRED community that supported the collaborative and transparent development of the reference implementation. NetHope created the architecture and design specifications for a generalized facility registry service through the development and review of the draft API and generated support for its continued

use. The draft API paved the way for reference implementations and provided information on the reference implementation's relevance to country needs and technology standards. The collaborative refinement of the draft API supported FRED's grounding in country needs and its relevance to future use by developers.

ACHIEVEMENTS AND IMPACT

1. Facility registry service API specification

The FRED community developed the facility registry API in 2012, then expanded it in 2013 to address initial gaps. Revisions to the facility registry API website² were based on API scope and issues determined by the facility registry community. The API was revised and rendered based on the resolution of issues in technical discussions of the FRED community.³

2. Host reference implementation of Resource Map by InSTEDD

InSTEDD developed and tested a host reference implementation based on the facility registry API specification. The host reference implementation was developed for client application development and testing as described below.

3. Client reference implementation of CommCareHQ

To demonstrate how the facility registry could be consumed by health service organizations, NetHope developed a client reference implementation of CommCareHQ. CommCareHQ is the server backend for CommCare, the world's largest platform for designing, managing, and deploying robust, offline-first, mobile applications to frontline workers worldwide. The client reference implementation was based on the facility registry API and the host reference implementation developed through FRED. The client reference implementation of CommCareHQ also transacted with a host reference

² <http://facilityregistry.org>

³ <https://github.com/facilityregistry/fred-api/issues?state=open>

implementation of DHIS2, which was beyond the FRED scope but in line with facility registry community collaboration. CommCareHQ deliverables were based on community input.

The client reference implementation included:

- » Description of key use cases involving Facility Registry for CommCare.⁴
- » Working reference client implementation.⁵
- » A lightweight Python API wrapper which can be re-used easily in future projects.⁶
- » A demonstration of functionality.

4. API specification document

NetHope developed a detailed document to describe the FRED interfaces at a wire level. It provided sufficient information for analysts, architects, and systems integrators to understand the behavioral and structural characteristics of compliant FRED facilities registries and consumers. It was documented in a format consistent with industry practices, covering both the host and client services.

5. Updated CHP framework documentation

The CHP framework was a partner-driven initiative to develop a cohesive mHealth/eHealth ecosystem that facilitated the delivery of healthcare in resource-constrained environments. The 2011 document was updated to reflect the available facility registry service API in 2012 and 2013 in both analyses and examples.

6. Support for facility registry community

NetHope engaged an initial community of developers for the development of the FRED API. This broadened input for the API to enhance its

relevance and acceptance for long-term viability. FRED integrated the facility registry community through the collaborative development of the API and reference implementations. NetHope included community participation in FRED subcontracts and invited external input on deliverables. Community input and decision-making was used for finalizing project goals, schedules, processes, and roles, as well as development of the API. The facility registry community was engaged in the selection of evolving tools for API development and communication. NetHope engaged the facility registry community by facilitating FRED technical calls and project management calls held on alternating weeks. The 2012-2013 FRED calls were openly tracked on the facility registry wiki.⁷ Community information was disseminated through the facility registry listserv. NetHope cultivated InSTEDD's leadership of the facility registry community and transferred community support to InSTEDD on April 1, 2013.

Since the facility registry is one registry within the larger OpenHIE, NetHope actively participated in the OpenHIE community and encouraged participation of the facility registry community. NetHope presented on FRED at the OpenHIE conference in November 2012. NetHope met with IntraHealth International three times in 2013 to transfer lessons learned on community building for open source registries. NetHope also participated in provider registry community calls organized by IntraHealth in 2013.

⁴ Luk, R., & McFadyen, E. (2019, August 28). *Facility Registry Client Use Cases*. Retrieved from Dimagi Web site: <https://confluence.dimagi.com/display/facilityregistry/Facility+Registry+Client+Use+Cases>

⁵ <https://github.com/dimagi/commcare-hq>

⁶ <https://github.com/dimagi/freddy>

⁷ Thomas, J., & Teesdale, S. (2013, July 19). *Community Meetings*. Retrieved from Dimagi Web site: <https://confluence.dimagi.com/pages/viewpage.action?pageId=9044225>



29. Payment Innovations

April 2011 – September 2020

BACKGROUND

Across much of the GBI program's 10 years, NetHope provided technical assistance to USAID to advance the global availability and use of digital financial services (DFS).

In 2011, USAID identified digital payments as an information and communications technology (ICT) application that could contribute to achieving USAID development objectives and aid effectiveness. At USAID's request, NetHope conducted a market assessment of the application of mobile money to USAID programs in Kenya, a market propelled by the M-Pesa service offered by the mobile network operator (MNO) Safaricom.¹ While Kenya was a clear leader in the DFS movement, the growth of digital networks and penetration of mobile phones throughout emerging markets created momentum in developing models for extending access to financial services to previously underserved groups. USAID's innovation team recognized that digital payments could improve efficiency and transparency of transactions of USAID's implementing partners (IPs) and provide a foundation for access to financial services and access for program participants. This digitally enabled financial inclusion was seen, and later proven, to be an effective tool for alleviating poverty and building resilience. Since 2011, an additional 1.2 billion adults have opened accounts with financial institutions or mobile money services. In some markets in sub-Saharan Africa, there are presently more mobile money accounts than bank accounts.²



Following the Kenya mobile money market assessment, the Payment Innovations (PI) project was created. From 2011 to its conclusion in 2020, the PI project used adaptive and agile techniques with annual workplans, budgets, and sequential funding obligations. Over the program lifecycle, the PI project's activities evolved with the momentum around digitally enabled payments and maturity of service offerings. Throughout the nine years of the PI project's activities, NetHope provided technical assistance to USAID to:

1. facilitate the internal agency and global conversation on the value of digital payments and digitally-enabled financial inclusion,
2. provide tools and curate evidence on how to transition to DFS, and
3. support market system development and active DFS product use to build resilience and self-reliance in USAID priority countries.

¹ Michaels, Loretta. 2011. "Better Than Cash: Kenya Mobile Money Market Assessment." *NetHope Solutions Center*. November. <https://solutionscenter.nethope.org/assets/collaterals/Kenya-Mobile-Money-Assessment.pdf>.

² Demircuc-Kunt, Asli, Leora Klapper, Dorothe Singer, Sania Ansar, and Jake Hess. 2018. *Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC: World Bank. © World Bank. <https://openknowledge.worldbank.org>

PROJECT ACHIEVEMENTS

2 Alliances Created and Supported



BETTER THAN CASH.

NetHope provided technical assistance to USAID in developing the concept note for the alliance, recruiting founding members and establishing the leading governance structure. The Alliance has grown to over 70 members since its launch at the UN General Assembly in 2012 and the selection of UNCDF as the Alliance’s Secretariat.

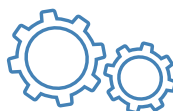
CGAP FINEQUITY.

NetHope is a founding champion and regular participant in CGAP’s FinEquity community of practice to advance women’s financial inclusion

11 Missions Engaged

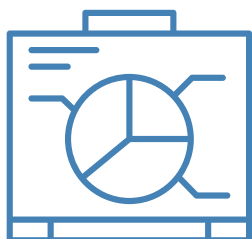
- Kenya
- Tanzania
- Uganda
- Ghana
- Cambodia
- Zimbabwe
- Malawi
- Rwanda
- Liberia
- Indonesia

7 Operational Units Engaged



- Global Development Lab
- CFO
- M/OAA
- General Counsel
- Bureau for Resilience and Food Security
- OFDA/Food for Peace
- E3

8 Key Tools & Resources Developed



- Costing Utility Analysis Tool
- E-Payments Toolkit (2014)
- Updated Digital Payments Toolkit (2020)
- Market Viability Tool
- Bulk Payments Report & Tool
- Barcelona Principles for Inclusive Digital Payments for Humanitarian Cash Transfers
- Toolkit on Integrating DFS into FTF programs
- Women and Trust in DFS framework

118 Implementing Organizations & 117 Individuals

trained on e-Payments Toolkit



1 In Country Market Systems Support Project Implemented Indonesia, e-MITRA project

10 Market Assessments & Snapshots

- Kenya
- Tanzania
- Uganda
- Ghana
- Cambodia
- Zimbabwe
- Sierra Leone
- Liberia
- Uganda
- Nigeria



10 DFS Integration Reference Grants & Case Studies

3 applying Costing Utility Tool (Philippines, Tanzania, Malawi)
 4 following e-Payments Toolkit training (Ghana, Zimbabwe)
 3 in the use of DFS in humanitarian relief (Somalia, DRC-Mali, Pakistan)

FIGURE 1

FACILITATING USAID BUY-IN

NetHope worked with USAID’s technical DFS team to build USAID’s internal capacity and that of its IPs to use mobile money for operational payments. To develop a global movement for organizations to move away from cash to digital payments, NetHope supported USAID in creating an alliance to drive government, private sector, and NGO commitments to move from cash to digital payments (the Better Than Cash Alliance, or BTCA). USAID’s commitment to digitize the full payment chain of its funding anchored the required approach of an internal and outward facing strategy.

Developing the Theory of Change

The PI project’s initial work plan included developing a theory of change and measurement framework for USAID’s movement to digitize payments made with USAID funding. Figure 2 depicts the theory of change for this USAID shift.

When USAID first launched this internal push for use of digital payments, it recognized payments as the “connective tissue of an economic system.” Physical cash was seen as a source of the poor’s “marginalization from the formal economy by making it more expensive to serve them.”³ With its member NGOs, NetHope was in an ideal position to build capacity among USAID’s IPs and the global development community to use digital payments. As digitally enabled payment services increased, USAID sought to use its financial footprint and the scale of its operational payments to create demand for payments products, thereby furthering markets and building the rails for new business models. USAID recognized that encouraging its IPs to digitize operational payments presented a clear solution, though one that would require education and capacity building for organizations to implement. Reflecting the construct of GBI, the PI project drew on NetHope’s membership of NGOs to test, validate, and further the use of digital payments both for operational payments and in program work.

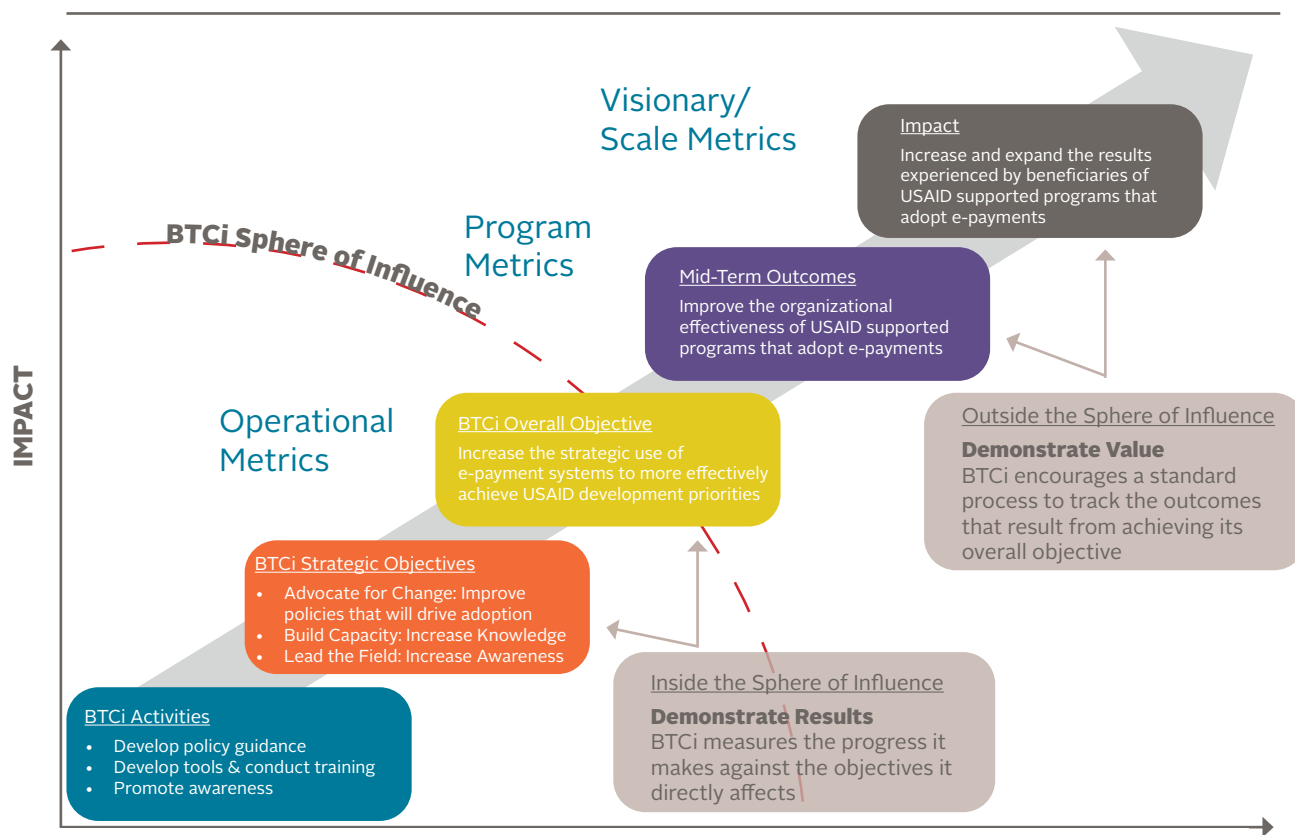


FIGURE 2: Theory of Change

³ Radcliffe, Dan, and Rodger Voorhies. 2012. “A Digital Pathway to Financial Inclusion.” SSRN. 11 December. <https://ssrn.com/abstract=2186926>.

CAPACITY BUILDING

Standards and Practices Report for Electronic and Mobile Payments

While international development agencies were recognizing the benefits of innovation of mobile payments at the start of the PI project, there were concerns about the potential risks of conducting financial transactions using personal mobile devices and mobile networks. For USAID to champion the use of digital payments, USAID needed to build the capacity of USAID's CFO's office and mission-level controllers, as well as IP treasurers' responsible for the integrity of funding flows from USAID. The PI project developed a report on "*Best Practices and Standards for Mobile and Electronic Payments*"⁴ in collaboration with Deloitte. The report helped set a baseline understanding of available payment alternatives and establish a framework for evaluating those alternatives in consideration of the unique environment and risk profile of individual USAID programs or Missions. The report also reviewed the associated risks and processes to mitigate those risks.

Market Assessments: Building the Evidence-Base

As part of its capacity building for the use of DFS in USAID programs, NetHope facilitated the development of knowledge products on the current and potential use of digital payments by USAID IPs within specific markets. NetHope conducted in-country assessments following the Kenya assessment on the state of mobile money in Uganda and Tanzania⁵ in 2012 and 2013, respectively. USAID's DFS team facilitated NetHope's mission-level engagement prior to and during each trip. NetHope analyzed the landscape of mobile money offerings at the time, interviewed IPs about their use of and experiences with mobile money, and facilitated workshops sponsored

by USAID Missions. The resulting reports were published resources. In addition to the reports, each market assessment included a half-day workshop to introduce IPs to the concept of using mobile money and other digital payment methods to replace cash in their operations. The workshop participants included both IPs and local financial services providers. Through these workshops, IPs met with and learned from mobile money providers about local service offerings. The reports and workshops provided important foundational insights for NetHope's subsequent creation of tools and resources for IPs to transition from cash to electronic payments. The first of those tools was produced following a request from USAID/Uganda during the market assessment. USAID/Uganda identified a need for a tool for its IPs to compare the costs of using cash and digital payments. In response, NetHope developed a cost analysis tool for IPs to evaluate the financial and non-financial costs associated with the cash and digital payment alternatives. The tool was used in a series of small grants to generate learnings on the digital transition process and subsequently incorporated into the *USAID e-Payments Toolkit (2016)*.⁶ In addition, The Bill and Melinda Gates Foundation funded a follow-on study in Uganda to work with USAID IPs to further document the transition process of moving from cash to digital delivery channels.⁷

Shared Learnings: NetHope Mobile Money Working Group

NetHope's membership of international nonprofits was at the core of the overall GBI award and formed a primary element of GBI's strategy to digitize USAID operational payments. The analysis of USAID's payment flows included in "*The Best Practices and Standards Report*"⁸ (see Figure 3) showed that payment flows from USAID to

⁴ Deloitte Consulting, LLP. 2012. "Standards and Practices Report for Electronic and Mobile Payments." *The Cash Learning Partnership*. June. <https://www.calpnetwork.org/publication/standards-and-practices-report-for-electronic-and-mobile-payments>

⁵ NetHope; Mennonite Economic Development Associates. 2013. "Tanzania Mobile Money Assessment and Case Study: Examining Cash Payment Streams and Their Electronic Alternatives Among USAID Implementing Partners." *NetHope Solutions Center*. February.

⁶ https://solutionscenter.nethope.org/assets/collaterals/USAID_NetHope_ePayment_Toolkit_2016.pdf

⁷ Vital Wave. 2016. "Digitizing Payments for Beneficiaries in Uganda." *Vital Wave Web Site*. <http://vitalwave.com/wp-content/uploads/2016/12/Digitizing-Payments-in-Uganda-Case-Study-2016-2.pdf>.

⁸ Standard and Practices Report at 13.

its IPs and certain vendors did not include cash but rather last mile payments being made by IPs for activities that presented a cash use-case. Thus, USAID IPs were key to fulfilling USAID’s commitment to digitize all its payment flows.

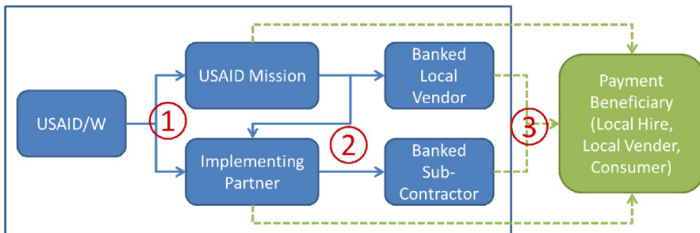


FIGURE 3: Analysis of USAID’s payment flows from the “Best Practices and Standards Report”

To leverage its NGO members’ experiences as influencers of bulk payers, NetHope convened a working group of finance officers and other NetHope staff interested in digitizing payments. The working group helped NetHope build relationships with high-level financial officers and decision makers in each organization that NetHope targeted to build capacity and understanding on digital payment options. Through this working group, NetHope was able to survey its members on their usage of and challenges with payments and use this information to inform the design of capacity building tools. This included conducting webinars and outreach events on electronic payments and contributing to an online mobile money course produced by USAID.

The Better Than Cash Alliance

While working internally to move all of its funding to digital channels, USAID also led the global conversation on the benefits of moving from cash to digital payments to achieve development outcomes. Through the PI project, NetHope served as the technical advisor in USAID’s design, facilitation, and launch of the BTCA.⁹ Now at 70 members, the BTCA is a global alliance of governments, companies, and international organizations dedicated to

⁹ <https://www.betterthancash.org>

digitizing cash payments to drive inclusive growth and reduce poverty. NetHope helped USAID design the concept note and structure of participants that provided the initial blueprint for the BTCA. This concept note was used to recruit alliance members, who contributed to the BTCA’s formation and launch at the UN General Assembly annual meeting in New York in 2012. NetHope managed the call for the BTCA’s Secretariat and helped in the negotiation of commitments to the BTCA. The founding core partners included USAID, the Ford Foundation, UN Capital Development Fund (UNCDF), Citi Foundation, the Omidyar Network, the Bill & Melinda Gates Foundation, and Visa, Inc.

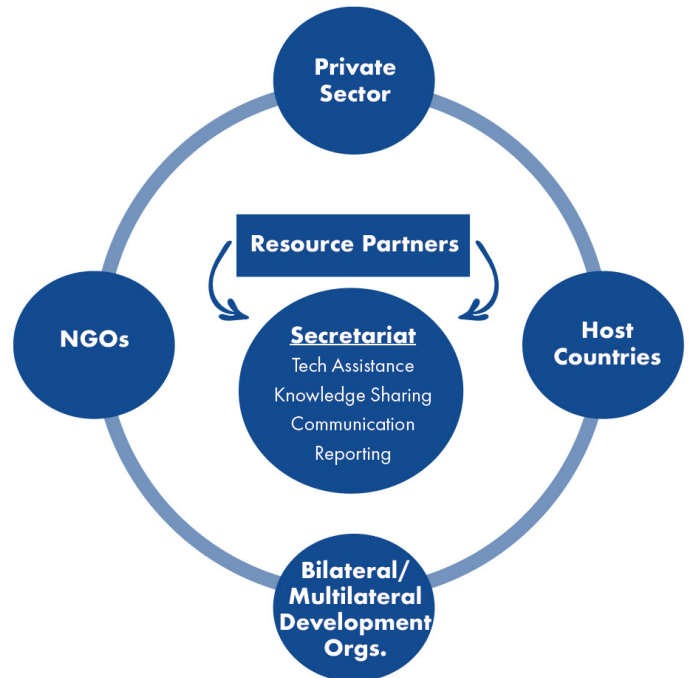


FIGURE 4: Program partners and resource partners

Through outreach to its member NGOs, NetHope also secured BTCA founding commitments from Mercy Corps, Concern Worldwide, and CARE USA to transition their global programs from cash to electronic payments.

Market-Level Programs: e-MITRA Indonesia

As the PI project facilitated global learnings and built capacity at the USAID/Washington and USAID Mission

levels, USAID also began to focus on supporting DFS market system development in priority countries with multi-year projects. In 2012, USAID awarded incremental funding to NetHope to implement the *e-MITRA Project*, a private sector capacity building program for DFS in Indonesia. Subsequent engagement led to joint funding of \$3.5 million USD from the Global Development Lab

and USAID/Indonesia for the three-and-a-half-year project. The e-MITRA Project focused on four project workstreams: (1) generating market interest in developing DFS, (2) demonstrating and documenting the business case of DFS, (3) funding experimentation with different business models, and (4) testing and building capacity in distribution channels (see Figures 5-8).

GENERATING MARKET INTEREST IN DEVELOPING DFS



4 CAPACITY BUILDING WORKSHOPS



19 NGOs trained on DFS use cases



9 leading banks, 3 largest MNOs study agent network strategy



50 organizations/100 attendees evaluate business case for DFS



11 NGOs/USAID implementing partners briefed on DFS market updates

DEMONSTRATING AND DOCUMENTING THE BUSINESS CASE FOR DFS



6 MARKET RESEARCH CONTRIBUTIONS



Survey of 549 cocoa farmers on mobile money use in South Sulawesi



Survey of traditional & SME retailer payment methods
800 retailers, 8 cities, 4 FGDs



Research and analysis of fishing and Islamic school cooperatives' potential role in DFS



DFS agent/target profile development through survey of 600 potential agents across 9 provinces



Survey of financial behaviors of 1,080 poor and unbanked consumers across 9 provinces



Cost/benefit on G2P payments in Papua (TNP2K working paper)
370 G2P recipients surveyed, 6 districts, 37 FGDs

FUNDING EXPERIMENTATION WITH DIFFERENT BUSINESS MODELS



TECHNICAL ASSISTANCE FOR PRODUCT DEPLOYMENT



Helped Bank Mandiri and Bank BTPN with scale and expansion of Laku Pandai



Provided support for branchless banking strategy for Bank Mandiri e-cash pilot in West Java, South Sumatra



Provided support with agent network strategy and implementation for btpn WOW! pilot in East Java, Bali

TESTING AND BUILDING CAPACITY IN DISTRIBUTION CHANNELS



DFS+ APPLICATIONS



Assessment for WFP on digital delivery of nutritional assistance for 80,000 potential household e-voucher recipients



Digital payments for solar kits in Papua, targeting 100 new households and 20 active agents

FIGURES 5-8: e-MITRA work streams

DIGITAL TOOLS

As mobile money markets matured, so did evidence of the role of digital technology in advancing financial inclusion and poverty alleviation. The *World Bank 2014 Global Findex* survey found that the number of “unbanked” had dropped by half a billion people from 2011 to 2014 due in large part to new mobile money accounts. In 2016, an academic research study in Kenya published in the journal *Science* established that the M-Pesa mobile money service helped bring hundreds of thousands of households, many headed by women, out of poverty.¹⁰ The study researchers relied on longitudinal data that was not available in the early years of mobile money. In 2016, the GSM Association (GSMA) declared that “mobile money has emerged as one of the primary tools for reaching the underserved.”¹¹ At this time, NetHope’s work became less about the “what” of mobile money and more about the “how.” NetHope began collecting best practices and developing a set of tools and resources to guide development organizations embarking on the journey to use DFS and to help DFS providers build capacity to serve their payment needs.

E-PAYMENTS TOOLKIT

In 2014, NetHope produced the *USAID e-Payments Toolkit* (later translated into French in 2015).¹² The toolkit provided user-friendly resources and guidance for USAID IPs to follow a ten-step journey to transition from cash to electronic payments. The *e-Payments Toolkit* was created as a resource to assist IPs in complying with USAID’s 2014 USAID Procurement Executive Bulletin (PEB) on e-payments, a seminal procurement change that made electronic payments the default form of payment for USAID’s contractors, grantees, and cooperative agreement partners. It has been downloaded thousands of times by hundreds of different organizations since its release.

