Digital Access in Africa

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Executive summary

Within this document we aim to summarize the current debates about connecting the unconnected in Africa, and move it forward by contributing a mix of analysis, synthesis of current research, primary user research, and expert interviews. As a summary, we list below the key points in the document:

There is a need for new Internet access models

We discuss the limitations of the existing business model of the mobile industry, which has done such a phenomenal amount to connect people to voice and SMS services, and is leading the way in providing data but is struggling to reach the whole population. This is particularly the case in rural areas where coverage is an issue, and at the lower end of the income spectrum where affordability is an issue.

We discuss the problems of a "metered-mindset", the way in which users who are constantly aware of the price of access will use the Internet in a more constrained and less productive way, and argue that even once basic Internet is offered it does not necessarily lead to effective usage, as other factors such as the lack of local language content and the limitations of cheap mobile devices can constrict productive usage.

There are many barriers to scaling Internet access

We move on to discuss the many supply and demand side barriers to scaling Internet access. On the supply side, the infrastructure costs for delivering new technologies with as yet unproven business models are a key barrier. Donors have played a role here before, notably in the IFC's funding of early African mobile operators, and we may again need donor capital to fund the laying of fiber optic cable, and support experimental business models using satellites, drones, and balloons to provide Internet access.

However, unlike 15 years ago when the mobile operators explored the region, today there is significantly more interest from the private sector in connecting the unconnected, and donor money will sit alongside private investments from Google, Facebook, Microsoft, Space X, and others.

Executive summary

Whatever Capital Expenditure investment there is, from whichever source, there are not yet clear break-even business models for connecting rural populations. Operating Expenses for delivering fast broadband data to rural populations will remain high, and revenues low, and new business models and—more importantly—innovative service models that address how Internet access sits alongside, or uses the infrastructure, of banking, retail, and other already successful businesses, will be needed.

Regulation can support and nurture new business models

Regulation will also provide an immediate barrier to some of these new businesses, as new demands on spectrum and the licensing of new technology such as drones and balloons will be critical to the success of these innovative new players. New policies for spectrum allocation and taxation of Internet access will be needed to stimulate the growth of new approaches to connecting the unconnected.

Demand side barriers are significant, and require new content and services to overcome them

To stimulate demand for internet access, beyond social media content produced by local users there are few services available for users in their local language. There are a significant number of users who live in areas with viable Internet access, but remain unconnected. Some of the research indicates that this is partly because there are not compelling reasons to come online in the first place. Facebook, WhatsApp, and other social media platforms continue to be strong drivers bringing people online, to the point where many consider that they are not "on the Internet" when they are using Facebook. The discoverability of local content, and indeed the ability to produce local content, will remain critical issues.

Zero-rating and free services are not necessarily the answer

Zero-rating services—removing the data cost to make certain websites free—has been a popular, if contentious way of trying to overcome some of the demand side barriers. Most notably, Facebook has zero-rated its services and those of selected partners via its Free Basics service. This has caused an often vicious debate online and offline, and Facebook has had its zero-rated service in India banned by the regulator TRAI which considers it to be an affront to net neutrality. We can learn a lot from such services, as they do give indications as to how services are used by users when they don't have a "metered-mindset", but it is not clear from the primary user research we publish here that these services are bringing the unconnected online for the first time.

We also briefly discuss the role of government services in bringing people online for the first time, as we believe that they can play a key role in driving the adoption of Internet by improving access to critical services. Here the UK government, with the success of its own Government Digital Service, could play a key role in exporting these services and experience to African governments.

Measuring the impact of access to the Internet requires us to look at the positives and negatives in a balanced, nuanced way

Finally, we discuss the many ways that have been used to measure the impact of the Internet on populations, from various attempts at calculating the GDP impact to more recent, nuanced efforts. The debate now is driven by the recent World Bank World Development Report 2016 report entitled Digital Dividends, which challenges many of the previous linear causalities posed that link Internet connectivity to economic, democratic, and social progress. The WDR, quite rightly, calls for a more detailed debate that measures the benefits of connecting people to the wealth of available knowledge online, but which is also sensitive to how digital platforms have redistributed wealth and reorganized labor globally.

Connecting the last four billion users in the world to the Internet may well bring wealth and opportunity, but the question remains unanswered whether this will be for the end-users, or for a small few platform owners, none of whom will likely reside within Africa.

Introduction

It is a timely moment to look at the issue of Digital Access in Africa. In September 2015 the right to Internet access was included within the Sustainable Development Goals—within Goal 9 there is the ambition to *"Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020."*[1] This is an ambitious but worthy goal, and illustrates the importance that connectivity to the digital economy has in the 21st century.

The mobile industry has, for the past 15 years or so, done a phenomenal job of connecting users in emerging markets to voice, SMS and Internet access services. But as we strive to reach the remaining unconnected users, we may need new models of connectivity to reach them. In the first section of this document we discuss the need for new Internet access models, and ask the question of what we mean by "Internet Access" and why it's important to understand what the impacts of limited service and capability are.

We then move on to look at the barriers to scaling Internet access, and why, despite the availability and affordability of mobile phones, Internet access remains sub-scale. On the supply side, we discuss the issues around the costs of delivery access, and the difficulty of making connectivity affordable. Many attempts to reduce the cost have been tried, with varying levels of success. From Universal Service Funds delivered at a policy level, to zero-rated services

Introduction

from the private sector, it is important to understand the considerations around subsidizing access for poor or hard-to-reach users. The debate around this is nuanced, as the recent decision by the TRAI to ban Facebook Free Basics in India has shown[2]. Supply side barriers are not easily solvable, and some mix of new industry business models and policy efforts to make regulation fit for purpose is required. Providing affordable—or free—Internet access will require negotiating the original principles of the Internet, the desire for an open and fair architecture, with the real costs of delivering this vision.

From a user perspective, even when the available infrastructure enables connectivity, it doesn't always drive adoption. Users require a reason to go online. A certain amount of this can be demand driven by access to essential government services, but a carrot as well as a stick is required. We have previously researched the digital lives of users in Ghana, Kenya, and Uganda, and have shown how users come online for non-instrumental reasons (social media, games, etc.) but then often use these platforms for instrumental activities such as self-directed education, searching for employment, or sourcing essential information.[3] User research can show us how these needs can be balanced, and we discuss this within this report.

More structural issues—cultural factors such as gender divisions, or income factors such as affordability—are more persistent problems that need to be addressed if we are to drive demand. We discuss these in the next section, and include important primary user research into the use of zero-rated services in India that, in light of the recent TRAI decision on Facebook Free Basics, is only more important in its findings. We can continue an ideological debate on the need to maintain the founding principles of the Internet against the need to make services sustainable from a business perspective, but after the argument has died down it is the users who make the ultimate choice whether to use these services or not. The voice of the end user—often missing yet implied in these debates—is here as a primary source, not corralled by others via assumptions or anecdotes.

Then we discuss probably the most important question, which is *why* we consider Internet access to be so vital to the lives of the poorest users in Africa. For the past decade, this debate has been led by a simple assumption that connectivity to mobile and Internet services directly drives GDP. This has most recently been re-animated by Facebook and Deloitte's research claiming that for every ten users connected to the Internet, we pull one out of poverty.[4] However, this January has seen the publication of the landmark World Development Report 2016 into Digital Dividends from the World Ban.[5], which has called into question the correlation between connection and economic growth, democratic freedom and productivity. We all *feel* that connecting to the Internet is a right—as the Sustainable Development Goals state—but as we discuss, it's important to quantify why we believe this, particularly where donor funds are being used to support connectivity.

Which brings us to the final section of the report, where we consider what role donors can play in overcoming these barriers, encouraging users to connect, and supporting the research needed to measure the impact of the Internet economy and how it can change lives for the better.

We hope you find this research useful and that it is a timely contribution to the on-going debate. This material has been funded by UK aid from the UK government; however the views expressed do not necessarily reflect the UK government's official policies. We have tried to move the debate forward by focusing as much as possible on the issues we are seeing emerging rather than just continuing the debates that have been going on for some time. Most importantly, we have tried as much as possible to view the entire debate from the perspective of the most important part of this debate—the user. Without considering their needs, their desires, and their restrictions, any debate is more likely to disconnect itself from the real debate around the unconnected.

1 Nino, "Infrastructure and Industrialization."

2 Ghoshal, "Why TRAI Backed Net Neutrality—and Killed Facebook's Free Basics in India."

3 Caribou Digital, "Digital Lives in Ghana, Kenya, and Uganda."

4 Truong, "Zuckerberg Says the Internet Lifts People out of Poverty, but Is Giving Them Subpar Access."

5 World Bank, *World Development Report 2016*.

Methodology

Methodology

There is an increasing body of research from academia and private sector analysis on the role that digital access can play within International Development.[6] This ranges from research into the impact of social media on behavior change communications to the GDP increase when access is made available to populations.

