

The Role of Social Media within the Context of ICT4D Projects:
How can the use of Social Media Enhance Project Adoption?

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Abstract

Information and Communication Technologies for Development (ICT4D) attempt to make the benefits of the information and communication enabled by technology available to developing or disadvantaged groups, but these projects have historically faced challenges of adoption and sustainability. Social media can potentially provide growth opportunities for ICT4D nonprofit organizations and non-governmental organizations (NGOs) through project adoption and collaboration; however, projects lack guidance on how to track and analyze the impact of the social media campaign on adoption of an ICT4D project. Historically, nonprofits and NGOs have relied on their websites to provide information to key stakeholders and partners, but social media provides an outlet for real-time collaboration as opposed to one-way information dissemination. In the case of ICT4D projects, the collaborative nature of social media can provide a channel to solicit feedback, impart good practices, and drive adoption of the solution for which the project is being conducted. In particular, the 3-2-1 service, a potentially high-value initiative, may benefit from including a social media campaign. The 3-2-1 service allows for organizations to make their content available to everyone within a country, on-demand, for no-cost using a toll-free short-code and using an interactive voice response (IVR) menu. Users dial the short-code and navigate the menu to select content about agriculture, financial services, health, etc.; content would be provided in their local language and recorded by native speakers. This paper explores the manner in which social media can benefit the adoption of the 3-2-1 service within country programs run by the Catholic Relief Services nonprofit organization. Additionally, this paper provides a proposed toolkit that can be used to create a social media campaign to drive adoption of any ICT4D project and provides proposed metrics to track success.

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Table of Contents

List of Tables	vii
List of Figures	viii
Chapter 1: Introduction	1
Chapter 2: Literature Review	6
History of ICT4D	6
ICT4D 0.0	6
Summary	6
Goals	7
Primary Actors	7
Types of Projects.....	7
Achievements/Challenges.....	7
Lessons Learned.....	8
ICT4D 1.0	9
Summary	9
Goals.....	10
Primary Actors.....	12
Types of Projects.....	12
Achievements/Challenges.....	13
Lessons Learned.....	14
ICT4D 2.0	18
Summary.....	18

Goals.....	20
Primary Actors	23
Types of Projects.....	24
Achievements/Challenges.....	25
Lessons Learned.....	25
ICT4D 3.0 or the Digital for Development Paradigm	28
Summary	28
Goals.....	30
Primary Actors	30
Types of Projects.....	30
Achievements/Challenges.....	33
Lessons Learned.....	33
The Need for ICT4D.....	33
What Have We Learned?	36
Defining Development.....	36
Design Flaws Affecting Current ICT4D Projects.....	41
Good Practices for ICT4D Design.....	42
Chapter 3: The Benefits of Social Media for ICT4D.....	49
Benefits of Social Media.....	50
Limitations of Social Media.....	53
Social Media Metrics	54
Social Media Metric Frameworks.....	56

Social Media Metrics and Facebook Insights	59
Chapter 4: Implementation of the 3-2-1 System in Nigeria.....	62
What was the Need?.....	62
Objectives	63
Why Nigeria?	63
Partners	64
Key Players	64
Background of Viamo.....	64
Background of CRS	65
Background of Airtel	66
Why Was Airtel Chosen?.....	66
Barriers to Entry.....	67
Technology	67
What is the 3-2-1 Service?.....	68
History of the 3-2-1 Service.....	68
How Can 3-2-1 Address the Need?	69
Project Methods/Implementation.....	69
Message Creation and Execution of Project	69
Advertisement/Adoption of the Platform.....	70
Client Use of the Service	72
Cost.....	72
Results.....	73

Reach.....	73
Findings.....	73
Return on Investment.....	75
Challenges.....	76
Future State of This Project	76
Chapter 5: Mexico Case Study	78
What was the Need?.....	78
Objectives for the Mexico Project	79
Why Mexico?.....	80
Overview.....	80
Mobile Penetration.....	81
CRS Programming Needs.....	83
Partners	84
Key Players	84
Background of Viamo.....	84
Background of CRS	85
Background of América Móvil.....	85
Background of Christian Tillett	86
Why Were They Chosen?.....	86
América Móvil - Telcel.....	86
Viamo.....	91
CRS.....	93

Christian Tillett.....	94
Barriers to Entry.....	94
Political Tensions with the US.....	94
Technology	95
How Can 3-2-1 Address the Need?	95
Role of Social Media in the Project	96
Project Methods/Implementation.....	96
Create a relationship with a Mexican Mobile Network Operator.....	96
Create Partnerships with other Mexican Nonprofits that could Benefit from Viamo.....	97
Message Creation and Execution of Project	97
Content Creation Workshops.....	97
Deployment of Content to 3-2-1 Platform	98
Advertisement/Adoption of the Platform.....	99
Case for Yammer	99
Statistics for Use of 3-2-1 Service	100
External Social Media Outreach – Case for Facebook	100
Strategy	101
Create a Social Media Presence.....	101
Audience.....	101
Purpose.....	101
How to Measure Success.....	102

Internal Social Media Campaign – Yammer	103
External Social Media Campaign – Facebook.....	106
Statistics to Be Measured.....	109
Results.....	111
Cost/Return on Investment	112
Chapter 6: Conclusion.....	120
Contributions.....	120
ICT4D Field	122
Limitations	123
Future Work	125
References.....	127
Appendix A: Post Implementation Survey	135
Appendix B: Statistical Results of Country Program Usage of the 3-2-1 Service	140
Appendix C: Mexico Market Analysis Provided to Viamo.....	141

List of Tables

Table 1. Sustainable Development Goals	21
Table 2. Summary of ICT4D Research History.....	26
Table 3. Summary of ICT4D Phases	27
Table 4. Internet users as a percentage of regional population.....	31
Table 5. 3-2-1 Usage in Nigeria.....	74
Table 6. Transportation Cost Prediction	113
Table 7. Training Cost Prediction.....	114
Table 8. Overhead Cost Prediction	114
Table 9. Face-to-Face Meeting Cost Prediction	115
Table 10. Message Cost Prediction.....	116
Table 11. Message Dissemination Cost Prediction.....	117
Table 12. Marketing Cost Prediction	117
Table 13. Overhead Cost Prediction	118
Table 14. Total Cost Per Message Bundle Prediction	118

List of Figures

Figure 1. Current ITU Global Project Portfolio (ITU, 2020a)	3
Figure 2. ITU Projects Around the World (2007-2020) (ITU, 2020a)	3
Figure 3. Information and communication technology (ICT) research and development (R&D) expenditure in the United States and Worldwide (Statista, 2019a)	4
Figure 4. Key digital ICT indicators for developing countries (Heeks, 2020)	29
Figure 5. The Generations of Digital Infrastructure for Development (Heeks, 2020)	32
Figure 6. Individuals Using the Internet per 100 Inhabitants (ICT Facts and Figures 2017, 2018)	37
Figure 7. GINI Coefficient World Map (GINI Index (World Bank Estimate) by Country, 2018)	39
Figure 8. Internet penetration rate for men and women, 2019 (ITU, 2019)	47
Figure 9. Social Media Framework Theories, Elements and Guidelines (Raghavendra, 2016)	59
Figure 10. Example of a CRS Poster Used in the Marketing Campaign for the 3-2-1 Service in Nigeria (Clifton, 2018)	71
Figure 11. Mobile penetration chart of the 10 largest countries by population (The State of Mexico’s Mobile Market - EMarketer, 2019)	82
Figure 12. Performance Tests for Mexican MNOs (OpenSignal, 2018)	87
Figure 13. Telcel Voice/Text (2G) Coverage, 2018 (Cellular Maps.Com, 2018)	88
Figure 14. Telcel 3G Coverage, 2018 (Cellular Maps.Com, 2018)	88

[Figure 15. Telcel 4G Coverage, 2018 \(Cellular Maps.Com, 2018\)](#)..... 89

[Figure 16. The chart shows the total number of mobile phone users in Mexico from 2011 to 2020 \(Statista, 2020\)](#)..... 90

[Figure 17. Example Dashboard for Analytics of Yammer Usage](#) 106

Chapter 1: Introduction

Information and communication technologies (ICTs) for development, otherwise known as ICT4D, is the concept that through better information and communication flow utilizing modern technologies, developing nations can receive knowledge that could better their society. The study of and application of ICT4D is a multidisciplinary approach that spans across the social sciences, technology, economic and political arenas in addition to other vast possibilities. Some other acronyms that have been used for the same area of study are ICTD and ITD; however, no matter what you want to call it, the focus is on the use of ICTs for international development (Walsham, 2017). The primary audience of ICT4D is what non-governmental organizations (NGOs) or nonprofits would call vulnerable populations; these populations are often materially disadvantaged, physically disabled, subject to oppression due to race, sex, sexual orientation, or socio-economic background. According to the 1999 World Development Report, “Knowledge is like light. Weightless and intangible, it can travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty – unnecessarily” (Wilson, 2003, p. 1). The lack of information creates a divide, now deemed the digital divide, in which underdeveloped nations are viewed as information-poor nations. Due to this paucity of valuable information, they experience economic disadvantages. The response to close the digital divide has occurred through global political action and goals by the United Nations (UN). In addition to the funding and goals set by the UN to address these targets, many individuals and other organizations feel compelled to offer their assistance in these endeavors. These projects seem more valuable than for-profit engagements that benefit of big business: “[S]eeking to squeeze a few extra ounces of productivity from firms that already perform relatively well, or save a few minutes in the life of a busy citizen, pales in ethical importance when compared to the potential benefits of applying new technology to our planet’s mega-problems,” (Heeks, 2008).

The ICT4D field comprises two types of organizations: 1) organizations that are specifically founded with the sole purpose of engaging in ICT4D activities/projects and, 2) commercial companies that fund ICT4D projects/activities as part of their portfolio or effort for corporate social responsibility. These different organizations often act as independent entities, although there is a push to create a consortium where knowledge management can drive the design, implementation and adoption of future projects. This consortium effort is being led by Catholic Relief Services and NetHope through their annual conference. The International Telecommunication Union (ITU) is the United Nations specialized agency that focuses on the use of information and community technologies and tracks progress made within the field as well as achievement of the defined global development goals. Since 2007, the ITU has reported the inception of 251 projects, with 191 of these projects being considered implemented [completed]. There are approximately 149 beneficiary countries of these projects. Currently, the 60 ongoing projects account for a portfolio equal to roughly \$80 million. The following figure shows the current ITU project portfolio breakdown around the world:

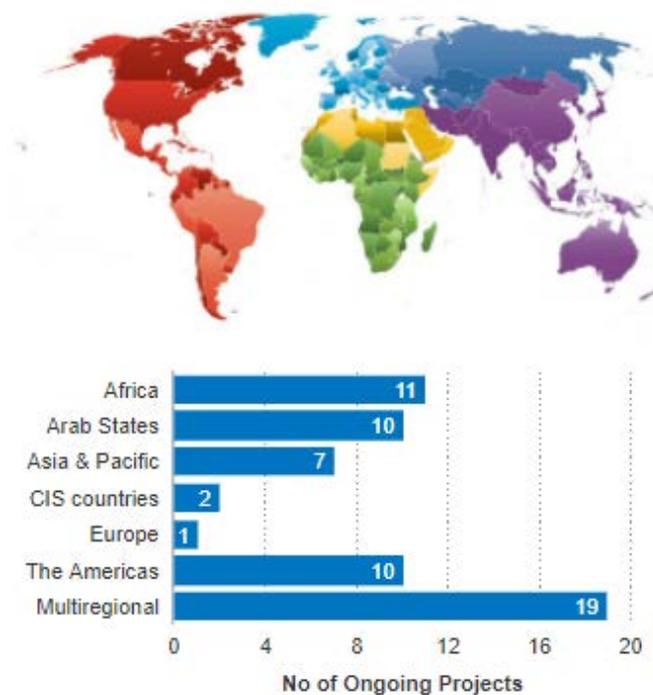


Figure 1. Current ITU Global Project Portfolio (ITU, 2020a)

The chart below shows the distribution of projects with the darker blue accounting for the countries that have more projects and the lighter blue showing the countries with fewer projects:

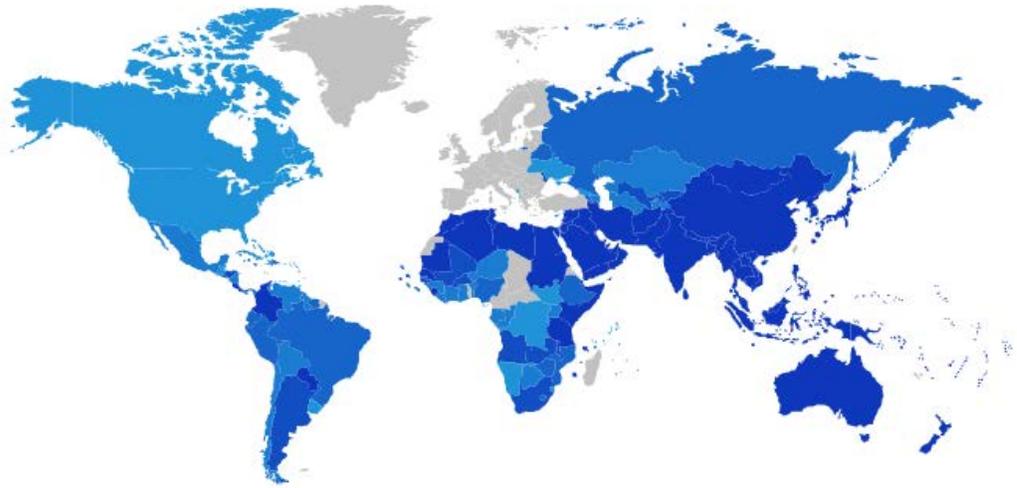


Figure 2. ITU Projects Around the World (2007-2020) (ITU, 2020a)

Although historical data showing total investments in ICT4D does not exist at an aggregate level, statistics provided by Statista show an increase in expenditure in ICT research and development within the world over the past five years, although this is not limited to ICT4D specifically:

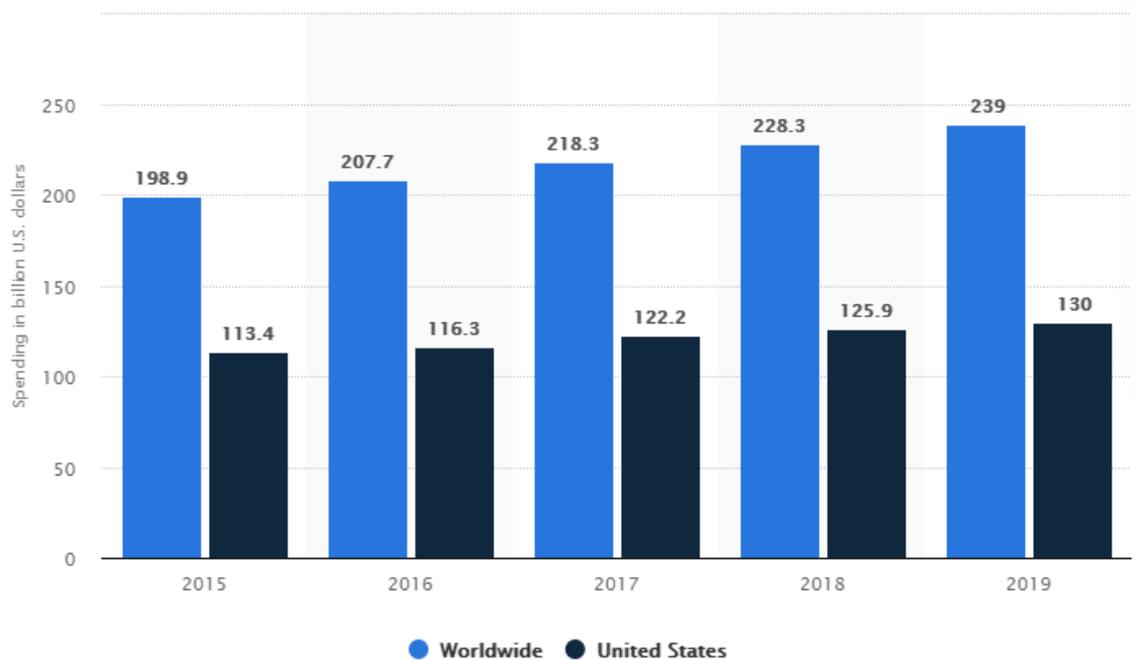


Figure 3. Information and communication technology (ICT) research and development (R&D) expenditure in the United States and Worldwide (*Statista, 2019a*)

While the ICT4D field continues to grow in terms of political awareness, number of projects, and resources that investors are contributing to the field, problems remain with project adoption and sustainability. Social media can have the ability to provide growth opportunities for ICT4D nonprofit organizations and non-governmental organizations (NGOs) through project adoption and collaboration. However, ICT4D projects lack guidance on how to track and analyze the success of social media campaigns on adoption. At this time, there is no support recorded within the ITU for an ICT4D project that involves the use of social media. However, in the case of ICT4D projects, the collaborative nature of social media can provide a channel to solicit feedback, impart good practices, and overall drive adoption of the solution for which the project is being conducted. For example, Catholic Relief Services (CRS) has identified a need to drive adoption of the 3-2-1 service, a service that allows users to call a toll-free

code to seek content validated by local experts based on their need, both internally as an enterprise tool/project and externally to drive awareness and adoption for service use. This paper seeks to explore how social media can support adoption of an ICT4D project and proposes a project framework to measure the success of a social media campaign through the use of Yammer and Facebook and their built-in platform analytics.

Chapter 2: Literature Review

History of ICT4D

While the history of ICT4D continues to evolve as the development paradigms and technology evolves, there are four different phases that can provide historical context in the creation of the field, the challenges within that time period and the evolution of the field. Each phase highlights distinctions between technology paradigms, goals, project types and the intended audience.

ICT4D 0.0

Summary. The first phase of ICT4D was the groundbreaking phase, or ICT4D 0.0, and was linked with the first utilization of a digital computer in Kolkata, India in 1956. This phase is considered the longest phase in the history of ICT4D and is associated with the time period between the mid-20th century, approximately 1950s, to the mid-1990s. The Kolkata project was an effort between England and India and focused on the development and installation of the world's first digital computer, the HEC-2M, to complete numerical calculations at the Indian Statistical Institute. The main purpose of this project was to allow for quicker and more accurate statistical analysis for India's national plans (The Godfather of ICT4D, and ICT4D's First Computer | ICTs for Development, n.d.). This technology allowed for the country to do computations to guarantee military defense and to complete "trajectory analysis for artillery canons" ("The First Computer Comes to India...", 2006). The input and output from these calculations consisted of punch cards.

ICT4D 0.0 focused on the use of information technology for data processing. The projects were not focused around communication or leveraging technology to assist vulnerable populations, but rather was centralized towards the benefits that technology could bring to governments, specifically within administrative functions. As technology shifted towards the mainstream, the second focus of this phase was on the role that

information technology could play in assisting with back-office administrative work within the private sector.

Goals. There were two goals during the 0.0 phase: 1) To assist in completing administrative tasks within governments, specifically governments in developing nations, and 2) delivery of economic growth in the private sector. These goals were not formal goals, but rather were the consistent objectives of most of the projects during this phase.

Primary Actors. As shown by the first ICT4D project in Kolkata, India, the primary intended audience in the ICT4D 0.0 phase was the government, and developers were using IT tools to assist in internal administrative functions of the public sector in developing countries (Heeks, 2008). As phase 0.0 started to develop into phase 1.0, the field saw a shift in how technology was utilized, approximately around the 1980s, where multinational corporations fueled by the creation of the microcomputer and its associated software shifted their focus towards using IT for economic growth in the private sector.

Types of Projects. Projects during this initial phase were few and far between due to cost implications and lack of familiarity with the tools available. Some key projects that occurred during this time period were created by the United Nations Development Programme (UNDP), that was launched in 1966 with the objective of improving technical, administrative and human resources within developing nations. The expansion of networks within Africa, Asia, and Latin America such as the Pan-African Telecommunications Network (PANAFTEL) and the Middle East and Mediterranean telecommunication master plan (MEDARABTEL) were key during this stage (ITU, 2020b).

Achievements/Challenges. The UN Expanded Programme of Technical Assistance merged with the UN Special Fund, resulting in the creation of the still existent UNDP. The UNDP shaped the path for the field of ICT4D by beginning global

conversations, framed within the ITU Plenipotentiary Conference in Nairobi in 1982, through the creation of the Independent Commission for World-Wide Telecommunications Development. This commission that began work in 1983 provided research through its report titled “The Missing Link,” otherwise known as the Maitland Report, about the intersectionality of telecommunications and economic growth. It brought international attention to the disparity in information technology access between the developed and developing world. Additionally, the first recorded journal dedicated to the field of ICT4D was created: the journal Information Technology for Development (ITD) launched its initial publication in 1986 (Walsham, 2017). Research in this journal primarily focused on application to the Information Science (IS) field.

Lessons Learned. Over time, the focus in this phase shifted from one that was government-centric to one that could be applied towards a global perspective. The expansion of the networks helped the field as guided by the UNDP to focus on the role of telecommunication and information as it applied to development. With the guidance of the “Missing Link,” international awareness increased about the accessibility issues within developing nations and highlighted how these issues could be shaping their lack of economic growth. One of the key milestones during this time period was a conference held in New Delhi, India, in 1988, that focused on the “social implications of IS in developing countries.” This conference was organized by the Information Federation for Information Processing and has led to a conference series that continues to this day. The proceedings from these conferences have been utilized to drive research in ICT4D work and to provide guidance for other conferences to be created to further work on IS in developing countries. The themes captured in the 1986 New Delhi conference pulled themes from mainstream information sciences and applied them to the needs of the developing nations and are listed below:

1. “Context is Important” – Technology implementation is futile if there is no social context for the usage of the technology being deployed.

2. “Participative and Cooperative Design” – Adoption of the technology can increase with consultation of the users that are expected to use the technology along with the computer experts.
3. “Need for Indigenous Development” – Technology can be adapted to fit the needs of the developing countries, but there is a significant portion of technology that needs to be developed indigenously.
4. “IT is only one element of change efforts” – IT is not enough by itself and other subject matter experts (SMEs) in the chosen areas where the technology is to be implemented need to work with IT as change agents.

These same themes carried from the end of ICT4D phase 0.0 into ICT4D phase 1.0 and helped to shape core ideals, project design, and future political development goals. The most crucial catalyst for the change between the two phases would be linked to increasing technology availability, decreasing cost, and the application of these themes into corresponding projects.

ICT4D 1.0

Summary. The mid-1990s to the mid-2000s, known as ICT4D 1.0, saw an increase in availability of the Internet and search engines and saw a decrease in cost of technology (Walsham, 2017). With Internet accessibility being more cost-efficient, there was an increase in interest in ICT4D projects and a shift in the type of projects that were being done within the field. Besides the availability of the Internet globally, the other primary driver for the next phase of ICT4D was the focus on the political arena where international development took a front seat. This political focus came as a natural result from the conferences and telecommunication reports highlighting the imbalance of accessibility between developed and developing countries that characterized the end of ICT4D 0.0. In addition to the increase in the number of ICT4D projects being implemented, there was an increase in the scope and range of ICT4D projects in the IS

field, as well as a move towards the use of ICT4D for multi-disciplinary purposes (Walsham, 2017).

Politically, the 1998 World Development report helped to highlight the role of information, knowledge, and ICT in economic development; the creation of the G8 countries by the Digital Opportunities Task Force in 2000 helped to create actionable tasks for ICT4D. Then the World Summits of 2003 in Geneva and 2005 in Tunis helped to add learning and policy-formation to the ICT4D trajectory (Heeks, 2008). The largest political action to highlight the need for international development and the reduction of poverty came from the Millennium Development Goals, which subsequently provided targets for projects to try to achieve. With the creation of the MDGs, funding became more available from governmental agencies, nonprofit organizations, and NGOs; debts within developing nations were forgiven, so that the funds could be redirected towards programs/projects that focused on outcomes that targeted the MDGs. The MDGs, along with the technological advances of the 1990s, helped to advance the field of ICT4D by encouraging additional publications, bodies, events, programs and project funding. The research within the ICT4D field continued to flourish and the Electronic Journal of Information Systems for Developing Countries (EJISDC) was started in 2000, an open access journal from its very foundation, providing access to research results for developing countries as well as to organizations with limited budget constraints. This journal also included articles that were written by authors that were not primarily linked to the IS discipline, in the hope that this could increase readership across developing nations as well as among academics in other disciplines. In addition, the journal Information Technologies and International Development (ITID) launched in 2003 with a similar premise of open access, with a strict interdisciplinary focus as opposed to an exclusive focus on information systems.

Goals. During ICT4D 1.0, international development gained more traction in the political arena and the global political economy sought to reduce poverty while improving health, education and gender equality. The United Nations played a key role in

establishing goals that would “commit world leaders to combat poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women” (World Health Organization, 2015). The original set of goals that were created to align with this political momentum came from the International Development Goals formulated in 1996 and were later formalized and adopted as the Millennium Development Goals (MDGs) in September of 2000. Eight MDGs were agreed upon by 191 UN member states and 22 international organizations with the target achievement date of 2015; the MDGs are listed below:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Global partnership for development

Aside from the eight goals listed above, there were 21 specific targets, and 60 indicators for achieving these targets. The role of ICT4D was to utilize technology in a meaningful way to achieve the overall goals defined by the MDGs. The goals are considered to be inter-dependent, with all of the individual goals within the framework of the MDGs being focused around improving the health of individuals. The key actors that emerged in the ICT4D arena were international development organizations and NGOs, who facilitated the transition of MDGs into actual projects attempting to achieve the target goals. The MDGs were created to pave a path forward in reducing extreme poverty (defined as living for under \$1.25 per day) and improving the everyday lives of citizens in developing nations. With the UN member states agreeing to the eight goals, funding, resources and targets became more available; these goals were reviewed every five years to assess the progress towards achieving the MDGs.

Primary Actors. With the emergence of the MDGs and the focus on creating technological solutions to benefit the marginalized, the key actors shifted from government and the private sector to international development organizations and NGOs. Projects were aimed at population groups rather than at governments.

Types of Projects. The type of content covered in ICT4D 1.0 projects was focused around creating knowledge networks in local context. Specifically, the technologies during this phase aimed to provide content around issues specific towards that community such as agriculture, education, health, and politics. With the increase in knowledge came the drive to also provide more public services via Internet access to the poor through e-government initiatives. The five main categories of projects were: creation of telecentres, networks and partnerships; e-commerce, e-services, and education. The archetypal 1.0 project was focused on providing Internet access to developing populations, specifically through the creation of cybercafes, telephone kiosks and telecentres. The most prominent of these three venues was the telecentre, specifically a community telecentre, which was a room or building that had one or more Internet-connected PCs and was meant to allow the local community access to information, communication and services. An example is the pioneer project titled “InforCauca” that was completed in Colombia. The objective of this project was to “strengthen communities in marginalized areas in their capacity to appropriate new information and communication technologies (ICT) for their own development” (Staiger, 2007). The project was to create three community telecentres in southwestern Colombia so that groups and individuals in the surrounding rural areas could gain additional information to help them with their daily lives. It was believed that if the role and capacities of specific individuals seeking information, the “information intermediaries,” could be grown by the use of these computers for knowledge that this information could then spread out to other local people through local information networks. Some of the more acclaimed telecentre projects that were done during this phase were InforCauca in Colombia, CLICs in Mali and Gyandoot in India. Most telecentre projects had similar objectives and goals; the key

difference was in the size of the telecentre and the location where it was implemented. These projects weren't the only type of project during Phase 1.0 but were the most frequently completed projects as they were easy to setup and partnerships or sponsorships by large IT corporations would often fund the hardware to get the project functional.

Achievements/Challenges. The projects in ICT4D 1.0 saw failures due to tight timeframes and pressure to show progress. Oftentimes projects were constructed with a “plug and play” mentality, with the notion that an off-the-shelf product could be utilized in a developing nation to assist a vulnerable population and then easily replicated out to other developing nations in the same capacity. There was a large increase in project failure rates during this phase, as cultural differences, environmental differences, and geographic needs weren't considered when these projects were rolled out to their intended audiences. The failures in the ICT4D 1.0 projects led to discussions and desires to promote projects that encouraged sustainability, scalability and evaluation (Heeks, 2008). Thus, ICT4D focus on projects that focused on availability of these technologies, whereas the next phase, 2.0, was set to focus explicitly on sustainability, scalability and impact. A key cause of failure that would also shape the projects in phase 2.0 was around understanding the affected audience of the product and incorporating the audience into the design of the project. Projects within 1.0 tended to be rigid and did not allow for flexibility based on lessons learned as the project progressed; technologies were pushed to the users from a top-down approach. Lack of project leadership and metrics to determine adoption and success of the project also contributed to project failure within this phase as well.

The telecentre project specifically highlighted the lack of foresight into solution design and implementation. Telecentres were created to impart knowledge through Internet access, but there was no preliminary investigation into the community where these structures were being created. Demographics of the intended audience, including technical skill, literacy, language, education, religion, and gender inclusivity, were never considered nor factored into how this solution would be utilized. Local and specifically

rural communities were never brought into the project to assist with adoption and never viewed the telecentre as something that they owned, so the telecentre never became integral to the community itself. The structures were set up, a proposed Western approach towards use was disseminated, and then the solution teams departed and marked the project as completed. There was no formalized plan to assist the local population in adopting the technology; the local community was not trained in how to maintain the solution, nor in how to scale the solution to provide more relevance and value to them. Furthermore, the organizations creating these telecentres did not consider the economic impact of asking the community to maintain the technology and the availability of infrastructure to keep these structures functioning. There was limited budget to afford the electricity, maintenance on the computers, internet service, and building maintenance, as well as a lack of trained labor resources to fulfill the day-to-day operations of the solution. The telecentre, while technically implemented, doesn't consider the true impact or benefit that it can bring the local community, the barriers faced by the community in order to utilize the proposed solution, and thus it ignores the resource constraints affecting sustainability or scalability. The limited reach of the telecentre as highlighted above helped to frame the future path for ICT4D 2.0 in the evolution from PC to mobile development.

Lessons Learned. Technology is transformative, but the people intended to benefit from these ICT4D projects for were not being considered. There needed to be a shift in how projects were designed, in the requirements for the solution, and by adding the involvement of the affected population, in order to build solutions that can actually increase the capabilities of the target populations.

One of the lessons of ICT4D 1.0 was the conceptual development of two main innovation models for ICT4D: passive diffusion and active innovation. Passive diffusion is the premise that an ICT could have a developmental gain for the poor, that there is a symbiotic relationship that will result in both the private firm finding profit plus the poor's search for value will bring the innovation to their market. Active innovation takes

a different approach by assuming that the market will not deliver or will be delayed in delivery to meet the needs of the poor. This approach requires deliberate intervention and a focus on creating innovations that will help to meet the poor's needs in a more responsive capacity. The first two phases of ICT4D, 0.0 and 1.0, were heavily linked with the passive diffusion model where projects were often funded by high-tech companies or nonprofits that focused on a Western approach towards innovation and development. The overarching principal was one built on the notion of "if we build it, they will come" as opposed to taking in the contextual needs of the affected populations. Toward the end of the first phase of ICT4D, as we transitioned into ICT4D 2.0, nonprofits and other NGO's started to explore the ethnographic needs of those that they were intending to help with development; with this shift came the adoption of active innovation.