Following the *USAID e-Payment Toolkit’s* publication, NetHope developed a three-day toolkit training curriculum for finance and program managers of IPs throughout USAID priority countries. NetHope coordinated the trainings with the USAID’s Global Development Lab and respective Missions, which participated by providing outreach to IPs to drive attendance. IPs participated in a baseline survey on cash and digital payments, which helped better prepare the

¹⁰ Tavneet, Suri, and Jack William. 2016. “The long-run poverty and gender impacts of mobile money.” *Science* 1288-1292. <https://www.georgetown.edu/news/study-use-of-mobile-money-lifts-nearly-200000-kenyans-out-of-poverty>.

¹¹ GSMA. 2017. “State of the Industry Report on Mobile Money, Decade Edition: 2006-2016.” *GSMA Mobile Money Programme*. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/03/GSMA_State-of-the-Industry-Report-on-Mobile-Money_2016.pdf.

¹² United States Agency for International Development; NetHope. 2014. *e-Payments Toolkit*. 22 October. <https://solutionscenter.nethope.org/resources/c2e-toolkit>.

trainers for the workshop. The training team also conducted market assessments before trainings to help customize the workshop’s content to each country’s local context. Trainings built technical understanding and provided practical implementation advice while working through a cash to e-payment transition case study requiring application of the toolkit’s tools. The sessions also incorporated service provider presentations to showcase existing e-payment products and use cases. These trainings were a clear example of NetHope’s work in building capacity in both the supply and demand sides of DFS ecosystems, as NetHope also provided market intelligence on international development organizations to service providers. NetHope conducted toolkit trainings in five countries – Ghana, Cambodia, Zimbabwe, Malawi, and Rwanda – reaching a total of 118 organizations and 177 program or finance officers. NetHope subsequently updated this toolkit in late 2020.

Market Assessment and Viability Tool

In 2015, NetHope developed a *Mobile Financial Services Market Viability Tool*¹³ to assist USAID Missions and IPs in evaluating the opportunity to migrate from cash to digital payments in each country. This tool identified five categories of key metrics to determine a market’s stage of mobile money product development and electronic payment infrastructure. The tool pulled updated data on 40 indicators for 104 countries, ranking the viability of mobile financial services (specifically mobile payments) in each country. NetHope released a new version of the

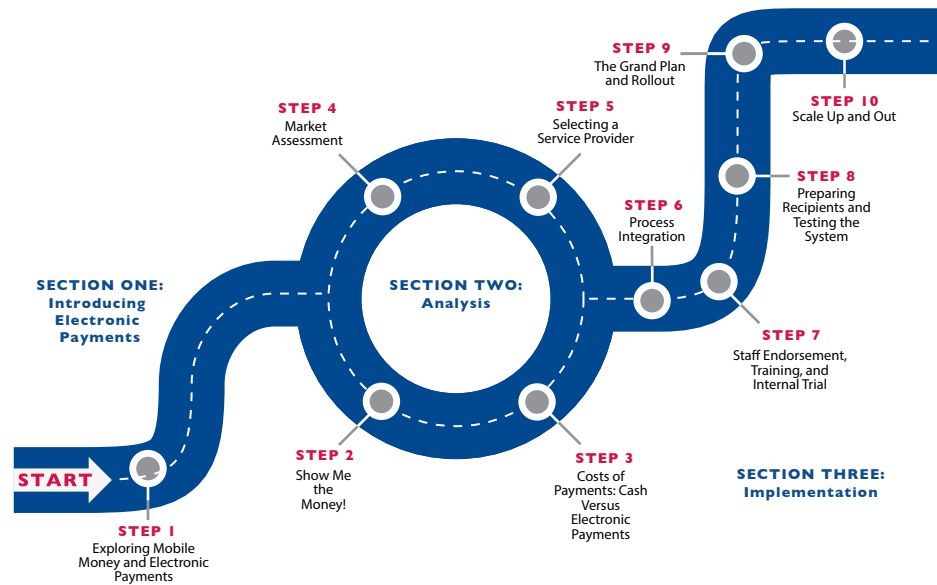


FIGURE 9: Ten Steps of the e-Payments Toolkit (2014)

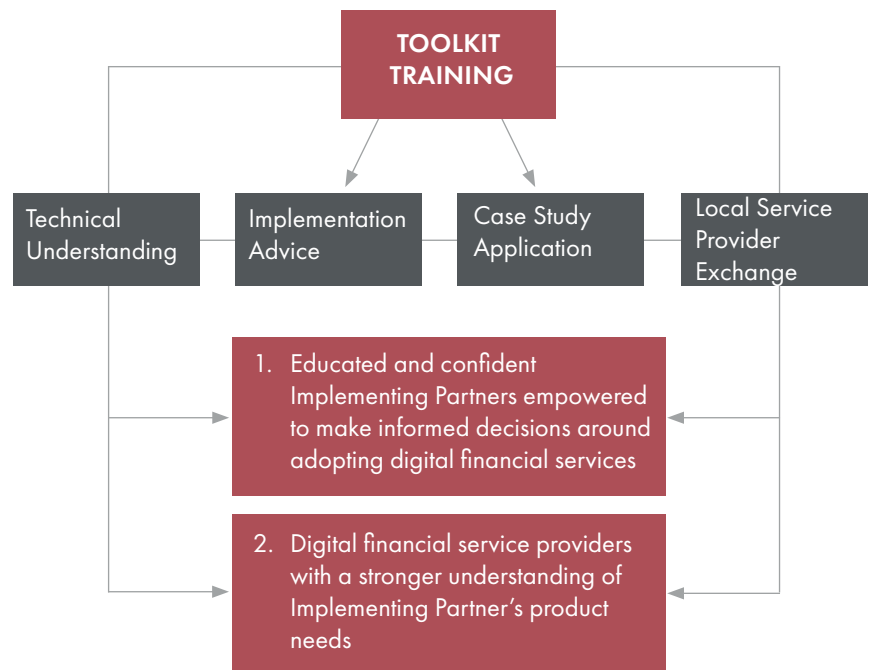


FIGURE 10: Overview of Toolkit training

¹³ NetHope. 2015. *Mobile Financial Services Market Viability Tool*. 27 May. <https://solutionscenter.nethope.org/resources/mobile-financial-services-market-viability-tool>.

market viability tool in 2020 as a resource for the updated *USAID e-Payments Toolkit (2020)*.

Building Supply Side Capacity: Bulk Payment Insights Report

In 2015, NetHope published a *Mobile Money Bulk Payment Insights Report*¹⁴ on the product needs of international development organizations and perceptions of existing products. The purpose of the report was to inform the design and development of bulk payment products to meet development organizations' payment needs and enable an easier adoption. NetHope used a mixed methods approach, conducting qualitative interviews and a quantitative survey of development organizations' bulk payment use. GSMA featured the report in a blog post in August 2015 as part of its mobile money blog series.¹⁵

TECHNICAL ASSISTANCE

In addition to the USAID e-Payments Toolkit and associated trainings, NetHope continued to support increased awareness and understanding of mobile money, digital payments, and how to implement the PEB requirements through participation in webinars, conferences, and convenings. These included:

- Hosting three sessions at the NetHope Summit on digital payments.
- Presenting on mobile payments at two sessions at the InsideNGO (now Humentum) annual conference and the Cash Action Learning Partnership (CaLP).
- Sponsoring webinars with CARE, EcoCash, Save the Children, and Freedom from Hunger.
- Hosting knowledge sharing events on the PEB, including the creation of a community of practice and internal promotion of capacity with a series of events held in FY2015.

Focusing on Women's Financial Inclusion

USAID has worked consistently and diligently to close the digital inclusion gap between men and women. This inclusion gap is echoed in women's access to DFS. After the first years of mobile money growth and implementation in development programming, it was clear that men and women had different levels of access to and experience with both traditional and digital payments and other financial services. At the same time, financial services access led to women's economic empowerment as well as improvements in household-wide wellbeing. In 2015, NetHope organized a convening on women's financial inclusion with stakeholders such as CGAP, UNCDF, and the Bill and Melinda Gates Foundation, as well as academic researchers who shared findings on how DFS could be used to increase economic empowerment.

Digital Payments for Humanitarian Response

Moving humanitarian cash transfers to digitally and financially inclusive products became a key use case for digital payments, particularly as cash transfers became an increasingly popular mode of aid delivery. Cash transfers can better support local market economies and, in humanitarian contexts, allow households the dignity of choice. In conflict and disaster-affected areas, it can be even more difficult and dangerous to carry cash into the field. Implementers of humanitarian aid saw the potential to use mobile money to reduce these risks and help build a sustainable financial infrastructure for affected populations – an effort that was particularly important given the longer duration of many humanitarian crises. Working with the Office of Foreign Disaster Assistance (OFDA), Food for Peace (FFP), and the Global Development Lab, NetHope played a key role in bridging capacity and understanding gaps between humanitarian organizations and providers who were often unfamiliar with one another's needs and how to practically develop mutually beneficial partnerships.

¹⁴ United States Agency for International Development; NetHope. 2015. "Mobile Money Bulk Payment Products: Capturing the Market Opportunity of Global Development Organizations." *NetHope Solutions Center*. July.

¹⁵ GSMA. 2015. *Interesting new research on bulk disbursements for NGOs*. 13 August. <https://www.gsma.com/mobilefordevelopment/programme/mobile-money/interesting-new-research-on-bulk-disbursements-for-ngos>.

IRC/Segovia Platform Pilot in Pakistan

Via subawards to the International Rescue Committee (IRC) and Segovia (a technology platform provider), NetHope oversaw a project in Pakistan to build, deploy, and test a technology platform that could be used to establish new benchmarks for cash transfer programs in humanitarian response – a platform that encouraged the adoption of digital payments and the establishment of key stakeholder relationships prior to disaster. The IRC and Segovia tested the use of technology to serve as an end-to-end solution for improving the speed and accuracy of launching cash transfer programs.

The IRC found that 43% of their implementation time in the cash transfer program was spent identifying and targeting beneficiaries. This significantly slowed the process of launching cash transfer programs and negatively impacted one of the IRC’s primary performance metrics – speed of delivery. The IRC worked with Segovia to determine how the technology could be leveraged to

link to existing beneficiary databases and reduce the time needed to identify beneficiaries and begin the flow of funds. In Pakistan, the Segovia platform tapped into the national socioeconomic registry to help speed the identification process. This linkage, along with the implementation of digital data collection and digital payments, helped reduce the time and money required to launch a cash transfer program. All of the findings from this work can be found at the IRC’s website.¹⁶

In addition to facilitating more efficient program delivery, the IRC worked with NetHope to design a questionnaire to assess the strengths and weaknesses of agents’ liquidity in bulk payment scenarios, such as cash transfers. The questionnaire was deployed through Telenor Agents in Pakistan to eight master agents and 30 agents to understand how they worked with Telenor, communicated with each other, and rebalanced their liquidity. This survey, along with interviews with service providers and IRC staff, culminated in a study¹⁷ on the key challenges

	Community-based targeting	Use of pre-existing beneficiary information + technology
Number of beneficiaries reached	150	900
Time to delivery (days)	35	19
Cost-transfer ratio	1.78	0.63
Non-transfer (admin) cost per household	\$122.97	\$43.38
User-experience — Monetary value of community time use (equivalent lost wages based on self-reported income)	\$12.27	\$1.51
User-experience – satisfaction with beneficiary selection	96%	92%
User-experience — satisfaction with payment process	99%	99%
Targeting accuracy, % in lowest 2 wealth quintiles	99%	Not measured

FIGURE 11: Project Statistics

¹⁶ International Rescue Committee. n.d. "A New Model for Delivering Cash Relief: Findings from the IRC’s Cash Research & Development Program Pakistan 2015-2016." *International Rescue Committee Web Site*. <https://www.rescue.org/sites/default/files/document/2181/cashrdbriefvfinal.pdf>.

¹⁷ Khan, Sana. n.d. "Improving Large-Scale Mobile Money Disbursements: Overcoming Liquidity Constraints in Humanitarian Bulk Payments." *International Rescue Committee Web Site*. <https://www.rescue.org/sites/default/files/document/2853/improvinglargescalemobilemoneydisbursementsvf.pdf>.

of ample liquidity during cash transfer programs. The study provided tools for other cash transfer implementing partners to use to assess the strength and organization of mobile money agents in their own programs.

Preparedness Grants

In collaboration with the USAID Office of Foreign Disaster Assistance (OFDA) and FFP, NetHope issued a call for applications for grants to support humanitarian response organizations in developing plans for institutional emergency response using the most appropriate cash transfer modality. These grants were conceived to build the evidence base for using DFS to disburse humanitarian cash transfers. A review board with members from OFDA, FFP, USAID's Global Development Lab, and NetHope reviewed and scored more than 20 grant applications received during the competitive procurement. NetHope issued grants in January 2017 to Catholic Relief Services in Somalia and Mercy Corps in the Democratic Republic of Congo and Mali. Both projects were designed to improve preparedness to efficiently implement cash transfer programs while linking transfer recipients with DFS. The projects also focused on providing examples of DFS integration in humanitarian work. NetHope reviewed and provided comments on the final reports from both grantees at the end of FY2018 and shared findings in a final Summary Report¹⁸ that highlighted key themes in both grantees' experiences as well as recommendations for IPs and donors. Key themes and questions from the grants are reflected in the summary report and may be useful to the broader efforts to support the use of DFS in providing cash assistance. The primary findings included:

1. There is a need to build better knowledge transfer linkages between the NGO headquarters and country-level offices.
2. There is a need for humanitarian organizations to see

themselves as experts in rural operations who can help build the capacity of financial service providers to deliver quality services in these environments.

3. Data collected on beneficiaries can be used to determine how sustainable a digital payment service might be for serving them after the disbursements from a cash transfer product end.
4. Datasets should be standardized across an organization, which will result in more rapid implementation of a cash transfer program.
5. Cash working groups should be leveraged to help aggregate demand for cash transfers across a variety of different organizations, helping to seek better pricing and stronger bargaining positions when issues arise.

Barcelona Principles

NetHope organized and facilitated the co-creation of the *Principles for Use of DFS and Financially Inclusive Products in Humanitarian Response*,¹⁹ eight broad principles for organizations to intentionally seek out and evaluate inclusive products for digital cash transfers in humanitarian response. In February 2016, NetHope hosted a collaborative workshop to help humanitarian implementers and donors understand how to maximize the potential of digital payments (where appropriate) and digital financial services in disaster response. Attendees included the Bill and Melinda Gates Foundation, CaLP, Catholic Relief Services (CRS), the Consultative Group to Assist the Poor (CGAP), the Development Credit Authority (DCA), the European Civil Protection and Humanitarian Aid Operations (ECHO), the Electronic Cash Transfer Learning Action Network (ELAN), the Food and Agriculture Organization (FAO), the IRC, Mercy Corps, NetHope, the Norwegian Refugee Council (NRC), Save the Children, UK Aid, the United Nations Children's Fund (UNICEF), United Nations Capital Development Fund (UNCDF), United Nations Development Programme

¹⁸ United States Agency for International Development. 2019. "Digital Cash Transfer Preparedness Grants: Summary of Findings & Recommendations." *United States Agency for International Development*. 20 May. https://www.usaid.gov/sites/default/files/documents/15396/Digital_Cash_Transfer_Preparedness_Grants.pdf.

¹⁹ [tps://nextbillion.net/eight-principles-for-digital-payments-in-humanitarian-response](https://nextbillion.net/eight-principles-for-digital-payments-in-humanitarian-response)

(UNDP), the United Nations High Commission for Refugees (UNHCR), the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), USAID, the U.S. State Department, and United Nations World Food Programme (WFP). The principles were subsequently discussed at the World Humanitarian Summit, the World Economic Forum, and other global ICT4D, humanitarian, and DFS events.

Digital Payments Case Study in Liberia and Sierra Leone

During the 2014 Ebola crisis in Liberia and Sierra Leone, cash-based relief was delivered as part of recovery and response efforts. Several organizations evaluated and tested the use of digital payments to deliver cash assistance. At the request of USAID, NetHope tasked a team to interview relief organizations and create a case study on the efforts of 10 FFP implementing partners' use of digital cash transfers.

ELAN Workshops and CaLP Trainings

CaLP²⁰ and ELAN (managed by Mercy Corps)²¹ are two leading organizations that support cash assistance delivery in the humanitarian assistance space. NetHope participated in two CaLP and ELAN mobile money workshops that took place in January 2016 in Dakar, Senegal and Gisenyi, Rwanda. The workshops brought together private sector providers and humanitarian organizations, groups that often don't interact, to increase understanding of the minimum requirements for successful mobile money cash transfers. Together, the two groups identified concrete steps to advance partnerships. The 52 individual participants in the workshops represented seven countries across West Africa and the Great Lakes region. NetHope worked with CaLP to deliver a module of the CaLP Level 2 training on cash transfers, which focused on the variety of new digital delivery mechanisms available to humanitarian organizations.

²⁰ <http://www.cashlearning.org>

²¹ ELAN was convened by Mercy Corps in 2015 and worked to improve the effectiveness and impact of humanitarian cash transfers through the appropriate use of payments technology through 2018. (Mercy Corps 2018)

²² Collins, Daryl, Liz Larson, and Abby Butkus. 2019. "Pathways to A Better Life: The Intricate Role of Digital Finance in Reaching the Sustainable Development Goals." *FinDev Gateway Web site*. February. <https://www.findevgateway.org/paper/2019/02/pathways-better-life-intricate-role-digital-finance-reaching-sustainable-development>.

DFS PROGRAM INTEGRATION

Over time, mobile money markets matured and product availability, use cases, and offerings expanded from money transfer to include savings, credit, insurance, and a variety of digital data-driven information and market support services. Many providers, particularly those including third parties, developed more diverse products targeted at low-income consumers and intentionally designed to achieve development outcomes in sectors like agriculture, education, and health. The potential role of this broader suite of digital tools in supporting program outcomes began to be more explicitly recognized by USAID in agenda-setting and programming planning documents, such as Country Development Cooperation Strategies and country strategies to implement the *U.S. Global Food Security Strategy*.

The PI project's activities evolved from developing learning and tools to supporting the use of broader DFS products and platforms as tools for holistically enabling program outcomes across sector portfolios. From operational payments, the PI project moved to facilitate a "portfolio integration approach." USAID's growing understanding of the role of DFS in financial inclusion and maturation of DFS markets enabled the shift in NetHope's approach. A recognition in the financial inclusion community that efforts to prove a direct, causal link between financial inclusion and development goals had not yet been universally successful also precipitated the shift. Even if product usage had a theoretical potential to lead to development goals, many customers were not using products long enough after adoption to see any impact. In 2019, UNCDF advised practitioners to identify a "multitude of pathways simultaneously to assess the full range of life benefits that finance may provide."²² NetHope's work around a DFS integration approach was based on this growing understanding that there was no simple, linear pathway between DFS and

development outcomes and that the integration approach prioritized developing multiple use cases for DFS that met a variety of needs.

Uganda/Feed the Future Technical Assistance

NetHope’s support for DFS in agriculture programming began in Uganda and centered around providing technical assistance and guidance to two Feed the Future (FTF) implementing partners – Chemonic’s Youth Leadership in Agriculture (YLA) project and the Alur Highlands Coffee Alliance (AHCA) project, a partnership between USAID, CARANA, and Ecom Agroindustrial Corporation Ltd. Work was performed as part of USAID’s D2FTF initiative – a three-year collaboration between the USAID Bureau of Food Security and the USAID Global Development Lab that ended in September 2018. NetHope’s D2FTF work in Uganda, which was completed in FY2018, produced implementation-level learnings on integrating DFS into value chains. The learnings and tools tested were integrated into a toolkit for use across all FTF programs and Missions and was a companion guide to *USAID’s DFS and Agriculture Guide*.²³

The PI project’s activities that contributed to the learnings incorporated in the toolkit included:

- Producing new data on the financial behavior of farmers in each program, including their use and interest in mobile money. The survey tool (Tool #1 in the toolkit) was designed to help FTF implementing partners perform broader analyses on the financial livelihoods of farmers, including crop and non-crop household expenditures, income, access to bank accounts, mobile money use, energy consumption, and participation in other non-formal financial services, such as savings groups. The survey data revealed farmers had a strong interest in broader mobile money use in their agricultural activities and personal



FIGURE 12: The Four Tools in the Toolkit on Integrating DFS into Feed the Future Programs

lives. This information was used to inform next steps toward improving farmers’ use of mobile money, including building the use case for mobile money among smallholders, digitizing buying-side value chain partner operations, digitizing opportunities with input suppliers, and strengthening mobile money agent networks in target areas.

- Providing technical support to FTF implementer YLA’s value chain partner, Equator Seeds (ESL), to assist on its path to digitizing its business processes. Before the intervention, ESL’s field operations were entirely paper based, creating arduous reporting procedures and low levels of transparency on day-to-day operations.
- Creating a rural stimulation campaign tool to support the adoption and usage of both DFS and solar products among farming communities through customer awareness, education, and trainings, as well as assessment, outreach, and engagement techniques to strengthen rural DFS ecosystems.

²³ Martin, Christine, Nandini Harihareswara, Elizabeth Diebold, Harsha Kodali, and Carrie Averch. 2016. “Guide to the Use of Digital Financial Services in Agriculture.” *United State Agency for International Development*. February. https://www.usaid.gov/sites/default/files/documents/15396/Digital_Financial_Services_for_Ag_Guide.pdf.

- Performing activity-based costing and payments mapping tailored to agri-enterprises to assess the cost of cash-based payment methods and identify potential merits of migrating toward digital alternatives.
- Defining DFS-specific measurement and evaluation indicators that go beyond metrics commonly used in Feed the Future programs.

Aggregating Demand into a Buying Program to Drive Use and Cost Savings in Rwanda

As a follow on to *USAID e-Payment Toolkit* training conducted by NetHope in Rwanda, NetHope approached USAID IPs about participating in a joint Request for Proposal (RFP) to procure DFS. By joining together, the IPs could reduce the administrative burden of individual procurement and aggregate demand through a buying program. Ten IPs agreed to aggregate their demand of DFS in a joint RFP. NetHope issued an RFP with a statement of requirements to DFS providers in Rwanda. Since NetHope's interventions in early 2016, organizations have made 23,680 mobile money payments valuing \$2.1 million (USD). Mobile money providers credit the buying program for introducing them to this market segment. By participating in the buying program, providers reported their bulk payment/corporate client offerings had grown, and over 50% of their corporate clients were in the non-profit sector. Aggregating the demand of the 10 IPs incentivized some mobile money providers to reduce the transaction pricing by as much as 75%. In addition, the decision of three participating USAID IPs to await the development of a mobile money product by their bank EcoBank prompted EcoBank to launch a new bulk payment mobile money service.

This effort demonstrated that USAID Missions can show the overall demand for mobile money services and connectivity to simplify procurement processes and



Since PI's intervention in Rwanda, organizations have made **22,680 mobile money payments totaling \$2.1 million.**

Half of clients are now non-profits, and some providers have **reduced transaction pricing by as much as 75%.**

generate interest in serving rural markets. NetHope's work in Rwanda to combine the demand of USAID IPs through issuance of a common RFP for service terms and pricing eased the burden of the procurement process. Efficiencies were gained on both the supply and demand side by providing a single point of contact and response for the mobile money service providers and a single process for evaluation by ten organizations. NetHope has since tested similar approaches in aggregating the demand for connectivity.

Thought Leadership on Women's Financial Inclusion

NetHope continued to advance USAID's internal strategy to build champions at both the headquarter and mission-level to advocate for linkages between DFS use and women's empowerment. Through the PI project, NetHope became a champion member of the CGAP Community of Practice on Women's Financial Inclusion (now called FinEquity).

In May 2018, USAID published a paper developed by NetHope entitled "*The Role of Trust in Increasing Access to Finance through Digital Technologies.*"²⁴ The paper presented evidence of a trust gap in women's relationships with DFS, discussed barriers women faced in accessing financial services (particularly through DFS), and outlined a framework for systematically identifying trust factors in women's decisions to adopt technology. Members of FinEquity provided peer review of the first draft. NetHope then presented findings from the paper

²⁴ Spencer, Shelley, Mandana Nakhai, and Jordan Weinstock. 2018. "The Role of Trust in Increasing Women's Access to Finance Through Digital Technologies." *United States Agency for International Development*. May. https://www.usaid.gov/sites/default/files/documents/15396/The_Role_of_Trust.pdf.

in a CGAP webinar around USAID’s focus on women’s financial inclusion through digital technology, along with representatives from USAID’s Global Development Lab and the FinEquity Technology Working Group. The webinar had strong attendance, and CGAP facilitated a lively question and answer session with the attendees.

Digital Development for Feed the Future - Nigeria

NetHope conducted a digital agriculture and DFS assessment for USAID/Nigeria as part of the agency’s support for Mission use of DFS to implement its U.S. *Global Food Security Strategy 2017-2021*. NetHope’s assessment used survey data it collected on payment modalities by USAID IPs in Nigeria and data collected in a two-week in country market assessment in August

2018. NetHope completed the scope of work for the assessment, which also included a digital agriculture work stream conducted in parallel.