In this report we aim to review and synthesize this body of research, focusing on an approach that asks key questions about the importance of Digital Access in Africa, what demand and supply side barriers there are to adoption, and what programmatic activities the donor community might invest in. We have broken these areas of inquiry down into the following categories:

Digital Access in Africa research methodology

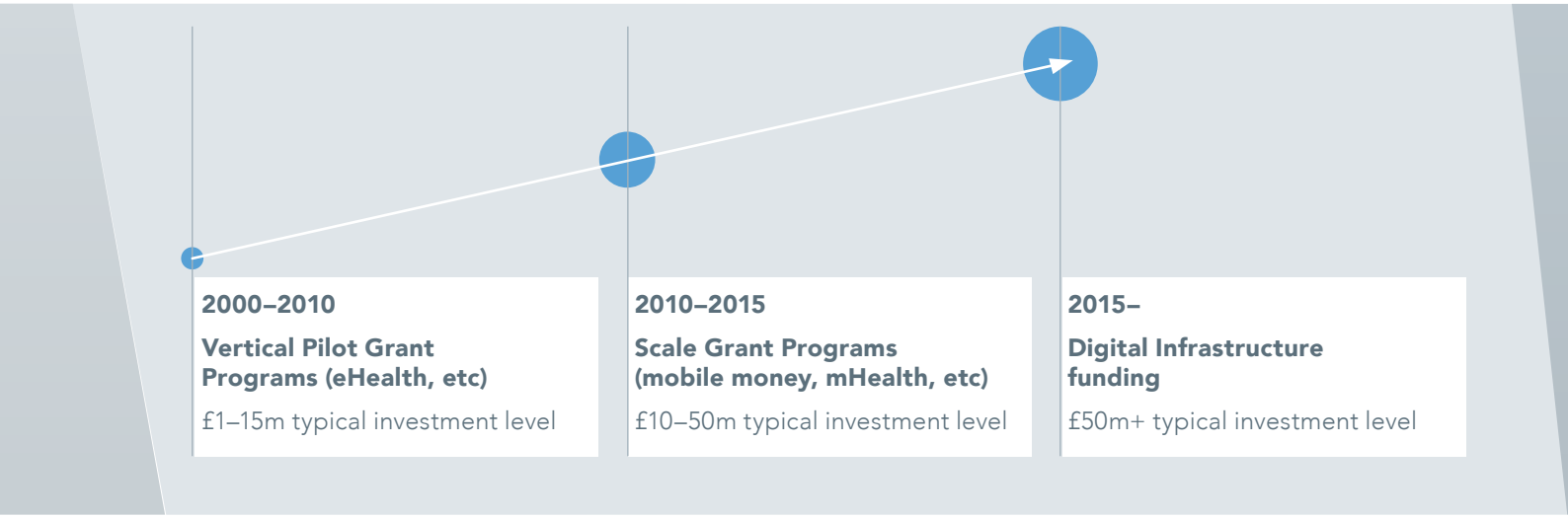
Our research methodology was focused primarily on literature review and expert interviews. Alongside this literature review and expert interview process, another research methodology is reflected in user-research into attitudes to zero-rated Internet access in India by Amba Kak, which is published for the first time in this report.

6 See the extensive literature review in our report: Caribou Digital, "Digital Lives in Ghana, Kenya, and Uganda."

Existing donor-funded
Africa Internet access programs

Existing donor-funded Africa Internet access programs

We have seen the growth of donor funding for mobile or Internet programs broadly increase over the past 15 years, from a tentative and sector-specific categorization of programs initially to more broad-based infrastructural programs that we are beginning to see now:



donor funding we have seen during this period. Firstly, outside of the investments of the mobile industry that drove basic voice and SMS take-up, there was little investment in creating the base of adoption to support the uptake of the services piloted. This led to a lot of what is termed as "pilotitis" in programs, particularly in the very active area of mHealth, where donor experiments in pilots often outstripped the user-base to the point where the Ugandan Health Ministry actually banned new mHealth pilots in their country until a more cohesive plan could be developed.[7] Only more recently has digital literacy and investment in basic digital infrastructure been seen as something that needs to be invested in before interventions using these platforms can scale.

Mobile and digital investments also suffered from another unique characteristic—that they cut across the traditional vertical silos of international development (Health, Education, Agriculture, etc.) and therefore suffered either from duplication—where similar interventions and platforms would be built, such as SMS messaging, and replicated for the different vertical sector—or a lack of co-ordination and sponsorship in traditionally structured donor organizations organized by sector. As a "horizontal" factor that can cut across, and often unite, the channels used to push health, education and other information—and ultimately as a unifying channel to contact the end-user—ICTs have often presented a structural challenge to donor organizations with long-established sector-specific organizations and funding budgets. USAID put a lot of effort into creating more horizontally organized mobile and digital teams with some success,[8] and other donors such as the Bill & Melinda Gates Foundation have created horizontal teams looking at mobile and digital as a platform, but for many donor organizations mobile and digital remains a conundrum that structurally is still an issue. This has impacted on the effectiveness of investments, both in terms of scale as without significant internal champions it has often been hard to raise funds for mobile and digital, and also in terms of integration as mobile and digital are often seen as niche concerns by more traditional investment teams.

7 McCann, "A Ugandan mHealth Moratorium Is a Good Thing."

8 USAID, "Digital Development."

Existing donor-funded Africa Internet access programs
continued

Whilst not exhaustive, we can from the table below see what kinds of existing donor programming there are, and how they are scattered across vertical sectors:

Donor	Program type	Description
US State Department	Access funding	The program will aim to connect 1.5 billion people to the Internet by 2020 and will "bring together governments and stakeholders to further advance our 'Global Connect' initiative and help bridge the digital divide. We hope to develop country-specific strategies that can create enabling environments that spur connectivity and also entrepreneurship, cross-border information flows and open and competitive marketplaces"
USAID, Microsoft 4 Afrika + others	Access + Renewable Energy for Access	Mawingu Networks benefited greatly from multiple funding providers to sustain a chain of mobile solar-powered and wireless Internet posts. Microsoft's 4Afrika Initiative, USAID, Angel Investor Jim Foster and Paul G. Alien's Vulcan Incorporation paid the network to provide last mile connectivity initiatives
USAID	Access	The LMI/Ghana project has three components: • Telecommunications Enabled Pack House-to-Field Application • Electronic Exchange to Bar Coded Logistics Transaction • Enhanced Capabilities of GIFEC; Private Sector, Civil Society Advocacy role
World Bank (RCTIP)	Access, e-government	World Bank and other donors supported Burundi, Madagascar, and Kenya to promote liberalization of the ICT sector so as to lower prices, extend the geographical reach of the broadband network, and advance regional market integration. This includes an e-government component that aims to re-engineer and streamline government services for business processes, contributing to the enabling environment to attract private investors. (Similar projects in West Africa)
World Bank	e-government, financial inclusion	October 22, 2013—US$97.00 million credit from the International Development Association (IDA*) supports eTransform Ghana. Improving e-government services designed for poverty alleviation, cyber security, consumer protection, and data protection
African Development Bank	e-government (Open Data)	Open Data Portals http://dataportal.afdb.org/default.aspx In close collaboration with the World Bank, International Monetary Fund, PARIS21, United Nations Economic Commission for Africa
African Development Bank	e-government	E-government Infrastructure in Lesotho Value—US12.48 million

Existing donor-funded Africa Internet access programs
continued

Donor	Program type	Description
Emerging Africa Infrastructure Fund	Access	EAIF provides US$10 million to US$36.5 million to projects across a range of sectors including telecoms, transport, water, and power. Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mozambique, Nigeria, Rwanda, Sierra Leone, Somalia, South Africa, Sudan, South Sudan, Tanzania, Uganda, Zambia PIDG is the implementing partner—case study for towers in Nigeria—http://www.pidg.org/impact/case-studies/helios-towers-nigeria Also http://www.pidg.org/what-we-do/where-we-work
EU-Africa Infrastructure Trust Fund (EU-AITF)	Access, Energy	U-AITF funding is available from two different envelopes: • The **regional envelope** promotes projects with a demonstrable regional impact • The "Sustainable Energy for All" **SE4ALL envelope** supports regional, national, and local projects targeting SE4ALL objectives **Information and communication technologies (ICT)**: submarine and terrestrial Internet cables, satellite-based infrastructure, etc http://www.eu-africa-infrastructure-tf.net/activities/index.htm
Oxfam	Access, renewable energy	• Northern Uganda (Gulu) • 100 rural villages will be connected with a high-speed fibre-optic connection • Computers at the centers run on 23W and are powered entirely by solar energy • By 2015, 200,000 people will have visited the centers to use the Internet • 45,000 people will have directly earned an income from the project by 2015 • $5 per day is the average earning for each micro-worker • Internet Now! is being funded by Oxfam until 100 centers are established by the end of 2014. By 2015, Internet Now! will run independently as a for-profit social enterprise called SINFA (Stichting Internet Now Foundation) https://www.oxfam.org/en/countries/connecting-villages-northern-uganda-internet-now
Google	Backhaul/Access Infrastructure	Google in 2013 launched **Project Link** in Africa. It builds fiber-optic networks to help Internet service providers (ISPs) and mobile operators provide faster and better broadband Uganda's capital was the first test site for Project Link. Two years after the launch, Google has built more than 700 kilometers of fiber across Kampala—making it possible for 13 ISPs and mobile operators to deliver faster connectivity speeds, and roll out 4G LTE services in the city

The need for new
Internet access models

As the initially disruptive mobile industry technology has become the incumbent means of Internet access, but failed to reach all populations, other technologies are emerging to address its perceived shortcomings.