Moreover, within the innovation model, theorists eventually identified three different approaches to project development: pro-poor, para-poor and per-poor, defined as projects designed for the poor, versus projects designed with the participation of the poor, versus projects designed primarily by the poor themselves, with help and support from outside resources. Phase 2.0 began with a deliberate shift from pro-poor to para-poor.

Pro-poor innovation is done on the behalf of the poor but is designed/created outside of the poor community. Some examples of pro-poor projects are the early telecentres and the one laptop per child (OLPC) initiative. One Laptop per Child is a nonprofit initiative that was created with the objective of increasing education and information available for children in developing nations through the use of educational devices, specifically laptops. The OLPC initiative provides each child a "rugged-low-cost, low-power connected laptop" that contains collaborative content and software to facilitate self-empowered learning (OLPC, 2020). This project was originally launched in 2005 by Nicholas Negroponte and was supported by other larger technology organizations such as AMD, eBay, Google, Nortel, Red Hat etc. This initiative was originally created with the idea that while computers were still considered to be high cost, roughly \$1,000 per laptop when the project was launched, that the technology was

necessary to help children in low-income areas gain a better education. The project was created by a US IT leader on behalf of poor children in developing nations, so it follows the pro-poor innovation schema.

One of the pros of the pro-poor approach is that it easily allows resources from first world nations to be funneled into design solutions for a developing nation; however, the major issue that occurs is that there is insufficient consideration of the reality of the poor communities where they will be implementing this solution. Project requirements are often not designed with the context of the community in mind but are designed from a Western perspective. This leads to issues with environmental design flaws, maintenance issues, and resourcing issues for the full adoption of the solution. The result of this overall project type is often failure due to the gap between design and reality.

With the realization that the pro-poor approach to innovation lacked contextual awareness, the end of phase 1.0 pivoted to use the para-poor innovation approach. Para-poor innovation occurs when the developer (agency) works alongside the poor communities. This model was heavily used during the end of the ICT4D 1.0 phase and has been prominent within the next phase of ICT4D 2.0. The transition from pro-poor to para-poor was a result of some key lessons learned from phase 1.0 of ICT4D.

A major lesson learned during the first phase of ICT4D was around the design of the interface for development. A lot of the interfaces that were built as part of the ICT4D phase 1.0 projects did not take into account local languages or the realities faced by the local “infomediaries,” the literate members of the community that were able to be taught through the method of “train the trainer” and who could then supposedly impart this knowledge to the community (Heeks, 2010). There were struggles in learning paradigms and trust between those that were designing the systems and those that were to use the systems. Additionally, even with access to the Internet, there were issues where the content that the locals or the marginalized communities were looking for was not in a digital format. In some cases, there was a need to create open knowledge networks where the subject matter experts within these communities could provide their own content and share with others in similar roles/capacities. This particular lesson about local content

creation helped to shape a lot of the projects in phase 2.0 as it led to a key pillar for users to be able to do content creation and share across community platforms, television, radio, etc.

Sustainability is therefore a key takeaway from phase 1.0, as sometimes those designing the projects get caught up in the technology without considering whether or not the solution is one that can actually resolve the issue within that community. Another example is that some nations that were having ICT4D projects implemented were receiving laptops when they do not even have access to electricity to maintain or use them. The current infrastructure needs to be considered during project design; if the project depends on certain infrastructure needs to work, then it must be determined if the nation has that access or otherwise that solution is not viable at all. The solution needs to be designed in accordance with the least available infrastructure, and must include alternative technologies such as solar or short message service (SMS) to prepare for intermittent availability. It also sometimes happened that ICT4D projects would be designed around donations of old technology. However, modern technologies typically require less power than older technologies to function (TEDxIIT - Dr. Laura Hosman - Technology for Development, 2011). The technologies should always be simple and easy to use, as oftentimes the people that will be using them will have never used a similar technology. Handheld technologies are preferred as they are portable and easy to take with the user. Of course, the technology does not need to be bleeding edge, but rather a stable, user friendly interface that serves to meet the user's needs. Technology doesn't need to be a computer but can be as simple as a radio or a mobile phone using SMS.

Finally, when creating an ICT4D project, there needs to be a dialogue between the organization's culture and the culture where they are going; all negative assumptions about that culture need to be removed. It was found that project leaders would go into the country with the intention of assisting, but in doing so, sometimes entered with negative ideas that the country is not capable or knowledgeable about how to do certain things such as farming, healthcare, finance, etc. The assumption was that the developing nation needed to be taught the proper way in how to do things, which generally meant the way

the project leaders thought appropriate. Instead of going into a nation and forcing a Western approach into their society, the project leads should go into the nation, determine what they do well, and then design projects that help them build on that strength. The best solution in the Western world might not be the best solution in a developing nation; there is no “silver bullet” that can apply across all realms. Project leadership needs to look for the advantages of that country, such as natural resources or practices that they do well, and find an appropriate technology that will help them grow their abilities.

ICT4D 2.0

Summary. There is no single date to link to the beginning of ICT4D 2.0, but as lessons were learned from ICT4D 1.0, projects began increasingly to account for the failures that were seen. The rough time frame for phase 2.0 is generally considered to be the mid-2000s to the late-2000s. While ICT4D 1.0 saw “ICTs as a tool for development, the second phase sees ICTs as the platform for that development,” (Heeks, 2008). The first phase of ICT4D saw a paradigm shift from what technology might be imported, to a focus on approaching projects with the technology that is currently prevalent within the poor communities such as radios or televisions. A primary goal during phase 2.0 was on findings ways to bring the Internet to those that were still lacking access. To try to achieve these goals, projects often focused on the use of low-cost terminals, wireless connectivity, and low-power or solar based solutions. While phase 1.0 focused on the use of personal computers (PCs) and landlines, this technology was found to be too expensive to maintain or scale for developing nations. Phase 2.0 also saw the emergence of a key technology called the mobile phone. Research increasingly showed that even those that were considered to be living well below the poverty line had access to a mobile phone. Thus, a growing emphasis during this phase highlighted the need to find innovation within mobile development (m-development), and on the development of services to reach the growing mobile base.

The shift from a blueprint approach in phase 1.0 to a process approach in phase 2.0 was due to the lessons learned from the failures in phase 1.0. Where the projects in 1.0 were designed by technical implementers without exploring the understanding that the users had, phase 2.0 shifted towards participation of the beneficiaries in the design of the project (a shift from pro-poor innovation to para-poor innovation). The premise of this innovation model is to focus on a participatory and user-engaged design process. Additionally, the process approach in phase 2.0 allowed for more flexibility in the implementation of the project and embraced improving the implementation of the project based on past experiences and through an iterative process. An example of a para-poor project is the project done by Dorien Baelden and Leo Van Audenhove that focused on the use of a living lab research method to create a mobile social media app for a rural Tanzanian University.

However, while para-poor projects have seen better success than the pro-poor projects that characterized phase 1.0, these projects still encountered issues with community participation. The sample that is chosen to represent the community's voice is generally small in size and is sometimes not representative. Projects need to focus on getting an equal representation of people of all relevant social levels, socioeconomic levels, genders, levels of technical skill, and educational levels. Designers and project leads using the para-poor approach should allow for participation and user-engaged design to occur in ways that both encourage community engagement as well as allow for an individual's ideas to be heard without social pressure to adhere to the opinion of group majorities; there needs to be an active effort to remove groupthink.

Towards the end of phase 2.0, ICT4D projects began to pursue a per-poor approach. Per-poor innovation (or grassroots innovation) is innovation that is led by the poor communities and is created within the poor communities. Previously, this mode of innovation was complex as it was hard for poor communities and technologists to get access new technology. However, with the increase in cheaper technology and the widespread use of the Internet, we have seen a surge in the poor becoming innovators and adapting new technologies that can help better their communities. Innovation doesn't

always come in the form of new development, but may consist of adopting existing technology in ways that could be beneficial to themselves or to their communities. Examples include mobile payments, new business processes, and new products. An example of a per-poor innovation is the project completed in Assam, India, by Priyamvada Tiwari and Keyur Sorathia of the Indian Institute of Technology, where an audio-visual application was designed for use on the Nokia 6303 and allowed affected mothers to get maternal health care information and provided access to healthcare from government health care facilities through remote monitoring (Tiwari & Sorathia, 2014). As the field of ICT4D continues to evolve, a number of projects are beginning to shift to a per-poor innovation approach with the community in the driver seat and the technologists and agencies providing assistance as needed by the community to be successful.

Goals. All phases of ICT4D have some overlap in their goals, as oftentimes the lessons learned that were being implemented at the end of the precursor phase are further formalized into the goals for the subsequent phase. Thus, there was a continuation in the goals from phase 1.0 as the targets for the MDGs were still in place during a large portion of phase 2.0. However, in addition to the implementation and development of solutions to fulfill the MDG goals, phase 2.0 increasingly emphasized the need to track adoption, sustainability, scalability, and actual impact. Moreover, Phase 2.0 also saw an explicit shift from the Millennium Development Goals into the Sustainability Development Goals as the ICT4D field began its transition to phase 3.0.

With the conclusion of the MDG initiatives in September 2015, the UN and its member countries announced the successor plan, the Sustainable Development Goals (SDGs) on September 25, 2015, with the focus on guiding policy and funding in order to end poverty everywhere permanently. Partnered with the pledge to “Leave No One Behind ,” the SDGs focus on fast-tracking the countries that are considered to be the furthest behind, aiming for the eventual eradication of some of the world’s largest issues such as poverty, hunger, AIDS, and gender inequality. The SDGs are targeted to be

achieved in 2030, fifteen years after their declaration; this timeframe is similar to the timeframe of the MDGs, and the goals build on the work that has been done thus far. There are seventeen integrated SDG goals and 169 targets, with each goal having multiple targets to assist in the outcome of the goal. Goals are meant to balance social, economic and environmental sustainability. The SDG goals are described in Table 1.

Table 1

Sustainable Development Goals

Goal	
1. <i>No Poverty</i> : Economic growth must be inclusive to provide sustainable jobs and promote equality.	2. <i>Zero Hunger</i> : The food and agriculture sector offer key solutions for development and is central for hunger and poverty eradication.
3. <i>Good Health and Well-being</i> : Ensuring healthy lives and promoting the well-being for all at all ages is essential to sustainable development.	4. <i>Quality Education</i> : Obtaining a quality education is the foundation to improving people's lives and sustainable development
5. <i>Gender Equality</i> : Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world.	6. <i>Clean Water and Sanitation</i> : Clean, accessible water for all is an essential part of the world we want to live in.
7. <i>Affordable and Clean Energy</i> : Energy is central to nearly every major challenge and opportunity.	8. <i>Decent Work and Economic Growth</i> : Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs.

- 9. Industry, Innovation and Infrastructure:** Investments in infrastructure are crucial to achieving sustainable development.
- 10. Reduced Inequalities:** To reduce inequalities, policies should be universal in principle, paying attention to the needs of disadvantaged and marginalized populations.
- 11. Sustainable Cities and Communities:** There needs to be a future in which cities provide opportunities for all, with access to basic services, energy, housing, transportation and more.
- 12. Responsible Consumption and Production:** Responsible Production and Consumption
- 13. Climate Action:** Climate change is a global challenge that affects everyone, everywhere.
- 14. Life Below Water:** Careful management of this essential global resource is a key feature of a sustainable future.
- 15. Life on Land:** Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
- 16. Peace, Justice and Strong Institutions:** Access to justice for all, and building effective, accountable institutions at all levels.
- 17. Partnerships for the Goals:** Revitalize the global partnership for sustainable development.

As the field of ICT4D carries these goals into phase 3.0, there has been an additional emphasis on the following three themes:

1. Transformation – The incremental development changes that have been achieved thus far will not be sufficient in the future. Whereas the MDGs

focused specifically on developing nations and utilized terminology around international development, the SDGs take a more universal approach and will focus on global development goals. This is acknowledged to be a challenging goal. Per-poor ICT4D projects are often incremental, and everyone wants to maintain the focus on per-poor project design. However, it is hoped that international groups, NGOs, governments, and nonprofits will also find ways to make room for and support dramatic changes.

2. Inclusion – There needs to be a focus on opportunities and benefits for all, including those that have been excluded by these development efforts historically. The MDGs were targeted as a first attempt to remove hunger and poverty, whereas the SDGs are designed to “get to a statistical “zero” on hunger, poverty, preventable child deaths and other targets” (Sandesh Adhikari, 2019). The focused areas expand from health and social dimensions to include economic growth, environmental protection, human rights, peacebuilding, equity and social inclusion.
3. Sustainability – Current needs must be addressed by development without stifling the abilities of future generations to meet their needs. This need for sustainability has been consistent from phase 2.0 into phase 3.0, since one of the biggest reasons for projects continuing to fail is due to lack of sustainability. Global partnerships will play a key role in sustainability of the SDG goals; there is an interdependence between the targeted areas, the affected populations, and the commitment from all stakeholders in order to implement solutions to achieve the goals.

Primary Actors. Where phase 0.0 focused on the government and private sectors, phase 1.0 focused on NGOs and development organizations, phase 2.0 includes all sectors. The emergence of the concept of corporate social responsibility has led the private sector to invest into more ICT4D projects; where investments of multinationals

existed within phase 1.0, there is growing investment from the IT firms of the APAC region, specifically within the countries of China, India and South Korea. Along with the private sector, public-private partnerships became a key concept in phase 2.0, allowing projects to leverage the information and processes of the government alongside the technology and implementation strategy of private sector firms. These partnerships lend themselves to the mobile development landscape of e-education, e-government, and e-enterprise (Heeks, 2010).

The emergence of crowd-source funding through platforms like Kiva or UN Online Volunteering also allowed individual donors to pick projects that were important to them and become a financial stakeholder.

Types of Projects. Content in ICT4D 2.0 was focused around the idea of involving the community in the interactions with the technology, and on the notion of building open knowledge networks and having local members be creators of content. One of the major types of projects being conducted during this phase was the concept of community radio that allowed for localized content dissemination but would also allow for community interaction. In addition, there was content created using the concept of participatory video where local community members could create video content that could be presented at screenings for groups of the community. Content creation is paramount in this phase of ICT4D. The focus shifted from a more IT-driven approach to a focus on communication, as research showed that the poor had valuable social networks that were viewed as “small, local and informal” (Heeks, 2008). Phase 2.0 highlighted the use of technology not only as a way to gain access to information, but as a way to empower people to find personal economic growth by providing income-generating goods or services that could be enhanced by technology or by knowledge provided through technology. Heeks provides an example of ICT-enabled microenterprises that sell pre-paid service cards for telecommunications or Internet access, accessories related to the hardware around the ICT, or micropayments from platforms that generate income from the content they host (YouTube, Blogs, Mashers etc.) (Heeks, 2010).

Achievements/Challenges. During phases 1.0 and 2.0, the MDGs led to progress on the reduction of extreme poverty, and the final MDG report has found that the 15 year-effort from September 2000 until September 2015 has been the “most successful anti-poverty movement in history” (UNDP, 2015). Some of the key findings of the MDG Report as listed by the United Nations Development Programme include:

- The number of people living in extreme poverty has declined by more than 50%
- The proportion of undernourished people in the developing regions has fallen by almost 50%
- The primary school enrollment rate in the developing regions has reached 91%, and many more girls are now in school compared to the year 2000
- Remarkable gains have been made in the fight against HIV/Aids, malaria and tuberculosis
- The under-five mortality rate has declined by more than half, and maternal mortality is down 45% worldwide
- The target of halving the proportion of people who lack access to improved sources of water was met.

While the efforts to achieve these goals took many forms, from international community projects, to civil society initiatives, to ICT4D projects, and even private sector projects, progress has been made in helping those living in destitution to be able to achieve a better quality of life. However, while there has been significant traction on these goals, the work still needs to continue to try to alleviate hunger, achieve full gender equality, improve health services and try to get all children into school; the path has been laid, but the shift must now be towards sustainability (UNDP, 2015).

Lessons Learned. Phase 2.0 took the lessons learned from phase 1.0 and used them to tailor project designs to be more successful in aligning with the MDGs. Specifically, the major lessons learned in phase 1.0 that translated into action for phase

2.0 were around sustainability, scalability and impact. The first three phases of ICT4D history are summarized in Tables 2 and 3.

Table 2

Summary of ICT4D Research History

Period	Characteristic Features	Publications	Some Research Achievements
Early Beginnings: Mid-1980s to Mid-1990s	<ul style="list-style-type: none"> • Largely within IS field • Social implications of IS in developing countries 	<ul style="list-style-type: none"> • Proceedings of Information Federation for Information Processing (IFIP) wg 9.4 conferences from 1988 • ITD journal launched in 1986 	<ul style="list-style-type: none"> • Themes from mainstream IS applied to developing countries
Expanding Horizons: Mid-1990s to Mid-2000s	<ul style="list-style-type: none"> • Major changes in technology • Increase in scope and range of ICT4D research in IS field • But also start of 	<ul style="list-style-type: none"> • Continuation of IFIP wg 9.4 and ITD journal • EJISDC started in 2000 – open access • ITID started in 2003 – open access and 	<ul style="list-style-type: none"> • Wide range of issues, theories, levels, and focus of analysis • Start of critiques on development, gender, etc.

	interdisciplinary focus of ICT4D	explicitly interdisciplinary	
Proliferation : Mid-2000s to Present	<ul style="list-style-type: none"> • Explosion of technology in developing countries, for example, mobile • Many disciplines involved in ICT4D research 	<ul style="list-style-type: none"> • Consolidation of existing outlets • Some special issues of prestigious journals • ICTD conference started in 2006 – explicitly interdisciplinary 	<ul style="list-style-type: none"> • Substantial research work in a range of areas • But critiques continue to raise complex issues, for example, on nature of development, role of new technologies, need for interdisciplinary

Note. From “ICT4D research: reflections on history and future agenda” by G. Walsham, 2017, *Information Technology for Development*, 23, p. 20.

Table 3
Summary of ICT4D Phases

Issue/phase	ICT4D 0.0 (1960s-mid 1990s)	ICT4D 1.0 (mid-1990s-mid- /late 2000s)	ICT4D 2.0 (mid- /late 2000s onwards)
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Iconic technology	PC database	Telecentre	Mobile phone
Key application	Data processing	Content (& interaction)	Services & production
The Poor	Who?	Consumers	Innovators & producers
Key goal	Organisational efficiency	MDGs	Growth & development?
Key issue	Technology's potential	Readiness & availability	Uptake & impact
Key actor	Government	Donors & NGOs	All sectors
Attitude	Ignore → isolate	Idolise → integrate	Integrate → innovate
Innovation model	Northern	Pro-Poor → para-poor	Para-poor → per-poor
Dominant discipline	Information systems	Informatics/Development Studies	Tribrid of CS, IS and DS
Development paradigm	Modernisation	Human development	Development 2.0

Note. From “ICT4D 3.0? Part 1 – The components of an emerging “digital-for-development” paradigm,” by R. Heeks, 2019, *The Electronic Journal of Information Systems in Developing Countries*, p. 2.

ICT4D 3.0 or the Digital for Development Paradigm

Summary. The current phase of ICT4D, which launched within the last year or so, is known as 3.0 or the “Digital for Development” paradigm, as termed by Richard Heeks. While ICTs were considered to be high technology during phases 1.0 and 2.0, the

infrastructure of the world has shifted to allow for internet access, oftentimes broadband access, to individuals in developing countries through their digital mobile phone. With this shift in technology, there has been a vocabulary shift from the phrase “information and communication technology” to “digital.” The framework for the third phase will be based on three parts:

- 1) Creating a foundation to relate digital technology to development
- 2) Operationalization of the digital systems
- 3) Quantifying the impact of the systems on development.

With the shift in infrastructure and availability of the internet to most individuals, the work being done to meet economic, political and cultural development will shift to incorporate the current tools and platforms available.

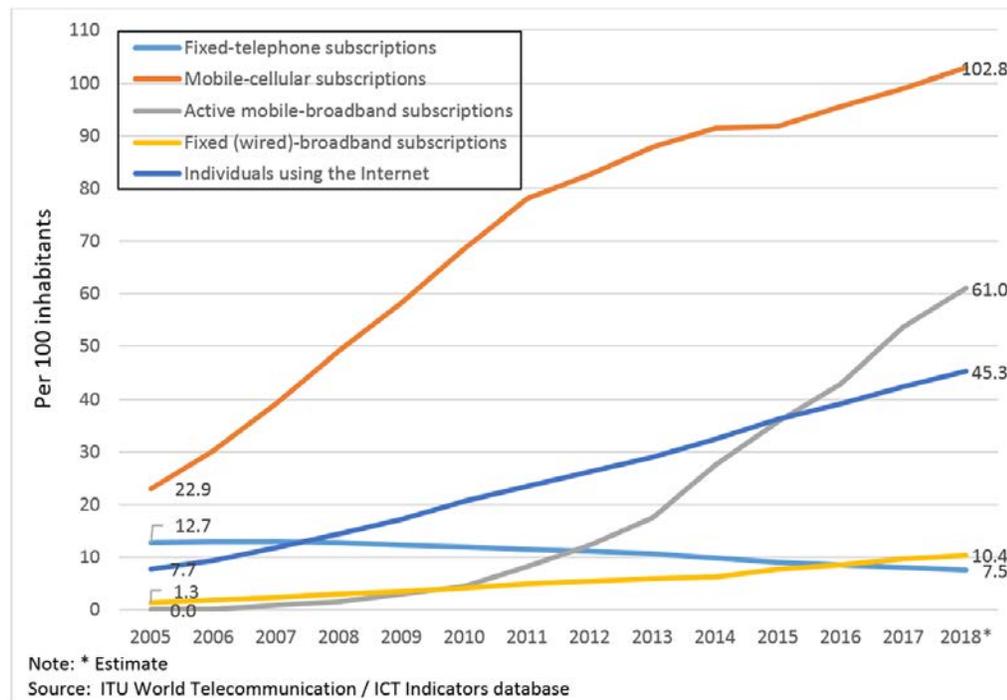


Figure 4. Key digital ICT indicators for developing countries (Heeks, 2020)

This phase of digital development will include a focus on social media: as Heeks mentions, “in 2019 North America and Europe made up just 16% of global social network users, with 60% in Asia (including Oceania), 12% in Central/South America and

11% in the Middle East and Africa and with growth rates faster in the global South than the global North” (Heeks, 2020a). The incorporation of social media into phase 3.0 is also supported by the data that “in a global sample of 28 countries, all of the top 10 countries in terms of average number of daily hours of internet usage were developing countries; as were all of the top 10 in terms of average number of daily hours of social media use” (Heeks, 2020a, p. 0).

Additionally, there has been significant impact within developing countries of the use of cloud technologies and the internet of things (IoT). Another primary insight within this phase is the shift in the notion that ICT is not a singular tool among many that enables particular aspects of development. Instead, ICT, or digital, is the “platform that increasingly mediates development” (Heeks, 2020a).

Goals. There was a continuation in the goals from phase 2.0 as the targets for the SDGs were created almost in parallel with the transition to phase 3.0. The overall focus of this phase will be to leverage digital technology to achieve global goals.

Primary Actors. ICT4D phase 2.0 saw the shift to all sectors from one defined specifically by NGOs and international development organizations. This trend will continue, but as the SDGs brought about the evolution from international development to global development, the same will apply to the actors in this phase. The transition from para-poor projects at the beginning of phase 2.0 to per-poor projects highlights the theme that phase 3.0 will aim to have more projects and technology being created using the per-poor innovation model. New digital technology will allow affected populations to create projects and solutions that are meaningful to their own context and share the knowledge gained through open source knowledge networks using digital platforms.

Types of Projects. Phase 3 projects are still in infantile stages, but Heeks predicts that mobile, broadband, and mobile broadband will be the foundational technologies, with a focus on the use of smartphones and tablets. (Heeks, 2020a). The use of social

media and cloud technologies as they partner together will also provide an avenue that builds on the concept of content creation from phase 2.0. Content creation is likely to expand to include not only self-created content but per-poor created services and will utilize digital resources that can extend to external producers and consumers. Digital platforms will continue to provide opportunities in developing countries as they expand and replace previous technologies. An already visible emerging trend on these digital platforms assists those in developing nations to secure ad-hoc employment through freelance apps/platforms like Upwork or Freelancer and physical ad-hoc jobs like Uber or TaskRabbit.

Heeks predicts that IoT is going to be a key technology in the ICT4D 3.0 project solution designs, as there are a large number of pre-built connections, objects and devices that can be utilized by or for the affected populations to help achieve targets and progress toward the SDGs. While IoT can exist as either a stand-alone sensor or as a sensor integrated into mainstream consumer goods, the strength of the digital technology exists in leveraging them in a smart capacity to move from passively collecting and transmitting data into using the data to make decisions with positive impacts to the welfare of individuals or communities. A prime example of an IoT project would be smart irrigation systems that can automatically water dry crops, or the use of soil monitoring software to predict the needs of the farmer's crops so the farmer can produce a larger surplus to take to market. Within this digital development phase, the developing world is looking into leveraging some of the newest technology such as 3D printing, blockchain, robotics and artificial intelligence (AI) and machine learning. As more of the world is gaining access to the Internet (a projected 66% of the world will have access in 2023 according to the Cisco Annual Internet Report), there is now a focus on the paradigm of access from anywhere at any time.

Table 4

Internet users as a percentage of regional population

Region	2018	2023
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Global	51%	66%
Asia Pacific	52%	72%
Central and Eastern Europe	65%	78%
Latin America	60%	70%
Middle East and Africa	24%	35%
North America	90%	92%
Western Europe	82%	87%

Note. From “Cisco Annual Internet Report,” by Cisco, 2019.

The figure below is Heeks’ prediction on the generations of digital infrastructure for development rooted in the claim that within a generation almost anyone and anything could be connected due to ubiquitous computing:

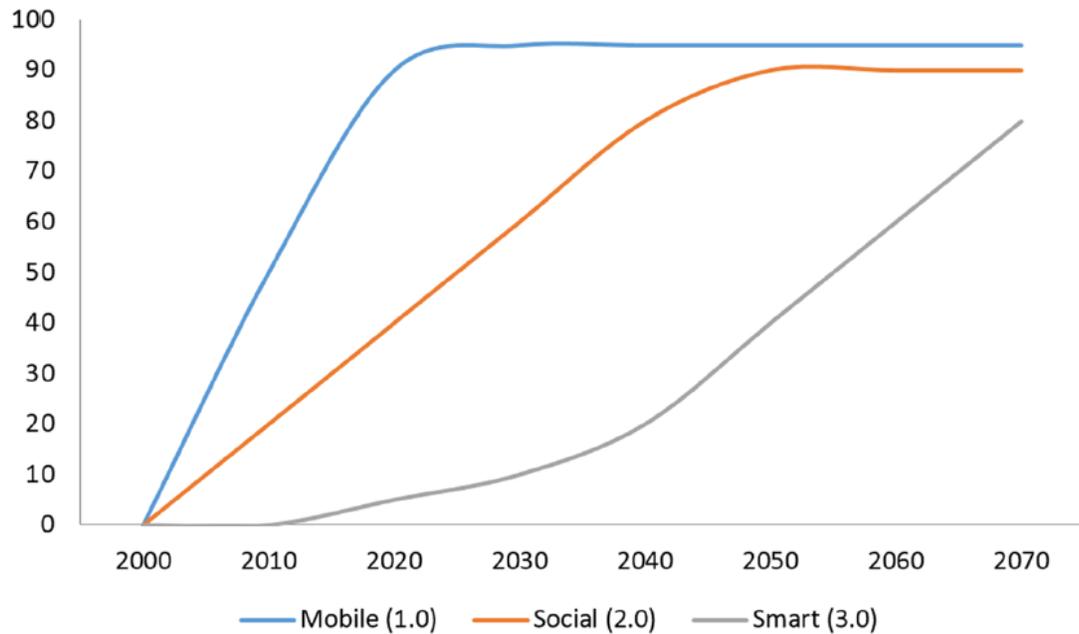


Figure 5. The Generations of Digital Infrastructure for Development (Heeks, 2020a)

Another emerging set of projects could focus around addressing the gaps in network coverage or speed using telecommunication technologies like mesh networks, white space spectrum networking, and small or micro satellite networking. These projects would continue the work from both phase 1.0 and 2.0 in trying to address digital inclusion.

Achievements/Challenges. Some key challenges that are in queue as part of this phase focus around the digitization of data; the need to convert analog data into digital blocks. Moreover, there will be a focus on the use and impact of digital data within development processes as well as the application of digitalization to organizational and social processes. The conversion to digitalization of these processes has the potential to impact the global SDGs by reengineering processes to maximize efficiency, allowing for an agile approach towards process design and the ability to integrate processes to create a more holistic process (Heeks, 2020a).

Another challenge will be the changing behavior and values online and addressing the differences in the use of technology between the youth and older adults. While some youth are growing up as “digital natives,” this is not true across the globe, and attention will need to be paid to compensate for variances in technology interaction and aptitude.

Lessons Learned. This current phase has just begun within the last year or so, and the projects are still being completed and the data is still being gathered to draw key themes for analysis. The increased attention to sustainability and measurability in this phase will help to guide further innovation.

The Need for ICT4D

ICT4D was created with the premise of assisting the poor and other vulnerable populations across the world with being able to build capabilities that can increase the

quality of their daily lives. Besides the basic human altruistic principal of wanting to help our fellow person, the knowledge that can be shared from these vulnerable populations on how to prevent major issues from social unrest, disease, and resource depletion can be applied globally. Moreover, broad involvement in small-donor projects allows more stakeholders (whether through project design or financial support) in ICT4D projects to experience positive mental health impacts and life enrichment. Finally, the concept of enlightened self-interest reinforces the need for ICT4D, as history shows that the problems of a marginalized population often can become globalized and affect those that weren't previously impacted.

The role that technology plays in helping to fulfill the humanitarian goals as set out by our global leaders in the Millennium Development Goals and Sustainable Development Goals helps to ensure that these problems will be addressed in a timely manner, with current tools and resources. The formalized targets as set by the MDGs and the later SDGs help to guarantee a global approach towards achievement of these milestones through financial resources, creativity, knowledge management, technology, and global policy. With over 191 countries and territories participating in the United Nations Development Programme, best practices for achievement of these goals within specific environments or cultural contexts can be shared in order to identify root causes and connections between challenges. ICT4D helps to create solutions that can respond to these challenges and allows partnering agencies/organizations to work towards these common global goals. The three types of ICT4D innovation models as laid out previously, per-poor, para-poor and pro-poor, help to determine the way that the projects can be designed to create the kind of solutions that can bring the biggest change to people's daily experiences. Unlike too many IT projects that are focused around the latest and greatest technology, ICT4D is now centered around people. The overarching mission of this subset of the technology field is to focus on how information, technology, communications and data overall can be beneficial to people; the focus should never be on implementation of technology without careful attention to how it can successfully increase the capabilities and self-determination of the targeted population.