Both scopes were designed in conjunction with USAID/Nigeria’s FTF team lead and controller. The assessment evaluated the viability of the DFS marketplace and opportunities for USAID and its IPs in Nigeria to integrate DFS and contribute to strengthening the DFS market system. The project’s survey of IPs, desk research as well as in-country interviews with government, donor, NGO, and private DFS stakeholders were presented to USAID’s DFS team in the Global Development Lab and USAID/Nigeria.

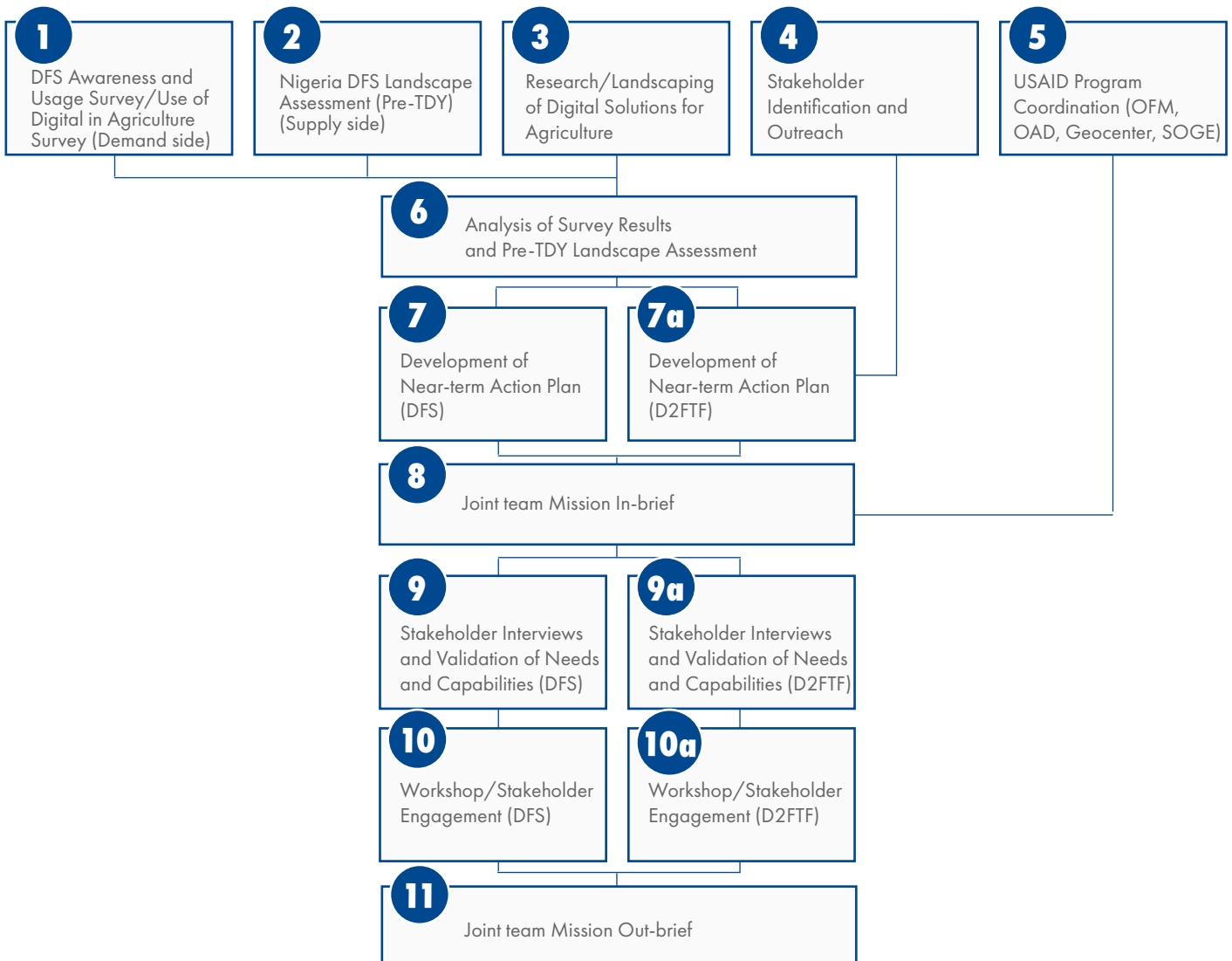
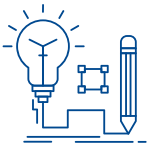


FIGURE 13: Nigeria Summary of Activities

Two DFS development hypotheses tested in the assessment led to changes in how USAID/Nigeria shaped DFS integration:

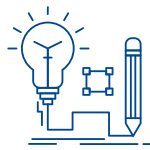


Development Hypothesis 1: DFS

providers in Nigeria did not see a business case for expanding their digital payment infrastructure beyond their current

customers or into rural regions to meet the needs of USAID IPs to eliminate cash payments. They expressed commitment to expand their reach if provided information on this demand and with identification of areas of concentration.

Finding: DFS products existed, and providers had strategies of offering financial products through digital delivery channels and agents. Providers had current products and were investing in agent strategies (including the Shared Agent Network Expansion Facility) that indicated a perception that there was a business case for existing providers to meet the DFS needs of USAID IPs.



Development Hypothesis 2: Only

MNOs with an airtime distribution network had the interest in offering mobile money. This required the Central Bank

of Nigeria to revise its regulations to permit these entities to hold mobile money licenses. It was likely this would occur and could shift the digital payments market system to meet the need for USAID IPs to eliminate the use of cash.²⁵

Finding: USAID IPs' use of cash for operational payments was low and, apart from a few programs, there was no compelling demand for DFS expansion in operational payments. There was interest in seeing MNOs participate more fully in the DFS ecosystem, beyond a communications channel with regulators, other donors, and USAID. The assessment produced a series of

THE PI TEAM NIGERIA ASSESSMENT INCLUDED MEETINGS WITH:



11 NGO/USAID implementing partners



2 government institutions



11 private financial service providers



& 3 research institutions

recommendations on next steps for the USAID/Nigeria engagement to further integrate DFS into its program portfolio. It also shaped broader learnings incorporated into the Global Development Lab's theory of change for the DFS team's work to build mission level understanding of the value and promotion of DFS.

UPDATED E-PAYMENTS TOOLKIT

In 2020, NetHope updated the 2014 *USAID e-Payments Toolkit*. It remains a resource targeted to USAID IPs. It focuses less on operational payments and more on supporting IPs' use of DFS as a tool to advance USAID's agency-wide vision for providing development and humanitarian assistance in the world's rapidly evolving digital landscape as set forth in *USAID's Digital Strategy 2020-2024*.²⁶ The updated toolkit retains the 10-step structure, with each step addressing key questions and providing practical tools for USAID IP's use and adaptation.

A panel of 10 experts provided peer review of the updated toolkit. These included DFS sector experts, NGOs working in a range of geographies and sectors, and staff from USAID and the U.S. Treasury. The toolkit

²⁵ In October 2018, the Central Bank of Nigeria issued guidelines authorizing the licensing of payment services banks that can include subsidiaries of mobile network operators.

²⁶ United States Agency for International Development. 2020. "Digital Strategy 2020-2024." *United States Agency for International Development*. 24 June. https://www.usaid.gov/sites/default/files/documents/15396/USAID_Digital_Strategy.pdf.

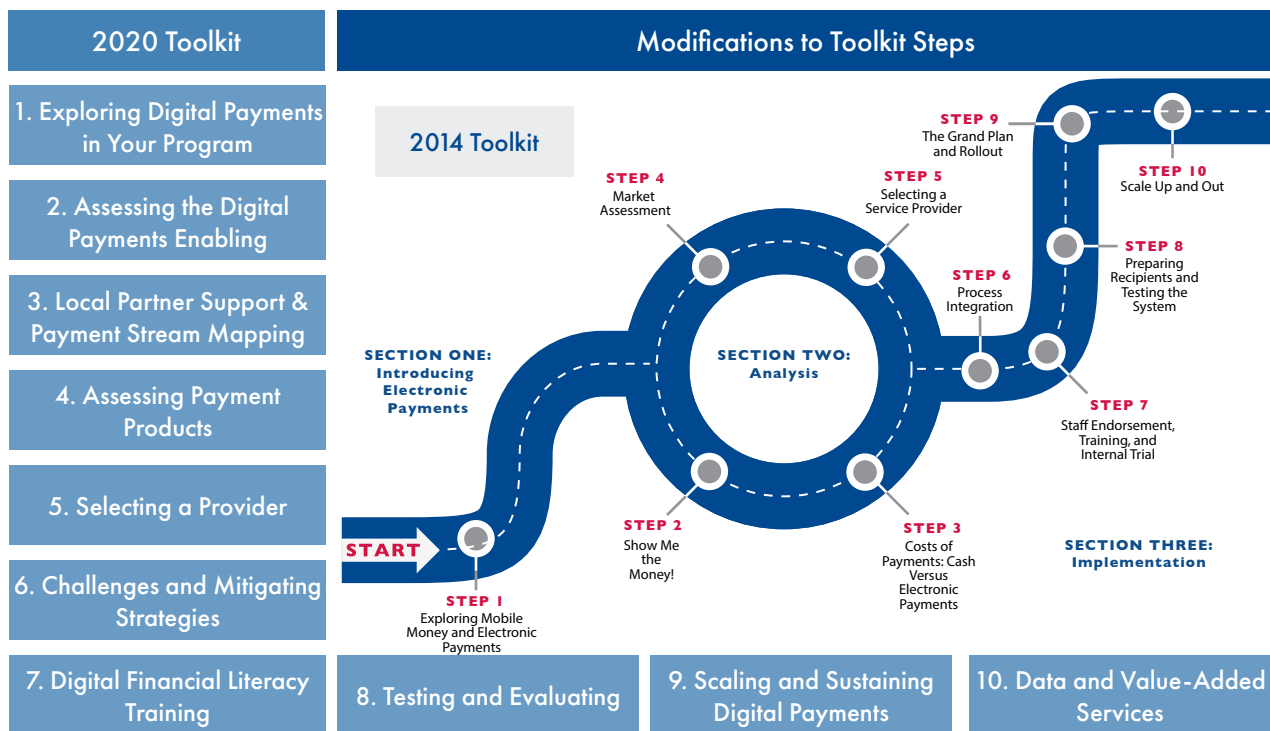


FIGURE 14: Comparison Between Steps in 2014 and 2020 USAID e-Payments Toolkit

was featured in a NetHope-sponsored webinar in September 2020 with participation from USAID, NetHope, Strategic Impact Advisors, and Management Sciences for Health (a USAID IP that participated in the review of the initial draft of the updated toolkit). It was also hosted on the [NetHope Solutions Center](#).

Included in Step #2 of the 2020 toolkit was an updated Market Viability Tool. This tool, like the original, used third-party data to rank the overall maturity of the DFS ecosystems in 104 countries. Countries that scored higher on the ranking scale (from one to five) generally had relevant market conditions most conducive to USAID IPs' integration of DFS.



Since publication of the first market viability tool in 2014, 21 of the 104 countries increased their market viability ranking, 59 maintained their ranking, and 24 fell in ranking.

The updated data showed a relatively even distribution of country DFS market systems across the five-point scale of viability with five (5) being the most viable and one (1) the least viable.

5	21 countries ranked 5
4	21 countries ranked 4
3	21 countries ranked 3
2	21 countries ranked 2
1	20 countries ranked 1

Some of the variation in the country rankings may be due to the change in underlying data sources used in the two market viability tools. The most significant shift in data sources used in the first and second tool was the move away from reliance on GSMA's proprietary market intelligence data. In the 2020 rankings, data from The Economist Intelligent Unit published in its *Microscope on Financial Inclusion Report (October 2019)* and its accompanying database and its *Inclusive Internet Index*²⁷ replaced the GSMA data. Other data sources remained the same but were updated for more current data when available, such as the *World Economic Forum's 2019 Competitiveness Report*.²⁸

²⁷ The Economist. n.d. *The Inclusive Internet Index 2020*. <https://theinclusiveinternet.eiu.com/explore/countries/performance>.

²⁸ World Economic Forum. 2019. *The Global Competitiveness Report*. Geneva: World Economic Forum.

LESSONS LEARNED

Over the multi-year PI project, NetHope provided technical assistance that fostered promotion of DFS as an agency wide development tool. DFS was incorporated into procurement policy and features prominently in the Agency's digital strategy that launched in 2020. At the Mission level, NetHope bridged the gap between in-country DFS market systems and USAID's IPs to drive an understanding and use of DFS. Consistent with NetHope's theory of change developed in the first year of the project (see Figure 2), over the nine-year project cycle, the PI project's activities moved along the impact scale achieving operational metrics of advancing the strategic use of e-payment systems to improving the organizational effectiveness and outcomes USAID supported programs, such as Feed the Future. In subsequent years, the PI project's activities focused on fostering e-payments to reach scale and the expanded vision of using DFS to improve the lives of beneficiaries in USAID supported program seeking to advance resilience and access to finance. DFS is an important part of USAID's digital strategy to support countries forward movement in the journey to self-reliance. As the GBI program ends, USAID will need to continue to work to build deeper capacity both within its missions and to support USAID IPs' use of DFS in their programs. The tools and learnings produced by the GBI program provide a foundation for that continued advancement and a firm foundation to build sustained use of DFS market systems.

LESSON LEARNED 1:

Digitizing Payments in Programs and Value Chains Must be Intentional Program Activities

Digitizing payments streams is not an obvious workstream or activity for most USAID programs. USAID most often targets achievement of sector-specific outcomes such as improved food security, health outcomes, or expanded access to credit. DFS is a cross-cutting application that has been shown to help move people out of poverty and

diversify their livelihoods, an embedded goal in most of USAID's programming. Throughout the PI project, USAID moved from suggested to more explicit requirements for incorporation of DFS in USAID programs. This included procurement reforms making e-payments the default form of payment and more recently explicit use as a tool to advance sector specific strategies. More recently, USAID's agency-wide *Digital Strategy 2020-2024*, called out DFS as an example of adapting to doing development programming in the digital age. For integration of DFS to become an intentional program tool, it must continue be included in USAID program and strategy design from the RFP stage to the workplans of IPs that USAID Missions review and approve. To achieve this level of consistent promotion and oversight will require ongoing efforts to raise the visibility of the application of DFS and build capacity at the policy level and within USAID Missions.

LESSON LEARNED 2:

Digitizing Payments Alone Doesn't Create a Compelling Use Case for Sustained, Active DFS Use

One of the foundational tenets of the Better Than Cash Alliance and early work of the PI project with USAID was that digitizing payments could serve as the gateway to broader and sustained use of DFS and help close the gap of financial inclusion. While initial use cases proved promising, including digitizing government payments, the ongoing active use and relevance of DFS and financial accounts to the lives of the poor require a broader use case than just payments. For example, India has made a great stride in closing the gap in financial account ownership, but almost half of the adults with accounts are inactive and have not been used in the past year.²⁹

In NetHope's work with Feed the Future, farmer data showed that active account use was fostered when DFS went beyond just payments and provided services that addressed farmers' financial lives holistically. This concept of bundled services is being tested to go beyond

²⁹ Global Index at 65.

account opening as the metric of success to a metric of active financial accounts. The work on socialization of the benefits of DFS beyond payments needs to continue to advance. The tools developed through the PI project for integration into Feed the Future programs provide tools for IPs to take that broader approach and work within value changes along the path to digitization. As discussed in the following Section ii, the advent of the COVID-19 pandemic in 2020 may have provided a tipping point in consumer perceptions on the value of digital payments and accelerate use and the continued progress towards inclusive digital financial systems.

LESSON LEARNED 3:

Market Contexts Matter in Approach to Driving DFS Integration in USAID Program

Regulatory frameworks, service provider investment, and agent network maturity drive local financial services. NetHope's mobile money market viability tool captures the variation between country ecosystems for DFS and the need for tailored approaches to integrate the use of DFS in USAID programming. NetHope's country engagement typically included a market assessment and a landscape survey of the DFS ecosystem, as well as structured approaches, either through workshops or RFPs (as in Rwanda) to support IP acquisition of DFS. There is no-one-size-fits-all approach, and building sustainable capacity in DFS ecosystems will continue to require a market-specific approach and customized work at the Mission level.

LESSON LEARNED 4:

Capacity Building Tools Coupled with Training and Technical Assistance Provide the Most Impact

NetHope developed a series of tools to build capacity in international development organizations to incorporate digital payments into their operation and programmatic payments. From the *USAID e-Payments Toolkit* to the recent toolkit on integration of DFS into Feed the Future programs to the updated digital payments toolkit, these practical tools can be used within many USAID programs. In reality, the tools are often not enough,

but active use requires training or technical assistance to explain and use these tools. This has included small grants that generate learnings on application of the tools and created reference examples. It also has included direct technical assistance to apply the tools within the program context. User download of these tools is not an indicative measure of the actual use of the tools. USAID should continue to pair release of the tools with training or technical assistance to encourage active use of the tools and capture learnings and ongoing impact.

LESSON LEARNED 5:

Aggregating the Collective Demand of Implementing Partners

In Rwanda, NetHope coordinated with USAID IPs to aggregate their demand for digital payment products. It was generally the experience of NetHope that most IPs have (a) similar procurement procedures and (b) similar requirements for the functionality of a bulk payment product. NetHope also observed that many digital payment service providers were experiencing proposal development fatigue, where they received many similar RFPs. By aggregating IP demand for digital payment products through a joint RFP, service providers can put energy into developing a stronger proposal and implementing partners will receive strong offers including better pricing options.

WHAT'S NEXT: The Future of Digital Financial Inclusion

By Shelley Spencer, Strategic Impact Advisors

While the GBI program has reached its end, digital financial services (DFS) continue to evolve, and USAID's support for using DFS as a tool to achieve development outcomes remains important. In 2020, USAID adopted an agency-wide *Digital Strategy 2020-2024*.¹ In its implementation approach to the strategy, USAID highlighted payments and financial inclusion initiatives as one area where USAID can "default to the use of appropriate technology." USAID implementing partners' (IPs) ongoing and growing use of DFS in their programs supports the achievement of each of the strategic objectives set forth in USAID's *Digital Strategy*.

The usefulness of DFS cuts across all sectors of USAID's work, from achieving programmatic objectives for programs in the Bureau for Resilience and Food Security to using DFS for global health outcomes as recognized by the Global Health Bureau. With advancements in digital ecosystems over the course of the GBI program, most of USAID's IPs have completed the journey to digital payment adoption in their own operational payments and are now moving on to integrating DFS activities into programs as a tool for generating measurable results in advancing development outcomes.

Work remains to be done, as goals for universal financial inclusion have been missed and in many countries people have yet to use DFS to their full potential. Although DFS account registrations continue to rise, active use of those accounts has lagged. Some countries still have weak DFS infrastructure requiring a market systems approach to address barriers to delivering reliable DFS access,



USAID DIGITAL STRATEGY 2020-2024 OBJECTIVES

Strategic Objective #1:

Improve measurable development and humanitarian-assistance outcomes through the response use of digital technology in USAID's programming

Strategic Objective #2:

Strengthen the openness, inclusiveness, and security of country digital ecosystems

especially in rural areas. Many of the 1.7 billion people that remain financially excluded are those whom USAID and its IPs seek to support.

Several issues currently impact the ongoing development of DFS, and stakeholders' current use should influence how USAID structures its support for DFS ecosystem development and the inclusion of DFS in programming across its portfolio. NetHope sees issues on both the demand and supply side of the DFS market ecosystem.

DEMAND SIDE ISSUES TO WATCH

1. Mobile Phones Will Be the Access Point for Closing the Digital Divide and Digital Financial Inclusion

There is no one mode or form factor for providing financial services digitally or for making digital payments. Humanitarian organizations may load cash assistance on prepaid cards, individuals may

¹ <https://www.usaid.gov/usaid-digital-strategy>

use ATM cards to access funds stored in bank accounts, or mobile phone users may make payments and manage their finances using mobile wallets accessed through smartphone apps or Unstructured Supplementary Service Data (USSD) menus on feature phones. While these options exist, there is a clear trend favoring the mobile phone as the primary means of delivering DFS. Given this trend, working to improve mobile phone ownership and digital inclusion (especially among women) is important, as well as addressing the long-standing issue of universal access to reliable mobile network signals, an issue NetHope has worked to advance through other GBI projects.



According to GSMA, women in low & middle-income countries are **10% (197 million) less likely** than men to own a mobile phone. This **gender gap widens to 23%** in use of the Internet via mobile phones.² Across all low and middle-income countries, when women own a mobile phone, GSMA reports women use a **smaller range of mobile services**.³

The GSM Association (GSMA) reports that affordability is the number one barrier to women owning a mobile phone. There are promising signs on affordability of mobile phones. Smartphone prices continue to fall, new operating systems (such as kaiOS⁴) offer simplified smartphone user interfaces, and mobile network operators (MNOs)⁵

and others are offering financing plans for mobile phone purchases.⁶

2. Official Identity is a Gating Item for DFS Improved by Digital ID Systems

Individuals must provide proof of identity to open financial accounts, including low balance mobile money accounts. This “Know-Your-Customer” (KYC) requirement is set by financial service regulators to meet global standards to counter the risk of money laundering and terrorism financing. Despite tiered KYC requirements and some flexibility in forms of proof of identity, individuals in countries with low issuance of birth certificates still struggle to meet these requirements. The World Bank estimates one billion people in the developing world lack proof of legal identity.⁷ One of the targets for Sustainable Development Goal (SDG) #16 (SDG Target 16.9) is to provide legal identification for all, including free birth certificates by 2030.⁸ USAID recognizes the importance of identity systems, especially in the digital age.

“There may be no single factor that affects a person’s ability to share in the gains of global development as much as having an official identity A functioning digital economy hinges on the critical infrastructure of digital identity.”⁹

² Rowntree, O. (2019, February). GSM Association. From Connected Women: The Mobile Gender Gap Report 2019: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/02/GSMA-The-Mobile-Gender-Gap-Report-2019.pdf>

³ Ibid.

⁴ General information on kaiOS, kaiOS tech, <https://www.kaiostech.com>

⁵ Ngugi, B. (2020, July 27). Safaricom starts Sh20 a day loan for buying smartphones. From Business Daily Africa Web Site: <https://www.businessdailyafrica.com/corporate/companies/Safaricom-starts-Sh20-a-day-loan-smartphones/4003102-5599526-pywu66/index.html>

⁶ McNutt, H. (2020, August 13). Making Mobile Phones Affordable in Malawi. From Strategic Impact Advisors Web Site: <https://www.siaedge.com/news/2020/8/13/making-mobile-phones-affordable-in-malawi>

⁷ World Bank. (2019). Global ID Coverage, Barriers, and Use by the Numbers: An In-Depth Look at the 2017 ID4D-Findex Survey. Washington, DC: World Bank License: Creative Commons Attribution 3.0 IGO (CC BY 3.0 IGO).

⁸ Sustainable Development Solutions Network. (n.d.). Indicators and a Monitoring Framework: Launching a data revolution for the Sustainable Development Goals. From Sustainable Development Solutions Network Web Site: <https://indicators.report/targets/16-9>

⁹ US Agency for International Development. (n.d.). Identity in a Digital Age: Infrastructure for Inclusive Development. From US Agency for International Development Web Site: https://www.usaid.gov/sites/default/files/documents/15396/IDENTITY_IN_A_DIGITAL_AGE.pdf

Many countries and donors (including USAID) are supporting development of digital identification systems. Some systems are tied to national identity programs, and others (such as India's Aadhaar program) provide a unique means of digital identity verification without being a national identity card. USAID is supporting efforts to develop cross-functional, infrastructural identification systems rather than fragmented systems. Improving the ease with which identity can be verified (while protecting individuals' privacy rights) will be an important contributor to progress in digital financial inclusion.

3. Building Digital Financial Literacy Remains Important to Gains in Financial Inclusion and Consumer Protection

One of the persistent barriers to the active use of DFS, especially for women, is low levels of digital financial literacy (DFL). The urgency to build people's capacity to evaluate and safely use DFS is further compounded by the current context of the COVID-19 pandemic, as more services are being transferred onto digital platforms. USAID's IPs are well positioned to address this challenge as organizations engage in building individual capacity and implementing program activities at the community level. Step #7 of the *USAID Digital Payments Toolkit* (updated by GBI in 2020) provides resources to help IPs build DFL campaigns.

In low and middle-income countries, GSMA ranked literacy as the top barrier to women's use of mobile internet service and the second highest barrier to mobile phone ownership, ranking only behind device affordability. Individuals less engaged in the digital economy may not have the capacity to use a mobile phone or their capacity may be limited to

making calls, using SMS, and accessing applications like WhatsApp or Facebook. Effective use of DFS requires a level of DFL that includes understanding which DFS products may be relevant, how to use the mobile phone to access those DFS products, how to effectively use the financial services, and how to protect yourself from cyberthreats and fraud.