The need for new Internet access models

CEOs of major Silicon Valley firms[9] are at the forefront of this new disruptive wave. Elon Musks' SpaceX wants to build a cluster of low Earth orbit satellites to wrap the world in Internet signals; Mark Zuckerberg's Facebook is testing solar powered drones that will circle the stratosphere for weeks at a time. Down the street at Google (now Alphabet), the Loon project is testing whether giant balloons can drift with the winds over places without affordable mobile coverage, creating an airborne network of Internet connections.

There are lots of ways to approach these efforts to bringing the "rest" of the world online. Never has the idea of a singular digital divide that is easy to close with new technologies been as simultaneously seductive and inaccurate as it is right now. We suggest a cluster of four themes to guide and ground discussions of new models:

- An acknowledgement of the weaknesses of mobile to balance the celebration of its successes
- A disaggregation of the idea of a "digital divide" into several interrelated access challenges
- Clear understanding of the limits of any technical solution, whether mobile or not, relative to slower and more complex social and structural factors, including but not limited to literacy and the "effective use" of any form of Internet
- A frame that accounts for the vertical integration and global reach of new centralized players in what was formerly a more distributed Internet; search, advertising, operation systems, apps, and social networking services each have centralized and remade the Internet in new ways, and in aggregate have repercussions for those at the margins. The "access" question cannot be really answered in isolation. "Access to what?" and "on whose terms" are critical questions to ask of those seeking to improve and shape the global Internet landscape.

Weakness of the mobile model

The Metered Mind-set. Mobile has brought connectivity to millions of users, and has crucially brought the price of devices down to historically low levels, but airtime is still too expensive and many are still excluded. Globally we have raced to 85 percent coverage with 50 percent 3G[10] but the remaining geographies will be hardest to serve under current mobile industry paradigms.

Mobile devices with significant Internet capabilities can be obtained for as little as $29,[11] but the on-going costs of airtime and data tariffs are still a significant percentage of many rural and poor users' limited income. Because pre-pay data—bought in bundles or drawn from airtime balances—is expensive and metered, many people hold back on deep and regular engagement with online resources. A metered Internet begets a "metered mind-set," and is disproportionately exclusionary to those who can least afford to pay to be online.

The roots of usage-based pricing lie in the way national spectrum auctions have allocated admittedly limited spectrum to a small number of mobile network operations in each geography. These solutions have worked well to date, most regulators have been able to encourage (some) competition and reasonable fast national deployments to almost all of the world's densely populated areas. But as the access challenge shifts to the base of the economic pyramid and remote geographies, the strains in this model are increasingly evident; and expensive spectrum licences equate to expensive metered mobile services, and new models of Internet access must point to ways in which this structural barrier can be overcome.

We discuss this at length later in this report, but one of the many solutions to cheaper Internet access often discussed as a "silver bullet", that of increasing unlicensed spectrum to encourage new entrants into the market, is often seen as very seductive. But we must remember a significant percentage of government taxation revenue comes from mobile industry spectrum licence income and mobile industry taxation. Even if we do accept that there is a direct correlation between the percentage of the population with Internet access and GDP growth, if achieving this requires spectrum taxes income to reduce, the net effect for African governments may well be negative. More importantly, it will be hard for western

9 Vance, "The New Space Race."

10 https://gsmaintelligence.com/

11 Tung, "Microsoft Releases the Nokia 215, its $29 'Internet Phone.'"

The need for new Internet access models
continued

governments who have benefited from billions of dollars of mobile spectrum licence revenue to tell African governments to forgo them. There is a lack of credibility in arguing that the preferred policy for access has moved on, and the payday will not materialize for them.

Different and limited affordances. A second theme is that, despite all the advances in interfaces, processors, services and networks, mobiles still support some Internet activities better than others. They are fantastic, of course for connection on the go, expanding people's abilities to interact with (or transcend) physical and socially defined spaces. Mobile form factors and mobile networks help us navigate, glance, chat, tag, capture, and mash up, better than any desk PC or landline connection ever could. Through portability and ubiquity, their intimacy and power is remarkable. But these same combinations of network and device—particularly Internet access modalities—come with constraints, as well.

The metered mind-set (mentioned above) is the most important constraint. But so, too, are the ways in which mobiles are not as good at information production as PCs; from long-form writing, video editing, design and automation, and perhaps, especially, coding, the world does not run on mobile computing alone, and those with "mobile only" digital repertoires may not be able to participate fully in some of the informational production tasks at the heart of the new economy.

Interrelated access challenges

A second theme also comes from the direct success of mobile. We argue that it is best not to speak of a singular technical divide, but rather to put mobile as a point of reference for a set of three interconnected technical access challenges.

- **Extending an affordable Internet connection to those still beyond the reach of the mobile infrastructure.** This involves at least 15 percent of the world's population, rural, poor, and isolated, often without electricity, often with low levels of literacy (let alone the digital literacies) so helpful for effective use, often speaking niche languages without a significant Internet presence. Make no mistake: if the goal is 100 percent potential access, then the hardest challenges lie ahead.
- **Improving the value and performance of mobile networks** to low-resource populations living under the mobile footprint. This involves upgrades in network capabilities from 2.5G to 3G, or from 3G to LTE/HSPDA, reducing the costs users pay per bit (to increase affordability), and the reliability and performance of the networks themselves (latencies, load sharing, etc.)
- **Providing alternatives and complements to mobile networks**, particularly by giving users capabilities to "offload" some of their Internet traffic to connections that do not charge by the bit. Metered mobile connections are a significant impediment to effective use of the Internet for video, cloud computing, e-health, e-learning, and general software as a service.[12]

Access alone doesn't guarantee effective use

A third theme is that technical access alone never guarantees effective use.[13] There is a large body of work on nontechnical determinants of digital practices. It has been over a decade since van Dijk and Hacker labeled the so-called digital divide as a "dynamic and complex phenomenon."[14] And since Mark Warschauer called for its re-conceptualization as an interrelated intersection of physical, digital, human, and social resources.[15] And since Michael Gurstein suggested the challenge of the so-called divide was not in securing access, but in encouraging "effective use." These formulations are as true today as they were a decade ago.

The same access (at the same price, through the same devices, across the same networks) may be used differently by two different people, structured in part by human capabilities like literacy and skills, and social forces like norms, incentives, pressures, and meanings. Add to that the diversity of languages—that the Internet available to speakers and readers of the global languages like English and Chinese is not the same Internet available to those using of nearly 6,000 other "smaller" languages, and it makes little sense to speak of a binary divide which can be closed by access alone. If one insists on using "divides," then there are many divides, including what Esther Hargittai and others have called "second level divides"[16] based on the same non-technical factors identified by these researchers.

12 Donner, *After Access: Inclusion, Development, and a More Mobile Internet*.

13 Gurstein, "Effective Use: A Community Informatics Strategy beyond the Digital Divide."

14 Van Dijk and Hacker, "The Digital Divide as a Complex and Dynamic Phenomenon."

15 Warschauer, *Technology and Social Inclusion*.

16 Hargittai, "Second-Level Digital Divide: Differences in People's Online Skills."

The need for new Internet access models
continued

The particulars of the challenge are changing. Advances in interfaces mean that some technologies are "easier" to use than ever before and will be made easier still. Icons have augmented command lines; touch is expanding what the mouse can do; voice is augmenting text, and machine translation is expanding manual translation and propagation of content. And yet, the research above suggests that the contours of the overall challenge may remain quite durable. Skills will always matter; incentives will always matter, prior capital will often lead to better use. It will be a struggle to bring everyone along—*to leave no one behind*—when those with prior skills may always be better positioned to benefit more from each new technical advance in access, interfaces, services, or content. Yet this complexity is not a reason for the global community to stay out of the access challenge, it is, rather, precisely the reason the global community needs to be involved. It just can't ignore the complexity or wish it away (with drones or satellites or even more mobile towers).

Access to what kind of "Internet"?

The final theme in this section introduces a different layer of necessary complexity into the evaluation of any new Internet access modality. We will cover it in more detail later in the report, but for now it is important to note that "the Internet" is not "the web", and that "the Internet", circa 2015 and more mobile than ever, is increasingly structured by the interrelated platforms of code and functionality controlled by a few major global firms. Conversely, it is increasingly hard to use "the Internet" without interacting with the cookies, apps, databases, identity systems, and content of the major firms, or without those firms converting your usage into data and revenue.

The shift towards a more centralized Internet dominated by a few platforms is a broad topic, but intersects with the challenge of access in a couple of key ways. The first is, access to what? Research from Myanmar suggests that some Facebook and WhatsApp users don't even know they are using the Internet.[17] Many people may not use more than a few bits to chat on a messaging client or may not venture beyond the new walled gardens of the social networks. Shall we consider such cases "Internet use"?

The second question is "access on whose terms"? Many of the new access modalities we will discuss below are led by these large platform firms. On the one hand, they have the wherewithal and the drive to pursue bold and global solutions at a scale few others (if any) can match. On the other, the access they pursue may come with constraints as well as new affordances. By design or by accident, their efforts may change what Harmeet Sawhney called "the character of the Internet."[18] These potential changes need to be known and discussable. Some may be leading towards a new model of Internet use that, while greater in reach, is more limited in depth, and falls far short of the ideal of a web in which everyone is a contributor and a consumer.[19]

Now, with these four themes in place, it is easier to contextualize and assess the recent and pending movements in the landscape for the provision of "Internet" "access" in the Global South. At the broadest level, further gains in access will come from a *combination* of continued advances in GSM (infrastructure sharing, good regulatory environments, creative spectrum auctions, etc.), coupled with advances offered by new, non-GSM approaches (top-down models such as satellites, drones, balloons, as well as bottom-up models like community-led white space spectrum, and mesh networking). These advances will undoubtedly combine to bring more people online in the next decade than we ever thought possible. The Internet of 2025 should be more diverse, more representative than today's Internet. Fewer people should be left behind thanks to technical advances we will outline below. But once there, everyone's Internet experience and outcomes will not be the same, and indeed, the Internet they find may not be the one we expected and hoped to provide.