Ironically, although ICT4D projects are widespread, and there have been many attempts to measure the reach of the ICT sector or ICT4D projects, the world has no way to estimate the overall investment in this sector because these projects can occur within the private sector, NGOs or nonprofits, or even within the corporate sector.

“A best overall estimate is that the digital economy makes up “around 5% of global GDP and 3% of global employment,” with developing countries likely to be around one-third to one-half this level. These sectors are growing faster than the general economy, particularly in the global South, but the majority of ICT gains are captured by the “traditional” economy. Measuring the total digitalised economy—i.e., all value addition from digital activity—has always been a near-impossible task due to problems of definition, measurement and availability of data; and EC flatly concludes, “Given that digital business models are present in more and more sectors of the economy it is not possible to come up with the size of the [digitalised] economy as a percentage of GDP” (Heeks, 2020a).

This digital economy is scaling quicker in that new telecommunication technologies are now able to reach into the spaces that previously were considered to be digitally void. The use of innovative technology and the power to put this technology into the hands of the developers within these affected countries will only see an increase in the need to take this technology and apply it to new solutions that can benefit the communities in need. New projects and platforms will call for business models that will hopefully add efficiency, virtualization, and openness to traditional structures. The decrease in technological costs, the increase in availability, and the growth of familiarity of mobile technology provides an opportunity to address problems with global implications.

What Have We Learned?

Defining Development

One of the biggest failures of ICT4D as a concept is that the definition of development for each entity, whether institution, country or individual, can be inherently different. Even within the ICT4D field, academics argue over what constitutes development based on their own interests and experience (*ICT4D*, 2012). There are several proposed models as to what constitutes a nation that is developed or developing. The most dominant model is the hegemonic model, where development is quantified by measuring economic growth (*ICT4D*, 2012). In this model economic growth is specified as the percentage increase in real gross domestic product which is calculated by adjusting the gross domestic production for inflation. The final figure from this calculation accounts for the market value of all final goods and services produced within a country's economy. The main premise behind the hegemonic model is that driving development will help to eliminate poverty, and this can be proven through the use of the absolute model of poverty. Absolute poverty refers to the poverty conditions where an individual does not have basic commodities to sustain life and other normal activities such as food, shelter and clothing. Both the MDGs and the SDGs rely on tracking the average amount of money an individual in various countries globally lives on per day. This percentage is tracked to provide analysis as to living conditions within the world and to compare these conditions on a yearly basis.

The hegemonic model of development as it applies to ICT4D states that by investing a set amount of money in the economic system, the institution funding the program can enable people to stand independently, which will then trickle down through the system, distributing the wealth amongst others in that society until all can rise above poverty (*ICT4D*, 2012). Put more simply, the idea is that through the use of ICTs, a developing nation can increase their production values, which leads to additional income; this income is expected to feed into the overall economy of the country through redistribution (consumerism) by those that benefitted from the production, and this in

turn feeds other sectors of the economy. This model lends itself to the Western ideal of democracy; such thinkers posit that there needs to be democracy to allow a free market so that there can be economic growth (*ICT4D*, 2012). The result of ICT4D projects would be that this investment would provide technology that would reduce or remove the digital divide and that the inequality that existed will be completely eliminated. Unfortunately, studies have shown that this digital divide is only increasing as ICT4D projects increase in their reach around the world. As shown by the International Telecommunication Union, the chart below illustrates that as the world grows digitally, the gap between the developing world and the developed world increases.

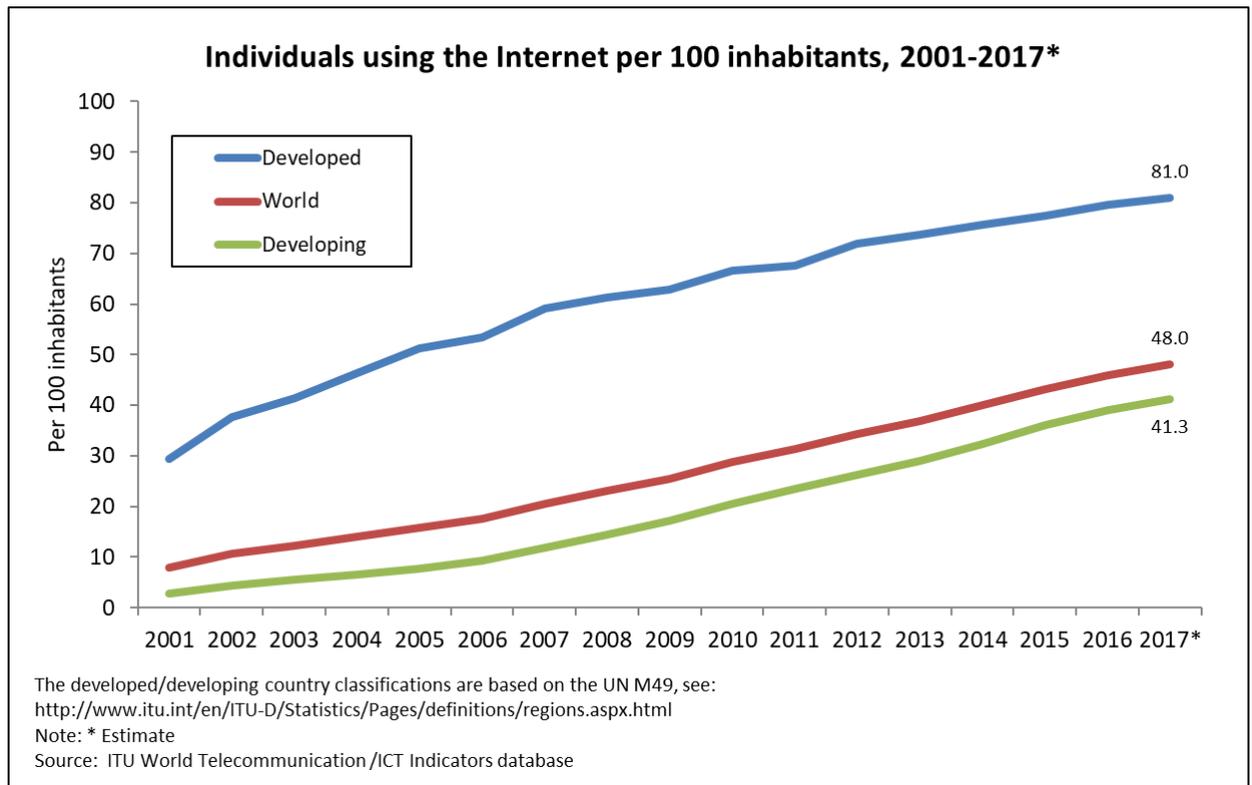


Figure 6. Individuals Using the Internet per 100 Inhabitants (ICT Facts and Figures 2017, 2018)

The second model used to define development is the Capability Approach, which was created by Amartya Sen in the 1980's and remains as one of the most prominent models in terms of development. The premise of this model is that development stems from learning capabilities that help to increase the amount of individual freedoms that one has (Wells, n.d.). Sen defines capabilities as “beings and doings ,” which translates into skills, opportunities, and abilities that an individual possesses that afford them the ability to make choices in their life that enable the life they want to live. Sen outlines a correlation between capabilities and freedom: “Capability reflects a person's freedom to choose between different ways of living” (Sen, 2003). Capabilities are affected by choices as well as the sum of the individual's experiences and desires. Sen's model has been applied to human development and international development, with the UNDP choosing this model to define development as opposed to using GDP and economic growth metrics. In terms of the application to international development, “‘poverty’ is understood as deprivation in the capability to live a good life, and ‘development’ is understood as capability expansion” (Being Political, 2019). The relationship between ICT4D and this model is that the solutions designed for the developing nation can increase the affected population's capabilities, thus allowing them additional freedoms or opportunities to make different choices in their life and thus pursue a life that is closer to their ideal. As stated by Hamel, “[I]nformation that is shared through technology such as ICTs can become capability enhancers, allowing people to make better judgments by virtue of having access to knowledge that was once not available to them,” (Hamel, 2010). An example of this model can be found in the project of LifeLines India; the project was created to provide information resources to rural farmers in India to “help them increase their incomes and fight poverty through increased agricultural productivity” (Hamel, 2010). The LifeLine system functions by having a farmer dial into a network and record a question; within 24 hours the farmer receives a response via recorded message. The system allows the farmers to receive expert agricultural and farming advice that expands their capabilities through new techniques and knowledge

that affords them the opportunity to improve their crop success and the health of their animals.

Social equity is the third model for development, which discusses redistribution of wealth between the rich and the poor. To become more developed in this model means to decrease the gaps between the richest and the poorest. The Gini coefficient is a statistical measure of economic inequality in a population. The coefficient value of zero indicates a perfectly equal distribution of income within a population whereas a coefficient of one represents a perfect inequality where a singular person in a population receives all the income, while the others earn nothing (CFI, 2019). As shown by the Gini coefficient, there is a link between economic growth and distribution of wealth. The figure below highlights the countries that have higher Gini coefficients with a darker saturated green, and thus by the social equity model would be considered to be “developing nations”:

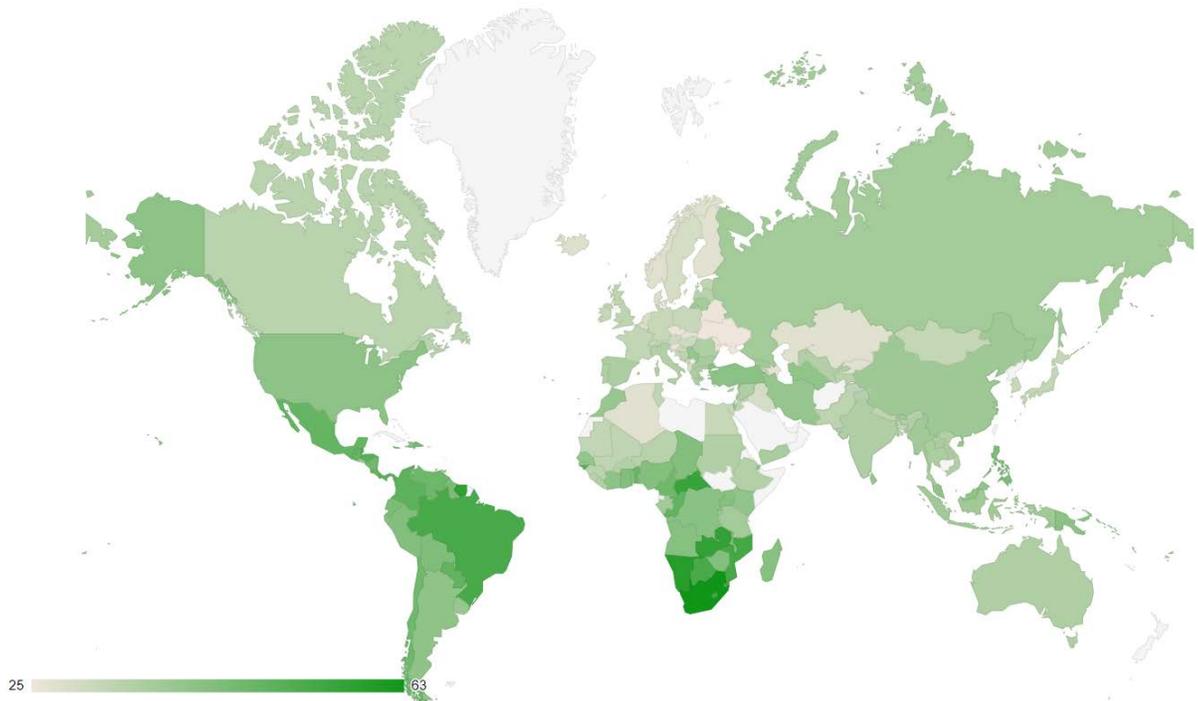


Figure 7. GINI Coefficient World Map (GINI Index (World Bank Estimate) by Country, 2018)

Political freedom is the last model for defining development, which stresses that the most developed nations are the ones that utilize democracy and who exert freedom in terms of their individual rights versus the government. The main idea is that there is nothing being done by the government to prevent the country's population from fulfilling their needs.

The approach towards development will set the tone for how to frame success of an ICT4D project. The approach for development needs to be agreed upon by all key stakeholders at the beginning of the project, specifically there needs to be alignment with the affected community to make sure that the tool being designed for their "development" has a congruent priority for them as it does for those implementing the tool. Next, goals need to be developed for the project and then the objective(s) need to be mapped to the goals. Key performance indicators will need to be identified and connected to the goals and objectives. The key performance indicators will provide the ability to measure against the goals and objectives to illustrate if the project meets criteria for success and subsequently provides progress on development.

Continued debate about these multiple models for defining development has characterized phases 1.0 and 2.0 of the ICT4D movement, and is likely to continue into phase 3.0. The most wide spread model for phase 2.0 and subsequently being set to be the most used in phase 3.0 is Sen's capability model as it accounts for providing capabilities/opportunities for the vulnerable and marginalized to change the issues in their life that they see to be the biggest obstacles. The selection of the development model has a lot to do with the path that the project follows and will shape the design of the project; consequently, if the wrong model is chosen and the project leads dictate what constitutes development and importance to the culture that is receiving assistance from the model is where there is oftentimes a large disconnect and can result in project failure.

Design Flaws Affecting Current ICT4D Projects

ICT4D projects need funding, and although there is widespread intention to “help” the developing nations, too often the true aim is to help the developing nations, while still maintaining an economic position of power and creating a dependence of the developing nation on the institution that is providing capital. There is no silver bullet that can eliminate poverty. Poverty is a relational concept that explores the differences between the classes within a society. There is no way to remove the differences just by increasing economic growth, but rather, a change is needed in the way those differences are extended or reduced (ICT4DatPenn, n.d.).

With the focus of ICT4D being primarily on gaining economic wealth, most information and communication technologies are being designed with the notion that they can help stimulate the economic conditions of these developing nations. The main problem resides with those that are designing and deploying these systems, when they know little about the culture they are trying to assist. Some project sponsors still look for quick fixes without thought to the sustainability of the technologies they are releasing to aid the developing world, and sometimes they overlook the people for a focus on the technology. Most ICT4D projects meet their objectives to roll out a solution that does x function using x, y, z technologies, but too many projects are never continued or never used to solve real-life issues within the society where the technology is being deployed; therefore, the projects are failures.

Projects that are technocentric as opposed to being based around the affected communities’ needs have been shown to be some of the major failures within ICT4D. New projects must incorporate notions of both information systems (IS) and development studies. Previously, the idea was that the best and latest technology was the best way to drive a project forward, but history has demonstrated the need for a focus on the human, political and ethnographic reasons for the implementation of the project. There needs to be consideration to whose interests are actually served and what the overall opportunity costs of the project will be. Partnered with IS studies, development studies need to be highlighted in the next phase of ICT4D; this would drive a multidisciplinary approach of

computer science, IS, and development studies to create a ternary approach towards project design/implementation. Previously 1.0 projects were often handled by IT vendors and ICT evangelists. As we move from 2.0 into the next phase of ICT4D there needs to be increased attention into how technology can fit into development paradigms, processes and structures: “A typical formulation would start with a development goal, seek to understand the role of information and communication in achieving that goal, then ask which new technologies – if any- could help deliver that role” (Heeks, 2008). Projects must establish measurable objectives/goals that can be qualified before the project begins and assessed after completion of the project; these measurements can help to set precedents for best practices, design and implementation strategies to increase adoption and project success.

Good Practices for ICT4D Design

With the increase of awareness regarding the digital divide as well as a push due to global legislation, we see more organizations, institutions, and individuals dedicating resources towards ICT4D endeavors; however, most of these projects continue to fail. The main goal of ICT4D is to decrease the digital divide and drive economic development in developing nations; however, it has been shown that too often there is still a disconnect between the needs as defined by the marginalized community and the needs as assessed by the groups running the projects. Historically, this incongruence in project design and implementation has led to many ICT4D projects being viewed as failures. Dodson, Sterling, and Bennett performed an analysis of ICT4D projects over a ten year time frame and found, “Of the papers examined, 70% (28 of the 40) referred to or reflected on some level of failure or unintended negative outcomes related to the use, uptake, or adoption of ICTs in developing communities,”(Dodson et al., 2012). Kleine and Unwin (2009) provided research that showed that bottom up initiatives started by local NGOs in response to perceived needs or specific struggles for justice were more

successful than projects that were disseminated from top down by development organizations.

Within the field of ICT, it has been found that the phrase “best practice” is a misnomer as there is always room for innovation and to adapt the information to the changing environment where the project is being applied. This section will cover what considerations should be addressed when designing ICT4D solutions. The first consideration should be having the solution tie directly into improving the economic condition of the user. According to George Omuono, a faculty member at Maseno University in Kenya, “ICT is an enabler, it is not going to create wealth from nowhere...That means it’s supposed to enhance what is already going on.” (*Top 7 Reasons Why Most ICT4D FAILS - Dr Clint Rogers, 2010*). ICT solutions need to support the way that the current economic model functions in that society and streamline the process to allow for better production, without stopping how the country currently does business. To get user adoption, there needs to be a way to assist users in their day to day activities with simple technology that can benefit the way that they do business. Professor Johannes Cronje, a dean at Cape Peninsula University of Technology in South Africa, has a perfect example of a failed technological intervention in that there is an ICT solution designed for farmers in which the farmer has a device that has internet connectivity so that the farmer can check the market price for tomatoes to determine when is the most opportune time to take the tomatoes to market. Unfortunately, nowhere in the solution was it considered that the tomato must be picked when it’s ripe, and in order to keep it from going bad it must be sold immediately. The farmer has no option to hold out for a better price. Instead of searching for market price, the farmer needs to receive more information on how to prolong the life of the tomato, or how to produce more tomatoes or more goods from tomatoes in order to sustain his family and to make more money at the market (*Top 7 Reasons Why Most ICT4D FAILS - Dr Clint Rogers, 2010*). ICT is never going to produce money for the user, but rather help the user to produce more of something else, or to produce the same quantity more efficiently.

All ICT4D solutions need to be relevant to the local context, utilize the strengths of the society and in order to fulfill a need that they have. For too long, most projects started with the technology as opposed to the people. Prior to engaging on a solution or a project, the organization needs to go to the locality itself and find out how the people work, how their government is structured, and what issues exist within the society. There needs to be collaboration between the people that are funding the projects and the end users to determine the ways that technology could benefit their lives. If the project isn't relevant to the culture and if they don't feel like they have a stake in the project, then the project will fail. Recipients will view it as just another project, not their project. For a project to succeed, there needs to be ownership and accountability of the project by the culture where the project is being implemented. According to Professor Matti Tedre, a chair at Tumaini University in Tanzania, "The implicit idea is if it worked there [the technology solution], then it will work everywhere in the world, and that is a category mistake. You have to understand that each of these contexts is unique and you have to understand the specific issues, the specific problems, the specific needs of each place... There is no generic solution for each of these places... They have to be built from the bottom up" (Top 7 Reasons Why Most ICT4D FAILS - Dr Clint Rogers, 2010).

With creating ICT4D solutions, not only do the people need to be considered, but the current infrastructure needs to be considered as well. In most developing nations, there is a lack of infrastructure that those of us in developed nations take for granted. Within developing nations, there are often issues with power levels and with having access to electricity. There are areas that still have no access at all to electricity and areas that are susceptible to rolling blackouts or power grid failures. "Donors don't know that there is electricity instability in third world countries. Voltages fluctuate. And the culture of third world people themselves, they wouldn't even inform you when the power is going to go off; the power just goes off like that [snaps]. And when these things happen over and over, the computers suffer" (Top 7 Reasons Why Most ICT4D FAILS - Dr Clint Rogers, 2010). There could also be issues with access to broadband or internet connectivity that the project would use. As ICT4D continues to adapt, there are

technologies that can fill these gaps and account for these limitations, such as the focus on mobile digital.

Another good practice for ICT4D projects is to consider maintenance costs and issues. Due to the lack of infrastructure and political considerations, the cost of connectivity can be incredibly high: “In our research, we found out that our respondents [devoted] roughly 1/3 of their formal income into mobile phones, into buying air time, into recharging and paying all kinds of overheads to the vendors” (Top 7 Reasons Why Most ICT4D FAILS - Dr Clint Rogers, 2010). If the needed infrastructure does exist, it may be limited in that individuals are paying triple what the developed world pays for connectivity that is half as fast as what others are afforded. In addition, after being provided with the technology, the culture might not have the expertise or the manpower to maintain the technology. The culture views this not as help, but rather, as having a project dumped on them without the resources to sustain the advantage that they were promised from this project. The climate of the country could also be problematic in that a lot of developing nations are in very hot environments, which are not conducive towards technology; technology would need to be kept in air-conditioned areas which adds more expense to the project. The climate and the hardships of the location physically need to be considered before deploying any solution to the area or otherwise the project will never take off and the technology will just be abandoned.

Funding is also a major consideration that needs to be accounted for when designing an ICT4D project. Oftentimes, projects are only funded by short term grants and the country doesn't have the income to support the project once the organization leaves. There needs to be a budget planned from the project's inception that includes resources to implement the project, resources for training after the project has been rolled out, resources to maintain the project, and resources to expand the project from its pilot stage to other areas where it could be applicable. Without this planning, the project will be abandoned once the funds are gone, as the country will have no way to sustain the project or its goals.

ICT4D projects need to be designed with the entire political and social system in mind as opposed to just looking at a small segment of the issue. Local governments as well as gender roles are just two important considerations when designing a project. If the local government does not find value in the projects that are being done within their jurisdiction, they can find ways to impede progress or to stifle the project altogether. While ICT4D has gotten better at trying to consider context for designing solutions, there are still some issues that can exist based on societal views of gender. Along with a digital divide as it pertains to developing nations, there is a gender digital divide that limits women from accessing resources based on their sex, ethnicity, socio-economic and socio-cultural background. While the gender gap hovered around zero in the Americas and has been shrinking in the CIS countries as well as in Europe, in contrast the Arab States, Asia and the Pacific, and Africa have seen an increase in the gender gap (ITU, 2019). The figure below shows the internet penetration rate for men and women in 2019 and highlights the digital divide gap as it pertains to gender:

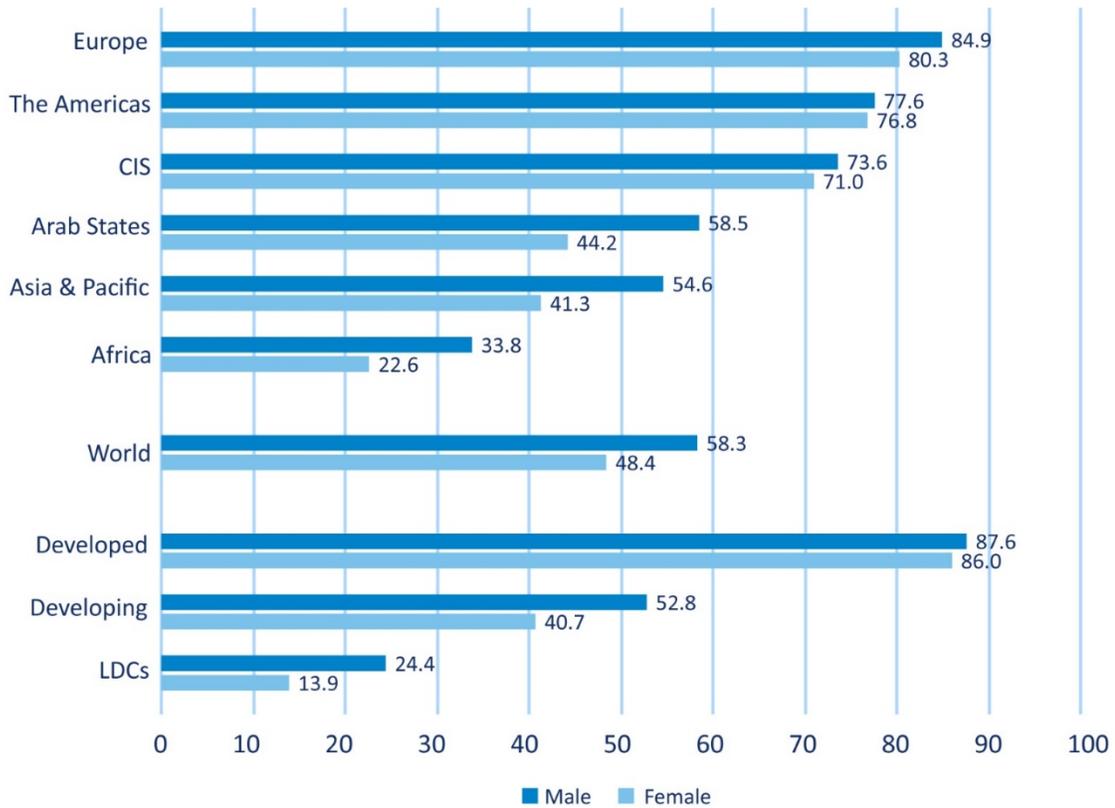


Figure 8. Internet penetration rate for men and women, 2019 (ITU, 2019)

ICT4D has outlined goals in phases 1.0, 2.0 and now 3.0 that focus on utilizing ICTs as a tool to promote gender equality in accordance with the MDGs and now the SDGs. As part of these projects’ women are being used in capacities that they never were before, but if social norms view women interacting with technology as negative, projects can still end in failure. Proof of this is reflected in a study funded by the UK Department of International Development that found that “women and girls were found to have suffered systematic disadvantage and discrimination that is magnified for those in so-called poorest states and sectors of the Nigeria society” (Danjuma et al., 2015). This issue highlights a barrier as ICT4D solutions cannot effectively empower women and create equity if women’s access to and control over technology is thwarted by their local community. Only by immersing oneself in the culture can the organization understand how the culture works, what their values are, and discover how to extend the culture and

use technology to enable it. The technology itself does not inherently increase the demand for a certain service, but instead redistributes wealth in regard to that service; those that have the technology will be able to provide the service while others may go bankrupt.

Finally, when creating an ICT4D project, there needs to be an assessment of unconscious bias to try to remove all negative assumptions about that culture. While this discussion has been a key theme that emerged from phase 1.0 to phase 2.0; it continues to be a problem as we continue into phase 3.0. Rapport between the organization sponsoring/funding the initiative and the community where the solution is being implemented needs to be established.

Information and communication technologies for development are meant to assist the developing nation in having access to more information to improve their quality of life. Current ICT4D solutions attempt to take the culture and its locale into consideration in order to design a solution that is easy to use and that can assist people in their day to day activities; the focus of the solution should always be on the people and not on the technology. Through using the good design principles listed above, the project failure rate of ICT4D should decrease, as many of the historical deficiencies discussed will be eliminated. Only then can there be more successful projects and an opportunity for the developing world to decrease the digital divide, experience economic growth, and most of all increase the capabilities of their society in a manner that corresponds with their values.

Chapter 3: The Benefits of Social Media for ICT4D

A key technology that will be incorporated in upcoming phase 3.0 ICT4D projects will be social media. Buettner defines social media as a “computer-mediated tool that allows people to create, share or exchange information, career interests, ideas and pictures/videos in virtual communities and networks.” Social media is a series of Internet-based applications that utilize the ideological and technological foundations of Web 2.0 that allow for creation and collaboration as it applies to user-generated content (Peters et al., 2013). While social media has existed since the late 1990s, its application to ICT4D is still in a very infantile phase, with most projects only using social media to gain funding, recruit volunteers, provide media relations, and provide exposure to the overall organization. Most organizations overlook the potential for social media to act as a means of driving communication and adoption of the solution from a project perspective. One benefit of leveraging popular social media sites like Facebook, Twitter, Google etc. is that they provide network effects: the more people that join a network, the greater the value achieved by joining that network (Heeks, 2020). In his article on the next phase of ICT4D, 3.0, Heeks mentions the ways in which social media could be used within ICT4D, such as creating communities, providing educational context, and creating a forum for “relationship marketing” and “social customer relationship management” (Heeks, 2020b).

While ICT4D has notoriously struggled with project adoption despite large investments within the field, the emergence of social media allows those leading an ICT4D project the ability to create meaningful engagements, to solicit feedback about the project, to create a community around the solution/platform, to collaborate on good practices and implementation design for future rollouts, and to disseminate the benefits of the project. As Roggemann states in her prediction on the future state of ICT4D:

“The rapid rise in smartphone penetration and social media usage has meant that a lot of the uphill battle of ICT4D—getting users to check their phones, teaching them how to interact with a mobile app, cultivating a

culture of reaction to both push and pull services—is being done for us. Facebook notifications have taught people to check their phones constantly. WhatsApp is teaching folks the difference between voice and text, the multiple uses of the chat function, and how to engage with an app-based service. Google and Twitter have taught users how to search for and pull information. These behaviors are vital to any successful ICT4D service, and were a nut, we in the international development sector, struggled to crack—until social media and the internet did it for us.” (Roggemann, 2016).

Benefits of Social Media

Social media is not a new concept as it applies to ICT4D initiatives and use within NGOs. The use of social media has been an alluring concept for most NGOs, nonprofits and small businesses, because the cost for entry technically is free and the audience reach is greater than what most would normally be able to hit. The benefits of social media are that it allows for faster and easier information delivery, dissemination of information and knowledge, connectivity and network creation, efficiency and transparency gains, and empowerment (Sheombar et al., 2015). A case study conducted in 2015 by Shoembar, Urquhart, Ndhlovu and Ravesteijn found that while social media can assist in improving communication and the exchange of information to strengthen and create new economic and social networks, there was no formal research from NGOs that showed how social media could be used for development purposes. Current uses of social media in the context of assisting developing nations comes primarily from a fundraising perspective, specifically in regard to coordinating emergency or disaster relief efforts. There are also groups and accounts on social media platforms dedicated to organizing community activism and empowering citizens, but the most impactful efforts have been focused around disaster relief. Prime examples of these efforts are shown in the crowdsourcing

efforts after the Haitian and Chilean earthquakes as well as after a typhoon in the Philippines. Shoembar, Urquhart, Ndhlovu and Ravesteijn outline four main areas where social media is used in the context of aid and development:

1. Connecting with others – social media allows a broad audience to connect with others that share similar philosophies, opinions and interests. This allows for people that felt disconnected based on their identities to feel a sense of community and acceptance.
2. Collaborating with other people – Users can collaborate with others that have similar interests to share information, insight, emotions, and activities that can be done to assist with the effort at hand.
3. Creating and sharing content – Easy to use interfaces embedded into the platform that makes it easy for any user, no matter their technical ability, to create and share content that is relevant to their interests and communities.
4. Finding, using, organizing, and reusing content – These tie into the first point that users can connect with others and easily find people sharing and posting content that is relevant to them and their interests. Through a click of a button, users can easily re-post content to increase the reach of that content and track to find more users and communities that might interest them. In addition, all the social media platforms have embedded search capabilities that allow for users to search on metadata terms/keywords/hashtags to bring back content specific to the user's query.