Improving consumers' DFL also benefits digital ecosystems and DFS service providers by increasing the market for their services. At an ecosystem level, capacity and literacy constraints among key demographics and market segments can reduce the potential commercial viability and development impact of DFS, increasing marketing and customer acquisition costs. Policymakers can also play a role in building DFL. Policy recommendations from the Better Than Cash Alliance, Women's World Banking, and the World Bank Group to the Global Partnership for Financial Inclusion of the G-20 to advance women's digital financial Inclusion include recommendations to policymakers to leverage technology and behavioral insights to strengthen women's digital skills and financial capability.¹⁰ In 2018, USAID launched the Women's Global Development and Prosperity Initiative that includes a project focused on building women's DFL.

4. Consumers' Use of e-Commerce, Especially During COVID-19, May Accelerate DFS Adoption

During the COVID-19 pandemic, individuals are finding DFS essential to their economic activity. Governments have imposed limits on mobility that require remote transactions and are encouraging digital transactions over cash.¹¹ Markets driven by human contact and physical presence have moved to digital platforms, from home food delivery to

¹⁰ Better Than Cash Alliance, Women's World Banking, and the World Bank Group. (2020, July). Advancing Women's Digital Financial Inclusion. From G20 Global Partnership for Financial Inclusion: https://btca-prod.s3.amazonaws.com/documents/482/english_attachments/_Advancing_Womens_Digital_Financial_Inclusion_G20_GPFI.pdf?1595254332

¹¹ Many governments have relaxed DFS regulatory policies and provided financial incentives including a waiver on mobile money transaction fees to encourage use. GSMA has a database to track policy shifts on mobile money regulation by country to respond to COVID-19 accessible (Chadha, Kipkemboi, & Muthiora, 2020).

facilitated sales of products through digital channels. Governments are providing stimulus payments through digital transfers which require a digital account for receipt. An individual's ability to adapt to this digital interaction shift has highlighted the need to close the gap in digital financial inclusion.

The value of DFS to consumers during the COVID-19 pandemic may create the long-awaited demand side pull for DFS adoption. Early development theories of the pathway to financial inclusion and potential role for DFS hypothesized that pushing cash payments to digital payments was the first step in consumer adoption and lasting behavior change in using DFS to participate in the formal financial sector.¹² The validity of this hypothesis was tested as more digital accounts were opened, metrics showed financial inclusion advancing and large payment streams, such as government support payments, were deposited directly into formal accounts. However, often consumers active use of those accounts lagged beyond the payments which consumers cashed-out to continue transacting in cash.¹³ Of the one billion registered mobile money accounts GSMA reported in 2019, only one million were active. In India, record gains were made in financial inclusion as measured by account opening in the World Bank's 2017 Global Findex. The Global Findex data also show that India had the highest rate globally (48%) of inactive accounts. Research conducted by NetHope with underbanked populations engaged in USAID programs, such as smallholder farmers, indicated that payments alone were unlikely to drive them towards a sustainable shift to DFS as a financial management tool. The necessity of digital

transactions to buy goods and services during the COVID-19 pandemic may change that and validate the early hypothesis that digitizing payments can catalyze broader DFS use. Time will tell.

5. The Cost of Inclusion is Paid in Fees Requiring Consideration of *Who Pays*

Most DFS providers rely on fees to drive the revenues in their business models. For mobile money providers, these are transaction fees. For banks offering agent banking and digital access to accounts, it is account fees. For merchant sales, the transaction cost may be borne by the seller, subsumed by the platform provider or paid by the purchaser. Governments have also begun to tax mobile money, as they seek to find sources of revenue. Depending on the structure of the tax, consumer behavior is showing that taxation of mobile money transactions can detract from consumers' mobile money use.¹⁴ Consumers' aversion to these transaction-based costs and taxes perpetuates a preference for cash, which they view as cheaper than digital payments. Numerous studies show there is a cost to the use of cash (from travel distance to a bank to security in transport). In USAID's previous *e-Payments Toolkit*, published by USAID and NetHope in 2014, calculating and understanding an organization's costs of cash was included as part of the journey to move from cash to digital payments.

While low cost services are ideal, DFS providers need to generate revenue to be sustainable and fund continued investment in innovation and expansion.¹⁵ It is unlikely that fees will go away, but who pays that fee is an important question. Ongoing conversations

¹² Radcliffe, D., & Voorhies, R. (2012, December 11). A Digital Pathway to Financial Inclusion. From SSRN: <https://ssrn.com/abstract=2186926>

¹³ Significantly, most researchers apply as the common measure for active use of accounts an accountholder conducting at least one transaction every 90 days. Some have modified their definition to define activity in a shorter 30-day period but even that level does not indicate normalization of the use of DFS for transactions.

¹⁴ Clifford, K. (2020). The causes and consequences of mobile money taxation: An examination of mobile money transaction taxes in sub-Saharan Africa. London: The GSM Association.

¹⁵ McKinsey estimated that for mobile money providers to reach break-even they need to process between \$2 billion and \$3 billion in annual transaction value to generate revenue of roughly \$20-30 million. <https://www.mckinsey.com/industries/financial-services/our-insights/mobile-money-in-emerging-markets-the-business-case-for-financial-inclusion>

are needed regarding the public funding of fees to receive and cash-out government payments and other sources of revenue to support transactions by those with limited consumption budgets, including donor’s authorization of recovery of the transaction costs in program activities.

SUPPLY SIDE ISSUES TO WATCH

1. Mobile Money Systems Delivering A Platform Service Rather than Direct Consumer Service Delivery is on the Horizon

The mobile money segment of the DFS sector is continuing to evolve, and questions about the business model and role of the network provider (typically MNOs) are being evaluated as consumer uptake of DFS matures. In 2017, GSMA suggested that MNOs would benefit by moving to a “payments as a platform” approach in which revenue is generated from enterprises use of the platform and less reliant on customer transaction fees derived from MNOs’ direct service delivery. This shift could positively affect affordability for consumers as the fee dependency lifts. GSMA reported that this shift is beginning to occur in its 2019 report on the state of the mobile money industry.

- 2018:** 80% of mobile money providers reported majority of revenues from customer fees
- 2019:** 12% less with 66% of mobile money providers majority of revenues from customer fees
- 2019:** 21% respondents reported that business fees drive most of their revenues

GSMA identified five pillars for mobile money operators to offer payments as a platform for others:

Establish plug-and-play access to mobile money system
Manage organizational change and introduce new business models
Optimize user experience (UX) and user interface (UI)
Enable third parties to develop new relationships via the front end
Adopt a personalized approach to product design

The “plug-and-play access” mentioned in the first pillar is enabled through an open application programming interface (API) that allows third party use to integrate the payment process into their own service offerings. This is a valuable feature for billers, organizations using bulk payments (such as USAID’s IPs), and governments to facilitate payments and collections. With time, the role of the mobile money provider may move more from the customer-facing and customer-branded role to the integrated technology platform with more limited visibility.

2. The Movement Towards Interoperable Payment Services Rather Than Proprietary Networks Has Begun is on the Horizon

One early advantage of MNOs offering mobile money service was a reduction in customer churn away from their mobile voice and data offerings. By requiring customers to have a SIM card on their network to use their mobile money service, mobile money providers found value in building proprietary systems. This helped justify the MNOs investments and allowed them to fight for market share.

As the sector has matured, DFS interoperability is gaining momentum as providers see value generated from a broader transaction base. Providers are increasingly seeing less value from mobile money services as most consumer know how to use multiple SIMs to switch between service providers to access services. Consumers benefit from interoperable systems in convenience, choice, and access to a range of services, including linking their mobile money accounts to formal bank accounts. In competitive markets, mobile money operators are seeing positive network effects from interoperable systems. The interoperability between mobile money operators in Tanzania is an example of industry collaboration on interoperability. In other markets, regulators are requiring interoperability. In India, the Unified Payments Interface (UPI) provides an inter-bank payment system that allows for sending or

requesting money from a mobile phone. Facebook-owned WhatsApp is using the UPI as the interface for payments processed through its messaging app. Interoperability can also extend beyond a given market to the regional and global level to facilitate cross border transactions. Originally reluctant to embrace interoperability as premature, GSMA now has launched an interoperability workstream.¹⁶

3. Regional Systems May Replace Single Country Services

Payment platform interoperability also feeds into the potential for integration of regional and global payment systems that can facilitate financial flows to individuals regardless of location. Remittance processors are linking with local DFS providers to enable payments directly to local mobile wallets. Governments are developing agreements for regional interoperability to enable cross border economic activity. Much like the banking system, the future likely includes the ability to move funds securely and seamlessly through a financial system that reaches rural and remote areas through mobile phones.

4. Uneven Development is Occurring and the Rural-Urban Divide Persists Especially in Agent Access

Consumers' access to reliable DFS, while improving, is not universal. Rural areas with lower population density than urban centers remain underserved. Issues include the quality, speed, and reliability of mobile network coverage. The DFS ecosystem currently relies on (and is likely to continue to include) agents that provide physical access points for cash-in and cash-out services. In rural areas, agents may be limited or not exist. If they do exist, these agents may not have enough liquidity to process cash-in and



cash-out transactions. Providers may need public funding to support service delivery to rural areas as the business case for private sector delivery and cost recovery through fees may not exist. Public support for servicing rural areas is important to meet broader socio-economic needs of households in rural areas. For example, public funding for support of mobile money in rural areas could also support the payment ecosystem used in pay-as-you-go financing for solar home systems and other assets and services, such as water pumps, appliances, and cooking stoves.

5. Non-Traditional Players Including FinTechs and SuperPlatforms are Entering the Sector

The players in DFS market systems are shifting and will continue to shift. Companies seeking to tap into the market to offer financial services and transactional capability over maturing digital networks range from start-up FinTech companies creating new service offerings to what has been dubbed "Super Platform" companies, such as Google, Facebook, and Amazon that have mastered using digital systems to reach consumers with products and services that are customer-centric.¹⁷ Chinese digital giant Tencent's messenger

¹⁶ Nautiyal, A., Pors, B.-J., Navarro, A., Morliere, S., Paillon, R., & Nanadoum, L. (2020). The many paths to mobile money interoperability: Selecting the right technical model for your market. London: The GSM Association.

¹⁷ For an interesting discussion of this potential and its impact on DFS providers, see FIBR Project White Paper No. 2 December 2017, Porteous, D., & Morawczynski, O. (2017, December). Inclusive digital ecosystems of the future. From Fibr Project Web site: <http://bfa.works/EBP-DFS-TZ-GH>

application, WeChat, has become a primary means of payment in China, proving Super Platforms can play a significant role in a country's digital payments landscape. In 2020, Facebook created a payments division to run all its payment projects.¹⁸ Companies are working to integrate payment processing across Facebook's messaging platforms (WhatsApp, Instagram Messenger, and Facebook Messenger).

security of their transactions and safety of their funds. In this space, standard-setting bodies and developing global alliances should develop best practices. In August 2020, Columbia University's DFS Observatory launched a draft risk management framework for cybersecurity and DFS.¹⁹

6. Cryptocurrency is Providing New Approaches to Currency

Movement away from cash to digital technology is also driving innovation in approaches to currency through blockchain and central bank-approved digital currency. Bitcoin was one of the early blockchain approaches to cryptocurrency. It has been met with mixed success. More recently, in 2019 Facebook announced its design of a new cryptocurrency, Libra, which would use a blockchain network to create the currency token and verifying transactions and token ownership. Facebook met intense regulatory resistance to its design and has adapted its payment plan to one more tied to fiat currencies. No doubt additional innovation in this space will occur, but regulators and central bank policies will be the biggest hurdle to their success.

7. Cybersecurity, a Digital Ecosystem Essential, is Important at the Platform and Consumer Level

Digital transaction processing raises the issue of cybersecurity. Vulnerabilities in digital payment systems will need to be addressed at the systems level with providers, but also at the consumer level to prevent internal threats such as sharing a PIN, responding to phishing attempts, and other risks. Consumers need to trust the system and the

¹⁸ Canales, K. (2020, August 10). Facebook is reportedly expanding its banking ambitions with a new division that will run all of the tech giant's payment projects, including Facebook Pay. From Business Insider Web site: <https://www.businessinsider.com/facebook-financial-new-payments-group-2020-8>

¹⁹ Columbia Business School. (2020, August 20). 8th Digital Finance Summit at Columbia. From Columbia Business School, The Columbia Institute for Tele-Information: <https://dfsobservatory.com/event/8th-digital-finance-summit-columbia>



30. Eastern Europe Internet Access Integrity Assessments

July 2019 – September 2020

BACKGROUND

In mid-2019, the USAID/Eurasia Bureau requested that NetHope evaluate the integrity of internet access in select Eastern Europe countries. While primarily focused on cybersecurity threats, the assessments reviewed all possible risks to internet access in Serbia, Kosovo, and Georgia. The resulting assessments addressed the risks to the stability of internet access in specific sectors in each target country. It provided an assessment of systemic risks and vulnerabilities in each country, strategically informing potential programmatic, policy, and technical responses. It was intended to offer brief, informative analytical guidance toward the choice and design of potential programmatic interventions. The end goal was to support the USAID assistance and host country development priorities related to addressing the target sectors' cybersecurity risks, ensuring greater resilience of the internet infrastructure, and countering digital disinformation.

All three assessments focused on cybersecurity of national internet infrastructure. In addition, the Serbia assessment focused on critical points of failure and cybersecurity resilience of the *online media* and *civil society* sectors in relation to disinformation threats. In Kosovo, the assessment focused on critical points of failure in the *financial sector* and the *elections system*. Finally, in Georgia, the assessment focused on critical points of failure and cybersecurity resilience of the *financial* and *education* sectors.

ASSESSMENT FOR SERBIA MISSION

Modern digital infrastructure comes with deep responsibility to understand and manage a continually expanding



set of cyber risks. As countries aim to reap the benefits of internet connectivity, they must address the core vulnerabilities associated not only with the technical infrastructure of the internet, but also those associated with specific groups of internet users within the population. To this end, this report explored two separate themes in Serbia: 1) resilience of critical internet infrastructure; and 2) cybersecurity needs of online media and civil society organizations (CSOs) in relation to threats of disinformation. High priority recommendations with regards to the critical infrastructure section were: 1) promoting policy discussion centered on security of internet infrastructure; 2) technical capacity building for government institutions responsible for compliance; and 3) support to public and private partnerships aimed at strengthening the cyber resilience of internet infrastructure.

Critical Internet Infrastructure

Serbia's national internet infrastructure has progressed along a pathway of resiliency. Its competitive market context, EU-aligned sectoral regulation, and geographic position have all been favorable for the evolution of

a competitive, advanced, and regionally significant telecommunications landscape. Development of Serbia's national internet architecture was not centralized, allowing high levels of redundancy in major population and service hubs. The internet backbone was diversified, with multiple reliable upstream providers. Main network and infrastructure operators were part of larger regional entities and were incentivized to invest in cybersecurity. These operators have developed advanced capabilities required to assess risks, prevent, mitigate, and recover quickly in case of major incidents.

Serbia's national DNS and ccTLD infrastructure was well-administered, ensuring high stability and availability of Serbian domains. Key cyber threats were at the domain owner level, while the DDoS risk is becoming a lesser concern over time. The main IXP, Serbian Open Exchange has also taken key steps to support technical security and reliable functionality of its infrastructure. Its facilities and equipment were found to be redundant, resilient, and recoverable, distributed across several high-grade data centers in Serbia.

In view of the key stakeholders, both the likelihood and potential adverse impact of cyber-attacks on critical internet infrastructure was low. The following areas were identified to constitute the systemic challenges to the stability of Serbia's infrastructure:

1. Industry collaboration and exchange of information regarding cyber threats was still a developing process. There was reluctance to share and collaborate due to the competitive nature of the market, and the risk of potential regulatory pressure.
2. Among the operators, the most frequent concern was DDoS attacks, but leading companies have world class defense and mitigation systems. There was limited view and understanding of potential insider and supply chain threats.
3. Technical regulations supporting information security requirements were also evolving, with challenges

of interpretation, implementation, and enforcement. Insufficient and basic technical oversight by the Ministry of Trade Tourism and Telecommunications was reported to be the case, with rudimentary information security audits of network providers.

Online Media and Civil Society

In looking at disinformation, the report intentionally focused on readiness for adversarial digital interference that might deploy cybersecurity attacks against local media and CSOs. Disinformation activity involving the cybersecurity dimension included, but was not limited to, hijacking the social media or email accounts of leading media outlets and key civil society voices, spoofing the communications from such high-profile accounts, and stealing sensitive information for use in disinformation and manipulation campaigns. The field of potential responses to such attacks was situated within the topic of information security and cybersecurity.

Overall, the report deemed the cybersecurity readiness level of online media outlets and CSOs to be low. A strong majority of media and CSO sector entities did not have most of the basic requirements related to organizational cybersecurity in place. A typical organization has no more than three to four constituent members, with low technical capacity, and inconsistent practices of digital hygiene. Cyber risk perception was generally high, both in terms of overall cybersecurity and its relationship with the disinformation challenge. The interlocutors engaged under this assessment clearly acknowledged the likelihood of attacks deployed with an intention of disinformation, misinformation, and/or propaganda. Perception of impact was also significant. Attacks on online media that have a disinformation dimension exploited the thin layer of social trust to online sources and may trigger significant reputational, revenue, and operational losses. Similar attacks on CSOs could also result in weakening of trust and bring about a cascade of negative implications for the beneficiaries, partners, supporters, and sponsors of the organization. Cybersecurity resilience of online media and CSOs in

Serbia in the face of disinformation threats was an area found to be in need of assistance. The report suggested that any focused engagement in this area should take a broader view that ensures a wide spectrum of cybersecurity risks is considered.

Recommendations for Critical Internet Infrastructure

Based on research, and input from the expert community, industry, and state representatives, several programmatic activities were recommended for consideration:

1. **Policy development.** Initiate and support a strategic policy discussion engaging the national system of cybersecurity governance, with prioritized attention to internet connectivity and strong involvement of the critical internet infrastructure operators.
2. **Capacity building.** Provide specialized training and consultative support to the Ministry of Trade Tourism and Telecommunications (MTTT) inspectorate in cyber risk assessment process, a risk-based scoring of critical internet infrastructure.
3. **Technical assistance**
 - a. Assist the technical staff within the public sector agencies of importance for the critical infrastructure in obtaining, maintaining, and developing specialized cybersecurity credentials.
 - b. Independent technical and capacity needs assessment of the infrastructure at main internet service providers (ISPs), Telekom Srbija, SBB, Telenor.
 - c. Facilitation of the procedural and organizational specifics at National Computer Emergency Response Team (NCERT) of ongoing and planned technical activities.
4. **Public and private sector partnerships.** Promote public sector and industry collaboration:
 - a. Support to public events bringing together the key stakeholders in Serbia, (e.g. sponsoring speakers from the U.S.).

- b. Industry-focused workshops on protecting critical internet infrastructure, including threat information sharing, emergency response coordination, and specific areas of expertise.
- c. Support to setting up of an industry Security Operations Center (SOC) for the telecommunications sector.

Recommendations for Online Media and Civil Society

The following specific recommendations are applicable to the current situation:

1. **Advocacy engagement.** Consider the possibility of supporting advocacy engagements aimed at strengthening accountability for cyber-attacks on media and civil society and ensuring consequential action against the perpetrators of such attacks.
2. **Re-evaluate current programming.** Identify and integrate concrete cybersecurity components in current USAID-supported or U.S.-funded programming focused on one or more areas, platforms and telecommunications providers for access and identity recovery. Any activities should maintain a balance of need, feasibility, and demand from the beneficiaries.
3. **Launch a dedicated digital safety assistance project.** Looking forward, as part of new programming, consider implementing a national project aimed at supporting the digital safety and security needs of the at-risk online media and CSO actors in Serbia, promoting long term organizational change, sustainable in-house technical capacity, and deep security awareness.
4. **Support to specialized Computer Emergency Response Team (CERT).** As an alternative and/or complementary effort to a large-scale digital security project, consider targeted support to existing CERTs providing civil society and media support.

ASSESSMENT FOR KOSOVO MISSION

For Kosovo, high priority recommendations with regards to the critical infrastructure section were to: 1) facilitate a strategic discussion engaging the national system of cybersecurity governance, with prioritized attention to internet connectivity; 2) support Autoriteti Rregullativ i Komunikimeve Elektronike dhe Postare (The Authority of Electronic and Postal Communications or ARKEP) and KOS-CERT in inventorying critical internet infrastructure, cyber risk assessment and improving the technical environment at Kosovo's Internet Exchange Point (KOS-IX); and 3) provide support to public and private partnerships in this area.

High priority recommendations for the financial sector were to: 1) jointly with the Central Bank of Kosovo, support a multi-stakeholder discussion of the enforcement and implementation of the existing information security regulations; 2) support the Central Bank of Kosovo in building the qualifications of key technical and policy implementing staff in cybersecurity regulation, audits, and specific areas of expertise; and 3) assist in the organization of dedicated financial sector cyber readiness exercises. High priority recommendations for the elections system were to: 1) provide institutional support to Central Elections Commission (CEC) in developing and implementing its cyber security strategy and workplan, including technical assistance, training, and IT infrastructure; and 2) assist in the implementation of public awareness campaigns focused on cyber security risks to the electoral process.

Critical Internet Infrastructure

At the national level, the backbone infrastructure and international connectivity of Kosovo was diversified and resilient. The main ISPs do not rely on the same transmission lines and have developed national fiber infrastructures that are largely independent of each other. As Kosovo does not have assigned country-code top level domain, Domain Name System (DNS) vulnerability concerns at the national level were diminished. At KOS-IX, the effects of malicious intervention would still allow



FIGURE 1: Sectoral Focus per Country

the country to stay online even if with lower the quality of service.

The operating environment for cyber resilience of critical internet infrastructure was not supportive and remained a major area of improvement. The ability of the telecom regulator as an implementing and enforcing body to maintain a high level of compliance and promote advanced maturity of the sector has been strongly limited by institutional, regulatory, and resource constraints. In general, the telecommunications operators in Kosovo were in early stages of readiness to cope with potential disruption of their infrastructure. At the level of ISPs and sectoral cybersecurity, the critical internet infrastructure remained vulnerable to advanced cybersecurity threats. Most ISPs did not possess advanced capabilities required to assess risks, prevent, mitigate, and recover quickly in case of major incidents. Only one ISP in Kosovo has obtained an ISO 27001:2013 certification. None of the ISPs fully implemented the cybersecurity audit requirements under the telecom regulator's information security regulations. Commercial incentives were recognized, but the operators were still more focused on quality and availability of connectivity, rather than security.

Financial Sector

The financial sector, and particularly the banking sector,

was found to be resilient in terms of its ability to prevent and respond to major cyber incidents. The main banks had invested heavily in cybersecurity and were more advanced and capable actors compared to the leaders of other industries. As eight out of the 10 banks were foreign owned, the banking sector was well-aligned with the European and/or international standards, and existing security measures to protect key assets follow the recognized global industry practices. At smaller banks, budget constraints made it challenging to prioritize information security and technical investments and external advisory services tended to be underfunded. Compliance with the information security standards tended to be partial. Similar disparities existed among micro finance institutions (MFIs) and insurance companies. The banks did not count on the government authorities as strong partners in detection, prevention, and response to incidents. At most of the banks, there was virtually no contact with the cybercrime team at the Ministry of Internal Affairs, the national CERT team, and limited communication with the Central Bank of Kosovo (CBK). Formal industry cooperation and coordination on information security issues was limited to banks. Multi-stakeholder cyber readiness exercises engaging the financial sector were not held, as the existing critical infrastructure legislation does not specifically account for financial sector infrastructure. Major plausible scenarios of cyber-attacks within the financial sector were not reviewed and integrated in risk management planning at the sectoral level.

Electoral System

Kosovo's election infrastructure had a relatively small *attack surface* in terms of exposure of its critical technology to cybersecurity risks. The essential processes remained predominantly analogue and/or paper-based even though the strategic plans of the Central Elections Commission (CEC) emphasize a greater role for technology. The main vital process dependent on internet connectivity was the live results transmission network, with outdated equipment. There were technical concerns associated with reliability of the network, but the results did not have a bearing on the official election

results. Technical issues were observed regarding the out of country voter system, and concerns voiced about the online service for change of polling station by voters, and the website of CEC. Significant concerns also existed in relation to leaks of sensitive data, due to large number of temporary staff during the electoral periods. The ability of CEC to safeguard the personal data of voters was questioned externally.

Recommendations for Critical Internet Infrastructure

1. Policy and regulatory engagement.

- a. Support the development of next level regulatory acts and bylaws under the NCSS 2020-2025, and the Law on Cybersecurity.
- b. Facilitate a strategic discussion engaging the national system of cybersecurity governance, with prioritized attention to internet connectivity, and strong involvement of the critical internet infrastructure operators.

2. Public sector capacity building and technical assistance.

- a. Provide specialized training and consultative support to ARKEP in inventorying critical internet infrastructure, cyber risk assessment process, risk-based scoring of critical internet infrastructure operators and their assets, as well as improving the technical environment at KOS-IX.
- b. Assist the technical staff within critical public sector agencies for the critical infrastructure in obtaining, maintaining, and developing specialized cybersecurity credentials.