17 Mirani, "Millions of Facebook Users Have No Idea They're Using the Internet."

18 Sawhney, "Innovations at the Edge: The Impact of Mobile Technologies on the Character of the Internet."

19 Berners-Lee et al., "The World-Wide Web."

Barriers to scaling

Internet access

A fundamental constraint to increasing Internet access in emerging markets is the high cost of installing and operating mobile infrastructure, the dominant form of last-mile access. The percentage of the population who are still without any viable signal predominantly live in rural and remote communities, exactly the places where it is most expensive to extend physical infrastructure. Because these communities are also typically some of the lowest-income, the ARPU (average revenue per user) tends to be low, which means these potential customers are simultaneously the most expensive to serve, and the least profitable.

Barriers to scaling Internet access

While there are many new models seeking to overcome this access barrier, they can be broadly grouped according to the three "access challenges" described in the previous section, and shown in the table below.

Extending infrastructure	Complementary technologies	Improving value
These models seek to deploy infrastructure that will extend more cost-effective access to underserved populations. Examples include community-based services such as Endaga[20] and Rhizomatica.[21]	Others are using new technologies—or repurposing existing technology in new forms—to provide an alternative, or complement, to mobile access. Examples include Outernet[22] and Argon.[23]	Other ventures don't try to expand infrastructure, and instead use software and data services to increase accessibility of existing networks to broader segments of the population. Examples include Internet.org and Gigato.[24]

As these categories show, it is important to consider "access" not as a binary characteristic, but as a range of values that operate across multiple dimensions. In other words, increasing access could be a function of geography, services/functionality, affordability, and more.

Many examples of models in each of these groups have recorded successful pilots, yet haven't achieved adoption or scale more broadly. For a service to reach "scale" implies that the service has enough users or volume of activity to enable it to take advantage of economies of scale. For a business with a heavy CAPEX model, "reaching scale" might mean millions of users, but for a small, grass-roots service model, it might mean only thousands of users. Importantly, what constitutes "achieving scale" for a private-sector business may be very different than what a development practitioner would consider "achieving scale" in a form that enables meaningful socioeconomic impact. Because, while increasing "access," broadly defined, is a goal shared by private firms, public institutions, and development practitioners alike, user count alone is never a sufficient metric for measuring potential social change. We will discuss this issue in more detail later in the report, when we consider the various ways we can measure the impact of Internet access on development goals.

And finally, it should be noted, that it's likely all Internet access initiatives—especially those with infrastructure—will follow a staged rollout, starting with a first stage that is a subset of their expected final service offering. They must prioritize a segment of their expected customers, their geographical regions, and/or their technological functionality in order to achieve their initial growth goals, and usually that subset will be their most profitable offering.[25]

Similarly, like most businesses (including mobile operators), access providers will have varying levels of value attached to different segments, and in some cases the more profitable customers will be subsidizing service provisioning to the least profitable. Therefore, analysis of different models of providing access to the underserved should not view service offerings as homogenous either over time or across customer segments.

Indeed, those services aimed specifically at offering Internet access to low-income or geographically remote users will have to overcome the most cost and revenue barriers to make their services sustainable. As an example, whilst the annual ARPU for Facebook from users in the US market is $13.54, in the rest of the world—primarily emerging markets such as Africa—it is $1.22.[26] This doesn't feel like it is enough to subsidize the large capital investments needed to provide Internet access.

To explore this issue in more depth, in this section we will examine some of these barriers that limit the growth of efforts to increase access to the underserved.

20 http://www.endaga.com

21 http://rhizomatica.org/

22 https://outernet.is/

23 http://argontelecom.co.uk/

24 http://www.gigato.co/

25 *"People have realized by now that the way to go into the satellite business is to start localized so your initial investment is low," says Max Engel, who follows space communications for the consulting firm Frost & Sullivan. "XM Radio, for instance, which I have in my car, uses just two satellites. Iridium's system was based on building [for] the whole globe, then wondering whether you were going to have any customers."* "The Rise and Fall and Rise of Iridium."

Barriers to scaling Internet access
continued

Supply Side Barriers

Infrastructure dependencies

Few access providers own the complete connection from user device to the international Internet backbone. Indeed, the Internet has always been built on complex "peering" arrangements with different tiers of service providers and inter-connection agreements to link various networks and services.

Depending on what layer of connectivity the service in question provides, it will rely on providers above or below to complete the connection, and thus its service will be restricted by the availability and scope of agreements it can arrange with the other layers.

For example, services providing "last-mile" connectivity will rely on backhaul and/or "middle-mile" pipes from other providers, resulting in dependencies on pricing and performance availability. Similarly, some backhaul providers, such as satellite services, will depend on local providers to connect users and manage the customer relationship, restricting the backhaul provider's reach to only those areas/customer segments for which the local provider(s) have established last-mile service.

Therefore, a service provider's ability to scale is likely to be constrained by the available complementary providers it will have to partner with to offer full end-to-end connectivity to users. This may mean geographical constraints—e.g., a last-mile provider won't be able to service a remote community where there is no reliable access to backhaul—or it could mean service level or affordability constraints—e.g., the provider can only afford to connect with a backhaul provider at a slower speed.

Financing Digital Access initiatives

Some of the key players—Facebook, Google, Microsoft—have deep enough pockets that they can self-fund their access initiatives. But for those services that require significant CAPEX investments, the availability and type of financing can be a significant constraint. Obtaining traditional debt financing for CAPEX investments in infrastructure usually isn't a problem for mobile operators, who have high revenues and a proven business. But for alternative models or unproven technologies, finding sources of capital can be challenging, especially for early-stage financing. Equally, satellite services and other high-risk, high CAPEX ventures may require equity investment given the level of risk and financing involved.

The source of financing—venture capital, debt financing, and grants—can also define the timeline for reaching growth or revenue milestones, and limit the firm's options for pivoting to a different model. For example, satellite provider Iridium had to declare bankruptcy in part because:

"It could not keep its promise to bankers [including Barclays and Royal Bank of Scotland] that it would have at least 27,000 subscribers to its satellite network by June 30. By the end of the year, it was supposed to have 173,000. It [had] about 20,000." [27]

Traditionally, this is where donor and public sector capital has moved in. When emerging market mobile businesses were in their infancy risk capital from organizations such as the World Bank/IFC were critical to their early growth—indeed, support for the mobile industry is still forthcoming.[28] We are starting to see donor capital making the same call on the early, risky business models for the new Internet access businesses, most notably with OPIC's recent investment in Microsoft's white-space spectrum offering Mawingu.[29] We may need to see many more investments of this type for these new business models to achieve the scale we would desire.

26 Constine, "Facebook Learns To Make Money Where There Isn't Much."

27 Martin, "Iridium Fails to Find a Market."

28 IFC, "IFC Invests in Africell to Expand Telecommunications in Africa."

29 Overseas Private Investment Corporation, "OPIC and Microsoft Begin Financing Discussions with Kenya's Mawingu Networks."

Barriers to scaling Internet access
continued

Cost structures

The cost structure of access services can vary tremendously based on infrastructure and scope of coverage. At one extreme, businesses that are deploying new proprietary infrastructure with a global footprint will face extremely high upfront capex costs, while regional last-mile service providers using off-the-shelf hardware with minimal modification will have much lower costs. In both cases there is the probable need for extending or upgrading the equipment to mitigate obsolescence. Of course, software-based businesses don't have the same kind of upfront costs.

Capex costs may include: Telecom infrastructure and equipment (e.g., base stations, satellites), non-telecom assets (e.g., factories, buildings, power generation).

Opex costs may include: Infrastructure and equipment installation, maintenance, power, servers, hosting, marketing, distribution or service provisioning, field agent networks, spectrum licensing, bandwidth and other connectivity agreements.

A promising opportunity to address costs is "infrastructure sharing,"[30] where two or more service providers (typically, mobile operators) agree to share usage of assets such as base stations or power lines. The advantages are mostly reduced costs—Vodafone has claimed savings of $1 billion over five years of infrastructure sharing[31]—with each partner able to reduce the Capex and Opex of maintaining its own infrastructure completely independently. One clear example of this trend is operators outsourcing their cell tower management to third-party "towercos" who assume ownership and provide all maintenance for the infrastructure, which they then lease back to multiple operators.

"Network sharing has emerged as the most viable and economical strategy among mobile operators for expanding coverage to rural and remote areas. …Most network sharing initiatives are commercially oriented, rather than mandated by regulators, driven by cost reduction pressures, coverage obligations attached to 3G and 4G spectrum licenses and, in some cases, a shift in the focus of competition from the network towards the service layer (such as Bharti in India)."—GSMA[32]

We have begun to see this formalized as a business model with MTN's adoption of Ericsson's Managed Rural Coverage product[33] in Benin. Through a combination of satellite and solar power, Ericsson claims to be able to radically reduce the cost to serve rural customers. For our discussion the critical piece of this deal is that the mobile operator does not own the infrastructure—and perhaps third-party towerco models that manage may be a viable way to improve rural coverage.