While the case study completed by Shoembar, Urquhart, Ndhlovu and Ravesteijn showed that NGOs find social media to be helpful for collaboration, only a couple NGOs monitor and analyze their social media activities. Through the use of platform analytics, activity on a social media platform can easily be assessed to make sure the campaign is achieving the goals that are intended. The built-in analytics allow for an agile approach

for those running the campaign to help resolve issues as they arise, to target content that is more relevant at the users of the platform, to schedule content deployments specific to the geolocation of a set of users, and to use the demographics of those engaged to grow awareness and brand/product loyalty.

Social media has a large capacity to assist with ICT4D initiatives as it has an easy-to-use interface that more users are being exposed to everyday. Organizations can also build rapport with their affected populations by engaging in interactive encounters with these populations and their networks (Armstrong & Butcher, 2018). Hashtags and sharing methods allow for outreach from the intended population to other partner organizations or potential client users. Moreover, social media provides a large storytelling capability, and storytelling is an effective strategy for disseminating content that can impact communities, bring about awareness, and drive backing to your project. Social media can encourage users in developing nations to collaborate with other likeminded individuals in similar situations to help address challenges, brainstorm for solutions, work to create a strategy to implement the solutions, and empower the users to own the solution in a way that improves scalability and longevity (Sheombar et al., 2015).

Social media has also been useful as a platform for online educational communities. The use of social media for educational purposes has been linked with increased student collaboration, increased student participation, and easier project review (Hopkins, 2015). These same benefits could play a role in increasing adoption of an ICT4D project. Sari and Tedjasaputra used Facebook as a communication platform during the design and development of an online learning community that was created to assist with professional development for teachers in Indonesia. The object of the social media campaign was to “promote active and collaborative learning processes and give an opportunity for teachers to engage in reflective practice that can lead to transformative professional learning and development” (Sari & Tedjasaputra, 2013). This social media campaign led to an increase in the awareness of the project overall through word of

mouth. Satisfaction with the project also increased, as users could easily get faster responses to their questions through Facebook messages, posts, surveys etc.

Civic participation is another area that has experienced success with the use of social media to drive an ICT4D initiative. Wamuyu conducted a study to see if Facebook could support the residents of Mathare slum to actively participate in civic environmental initiatives and to foster community activity towards civic environmental protection. Facebook was chosen as a platform for this social media experiment, because out of the 595 users surveyed, close to 56% were already on Facebook and were using it as a web 2.0 technology (Wamuyu, 2018). The analysis from the project showed that web 2.0 technologies, specifically Facebook, positively influenced participation in community civic environmental initiatives. As ICT4D projects often involve an aspect of civic participation, we can apply the knowledge from Wamuyu to assert that Facebook as a platform may be familiar to users of ICT solutions in developing nations, and it could help to drive adoption and awareness of the solution and its benefits to the community.

Limitations of Social Media

The use of social media in the world has exponentially increased and it is predicted that more growth is expected, especially in Asia, Latin America, the Middle East, and Africa, which is where most ICT4D initiatives currently occur (Sheombar et al., 2015). While there is a strong case for use of social media within NGOs and other nonprofit organizations, some of these organizations are avoiding social media interaction due to risk associated with digital footprints, especially within locations that may have more oppressive governmental restrictions (Armstrong & Butcher, 2018). A study by Waters and Feneley found that most nonprofits prefer to use their websites to cultivate relationships with stakeholders and are hesitant to use social media platforms; additionally, they found that those who are using social media platforms aren't utilizing the features in a way that is interactive with their users (Armstrong & Butcher, 2018).

Additionally, another limitation of social media is that while it appears to be low cost, as the entry fee is free, resources are required to make social media effective and to lead campaigns that can bring about positive results. Oftentimes NGOs will face hard decisions around allocating the resources necessary to run an effective online social media campaign versus dedicating that same time and funding to another competing need or project. Effective campaigns need to have staff who are bringing relevant conversations to the forefront, circulating content, and cultivating collaboration, or else the campaign will become stale and begin to fail: “[e]ffective messages are those that have the information packaged in a clear and easily understandable manner, contain the right appeal to get the audience's attention, and fill the gap between what they audience knows and what they need to know” (Sheombar et al., 2015). Staying relevant is the number one objective on social media; users need to want to engage with the product/service/organization/campaign and actively seek to stay abreast of the latest posts/content, whether that is through passive following or by actively visiting the platform daily. Research has shown that the same limitations that plague NGOs and other nonprofits within traditional media coverage extends to social media, as these types of initiatives tend to provide the most benefit to groups that have the greatest resources and largest pre-existing networks (Armstrong & Butcher, 2018).

Social Media Metrics

Social media is different from traditional media in that it is a dialogic transmission system. The transmission pattern has shifted from focusing on a single source to many receivers to many sources to many receivers. This modification has seen an increase in messaging reach, frequency, immediacy, and permanence. Two other factors that have also been considered different from traditional media are quality and usability. Furthermore, a lot of the research pertaining to social media and the metrics to describe impact are specifically targeted to commercial audiences, and thus may have limited applicability to nonprofit initiatives. Calder, Malthouse and Schaedel completed a

study on engagement with media platforms and the effectiveness of advertising and found that engagement with online media platforms led to more exposure to the advertisement, and that subsequently the advertisements carried on these platforms were more effective, in what is sometimes called a virtuous circle (Paek et al., 2013). Thus, an effective social media campaign within ICT4D is likely to find that “users who are highly engaged with a social media platform are more likely to be exposed to campaign messages on it; campaign messages on social media platforms that have more engaged users will therefore be more effective; and a platform with highly engaged readers should help achieve the campaign’s goals more effectively,” (Paek et al., 2013). Some of the insights gained from marketing research can be applied within an ICT4D context by reframing the framework from a profit perspective into an adoption perspective. The target for ICT4D should be to use social media to influence adoption and awareness of projects and services, and if possible, to use these channels to support open communication between the organization, project staff, and the intended client base.

Previously, social media was using traditional metrics to measure impact such as number of users visiting the social media site, comparison of sales before and after campaign, click-through rates etc., but due to the dynamic, interconnected, interactive and egalitarian nature of social media, a different approach needs to be used to approach measurement, analysis and management (Raghavendra, 2016). A key consideration when designing a social media campaign that does relate to ICT4D contexts should be on how to engage the user in a way that is meaningful to their lives and that will both evoke action and create a pattern of consistent use and interaction.

Since social media allows for both real-time and asynchronous communication regardless of geolocation and time zone differences, users can interact with an organization whenever they have availability, which provides an invaluable benefit to the user. Organizations can respond to feedback or issues quickly, and their response can be captured and preserved for future users that might have a similar question. This allows for a forum where users can both get help from the organization and from other users on

the product(s) they are utilizing. It also provides a place where users can talk about their experience and use of the product, which can be used to enhance the product, thus driving even further adoption. Additionally, the dynamic and collaborative nature of social media allows for organizations to build their brand through creating a sense of community around their product(s) offering(s) through the interaction that their users are having with their organization and other similar users that like the product. As users feel engaged and welcomed as part of a community, they will be more likely to invite their networks to these sites and will promote additional usage of the product. The organization(s) running the project can get real-time feedback on issues, disseminate information on training and good practices for using the solution, build awareness of the project/solution, and adapt/enhance the solution to meet the requests of the community.

Social Media Metric Frameworks

Raghavendra outlines the four primary frameworks for social media metrics: Stimuli-Organism-Response Framework (SOR), CLEAT Framework, IAB Framework, and AMEC Social Media Framework. The Stimuli Organism Response Framework was created by Peters, Chen, Kaplan, Ognibeni, and Pauwels and focuses on four key elements of motives, content, social roles and interactions and network structure. The actors in the framework are the main component of the system; each of the actors has their own motives, ability to create and exchange content through their social roles and interaction with the network structure that they have built on the platforms. This model is incredibly simplistic and doesn't lend itself to quantitative metrics to prove effectiveness of a particular campaign or service.

The IAB Framework was created by Pentin in 2010 and is based on three main components: intent, the four A's (awareness, appreciation, action and advocacy) and benchmark. According to the IAB Board, the model functions to define intent as the objectives or intentions of the social media usage in order to determine and define

relevant KPIs (key performance indicators); the four A's to "define and measure the core KPI metrics by social media platform"; and the benchmark to compare the KPIs established with other social media activity, channels and industry averages (Raghavendra, 2016). The model is meant to be a simple framework that can be applied across any social media platform, while allowing the organization freedom to define their own KPIs based on previous experience and expertise. So far, this model is limited in the context of ICT4D as adequate benchmarks have not yet been defined with regard to the effectiveness of a social media campaign as it applies to an ICT4D project.

The CLEAT framework was created by Pangaro and Wenzek in 2015 and provides a different approach to grouping social media metrics. Pangaro and Wenzek proposed a five-grouping model that subdivides social media metrics into context group, language group, exchange group, agreement group, and transaction group. These five groups then are subdivided into the subgroups of primary metrics: consumer actions; secondary metrics: outcome (new & historical); and supporting metrics: group statistics. Unfortunately, this model has been found to be difficult to tie to quantifiable returns.

The AMEC Social Media Framework was created by Bagnall and Bartholomew and works to integrate the marketing communication phases with the stages of marketing. This model is more detailed and provides a way to link activities directly to outputs or outcomes. It is structured so that is easy to understand as it follows through the sales funnel pattern. This framework is flexible and is inclusive for public relations work focusing on reputation, internal communications and media relations. The limitations for this model are that the sales marketing funnel approach is only applicable in a small percentage of social media campaigns and use-cases, so it is not always the best way to model interactions or relationships with customers or stakeholders. The AMEC framework has been modified since its creation to include program metrics, channel metrics, and business metrics. This modification was done to help those using the tool get properly organized to do measurement and evaluation that creates connections between communication results and organizational goals.

Raghavendra adapted the AMEC social media framework to incorporate the social media metrics that are used by most organizations: conversion rate, amplification, applause rate, social value, engagement rate, percentage of influencers, and economic value. Applause rate is measured as the number of likes per post or “favorite” clicks per post (depending on the system, Facebook or Twitter). This metric is important as it allows organizations to find out what the target audience likes, and not only what do they like to view, but what brings about a desire to mark approval of a particular post. The amplification rate is measured as the rate that a user’s network or followers consume the content and disseminate it across their own social networks. The specific metrics for rate are retweets per tweet in Twitter or the number of shares per post on Facebook/Google+/YouTube. These metrics outline what content is deemed as valuable and allows for the user’s network and followers to create a broader audience for created content.

Conversion rate is a slightly different metric with regard to social media in comparison to traditional media. In Raghavendra’s framework, conversion rate is measured as the number of comments per post. This metric is social media platform agnostic and can be applied to all top social media providers. Raghavendra argues that the six principles of persuasion: reciprocity, consistency, social proof, authority, scarcity and liking, as written by Cialdini, could serve to boost conversions in social media marketing if used correctly. Reciprocity influences an increase in conversion rate if quality content is served to the customer and the customer uses their social media affluence to bring influencers to the organization. Consistency as defined for social media use is the offering of a free license, product or service for a trial period to entice customers to become repeat buyers or engage more with the organization overall. By using free trials, the organization can normally secure demographic and individual details to increase their database for future campaigns or product launches. Social proof is tied to the number of followers, likes, and shares of posts. This shows the true outreach of the products, organization, campaign as it culminates all of the factors together to get a total

picture. Authority is the brand ambassador for the organization that assists with influencing or advising others in their social networks to use a good/service/event. Liking is when people in a social network have similar interests as people that represent the brand or product, and this similarity causes them to want to engage more with the organization and that specific product/service. Finally, scarcity is the idea that certain products/services are only available for a limited time and follows the supply and demand principal to bring about the conversion.

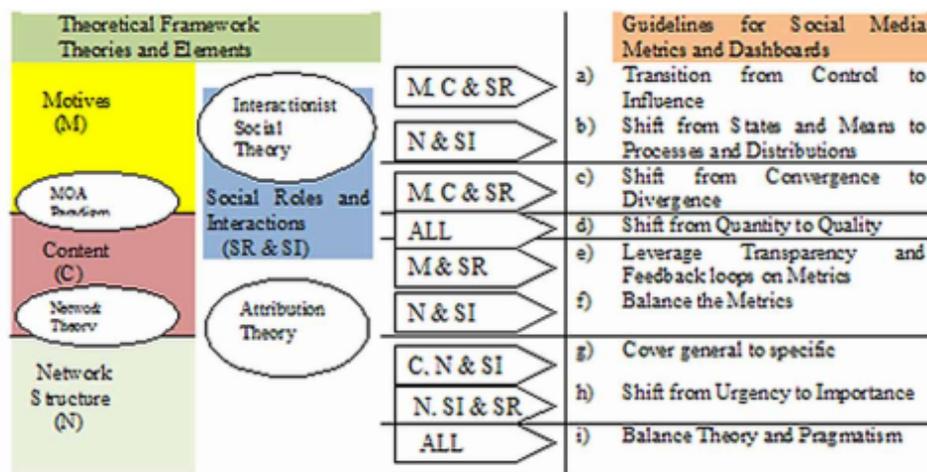


Figure 9. Social Media Framework Theories, Elements and Guidelines (Raghavendra, 2016)

There is still a need for research to be done to improve the existing social media frameworks to map specific business objectives into metrics that can measure the success of the campaigns, customer feedback, or product offerings in an ICT4D context.

Social Media Metrics and Facebook Insights

Facebook provides an analytics platform called Facebook Insights that allows an organization to access metrics that are specific to the Facebook page or group that was

self-created. Metrics are available to anyone that has read_insights permission on the associated page and can be accessed via the GUI or during a development effort while utilizing a page access token (*Insights - Pages - Documentation*, n.d.). Insights are subdivided by the type of content, with videos having their own set of insights and posts and pages having their own set of insights.

The metrics available are different pending if it is a page or a group that is being measured. Group Insights provide information around member activity and engagement within the group. Available insights include the most active group members, post engagement, and demographics of your group (if under the size of 50 participants). In social learning groups, administrators are also able to see who has completed the tasks within the group.

The page metrics available are geared towards business interactions. According to Facebook, the purpose is to “help you understand who among your audience is most engaged with your page.” The overview section provides a seven-day snapshot that shows total and new likes for the page, the total number of unique people who were shown your page and posts (post reach), and the total number of unique people that engaged with your page as well as the type of engagement (engagement). This section does provide a means to benchmark against what Facebook deems to be similar businesses based on self-applied metadata for industry, topic etc., but these comparisons are not likely to be useful for ICT4D projects at this time. The likes section shows three core metrics about daily page likes/likes over a 28-day period, number of new likes minus number of unlikes (net likes), and where the page likes happened. There is a benchmark component where metrics can be viewed over a period of time. The recommendation from Facebook is to utilize the likes section heavily to make sure you are connecting with the intended audience or to adjust your targeting to hit the correct demographics. The reach section shows the number of people that viewed the post, broken down by paid and organic reach groupings. There are also metrics for engagement that show which users had positive engagement as dictated by likes, comments, and

shares, versus negative engagement, which is when a user flags as hide, report as spam, or unlikes. Positive performance can be tied to time periods, so that you can specifically tailor content to performance trend benchmarks. The visits section provides data into the number of times each of the page tabs was viewed, as well as the referring mechanism to the site. The posts section allows an organization to see the top posts from the pages the organization watches, provides metrics into when people that like your page are online, and provides success metrics based on different post types. Scheduling posts when your target audience is online is one of the most useful successful factors in addition to reviewing post types to see what content is most relevant to your specific audience. The video section provides insight into the number of times videos were viewed, the number of times videos were viewed for more than 30 seconds, and the top videos on the page. Finally, the people section is subdivided into three sections: your fans, people reached, and the people engaged. The fans section provides demographics such as gender, age, location and language of people that like your page. The people reached shows similar content to the reach section and shows the people that saw your posts in the past 28 days. The people engaged section summarizes who has liked, commented on, or shared the organization's post over the past 28 days.

Insights is designed to be partnered with the Facebook advertising campaign section to boost posts and hit a larger audience, but it can still provide valuable insights into the audience, relevant content, and timing that can help to launch a successful campaign, product, service or project.

The next two chapters discuss parallel ICT4D projects in Nigeria and Mexico, created and funded by Catholic Relief Services. The first project was an ICT4D 2.0 project. It experienced measurable success, but with limitations. The second project, in Mexico, is designed to incorporate lessons learned from the first project, and to leverage the potential of social media to improve project implementation, capture and disseminate ongoing lessons learned, and ultimately to drive adoption and to provide valuable engagement with the project's audience.

Chapter 4: Implementation of the 3-2-1 System in Nigeria

What was the Need?

Approximately 80 million of the total 180 million population in Nigeria are small scale farmers. These small-scale farmers face a multitude of issues related to soil, crop production, and crop disease, and they often require consultation from an extension agent to determine the best strategy to help them produce, maintain and sustain their specific crops. An extension worker, as defined by Kathryn Clifton of Catholic Relief Services (CRS), is an “agriculture service officer that works normally for the government, they can also be private; they serve per district or per government” (Clifton, 2018). These extension agents tend to be governmental-based, and due to budgetary constraints and resource constraints, the average ratio of extension agent to farmer is 1: 10,000, which means that most farmers do not have access to an extension agent. Due to bad roads and the high cost of transportation, face-to-face extension visits can cost up to \$25 per visit, which is outside of the budget for the department. Since the state governments in Nigeria cannot usually afford to hire new workers, the existing extension agents are older men between the ages of 55-60 years old, and often have a more antiquated approach towards farming. Thus, even extension agents often do not provide knowledge or skills on newer techniques that could benefit the farmers. The lack of gender diversity within extension agents poses a problem, as due to social norms within the Nigerian culture, females are not allowed to interact men outside of their family; this means that female farmers must interact with a female extension agent, which creates an additional challenge. Due to this ratio and the other highlighted issues, most small farmers don’t have access to services or must use private agricultural consultants that they often cannot afford. The focus of the CRS 1-2-3 project was to be able to provide the necessary knowledge and skills using a platform that was familiar and accessible, i.e., mobile phones, so that farmers could sustain or increase their crop yield.

Objectives

There were two main objectives of the project in Nigeria:

1. Prove the feasibility of text and recorded voice messages to disseminate good agricultural practices and increase agricultural knowledge across Nigeria.
2. Provide farmers timely and unhindered access to relevant information on production, post-harvest management and agribusiness on the focused crops.

Why Nigeria?

Nigeria is the most populous country in Africa and is the ninth most populous country in the world. Additionally, the country reports one of the highest growth rates (Catholic Relief Services, 2020b). While the country is known for being a major oil producer and having the largest natural gas reserves in the continent, it also faces serious socioeconomic problems such as poverty, unemployment, hunger and disease. Out of their total population, 65% live on less than \$1.25 per day and the population keeps increasing, with the result of even deeper poverty (Catholic Relief Services, 2020b).

There is an untapped potential for food production within Nigeria as roughly 84 million hectares of land could be cultivated for agricultural purposes. Not only could agriculture benefit the people from an economic perspective, but it could assist the growing issues with food security that occur within the nation. There are some additional challenges to food production, as violent conflict within the country has caused displacements and disruptions to agricultural production and trade (Catholic Relief Services, 2020b).

Nigeria had the resources available and a strong use case, as outlined above, that warranted implementation of the 3-2-1 system. This country program became the first documented 3-2-1 ICT4D project that was visible from an enterprise organization perspective.

Partners

Key Players

There were three key players that were involved in the planning, design, and implementation of the 3-2-1 project: Catholic Relief Services (CRS), Viamo (formerly known as Human Network International (HNI)), and Airtel.

Background of Viamo

In 2012, VOTO mobile, a company that employed a handful of Ghanaian and Canadian engineers in Kumasi on the campus of Kwame Nkrumah University of Science and Technology, noticed that there was an increase in mobile phone usage by Africans, but that most organizations were not using this communication channel to reach their users. They partnered with Human Network International to assist in trying to create an SMS channel to spread information to end users, specifically focusing on rural populations and women. It was found that including a voice element, interactive voice response (IVR), assisted with getting more user acceptance and system usage.

In 2017, the partnership between HNI and VOTO mobile was re-branded as a B corporation under the name of Viamo with the goal of “same goal of improving lives via mobile by reaching the most isolated populations and providing them with information to make informed decisions for a healthy, prosperous life.” The mission of Viamo is to “connect individuals and organizations using digital technology to make better decisions.” The vision statement for the company is: “We envision a world where all people have access to the information, they need to make decisions for healthy, prosperous lives, and have meaningful relationships with governments, civil society, and business.”

Originally, the company was primarily focused on West Africa, but they have now extended the 3-2-1 platform to more than 20 major markets in both Africa and Asia.

Per their reports, they reach more than 100,000 people per day and have impacted more than 10 million people from 2012 to 2017.

Viamo offers multiple products and services including:

- Interactive, targeted and measurable mobile engagement campaigns and surveys
- Full-featured mobile engagement solutions to serve complex programming on IVR< SMS< Apps, Web and IM bots
- In-country design and implementation support in many emerging markets
- Strategic connections to telecoms to offer special services and thus guarantee the lowest price, highest reliability, and largest scale to 3-2-1 subscribers

Background of CRS

Catholic Relief Services is a 501(c)3 nonprofit organization that has their headquarters in Baltimore, Maryland. Their mission is to “[carry] out the commitment of the Bishops of the United States to assist the poor and vulnerable overseas” (Catholic Relief Services, 2017b). Through the use of Catholic social and moral teachings they work to promote human development through emergency response, fighting disease and poverty, and helping to assist in nurturing peaceful and just societies. Additionally, they allow for Catholics within the United States to “live out their faith in solidarity with their brothers and sisters around the world” (Catholic Relief Services, 2017b)

The organization has been able to impact the lives of more than 136.4 million poor and vulnerable people in more than 110 countries across the globe, according to their 2017 annual report. Within the field of agriculture there were over 6.2 million people served in 53 countries through 124 projects (Catholic Relief Services, 2017a). The agricultural budget made up 15.08% of the overall expenses for the 2017 fiscal year.

The relationship between CRS and Nigeria stems back to the 1960s and the first initiative for emergency response during the civil war. After the war subsided, the

government asked NGOs and other international development agencies to leave the country, but upon the return of democracy in 2000, CRS returned to assist the country with its many challenges. The main programming areas for CRS within Nigeria are agriculture, sustainable growth and capacity building, emergency response and recovery, health, HIV and tuberculosis, water security, peacebuilding, and partnership and capacity strengthening.

Background of Airtel

Airtel Networks Limited (Airtel Nigeria) is a leading mobile telecommunications company headquartered in Lagos, Nigeria. The company is a child member of Airtel Africa, which is the holding firm for Bharti Airtel's operations in 16 countries across Asia and Africa (Airtel, 2020). The company has a vast product portfolio of wireless services, mobile commerce, fixed line services, broadband, and enterprise services.

Why Was Airtel Chosen?

Airtel is a telecommunication company that operates in Nigeria and is prominent throughout the continent of Africa. In 2017, Airtel was known to be the third largest network in Nigeria and had approximately 32 million subscribers. Of those 32 million subscribers, the majority of them were considered to be in the socio-economic level of middle class or below; this coincides with the socio-economic levels of farmers and the rural target demographic. Besides being willing to host the 3-2-1 service on their network at no-cost and as a value-added feature for their customers, they also were known to have an above average grassroots reach, which means that they had a larger ability to reach out to rural areas that are normally hard to penetrate (Clifton, 2018). According to the Airtel site, their mobile networks cover over 70% of Nigeria's population, and they actively seek to provide funding for corporate social investment programmes.

Viamo (f/k/a HNI) was brought onto the project as they were a well-known global development organization that focused on leveraging technology to bring benefits of

development to people. The role provided by Viamo was to design and implement the 3-2-1 service that would be able to fulfill the technology required to disseminate the necessary information to the intended audience in a timely manner. Additionally, Viamo was to provide technical support in the implementation of the service. Viamo oversaw negotiating the MNO contract and finding a company that would want to provide the service on their network (ultimately Airtel).

CRS is known to be one of largest humanitarian nonprofits and has a top four-star rating from Charity Navigator. Within the country of Nigeria, they have presence in 34 of the 36 states and employ both foreign nationals as well as international staff to carry out their programming activities. CRS reports that they serve 4,569,168 people out of a total population of 190,632,261 (Catholic Relief Services, 2020b). In the context of this project, the role of CRS was to organize funding, content, and programmatic linkages.

Barriers to Entry

There are no remaining barriers to the implementation of this project as the project was previously completed in 2017 by the key partners listed above. The documentation of this project serves as a building block for the Mexico case study. One of the lessons learned by this project is that too many potential lessons were lost rather than learned; much of the implementation process was not documented in sufficient detail.

Technology

The technology platform that was selected to carry out the objectives listed above was the 3-2-1 service. The 3-2-1 service was chosen due to its rich feature set, low cost, and its ability to be accessed using technology (simple mobile phones) that was already being utilized within the country.

What is the 3-2-1 Service?

3-2-1 is a service provided by Viamo, formerly a collaboration between Human Network International (HNI) and VOTO Mobile, that spreads knowledge and behavior change information through short message service (SMS) text messages and interactive voice response (IVR). The role of the 3-2-1 service is to host a platform of information that can be requested by users within the specific countries where the service is available. A user of the service can request information using a basic mobile phone and can receive information applicable to their needs in real time and in their native language. To access the service, a user dials 321 on their own simple mobile device and uses their telephone keypad to choose from available sound files. Content on the 3-2-1 platform is organized based on country, local language, and topic. Topics can include health, agriculture, microfinance, water and sanitation, gender relations, etc.

History of the 3-2-1 Service

In 2010, Human Network International launched Centre Mandrosoa in Madagascar in collaboration with Airtel, who was the largest mobile network operator within that country. The agreement between Airtel and HNI was one that was simple and scalable. The content on the 3-2-1 platform was provided by HNI (now Viamo) for free to the mobile network operator, Airtel. Airtel allowed their existing subscribers to access the content for free by using their existing phone and service to access the platform. The goal of the project was to make information easily accessible and to assist in educating a new generation of cell phone users.

The statistics as provided by HNI show that Centre Mandrosoa received an average of 250,000 calls per month in 2013. Since the inception of the project, Airtel provided over 30 years' worth of free airtime to listeners, which equates to roughly 18,000,000 minutes.

How Can 3-2-1 Address the Need?

An estimated 152 million people are phone subscribers in Nigeria. This is a high number considering that the total population is 180 million, so roughly 84.44% of the population has a mobile device as of March 2017 (Clifton, 2018). From a previous project, Growth Enhancement Scheme (GES), it was shown that farmers are users of mobile devices with the project roughly reaching over 225,000 farmers via mobile phone in 2013. Since the communication channel is one that farmers are already using, 3-2-1 can give access to messages that are either written or recorded in English or their local language, and allow the farmers to pick messages and information that are important to them. The estimated cost of providing the service is roughly three cents per call and the service can be reached on any type of mobile phone, simple or smart, which helps to increase reach and decrease socioeconomic barriers. The 3-2-1 platform is accessible on demand, so anytime information is needed a farmer can easily call in, select an appropriate topic and browse the sound bites/written messages available. This service would allow for farmers in difficult terrains or remote communities to be able to get crucial information to assist them with agriculture where extension services wouldn't normally be available.

Project Methods/Implementation

Message Creation and Execution of Project

For the Nigeria project, the messages/content were created by CRS in conjunction with key local partners in a two-day workshop. The workshop allowed the local partners to guide the development of the IVR tree and to create the content around the key messages. Some of the topics that farmers could get information on within the agriculture sector were agribusiness basics, seed/stem sourcing, land preparation, fertilize use, field management and harvest, crop diseases, prevention and treatment of diseases, harvesting, shelling/sorting/grading and storage and transportation.

The partners collaborated to make sure all salient points were addressed and then the messages were sent to the relevant government agency for vetting and approval. After they were approved, the messages were translated and recorded. An IVR message can be roughly 100 words, or about 60-90 seconds worth of recorded voice. To ensure integrity and establish the credibility of the messages, they are recorded by a local staff member in the local dialect. Newly recorded messages are reviewed as a quality check, and if corrections are needed, they are made at that time. The messages were then tested via urban and rural focus groups. Finally, the messages were uploaded to the 3-2-1 platform, so they could be accessed by Airtel subscribers.

Advertisement/Adoption of the Platform

To enable the potential users of the service, two levels of publicity were completed: at the network providers' level and the country program level.

Airtel was assigned to handle below the line marketing. This included advertising using notifications at the end of calls, top up notifications and balance checkers, and robo-calls.

CRS handled additional publicity through more traditional marketing means such as the distribution of leaflets and posters. The figure below shows an example of one of the posters that were distributed:

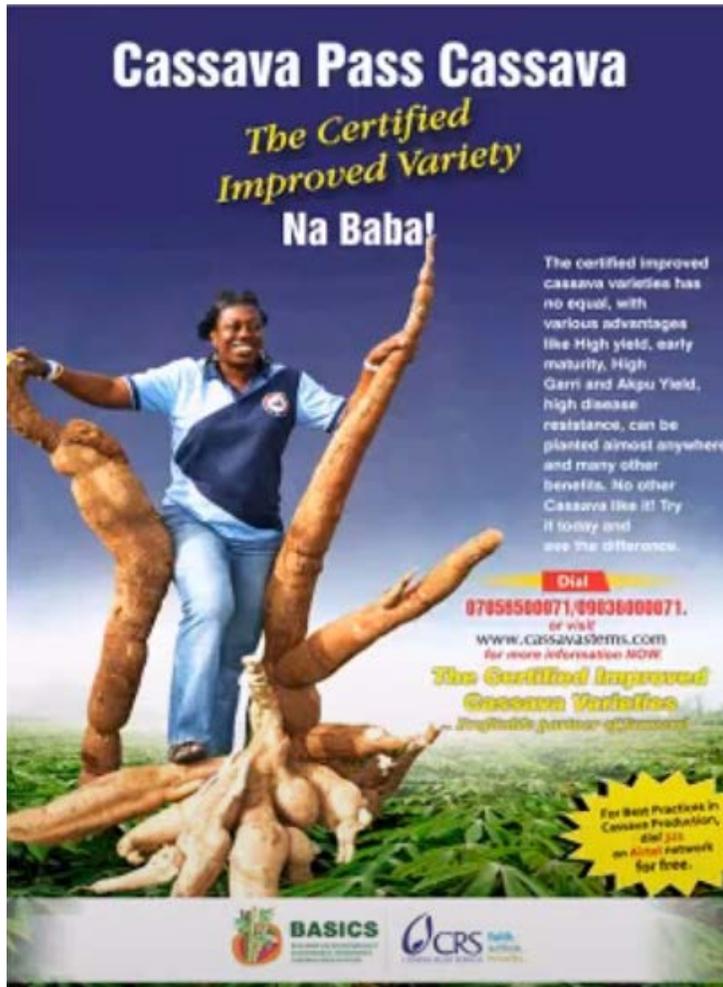


Figure 10. Example of a CRS Poster Used in the Marketing Campaign for the 3-2-1 Service in Nigeria (Clifton, 2018)

Within the poster you can see the information on the number to call and an example of the type of information that was available on the 3-2-1 service. Flyers were manually distributed and also disseminated at the local market(s). In addition, CRS purchased billboards, market day promotions, radio program spots, and promoted the project on their various project websites.