3. Private sector engagement.

- a. Independent technical and capacity needs assessment of the infrastructure at Kosovo Telecom, IPKO, and other interested network providers.
- b. Assist the technical staff of these companies in obtaining, maintaining, and developing specialized cybersecurity credentials.
- c. Support to public events bringing together the key stakeholders in Kosovo, (e.g. sponsoring

speakers from the U.S.).

- d. Industry-focused workshops on protecting critical internet infrastructure, including threat information sharing, emergency response coordination, and specific areas of expertise.
- e. Support to a series of events - cyber exercises, hackathons - specifically devoted to critical internet infrastructure.
- f. Promote the development of responsible disclosure conditions, emphasizing collaboration of the operators with the local cybersecurity community.

Recommendations for Financial Sector

1. Public sector capacity building and technical assistance.

- a. Support the CBK in building the qualifications of key technical and policy implementing staff in cybersecurity regulation, audits, and specific areas of expertise.
- b. Develop partnerships with the CBK, ARKEP, Kosovo Banking Association and other stakeholders to organize dedicated financial sector cyber readiness exercises, with a national perspective.

2. Private sector engagement.

- a. Jointly with the CBK, support a multi-stakeholder discussion of the enforcement and implementation of the existing information security regulations, engaging specifically smaller banks, MFIs, and insurance companies.
- b. Co-organize a series of workshops, speaker series, and hackathons to strengthen awareness of systemic cyber risks for the industry.
- c. Explore, jointly with the Kosovo Banking Association, the creation of a technical platform or service for financial institutions allowing sectoral threat exchange facilitation, with an alert system, and anonymized submission option.
- d. Consider providing a cybersecurity capacity

building program for the financial sector. Some of the topics mentioned were core certifications, malware analysis and digital forensics.

Recommendations for Election Systems

1. Institutional support to CEC.

Support to development and implementation of the CEC's cybersecurity strategy and workplan, with focus on:

- a. Conduct a comprehensive independent technical audit and needs assessment of the infrastructure at CEC.
- b. Upgrade of critical election management infrastructure.
- c. Security awareness at the staff level and organizational policy development.
- d. Technical training to key staff members.

2. Public recognition of cyber risks.

- a. Help conduct a public-facing awareness campaign for electoral process participants and stakeholders regarding cyber risks to the electoral process. This should engage the independent observers, political parties, voters, and CEC staff.

ASSESSMENT FOR GEORGIA MISSION

High priority recommendations with regards to critical infrastructure in Georgia were to: 1) facilitate a strategic discussion on cyber risks to internet infrastructure, engaging the main actors within the national system of cybersecurity governance; 2) facilitate discussions among the main network operators on setting up a functional IXP in Georgia; and 3) promote public sector and industry collaboration on critical internet infrastructure. High priority recommendations for the financial sector were to: 1) support dialogue and on enforcing compliance with the existing cybersecurity regulations; 2) promote sectoral collaboration and coordination, engaging the leading private and public CERTs; 3) provide technical support to National Bank of Georgia's plan for setting up a threat information sharing and analysis center. Finally, high priority recommendations for the education

sector were to: 1) review and strengthen cyber security dimensions of ongoing assistance within the sector; 2) provide specialized cybersecurity training for main education sector stakeholders on competencies required to identify, assess, and manage cyber risk, developing and implementing an effective information security strategy, and technical measures; and 3) promote greater awareness and recognition of cybersecurity requirements at Georgian higher education organizations.

Critical Internet Infrastructure

Georgia's critical internet infrastructure operated in an environment vulnerable to advanced cybersecurity threats. The country's geography, market environment, and geopolitical situation presented systemic security challenges. The internet backbone infrastructure was not diversified in terms of international linkages, with limited fallback options in case of major disruptions. There was a high degree of dependency on the only direct connection to the European infrastructure, through a single submarine cable that connects Georgia to Bulgaria. This connection provided 65% of the wholesale market. Within Georgia, the internet backbone was redundant along major routes. However, in absence of a national IXP, and the dominance of two ISPs, the reliability, redundancy, and availability of internet connectivity for the country was suboptimal. The internet connectivity infrastructure remained vulnerable to large scale DDOS attacks. Even the largest ISPs found it challenging to invest in world class cybersecurity solutions and establish compliance with the recognized cybersecurity standards.

Financial Sector

The financial sector remained a prime target for cyber-attacks, even though no serious incidents with sector-wide implications have been reported. The sector had experience with significant incidents in the past and deals with minor security events daily. The bigger industry actors were purposely targeted in a variety of geopolitical and politically conditioned incidents. Cyber threats directed at consumers were well managed. The primary constituents of Georgia's financial system have

an emerging, but stable capacity to address advanced cyber threats. Systemically important banks in Georgia were well-prepared to defend their infrastructure and protect their customers. Established procedures were in place safeguarding critical IT infrastructure, such as data centers, servers and networks, digital banking platforms, payment systems and card processing infrastructure, ATMs, and branch infrastructure. Existing security measures to protect key assets followed the recognized global industry practices.

Education Sector

Georgia's education sector faced key cyber risks related to personal data, integrity, and protection of data, communications, and other digital assets within the centralized enterprise technology platforms, and critical functions of the educational system related to nationwide testing and examinations. However, in expert assessment, the potential impact of cyber-attacks on the education sector's day to day business continuity and operational ability to deliver critical functions was limited. The main IT system linking and serving the educational institutions on centralized basis – The Education Management Information System (EMIS) – was designated as critical infrastructure and was subject to periodic technical controls. Recent reviews by the State Audit Office of Georgia highlighted several shortcomings at EMIS in relation to information security management. The academic network Georgian Research and Educational Networking Association (GRENA) provided reliable, secure, and essential internet connectivity for higher education and research institutions across the country. GRENA claims downtime indicators of less than 10 minutes per year, signifying high availability and reliability of service.

Recommendations for Critical Internet Infrastructure

- 1. Policy engagement.** Facilitate a strategic discussion on cyber risks to internet infrastructure, engaging the main actors within the national system of cybersecurity governance, telecommunications sector, and the expert community.

2. **Public private partnerships.** Promote public sector and industry collaboration on critical internet infrastructure, through support to public events bringing together the key stakeholders in Georgia; industry-focused workshops on protecting critical internet infrastructure, including threat information sharing, emergency response coordination, and specific areas of expertise; and series of technical events – cyber exercises, hackathons – specifically devoted to the topic of securing critical internet infrastructure.
3. **Capacity building.** Assist the technical staff within the public sector agencies of importance for the critical infrastructure in obtaining, maintaining, and developing specialized cybersecurity credentials.
4. **Technical Assistance.** Provide independent technical and capacity needs assessments of the infrastructure at operators Caucasus Online, Magticom and Silknet; technical assistance to improving DNS infrastructure at Caucasus Online; jointly with the Georgian National Communications Commission (GNCC), facilitate discussions among the main network operators on setting up a functional IXP in Georgia; jointly with the Data Exchange Agency (DEA) and main operators, review the possibility of setting up a DDoS scrubbing center, providing Georgia with greater capacity to withstand large scale DDOS attacks.

Recommendations for Financial Sector

1. **Improving policy and regulatory response.** Jointly with the Nation Bank of Georgia (NBG) and DEA, support dialogue and strategic discussions on practical aspects.
 - a. Ensuring and enforcing compliance with the existing cybersecurity regulations for the financial institutions in Georgia.
 - b. Defining the critical infrastructure-focused legislation and regulations in terms of their applicability to the financial sector, as well as relationships and dependencies of the sector's cybersecurity objectives to risk factors within the

telecommunications, energy, and other relevant industries.

2. **Strengthening sectoral collaboration and coordination.** Engaging the NBG, DEA, Association of Banks, Georgian Information Security Association, and leading industry players deliver a small, targeted program with:
 - a. Support to multi-stakeholder, technical activities – workshops, sectoral readiness/blue team exercises – involving the BoG-CERT, TBC-CERT and public CERTs and engaging a wide group of institutions, including smaller banks, MFOs and financial service providers.
 - b. Co-sponsored series of roundtables, speaker series, hackathons, and other public events designed to elevate the profile of cybersecurity dimension at the sectoral level, develop sector-level solutions and attract young technical talent.
 - c. Capacity building activities designed to strengthen the information security expertise of participating banks, as well as local information security service providers with specific focus on such topics as core security certifications (e.g. CISSP, COMPTIA), malware analysis, digital forensics, and supply chain risks;
 - d. Integrate a financial sector dimension in the planned assistance from SEI Carnegie Mellon to the GOV CERT (National CSIRT) at DEA.
3. **Institutionalizing technical industry capabilities.**
 - a. Provide technical support to NBG's plan for setting up a formal threat information sharing and analysis center (which specifically leaves response and mitigation to DEA).
 - b. Alternatively, explore the creation of a technical platform or service for financial institutions allowing sectoral threat exchange facilitation, with an alert system, and anonymized submission option.
 - c. Explore the feasibility of supporting the Association of Banks in setting up a financial sector SOC/CERT for response and mitigation

to sector-wide incidents. A pre-requisite to this would be resolving the challenges of trust and confidentiality raised by some of the banks regarding such an initiative.

School) and Georgian Information Security Association.

Recommendations for Education Sector

1. **Review sectoral assistance from USAID.** Review the cybersecurity dimension and strengthen relevant components within the current and planned sectoral assistance from USAID. Emphasis should be made on activities introducing digital platforms and solutions, and/or digitizing existing processes and services within the educational sector.
2. **Technical assistance.**
 - a. Provide specialized cybersecurity training for EMIS, the National Assessment and Examinations Center (NAEC), and other education sector stakeholders covering such topics as key competencies required to identify, assess, and manage cyber risk, developing and implementing an effective information security strategy, and technical measures.
 - b. To help minimize potential disruption of the educational processes overseen by NAEC, consider direct support or advocacy resulting in upgrade of the outdated IT infrastructure at NAEC with an emphasis on cybersecurity.
 - c. Support independent information security audits, penetration testing and advisory services to key institutions.
3. **Sectoral awareness.** Promote greater awareness and recognition of cybersecurity requirements at Georgian higher education organizations through:
 - a. Jointly with the Ministry of Education, Science, Culture and Sport of Georgia engaging the public and private universities in a stakeholder discussion on cybersecurity risk and responses, and review of cybersecurity dimension in current institutional development strategies.
 - b. Sponsor university-led hackathons and cyber readiness exercises, jointly with GRENA, National Defense Academy (CyberGeorgia



31. Collaborative Health Platform (CHP)

December 2011

BACKGROUND

The rise of mobile health solutions in resource-constrained jurisdictions gave rise to the need for interoperability for both donors and implementers through a standards-based approach. The Collaborative Health Platform (CHP) was a partner-driven initiative to develop a cohesive mHealth/eHealth ecosystem that facilitated the delivery of healthcare in resource constrained environments. Figure 1¹ shows a diagram illustrating the concept of how a collaborative *virtuous circle* could be realized. The availability of mobile handsets in developing countries bundled with quickly maturing network capabilities gave rise to several mobile healthcare solutions that target development objectives.

IMPLEMENTATION

In 2011, with the support of USAID President’s Emergency Plan for AIDS Relief (USAID/PEPFAR) and in collaboration with the Mohawk College of Applied Arts and Technology, NetHope developed the CHP Design Specification & Analysis Report.² The report provided a series of guidelines, analyses, and specifications outlining how integrating open source solutions already deployed in these environments can be achieved. The report was updated in 2012 and 2013 to incorporate the FRED API Specification Document developed under NetHope’s Open Facility Registry Service Project (see Chapter 28 for more information).

The CHP Design Specification & Analysis Report provided:

1. An identification of “roles” that were required to exist within an interoperable system.
2. An analysis of several standards-based interfaces that were identified for communication with the integrated health platform.
3. An analysis of the capabilities of deployed systems with a list of integration issues and gaps that needed to be addressed.
4. A list of alternate open source technologies that also implemented each service role.
5. Sample messages for each of the standards-based interfaces identified.
6. Sequence diagrams of how messages and operations could flow between systems and service roles within the system.

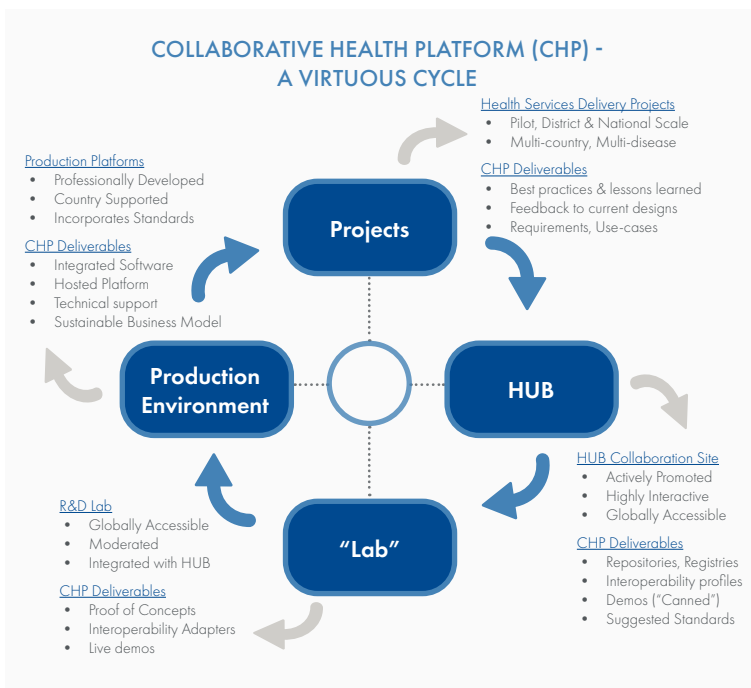


FIGURE 1: The CHP interoperability guidelines

¹ ecGroup Inc. (2011, November). *meHealth Framework for MNCH: A person-centric mHealth + eHealth Framework for Maternal, Newborn and Child Health*. Retrieved from Global Health Delivery Online Web site: https://www.gdonline.org/uploads/meHealth_Framework_for_MNCH_v0.9.pdf

² Fyfe, J. (2011). *Collaborative Health Platform: Design Specification & Analysis Report*. Washington, DC: NetHope.

VIII. PROGRAM SUMMARY

CAPACITY BUILDING





Another core tenet of the GBI program was that a more robust, wholistic broadband ecosystem required, not only technological innovation connectivity and applications realms, but also corresponding advancements in the knowledge and ability of the individuals and institutions that manage and drive these changes.

Given that, NetHope carried out several program activities that sought to empower key stakeholders, including regulators, policy makers, and users of broadband technologies. Sub-themes within this category included provision of support, guidance, and technology systems to national institutions seeking to more effectively manage their country's radio spectrum resources, webinars designed to familiarize donors and implementers with cutting-edge technologies with IT and broadband utilization implications, and active participation in public events and collaborative bodies that seek to identify new methods of sectoral cross-collaboration and explore new models of technology-enabled refugee assistance.

Finally, NetHope carried out a groundbreaking activity designed to bring 640,000 Kenyan and Nigerian women and girls online, laying the groundwork for major USAID gender and technology programming.



32. Afghanistan 4G Spectrum Licensing

August 2018 – October 2019

BACKGROUND

One of the fundamental prerequisites of mobile communications network is the availability of RF (radio frequency) spectrum. Management of those spectrum resources on a national level is the typical function of modern telecommunications regulatory authorities. In the spring 2018, nine years after the introduction of 4G mobile technology and at a time when nearly 2 billion people worldwide had access to 4G technology, the bulk of Afghan mobile users were still limited to 2G and 3G data services. This constraint persisted, even as several foundations for advancement were in place at the end-user level and inexpensive 4G-compatible handsets were widely available in Afghanistan, underpinning the potential for mobile broadband applications to grow exponentially among large swathes of the businesses, government, and consumer markets. Other preconditions were also in place – the government had initiated universal MNO (mobile network operator) licenses, established the Open Access Policy setting aside the government monopoly over optical fiber, and issued five national licenses for installation and operation of optical fiber networks. A rational basis for assigning 4G spectrum to commercial operators was the final remaining piece in this matrix of regulatory and market elements needed to make robust 4G technology available and commercially viable.

Building on the success achieved in the NetHope TDF modernization activity (outlined above), USAID and NetHope reached an agreement with ATRA (the Afghanistan Telecommunications Regulatory Authority) in July 2018 to take on the 4G activity, which had previously been advanced by a similarly-themed World Bank program. Upon initiation of the agreement,



ATRA established a very aggressive timeline of only six months (concluding in February 2019) to accomplish the assignment.

CAPACITY BUILDING

Working rapidly, NetHope finalized a scope of work, identified technical, legal, financial, and regulatory experts, established the list of major steps needed to complete the assignment, and developed a timeline designed to meet the February 2019 target. Due to the urgency expressed by ATRA, NetHope believed that key ATRA decisions would be reached rapidly and enable the activity to be concluded on schedule and within budget. Unfortunately, this intervention led mostly to a 12-month exercise in ATRA team building, extensive coaching, and search for consensus on key decisions needed for the assignment. At the end of this process, delays caused by ATRA inaction resulted in a need for further funding, which was denied due to a U.S. State Department decision to eliminate additional financial support needed to conclude the activity.

Challenges to project implementation arose quickly after the initial agreement, with ATRA unresponsive to questions for several weeks. As NetHope learned later, this silence came as a result of domestic unrest, political instability, and a resulting complete overhaul of the ATRA Board.

Once communication was re-established with ATRA, NetHope conducted a planning mission to Kabul during which ATRA leadership reiterated (despite the loss of time due to the multi-week hiatus) its commitment to the original February 2019 timeline. Fortunately, NetHope and the U.S. Department of Commerce's Commercial Law Development Program (CLDP) were able to convene a day-long meeting with the ATRA leadership in Paris during which NetHope and two *pro bono* spectrum auction experts identified the significant risks to a successful auction created by excess haste. This meeting was followed by a second NetHope planning mission to Kabul in December 2019 and a final planning session in January 2019, during which ATRA conceded the challenges of expedited assignment schedule and adopted a more realistic six-month timeline. Hence, with the February 2019 mission, serious work began, focused on the following steps:

1. Identifying the packages of spectrum in the 1800, 2100, and 2600 MHz bands to be made available for assignment, and the caps limiting the amount of spectrum any single MNO may acquire.
2. Examining the financial conditions of all the MNOs and calculating an auction Reserve Price (minimum acceptable price, regardless of the method of assignment).
3. Establishing the method of assignment (benchmarking vs. multiple types of auction) based on an in-depth review of Afghan law.
4. Establishing bidder's performance bond level and method; and,
5. Establishing bidder eligibility criteria.

Between February 2019 and April 2019, the NetHope team consulted with the MNOs individually and rolled

the results of steps 1-5 above into a draft policy paper. This was circulated to all the MNOs in late March 2019. NetHope responded to clarifying questions from the MNOs in April 2019, and MNO comments were received in May 2019. NetHope incorporated those comments into a revised policy paper and submitted it to ATRA.

By mid-March 2019, it was clear that the original tranche of program funding would not suffice, and USAID Kabul indicated that it would provide a 67% funding increment to carry the activity to conclusion. In April 2019, however, the U.S. State Department directed USAID to rescind the previously approved funding increment.

NetHope subsequently transitioned to close-down mode, all the while doing the most to preserve the fruits of the work already completed. By October 2019, NetHope delivered to ATRA all the documents necessary for a successful conclusion of the spectrum assignment process, contingent upon ATRA identifying the requisite funding for the remaining steps. NetHope also worked with the CLDP to structure a training and strategy seminar for ATRA staff, during which NetHope assisted the ATRA staff to identify a strategy for funding, contracting for inputs needed, and final decisions on the auction methodology to be executed. This event was successfully carried out in Dubai in October 2019.

The entire 4G Spectrum Assignment activity took place in the context of innumerable shifting variables, including a steadily worsening security environment and the attendant high security costs for in-country personnel, the sacking and reinstatement of the entire ATRA Board due to a domestic political attack, the run-up to the Afghan presidential elections, the inception of U.S./Taliban peace negotiations, the arrival of a potential new entrant into the MNO market, and the sudden resignation of the long-serving ATRA Chairman. In the face of these exogenous factors, NetHope was able to complete approximately 90% of the steps required to conclude the spectrum assignment process, leaving only the approval

and publishing of the policy paper, finalization of spectrum auction date, eligible bidder qualifications, and execution of the three-day auction event remaining.

LESSONS LEARNED

NetHope's capacity-building program provided ATRA with the tools needed to execute a spectrum auction that had the potential to both accelerate investment in and deployment of commercial wireless broadband networks and generate up to \$70 million in spectrum permit fees, which would have accrued to the Afghan national treasury. Even with the project's limited success, however, there were significant lessons learned. During periods of relative peace and stability, developing country telecom regulators are typically buffeted by a wide variety of disruptive forces – including the jostling of multiple, often-conflicted stakeholders, rapid changes in telecom technology, business models and user applications, and political intrigue. This project faced an extreme version of this dynamic in a delicate activity with profound, national and international political and economic implications. In that sense, the gains were a profound success in that they provided local stakeholders the tools needed to implement a critical phase in digital transformation. That success, however, was hard-fought and at times in serious doubt.

Among numerous lessons learned in the project's implementation is the importance of carefully balancing the development of planning and technical requirements of project success with stakeholder perspectives and capacities. NetHope found success in an approach that combined specialized expertise (legal, technical, financial, regulatory, and auction mechanics) coupled with an approach that emphasized putting the Afghans in the lead ("Learn-by-Doing"). This methodology produced positive outcomes in the near-term and will likely result in a more durable capacity at ATRA to lead a critical sector of the national economy.

The project underscored the notion that planning and budgetary contingencies *should* be allowed in

traditional post-conflict development work. Furthermore, in environments that have not yet fully emerged from conflict, those contingencies simply *must* be factored in. Finally, even with those contingencies properly factored in, tenacity, flexibility, and commitment to purpose – especially among members of the technical assistance team – is a critical success factor for such challenging assignments.



33. Liberia Spectrum Monitoring and Management

March 2017 – February 2019

BACKGROUND

An independent and competent telecom regulator is one of the most important stakeholders in any country's effort to achieve national access to and use of modern telecommunications services. A critical limitation identified in NetHope's post-Ebola crisis analysis of the Liberian telecommunications space (the Liberian Broadband Telecommunications Assessment) was that the Liberian government's telecommunications regulator, the Liberia Telecommunications Authority (LTA), lacked the technical ability to effectively monitor and manage the radio airwaves that carry mobile communications signals. This radio frequency (RF) spectrum is considered a national natural resource and is a critical element of all communications infrastructure.

One important function of any independent telecom sector regulator is to ensure that finite RF resources (spectrum) are appropriately allocated among network operators, businesses, and individuals and that the property rights of those operators are protected through effective management and the enforcement of rules related to usage. A weak RF regulatory and enforcement mechanism with no safeguards to limit such interference leads to poor, unstable wireless network quality. This can come from a variety of accidental sources, such as faulty or illegally operated radio equipment, and some purposeful sources, such as pirate radio or rogue operators. This creates second-order effects of constraining digital development through weakened enthusiasm for wireless network operator and investor investment in network expansion.

At the time of the Ebola crisis, the LTA had none of the technical tools and equipment needed to monitor

spectrum and to ensure that RF was being used appropriately in accordance with legal assignments. At USAID/Liberia's request, NetHope engaged the LTA to build spectrum monitoring (SM) capacity within its Engineering and Technology unit.