Other research has shown how towercos who can derive revenue from the mobile infrastructure than just airtime can better justify the return on investment from the capex and opex of rural networks. The GSMA's Community Power program showed how the provision of energy from tower power plants both provided a much-needed resource to the local rural community as well as increasing ARPU from the user.[34] (This work has now expanded into the Mobile for Development Utilities program investigating the intersection of mobile and energy, funded by DFID[35].)

30 See, for example, The Association for Progressive Communications and Deloitte LLP, "Unlocking Broadband for All: Broadband Infrastructure Sharing Policies and Strategies in Emerging Markets"; GSMA, "Mobile Infrastructure Sharing."

31 GSMA, "Mobile Infrastructure Sharing."

32 GSMA Intelligence, "Closing the Coverage Gap: A View from Asia."

33 Carroll, "MTN First to Choose New Ericsson Rural Coverage Approach."

34 GSMA Green Power for Mobile, "Community Power from Mobile-Charging Services."

35 http://www.gsma.com/mobilefordevelopment/programmes/utilities

Barriers to scaling Internet access
continued

Revenue models

The wide variety in Internet access revenue models reflects not only the different technologies and layer of network connection—e.g., last-mile, backhaul—but also distinct customer types.

At one end of the spectrum, organizations such as Village Telco are selling their systems for community-based networks directly to individuals who may be interested in setting up micro-networks. Other providers of last-mile connectivity, such as Endaga, sell complete turnkey systems, including billing and account management software, to co-ops or entrepreneurs wanting to operate as a local micro-ISP.

Services such as these—which sell to small organizations or individual entrepreneurs—face the challenge of marketing and distributing their product/service to heterogeneous customers who, by definition, are more difficult to access through available communication channels. Furthermore, these customers are likely to be resource-constrained and inexperienced in establishing and operating local networks.

At the other end of the spectrum, the global satellite ventures provide fast backhaul and global connectivity to (relatively few) large enterprise customers, including mobile operators, who in turn use that bandwidth to serve their end-users. For these providers, their ability to scale is dependent on their customers' own growth. Most importantly, if the economics of providing backhaul connection change—which is possible given the fast pace of technological advances and the long runway required to design, build, and launch satellite systems—the satellite providers may struggle to find customer segments for which the value proposition still holds.

And completely asymmetric to these access models are the software-based businesses that combine advertising and digital incentives (e.g., data) to increase usage in areas where access is possible, but limited. Software-only ventures such as Jana[36] or Free Basics (Internet.org) have an entirely different cost structure and scaling potential; they connect directly with the customer, which allows low-cost and potentially viral customer acquisition, but their services do require approval and partnership with the operators, whom must believe the arrangement delivers value (typically framed as converting non-users of data into users of data).

Regulatory Barriers

While the telecommunications sector in most countries in Africa has been fully liberalized for the greater part for more than 15 years—with good competition levels among mobile, fixed and Internet providers, and overseen by independent regulators—attaining universal access has remained a major challenge owing to various factors.

A greater part of connectivity for both data and voice is currently delivered through mobile devices, with fixed broadband Internet connections having a negligible and declining share of the total connections.

According to the GSMA, penetration levels, in terms of unique mobile subscribers in Africa, stood at 41 percent[37] at the end of 2014 with the majority of these found in urban areas. CAGR growth over the last five years stood at 13 percent but is forecast to slow to 6 percent between 2015 and 2020.

In terms of Internet access during the same period, ITU statistics[38] indicate that less than 21 percent of individuals in Africa had Internet access with 17.4 percent being mobile broadband subscriptions and 0.5 percent fixed broadband subscriptions.

36 https://www.jana.com/

37 GSMA, "The Mobile Economy 2015."

38 International Telecommunication Union, "ICT Facts and Figures 2015."

Barriers to scaling Internet access
continued

Developments that have promoted growth

Over the last decade, a number of developments and initiatives have allowed the telecommunications sector in Africa to thrive and register high growth. These include:

- Unified lisencing regimes—Most regulators have made a departure from technology based lisences to service based lisences, allowing providers more flexibility in terms of infrastructure choices as well as broadening their service offerings, thereby fostering greater competition among operators.
- Infrastructure investments—Before 2007, the greater part of international connectivity was achieved via satellite links, making Internet and international voice tariffs very high. At the same time, a good part of terrestrial backhaul and last-mile links were via microwave. However, between 2007 and 2010 a number of international fiber projects were completed, drastically lowering costs on international connectivity and giving impetus to terrestrial fiber infrastructure, allowing for higher speeds and lower costs.
- Lower entry costs—These include interventions by regulators to lower mobile termination rates, drastically reducing usage tariffs, as well as lower cost of devices.
- Mobile money—The evolution of mobile money and the convenience it offers the unbanked in Africa, as well as the knock-on effect it has in other sectors, has and will remain a key growth driver, not just in Africa but also in many other developing countries.

Slowing growth and the changing business environment

Despite the very high growth seen over the decade, mainly driven by demand, technological developments, and regulatory interventions, various factors have come into play to alter the business environment, causing growth to taper off and in turn affecting operators' ability to reach more rural areas. These include:

- Declining revenue growth—As more subscribers are added to networks, with the more recent ones being individuals with low income, the average revenue per user (ARPU) is becoming more diluted. This is further impacted by intense tariff competition as well as lower mobile termination rates. As such revenue growth is slowing, leaving operators with less to invest in network expansion.
- Regulatory pressure—Spurred by demands from consumers for better coverage and higher quality of services, many operators are under pressure from regulators to make requisite investments in improving quality of service in terms of capacity and coverage. And with some licenses coming up for renewal, some regulators have made threats to make renewal contingent on attaining pre-set quality of service standards.
- Disruption by over the top (OTT) providers—Additional pressure is being exerted on operator revenues through market disruption by over the top providers (including Whatsapp, Skype, etc.) whose messaging and VoIP services are gradually chipping away at operator voice and SMS revenues. Operators feel that OTT providers enjoy undue advantages in that they do not pay license fees at a country level and are largely unencumbered by regulation.

Barriers to scaling Internet access
continued

- Electricity—In many countries in Africa the expansion of networks into underserved areas has outpaced growth in the electricity grid, which itself is largely unreliable and compels operators to incur the additional costs of back-up power, mainly diesel generators. However, more and more operators, with the support of governments, are exploring other means to power their networks in rural areas, including wind and solar power. Consolidation—High levels of competition, declining revenue growth, high operating costs, and disruptions by over the top providers are exerting pressure on existing operators, making their businesses no longer viable. In addition, with many licenses becoming now for renewal (after their 10–15 year concessions have elapsed), the initial business premises of demand and growth no longer exist. As such, many smaller operators have elected to cease their operations and sell off their assets to their rivals. (It is worth noting here that the USA and China, who offer a similar market size to Africa, have no more than 3–4 mobile operators for the entire population. Africa has over 50. We can expect more consolidation, mergers and acquisitions, and infrastructure sharing as these diverse markets aim to achieve the economies of scale of the US and Chinese powerhouses.)

The confluence of these issues, and many others, is slowly changing the telecommunications landscape in Africa, and in a sense, giving more justification to operators as to why rural and underserved areas cannot be covered.

Key regulatory issues

Against this backdrop, a number of regulatory issues merit some robust debate, and, in order to reanimate the quest for universal access, will call for more innovative approaches to be considered. These include:

Spectrum policies

- **Unused spectrum:** While wire line technologies like fiber do not come with the cost and administrative burden related to spectrum allocation, the cost of such infrastructure, especially for last-mile access, remains prohibitive. As such coverage of underserved (uneconomic) areas is best achieved through wireless technologies. However, in the current landscape, licensed operators possess spectrum that they are unable to fully utilize given the economic viability of venturing into rural and under served markets. Thus a good amount of spectrum remains unused and regulators and policy makers should be engaged to consider frameworks that allow existing operators to work in collaboration with "bottom up" providers and similar viable initiatives, whether government or private sector led.
- **Unlicensed spectrum:** The economic barriers that exist in underserved areas demand that, at the very least, for any operation to be remotely viable, its capital and operating costs should be very low. As such, when it comes to spectrum, whether in existing coverage bands or through innovative uses of other unused spectrum (white spaces), license fee waivers should be extended to providers that want to ensure rural access. According to a World Bank Working Paper:[39]

39 Kunigami and Navas-Sabater, *Options to Increase Access to Telecommunications Services in Rural and Low-Income Areas*.

Barriers to scaling Internet access
continued

"In rural areas, spectrum has become a costly entry barrier for small operators oriented towards low-income segments. Many countries have spectrum allocation policies that grant nationwide licenses, not bearing in mind that license holders are usually going to concentrate their operations in urban areas.

Even in those cases where operators granted with nationwide licenses do provide service in rural areas, usage of spectrum in rural areas is certainly different than in urban areas. That is, in urban areas, due to population concentration and intensive use, the value of spectrum as a scarce resource is much higher than in rural areas. So, the opportunity cost of spectrum in rural and low-income areas is different, building a case for different approaches when dealing with frequency allocation between rural and urban areas."