Client Use of the Service

Users that are seeking the information being provided on the 3-2-1 service just dial the toll-free number, 3-2-1, at any time from any location. When the users access the system, they are greeted by a welcome message in their local language. At that time, they can select the language they want to use to interact with the system; there are selections for English as well as all of the native local languages. After the welcome message plays, the voice prompt walks them through the menu of topics, so that they can navigate to the information that could be beneficial to them.

Cost

The program portfolio during fiscal year 2017, when the project was completed, was \$77 million. This portfolio was comprised of activities in agriculture, health and emergency operations. Out of 36 states in Nigeria, 34 states had CRS programming presence. Unfortunately, there is no exact breakdown of cost for the 3-2-1 service project specifically. As stated by Azaino, “The cost implication of this initiative was something that was done at the country level, program level, and is not [readily] available” (Clifton, 2018).

Per follow-up guidance provided by Kathryn Clifton, the ICT For Development, Data And Communications Manager, a base estimate for implementing the 3-2-1 service starts with an approximate one-time cost of \$30,000 - \$50,000; however, this is changing as mobile network operators are often willing to incur the cost of the set-up of the system because it increases client loyalties. In the case of Nigeria, Airtel believed that the 3-2-1 project created a symbiotic relationship in that the farmers will continue to utilize their mobile network provider in a volatile telecommunication market and country programs would be able to fund the service with minimal cost implications to their limited budget. Additionally, Viamo later estimated that there was a one-time per message cost of approximately \$1,000 that accounts for the resources to create and deploy the message on the system. This cost allows that message to live on the system permanently. However,

the total cost is hard to calculate more precisely, and the number of messages created during this project was not known.

Results

Reach

The target for 2017 was for CRS to be able to reach and assist 7 million beneficiaries in Nigeria. This target number was not specific to the 3-2-1 service project but was an overall number that the country program wanted to reach through all of their programming efforts.

From the reports provided by Viamo, table 5 (below) provides statistics about the use of the 3-2-1 system within Nigeria. Specifically, the focus for this project was on the agricultural content. From these statistics, we can see that 58,923 users accessed the agriculture menu from the Nigeria 3-2-1 menu. Of those 58,923 users, we can see that the users accessed content about grains in the following order from most to least accessed: rice, cassava, groundnut & cowpeas, and cereals. The numbers also show that there was some abandonment during the call; the number of those that reached the content was greater than the number of those that listened to 75% of the content or more. Unfortunately, these statistics do not provide the ability to do a thorough analysis as to what content was successful and why, and the current setup does not provide a way for users to give feedback on the type of content that they would like to access.

Findings

A total of 52,315 calls were received during the initial trial period. The majority of callers fell in the 18-24 age range (37.9%), the next highest range was 25-34 (23.3%), this was followed by under 18 (17.9%), then 35-44 (12.6%) and finally over 44 (8.2%). The summary was that the age range of 18-34 was the primary users of the 3-2-1 service as they composed 61.2% of the active users. Per Azaino, the programming staff believes

that the younger generation was more comfortable with the technology and also more adventurous in seeking to create additional business opportunities.

The agriculture menu ranked its findings based on crop type and found that rice had the most callers (43.5%), then cassava (31.2%), followed by ground nut and cow pea (16.2%) and finally cereals (8.8%).

The most frequently accessed topics were ranked as such: agribusiness basics (43.3%), fertilizer, field management and harvest (13.4%), prevention and treatment of cassava pest and diseases (13.4%), cassava diseases (12.5%), land preparation (10.2%) and storage and handling of planting material (7.1%).

The table below provides the analytics as given by Viamo for the country program of Nigeria on the 3-2-1 service:

Table 5

3-2-1 Usage in Nigeria

Theme	Topic	Unique Reachers to Tree	Unique Reachers of Content	Unique Listeners	Total KM's
Health	Malaria	168,639	27,898	23,031	33,771
	Common Illnesses in Adults	168,639	20,104	17,330	31,352
	Women's Health	168,639	20,971	15,222	23,038
	Child Health	168,639	7,497	6,384	8,620
Agric ulture	Groundnut & Cowpea	58,923	9,048	6,892	17,933
	Cereals	58,923	5,059	3,674	9,314

Rice		58,923	16,985	13,890	36,871
Cassava		58,923	13,869	10,690	28,523
WASH	Ensuring Water is Clean	37,197	8,525	7,696	10,815
	Sanitation	37,197	5,691	4,762	6,718
	Hygiene	37,197	5,500	4,650	6,913
	Hygiene and Sanitation for Pregnant Women	37,197	5,067	4,713	6,567

Metric	Definitions
Unique Reachers to Tree	Unique subscribers that reached the theme menu of the topic
Unique Reachers of Content	Unique subscribers that reached the message blocks of the content
Unique Listeners	Unique subscribers that listened to 75% or more of the message
Total KM's	Total number of message blocks listened to

Return on Investment

Prior to the use of the 3-2-1 platform, information provided by CRS was disseminated through posters, leaflets, and brochures that were placed in town or at the common markets. This information was also directly passed to the affected population as they were interacted with on a 1:1 basis. Naturally, 1:1 service was severely constrained by resources available, lack of staff or knowledgeable subject matter experts (SMEs),

lack of transportation to reach the rural populations, and lack of funding to support a larger initiative. A lot of the content was disseminated to a singular point person and relied on a grassroots approach for circulating the content through word of mouth.

The statistics for the number of people served in a manual, 1:1 process was requested from CRS, but there were no records found to provide this data. Without a baseline to compare this data to, the return on the overall investment in the 3-2-1 system in Nigeria cannot be accurately calculated.

Challenges

Even with advertisement by Airtel and CRS, most potential users in Nigeria weren't aware of the 3-2-1 service. Additionally, there were a number of farmers who could have benefited from the information but who couldn't be reached as they weren't Airtel subscribers.

Future State of This Project

As the project in Nigeria continues, CRS will need to engage with Airtel to make sure they are continuously promoting awareness of the program through BTL marketing. CRS will also continue to use the 3-2-1 service in projects within Nigeria to make sure more information gets on the platform and to assist with the word of mouth dissemination of the platform. Additionally, CRS will seek to increase sensitization among MDAs, NGOs, farmer organizations etc. within Nigeria to assist in spreading awareness of the platform and to expand the information that is being offered. Finally, CRS and its partners will continue to make sure content on the platform is relevant, engaging, and user friendly.

This researcher worked with CRS to track down metrics, lessons learned, and good practices from this case study in order to benefit future 3-2-1 projects. It quickly

became clear that the project needed to be better documented, and the lessons that were learned need to be formally disseminated for future 3-2-1 service projects.

An analysis on impact from a geospatial context could be beneficial for future 3-2-1 projects within Nigeria or any country program. The analysis would focus on comparing the reach that an extension agent would have across the country: specifically the mile coverage of the service area versus the mile coverage of the 3-2-1 platform. Statistics would need to be retrieved from the Nigeria extension agent local government program that shows the number of users serviced and their geolocation coordinates over a definitive time period and compared to statistics from Viamo that shows the number of users and their geolocation coordinates where the call was placed. This analysis could help to show the benefits of 3-2-1 by having a larger reach than what is available from the extension agents, could also show the areas that are most using the services, and could help to drive future justification for return on investment.

Chapter 5: Mexico Case Study

What was the Need?

Mexico is the third largest country in Latin America and is ranked as one of the ten most populous countries in the world. While the country is considered to be 80% urbanized with the majority of the population living in or close to cities, 20% of the country, roughly 26.46 million, is located in rural areas. These rural areas have limited access to the internet and mobile phones due to monopolization of the telecommunications industry and lack of infrastructure in their area. This limitation leads to their lack of ability to access crucial information and creates a digital divide that does not allow this population the ability to achieve as much as their wealthier counterparts. The goal of this project is to try to work within their current infrastructure to provide access to information that could be beneficial to increase the quality of their current lives.

The need for this project was two-fold, 1) the need from a country level perspective to disseminate information to populations that needed assistance, and 2) the need to streamline the implementation process to make better use of the service in other CRS projects.

Mexico has a high population of migrant workers and a history of social and economic unrest due to drug trafficking, violence and organized crime. Due to these economic and social factors, migrant workers will often cross the border into the United States to try to find employment as well as a better life for their families. With the change of presidency in the United States in 2017, tensions between the US and Mexico have increased and regulations for immigration have been amplified to be more restrictive. Within the Mexico country program, there was a need to disseminate information regarding immigration regulations, information on legal representation, guidance on wages and working conditions as well as the current political climate issues between the United States and Mexico. The belief was that the 3-2-1 system could reach the rural areas where these migrant workers lived and provide critical information that could allow them to make choices to better their lives.

3-2-1 was deemed a “surprise” service that ended up in the suite of tools for CRS. Initially, the enterprise relationship launched after a webinar from David McAfee, the President and CEO of Viamo, and CRS discovered that the service was already implemented in ten different country where CRS had programs. A directive was launched from the ICT4D department within CRS to try to leverage this tool more often, when appropriate, as previously the creation of SMS services or IVR services had been done on an ad-hoc basis and coded specifically for the sector and country program that needed this functionality. This approach meant that the solutions weren’t reusable, which led to higher costs across CRS initiatives, additional marketing costs, a lack of accessibility to users, and ultimately to low usage rates of the system.

Since the initial discovery of the 3-2-1 service usage in CRS, there are now twelve countries (Tanzania, Madagascar, Zambia, Malawi, Democratic Republic of Congo, Ethiopia, Ghana, Haiti, Niger, Greece, Zimbabwe, and Nigeria) using the service to disseminate information to targeted user bases; however, there is a lack of information both internally and externally about the implementation of these projects, little guidance around good practices, and uneven awareness of the benefits that the service can provide for internal and external clients. As part of the initial research phase of this project, a survey was created (see Appendix A for a copy of the survey) and sent to the twelve heads of programming for the countries that implemented the 3-2-1 service. The goal of the survey was to collect lessons learned across these projects as a guide for future 3-2-1 projects. Unfortunately, although the survey was sent in four different communications over the course of two months, no responses were received. Eventually the effort was abandoned. It became clear that relevant information about the implementation process needed to be captured during the implementation; information was difficult and, in some cases, impossible to collect afterwards.

Objectives for the Mexico Project

1. Disseminate information and knowledge throughout rural areas of Mexico related to emergency prevention, health and safety, and migration.

2. Document the good practices for a successful implementation of the service within the country program
3. Provide guidance on how to set up and configure the platform within the country program; capture this guidance for future projects
4. Provide an average timeframe that can be anticipated from design to completed implementation of the system
5. Provide a rough budget on the cost implications of completing a project using the 3-2-1 service; provide estimates of the comparison costs between providing information on a 1:1 basis vs. through the 3-2-1 system
6. Provide metrics showing the impact on project implementation and then on adoption by comparing the use of social media during and after implementation in one district while using no social media in another, similar district

Why Mexico?

Overview. Mexico ranks as one of the ten most populous countries in the world today with their 2019 estimated population being 132.33 million people; concurrently, it is also the highest populated Spanish speaking country in the world (Mexico Population 2019 (Demographics, Maps, Graphs), 2019). Even though Mexico has one of the largest economies in Latin America, half of its population lives in poverty (Catholic Relief Services, 2020a). Income distribution is highly unequal and roughly 46.2% of the population lives below the poverty line. Economic growth has only averaged roughly 2% annually for the last few years.

Mexico faces hardships related to economic concerns, social concerns, and security issues such as drug trafficking, violence and organized crime. The CRS outreach program has programming that assists with migration, peacebuilding and human rights, and inequitable access to rural development opportunities. A key focus during the last few years has been immigration rights and advocacy for migrants and farmers that are seeking security through immigration to the United States. CRS has an outreach office

within Mexico that works with local partners to “strengthen social-ecclesial platforms to design innovative social, political and economic strategies to address systemic injustice in Mexico, migrant and farmworker vulnerability, social transformation in high violent contexts, and rural development” (Catholic Relief Services, 2020a). The country program was interested in leveraging 3-2-1 to be able to reach a larger percentage of the population to provide information that could educate migrant workers about their rights, provide information on legal representation and provide guidance on the best manner to immigrate to the United States within the current political climate.

Mobile Penetration. Of the 130 million people in the 2018 Mexican population, there were 81 million unique mobile users. This accounts for a 62% user penetration rate; a 4% increase from January 2017 (We Are Social, 17:09:27 UTC). According to Mexperience, Mexico is one of the least expensive places in the world to own and use a mobile telephone, yet Mexico is still viewed as a relatively untapped market, ranking low in mobile penetration rates amongst the ten largest countries.

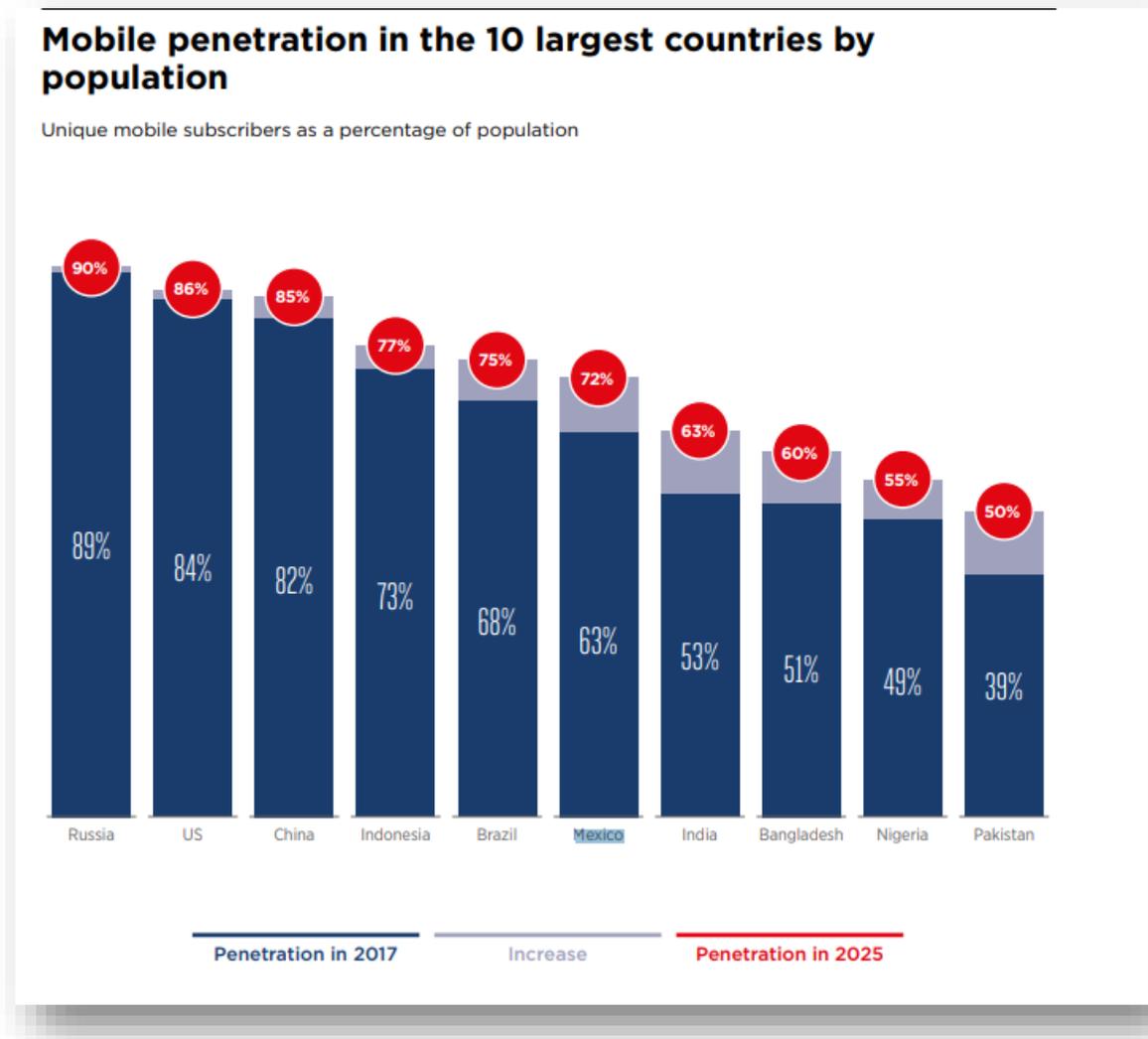


Figure 11. Mobile penetration chart of the 10 largest countries by population (The State of Mexico’s Mobile Market - EMarketer, 2019).

These mobile penetration rates are predicted to increase within the next several years due to telecom regulations put in place to create competition and drive costs down. Removing these relatively high fees and taxes could allow mobile phone access to those that were previously limited.

Most of the mobile connections in Mexico are prepaid contracts where users pay upfront for a specific number of minutes and megabytes (MB) of data. In 2011, prepaid contracts made up roughly 85.4% of the subscriptions within the country, but the country

is starting to see that number drop slightly, to 83.6% in 2015, as mobile contracts become less expensive (The State of Mexico's Mobile Market - EMarketer, 2019).

Studies by We are Digital have shown that there are positive attitudes towards digital with 57% of Mexicans believing that new technology offers more opportunities than risks and 60% preferring to do tasks digitally where possible. There is also an opportunity for training and knowledge related to improving digital skills. The GSMA mobile connectivity index measures the performance of 150 countries against the four key enablers of mobile internet connectivity. The 2018 scoring for Mexico is as follows:

- Overall Country Index Score – 67.3/100
- Mobile Network Infrastructure – 66.4/100
- Affordability of Devices and Services – 60.3/100
- Consumer Readiness – 71.0/100
- Availability of relevant content and services – 72.3/100

Overall, it appears that consumers are ready to move into a more subscription-based approach to mobile access. The 3-2-1 service will be more valuable to those who have a mobile subscription, obviating the need for users to pay per message. However, the mobile network infrastructure score shows that while there is adequate network coverage, network performance needs to be improved. The affordability score shows that there is still room for improvement with regards to the cost of hardware as well as the taxation rates. The consumer readiness score shows that while gender equality and access to mobile ranks high, there is room for growth in mobile phone ownership as well as in basic skills for utilizing the technology. The availability of content data provides insight into the value of providing expert knowledge around topics that are important to the consumer base using the 3-2-1 system. Specifically, the number under the content and services called local relevance is 68.2, showing the need for content that is more applicable to the local context.

CRS Programming Needs. The Mexico outreach program has a need to deliver information to rural areas where there is a lack of information or incorrect/outdated

information. The manager of the ICT4D projects, Kathryn Clifton, is also located within the country program for Mexico, which would allow the Mexico project access to a top resource that could help to drive adoption of the service internally. The need to be able to provide information for immigration, security emergency services has increased as political tensions increased between the US and Mexico.

Partners

Key Players

There were four proposed key players for the planning, design, and implementation of the 3-2-1 project in Mexico: Catholic Relief Services (CRS), Christian Tillett, Viamo, and América Móvil (specifically Telcel, a subsidiary of América Móvil). There was a mutually beneficial relationship between the four key players in this project. From a research perspective, I could gain access to country resources such as staffing, budget for the project as well as have a trusted set of target users for the ICT4D application that was being designed; CRS received a dedicated resource to assist in the design and implementation of the project as well as in documentation of best practices and time frames, and guidance on implementation; Viamo could deploy their 3-2-1 platform in another country and would gain access to an additional global mobile network operator that could assist in future implementations of their service; and, América Móvil could not only grow customer loyalty in a volatile and untrusting market, but also help repair their brand perception, which has suffered from negative stigma around monopoly issues.

Background of Viamo

Viamo is a benefit corporation (b-corp) that uses “simple, low-cost technology for data collection and for the provision of public service information via mobile” (Viamo, 2020). CRS and Viamo have interacted on other projects and CRS currently have implemented the 3-2-1 service in twelve of their country programs.

Background of CRS

Catholic Relief Services is a 501(c)3 nonprofit organization that has their headquarters in Baltimore, Maryland. Their mission is to “[carry] out the commitment of the Bishops of the United States to assist the poor and vulnerable overseas” (Catholic Relief Services, 2017b). Through the use of Catholic social and moral teachings they work to promote human development through emergency response, fighting disease and poverty and helping to assist in nurturing peaceful and just societies. Additionally, they allow for Catholics within the United States to “live out their faith in solidarity with their brothers and sisters around the world” (Catholic Relief Services, 2017b)

The organization was able to impact the lives of more than 127 million poor and vulnerable people in more than 114 countries across the globe according to their 2018 annual report. Within the field of justice and peacebuilding there were over 2.9 million people served, 64 projects and 34 countries (Catholic Relief Services, 2018). The agricultural budget made up 3.75% of the overall expenses for the 2018 fiscal year.

The relationship between CRS and Nigeria stems back to the 1943 and the first initiative for emergency response during World War II. CRS built a relationship with a local partner called Caritas and continued to provide programming as needed focusing on key responses to the 1985 earthquake, the 1994 Zapatista uprising and mounting poverty and inequality issues. In contrast, the country program response in Mexico is not a full program, but is an outreach program, so the scale for the amount served and the resources invested are smaller than for other country programs. The main programming areas for CRS within Mexico are agriculture, emergency response and recovery, peacebuilding, and institute for capacity strengthening.

Background of América Móvil

América Móvil is the leading provider of integrated telecommunications services in Latin America (América Móvil, 2020). Excluding China and India, América Móvil is

the largest company in the world in terms of wireless subscribers and offers customers a portfolio of value-added services and communication solutions throughout 25 countries in Latin America, the United States, and Central and Eastern Europe (América Móvil, 2020). Their corporate values include areas that align with ICT4D, CRS and Viamo's values, such as human development, productivity, entrepreneurial creativity, social responsibility, sustainability and respect.

Within Mexico, América Móvil accounts for 76,918 wireless subscribers, with services provided by two subsidiaries, Telmex and Telcel.

Background of Christian Tillett

Christian Tillett is currently pursuing a doctoral degree in Information and Interaction Design at the University of Baltimore. He also holds an MBA and an MS in ITS from Johns Hopkins University. He conducted his undergraduate studies at the University of Delaware, where he earned a Bachelor of Arts degree. Christian is also the director of collaboration platforms at Merkle and has over thirteen years of experiencing designing, implementing and maintaining collaborative solutions using the Microsoft technology stack. His background in both IT and business allows him to design custom solutions with business objectives as a top priority.

Why Were They Chosen?

América Móvil - Telcel. América Móvil continues to be the dominant provider in the Mexican landline and wireless markets. A report released by the Central Intelligence Unit, a Mexico City-based consulting firm, showed that the market share of the Telecom sector, 60.8% in Q3 2016, belonged to América Móvil (Estevez, 2017). The infrastructure provided by América Móvil is critical for access as most mobile operators like AT&T and Telefonica use it to transmit calls and data as well as deliver internet and cable packages (Love, 2018). While other competitors might have infrastructure in major Mexican cities, América Móvil is the only option for access in many small towns and

villages (Love, 2018). For this project, we are focusing on the subsidiary, Telcel, that is the largest provider within the country and has the most widespread coverage in rural areas. In addition, while there are other competitors like Movistar, Virgin Mobile and AT&T, Telcel has been proven to provide the best services in terms of download speed, upload speed, and latency. The figure below was created by OpenSignal and shows the telecommunication company that was the winner of the various tests that were performed to measure speed, latency and availability. These tests were conducted from June 1st, 2018 – August 29th, 2019; 1,847,612,760 measurements were taken from 126,432 devices (OpenSignal, 2018).

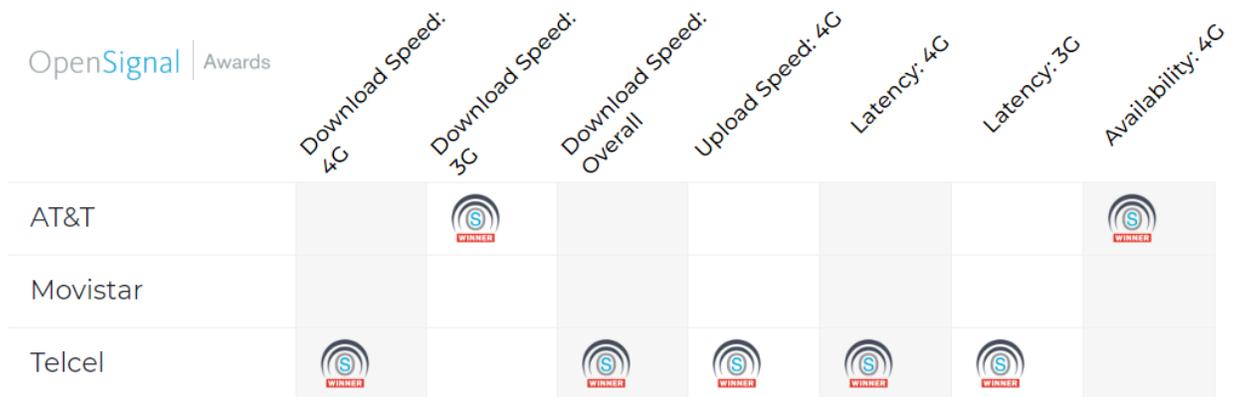


Figure 12. Performance Tests for Mexican MNOs (OpenSignal, 2018)

The project’s intended audience for the 3-2-1 service lives within rural areas of Mexico. Telcel tends to provide the best coverage within those areas and is sometimes the only provider available. The Competitive Intelligence Unit (CIU) has estimated that Telcel controls more than half of Mexico’s mobile market in terms of mobile connections (68.5% of the total as of Q4 2015) and revenue (72.4%) (The State of Mexico’s Mobile Market - EMarketer, 2019). Figures 16-18 below show the coverage for Telcel on the various network levels that outlines not only the coverage, but the speeds available in various parts of the country:

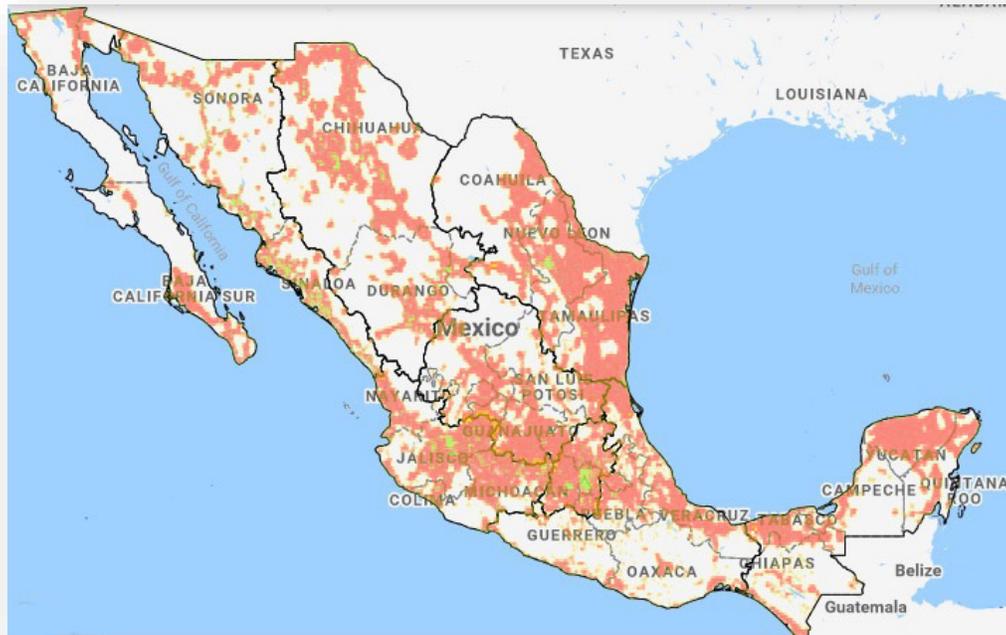


Figure 13. Telcel Voice/Text (2G) Coverage, 2018 (Cellular Maps.Com, 2018)

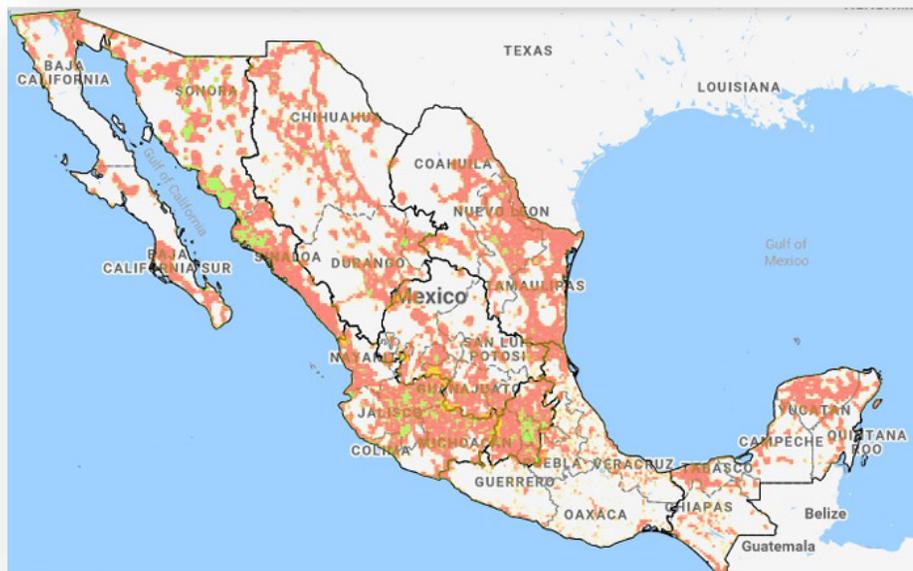


Figure 14. Telcel 3G Coverage, 2018 (Cellular Maps.Com, 2018)



Figure 15. Telcel 4G Coverage, 2018 (*Cellular Maps.Com, 2018*)

Historically, Mexico has faced issues with telephone service being monopolized. According to a report released by the Organization for Co-operation and Development, “[t]he Mexican telecommunications market is dominated by a single company with 80 percent of the fixed line market and 70 percent of the mobile phone market” (Kerr, 2012). The two major companies that were linked with the monopolization were América Móvil and its subsidiary, Telmex. This monopoly led to Mexicans being overcharged for mobile and fixed line access, with particular problems relating to the disproportion of wealth and access. Per the report, “poor people are being charged disproportionately higher” (Kerr, 2012). In addition, the telecom monopoly was linked to a lack of growth and development in the country as citizens needed to be able to access telephone services to get information and be able to compete in the economy. With new telecom reforms in 2013, the country has seen some increased competition amongst mobile network providers and somewhat lower prices for consumers. Emarketer estimates that subscription costs have decreased by 11.3% from 2013 to March of 2016 (*The State of Mexico’s Mobile Market - EMarketer, 2019*). The decrease in subscription costs has also

led to an increase in mobile subscriptions: “The combination of a steadily growing economy, record-low inflation and declining mobile prices is contributing to accelerating subscriber penetration, migration to mobile broadband (3G and above) services and rising smartphone adoption,” (GSMA, 2016). The chart below from Statista illustrates the number of mobile phone users in Mexico from 2011 to a 2020 prediction.