PROJECT IMPLEMENTATION

From 2017 to 2019, NetHope carried out a program of training and technical assistance designed to enhance the LTA's ability to more effectively manage the radio spectrum through more effective monitoring and administration techniques. The first phase of this activity provided the LTA with the minimum technical means to properly monitor RF spectrum. To develop appropriate system specifications, NetHope consulted experts at the U.S. Federal Communications Commission Enforcement Bureau (FCC/EB) for guidance and insight. The FCC/EB identified a number of important system characteristics, including:

- **Scalability** – the capacity to rapidly initiate RF monitoring and management activities targeted at high-priority dense urban areas such as Monrovia and allow it to build on this core system in a modular fashion as demands grow and resources become available in the future.
- **System flexibility** – the ability to rely on a combination of portable and stationary sensors and monitoring nodes that give the LTA the flexibility to deploy this more limited starter system to multiple areas as priority areas emerge.
- **Compatibility with LTA human resources** – as significantly automated systems tend to be much more costly, a more affordable and realistic

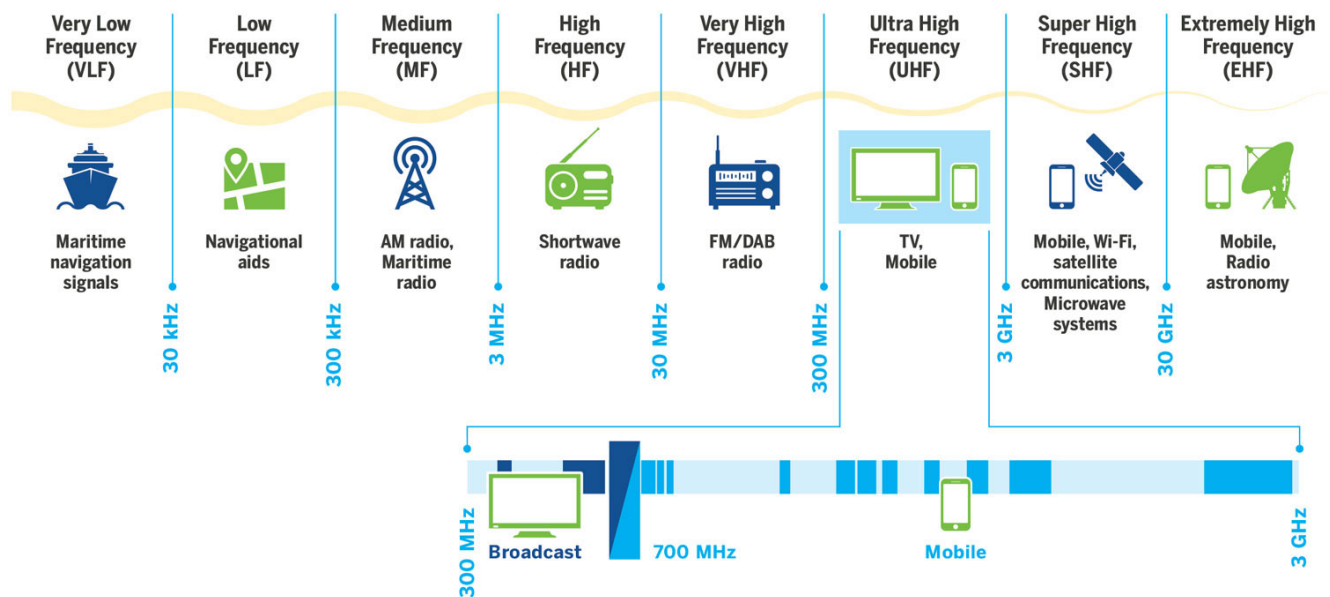


FIGURE 1. Source: CIMA

approach would leverage the relatively lower costs of LTA staff personnel to deploy and the monitor the system.

With these parameters in hand, NetHope began hands-on work with LTA to prepare LTA’s engineering and technical staff and systems for implementation. In parallel, NetHope carried out a comprehensive, competitive tender process that resulted in procurement of compatible spectrum monitoring software and hardware. In June 2017, a team from NetHope, LTA staff, and an engineering team from a systems vendor accepted delivery of system components at LTA headquarters in Monrovia and initiated deployment and user training.

Over ensuing months, NetHope conducted in-person and virtual training of LTA staff on the use and maintenance of the monitoring system. With this assistance, the LTA technical staff augmented the knowledge and hands-on proficiency and formed an in-house learning unit. Other milestones included:

- Updating of the National Frequency Allocation Table (NFAT).
- Implementation of the ITU’s SMS4DC spectrum

management database.

- Preparation of administrative forms and technical annexes for spectrum licensees.
- Implementing automated spectrum occupancy monitoring systems.
- Improved familiarity of RF monitoring techniques using a spectrum utilization database.

OUTCOMES AND IMPACT

NetHope’s support provided significant improvements in capacity of the LTA, especially within the Engineering and Technology department. In particular, the staff was guided in developing a simplified application form and process for radio spectrum usage, as well as presenting and explaining the form and process to applicants and the general public. When NetHope ended its engagement in early 2019, LTA staff had demonstrated competence in planning and conducting remote measurement campaigns designed to identify and locate unwanted radio signal sources.

This Liberia spectrum initiative provided critical tools much needed to improve Liberia’s national broadband and ICT capacity in several ways – as a priority response tool to mitigate future health crises (such as the Ebola crisis), as

an engine powering regional and national economic development, and as a tool for improving government performance, effectiveness, and accountability. The initiative provided the tools and many of the frameworks that will help LTA to meet the growing regulatory demands of the future.

That said, the activity foregrounded several challenges that stem from the natural complexities of integrating sophisticated technical systems in regulatory agencies with limited (if emerging) capacity. Some of these challenges included:

- **Data Flows** – During implementation, it became clearer that processes related to the flow of newly generated spectrum monitoring data across the LTA’s varied operational units required updating and revision. Along these lines, it became apparent that the LTA’s physical data infrastructure (e.g., servers, networks) required upgrades to support data collection, storage, and exchange, as well as enable up-to-date methods of sharing monitoring results.
- **Technical Expertise** – State-of-the art spectrum monitoring equipment relies on high-performance components and is comprised of extremely sensitive, high-performance electronic systems. Especially in the early stages of implementation, staff capacity for troubleshooting and management, combined with operational issues related to system component design themselves, required significant attention and time.
- **Staff Capacity** – As training interactions proceeded, the implications of relatively low and somewhat varied levels of baseline technical and administrative capacity at LTA became more apparent. While approaches to capacity building were adjusted in the course of implementation, it is likely that they slowed and limited the scope of the initial system integration into existing monitoring and enforcement mechanisms.
- **Maintaining Commitment** – Staff and leadership changes highlighted the importance of maintaining



Core hardware components of LTA's spectrum monitoring

appropriate stakeholder buy-in to maintain appropriate focus and continuity.

Finally, as the engagement drew to a close, USAID/ Liberia, NetHope, and the LTA collaborated to outline a series of follow-on activities designed to build on work to date. These activities included:

- Development of “Dig Once” Broadband Deployment Guidelines to modernize regulations governing deployment of fiber optic cables to encourage coordinated infrastructure deployment across multiple sectors.
- Development of policies that would support regulatory standards for lower-cost wireless network deployment, including TV White Space/Dynamic Spectrum Policy, to help improve economics for rural broadband networks.
- Enhancing the LTA’s role in transitioning the Liberian Internet Exchange Point (LIXP) to an independent and sustainable management entity. This activity would help drive network efficiencies and lower costs for Liberia’s digital connectivity ecosystem.



34. AI/Machine Learning Webinars

May 2020 – June 2020

BACKGROUND

As part of its Emerging Projects efforts, NetHope hosted six webinars focused on the ethical use of artificial intelligence (AI) and machine learning (ML) over the internet. Three sessions were delivered as part of the inaugural Global Digital Development Forum co-sponsored by USAID in May 2020, during which 260+ stakeholders from around the world participated. Three other follow-up sessions were held in June 2020. The webinars covered diverse topics, including how to get started with AI, how to address needs using AI-enabled

chatbots, and how to achieve inclusive and trustworthy digital identification adoption (see graphic). These webinars were followed by the first of three sessions addressing AI ethics, responsible innovation, and potential risks and ethical considerations within the international development context. The second and third installments were completed scheduled in June and addressed use cases of various AI capabilities, including values and ethical considerations.

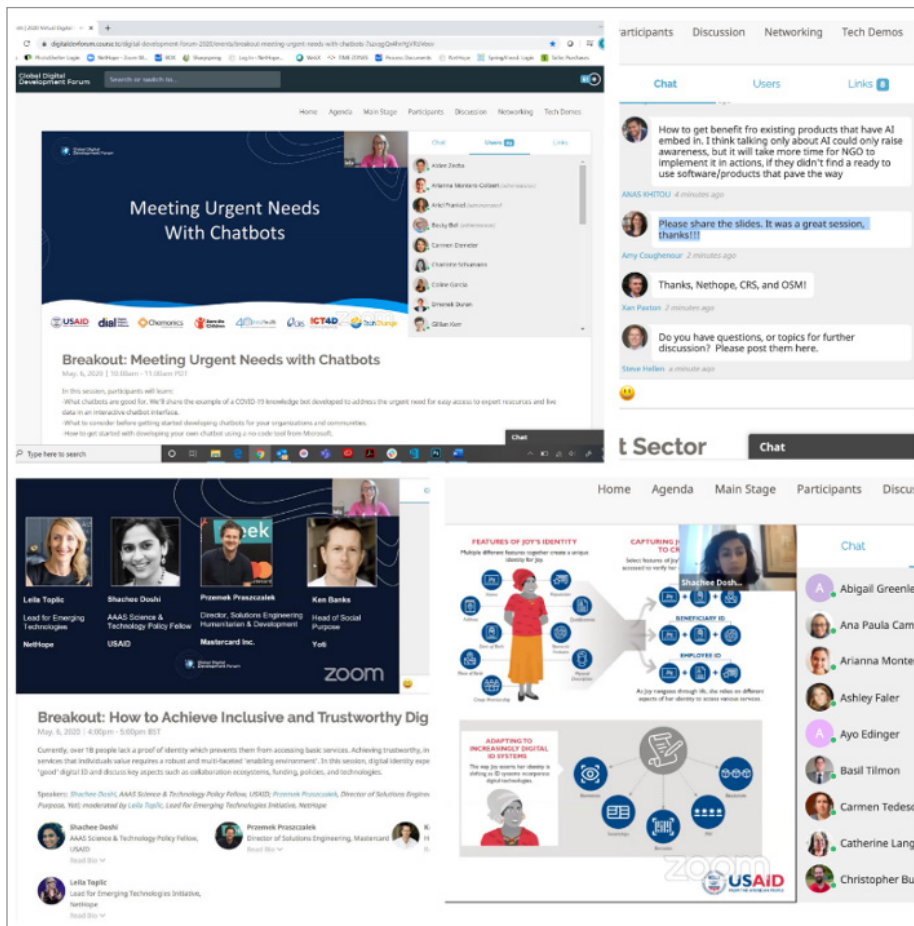


FIGURE 1: Screenshot of Ethical AI/Machine Learning Webinar

WHAT'S NEXT: Technologies Transforming Program Delivery

By Leila Toplic, Emerging Technologies Initiative Lead, NetHope

INTRODUCTION

In April 2020, USAID announced an agency-wide digital strategy.¹ The strategy cited the use of emerging technologies, such as artificial intelligence (AI) and machine learning (ML), in “aiding in the formulation of strategies and the design and implementation of projects and activities.” In order to create technology solutions that are ethical, sustainable, and inclusive, the nonprofit sector needs to be aware of the various technologies that are available to them and get involved in the design and implementation of emerging technologies.

This chapter aims to be a resource for USAID Missions, operating units, and implementing partners to:

- Understand where the opportunities and barriers exist with regards to some of the most relevant emerging technologies in the international development sector.
- Guide future investments and support for responsible and sustainable adoption of emerging technologies in the international development sector.
- Help implementing partners become better informed about emerging technologies, their opportunities, barriers, and resources.
- Foster learning, sharing, and collaboration between those who are already using emerging technologies in international development programs and those who are just getting started.

While this chapter will address several emerging technologies, it will focus mostly on AI/ML for four key reasons – (1) Out of all emerging technologies that are covered in this section, AI/ML is by far the most widely applicable and relevant for the sector. (2) There have been significant technological advancements in AI/ML in the past few years, both in terms of innovation in capabilities and *accessibility* in the form of new low-code and no-code tools. (3) There has been a steady increase in the investment in adoption of AI/ML in the sector, with the resources provided in the form of capacity building, grants, technical expertise, and product. (4) For AI/ML to benefit all, nonprofits need to get more involved in the design and use of it.

On the other hand, some of the other emerging technologies have been less impactful due to several barriers, including limited application in the sector, lack of capacity and expertise, limited investment and resources, and policy and regulation. We hope that this chapter will inspire future investment in the sector and collaborations that are guided by the potential, lessons learned, and key considerations of these technologies to advance nonprofit missions, especially considerations related to the ethical and responsible design and use.

¹ United States Agency for International Development. (2020, June 24). *Digital Strategy 2020-2024*. Retrieved from https://www.usaid.gov/sites/default/files/documents/15396/USAID_Digital_Strategy.pdf.

ARTIFICIAL INTELLIGENCE/MACHINE LEARNING (AI/ML)

AI/ML is among the technologies that have the potential to have a transformative impact on our ability to solve some of the toughest global challenges, such as refugee crises, poverty, and infectious disease outbreaks. By 2030,² AI/ML will add \$15.7 trillion to the global gross domestic product (GDP), with \$6.6 trillion projected from increased productivity and \$9.1 trillion from consumption effects. Much of that is expected to be concentrated in the Global North and private, for-profit sector. According to PricewaterhouseCoopers, almost 70% of the global economic impact from AI/ML will accrue in China and North America.³ As advancements in AI/ML accelerate and AI/ML gets embedded all around us, those working in the international development sector have a responsibility to the people and communities they support to apply all available tools in a meaningful, responsible, and sustainable way.

What benefits does AI/ML offer the sector?

Much has been written about the benefits of AI/ML. What we know from early practical implementations of AI/ML in the international development sector is that there is a whole set of problems across humanitarian, development, and conservancy sectors that AI/ML could help solve.

AI/ML systems, with their capacity to learn, predict, and in some instances, make decisions based on those predictions, can help international development organizations:

- Reach more people with services and information they need, such as education, legal, and health services.
- Make decisions and act faster in emergencies through real-time situational awareness.

- Predict problems before they spread or escalate (e.g., infectious disease, famines) through early detection and warning.
- Prevent loss of life (e.g., poaching of wildlife, earthquakes) and loss of resources.
- Get the most value out of a growing dataset while freeing up limited human resources to focus on other high-priority work.
- Improve outcomes through real-time feedback on the effectiveness of programs and policy actions and recommendations for improvements.

What are some viable use cases?

We are still in the early days of applying AI/ML in the nonprofit sector. Many of the AI/ML initiatives are in the exploration or piloting stage and are not yet delivering significant benefits on a sustained basis. Furthermore, they are mostly focused on improving existing programs and processes rather than creating solutions that would not be possible without AI/ML. While the most promising applications of AI/ML in international development are still to come, the sector is taking the first step by exploring a whole range of programs and experimenting with different AI/ML capabilities. Some examples of early practical implementations include:



Catholic Relief Services (CRS)

is using AI/ML to gain a better understanding of resilience in rural areas in Malawi and improve CRS' resilience programming in Malawi. The Measurement Indicators for Resilience Analysis (MIRA)⁴ is a resilience measurement protocol that uses two machine learning algorithms, K-Nearest Neighbor (KNN) and the Least Absolute Shrinkage and Selection Operator (LASSO), that rely on data about shocks (e.g., natural disasters, crop destruction due to crop pests), household characteristics, and food security to predict household vulnerability.

² PwC. (2017). *Sizing the Prize: What's the real value of AI for your business and how can you capitalise?* Retrieved from PwC Web site: <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>

³ Ibid.

⁴ Knippenberg, E. (2017). *Measurement Indicators for Resilience Analysis, Phase II (MIRA II): Final Report*. Baltimore: Catholic Relief Services.



Plan International's Training and Employment Support Services Assistant (TESSA) chatbot helps

marginalized youth in the Philippines articulate their skills, create a full competency profile, and find work and training opportunities where they live.



Norwegian Refugee Council's chatbot assists Venezuelan migrants in Colombia with learning their rights according to current immigration policies and laws.



The Carter Center is currently using AI/ML to get more accurate and timely analysis of the Syrian conflict.



The Nature Conservancy's

Mapping Ocean Wealth

(MOW)⁵ is a global initiative to

map coastal and ocean ecosystem services and the benefits nature provides to people. AI/ML techniques in image recognition, such as Deep Learning, were used to classify geo-tagged photos from Flickr combined with global data provided by the tourism industry to map tourism benefits provided by coral reefs in the Caribbean region. The Nature Conservancy developed MOW in partnership with the University of California Santa Cruz (UCSC) and Critigen.



Danish Refugee Council is using AI/ML to forecast forced displacement in places like Burkina Faso, Mali, Niger, and Nigeria in West Africa. The

Foresight tool uses open data, such as historical displacement, economy, conflict level, climate,

governance, and food security, from sources including UNHCR, the World Bank, and NGOs to predict forced displacement in each country.



Compassion International is using AI/ML to track the progress and effectiveness of their anti-

poverty programs and interventions. Compassion is using algorithms to identify features in the satellite imagery that are indicative of economic activity. This method of poverty estimation and mapping has the potential to be faster than traditional household surveys, lower-cost, and offer higher scalability. The solution is currently being implemented in the Amazon Web Services' (AWS) SageMaker environment and tested in South America.

Other examples include:

- The United Nations (UN) is using natural language processing to analyze radio content⁶ in Uganda and gain insight into public opinion and the effectiveness of UN programs.
- mCrops⁷ is using image processing tools to help farmers in Uganda diagnose crop disease.
- Geekie⁸ is using AI/ML to provide tailored virtual tutoring to students in Brazil.
- Kudi.ai⁹ is a chatbot that enables people to make payments and send money via messaging.
- Aerobotics¹⁰ uses drones and satellite images to help farmers optimize crop yields in Malawi, Zimbabwe, and Mozambique.

⁵ Available at <https://maps.oceanwealth.org>

⁶ Pulse Lab Kampala. (2017, September 11). *Using machine learning to accelerate sustainable development solutions in Uganda*. Retrieved from United Nations Global Pulse Web site: <https://www.unglobalpulse.org/2017/09/using-machine-learning-to-accelerate-sustainable-development-solutions-in-uganda-2>

⁷ Additional information at <http://air.ug/mcrops>

⁸ Additional information at <https://www.geekie.com.br>

⁹ Additional information at <https://kudi.com>

¹⁰ Additional information at <https://www.aerobotics.com/?identifier=default-sign-up-button>



What are the barriers to AI/ML adoption?

AI-for-development shares the same barriers and challenges as other technologies for development. They include challenges related to data, sustainability, inclusion, funding, and oversight. However, the barriers to adopting AI/ML remain higher in comparison to other technologies, such as mobile applications, due to the lack of awareness of the technology, lack of relevant technical expertise in the sector, and the fast pace of change. So, it is not a surprise that many in the sector, such as NetHope’s NGO members, are not quite sure where or how to get started with AI/ML or how it may apply to their programs and organizations. Barriers to overcome include:

Awareness and Representativeness – So far, the benefits of AI/ML have been reaped mostly by those who have the technical expertise and the resources, including data and infrastructure (cloud), to design, implement, and sustain AI/ML projects. As a result, wealthier nations and companies have been driving the implementation of AI/ML and the evolution of the technology. The nonprofit sector has struggled with both awareness of AI/ML (including benefits, use cases, and risks) and having a voice in how the technology is developed and used. Nonprofit organizations are

slowly starting to shift their mindset from “*It’s too soon*” to “*We need to get started now*” to ensure that AI/ML is designed and deployed deliberately to reach and benefit all.

Expertise, Resources, and Tools – AI/ML projects are complex, and most nonprofits lack the capacity and expertise to successfully implement AI/ML projects. There is also a gap in resources, including finding donors who wants to spend money on new, potentially risky solutions and pilots; finding technical experts to help with initial model development; and AI/ML tools and services that do not require specialized expertise. On this last point, the use of AI/ML in international development is likely to become more prevalent now that Microsoft, Google, AWS, and Salesforce have started introducing no-code and low-code tools, such as Microsoft’s Power Virtual Agents and Google’s AutoML Tables tools.

Data – Data are a crucial component of any AI/ML solution. ML algorithms learn from data, so it is important to have enough high-quality data for the problem that you want to solve. According to *The Economist*, data issues are one of the most common barriers to AI/ML adoption across all sectors.¹¹ Issues range from the lack of required data representative of the target audience, problem statement, and context to manual data collection, preparation, and analysis, taking over 90% of a project’s time. Many are using few broadly available data sources, such as satellite imagery, mobile phone data, and survey data. Additionally, it is necessary to address concerns over privacy and the protection of sensitive data (particularly in cases of healthcare and refugees).

Sustainability – Many of the early practical implementations have come from cross-sector collaborations, NGOs working together with technology companies and/or academic institutions who have AI/

¹¹ The Economist. (2020, June 11). *For AI, data are harder to come by than you think*. Retrieved from The Economist Web site: <https://www.economist.com/technology-quarterly/2020/06/11/for-ai-data-are-harder-to-come-by-than-you-think>

ML technical expertise and can help with the initial model development. Transitioning from a pilot phase, where the model is developed by a partner outside of the sector, to scaling and sustaining, where NGOs own re-training of the model and refreshing the data, can be challenging and require new resources and processes.

Ethics – The challenge facing the nonprofit sector today is how to maximize the positive benefits of AI/ML while preserving human rights and privacy and protecting the people they serve from any negative impact. While AI/ML promises many of the benefits outlined above, it will only be as impactful and sustainable as designed and implemented. Nonprofits need to develop the capacity to evaluate AI/ML solutions for ethical risks and know how to address them proactively by operationalizing ethical values and principles, such as fairness, across all touchpoints (including people, process, and technology). Gartner predicts that through 2022, 85% of AI/ML projects will deliver erroneous outcomes due to bias in data, algorithms, or the teams responsible for managing them.¹²

What is the way forward?

NetHope believes that nonprofits have an obligation to understand the best uses of powerful technologies, such as AI/ML, and the possible implications of their use. The time for learning and incorporating AI/ML into our work is now. To make that possible, our way forward needs to include:

- Growing capacity in the sector through workshops, trainings, sharing of use cases and lessons learned, and project-based knowledge transfer.
- Advocating private sector, bilateral, and multilateral donors to financially support smart and emerging applications for AI/ML in their implementing partners' work. This could include a combination

of grants, technology expert support, and product donations.

- Exploring suitability of AI/ML for specific problems and contexts.
- Being intentional about responsible, ethical design, and use of AI/ML.
- Evaluating and deploying AI/ML deliberately to ensure that it reaches and benefits all.
- Democratizing access to AI/ML expertise by working with experts in the private and academic sectors to transfer knowledge via specific projects or general training.
- Sharing and learning from each other and reusing and scaling what works.

Since 2018, NetHope has been focusing on building the capacity in the nonprofit sector to design and use AI/ML responsibly and ethically. This has been advanced through workshops and webinars, project-based collaborations with experts from the private sector and academia, and toolkits such as the *AI Suitability Toolkit for Nonprofits*¹³ that was developed with the support of USAID and published in April 2020. All resources are being shared broadly through the NetHope Solutions Center¹⁴ with the goal of benefiting and lifting the entire sector.

BLOCKCHAIN

While the potential of blockchain/Distributed Ledger Technology (DLT) to transform existing processes and programs is significant, it is still early days for blockchain in the nonprofit sector. Some in the sector would argue that the technology has been overhyped and has underdelivered on its promise, with many practical implementations in pilot stage not able to demonstrate proven social impact. Nonprofit organizations are struggling to clearly identify applications for blockchain/

¹² Gartner. (2018, February 13). *Gartner Says Nearly Half of CIOs Are Planning to Deploy Artificial Intelligence*. Retrieved from Gartner Newsroom: <https://www.gartner.com/en/newsroom/press-releases/2018-02-13-gartner-says-nearly-half-of-cios-are-planning-to-deploy-artificial-intelligence>

¹³ The toolkit is available electronically at <https://solutionscenter.nethope.org/artificial-intelligence-suitability-toolkit>.

¹⁴ Additional resources on Emerging Technologies are available at <https://solutionscenter.nethope.org/resources/initiatives/emerging-technologies>.

DLT and find blockchain difficult to implement due to several barriers described below.

What benefits does blockchain offer the sector?

Some of the most compelling benefits of blockchain/ DLT include transparency, increased efficiency, reduction in costs, auditability, and reduction in risks of data falsification and user-centricity (i.e. allowing individual users to access, track, and share their data).

What are some viable use cases?

To understand the ways in which blockchain can most effectively be used for social impact, we need to look at some of the early use cases, including cryptophilanthropy, asset donations, storing and verifying records such as educational certificates, payments and money transfers without relying on many intermediaries in the financial system, provenance and supply chain management documenting relevant supply chain information (entities, locations), and smart contracting for automating processes (facilitating transactions between entities).



Heifer International¹⁵ has been piloting and utilizing blockchain for food supply chain tracking, land title registration, donation tracking and financial inclusion across multiple projects and geographies (e.g., Guatemala, USA, Honduras, and Malawi).



Oxfam's Project Unblocked Cash¹⁶ is an Ethereum-based cash and voucher assistance solution developed in partnership with Sempo and ConsenSys to enable rapid, efficient, and transparent financial aid for disaster relief.



World Wildlife Fund's blockchain solution¹⁷ was developed in partnership with ConsenSys, Sea Quest, and TraSeable to address the problem of illegal fishing and human rights abuses in the Pacific Islands' tuna industry. Consumers can scan tuna packaging using a mobile application to learn where and when the fish was caught, by which vessel, and by which fishing method.

What are the barriers to blockchain adoption?

Some of the barriers include awareness and technical expertise, resources to get started and build a solution, end-user digital literacy, connectivity and hardware, fragmentation due to proprietary systems, and a mismatch between regulations and platform. On the latter point, regulations are bordered but the technology is not. This means that regulations apply to the organization but not to the platform, and NGOs are not taking any regulatory responsibility.

VIRTUAL REALITY

Virtual Reality (VR), Augmented Reality (AR), and Extended Reality (XR) can be valuable tools for training, coaching, and support in several humanitarian contexts, such as complex emergency response situations. While the use of these technologies is not widespread, their ability to simulate realistic environments and help end-users learn and generate empathy through immersion in those environments has the potential to augment existing programming and deliver unique value in a few areas.