- **Digital Dividend spectrum:** June 2015 marked the international deadline set by the ITU for the transition from analog to digital broadcasting services, freeing up spectrum known as the digital dividend—spectrum under 1Ghz, which is better suited for coverage. This spectrum has been identified as being ideal for broadband coverage since the spectrum band requires fewer base stations, therefore lower capital outlay (compared to other bands proposed, e.g., 2.3 and 2.6Ghz, better suited to last-mile access, which would increase infrastructure costs).

Save for less than a dozen countries, most countries in Africa have failed to meet the deadline but are nonetheless working towards it. Until this is done, the spectrum that can be used to economically cover rural areas remains inaccessible.

Taxation policies

Consumer taxes—Taxes amount to up to 19 percent of the total cost of mobile ownership and these range from Value Added Tax (VAT) or Goods and Services Tax (GST), to import duties on devices, taxes on mobile payment transactions, as well as taxes on incoming traffic

Operator taxes—Players in telecommunications face higher taxes than other sectors, given the huge growth of the sector as well as its impact on the broader economy. Among the taxes operators have to pay include: customs duty in imported equipment, Value Added Tax (VAT) or Goods and Services Tax (GST) on services, Corporate (Income) tax on earnings, one-off and annual license and spectrum fees, levies to local and national government authorities for rights of way, and universal service contributions.

The combination of consumer and operator taxes serve to make the adoption of services in rural areas even harder as consumers face pricing that is not within their ability and operators are left with thinner margins that affect their ability to invest in expansion to such areas.

At a continent level, despite there being numerous taxes levied on consumers and operators, there have been recent proposals by heads of state after Africa Union meetings to tax SMS services to fund Africa Union activities. Ironically, this proposal comes at a time when SMS usage is already being affected by instant messaging applications, and may not provide the payday expected.

Barriers to scaling Internet access
continued

Case study

Digital dividend and rural broadband in Rwanda

Rwanda is among the countries in Africa that has successfully completed its digital migration.

Rwanda is using the 800Mhz band to roll out a nationwide 4G/LTE network through a public private partnership between the government and Korea Telecom.

As of September 2015, nearly one year after launch, this network had only 10,000 users, mainly business users concentrated in urban areas. Among the challenges cited by consumers include the cost of services as well as devices.

A lot could be gleaned from both the business model adopted in this case (i.e., a public private partnership) as well as the ambition to provide universal coverage while being indifferent to the economic viability of the project. Various studies indicate that a mix of technologies and business models could better address rural coverage better than a "blanket" approach that involves huge capital outlay and an undefined return on investment period, especially as a private sector partner is involved.

Nonetheless, a few countries in Africa, including Kenya and South Africa, may be considering adopting the same approach as Rwanda, despite it being largely unproven.

According to the GSMA,[40] "The design, financing and implementation of Single Wholesale Networks (SWN) are likely to prove challenging and that there is a significant risk of failure. Although a publicly funded SWN could deliver coverage in areas where privately funded competing networks would not be willing to expand into, the correct approach is to consider how public subsidies could be used to extend the benefits of network competition to those areas. This can be achieved in a variety of ways, including coverage obligations and other forms of subsidy, such as the award of contracts to cover particular areas using public funds."

40 GSMA, "Single Wholesale Networks."

Barriers to scaling Internet access
continued

Case study

Removal of VAT in Kenya
and its impact

In 2009 the government of Kenya removed VAT on mobile handsets.

This resulted in lower acquisition costs and promoted growth. According to a study[41] by C4DLab, in the first six months after the exemption of VAT on handsets, the Kenya market registered a 7 percent increase in mobile penetration. The study further explores the impact of the removal of VAT on handsets on the economy, including financial inclusion, GDP growth, and employment among other areas.

However, in 2013, the Kenyan government re-introduced VAT on handsets and one result of this re-introduction was the increase of counterfeit and grey market shipments[42] into the market, negatively affecting revenues for legitimate channels that have investment in Kenya, create employment and pay taxes.

41 Omwansa, "Re-Introduction of VAT on ICT Equipment in Kenya Special Focus on Mobile Phones."

42 Cellular News, "Introduction of VAT Turns Kenyan Mobile Handset Market a Deeper Shade of Gray."

Barriers to scaling Internet access
continued

Infrastructure sharing and open access

In recognition of the wastage resulting from duplication of infrastructure costs, and in a bid to steer such investments to underserved areas as well as provide additional capacity to enhance the quality of services, regulators are considering implementing guidelines that compel operators to share non-core infrastructure.

According to a World Bank working paper[43]

> **"There are certain investments that companies would not be able to afford individually but, if deployed collectively, could extend service coverage towards low-income areas. In these cases, collaboration between companies that would benefit from such infrastructure could be explored."**

However, in markets where market share is unevenly distributed, operators with greater coverage seem disinclined to embrace such proposals as it puts them on an equal footing with their competitors who have made less investments but would stand to benefit by adding more subscribers in areas they have not reached.

Concurrently, and driven by discussions on spectrum, where wireless technologies are considered, some governments are considering the development of Single Wholesale Networks (SWNs), such as the Rwandan example in the case study above.

Many governments' preference for the SWN models for rural communications comes from concerns that, should existing market players be given spectrum for 4G, they would not prioritize rural areas and at the same time deliver affordable services. Various governments also believe that a SWN model would allow different market players, irrespective of size and or financial capability, to access the network and provide services on a competitive basis.

Universal Service Funds

The initial premise behind Universal Service Funds—subsidizing the cost of infrastructure in uneconomic areas—has been overtaken by technological developments. Current initiatives in some countries focus more on equipping rural communities with access, skills development, content and devices, and with special emphasis on initiatives that allow access to healthcare, education, small business support, agriculture, and delivery of government services.

According to an online resource, the ICT regulation toolkit[44] an online resource from the ITU:

"UAS policy needs to be resilient and forward-looking as it takes emerging technologies into account, but it should aim to be technologically neutral. Regulators should be informed observers regarding technologies, but they need to allow UAS providers to choose which technologies are cost effective. As an overall principle, it is important to note that technologies are neither isolated from market, nor solely the determining factor in successful service provision. Country by country, whether a particular technology is an appropriate solution for UAS and rural areas, and for low-income people, depends strongly on these market factors:

- *Competition (the market position of the providers, their service packages and pricing strategy);*
- *Demand and affordability;*
- *Customer density; and*
- *End user terminal distribution and availability."*

Meanwhile, while many countries have been collecting for this fund from operators, not many are actually disbursing the funds. And for the few that are, the projects invested in lack requisite monitoring and evaluation in order to gauge the impact.

43 Kunigami and Navas-Sabater, *Options to Increase Access to Telecommunications Services in Rural and Low-Income Areas*.

Barriers to scaling Internet access
continued

Policymaking

Policymaking in Africa tends to be a rather protracted process owing to various reasons including, but not limited to:

- Lack of knowledge about best practices.
- Slow speed of innovation.
- Efforts to harmonize policies among regional economic communities (RECs) which are at different levels of development and economic development, and also affected by the inherent process which involves multiple stakeholders and in some cases, intense lobbying driven by commercial considerations.
- Revenue and tax ambitions from government.

Against this backdrop are other government-driven initiatives aimed at gaining political capital amongst the electorate and donor community. Some of these initiatives tend to be indifferent to the realities on the ground that dictate that various prerequisites must exist, e.g., road infrastructure (to allow trade, communications, access to hospitals, etc.), electricity (to power rural businesses and devices), education and literacy levels—prerequisites which allow rural connectivity to have the desired impact

Rural access policies and initiatives

Overall, governments in Africa are trying to address rural access in collaboration with donors, market players and other stakeholders, through various initiatives including Single Wholesale Networks (SWN), infrastructure sharing and the use of universal access funds (mainly aimed at removing consumer access barriers).

However, addressing cost barriers for consumers is only part of the battle. Given the foregoing regulatory considerations, a lot more needs to be done from a policy and regulatory perspective to make existing frameworks more agile, innovative, and inclusive.

Some initiatives that could have great impact on access in underserved areas, and where no legal framework exists, are being allowed on a trial basis in different parts of Africa. Most of these initiatives share some common features including:

- Unlicensed spectrum and use of white spaces
- Wireless last-mile access (via satellite or wireless technologies linked to fiber, mesh networks and others
- Community support and or ownership
- Measurable impact in specific areas like education, healthcare, business and employment
- Use of renewable energy to lower costs.
- Use of excess capacity and power by the local community, schools, health centers, etc.)

44 infoDev and International Telecommunication Union, "ICT Regulation Toolkit."

Barriers to scaling Internet access
continued

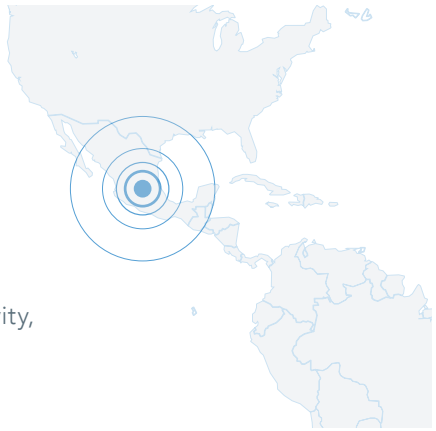
Regulatory outlook

As different industry stakeholders grapple with the issue of universal access, especially in an ever-changing environment characterized by technology changes, varied business realities, innovation, infrastructural challenges (power, roads) and a host of other issues, policymakers and regulators will need to build some flexibility into current frameworks in order to allow different stakeholders to work together.