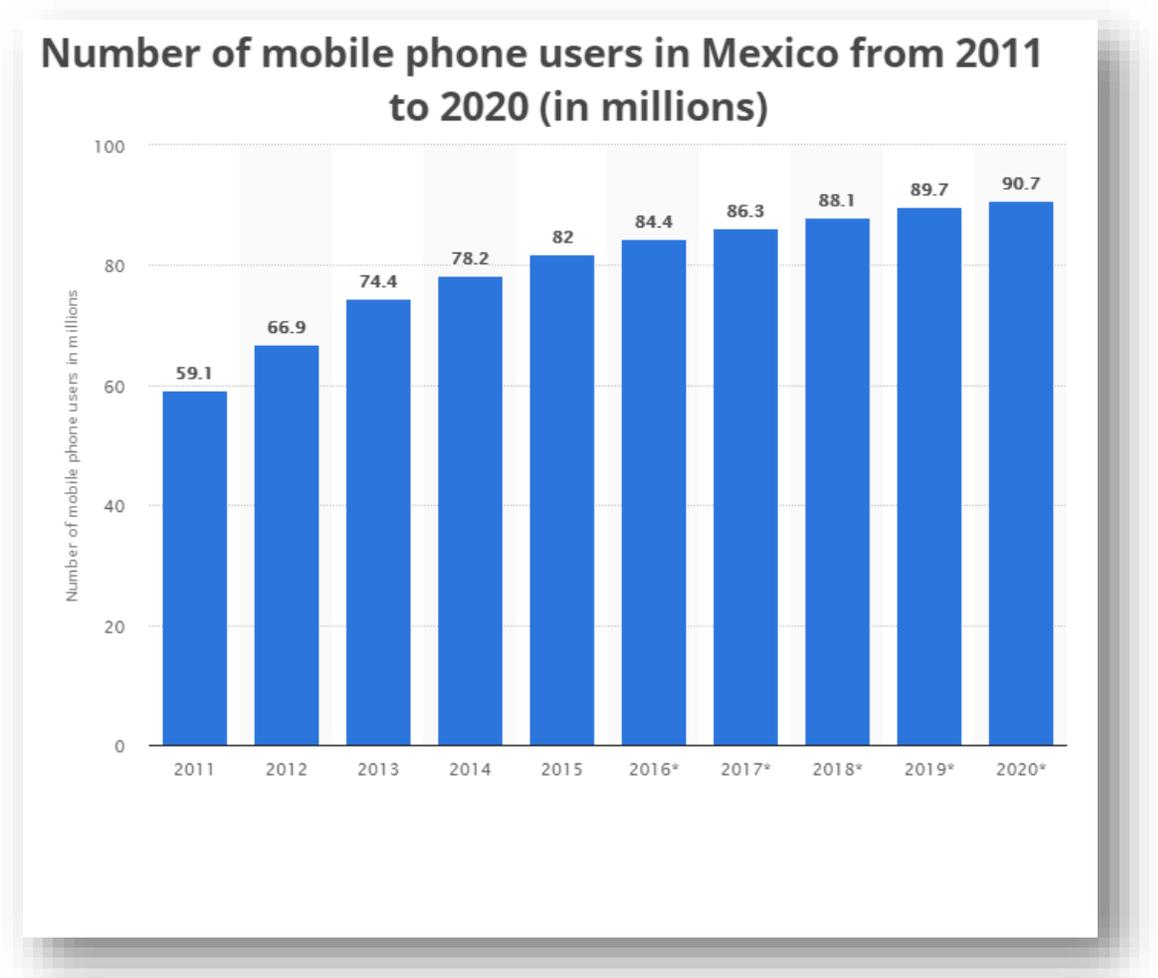


Figure 16. The chart shows the total number of mobile phone users in Mexico from 2011 to 2020 (*Statista, 2020*)

As the number of mobile phone users continues to grow, as shown in Figure 16, the potential for the 3-2-1 service to reach the intended audience and disseminate needed information also grows. The type of phone, whether simple or smart, does not matter; this platform allows a user on any network coverage type (2G, 3G, or 4G) to access information that could be beneficial to them.

The next couple years will likely prove to be pivotal in the de-monopolization of the telecommunications industry within Mexico. However, based on strict market penetration and infrastructure, the recommendation would be for CRS and Viamo to partner with Telcel (América Móvil) to target the rural populations. Because Telcel is in the crosshairs of governmental regulation and is viewed negatively within the community, the opportunity to partner with Viamo and provide the 3-2-1 service on its platform for free could be viewed as a positive change for their brand. The addition of a value-added service for their client also resonates with their declared corporate values of human development, productivity, entrepreneurial creativity, and sustainability, and their recent focus on corporate social responsibility.

Viamo. This partner was brought onto the project as they were a well-known global development organization that has successfully leveraged mobile technology to provide useful content to under-served populations. Additionally, there was an existing relationship between Viamo and CRS through twelve other implementation projects. The role of Viamo was to provide the 3-2-1 service, the platform that would be used to disseminate the necessary information to the intended audience in a timely manner. Additionally, Viamo were to provide technical support in the implementation of the service. One of their key tasks was to build the relationship with the MNO, Telcel, and to negotiate the addition of the 3-2-1 service to their network as a value-added no-cost feature for their clients. Since there was no prior implementation of their 3-2-1 solution in Mexico and Mexico was not on Viamo's list of "whitelisted" countries, additional infrastructure groundwork as well as negotiation with the MNO would be required.

A whitelisted country is one where Viamo has previously done analysis to determine that they have the ability to deploy the platform successfully based on a signed agreement from a local mobile network operator, signed contracts with future partners for once the platform is launched, and a user base that will utilize the information that is being shared. If a country would like to add the 3-2-1 service, but it is not on the “whitelist” of countries for Viamo, then the process becomes a bit more complex and the cost will increase. The cost is related to having a resource from Viamo come into the country to negotiate and foster a relationship with the local mobile network operator. Oftentimes, the mobile network operator is willing to assist with subsidizing the cost and this can be a mutually beneficial relationship between Viamo, the associated partners, and the mobile network operator.

There are very few competitors in the market that offer similar services to the 3-2-1 service. Most competitors that offer IVR and SMS solutions within the country are paid services such as Twilio where a company pays to use their software as a service (SAAS) solution to market towards their specific audience segmentation. The following list shows the closest competitors to the Viamo 3-2-1 service:

1. Twilio - Twilio provides service to Mexico as well as other nations in the form of a developer platform for communications. Different software teams will use Twilio’s APIs to add voice, video and messaging to their applications.
2. RapidPro - The closest competitor that was found to the 3-2-1 service is called RapidPro, which is a product that allows for SMS, IVR and social media capabilities within most developing nations. RapidPro is a subset of Unicef innovations and was originally created in 2007 (under the name RapidSMS) to send and receive data using basic mobile phones, manage complex workflows, and automate analysis and present in real time. A Rwandan software firm called Nyaruka partnered with RapidSMS in 2014 to enhance the capabilities of RapidSMS by incorporating a spin off they created called TextIt. The result of this partnership was RapidPro that

combined the features of RapidSMS while addressing the limitations with deployments in tough environments. RapidPro is different from 3-2-1 as it is a platform intended to help build a mobile service rather than partnering with existing mobile networks. It is a scalable solution and does account for language variations in SMS, voice and social media applications. It is set up in a way that supports metrics: each interaction with a data flow creates a specific data point that is associated with a user. Those interactions are tracked in the database which provides for real time analysis or exportation of the data for further manipulation.

3. Frontline SMS - Frontline SMS is “clever automation and logic that sits on top of an SMS message delivery service.” This service is SMS only and does not work with IVR. The service does have ties to over 120 countries and has extensive application in the NGO and not-for-profit realm.
4. EZ Texting/Slick Text – This service is linked with nonprofit projects, but it is not interactive; it is designed to drive more sales and engagement for donors. The company provides a keyword and the short code for users to opt in to receive text messages. It does not provide a voice component for IVR. Cost is on a per month basis and is dictated by how many messages and keywords are needed

CRS. CRS is known to be a leader in the ICT4D arena and organizes a yearly conference that “brings together almost 1,000 technology professionals to discuss lessons learned in technology implementation” (Catholic Relief Services, 2020a). The project as defined by Kathryn Clifton, ICT for Development, Data and Communications Manager, was to implement the Viamo 3-2-1 solution in the Mexico Country Program (CP), specifically targeting the rural areas as a communication channel to disseminate information on immigration, safety, security and migration issues. The social media component of the dissertation project is actually ICT4D-project agnostic with the focus to be on using a social media platform (Facebook, Twitter, Yammer etc.) to drive adoption

of the solution. In this particular project with CRS in Mexico, the focus was to use Yammer as a way to drive adoption both internally and externally of the proposed 3-2-1 solution for the country program of Mexico. Within the country of Mexico, CRS currently serves 58,497 people out of a total population of 124,574,795. In the context of this project, the role of CRS was to assist with building MNO relationships/contracts, and to organize funding, content and programmatic linkages. While Viamo had to sign the contracts with the MNO, CRS would be able to assist in building rapport and ease the negotiation process, due to their larger network and ties to local business through their previous efforts.

Christian Tillett. Christian was previously an employee of CRS; he helped to design and implement ICT4D efforts throughout various country programs. Additionally, his expertise as a collaboration platforms engineer lent itself to a deep understanding of social media platforms and the capabilities that they could provide to assist in the project.

Barriers to Entry

Political Tensions with the US

With the increasing immigration tension within the United States, millions of Mexican migrants are returning from the United States. The latest issues with racial discrimination within the United States, specifically tied to mass-shootings and gun violence, has caused a political divide between the Mexican and United States governments. There could be hesitation from the Mexican people and businesses about interacting with American businesses and American people. The utmost care and concern and maximum use of national staff should be a key part of trying to launch any program within the country. As stated by Export.gov, a successful strategy “should be based on establishing an agent, representative, or authorized distributor for your products and services in Mexico or opening a representative office” (International Trade Administration, 2020). As CRS already has local staff as well as ex-patriots that are

helping to assist in running the country program, CRS is well-placed to launch a project that can utilize the local representatives along with the Viamo staff in order to build a partnership with the major mobile operators Telcel. The project would focus on rural areas within the country and target demographics such as farmers that could find the service useful and accessible. It needs to be noted that the Mexican culture endorses regular direct communication and rapport is crucial in launching a successful project.

Technology

The technology platform that was selected to carry out the objectives listed above was the 3-2-1 service. The 3-2-1 service was chosen due to its rich feature set, low cost, its ability to be accessed using technology that was already being utilized within the country, and the presence of some familiarity with the tool and the implementation process from previous projects completed by CRS. It was assumed that other project managers would be able to provide some assistance if issues occurred.

How Can 3-2-1 Address the Need?

As of February 2020, an estimated 86.46 million people are phone subscribers in Mexico (Statista, 2020). This number corresponds with roughly 65% of their population having access to a mobile phone. Since the 3-2-1 service isn't specific to the type of phone, this would allow for CRS and its associated content partners to make its content widely available, so that the users can retrieve information that is relevant to them at any time from any location.

Role of Social Media in the Project

Social media, specifically the Yammer platform, was to be used as part of the project to create a Community of Practice/Community of Excellence that would ultimately be able to drive additional projects of 3-2-1 service as an ICT4D platform within CRS; the increase in projects would allow the adoption of the 3-2-1 service as an enterprise tool. Additionally, the Facebook platform was to be used as part of the project to create a knowledge community and adoption campaign for the 3-2-1 service within Mexico for the users of the system.

Project Methods/Implementation

Create a relationship with a Mexican Mobile Network Operator

Since Mexico was not considered to be a whitelisted country, a country in which Viamo already thought it would be advantageous to deploy their solution, a market analysis (found in Appendix C) needed to be completed and was provided to Viamo. The market analysis was submitted to the 3-2-1 Product Director, Leah Newman, along with the Chief Operating Officer, Louis Dorval, in an effort to try to encourage them to invest their time, resources and budget into the country of Mexico. Unfortunately, Viamo saw potential in Mexico, but they saw a financial barrier for implementation in Mexico. This meant that CRS needed to raise funds to get the country manager for Viamo out to negotiate a contract with the mobile network operator (MNO). The estimate to get a country manager out to work on building a relationship with a local mobile operator company was roughly \$50,000-100,000 depending on the length of time it took to negotiate. Viamo provided a time range for contract negotiation of two months to a year. A country manager was needed to build rapport and a symbiotic relationship with 3-2-1.

Create Partnerships with other Mexican Nonprofits that could Benefit from Viamo

The cost for implementation was too large for CRS to be able to handle by themselves, so research was done into potential nonprofits that had a focus on immigration and security within Mexico. Kathryn Clifton led the initiative to create partnerships with the listed organizations below in an effort of sharing costs for implementation of the 3-2-1 system:

1. Save the Children announced a campaign in July 2018 that is in support of children and families facing difficulty at the Mexican border. They are partnering with the American Immigration Council and the American Immigration Lawyers Association's Immigration Justice Campaign as well as Kids in Need of Defense. The mission of the campaign is to take action to assist children and families that are seeking asylum and to support children that have been separated from their families (Save the Children, 2018)
2. The Florence Project and Refugee Rights Project acts as legal assistance and social services to detained immigrants in Arizona.
3. The Young Center for Immigrant Children's Rights is an organization that works to assist children in immigration proceedings.
4. Kids in Need of Defense (KIND) works to provide legal representation so all children are represented in immigration court.
5. Asylum Seeker Advocacy Project works to prevent the deportation of asylum-seeking families that are fleeing violence in Mexico

Message Creation and Execution of Project

Content Creation Workshops. After the negotiation was completed with the MNO to get a partnership with 3-2-1 and clients purchased the message bundle backs, workshops would be hosted to create the content pack message bundles. The messages

are roughly poised to be about 100 words or 60-90 seconds worth of content; they are meant to be quick bites of easy-to-understand information that can branch to other content or be implemented for immediate use. The workshops would focus on working with internal staff as well as key partners to guide the development of the interactive voice response (IVR) tree and to place proper phrasing around the messages that were to be transmitted to users. Local context and applicable information would be included in the messages. After the workshops concluded, the relevant government agency would need to vet and approve the messages; there would be quality control through review between CRS and the other content partners to make sure all salient points were included. This review process would include national staff from CRS as well as other local subject matter experts to verify that content is correct and that it is relevant to the intended users. Pending approval, the content would be tested on multiple rural focus groups to make sure the information is considered to be relevant and pertinent to their daily needs. Rather than specifying what information was to be disseminated for user selection, the goal was to utilize local staff to create the messages, local government to approve the messages, and local users to test the messages, which leads to a per-poor approach with support from technical experts as needed.

Deployment of Content to 3-2-1 Platform. These bundles would be published to the 3-2-1 system through the upload process and would be available for all users to dial in or access via the web to get the content that they wanted. Content is self-selected, so users would be able to call in and select the content theme (agriculture, health, microfinance, etc.) and the topic of interest using a touch-tone menu. In addition to the touch-tone menu, users could access the 3-2-1 website and find content in easy to use menus based on the content theme and topic. Additional content such as videos and downloadable soft copy files would be available on the 3-2-1 service website alongside the audio recordings.

Advertisement/Adoption of the Platform

To get started, I did some preliminary research into the projects that were previously completed by CRS in other country programs using the 3-2-1 platform. From the information that was gathered, I reached out to the Heads of Programming (HOP) for the country programs to get information about their project, issues and the success/failure status (see survey in Appendix C). The survey was conducted to try to get baseline statistics that could be leveraged against future 3-2-1 service implementation projects to see if the process became more efficient, to see the impact of these projects in terms of timeline, resources and reach, and to try to gain insight into good practices for future project design. Unfortunately, after multiple requests for data, it became clear that no historical baseline data was available.

Case for Yammer. Retrieving information about the good practices, budget, timeframe for implementation, challenges and the way the challenges were resolved was difficult, because:

1. There is high turnover of employees within these country programs, so oftentimes employees that were engaged on the project are no longer part of the organization
2. Information about the project is rarely formally documented – hard to remember or retrieve details about project specifics as they were never formally or informally recorded
3. Employees struggle with time management between the various initiatives they are assigned, so they lack the resource hours to follow up on administrative tasks or retrospective examination of past projects.

The notion was that the use of social media, specifically Yammer, would allow for the free flow of project information in real-time as part of the implementation within Mexico. This use of social media would not only provide support and a collaborative space as implementation of the service is carried out but could provide naturally captured

documentation of project information in terms of good practices, budget, timeframe, challenges and their resolution.

Statistics for Use of 3-2-1 Service. Reporting metrics were requested from CRS to try to determine a baseline for the content currently disseminated within rural Mexico based around the topics of migration, security, immigration issues and safety, prior to deployment of the 3-2-1 project, but these metrics were also never provided. Per CRS, they were unsure if the information existed aside from the general information provided in the annual report. The annual report is available to all investors/donors, stakeholders and interested parties on the CRS website; however, the report only provides statistics by sector without breaking out detailed statistics for the individual country.

External Social Media Outreach – Case for Facebook. There was a CRS campaign that was done through social media to promote information about refugee and migrant issues, and CRS reported that they reached 5.7 million people on social media with over 745,000 people on Facebook, Twitter and Instagram accessing the content. While statistics could be retrieved from Viamo to provide general numbers on usage of the 3-2-1 service in some countries, the data (see Table 2) did not provide any information about challenges associated with use of the 3-2-1 service, about the success in driving awareness of the service offering, about the creation of a community around adoption and usage of the 3-2-1 service. Nor did Viamo have any response about the potential use of a collaborative feedback mechanism for users to request additional content/information on the platform. As shown in Table 5, there are issues with users abandoning the IVR tree in the 3-2-1 platform, which provides a clear opportunity to improve the service. While there is no definitive answer as to why this drop-off is occurring, it provides a clear call for further research into the causes; utilizing the Facebook platform would allow for project staff to engage with users of the 3-2-1 service in order to understand why this phenomenon is occurring and allow staff try to remedy the issue in real-time. Facebook would also allow for users of the 3-2-1 platform to

discuss their reasons for its use, tips and tricks that they have found to get to the content that they need or to engage with the system overall. Facebook might also foster a sense of community where users could feel like this system is their system, which would provide additional impetus for adoption. As the users of the system embrace the system as their own and create that sense of ownership, the premise is they should share this information/project with others that could find it similarly useful.

Strategy. The go forward strategy decision was to use this project as a way to get needed baseline numbers by creating two subprojects, one where the implementation of this system was announced and monitored with the social media campaign, and the other where the implementation was announced, but there was no social media campaign attached to the implementation. The projects were to be completed within two different rural communities within the Mexico outreach program to try to minimize differences in culture, context and environment.

Create a Social Media Presence

The social media component of the project is actually ICT4D project agnostic with the focus to be on using a social media platform (Facebook, Twitter, Yammer etc.) to drive adoption of the solution. In this particular case, the focus was to use Yammer as a way to drive adoption internally and then to use Facebook to drive adoption externally of the proposed 3-2-1 service for the outreach program of Mexico.

Audience. There are two distinct audiences for the social media portion of the project 1) internal CRS staff and 2) external users of the 3-2-1 service in Mexico.

Purpose. The internal social media component of the project would start with the inception of the project and would provide a place for internal collaboration around best practices, guidance, budget, and real time resolution of issues as they arise. The external social media component would start following implementation of the 3-2-1 service and

would allow for a place for external users to speak about the service, receive training on how to utilize the system, address issues in real-time with project management as they arise, provide feedback on the type of information they would like to access, and finally foster a sense of community dedicated to building awareness and acceptance of the 3-2-1 service.

How to Measure Success. To get baseline statistics for how successful the two social media campaigns would be, we would need to compare the usage of 3-2-1 in a rural Mexican area as a new implementation with no use of social media to the usage of 3-2-1 in a rural Mexican area as a new implementation with the use of a social media campaign.

The goal of the external social media campaign would be to create an engagement-rich platform where users can collaborate with other users of the 3-2-1 service as well as with key staff members. For the internal Yammer campaign, success would be measured in usage and engagement with the group discussion, to support a smoother implementation project and to provide some documentation of the process. For the Facebook campaign, success would be measured by the level of 3-2-1 usage (adoption), as well as by engagement with the project and its content through posts and shares: “It is engagement with a website that causes someone to want to visit it, download its pages, be attentive to it, recommend it to a friend or be disappointed if it were no longer available,”(Calder et al., 2009) The expected behavioral outcomes for the social media platform would need to be agreed upon by the stakeholders for the project, but the proposed outcomes are listed below. These behavioral outcomes will help to determine success of the external campaign and verify that the campaign is proceeding

Expected behavioral outcomes should include:

1. Joining the Facebook/Yammer group
2. Liking relevant posts/content
3. Communicating about the project with others
 - a. Word of mouth external to the social media platform

- b. Within the social media platform by sharing posts, content or links to the Yammer/Facebook group with other members not in the Yammer/Facebook group.
4. Adding to the best practices, content and adoption of the 3-2-1 system within Mexico
- a. Users are mobilized to create content that can assist in the adoption of the platform
 - b. Users create content that show use case application of the system
 - c. Users create content that shows limitations or challenges within the system
 - i. Dialogue to occur with project staff to get issues resolved as soon as possible or to queue up for a future release of the project/platform

Internal Social Media Campaign – Yammer. The platform chosen for the collaborative social media campaign for internal purposes is Yammer. Yammer is a Microsoft enterprise social media network platform that is considered to be a corporate version of Facebook. This platform was one that CRS was familiar with and it provides internal collaboration capabilities such as threaded chat, announcements, polls, praise mentions, @mentions, a document repository, notifications and tracking analytics. The cost for implementation was low as the license was one that was already included as part of the CRS overhead and could thus be extended for free out to external users. The intention was that as the project was being designed and implemented, this Yammer group would be rolled out to internal CRS staff and close collaborators. The threaded chat capabilities and file sharing functions would allow for staff to troubleshoot issues, document their process, and collaborate in real time regardless of their physical proximity. This would allow for a free-flow conversation between the CRS headquarters that would be tracking the project and provide resources for future projects using the 3-2-1 platform and the country staff that were implementing the project.

There would be three key messages placed out on a daily basis for sixty days. These messages would be used to inspire engagement of the project staff and potential future country programs that want to implement 3-2-1. The messages would vary in their content, with one message every day being a technical tip or trick on how to implement the 3-2-1 service, one daily message focusing on how to create successful content for the 3-2-1 service, and another daily message focused on asking questions of the users to gain insight into project details and status. As the project continues, analytics can be pulled from Yammer to help to change the social media campaign in real time to adapt to the Yammer group's needs and desires on engagement types.

After the 60-day campaign has completed, these analytics can be used to see engagement levels on the Yammer platform from the internal project team. This campaign would continue internally and would morph into a community of practice for a global CRS community that could create content for training for staff on implementation of the 3-2-1 platform within different environments, create content that could be used for training users on how to utilize the 3-2-1 service (thus providing content to the external Facebook group as well), documentation of good practices around use/adoption of the 3-2-1 service, documentation on sample project plans, communication plans and tools to assist in the roll-out of the 3-2-1 service within a country program, documentation on the timelines and budgets of projects using the 3-2-1 service, documentation on good practice for marketing and awareness of the 3-2-1 service within a country program, and tips around how to engage local mobile network operators in the form of prior experience/case studies.

Success would be measured using the built-in analytics as provided by the Yammer tool. The analytics app that is built in provides six different categories that contain information related to the usage of Yammer within the organization. For the purpose of this project, not all six categories will be used; the proposed reports that are needed are listed below:

1. The Yammer overview report provides a high-level view of how the group was utilized, including the number of likes, messages, and files that are within your group.
2. The Yammer members report shows the distinct number of users in the group, the total number of engaged users, and the total number of new users. This information can be viewed in a time range that will adjust to fit the needs of the project.
3. The Yammer messages report shows the total messages across the platform, both private messages and group messages as defined by your time range parameters.
4. The Yammer files report shows how many files are uploaded to Yammer and information on the number of times these files have been accessed.

Custom analytics can also be accessed from the platform logs and used to create dashboards that would allow the group to see information about active vs. enabled users, activities that users are conducting on the platform (specifically within our Yammer group) such as liking posts, reading posts or creating posts. All data could be tailored to be specific towards the group being used for the ICT4D project itself.



Figure 17. Example Dashboard for Analytics of Yammer Usage

External Social Media Campaign – Facebook. Facebook has 2.41 billion monthly active users and a reported rate of 74% of their user base logging in daily, and it also provides a large set of usage statistics and demographic data that can be used to run analysis (Newberry, 2019). As reported by Statista in 2019, there are a predicted 56.6 million users in Mexico that use the Facebook platform (Statista, 2019b). The familiarity of the platform would allow for rural end-users to provide feedback to the outreach program and CRS staff to help improve the 3-2-1 service. After the deployment of the message bundles to the 3-2-1 service, as the project was released to the intended rural demographic, the Facebook group would be launched to the external users. This platform would also allow for them to provide feedback on the type of information they would like to see on the 3-2-1 platform and discuss any technical issues that they might have. The Facebook group would be moderated by a cross-departmental team for CRS composed of IT staff, programming staff and SMEs for health, safety and immigration. There would be

three key messages placed out on a daily basis for sixty days. These messages would be used to inspire engagement between staff and the users of the platform. The messages would vary in their content with one message highlighting a technical tip or trick of how to utilize the 3-2-1 service, one message focusing on the content available on this particular implementation for Mexico, and another message asking questions of the users to gain insight into potential future content. As the project continues, analytics can be pulled from Facebook Insights to help to change the social media campaign in real time to adapt to meet the user's needs and desires on engagement types. Particular attention would be paid to posts that are shared, since this would be a key component of using this social media campaign to drive adoption. After the 60-day campaign has completed, these analytics can be used to see how many of the 3-2-1 platform users engaged with the campaign and apply the social media framework to gauge success of the campaign. This campaign could continue both internally and externally to facilitate collaboration on continued use/adoption of the platform within rural Mexico and be used for information for future projects involving the 3-2-1 platform.

By building the Facebook group, CRS could create a community of knowledge around their initiatives with the Viamo 3-2-1 platform and engage both potential future country program programming staff along with potential users of the system in the countries where the system is already rolled out. The Facebook group allows staff to engage with the core user base by encouraging and responding to feedback and facilitating conversation amongst users of the ICT4D solution. The overall goal would be to drive adoption of the platform through building loyalty to both CRS and the project and moving that loyalty into a venue where it becomes advocacy to push out to other countries or areas that could benefit from the solution. As the users post to the group, their posts will appear in the feed and allow other users and group moderators to interact with the post; this is contrary to a Facebook page that opts to store user posts under the "Community" tab. With the modification of the Facebook algorithm in 2018, there was a shift in the content that was made readily available to users with the focus being on "fostering communities and relationships and showing users more of the content that they

want to see”; the result was that the feed “gave group postings more priority” (Hootsuite, 2019). The 3-2-1 group would be linked to the Catholic Relief Services main Facebook page, as well as to any local CRS project Facebook pages that may arise, in order to provide a robust social media presence on the Facebook platform. The combination of the page and the group will allow the organization to target specific content around the ICT4D project while leveraging the page to run ad campaigns for the organization, get reviews from other partners, stakeholders and affected users as well as post public content about other initiatives and activities.

With new features like watch party, video content can be shared live to those who have liked the page, allowing for interaction and discussion among group members. This feature should be announced prior to launching the watch party to allow for users to schedule time for this event and to highlight the agenda and benefits of attending the watch party. Live events could allow the moderators of the group to highlight specific case studies or how-to videos, and to partner the video content from the 3-2-1 system with Facebook to help drive discussion back to good practices for the platform. The goal of the watch party would be to use that sense of community to elicit conversation around relevant videos; group members can be invited to participate, and (with prior notice) participation can be recorded for future analysis. The organization can provide information and can respond to feedback in real-time to assist with driving adoption of the platform. Another feature that should be used as part of the campaign is learning units, which allow the project leads to create a course-like structure to provide information to users that can drive better understanding of the project and the platform.

The platform utilization plan would be similar to the one proposed in Yammer, except the success would be measured based on the built-in analytics tool for Facebook called Group Insights. Group Insights provides metrics about the group including member activity, growth, top contributors etc. and can highlight trends in membership and activity. The data provided by Group Insights can be leveraged to determine the best times to post content, the content with the most engagement, and can even highlight the most engaged members to allow for a potential partnership as a moderator on the group.

Group Insights allows those running the social media campaign to make key decisions that can affect content visibility, and the scheduler built into the group can assist in pushing content to a valuable user population at peak periods of usage. One strategy that can spur additional engagement is to recognize the top ten contributors each month by featuring them in a post. This can drive a feeling of gamification and lead to others in the group becoming more motivated to collaborate on the project at hand.

Statistics to Be Measured

To prove that the level of effort exerted into the social media campaign provided a return on investment in terms of adoption of the Viamo 3-2-1 platform, we have to measure a few categories such as awareness, community growth and engagement, lead generation, and social customer support. The metrics that play a key role in these categories are engagement, discussion, sentiment, and sharing. Following the SMART format (specific, measurable, attainable, relevant, and time-based), we can measure these categories against the baseline provided by the number of people reached in the parallel project that is not using a social media campaign.

Awareness can be measured by the number of unique user visits to the page and by the number of calls to the 3-2-1 platform. The increase in access to the information provided by the page and by the 3-2-1 platform would show an increase in awareness. For internal people, this could also be tracked by the search results within the Yammer platform for the group and its associated keywords/hashtags (ICT4D, 3-2-1, Viamo etc.). Similarly, monitoring mentions of the page as well as the associated hashtags will help to facilitate conversation and re-route users to the Yammer group. These measurements can be obtained from the pre- and post-rollout usage report available in the Office 365 administrative portal.

Community growth and engagement during implementation would be measured based on the trends of the number of unique users that posted, read, and liked Yammer messages. This metric can be measured in two different capacities; one measure would be in the number of members that posted messages, read messages, and liked the posted

content; the other measure would be in the number of non-members that posted messages, read messages and liked the posted content. The increase in the number of active people and number of posted messages over time can be attributed to an increase in awareness of the project. The retention of these users would also be tracked to see how many users converted from non-members to members (lead generation) or chose to follow the group to make sure they were receiving the latest content.

Lead generation will be measured in the number of shared posts that lead to a person joining/following the Yammer group. This statistic can be retrieved from both the membership group data on the Yammer group as well as the Yammer activity report that shows the shared content.

Finally, social customer support will be measured in terms of the engagement on specific posts, the training posts as well as the reactions or comments from the customers based on feedback on their direct questions. This will partner with an end-user satisfaction survey that will be issued at the end of the project to determine staff members' level of satisfaction with assistance on the 3-2-1 platform as provided by the Yammer group.

Individual posts can also be evaluated to compare the success of the types of posts and allow the campaign to be tailored towards the content being posted that is considered to be most engaging for the users. Evaluation of individual posts will be measured on the reactions (likes), comments, and reach (shares).