What benefits do VR/AR/XR offer the sector?

These technologies can provide rich, immersive, and interactive user experiences that can augment and enhance existing programming, such as education

¹⁵ Additional information at <https://www.heifer.org/campaign/2019/blockchain-initiatives.html>.

¹⁶ ConsenSys. (n.d.). *Project Unblocked Cash: Revolutionising Humanitarian Cash Transfers in Vanuatu*. Retrieved from ConsenSys Solutions Report: <https://cdn2.hubspot.net/hubfs/4795067/Project%20Unblocked%20Cash%20/Project-Unblocked-Cash-ConsenSys.pdf>

¹⁷ Additional information at https://www.wwf.org.nz/what_we_do/marine/blockchain_tuna_project.

¹⁸ Additional information at <https://www.virtualrealitymarketing.com/case-studies/the-nature-conservancy-vr-platform>.

¹⁹ Mercy Corps. (2020, May 28). *Field testing virtual reality mindfulness and relaxation therapy*. Retrieved from Mercy Corps Web site: <https://www.mercycorps.org/blog/field-testing-vr-therapy>

and training, planning of humanitarian response, and psychosocial support.

What are some viable use cases?

Based on early practical implementations in the sector, some viable use cases include crisis-immersion staff training, which enables humanitarian staff to develop their emergency-response skills in a *realistic* environment, beneficiary training (e.g., The Nature Conservancy is using VR to help farmers in Guatemala¹⁸ learn to create irrigation systems for their crops), psychosocial support and therapy for affected individuals (e.g., Mercy Corps' mindfulness and relaxation therapy program for youth in Iraq¹⁹), and empathy building which may be linked to fundraising for affected populations (e.g., World Vision is raising awareness of refugee life through immersive VR and AR experiences²⁰).

What are the barriers to VR/AR/XR adoption?

Three of the biggest barriers are cost of headsets, protecting hardware, and content creation and usability, especially for VR that requires proprietary and often cumbersome hardware.

3D PRINTING

One of the major challenges of humanitarian aid is establishing efficient supply chains in times of disaster, which reduces the wait time for critical supplies. 3D printing promises to be a more efficient, cheaper, and sustainable way of delivering some of the items and objects when and where they are needed most rather than relying on traditional supply chains.

What benefits does 3D printing offer the sector?

3D technology offers a cheaper and faster alternative to getting goods on the ground (e.g., personal protective equipment/PPE and prosthetics).



Photo credit: Mercy Corps

What are some viable use cases?

Examples of 3D printing applications in the international development sector include Printing PPE in Tunisia (Mercy Corps) or Nepal (FieldReady), printing prosthetics in Za'atari camp in Jordan (Mercy Corps), and printing Wi-Fi equipment in Puerto Rico.

What are the barriers to 3D printing adoption?

Barriers to broader adoption of 3D printing are the cost of the 3D printing technology, supply chains for filament, and capacity (ability to use 3D modeling software and printer).

BIOMETRICS

Biometrics measure and analyze people's unique physical and behavioral characteristics. Examples of biometrics include an individual's DNA, fingerprints, eyeballs/irises/retinas, voiceprints, handprints, and facial geometry. Some biometrics, like fingerprints and retinal blood vessel patterns, generally do not change over time. Others, like facial geometry, can change over time due to age, illness, or other factors, and thus may adversely impact the accuracy of the biometrics. The

²¹ Wadhvani, P., & Gankar, S. (2017, August). *Biometrics Market Size By Application (Banking & Finance, Consumer Electronics, Defense Services, Government, Transportation, Healthcare), By Product (AFIS, Non-AFIS, Hand Geometry, Signature, Voice, Iris, Face), Industry Analysis Report, Regional Outlook*. Retrieved from Global Market Insights: <https://www.gminsights.com/industry-analysis/biometrics-market>

uniqueness and potential permanence of biometrics are advantageous from a security perspective to accurately identify and distinguish individuals. Users do not have to worry about forgetting their biometric password.

In the humanitarian sector, the use of biometrics has been driven mainly by the need for fraud prevention, ensuring that aid reaches its intended destination, and increasing the speed and reach humanitarian assistance delivery, especially for 1.1 billion people around the world who lack formal identification. While biometrics can help demonstrate the effectiveness of humanitarian interventions and reach more people with the support and services they need, some in the sector remain skeptical about the use of biometrics in the humanitarian sector due to a number of barriers and risks, many of which are listed below.

Globally, the biometric market is expected to top \$50 billion by 2024, according to Global Markets Insights,²¹ due to several growth drivers including rapid technological improvements, rising security concerns, increasing demand from government sector. Technological innovation will continue to expand biometric techniques beyond what we already know (fingerprints, face recognition, iris, palm, and DNA-based recognition) to include ear shape, facial thermography, and other techniques that are currently in the research stage. We can also expect to see more solutions enabling multi-biometric identification, which uses several biometric features in combination, such as fingerprints, face, and iris, for security and accuracy purposes.

Other key topics expected to dominate the discussion around biometrics in 2021 include regulation of the use of facial recognition, activism exerting pressure on regulators for protection and transparency, impact of piecemeal regulation on innovation and global initiatives, and responsible innovation and ethics of biometrics technologies.

What benefits do biometrics offer the sector?

Key benefits of biometric technology are security, accuracy (data veracity), and convenience and speed for the end-user.

What are some viable use cases?

The ability to identify and authenticate a person based on a set of recognizable and verifiable biometrics data has led to a variety of use cases in the humanitarian sector and beyond, including aid delivery, financial inclusion, health, travel, education, and voting. In 2015, the United Nations High Commissioner for Refugees (UNHCR) began rolling out its global Biometric Identity Management System (BIMS). BIMS captures biometric information from refugees in order to authenticate their identity. This authenticated identity in turn gives the refugee access to aid, such as food parcels and various services, including legal aid and case tracking. Mercy Corps has also used a biometric-based registration solution developed by Simprints in their humanitarian response interventions that involve distributing cash or vouchers to vulnerable individuals and communities.

What are the barriers to biometrics adoption?

As with other emerging technologies, biometrics share similar barriers to adoption regarding awareness and capacity of implementing organizations. The following outlines significant challenges in security and protection of those whom biometrics aims to serve.

Security and privacy concerns. Collection of biometric data from vulnerable populations has raised concerns about the potential for mass surveillance. Privacy activists have criticized the UNHCR for fingerprinting refugees who enter the Democratic Republic of Congo – a practice that, they say, increases the risk of surveillance, discrimination, and exploitation. Importantly, organizations and agencies collecting and storing biometric data face increased risk and become targets for hackers and other bad actors.

²² Tewary, A. (2018, June 9). *Jharkhand, where not having Aadhaar could starve you to death*. Retrieved from The Hindu: <https://www.thehindu.com/news/national/other-states/jharkhand-where-not-having-aadhaar-could-starve-you-to-death/article24123423.ece>

Reliability of biometric based identification. In India, around half-a-dozen people have allegedly died of starvation in Jharkhand in the last six months.²² Most of them were reportedly denied rations from the Public Distribution System shops for failing to have Aadhaar-based biometric authentication. They were unable to procure food after the Aadhaar-enabled point of sales machine could not authenticate their biometrics.

Concerns about abuse of biometric data. A primary concern about the use of biometrics is the infringement on rights and values through surveillance or reuse without consent. Several events around the world have brought about this concern. In China, the government is using sophisticated facial recognition tools from thousands of cameras to track and carry out mass surveillance on Uighurs, the Muslim minority in the country, under the guise of re-education against extremist thought. In 2017, China carried out a mass biometric data collection of Uighurs through compulsory medical check-ups, where they collected blood samples, face scans, voice samples, and iris scans. Xinjiang province has become the laboratory of Chinese surveillance, with certain aspects of surveillance methodology slowly propagating to other parts of China. According to Comparitech's report, eight out of the top 10 most-surveilled cities are in China and, by 2022, China is projected to have one public closed-circuit television camera for every two people. On the global level, China had shown signs of wanting to spread their methodologies of mass surveillance to other parts of the world as early as the 2008 Olympics when they invited various state officials from Angola, Ecuador, and Venezuela to see their state of the art surveillance system that was allegedly set up for safety reasons.

During the 2019 anti-Citizenship Amendment Act protests in India, police recorded footage of protesters across various parts of the country, raising questions about how this data was being collected, stored, and used. In a viral video, a policeman was seen taking photographs of women at a bus stop in the area, but the women were not even at the protest. No consent was taken by the police to record those women.

In 2019, during the months-long pro-democracy demonstrations, authorities in Hong Kong used facial recognition and biometric data to identify protesters. Demonstrators responded by wearing masks. Authorities in turn enacted an emergency law to ban face masks and arrested numerous demonstrators for violating the mask ban. Under Hong Kong's privacy laws, members of the public must be informed if they are subject to surveillance, but police can claim an exemption if the data is used to prevent crime.

Regulations. Currently, there is no common legal framework for biometric personal data at the global level. The General Data Protection Regulation (GDPR) established by the European Union, is the only uniform law for the protection of biometric data at the regional level. Under the GDPR, biometrics is considered a *special category of personal data* that requires both a special legal basis for processing and an accompanying data protection impact assessment. Going forward, it will be important to pay attention to the laws that focus specifically on regulating processing of biometric data, including collection, use, storage, and sharing.

THE INTERNET OF THINGS (IOT)

The Internet of Things (IoT) has the potential to improve the lives of individuals and communities around the world through an ecosystem of devices that can capture and communicate data automatically and constantly and contribute to better outcomes in health, agriculture, conservation, water, and sanitation. We are in the early stages of IoT adoption, with several promising applications and a whole set of challenges that need to be addressed.

What benefits does IoT offer the sector?

Improved efficiency and effectiveness of initiatives through IoT's ability to monitor situations, learn, and respond in real time.

What are some viable use cases?

Use cases include monitoring vaccines through the use of internet protocol (IP) connected thermometers, such

as moisture sensors in agricultural fields that alert farmers to the exact needs of food crops and acoustic sensors in rainforests that help curb illegal logging.

What are the barriers to IoT adoption?

Network deployment, power requirements, reliability, and durability of sensors, interoperability, policy and regulations, and getting the most out of IoT in an ethical and responsible way (e.g., adding AI/ML to IoT devices so that they can analyze data that those devices capture and make decisions and act on that data automatically).

CONCLUSION

The future of international development will most definitely leverage several of these emerging technologies. Some may show early promise but ultimately not delivering what the sector needs, while others may take a while to reach their full potential but ultimately transform the sector completely. No doubt, there are technologies unknown to us today that may have huge, positive impacts on international development in the future. Only time will tell.



35. Women & the Web Alliance

January 2014 — March 2017

BACKGROUND

In 2013, Intel Corporation released what was then the groundbreaking *Women and the Web* Report with UN Women and U.S. Department of State, authored by some of the most respected gender, development, and technology researchers. The gender digital divide was not a new issue, but the report moved the topic from the research community, which had been writing about it in earnest for a decade and a half, to mainstream discussions. A year later, Intel, USAID, and NetHope launched a public-private partnership, called the Women and the Web Alliance at the First Ladies Forum during the U.S./Africa Leaders' Summit at the White House with partners World Vision, World Pulse, Women in Technology in Nigeria (WITIN), and UN Women.

The Alliance shared the goal of making the internet more relevant and engaging for girls and women through four major initiatives highlighted in the Intel report – boosting digital literacy, producing and accessing relevant content, supporting economic empowerment, and connecting women to social networks to help them build community online and mobilize around issues they deemed important. The Alliance focused on Kenya and Nigeria, given the population and regional influence of these countries. At project launch, the internet penetration in sub-Saharan Africa was 12%, with a significant gender gap of 30% in urban communities and closer to 95% in rural areas.

PROJECT IMPLEMENTATION

Given the size of these markets, the Alliance aimed to leverage their respective networks and resources of partners and reach 640,000 15- to 25-year-old Kenyan and Nigerian women and girls. The program began in earnest in winter 2014 and ended three years later.

WOMEN AND THE WEB ALLIANCE

The four major program goals as stated above were to offer the following skills and opportunities to the Alliance participants: digital literacy, relevant content, economic empowerment, and accessing online social networks to improve women's lives and livelihoods. These goals were accomplished through the Intel *She Will Connect* curriculum, which eventually became the Women and the Web Alliance curriculum. Intel updated the curriculum to include culturally inclusive and appropriate examples, as well as links to the women's empowerment website, World Pulse. USAID funding went to support both major enhancements, created by Intel and World Pulse. World Vision included discussions and applications to its microcredit program, VisionFund, in the Kenya trainings.

During site visits and post-program interviews, participants relayed that all four goals had been accomplished through their trainings. There were several examples of successful outcomes, such as women starting ICT-focused businesses, seeking further education, becoming Woman and the Web Alliance trainers, and getting microloans for projects that they conceptualized as part of the trainings.

In Nigeria, trainings were held at several Women's Development Centers across the country. These were municipally funded vocational training centers for unemployed women. WITIN, the Nigerian partner, had contacts with local and regional governments, which



Participants in the training held at a Women's Development Center in Nigeria.

allowed for the use of computer labs already in the centers. Women were not recruited for these trainings, but the Women and the Web program was part of the year-long curriculum that these women attended. Other activities in the year-long curriculum included English instruction, haberdashery, sewing, baking, and hair design.

In Kenya, World Vision chose Matete and Transmara, as these were regions with computer labs left over from a previous initiative, Spark a Child's Digital Future, also sponsored by Intel. Transmara, as a training region, had to be abandoned, as NetHope was unable to get internet connectivity to the schools in a timely or cost-conscious manner. Five thousand people were supposed to be trained in Transmara. In Matete, 18 high school computer labs served as meeting places for trainings. Of those, two were unable to provide electricity or internet and had to be removed from the original list.

RESULTS AND FINDINGS

The Alliance aimed to bring 600,000 Kenyan and Nigerian women and girls online using the Intel *She Will*

Connect curriculum and the World Pulse online platform. The 600,000 intended participants were to be reached by a three-part combination of training tools – in-person training, mobile application-based training modules, and an immersive online training platform. Around 35,000 women and girls were targeted for in-person training with 500,000+ intended to use the mobile- and web-based applications.

Ultimately, 100,000 women were trained either in person or through Intel's mobile training application. The Alliance lost one key partner, and Intel underwent a reorganization that resulted in program changes and cancellation of the online platform that would have reached the majority of intended participants. There were a handful of participants in each country who leveraged their training into new professions and higher earnings. In Lagos, a young woman named Jessica was able to market her salon online and find new hair designs. In Kenya, a woman became a technology trainer in other schools and an advocate for digital government. One woman opened an internet kiosk with two used computers and sold online airtime to those wanting to use

Facebook and email. Another, who made a point of her illiteracy and advanced age, sold a large plot of trees for timber to buy computers and printers that she then rented out to others, including schools and government offices. She eventually employed other women and managed them full-time. In a country proud of its green movement and Wangari Maathai's legacy, one could argue that trees and land were not sustainable sources to fund technology, and yet this program participant had always seen her trees as her "nest egg" for future socioeconomic stability.

Most participants reported having learned some digital skills but did not put them to use when surveyed three and six months after project ended. They cited a lack of opportunity, mobility, and cost as common barriers. Most women would have had to go to metropolitan areas to access additional courses and employment opportunities, which were neither feasible nor attractive options. Women wanted to stay within their local communities with their children and their family land. The internet offered them little, even when shown the many agricultural and health applications designed for such populations. As with many studies, the thousands of mobile applications built specifically for the rural poor were rarely used or trusted. Women obtained advice from people they trusted over WhatsApp, rather than from an outside service.



IMPACT STORY CONNECTION EQUALS OPPORTUNITY¹

In Nigeria, as in many developing countries, few women are connected to the internet, Jessica was no exception. Her enthusiasm for hairdressing and makeup lead her to a government training institute to pursue her passion. While attending courses, she discovered the Intel *She Will Connect* program and enrolled. Jessica had never used a computer and was surprised to learn that there was more to using technology than she had imagined, initially thinking technology was for young men in her community to promote illicit pictures. She learned many new skills in the program, however, learning to use the internet to improve her business had the greatest impact on her life and the lives of her seven siblings. Watching YouTube videos, Jessica learned new braiding techniques, enabling her to offer more services to her customers and increase her prices. She also grew her customer base by leveraging her new social media skills to create and maintain her Facebook business page.

¹ Intel. (2017). *Intel She Will Connect: Connecting women in Africa to opportunity through technology*. Retrieved from Intel Web site: <https://www.intel.com/content/dam/www/public/us/en/documents/corporate-information/she-will-connect-exec-summary.pdf>

WHAT'S NEXT: Closing the Gender Digital Divide

By S. Revi Sterling, Director, USAID W-GDP WomenConnect Challenge

“Women represent the main economic force in most developing countries. As economies become more and more information-driven... the involvement of women in the Information Society on an equal footing with men will directly contribute to improving the livelihood of people, making it more sustainable and thereby promoting the social and economic advancement of societies.”¹

WOMEN & THE WEB ALLIANCE LEGACY

Over 60 years of development research and programming has unequivocally demonstrated that women’s advancement is key to development. Over twenty years of information and communication technology (ICT) and development work has confirmed that the gender digital divide is real and worsening in many regions, although no one debates the potential of information technology to empower women. Thus, an imbalanced equation persists, and digital development remains *unequal* development:

- Women’s advancement is key to poverty alleviation in all forms.
- Digital technology can be a powerful tool in poverty alleviation.
- Women do not have the same opportunities to use digital technology as men do for a variety of cultural and socioeconomic reasons.
- If women continue to be excluded from the benefits

of technology access and use, they will be further marginalized.

This inequality has always been a concern and has fueled gender digital divide efforts. However, there are two major factors that continue to unwittingly perpetuate this gender gap, in addition to the well-documented traditional barriers to women’s ICT access and use.

First, most efforts to bring women online are failures, which include the many ICT training and digital literacy programs that are popular with private sector technology companies, foundations, and development agencies. These trainings are easy to produce, and the beneficiaries are easy to count. They also push a software and hardware agenda. Rarely do these trainings produce lasting change in women’s lives because they do not address women’s local information needs, livelihood support, or offer relevant and compelling experiences. UN’s EQUALS Program (The Global Partnership for Gender Equality in the Digital Age) and others have made this point – there is a mismatch between skills training and capacity, job availability, and culturally-appropriate approaches, even with an eye on culturally-specific content as offered on platforms such as World Pulse. The Women and the Web Alliance (WTWA) content promoted women’s mobilization and activism, which was a world away from the realities of most Nigerian and Kenyan participants, who live on under a dollar a day and for whom activism is a luxury for those with more resources. Often funded by corporate social responsibility (CSR) divisions of major organizations,

¹ Primo, N. (2003). Gender issues in the information society. Paris, France: UNESCO

these kinds of trainings look effective on paper but have little bearing on actual development, due to a lack of understanding of the participant base and an absence of future opportunities. Even in programs where internships and employment opportunities are included, women often are prohibited by their families from working outside of the house or community or find a new level of untenable sexism and gender gaps in their new positions. It is not a coincidence that the internet boasts hundreds of women & technology training program announcements but almost zero program assessments or outcomes data.

Second, the wholesale movement of development sectors to digital solutions further marginalizes millions of women. While this may seem ironic given the reach and popularity of mobile phones and the positive rhetoric about women and the internet, there is a significant mobile phone ownership gap between the genders and a much more pronounced mobile internet use gap. Common statistics put the mobile internet gender gap at 30% in developing countries writ large, with gaps over 50% in many countries. As that is an average of rural and urban women across all socioeconomic strata, it is not a surprise that in many places where development and women's empowerment are most needed are the same ones where women have almost no access to the internet. Local fatwas prohibit women's mobile phone use across the Sahel, while hundreds of villages across northern India have banned unmarried women's mobile phone use in order to preserve the patriarchal social order. When development organizations publish digital strategies and adopt mobile-based agriculture and health programming, the women who would usually meet with the farm extension worker or the community health worker for critical information no longer have access to these resources. These are some of the negative aspects of *going digital* – we do not see who is being left behind in our quest for technical scale and sustainability. When women do have smartphones, or even feature phones in many rural communities, the likelihood is high that they hold an elevated position in that community and are not representative of most women. As an outsider, these



cultural nuances are often lost on development workers on trips *to the field*, but they must inform policy and programming decisions.

If development professionals are mostly witnessing women of status using technology – even in the most remote or challenged environments – how does the sector reach the women who comprise the gender digital divide? This was the main question addressed by the Women and the Web Alliance. If digital literacy programs aren't the answer and are missing a huge swath of those who would benefit most from accurate development information and increased skills, what is the correct approach? This question led to a level of reflection in which USAID had not previously engaged regarding gender and technology. Spurred on by both a significant amount of research and internal lobbying, the Center for Digital Development in the Global Development Lab and the Office of Gender Equality & Women's Empowerment decided to pursue a new set of interventions focused on the root causes of the gender digital divide rather than its symptoms. This gave rise to the USAID WomenConnect Challenge, which was a direct response to the general shortcomings of the Women and the Web Alliance.

USAID WOMENCONNECT CHALLENGE

The Women and the Web Alliance program had long flagged the flaws inherent in technology training programs for women and had pushed for funding

to address the gender dynamics and conditions in communities where the gender digital divide is the greatest. With funding first from the Office of Gender Equality & Women's Empowerment and then the government-wide Women's Global Development and Prosperity Initiative (W-GDP), the WomenConnect Challenge became the only major gender and technology program designed to identify, research, and prove the viability and sustainability of interventions that challenge the social norms that claim that technology and the internet are appropriate for women.

The internet is a huge risk to the traditional social order, and as more societies undergo economic and social stressors, they revert to reactionary gender roles. Conservative communities the world over have declared internet use *immoral* for women, resulting in honor killings of women who use social media to women being jailed for possessing a mobile phone. From the *Wall Street Journal* to academic conferences, these social norms are well-documented but difficult to address, as they run deep and unchallenged. Thus, it is necessary to understand the conditions under which women can use technology, if at all. As women have less agency, less purchasing power, and lower literacy and digital literacy levels, they have less opportunities to challenge the status quo. It is important to remember that the real reason digital development efforts cannot reach the last several hundreds of millions of women comes down to fact that there are people in their communities who do not want them online.

The common factors contributing to the gender digital divide are almost universally listed as cost, skills, relevance, time, poverty, and safety/privacy concerns. Some reports list social norms as a factor after the first three. However, all these factors are outcomes of *social norms*. Social norms remain the root cause, with the rest of these factors merely outcomes of deep-seeded gender and power inequities. It is a red herring to list *cost* or *skills* as the underlying reason for the gender digital divide; however, as social norms are psychologically internalized

and often perpetuated by women themselves, it is not surprising that women blame these external factors. They are also the easiest to address. A company can heavily subsidize handset or connectivity costs, and an internet café can offer free women's days. A program like WTWA can offer skills, much as other companies do. Focusing on the symptoms and manifestations of harmful social norms is only a bandage. The only effective approaches meet women *where they are* in terms of access, cultural appropriateness, literacy and user interfaces, hardware and network availability, and perceived benefit of being online.

While social norms are eschewed by funders and partners for being difficult to identify, harder to address, and outside of the traditional domain and comfort zone of technology interventions, the WomenConnect Challenge and its various iterations have demonstrated significant, sustainable models that agencies and organizations would be remiss to ignore. Indeed, in some communities, these social norms-targeting programs may be the only viable pathway to closing the gender digital divide. The common characteristic across the current 12 programs include identifying the gating barriers to women's technology access and use, creating compelling cases to use the internet, and then obtaining not just permission but explicit enthusiasm from those who had previously disallowed or discouraged women's technology use. The most effective practices included:

- **Working with the naysayers and gatekeepers**
 - husbands, fathers, mothers-in-law, religious and spiritual leaders, and community leaders to understand the root of their distrust and building interventions that directly addressed those fears. In some cases, whole families took internet trainings together, and conservative and moderate clerics debated the role of technology in women's life on popular radio stations. Turning on location services was a way for women to show that they could be trusted with phones outside the house, as a major concern is that mobile phones facilitate extramarital

affairs. Therefore, content was initially limited to certain topics until those in control realized the benefit of letting women access additional content. Women engaged in smaller challenges to find better tasting recipes or find educational content to help children with homework, thereby demonstrating value and trust. In time, and with the blessing of those in power, women were often given full permission to use technology formerly prohibited to them.

- **Creating relatable role models.** Women's confidence to use technology was bolstered by characters and avatars in the intervention itself – cartoon or fictional women who were easy to relate to, who reached out to participants as relatable chatbots, and who spoke the same dialect and faced the same challenges as them. Participants felt a deep rapport with these digital actors and used them as examples of good health, educational, and livelihood information. Often, the characters engaged in dramas that whole families enjoyed, where technology was featured as an asset rather than a liability.
- **Helping build confidence for women to interact with technology, often for the first time.** Having internalized their lower status, many women claimed to be too stupid to use technology and unwilling to engage at all. Using interactive voice response (IVR) technology in one community, women could learn rudimentary digital skills on any feature phone at no cost. Women made great use of a service that allowed them to find out what the internet was, what email was, what social networks provided, how to stay safe online, and how to get data bundles. There were more advanced topics for those who built up the confidence to use the mobile internet for the first time, and over 200,000 calls were received. In another program, participants used technology, sometimes for the first time, in the service of other development and humanitarian projects.