Such flexibility can be informed by addressing questions such as:

- Which rural areas are ready to receive, utilize and benefit from rural connectivity in terms of supporting infrastructure like roads, electricity, storage as well as in terms of human capacity (digital literacy)?
- Where access gaps have been established, how can stakeholders work together to prioritize filling the gaps?
- What impact can unlicensed and unused spectrum have in terms of attracting investors and social enterprises? Can special provisions (such as the Mexico example) be made for rural community operators?
- Given that taxation bears heavily on the cost of services, how can this be addressed for rural areas?
- When looking at objectives tied to offering rural connectivity (healthcare, education, government services), can these objectives still not be met using a mixture of lower cost and existing technologies?
- Can a special legal framework be created to treat rural and underserved areas differently in relation to consumer and provider taxation as well as unlicensed spectrum?
- How can the approach to disbursing Universal Service Funds be refreshed to take into account modern realities?

Barriers to scaling Internet access
continued



Rural access case study

Rhizomatica,
Mexico

While numerous rural connectivity models exist, some are dependent on factors like economic activity, geographic area, access to national infrastructure. One project that stands out in terms of its success in scaling up as well as the positive impact it has had on regulation, can be found in Mexico.

Rhizomatica is a non-profit organization that is leveraging low-cost alternative GSM technologies to provide services to indigenous communities around Oaxaca, Mexico.

In order to meet the requirements of low-cost networks, it takes advantage of open source software (OSS) as well as low-cost radio platforms. In order to trial the service, it obtained permission from the Mexican regulator.

Following successful deployment of their model, the regulator has included in the national frequency plans, a provision that sets aside 2 x 5MHz of spectrum in the 800MHz band for "social" use for communities of less than 2,500 people or for use by regions designated as an indigenous or priority zone.

Rhizomatica continues to expand its services in the Oaxaca region and currently serves more than 15 communities.

Demand side
barriers

Demand side barriers

Availability of relevant content and services

One school of thought suggests that a persistent barrier to more widespread adoption of the Internet is lack of relevant "local" content and services.[45] The kernel of this idea remains verifiable; despite the worldwide spread of the Internet, content and services are more readily available, more diverse, and probably of higher quality in a few dozen of major languages then they are across the long tail of 6,000 specialized, regional languages in use around the world.

The full linguistic, contextual, and cultural diversity of the world is not reflected, at least not without distortions and concentrations, in the diversity of content and services available online. Along with several colleagues, Mark Graham, a geographer at the Oxford Internet Institute, offers some particularly striking work[46] representing how this distortion plays out at the macro level, with content, and cultures of content production. Representation of the total number of Wikipedia entries by country reveals that the Internet is still not being written by everyone, for everyone.

But how does this play out at the individual level? Are individuals' decisions about whether to take up and use the Internet affected by this lack of local content? Evidence on this question is scarcer, but we can break the content discussion up into at least three nested challenges.

- The first is the challenge of what *can be put online*. There are still issues with the representation of some non-Roman scripts in Unicode, making it easier to capture content in some languages than others.
- Most important, perhaps, is the challenge of *what is put online*. To Graham's point, above, cultures of content production beget cultures of content production, and the creation of local services.
- Finally, there is a question of *what can be discovered online*. Broadly speaking, there are three global mechanisms connecting people to digital content and services: search (both pure and ad supported), social networks and the application store model. Each works on personal computers or on mobile devices, but it is fair to say that while search came to dominate the browser models of the World Wide Web from 1995 to 2010, it is the application store model that works on mobile devices and is increasingly central to the way people select content and services to interact with online.[47] This creates limited windows for the identification and servicing of relevant local content, contrasted with global bestsellers.

As discussed above, individuals' own skills, training, and local environment of digital support and practices of use interact with each of these three content barriers. Just because content is there in theory does not mean it has a representative chance of being discovered or used in the ways the development community might want.

Thus there are multiple dimensions and levels to what might commonly be called the "local content" challenge; it involves the creation of a local content ecosystem, rather than the injection of specific content or services.[48] One catalyst for the creation of a more virtuous cycle of content creation may be around the encouragement of open data arrangements, so that others may build content and services upon the data gathered by institutions about a community.

Similarly, e-government programs, when well-architected, well-designed, easy to use, reliable and useful, may provide incentives for non-users and infrequent users to begin engaging with digital data and the Internet more regularly and effectively.

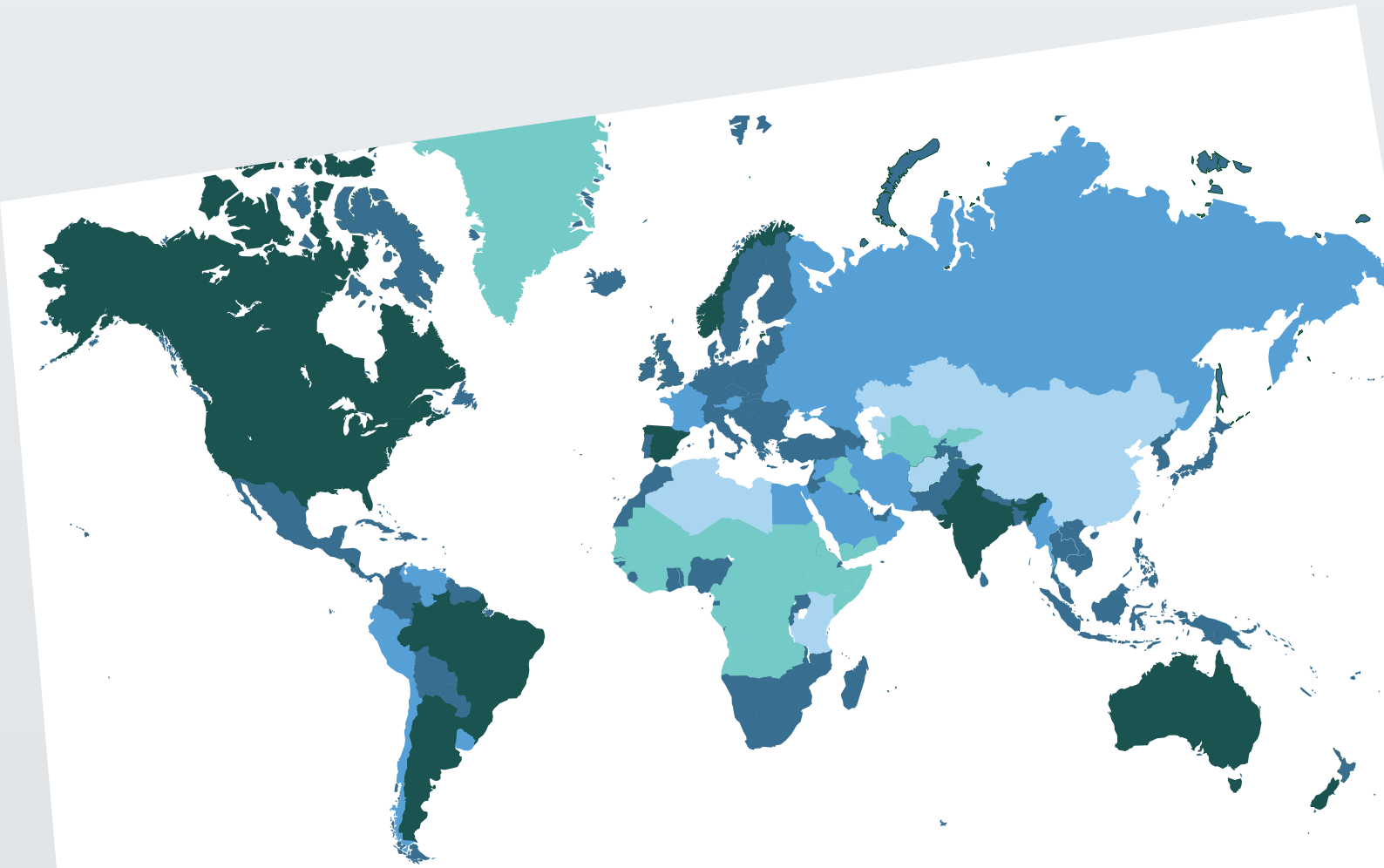
45 McKinsey & Company, "Offline and Falling behind: Barriers to Internet Adoption."

46 Graham and Zook, "Augmented Realities and Uneven Geographies." Diagram from http://www.floatingsheep.org/2013/03/what-percentage-of-edits-to-english.html

47 Pon, Seppälä, and Kenney, "One Ring to Unite Them All: Convergence, the Smartphone, and the Cloud."

48 Burns and Dolan, "Building a Foundation for Digital Inclusion: A Coordinated Local Content Ecosystem."

Demand side barriers
continued



What percentage of edits to English-language Wikipedia articles are from local people?