Performance will be evaluated on a real-time basis to try to draw engagement through conversation, reactions, and sharing.

While device usage won't be tracked to measure success of the social media campaign, it will be a statistic that is captured to assist with future design of social media campaigns. The Yammer device usage report allows us to see the user's device(s) used to access the Yammer platform, so that future content, projects and campaigns can be targeted towards the most utilized devices in these areas. The data captured in these reports are email address, display name, user state, and device type (Web, Windows phone, Android phone, iPhone, iPad, other). This will help to tailor training to be specific

towards geographically utilized devices and will be useful to understand how users are accessing the social media platform.

Metrics from Yammer and Facebook are calculated from individual system log entries based on actions performed by the user and are considered to be valid with no research being found on disparities in information reported.

Results

Unfortunately, as CRS lost funding during this time period, the project was not followed to completion, to see if a social media campaign could assist in the adoption of the 3-2-1 platform. An initial attempt was made to complete this project within the Latin America/Central America region for CRS specifically with the target of Haiti or El Salvador, however Haiti faced issues with safety and political issues and El Salvador was not interested in the project. Additionally, there was an attempt to pivot to utilize the Greece country program or some of the Asia country programs to roll out the 3-2-1 service with the use of social media to drive adoption; however, none of the country programs had immediate interest or budget to support the project.

The key benefit of the project was the creation of a toolkit that could provide a template that could be used to create a social media campaign that could be used as a tool to drive adoption of the ICT4D project. Since the social media campaign component of the project was project agnostic, the toolkit that was created could be leveraged by any ICT4D project as a way to both increase external collaboration and project adoption as well as increase internal communication and assist with documentation of the project as well as transparency for project management milestones. Within the toolkit exists a proposed schedule for implementation of both the internal and external social media campaigns, a proposed schedule and list of content categories for posting content to drive the social media campaign, and key performance indicators/metrics that can be used to assess the effectiveness of the campaign. Additionally, proposed cost models were created to assist in justification for the use of the 3-2-1 system using the return on investment calculation as seen in the next section of this paper.

Within the ICT4D realm, no toolkit has been created to assist in leveraging social media as part of an ICT4D project; rather, the focus has been on using social media as the technology for the ICT4D project. This project focused on the role that social media can play as a supplemental tool for adoption as the ICT4D arena is still seeing the project failure rate of 70% as mentioned earlier in this paper. As this toolkit gets utilized in future projects, it can continue to be refined to reflect lessons learned and good practices based on practical experience.

Cost/Return on Investment

Mexico is not considered to be a “whitelisted” country by Viamo, so work will need to be done to launch the platform within the country, which increased the project cost estimate. The predicted total cost estimate to get Viamo’s 3-2-1 service added to a country where it doesn’t already exist falls in the range of \$50,000 - \$100,000 USD. The MNO typically would provide the 3-2-1 service to free for their constituents as an add-on initiative or corporate social responsibility initiative and the organizations; CRS and other nonprofit/NGO content providers, that wanted to host content on the platform, would pay Viamo for message bundles to have their content available to the users of the MNO. Viamo wanted a guarantee of a return on their willingness to implement the system, specifying that they would not move forward without a pre-purchase of four bundles of messaging, each bundle containing 100 messages, valued at \$20,000-30,000 per bundle for a total of \$100,000.

CRS was to contact other NGOs as well as nonprofit organizations to try to get message bundles purchased from Viamo. Key partners were identified as part of the Mexico market analysis that can be found in Appendix C.

The other cost implication comes from the production of a message. Time, employee resources, and meeting resources are utilized in the creation of the message(s) and need to be accounted for, especially if creation includes travel-related expenses for workshops/meetings. In the past Nigerian implementation, CRS had success in hosting a

two-day workshop to draft the messages for the 3-2-1 system, so costs were estimated on the basis of a two-day workshop.

To try to get statistics about return on investment, we would need to get a baseline of the number of users that previously had to have this content served to them directly by the CRS staff, the time spent in providing this content directly to these users, and the cost associated with providing content in this one-on-one capacity. The way this content was previously provided to the users was via one-on-one meetings where the clients could ask questions about topics/themes. This statistic for one-on-one meeting metrics would be compared against the total number of knowledge messages being accessed as well as the number of unique users accessing the message, and the cost associated with creating the messages. The number of users that had the content given to them in person can be calculated from the meeting logs where staff would go to meet these users as requested. To calculate this baseline cost statistic, we can use the following model to make a per message cost prediction, based on information provided in the Nigeria case study in Chapter 4:

Cost to Provide Information Prediction = (Transportation Cost + Training Cost + Overhead Cost) * Number of Users Visited

Table 6

Transportation Cost Prediction

Transportation Cost Prediction	
Knowledge Expert Per Hour Cost	154.62 MXN
Travel Time To/From Meeting (1 Hr.) (Cost of Knowledge Expert * Transportation Time)	154.62 MXN

Gasoline	X
Routine	Y
Maintenance/Repair for Vehicle	
Total Transportation Cost	(309.24+X+Y)*N

Note: Average salary in Mexico is roughly 26,800 MXN/month, roughly 154.62 MXN per hour (Salary Explorer, 2018)

Table 7

Training Cost Prediction

Training Cost Prediction	
1 Hour Predicted Meeting	154.62 MXN
Time to Train/Provide Knowledge to Intended User	
Total Training Cost	154.62 MXN

Note: Average salary in Mexico is roughly 26,800 MXN/month, roughly 154.62 MXN per hour (Salary Explorer, 2018)

Table 8

Overhead Cost Prediction

Overhead Cost Prediction	
Administrative time to set up/coordinate meetings	154.62 MXN * N Hours

Administrative time to find affected population that needs assistance 154.62 MXN * N Hours

Total Overhead Cost (154.62 MXN * N Hours) + (154.62 MXN * N Hours)

Note: Average salary in Mexico is roughly 26,800 MXN/month, roughly 154.62 MXN per hour (Salary Explorer, 2018)

Number of Users Visited:

- CRS predicted in the Nigeria case study that there was 1 Knowledge Expert per 10,000 Users. This is not really a congruent comparison as they were different sectors: Nigeria was agriculture versus Mexico is security and migration, but for prediction purposes, this number will be utilized. To try to replicate, the statistic being used is the number of CRS staff in Mexico (5-7) to the total number of rural people in Mexico (21.16% of population), which is a ratio of 6 (avg): 27,242,068.
- N is equal to the number of clients that CRS had face-to-face meetings within Mexico

In the Nigeria case study, it was predicted by the Nigeria HOP, Emmanuel Azaino, that the cost was roughly \$25 per visit. This prediction was based on the high cost of each transaction due to lack of transportation, poor roads or lack of infrastructure to physically get to the farmer, and lack of extension agents to provide the service.

Table 9

Face-to-Face Meeting Cost Prediction

Cost
Prediction from Nigeria

Cost Per Visit/User	\$25
Number of Users	10,000
Total Cost to Provide	\$250,000
Face-to-Face Meeting to Users	

Note that with this cost prediction, users would be limited to the knowledge base of the particular knowledge expert that was available and would also have time restraints around their particular meeting. Both of these constraints could reduce the amount of help received.

This baseline cost statistic would be compared to the number of users that accessed the 3-2-1 platform, the total number of knowledge messages accessed, the time spent in creating and disseminating this content on the 3-2-1 platform, and the cost associated with uploading the information to the 3-2-1 platform, as follows:

Cost Per Message Prediction = Cost of Message Creation + Cost of Message Dissemination + Cost of Marketing + Overhead Cost

Table 10

Message Cost Prediction

	Message Creation Cost Prediction
16 Hours of Workshop for Content Creation/IVR	14,844 MXN
Menu Design (6 Employees/Key Partners * 16 Hours * Average Salary Per Hour)	
8 Hours of Recording/Translation Time (2 Employees * 8 Hours * Average Salary Per Hour)	2,474

Administrative or governmental fee for review and approval of messages	X
Focus Group Cost ((10 users * 4 Hour Focus Group * Average Salary Per Hour) + (2 Employees * 5 Hours (Focus Group Plus Set Up/Break Down) * Average Salary Per Hour	7,731 MXN
Total Message Creation Cost	25,049 MXN (\$1,000 USD) + X per Bundle; 100,196 MXN (\$4,000 USD) for 4 Bundles as per Viamo Contract

Note: Average salary in Mexico is roughly 26,800 MXN/month, roughly 154.62 MXN per hour (Salary Explorer, 2018). Workshop hour prediction based on historic data from the Nigeria 3-2-1 implementation

Table 11

Message Dissemination Cost Prediction

Message Dissemination Cost Prediction	
4 Bundles (100) of Messages	400
Cost Per Bundle	\$25,000
Cost Per Message	\$250
Total Message Dissemination Cost	\$25,000 Per Bundle

Table 12

Marketing Cost Prediction

Qty.	Marketing Cost Prediction
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Distribution of Flyers/Leaflets/Posters Per House	8 Hours	1,237 MXN (\$50 USD)
Ream of Paper (\$5.49*2 + 6% Tax)	2	\$11.64 USD
High Yield Ink (\$39.99 USD (Inc Tax))	2	\$39.99 USD
Total Marketing Cost		\$102 USD

Note: In the previous 3-2-1 service implementation in Nigeria case study, CRS printed flyers and distributed at local markets weekly to notify locals of the platform

Table 13

Overhead Cost Prediction

Overhead Cost	
Internet Cost Per GB to Upload Messages	Included in Office Monthly Overhead Cost as opposed to per project cost

Table 14

Total Cost Per Message Bundle Prediction

	Predicted Total Cost Per Bundle of Messages
Message Creation Cost	\$1,000
Message Dissemination Cost	\$25,000
Marketing Cost	\$102

Total Cost Per Bundle of Messages	\$26,102 or \$261 per message; \$104,408 for All Bundles per Viamo Contract
------------------------------------------	------------------------------------------------------------------------------------

The cost per message stays the same regardless of the number of users that are accessing the message. Once the messages are created, they can be accessed by anyone on the 3-2-1 platform on-demand, indefinitely, until the messages are either removed or replaced with upgraded content. The prediction based on the Nigeria 3-2-1 project was that this roughly equates to \$0.03 per message. Users would not be limited to a particular knowledge expert's information bank, but rather would use the IVR tree to navigate the content relevant to them. We can make the prediction that in an hour, there would be roughly 45-60 messages, a reflection of the 60-90 second snippet, that are portrayed to the user of the 3-2-1 system as the average snippet on the platform is 60-90 seconds. The total cost for 60 messages would be \$15,660, a decrease of over \$234,340 in cost associated with face-to-face meetings and would cover unlimited users as opposed to only a 10,000-person user base.

Chapter 6: Conclusion

This paper sought to explore the relationship between social media and ICT4D projects. The hypothesis was that the use of a social media campaign as part of an ICT4D project could help to drive collaboration and adoption of the solution that was being deployed. This hypothesis was based off the notion that the collaborative nature of social media can provide a channel to solicit feedback, impart good practices, and overall drive adoption of the solution for which the project is being conducted. Previous research by Shoembar, Urquhart, Ndhlovu and Ravesteijn (2015) found that social media can assist in improving communication and the exchange of information to strengthen and create new economic and social networks through 1) connecting with others, 2) collaborating with other people, 3) creating and sharing content, and 4) finding, using, organizing and reusing content, however there is not statistically significant data that shows how NGOs and nonprofits monitor and analyze their social media campaigns to drive adoption.

Contributions

This study was not able to provide statistical data to show the correlation between social media and the adoption of an ICT4D project, specifically the 3-2-1 service referenced in the case studies of Nigeria and Mexico. Instead, this paper provides a toolkit that outlines the process for creating a social media campaign, a proposed implementation schedule and key performance metrics to measure success of the campaign. Within this toolkit exists research and a proposed implementation method of a Facebook social media campaign focused on external users that could potentially drive adoption of an ICT4D project. The Facebook social media campaign designed also proposes a method that could foster a sense of community for those that are using the ICT4D solution to spread awareness and provide insightful feedback that could assist with future versions of the 3-2-1 platform as well as the content provided on the platform. Additionally, the paper also provides a proposed method to drive internal adoption of an ICT4D project solution and a collaborative way to garner good practices, budgets,

timelines, implementation methods, challenges, and resolutions as needed to assist in future implementations of similar technology.

The Nigeria case study provides a baseline for future 3-2-1 implementation projects and was the building block for the Mexico case study. The estimated cost predictions and impact numbers that were derived from the Nigeria case study can always be refined as future projects state more accurate numbers but provides a starting point budget estimation for a country program that is considering implementing the 3-2-1 service. Pending distribution approval, CRS could also share their case study with other NGOs or nonprofits that are hoping to implement the 3-2-1 service for themselves and potentially grow new relationships for future projects or become a thought leader in this arena. This benefit could be both for CRS and Viamo as the case study could increase interest in the 3-2-1 service, which could drive more implementations globally and profit for Viamo, and could provide future country programs access to an already implemented 3-2-1 service infrastructure.

The survey that was designed to get baseline statistics could be used for future assessment of implementation success as it relates to 3-2-1 projects. There is also a potential to slightly revise the survey to be used as a tool to do assessment against any ICT4D project implementation.

The research done as part of the Mexico case study provides a good use case and market analysis that could be leveraged for a future implementation of the 3-2-1 service within the CRS outreach office as available with budget. The same market analysis could also be leveraged for other future mobile phone technology ICT4D projects or other general projects within Mexico. CRS also has the ability to leverage the research completed to create future partnerships or alliances with other NGOs or nonprofits to help supplement limited funding to get the 3-2-1 service implemented within the country. The Mexico case study provides leverage to persuade Viamo to add the country to its list of “whitelisted” countries in the future, which could lessen the financial burden associated with implementing the 3-2-1 service within the country.

Finally, the research and case studies provide a way to monitor and analyze activity on both Yammer and Facebook to track success of a social media campaign. The Mexico case study provides step-by-step guidance on how to implement a social media campaign and provides potential content suggestions to spark engagement with the targeted population. The same methods to track the social media campaign could be applied to other projects or initiatives being completed by NGOs or nonprofits that aren't necessarily within the field of ICT4D. The work completed could be used as a template for future projects to deploy social media to allow measurability and improve return on investment.

ICT4D Field

The main contribution of this research within the field of ICT4D is the creation of the toolkit that can be applied to any ICT4D project to use social media to drive adoption of the solution/project. Another primary contribution was to add to the body of work being done on the use of social media as a tool for ICT4D and specifically as a way to drive adoption of an ICT4D project. The knowledge within the paper seeks to add to the work being done to attempt to ensure better future success of ICT4D tools through the use of social media as an collaborative and community-centric forum that can drive awareness and future solution iterations through a continuous feedback loop. To this researcher's knowledge this is the first study to investigate the role that social media could play to increase ICT4D project adoption as well as one of the only studies that used social media in a manner that wasn't about crowd sourcing funding for an emergency.

The study also contributed to documenting a better historical analysis of the ICT4D field and providing more recent examples and insight to why these projects continue to fail. Without understanding the past projects and their failures, it is hard to progress the future of the ICT4D field.

Finally, the study contributed by proposing a social media campaign method that could be leveraged for any ICT4D project as it was built on a project agnostic premise.

The proposed metrics to study and analyze to determine success for the use of social media can also be leveraged across the field by any other nonprofit, NGO, or corporation.

Limitations

There are numerous limitations that can be found throughout this paper. Primarily, the largest limitation was not being able to complete the experimental case study where a social media campaign was used to support the adoption of the ICT4D project and compare it to the implementation of the same ICT4D project in a different area of the country that did not use the social media campaign. The ability to provide hard numbers to show a correlation between the use of social media and the adoption of an ICT4D project is something that could be very beneficial to the field. Prior to the project laid out in this paper, there were two other projects: 1) a project based around using social media to increase users in a selected program for the device challenge from Google; however, CRS did not receive the grant to continue with this project, and 2) using Facebook to create better population maps as part of a sub Saharan spatial data gates grant; however, this grant fell through as well.

Funding continued to be a large limitation, and unfortunately, the funding of \$100,000 to implement the 3-2-1 service was something that CRS was not able to provide. The limitation of being dependent on external funding as this is a nonprofit initiative could be remedied through dedicated budget in the future or through a partnership/alliance with one or more NGOs or nonprofits that could mutually benefit from disseminating this information to the target audience. There was an effort to try to find supplemental funding by creating a mutually beneficial partnership or alliance with another NGO or nonprofit within Mexico that focused on emergency prevention, health and safety, and migration, however none of the leads came to fruition. Additionally, the project did try to pivot to do implementation in a different country that was on the “whitelist” for Viamo, specifically, the country of Haiti; however, the employees within the country program were not available to support this roll-out during the timeframe

necessary. While the information learned from the Nigeria case study and Mexico design and planning portion of the case study could provide valuable knowledge to CRS, other nonprofits/NGOs, and the field of ICT4D, there should be secured funding and dedicated resources in the future before proceeding with future projects.

In addition, there was a lack of documentation on previous work that had been done within CRS using the 3-2-1 service. The previous implementations of the Viamo 3-2-1 service were lessons that were lost that could have provided valuable insight for implementation guidance, good practices, training, message composition, and additional statistics that could be used to estimate reach, cost, timeline and reach. The greater the number of use cases for implementation, the better chance at driving more universal guidance and statistics that can be applied globally. While this information was sought to be retrieved after the projects had already been implemented, there was a lack of resources that had knowledge about the implementation due to staff turnover and lack of process documentation.

Finally, a limitation was being able to locate a nonprofit or NGO that did have the resources and funding available to go forward with an ICT4D project within the timeframe that was needed. The key actors within the ICT4D field at this time are still NGOs or nonprofit organizations. Although a thorough campaign was launched to try to find an organization that was willing to engage in a partnership as the ICT4D project itself was an agnostic factor in this research, as the focus was on the social media campaign to drive adoption, organizations faced complexities in disassociating the supplemental personal project from the one they were hoping to implement. Organizations were focused on trying to locate a social media ICT4D project as opposed to allowing the social media campaign to overlay on an existing ICT4D project. For those organizations that were willing to engage in conversation, they wanted to have statistical proof that social media could enhance their project before they would be willing to dedicate their time and resources to this partnership. This caused a conundrum as the proof could not be made available until the project was completed, but organizations did not want to engage without knowledge of success. The resolve was to

partner with an organization, CRS, that was familiar with ICT4D as well as with myself as lead researcher and project implementer, and to attempt to leverage one of their existing projects to create a mutually beneficial partnership where in exchange for pro bono work and research, the social media campaign project could be added as a supplemental research project. This partnership proved viable, but then funding dried up I during the final stages.

Timing also was a large limitation as well within this project as this project was for academic work that had specific timelines and budget associated with them as well.

Future Work

As previously mentioned, future work should focus on doing a full experiment that utilizes two implementations of an ICT4D project within the same country where 1.) utilizes a social media campaign to drive adoption and 2.) the other leverages the standard manual practice for dissemination of information about the project. The tracking of the metrics to determine this success would be invaluable to the field of ICT4D as well as could be applied to other nonprofit or NGO projects/initiatives. The easiest work to implement in the future would be to complete the Mexico case study either using CRS as a partner or finding another NGO or nonprofit that could benefit from implementing 3-2-1 to disseminate helpful information to a targeted population. The next best project would be to do an implementation project of the 3-2-1 service in an already “whitelisted” country and leverage the laid out social media campaign method.

Future iterations of the project could focus on other types of ICT4D projects and could extend into using social media for other nonprofit and NGO initiatives. Similarly, future work could also focus around the various stages of a project or initiative and the engagement on social media within these stages both from an internal and external perspective.

Finally, future iterations could be completed to analyze the most successful content and types of content on the social media platform as it relates to engagement. This information could be used to tailor the guidance provided on how to design the

social media campaign. As we have learned through ICT4D historical projects, context is key, and there could be an interesting study completed across regions to see if there is a difference in engagement using social media for nonprofit and NGO purposes.

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Appendix A: Post Implementation Survey

3-2-1 Post Implementation Survey

The 3-2-1 Post-Implementation Survey is used to collect feedback from all project stakeholders regarding the outcome of the project. The results of this survey will be compiled into the Post-Implementation Report and will help to shape best practices/guidance for future 3-2-1 projects.

* Required

Project Feedback

1. What Country were you associated with during the 3-2-1 project? *

- DRC
- Ethiopia
- Ghana
- Greece
- Haiti
- Madagascar
- Malawi
- Niger
- Nigeria
- Tanzania
- Zambia
- Zimbabwe

2. What sector were you associated with during the 3-2-1 project? *

- Agriculture
- Finance
- Food Security
- Health
- Nutrition
- Peace building
- WASH
- Water Security
-

3. How many months did it take to get 3-2-1 messages operational? *

4. What were the intended goals for the implementation of 3-2-1? *

5. How satisfied are you with the project, overall? *

- Very Dissatisfied 1 2 3 4 5 6 7 Very Satisfied
-

5. How satisfied are you with the project, overall? *

Very Dissatisfied 1 2 3 4 5 6 7 Very Satisfied

6. What made the project successful/unsuccessful? *

Enter your answer

7. How easy was it to implement 3-2-1? *

Very Difficult 1 2 3 4 5 6 7 Very Easy

8. What issues (if any) did you face in implementation of 3-2-1?

Enter your answer

9. On a scale of 1-5, with 5 being the highest, how cost effective was it to implement 3-2-1? *

Very Ineffective 1 2 3 4 5 6 7 Very Effective

10. Please give approximate cost for implementation of the 3-2-1 solution

Enter your answer

11. How would you rank the reliability of the 3-2-1 platform? *

Very Poor 1 2 3 4 5 6 7 Excellent

12. What could 3-2-1 do to increase adoption of their platform?

Enter your answer

13. How would you rank the ease of use for the 3-2-1 platform? *

Very Hard to Use 1 2 3 4 5 6 7 Very Easy to Use

14. What could be done to increase the ease of use for the 3-2-1 platform?

Enter your answer

15. How would you rate the customer service of the 3-2-1 platform?

Very Poor 1 2 3 4 5 6 7 Excellent

16. What could 3-2-1 do to make their support for implementation/customer service better?

Enter your answer

17. What could be improved upon in future 3-2-1 projects?

Enter your answer

18. Have you received data on use rates from 3-2-1 (Viamo)? *

Yes

No

Next

Never give out your password. [Report abuse](#)

Appendix B: Statistical Results of Country Program Usage of the 3-2-1 Service

Country Program	Sum of Total Knowledge Messages	Average of Unique Reachers to Tre
+ DRC	457,700.00	254,931.8
+ Ghana	37,927.00	27,506.0
+ Madagascar	558,923.00	236,744.8
+ Malawi	986,663.00	68,599.8
- Nigeria	220,435.00	88,253.0
Cassava	28,523.00	58,923.0
Cereals	9,314.00	58,923.0
Child Health	8,620.00	168,639.0
Common Illnesses in Adults	31,352.00	168,639.0
Ensuring Water is Clean	10,815.00	37,197.0
Groundnut & Cowpea	17,933.00	58,923.0
Hygiene	6,913.00	37,197.0
Hygiene and Sanitation for Pregnant Women	6,567.00	37,197.0
Malaria	33,771.00	168,639.0
Rice	36,871.00	58,923.0
Sanitation	6,718.00	37,197.0
Women's Health	23,038.00	168,639.0
+ Tanzania	97,564.00	151,346.8
+ Zambia	546,828.00	135,270.0
Grand Total	2,906,040.00	145,034.8

Appendix C: Mexico Market Analysis Provided to Viamo

Mexico Market Analysis

VIABILITY OF UTILIZATION OF THE 3-2-1 SERVICE WITHIN
MEXICO

CHRISTIAN TILLET

Table of Contents

Mexico Market Analysis: 3-2-1	Error! Bookmark not defined.
Location Information	Error! Bookmark not defined.
Population Information	Error! Bookmark not defined.
Economic Information	Error! Bookmark not defined.
Electricity Access	Error! Bookmark not defined.
Mobile Network Operators	Error! Bookmark not defined.
Mobile Network Operator Coverage Maps	Error! Bookmark not defined.
Mobile Speed/Latency Chart	Error! Bookmark not defined.
Regional Performance Metrics	Error! Bookmark not defined.
Social Agreements with Telecom Companies	Error! Bookmark not defined.
Social Outreach within the Telecom Industry	Error! Bookmark not defined.
Information Line for Public Services	Error! Bookmark not defined.
Competitors in the Market	Error! Bookmark not defined.
Twilio	Error! Bookmark not defined.
RapidPro	Error! Bookmark not defined.
Frontline SMS	Error! Bookmark not defined.
Barriers to Entry	Error! Bookmark not defined.
Telecom Industry Regulations	Error! Bookmark not defined.
Political Tensions with the US	Error! Bookmark not defined.

Mexico Market Analysis: 3-2-1

Location Information

Mexico is a country located in the southern portion of North America. It is bordered by the United States, Guatemala and Belize. Considered to be the third largest country in Latin America, it measures roughly 1,964,375 sq. kilometers (*North America :: Mexico — The World Factbook - Central Intelligence Agency*, n.d.). The capital of Mexico is Mexico City that boasts a population of roughly 21.2 million people. The country is considered to be 80% urbanized with the majority of the population living in or close to cities. The graphic below shows the population density spread within the country.

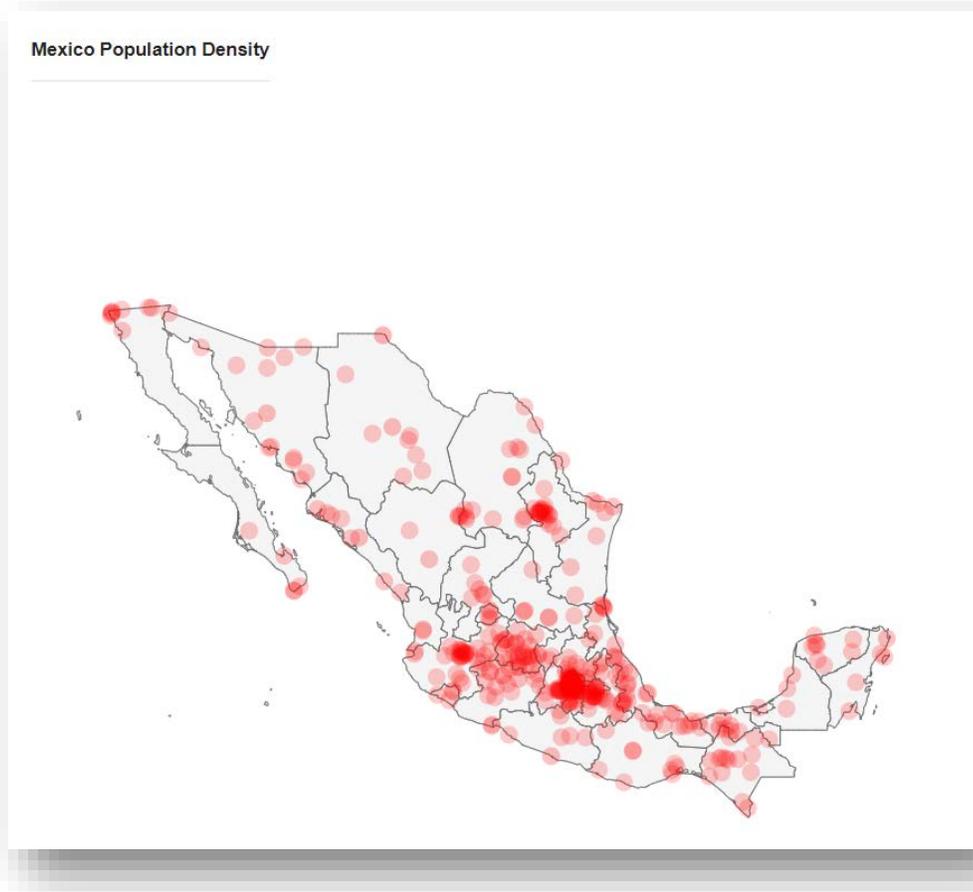


Figure 18: Population Density throughout Mexico

Of the total country area, roughly 54.9% is agricultural land. The natural resources for Mexico are petroleum, silver, antimony, copper, gold, lead, zinc, natural gas, and timber (*North America :: Mexico — The World Factbook - Central Intelligence Agency, n.d.*).

Population Information

Mexico ranks as one of the ten most populous countries in the world today with their 2019 estimated population being 132.33 million people; concurrently, it is also the highest populated Spanish speaking country in the world. With an average growth rate of roughly 1.20%, the country saw an increase in population from 130,759,074 in 2018 to 132,328,035 in 2019 (*Mexico Population 2019 (Demographics, Maps, Graphs), n.d.*).

Mexico Population by Year (Historical)

Year	Population	% Male	% Female	Density (km ²)	Population Rank	Growth Rate
------	------------	--------	----------	----------------------------	-----------------	-------------

2019	132,328,035	49.79%	50.21%	67.36	10	1.20%
2018	130,759,074	49.79%	50.21%	66.57	10	1.24%
2017	129,163,276	49.79%	50.21%	65.75	10	1.27%
2016	127,540,423	49.79%	50.21%	64.93	11	1.31%
2015	125,890,949	49.79%	50.21%	64.09	11	1.42%
2010	117,318,941	49.77%	50.23%	59.72	11	1.58%
2005	108,472,228	49.73%	50.27%	55.22	11	1.29%
2000	101,719,673	49.65%	50.35%	51.78	11	1.58%
1995	94,045,579	49.65%	50.35%	47.88	11	1.96%
1990	85,357,874	49.73%	50.27%	43.45	11	1.99%
1985	77,360,707	49.79%	50.21%	39.38	12	2.21%
1980	69,360,871	49.87%	50.13%	35.31	12	2.65%
1975	60,872,399	49.88%	50.12%	30.99	12	3.19%
1970	52,029,861	49.87%	50.13%	26.49	14	3.12%
1965	44,623,043	49.85%	50.15%	22.72	16	3.17%
1960	38,174,112	49.82%	50.18%	19.43	16	3.20%
1955	32,605,178	49.78%	50.22%	16.60	16	3.08%
1950	28,012,561	49.73%	50.27%	14.26	17	0.00%

Of the total population, roughly 50.7% are female and 49.3% are males. Religion within the population is sub-divided as 82.7% Roman Catholic, 1.6% Pentecostal, 1.4% Jehovah's Witnesses, 5% Other Evangelical Churches, 1.9% other faiths, and 7.4% unspecified or non-religious. The median age of a person in Mexico is 28.6 years old. The percentage of population by age bracket is as follows: 0-14 years is 27.8%; 15-24 years is 18.2%; 25-54 is 40.5%; 55-64 is 6.7%; while 65 years and over is 6.7 (*Mexico Population 2019 (Demographics, Maps, Graphs)*, n.d.). The population has a total literacy rate of 94%, with female literacy being 93% and male literacy being 96% (We Are Social, 17:09:27 UTC).