In Tanzania, mobiles were used to geolocate households where young women were of female circumcision age, so that those households could be targeted for intervention. In Peru, students and advocates gained technical skills by mapping rural health clinics and other civic services, or the absence thereof.

- **Putting women in charge of the internet.** Women in internet deserts trained with community network experts to set up and manage a women-led community network, thus bringing affordable connectivity to a community for the first time and demonstrating that technology is a *woman's place*. By creating new roles for women, new social norms followed, and women became the natural and expected technologists and ICT trainers. In other interventions, women created development content, curated content for relevance, translated information, and facilitated grievance processes online for others, which provided jobs that paid in both cash and status.
- **Creating a social network for illiterate populations.** Poor women know the internet exists and that they do not have access to Facebook. One project created a text-free social network that used voice messages, photos, and videos as the communication medium. With commands similar to WhatsApp and most mobile phones, women with no education or digital skills were able to create the kind of online platform that the Women and the Web Alliance provided from a top-down perspective. Given the ease and media richness of this social network, there was dignity in the design that is often missing from applications that are *made for the poor*.
- **Leveraging advanced technologies and creative business models.** Creating viable, sustainable technology interventions at the margins pushes the margins of computing. Several projects utilized artificial intelligence for credit rating algorithms,

detecting fake news, and determining the gender of the phone user so that only women could access the programs designed for them, as 30% of phones given to women tend to *disappear*. Rent-to-own models helped women get smartphones of their own, and female community network operators worked with communities to support online forums for COVID-19 awareness and resource-sharing in times of crises, reminiscent of technologies that emerged in response to such events as the Kenya 2007 election (leveraging Ushahidi) or the work of Hollaback² in the wake of sexual harassment.

These are only a subset of the kinds of effective practices that hold more promise than technology training programs, and while many of them have their roots in past digital development research, the WomenConnect Challenge moved them firmly into the practitioner domain. It is tempting to look with this hindsight at the WTWA program and guess how different the outcomes could have been. What remains indisputable is that WTWA created the opportunity for the WomenConnect Challenge, which is in its third round of projects and is now a franchised model, adopted by the Reliance Foundation in India and other private sector partners. There is a growing appetite and willingness to re-think how the gender digital divide has been perceived and addressed in the past, given both the low return on investment, low impact of many projects, and critical need to reach more women as more and more development efforts become digital.

LOOKING FORWARD

Measuring the gender digital divide?

It is an interesting time in digital development work. The industry is at the top of a cyclical ebb-and-flow period where gender is receiving a lot of attention from USAID, the World Bank, the United Nations, Web Foundation, and ongoing science, technology, engineering, and mathematics (STEM) efforts for women and girls. At

the same time, the move towards *digital inclusion* still excludes women for the most part, bifurcating efforts to address both the marginalized *and* women. This is problematic, as it continues to obscure women's unique challenges to access and use of technology. *Digital inclusion* as a term may sound inclusive and politically correct, but it does not call out women as a specific set of participants, which conceals specific gender issues. At the same time, the gender digital divide does not enjoy the attention it used to receive from private sector technology companies who have previously sponsored well-funded efforts, but this is due to the mismatch of programming. Traditional CSR-led digital literacy camps have a definite role for more skilled, urban women but offer little opportunity for rural, poor women. As an example, many curricula have a women's entrepreneurship module in ICT training programs, where women are told they can sell their wares online. This is unrealistic in countries with no functional postal service, where the same women are often unbanked, where customs and tariffs would come into play, and where most local goods cannot compete against the quality of higher-end crafts. However, given the move toward digital development across all sectors, technology has a great opportunity to recast the gender digital divide and create opportunities for over half the population to access all the mobile-based development interventions that are replacing face-to-face models while further pushing into the technology gap.

How large is the gender digital divide? The International Telecommunication Union (ITU) Broadband Commission states that it is growing. The GSM Association (GSMA) claims it is shrinking. The state of both definitions and data collections lead to this contested figure. It is standardly accepted that the gap is 30% across low- and middle-income countries as an average. The need for gender-disaggregated data was first raised in 2003 and has been written about extensively since then, but country-level data is sparse, expensive

² www.ihollaback.org

to collect, and non-representative of hard-to-reach populations. Definitions of the gender digital divide are also contradictory. Some datasets base their calculus on phone ownership, mobile internet access, or digital skills that are based on computer, rather than cell phone, functions (such as moving a file and copy/paste functions). Some data sets are based only on social network participation. Digital financial service access is sometimes counted and sometimes not – many women use mobile money but have no idea that it involves the internet. It is critical to look at the sample size and selection of gender digital divide indexes. Often, eight or ten countries serve as proxies for global statistics. In typical studies, the small sample size does not reach into more remote rural areas or insecure regions, where women have the highest need for timely, accurate information. These studies do not accurately overlay women’s technology access with internet penetration. For example, what does it mean if 33% of women in a Maputo slum have *accessed* the internet, but the country has an internet penetration rate of 10%? While the United Nations Conference on Trade and Development (UNCTAD), ITU, Organisation for Economic Co-operation and Development (OECD), Eurostat, and others continue to define useful indicators, it is the adoption and data collection that remain challenging. Other efforts combine online indicators derived from Google AdWords impressions, Facebook audience estimates, existing surveys on gender gaps in internet use and digital skills, and datasets that track offline development indicators such as the Human Development Index (HDI) to arrive at more accurate data.

We may be going about this inefficiently. This a supply side effort, where development agencies, trade organizations, and researchers are driving the agenda and the indicators. There is a need to move this to a demand-driven model where countries want to collect well-defined data and have an incentive to do so or where coalitions of international NGOs and implementing partners determine the parameters that would be most useful to them, giving them an active role in producing gender digital divide data as opposed to consuming it.



Meaningful Use

Questions of access and use lead to the next question – what are women actually doing online once they are connected? This may be more difficult to assess, especially as organizations push their own definitions of meaningful connectivity as benchmarks for affordability and connectivity. This model links *meaningful use* to being online and at a certain data transfer rate. There are at least two problems with this approach. Meaningful use is inextricably linked to relevance, even if that is not called out as a specific component. Relevance and meaning are highly subjective. If someone is gaining information from WhatsApp rather than a dedicated mobile agriculture application, is that still *meaningful* digital development use? Why do we assume all women with smartphones are entrepreneurs-in-waiting or will use their phones any differently than any other human? Some digital development programs lock content to specific development domains. This is reminiscent of the zero-rating conversations. Is it acceptable that *experts* are content mediators? Or is a more metered approach acceptable, especially if men or community elders only want women to access *appropriate* content? Definitions of meaningful access and use that are tied to online-only scenarios are also problematic, as so many regions remain unconnected for cost, geographical, or political reasons. What is the role of offline digital development systems? The “Talking Book” by Amplio Networks, Outernet-type solutions, Solar SPELL, and programs like Cell-Ed and Arifa that have offline mobile applications

are often far more appropriate for low-resource women. IVR remains a stalwart digital development technology. It may not be internet-based for the user, but it is a digital service nonetheless. How are we counting these solutions? More importantly, why are we not positioning these technologies as the gateway technologies to eventual always-on connectivity? There is no need to wait for available or affordable connectivity when there is a huge range of offline/online hybrids that can currently close the information and gender divides. These and other innovations should receive more attention by donors and funders, especially in places where the internet is routinely shut off, which makes it all the less reliable and *meaningful* to users.

Other Considerations

Online GBV

The women on the far side of the gender digital divide need us to create appropriate, sustainable, and equitable solutions. While some examples are suggested in this writing, there are other issues at the margins of gender digital divide conversations, which will become more important as we take on the responsibility to close these chasms. Online gender-based violence (GBV) is a serious and growing consideration as more women and girls come online, especially with little understanding of the risks that can await them. Rumors, sexual harassment, compromising photographs, and deepfakes provide compelling justification to those who want to keep women offline. Issues of safety, privacy, and family honor compound the need to maintain social order and uphold restrictive social norms. While several human rights and internet security companies have banded together to spur technical and regulatory advances, many large-scale connectivity programs have been cancelled due to the threat of online GBV. For example, an opportunity to connect over 200 girls' schools in one country, providing not only educational opportunities but community networks for the benefit of the larger population, was derailed because country-level leaders were concerned girls would be harassed on the internet. While online GBV is a daunting and critical issue, it cannot be used



to justify the gender digital divide. Women, especially those with low agency and self-efficacy, must deal with significant sexual harassment in real life. There are organizations and strategies that are dedicated to helping women empower themselves in these situations, and there are laws (albeit unevenly applied) to prosecute gender-based crimes. Online GBV can take a page from these approaches, and those fighting it have the extra advantage of developing countermeasures at the hardware, software, network, and end-user level.

Intersectionality

Intersectionality recognizes how intersecting forms of discrimination (such as race, gender, sexual orientation, age, and class) further complicate efforts to reach marginalized populations such as women. The generally accepted understanding of the gender digital divide does not use an intersectional lens. Instead, development practitioners often generalize an entire female population as a monolith, which masks digital divides among subgroups of women. As many organizations have pointed out, there is a lack of understanding of how people's intersectional identities (gender, sexual orientation, class, disability, indigenous identity, language minority, and other factors) interplay with their access to and use of digital technology. Technology and its resulting socioeconomic benefits are therefore not necessarily reaching some of the most marginalized women and girls in many countries. Pockets of gender

digital divide research on intersectional identities have shown the extension of marginalization in the ICT space. In July 2020, GSMA published startling research on the gender and disability gap of low- and middle- income countries. According to the report, a gender gap of 52% in Bangladesh and 48% in Uganda masks women with disability gaps of 100% and 80% respectively.³

In Latin America, studies of indigenous populations in Ecuador and Peru show that the lack of online content in indigenous languages, rather than cost, hampers these communities' access to the internet.⁴ While data is lacking for girls' internet access, especially in the Global South, studies have shown that girls are usually given access to the internet later than their male peers, and when they are given access, it is more likely to be limited and surveilled.⁵ Without further research and concentration on these issues, the full phenomenon of the gender digital divide is obfuscated, and steps towards mitigating unequal access and use of technology are further hindered.

CONCLUSION

There are other pressing issues in gender and technology, such as female and non-Western representation and bias in artificial intelligence, the role of technology policy in addressing the gender digital divide, how the future of work affects women and other marginalized populations, and the concepts of a *feminist* internet. This piece specifically speaks to the hard-to-reach, mainly rural women who will benefit from far more comprehensive and thoughtful approaches to technology access and use. The Women and the Web Alliance served as an important launching pad for changing the way that USAID and its partners conceptualize and positively address the gender digital divide. It marked

a sea change that resulted in sustainable, equitable programs being led by local organizations that are best suited to understand culture, context, intersectionality, and other complex factors that promote or discourage women's access and use. Work inspired by the WTWA demonstrate that restrictive social norms remain the underlying barrier for other symptoms of the gender digital divide, such as cost, skills, and relevance. At a time when information is the new global currency, it is imperative that we build compelling conditions and use cases that address societal fears and challenge conventional wisdom while creating truly meaningful services for women, truly meeting them where they are.

Lauren Grubbs, USAID Presidential Management Fellow, contributed to the writing of this article.

³ Jan, C. A., & Shanahan, M. (2020, July 16). The digital divide at the intersection of gender and disability. Retrieved from The GSM Association Website: <https://www.gsma.com/mobilefordevelopment/blog/the-digital-divide-at-the-intersection-of-gender-and-disability>

⁴ Galperin, H. (2017). Why Are Half of Latin Americans Not Online? A Four-Country Study of Reasons for Internet Nonadoption. *International Journal of Communication*, 1-23.

⁵ Livingstone, S., Nandi, A., Banaji, S., & Stoilova, M. (2017). Young Adolescents and Digital Media Uses, Risks and Opportunities in Low- and-Middle-Income Countries: A Rapid Evidence Review. London: Gender and Adolescence: Global Evidence.



36. ICT4D Conferences

April 2014 – April 2020

BACKGROUND

For the past 11 years, Catholic Relief Services (CRS) has sponsored the annual ICT4D Conference. For four years during the tenure of this program - in 2014, 2015, 2019, & 2020 - NetHope has sponsored or facilitated conference programming in partnership with CRS.

2014 ICT4D Conference

NetHope supported USAID’s participation in the 2014 ICT4D conference held in Nairobi, Kenya. At that event, NetHope supported the preparation and inclusion of four sessions on digital financial services, including three proposed by USAID with a focus on electronic payments and ICT4D guidelines. Working closely with USAID/ Haiti, NetHope facilitated one of the conference’s master class workshops on the “Nuts and Bolts of Transitioning from Cash to Electronic Payments.”

2015 ICT4D Conference

NetHope presented on a panel with USAID, Barclays Bank, and CRS at the 2015 ICT4D Conference. During the preceding months, NetHope coordinated with CRS on planning the conference, which was held in St. Charles, IL. NetHope also leveraged its online Solutions Center to provide general conference information and overall news to the general public.

2019 ICT4D Conference

In support of USAID’s Digital Connectivity & Cybersecurity Partnership (DCCP), NetHope partnered with Development Alternatives, Inc. (DAI) to sponsor a track of 15 sessions on responsible data use and information security at the 2019 ICT4D Conference in Kampala, Uganda in April-May 2019. Track sponsorship included the solicitation of speakers and



presenters, evaluation of submissions, coaching and refining of session materials, and on-site coordination of session presentations. Sessions addressed various topics including the increased use of digital IDs, artificial intelligence and data bias, ethics of data collection, and USAID’s responsible data guidelines. NetHope staff moderated and spoke on several panels and presented a summary of the conference track in sessions at the end of each day. The NetHope team also presented two sessions aimed at highlighting the GBI Broadband Demand Aggregation program. One session was co-led by the Digital Impact Alliance (DIAL) and focused on their research related to possible markets for aggregating demand for mobile services, with NetHope presenting



Christopher Burns, Director of USAID’s Center for Digital Development, presenting at the 2019 ICT4D Conference

a broad overview of the Uganda broadband demand aggregation program.

In another session NetHope presented a more detailed overview of its work and was joined by co-presenters from DAI and Airtel Uganda, who provided additional insights on both existing and future demand aggregation country programs in countries beyond Uganda. Approximately 900 attendees and participants attended the 2019 conference.

2020 ICT4D Conference

At CRS's request, NetHope reprised its role as co-lead of the Responsible Data and Information Security track at the 2020 ICT4D Conference originally scheduled for April 2020 in Nigeria. NetHope partnered with World Vision (a NetHope member) to solicit and review hundreds of session applications. Ultimately, 15 were selected for inclusion in the conference. Unfortunately, due to the COVID-19 pandemic, the on-site conference was cancelled, and CRS committed to hosting some of the winning sessions via online webinars over the following months. NetHope continues to provide CRS support during this process.



37. Smart Communities Coalition

January 2018 — September 2020

BACKGROUND

Launched at the World Economic Forum in January 2018, the Smart Communities Coalition (SCC) is a public/private initiative that seeks to transform the service delivery operating models in refugee camps and settlements. Co-chaired by MasterCard and USAID's Power Africa Bureau, the Smart Communities Coalition targets three fundamental pillars – Connectivity, Energy Access, and Digital Tools. Pilot solutions are focused on three refugee communities in Uganda and two refugee communities in Kenya. The expressed aims of the SCC are to:

- Decrease barriers to electricity, financial services, and connectivity access for refugee populations and host communities through subsidization of initial costs.
- Increase socioeconomic development in refugee settlements and host communities through private sector participation and market development activities.
- Increase private sector participation in refugee settlements through incentives for developers establishing or expanding operations on-site.
- Support development of local economy through inclusion of entrepreneurs in refugee settlements.
- Increase utilization of these sectors by humanitarian agencies such as United Nations High Commission for Refugees (UNHCR) and civil society organizations.

PROJECT IMPLEMENTATION

NetHope was asked by the USAID Global Development Lab to assume a coordination role in the SCC's Connectivity pillar; and, beginning in late 2017, NetHope maintained continued engagement with SCC activities and partners. In late 2017, NetHope conducted field assessments in the three Uganda refugee settlements to



collect demand- and supply-side information and create coverage maps of available infrastructure. Results of the field visit were presented to USAID and at the 2018 Annual SCC Meeting in Nairobi, Kenya. NetHope also participated in numerous pilot project design workshops and discussions in numerous planning sessions held in virtual and in-person settings. As the leader of the Connectivity pillar, NetHope provided insights into connectivity aspects of the SCC pilot planning and sought opportunities for direct pilot involvement.

NetHope convened periodic meetings of the SCC Connectivity Pillar during which partners shared opportunities, challenges, and plans for better integrating connectivity into pilot activities. In October 2019, NetHope led a session on issues related to connectivity challenges, including approaches to integrating connectivity into multi-sector SCC activities, a renewal of NetHope's commitment to facilitating connectivity across the SCC portfolio of pilots. Specific developments were shared by SCC members, including new partnerships between SCC members and local Ugandan mobile network operators designed to expand connectivity in rural and underserved areas, UNHCR's focus on improving digital identity through improving mobile device usage and accessibility in refugee communities in Uganda and Kenya, and the GSM Association's (GSMA) research efforts designed to better understand the role of mobile digital technologies in SCC target communities.

During the 2019 Annual SCC Meeting, participants reflected on the prior year of SCC activity; catalogued SCC member capabilities; laid out coalition governance, communications, and monitoring and evaluation (M&E); and envisioned new pilot activities for the upcoming year. Specifically, NetHope explored opportunities to partner with other organizations, including:

- A pilot in partnership with USAID/Power Africa, the Lutheran World Federation, and other partners to incorporate connectivity via an ICT hub in a pilot activity seeking to promote livelihood development, job training, and electric power mini-grid development in the Rwamwanja refugee camp in Uganda.
- A pilot in partnership with the Norwegian Refugee Council and Microsoft to enhance entrepreneurship and business training and deliver connectivity, mentorship, and business development support to refugee and host communities in Kakuma and Kalobeyi refugee camps in Kenya.

While the Kenya concept was set aside due to lack of partner interest, planning for the Rwamwanja pilot continued to evolve over the subsequent months. The proposed pilot, led by Accenture Development Partners, sought to build on the development of an electricity mini-grid. NetHope contributed to the project plan and sought to leverage its work in Uganda to support connectivity at key community nodes in the mini-grid focus area. Ultimately, the project plan experienced significant delays in implementation, first due to regulatory challenges that led to a major revision of the mini-grid implementation plan and then due to challenges with pilot fundraising. As of this writing, these challenges have not yet been resolved, and NetHope retained its status as a contributing connectivity partner as efforts to secure project funding continue.

In October 2019, NetHope convened an SCC meeting at the NetHope Global Summit in San Juan, Puerto Rico that featured an intimate dialogue between SCC program leadership from USAID/Power Africa and

Mastercard and NetHope members and partners.

Much of the meeting provided NetHope members and partners who have not previously engaged with the SCC a detailed background of the SCC operating model and possible ways to engage in SCC program activities.

Later, in February 2020, NetHope attended the 2020 Annual SCC Meeting in Kampala, Uganda. With the goal of reconnecting as a coalition and deepening member relationships, the two-day meeting was attended by 40 participants representing 22 SCC member organizations. Sessions focused on a range of topics, including updated overviews of existing pilot activities, collaborative problem-solving activities, and discussions on upcoming SCC funding opportunities. NetHope reiterated its support of the coalition by offering to hire a local expert in Kampala or Nairobi to help address the connectivity needs of SCC member activities, including technical and policy advocacy work. NetHope requested feedback from SCC members on connectivity needs and applications in SCC pilots, which could inform scopes of work that were currently being developed.

During early 2020, NetHope held discussions with UNHCR, GSMA, and member organizations to explore requirements and methodology for a study to assist stakeholders (including pilot projects and service providers) to better understand the potential to leverage connectivity to amplify project impacts. With the onset of the COVID-19 pandemic and the resulting limitations on access and travel to refugee communities, NetHope indefinitely delayed its plans to carry out an on-the-ground assessment of refugee camp connectivity. In April 2020, NetHope convened an advisory meeting at the request of the SCC Secretariat to explore ways that the SCC might learn from NetHope's engagement model in building better, multi-stakeholder coalitions. In May 2020, NetHope subsequently participated in a *matchmaking* event of SCC partners during which NetHope reiterated its ongoing availability as a resource in developing connectivity solutions for existing and future pilot projects. NetHope is likely to continue its support of the SCC into the future.



38. Indonesia Maternal e-Health Initiative

April 2015 – March 2016

BACKGROUND

In 2015, USAID/Jakarta requested the assistance of NetHope to support its existing Maternal Health program (EMAS). EMAS' goal was to build upon a range of initiatives that aimed to coordinate treatment and linkage between expectant mothers and health care providers, to reduce infant mortality rates, and improve infant and maternal health conditions, particularly in rural districts. The key goal of collaboration with NetHope was to support connection of rural health clinics (Puskesmas) to broadband internet services, allowing integration of these clinics to national health care services, the health insurance system, and other resources available in urban areas.

The e-Health Initiative explored the possibility of expanding the ongoing activities of EMAS and linking it with rural connectivity initiatives implemented under the Indonesia Broadband Plan (IBP) and the USO Fund (BP3TI). (See Chapter 16 on Indonesia Broadband Plan.) NetHope reviewed priority plans, targets, and needs of EMAS, then overlaid these with priorities of the Ministry of Health and BP3TI, which was responsible for providing rural connectivity.

TECHNICAL ASSISTANCE

From April to May 2015, NetHope defined and shared priority location lists and options for EMAS. Through a series of meetings with the USAID Sijari EMAS group, NetHope redefined the objectives and determined compatibility between EMAS and National Health Insurance (BPJS) project locations. In June 2015, NetHope presented its recommendations to the EMAS program team. The first recommendation was to provide EMAS pilot locations with broadband connections, which

could provide experience and evidence for eventually scaling up the program. The second recommendation was to link Puskesmas with the BPJS insurance service. Improved connectivity was expected to lead to the expansion of the health insurance system for rural people. To follow up this option, further action would be required, including establishment of terms for scaling up the assessment framework for BPJS and/or EMAS.

From July to August 2015, the identification of priority Puskesmas locations continued. Simultaneously, the Directorate of USO and BP3TI assigned a local consultant to work on developing an annual program for broadband deployment. The project included a bottom-up process for collecting initiatives for all line ministries and relevant institutions that might need rural connectivity. NetHope provided clarification on IBP planning and implementation, including the approach for prioritizing the program. The number and location of health clinics was expected to be one of the sectoral allocations in the priority list.

During the period of April-May 2016, based on the Strategic Plan (2014-2019) of the Indonesian Health Ministry, NetHope reviewed e-Health program indicators for connectivity. The two main indicators for connectivity were:

1. Percentage of district hospitals that reported prioritized health data (baseline was 20% in 2014 to 70% in 2019).
2. Data connectivity dedicated to district hospitals (baseline was 0% in 2014 to 50% in 2019).

Establishing connectivity to all district capitals was a prerequisite for the e-Health Initiative. Fifty-six of the 505 district capitals did not have fiber optic backbones. The Palapa Ring Project, one of the IBP's flagship projects identified through NetHope's assistance, expanded the national fiber backbone infrastructure, providing connectivity to all district capitals and the BJPS. Unreliable connection at the sub-district level was one of the constraints for this insurance service to rural people.

With respect to providing a pilot broadband connection to one USAID clinic location (in the Bogor area), NetHope arranged a deployment of a TV White Space trial supported by the Government of Japan and endorsed by MCIT/Kominfo (see Chapter 5 for additional information on NetHope's implementation of this TVWS pilot). During the period of January-March 2016, a hybrid solution with wireless backbone technology at 5Ghz was constructed at the site. Network access was successfully delivered, however the operation to support the Sijari EMAS program was suspended due to local politics and changes of officers and staff involved in the deployment. With the limits of the license permit and the TVWS radio lending period, the operation was ended in March 2016.

FINDINGS AND LESSONS LEARNED

The e-Health Initiative aimed to support the Mission's objectives of expanding existing rural health-related programs via ICT connectivity, specifically in relation to maternal health. While the activity was completed, the activity yielded ideas for improving similar USAID programs in other countries or regions in the future. Some lessons learned include:

- The e-Health Initiative was part of a multi-level technical assistance related to the Indonesia Broadband Plan, which involved coordination with several ministries, USAID/Washington, and USAID/Jakarta. For such a collaborative work, it was very important to identify clear roles and contribution for each party. It required an understanding of each



group's objectives, constraints, milestones, and risks relating to the performance of ongoing processes within a limited timeframe.

- NetHope and its project partners worked with different levels within the impacted ministries. NetHope worked at the strategic level, coordinating with the Minister and Vice/Deputy Minister levels and the Directorate level, while USAID worked with the technical team. This holistic approach ensured both high-level coordination while considering bottom-up priorities and needs for piloting the e-Health Initiative.



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