Economic Information

Mexico has the 11th largest economy in the world and in 2018 reported a GDP of \$2.4 trillion. The average household GDP is \$19,900 as estimated by the CIA in 2017. The

GDP composition by sector is agriculture, 3.6%, industry, 31.9% and services, 64.5%. In terms of agriculture, their main crops are corn, wheat, soybeans, rice, beans, cotton, coffee, fruit, tomatoes; beef, poultry, dairy products; and wood products (*North America :: Mexico — The World Factbook - Central Intelligence Agency, n.d.*). With the signing of NAFTA in 1994, the Mexican economy has primarily oriented towards manufacturing with most of their industrial goods being food and beverages, tobacco, chemicals, iron and steel, petroleum, mining, textiles, clothing, motor vehicles, consumer durables and tourism. Mexico is the world's largest producer of silver.

Income distribution is highly unequal and roughly 46.2% of the population lives below the poverty line. Economic growth has only averaged roughly 2% annually for the last few years. The lack of growth has been attributed to “falling oil production, weak oil prices and structural issues such as low productivity, high inequality, large informal sector employing over half of the workforce, weak rule of law and corruption” (*North America :: Mexico — The World Factbook - Central Intelligence Agency, n.d.*).

Electricity Access

Per the CIA, most of Mexico has electric access with the electrification rate in urban areas being 100% (2012) and rural areas having an electrification rate of 97% (2012). Of the total population, only 1,231,667 do not have access to electricity at the time the survey was taken in 2012. It is predicted that these numbers have decreased as accessibility has spread throughout the country over the past seven years.

Mobile Network Operators

The Mexican telephone system is a domestic satellite system with 120 earth stations as well as an extensive microwave radio relay network. The country has a considerable fiber-optic and coaxial cable backbone as well. The country just opened up their first local Internet Exchange Point in Mexico City in 2017 and are working to build out 5G and LTE-M services (*North America :: Mexico — The World Factbook - Central Intelligence Agency, n.d.*).

The main cell phone providers in Mexico are Telcel, Movistar (a Telefonica company), Virgin Mobile and AT&T Mexico. AT&T is the newest Mexican carrier after their acquisition of two Mexican carriers, Lusacell and Nextel of Mexico (Mexico Cellular, n.d.). Telcel, a company owned by América Móvil, a subsidiary of Telmex, is considered to be the largest provider within the country and has the most widespread coverage. In rural areas, Telcel tends to be the only provider available, which has led to issues in the past with Telcel having a monopoly on the mobile network service. The Competitive Intelligence Unit (CIU) has estimated that América Móvil 's Telcel controls more than half of Mexico's mobile market in terms of mobile connections (68.5% of the total as of Q4 2015) and revenue (72.4%) (*The State of Mexico's Mobile Market - EMarketer, n.d.*).

According to research by GSMA, the mobile sector contributed roughly 3.5% to Mexico's total GDP and 335,000 jobs due to the mobile ecosystem in 2015.

In 2018, the Red Compartida (The "Shared Network") was created by the Mexican government with three main objectives:

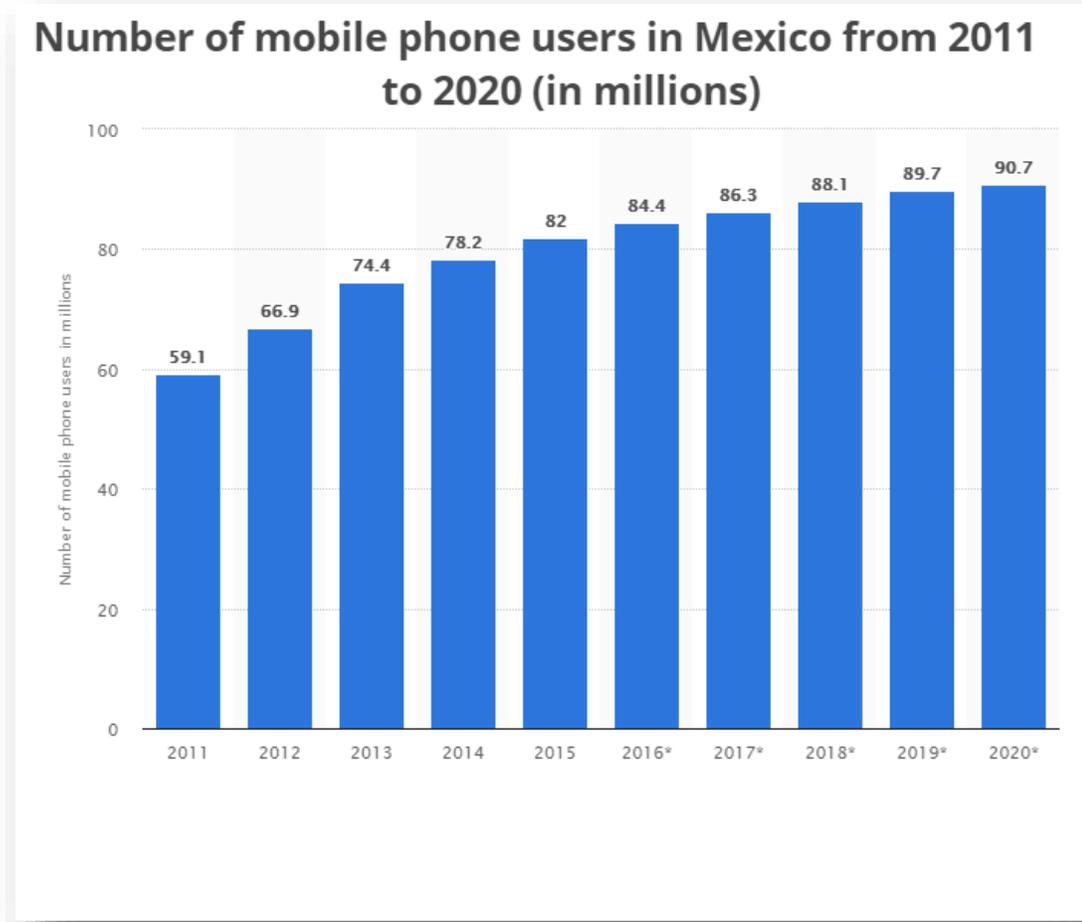
1. To allow for accessibility of the network by any of the Mexican wireless carriers
2. To provide wireless coverage in "unserved" areas of the country
3. To provide fast, 4G-LTE service where it may be otherwise unavailable.

Per Cellularmaps, there is no data as to whether or not any of the Mexican carriers are currently using this network.

Red Troncal is also a governmental project that is expected to launch this year as a public-private partnership operated by a private company. This is viewed to be similar to the Red Compartida project that launched last year.

Historically, Mexico has faced issues with telephone service being monopolized. According to a report released by the Organization for Co-operation and Development, "[t]he Mexican telecommunications market is dominated by a single company with 80 percent of the fixed line market and 70 percent of the mobile phone market" (Kerr, 2012). The two major companies that were linked with the monopolization were América Móvil and Telmex. This monopoly led to Mexicans being overcharged for mobile and fixed line access with specific focus on the disproportion of wealth and access. Per the report, "poor people are being charged disproportionately higher" (Kerr, 2012). In addition, the telecom monopoly was linked to a lack of growth and development in the country as citizens needed to be able to access telephone services to get information and be able to compete in the economy. With new telecom reforms in 2013, the country has seen increased competition amongst mobile network providers and lower prices for consumers. Emarketer estimates that subscription rates have decreased by 11.3% from 2013 to March of 2016 (*The State of Mexico's Mobile Market - EMarketer*, n.d.). The decrease in subscription costs has also led to an increase in mobile subscriptions. "The combination of a steadily growing economy, record-low inflation and declining mobile prices is contributing to accelerating subscriber penetration, migration to mobile broadband (3G and above) services and rising smartphone adoption," (GSMA). The chart below from Statista illustrates the number of mobile phone users in Mexico from 2011 to a 2020 prediction.

Figure 19: The chart shows the total number of mobile phone users in Mexico from 2011 to 2020.



Of the 130 million people in the 2018 Mexican population, there were 81 million unique mobile users. This accounts for a 62% penetration rate; a 4% increase from January 2017 (We Are Social, 17:09:27 UTC). Specifically, within that 81 million cell phone users, roughly 72% are smart phone users as well. According to Mexperience, Mexico is one of the least expensive places in the world to own and use a mobile telephone. Even with the increase in subscriptions, Mexico is still viewed as an untapped market ranking low in mobile penetration rates amongst the 10 largest countries. These rates are predicted to increase within the next several years as costs have diminished with the telecom regulations.

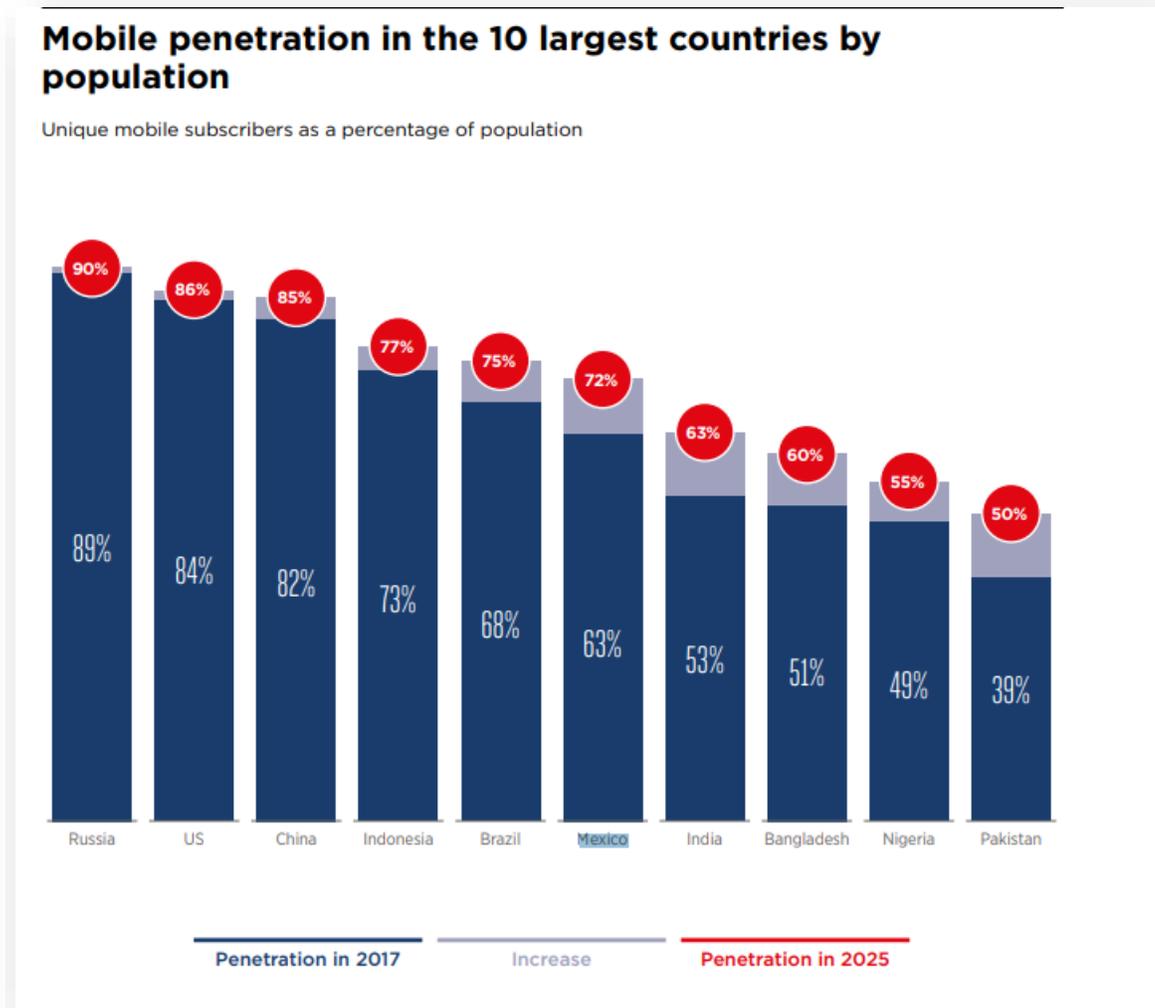


Figure 20: Mobile penetration chart of the 10 largest countries by population

Most of the mobile connections in Mexico are prepaid contracts where users pay upfront for a specific number of minutes and megabytes (MB) of data. In 2015, prepaid contracts made of roughly 83.6% of the subscriptions within the country, we are starting to see that number drop slightly as mobile contracts become less expensive; decrease from 85.4% in 2011 (*The State of Mexico’s Mobile Market - EMarketer, n.d.*). The total number of subscriptions are 114, 326, 842 according to research done by the CIA in 2017. This number equates to roughly 92 subscriptions per 100 people, which ranks 14th in the world (*North America :: Mexico — The World Factbook - Central Intelligence Agency, n.d.*). Studies by We are Digital have shown that there are positive attitudes towards digital with 57% of Mexicans believing that new technology offers more opportunities than risks and 60% preferring to do tasks digitally where possible. There is a need within the

country to lower high taxes and fees applied to mobile services in Mexico to try to close the coverage gap. There is also an opportunity for training and knowledge related to improving digital skills. The mobile connectivity index breaks out the scoring for Mexico as such:

- Overall Country Index Score – 65.98/100
- Mobile Network Infrastructure – 55.67/100
- Affordability of Devices and Services – 62.47/100
- Consumer Readiness – 71.39/100
- Availability of relevant content and services – 76.35/100

This table shows that consumers are ready to want to buy into more mobile based subscription and that there is still room to provide more relevant content to those that are accessing the services.

Mobile Network Operator Coverage Maps

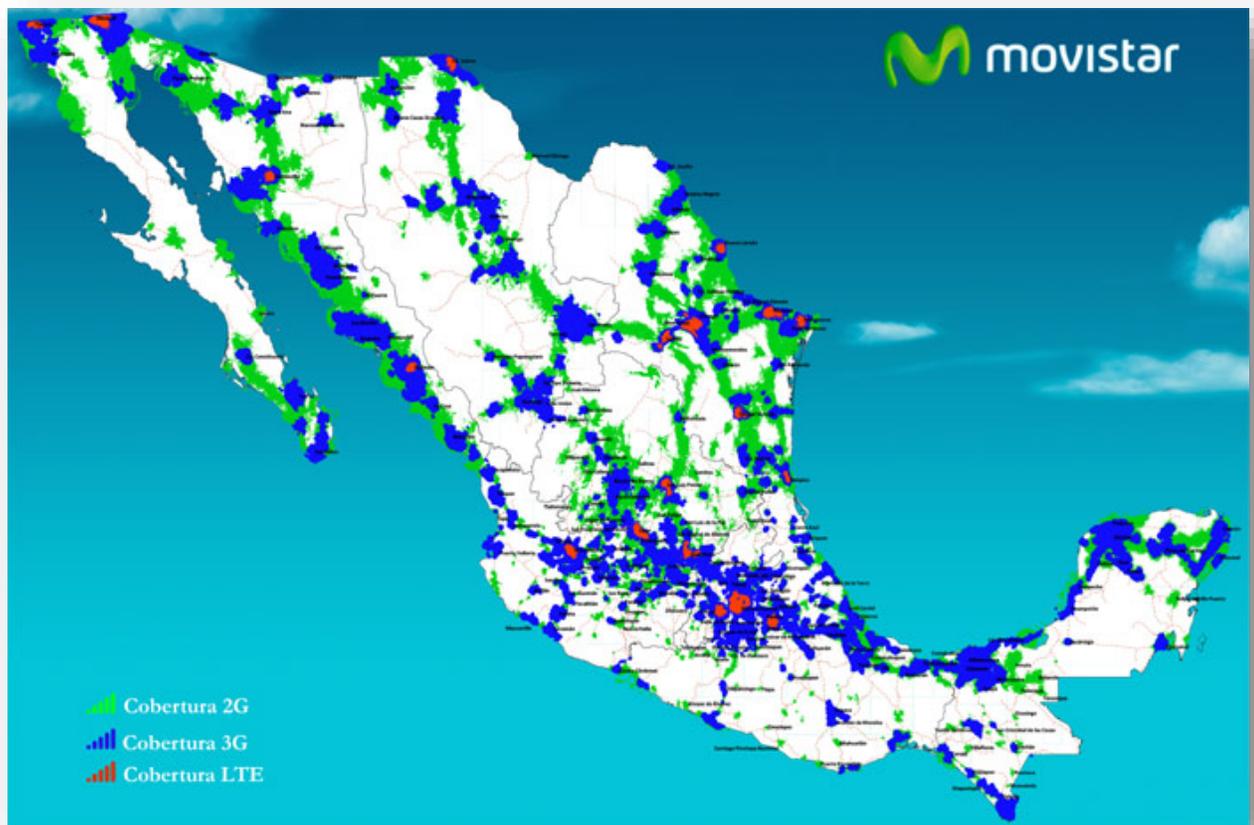


Figure 21: Movistar Coverage Map

Movistar, Cierito, Maz Tiempo, QBOcel and Virgin Mobile are currently utilizing this coverage map for the services they offer.



Figure 22: AT&T Coverage Map

AT&T and Unefon are currently utilizing this coverage map for the services they offer.

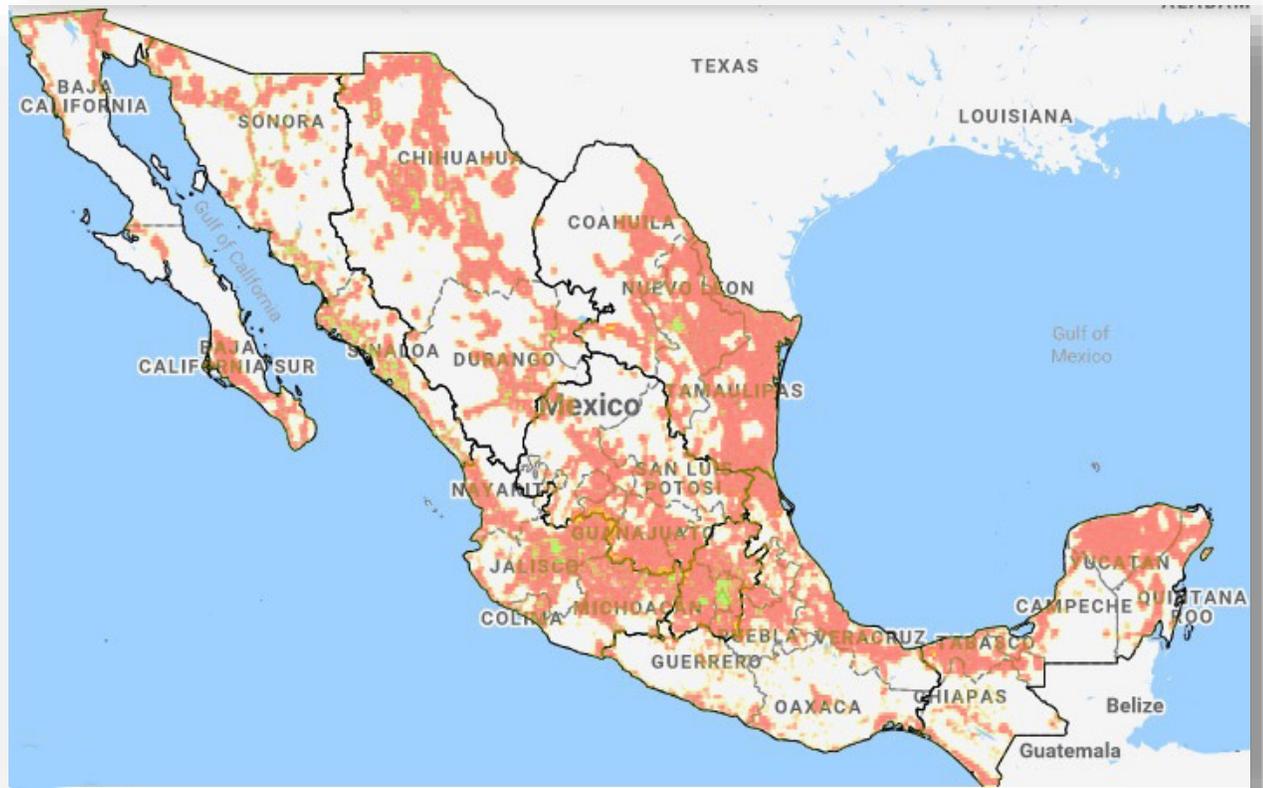


Figure 23: Telcel Voice/Text (2G) Coverage, 2018

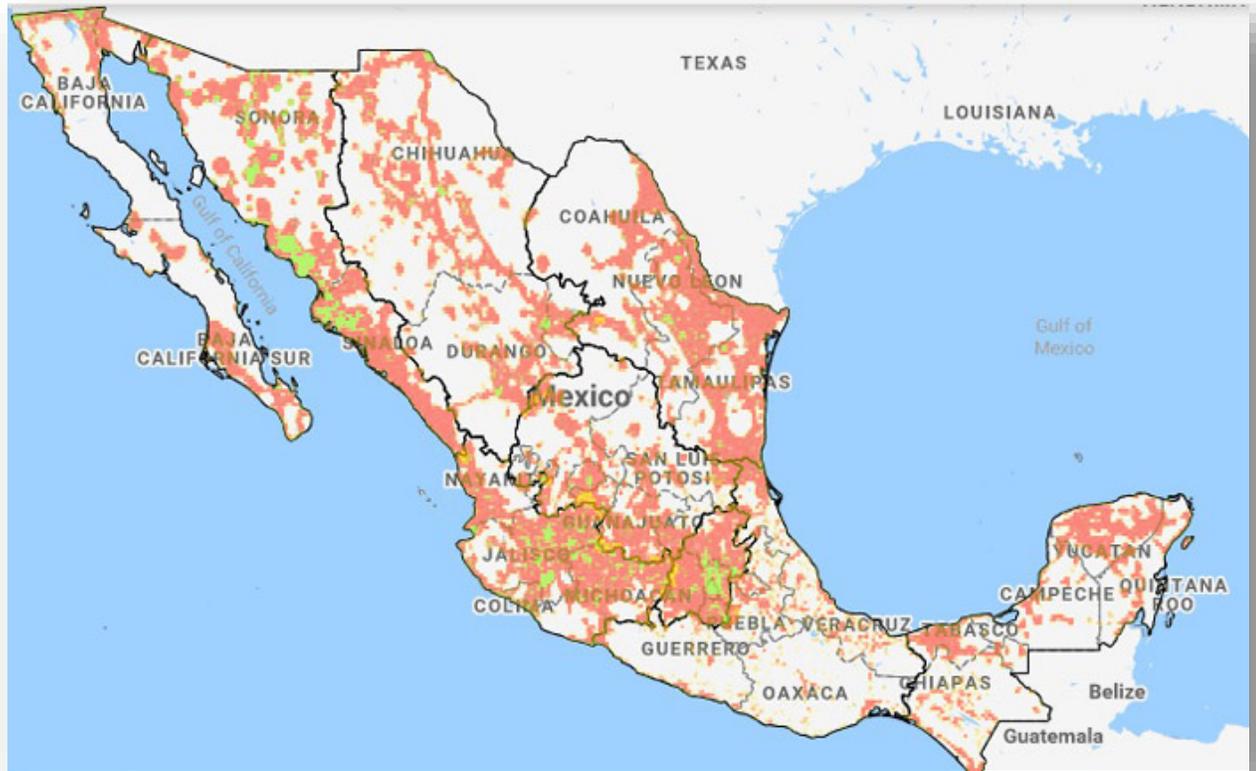


Figure 24: Telcel 3G Coverage, 2018



Figure 25: Telcel 4G Coverage, 2018

The three charts above break out the coverage maps for Telcel.

OpenSignal | Awards

	Download Speed: 4G	Download Speed: 3G	Download Speed: Overall	Upload Speed: 4G	Latency: 4G	Latency: 3G	Availability: 4G
AT&T							
Movistar							
Telcel							

Regional Performance Metrics

Legend:  Telcel  Movistar  AT&T

Region	Download Speed: 4G	Download Speed: Overall	Latency: 4G	Availability: 4G
Aguascalientes	 	 		
Guadalajara				  
Juárez	 	 		 
Mexico City				
Monterrey		 		 
Puebla				
Querétaro				
San Luis Potosí				
Tijuana				  
Toluca				

Social Agreements with Telecom Companies

Internet Para Todos, is the government’s public spaces connectivity program that hopes to close the digital gap and bring connectivity to locations where it doesn’t currently exist

(bnamericas, 2019). The budget for the project is deemed to be low at an estimated \$32 million by industry expert Gabriel Sosa Plata.

There are no known social agreements between telecom companies and nonprofits at this point.

Social Outreach within the Telecom Industry

The Indigenous Communities Telecommunications (TIC) is a company that is the world's first, not for profit group that has a mobile phone concession. The group is a social cooperative that has "license to install and operate mobile phone networks in 356 marginalised municipalities in five of the country's poorest states: Chiapas, Guerrero, Oaxaca, Puebla and Veracruz." (Lakhani, 2016). TIC provides the calls via internet using Spectra Telecomunicaciones and uses cheap infrastructure and innovative technologies to provide free in-network calls (roughly 17 communities), low-cost Wi-Fi and cheap national as well as international calls.

Information Line for Public Services

The Maya Nut Institute has previously been noted as receiving awards for the use of SMS in Mexico in service of forests and families and women's empowerment. The Maya Nut Institute is a nonprofit charity that was founded in 2001. Their mission is to "find balance between people, food and forests by teaching rural communities about the value of the Maya Nut for food, fodder, ecosystem services and income."

Competitors in the Market

There are very few competitors in the market that offer similar services as the 3-2-1 service specifically in regard to the target audience. Most competitors that offer IVR and SMS solutions within the country are paid services such as Twilio where a company pays to use their SAAS solution to market towards their specific audience segmentation.

Twilio

Twilio provides service to Mexico as well as other nations in the form of a developer platform for communications. Different software teams will use Twilio's APIs to add voice, video and messaging to their applications.

RapidPro

The closest competitor that was found to the 3-2-1 service is called RapidPro, which is a product that allows for SMS, IVR and social media capabilities within most developing nations. RapidPro is a subset of Unicef innovations and was originally created in 2007 (under the name RapidSMS) to send and receive data using basic mobile phones, manage complex workflows, and automate analysis and present in real time. A Rwandan software

firm called Nyaruka partnered with RapidSMS in 2014 to enhance the capabilities of RapidSMS by incorporating a spin off they created called TextIt. The result of this partnership was RapidPro that combined the features of RapidSMS while addressing the limitations with deployments in tough environments.

RapidPro is different from 3-2-1 as it is a platform that provides an easy to use interface to build a mobile service and is not a provided service that is partnered with the mobile networks. It is a scalable solution and does account for language variations in SMS, voice and social media applications. Each interaction with a data flow creates a specific data point that is associated with a user. Those interactions are tracked in the database which provides for real time analysis or exportation of the data for further manipulation.

EZ Texting/Slick Text

Linked with nonprofit projects, but not interactive, meant to drive more sales and engagement for donors. Company provides a keyword and the short code for users to opt in to receive text messages. No voice component for IVR. Cost is on a per month basis and is dictated by how many messages and keywords are needed.

Barriers to Entry

Telecom Industry Regulations

While the barriers for new companies and competition to the telecommunications industry are strong and can involve high capital expenditure investments, partnering with one of the existing telecommunications companies should eliminate these concerns. Even with the governmental regulation changes in 2013, Mexico is still not seeing a notable increase in competition in the sector. América Móvil continues to be the dominant provider in the Mexican landline and wireless markets. A report released by the Central Intelligence Unit, a Mexico City-based consulting firm, showed that the market share of the telecom sector, 60.8% in Q3 2016, belonged to América Móvil (Estevez, 2017). The decrease from Q2 2013 was only found to be roughly 0.7%. With these statistics it is predicted that the reform's effects might not be visible until after 2020 where the Central Intelligence Unit is predicting that América Móvil might only embrace 55.5% of the market (Estevez, 2017). In 2018, the Federal Telecommunications Institute (IFT) approved a plan to separate part of América Móvil's fixed-line units into new companies. This plan was put into place to try to remove the barriers to infrastructure access that rivals were receiving from América Móvil (Love, 2018). The infrastructure provided by América Móvil is critical for access as most mobile operators like AT&T and Telefonica use it to transmit calls and data as well as deliver internet and cable packages (Love, 2018). While other competitors might have infrastructure in major Mexican cities, América Móvil is the only option for access in many small towns and villages (Love, 2018). The plan will force América Móvil to separate parts of its Telmex and Telnor

subsidiaries to form new companies and these companies will be responsible for selling access to their infrastructure wholesale to rivals (Love, 2018). Currently, there is no report on the success of this plan as América Móvil has two years to implement the separation, but this timeframe would also still align with the predicted loss of majority/monopoly share of the telecom market in 2020. The IFT is continuing to pursue fines and penalties against América Móvil as shown in the December 2018 \$128 million bill for failing to meet quality standards for the telecom infrastructure offered to other competitors in 2013 and 2014. The next couple years prove to be pivotal in continuing to see the de-monopolization of the telecommunications industry within Mexico. Based on strict market penetration and infrastructure alone, the recommendation would be to partner with Telcel (América Móvil) to target the rural populations. With their company being in the crosshairs of governmental regulation as well as being viewed as negative within the community, the ability to partner with Viamo and provide the 3-2-1 service on its platform for free could be viewed as a positive change for their brand.

Political Tensions with the US

With the increasing immigration tension within the United States, we are seeing millions of Mexican migrants return from the United States. The latest issues with racial discrimination within the United States specifically tied to mass-shootings and gun violence has caused a divide politically between the Mexican and United States governments. There could be hesitation from the Mexican people and businesses on wanting to interact with American businesses and American people. The utmost care and concern and use of national staff should be forefront in trying to launch any program within the country. As stated by Export.gov, a successful strategy “should be based on establishing an agent, representative, or authorized distributor for your products and services in Mexico or opening a representative office” (International Trade Administration, 2020). As CRS has local staff as well as ex-pats that are helping to assist in running the country program, there should be success in launching a project that can utilize the local representatives along with the Viamo staff to build a partnership with one of the major mobile operators such as Telcel, AT&T or Movistar. The project should focus on specific areas within the country and target demographics that could find the service useful and accessible. It needs to be noted that the Mexican culture endorses regular direct communication and rapport is crucial in launching a successful project.

Potential Nonprofits that could Benefit from Viamo

1. Save the Children announced a campaign in July 2018 that is in support of children and families facing difficulty at the Mexican border. They are partnering with the American Immigration Council and the American Immigration Lawyers Association’s Immigration Justice Campaign as well as Kids in Need of Defense. The mission of the campaign is to

take action to assist children and families that are seeking asylum and to support children that have been separated from their families (Save the Children, 2018)

2. The Florence Project and Refugee Rights Project acts as legal assistance and social services to detained immigrants in Arizona.
3. The Young Center for Immigrant Children's Rights is an organization that works to assist children in immigration proceedings.
4. Kids in Need of Defense (KIND) works to provide legal representation so all children are represented in immigration court.
5. Asylum Seeker Advocacy Project works to prevent the deportation of asylum-seeking families that are fleeing violence in Mexico