Key
- < 5%
- 5%—10%
- 11%—25%
- 26%—50%
- > 50%

Source: Data obtained from Wikipedia in Feb 2013. Floatingsheep.org
More info at http://wikiproject.oii.ox.ac.uk/

Instrumental and non-instrumental content and services

While acknowledging these persistent and significant gaps in the overall contours of available and useful content, it is nevertheless possible to reframe a view of relevance to tell a more dynamic story. In this reframe, there are, indeed, already significant draws on line of content and services, happening almost irrespective of local languages. The complexity is that these content and services tend to be closely connected to entertainment, games, and particularly social media. These services are hugely popular and the major driver of attention on-line globally, and they are compelling to users. The question is how the donor community balances out the need to encourage digital inclusion alongside the desire to promote instrumental content—that directly addresses issues such as health, education, etc.—with non-instrumental usage such as gaming and social media.

Instrumental use (and the content and services which support it) remains idealized by the development community, using the Internet to check farm prices, research prenatal care, report a pothole or start a democratic revolution. Yet non-instrumental use—games, cat videos, and social media—dominates the everyday in ways that are compelling and popular. In practice it is difficult to promote, encourage, or enable one without the other.

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Consider entertainment first. There is more "local" content uploaded to video photography sites than ever before. For example, one can use the site watchbycountry.com[49] to see recent "top viewed" videos by country, from all around the world. Pop music videos do dominate viewing, but so do news clips, clips from local television shows, national music stars, and other trending topics of the day of "local" interest. We are not aware of a global content analysis which assesses the proportion of YouTube or other Internet content which is entertainment or not, but it does seem to skew towards entertainment.

And, no discussion of the Internet circa 2016 would be complete without significant attention paid to central roles social networking sites like Facebook, Twitter, and Sina Weibo, and to mobile messaging platforms like WhatsApp, Line, Instagram, and WeChat play in the online lives of many people.

The telecoms research think tank LIRNEasia released research in 2014 which reported that amongst communities it was studying in Myanmar, "Facebook was the Internet" people were getting online because they wanted to use Facebook. Others claim to use Facebook but not the Internet.[50] The centrality of Facebook as the destination service for many first-time users is part of why Facebook's Internet.org program, now re-named "Facebook Free Basics" has achieved significant traction with mobile network operators in many developing countries. People want to use Facebook, and Facebook is making it easy (and inexpensive) for them to do so. Facebook-owned WhatsApp has also "scaled" quickly in many resource-constrained settings, providing multimedia chat, image, and voice messaging for fractions of what SMS and MMS used to cost.

At Caribou Digital we observed prolific and multi-faceted use of social networking platforms by participants in our 2015 research study *Digital Lives in Uganda, Kenya, and Ghana*.[51] Facebook dominated most of our participants Digital Days. However, it would be inaccurate to represent this use as strictly for entertainment or for unserious or unproductive chatting. Of course, those non-instrumental uses were there, but so was using Facebook and WhatsApp to search for jobs, or network with people in their community as a means of cultivating and maintaining social support. Social media is not inherently unserious or unhelpful; rather, it is simply social.

To return to the question of relevance, then, one could argue that in contexts without deep reservoirs of locally relevant content or services, it will be social networks that draw in "relevant" content as required. What could be more locally relevant than the links and advice shared by one's own circle of friends and community members?

There are certainly outstanding questions about whether Facebook and other social networks are indeed acting as "on-ramps" to a broader Internet, or instead are acting as more of a cul-de-sac or walled garden, providing a set of experiences sufficient to serve the digital needs of many people. We placed this brief section on social media and entertainment in the section ostensibly about barriers to adoption, because it is via entertainment and social networking that we might see the fast erosion of the so-called content barriers to adoption. Entertainment, games, and social media, all of which may be mostly non-instrumental with moments of instrumentality, will likely continue to dominate the rationale for adoption and use of the Internet by the next few billion people likely to come online.

The real barrier is one of framing, which discounts this behavior as somehow superfluous or not worthy of support; the opportunity is to find ways to create more virtuous and reinforcing cycles between instrumental and non-instrumental use.

49 http://watchbycountry.com/

50 Samarajiva, Rohan, "Facebook = Internet?"

51 Caribou Digital, "Digital Lives in Ghana, Kenya, and Uganda."

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Imbalances in global content ecosystems

To provide local content, content and service providers must be able to reach new customers that are brought online as part of the digital inclusion of the last few billion users. This may present a barrier where discoverability and access to platforms of distribution and monetization are not enabled for local content and service companies and entrepreneurs.

In the previous era of desktop-based Internet access, the decentralized nature of the web enabled relatively independent and unfettered online experiences. Of course, Internet firms have always sought to increase their user traffic—and thus ad revenue—through aggregating content and services into portals, directories, and networks, and when search became an increasingly critical tool, Google was able to build itself into a very profitable gatekeeper of information.

But the transition to the mobile era has meant critical shifts in this landscape. First, the battle to establish the dominant operating systems for this new class of computers quickly led to a duopoly, with Apple's iOS and Google's Android together reaching 75 percent market share by the end of 2011, and 98 percent market share by the end of 2015.[52] Second, the nature of the mobile device, mobile network connection, and typical use cases has led to the emergence—and now preference—of apps over web sites, as the former are designed to fit smaller screens, load quickly using less data, and provide streamlined functionality for the most common use cases. Because apps only work on the operating system they were built for, the result is that vast swathes of Internet-based content and services are now accessed through purpose-built apps that are tied to proprietary operating systems.

This new arrangement is embodied in the app stores, those virtual markets for apps and other digital content. Because the Apple and Google app stores manage the vast majority of apps outside of China,[53] these two firms control many aspects of digital creation and distribution, including what types of apps can be offered, how developers can monetize their apps, and how much users pay for apps.[54] Importantly, many of these controls are exercised on a geographic basis, with the platforms defining different parameters for different countries. For example, Google set $0.99 as the general minimum price for paid apps or in-app purchases, but has introduced lower minimum pricing for some countries in the Global South.[55] And both of the app stores restrict app inventory on a per-country basis in order to comply with state-level regulations, for example, around gambling.

But the most significant control is Google's policy around monetization, which requires that developers have a Google Merchant Account in order to earn revenue from paid downloads or in-app purchases through the Google Play app store. Google allows developers to register for Merchant Accounts in only 78 countries, excluding much of the Global South (for example, the only two African countries allowed are Nigeria and Egypt). By explicitly disallowing developers in emerging markets from earning revenue through the dominant digital content platform in their countries, Google hampers the development of local content and services in these areas, increasing the likelihood that the available content will be from foreign firms who face no such monetization restriction.[56] With a broad range of research[57] showing that culturally, linguistically, and topically relevant content is a key driver for adoption or use of Internet technologies, Google's limits on monetization are likely also reducing demand for Internet access in many emerging markets.

52 Gartner, "Gartner Says Worldwide Mobile Phone Sales Declined 1.7 Percent in 2012"; Gartner, "Gartner Says Emerging Markets Drove Worldwide Smartphone Sales to 15.5 Percent Growth in Third Quarter of 2015."

53 There are hundreds of third-party app stores in China, primarily dealing in Android apps.

54 Both platforms prohibit certain types of apps and content, including pornography, and reserve the right to approve or deny any app based on editorial discretion. Both platforms dictate which types of revenue-generation are permissible (e.g., paid download, subscriptions, in-app purchases, etc.), and the terms of the revenue sharing between app developer and the platform (typically 70 percent-30 percent). The platform owner also determines the minimum and maximum prices the developers are allowed to charge end-users.

55 Indonesia, Turkey, and Ukraine now have the lowest minimum, approximately $0.21. Pott, Alistair, "Minimum Purchase Price for Apps and in-App Products Reduced on Google Play."

56 Caribou Digital research has shown that lower levels of domestic production in apps results in higher level of imports from the United States especially. Caribou Digital, "Winners and Losers in the Global App Economy."

57 See, for example, Viard and Economides, "The Effect of Content on Global Internet Adoption and the Global 'Digital Divide'"; Surman, Gardner, and Ascher, "Local Content, Smartphones, and Digital Inclusion"; GSMA and Mozilla, "Approaches to Local Content: Realising the Smartphone Opportunity."

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continued

The question of access in this context is thus bidirectional and reflexive, with content providers needing access to the formal distribution and markets provided by the app stores, consumers needing access to devices and networks that allow them to connect to the content, and both sides responding in a positive feedback loop of supply and demand. For policymakers, the key is therefore finding ways to promote not only content development but also the supporting market structures that enable sustainable digital content and service businesses.

The power wielded by technology platforms is not limited to Apple and Google's dominance of mobile operating systems and the app economy. Internet-based services—especially social media and over the top (OTT) services—such as Facebook, WeChat, Twitter, LinkedIn, and WhatsApp have built up their own platform ecosystems, with hundreds of millions of users, integrated third-party services, and robust revenue streams. Because these services have become so prevalent, they are often the first—and sometimes only—Internet experience many users have. This speaks to the great value that users place on these services, but it also reflects intentional strategies by these platforms to envelop additional functionality and content in a never-ending effort to keep users within their platform (and thereby generating advertising revenue) as long as possible. As a result, the online experience of their users is increasingly moderated by algorithms, policies, and code that rely on the user's engagement in order to generate profits for the platform, yet are completely outside the user's control.[58] As these services become an increasingly dominant part of a typical Internet experience, the question of "access to what?" is increasingly shaped by platform logic in the service of a for-profit revenue model.

More importantly, this platform logic affects the ability of the user and the local content or service provider to have unfettered access to the potential digital networks on offer, which becomes acute when pricing practices lock-in users to the individual platform ecosystem via "white-labelling" services or "zero-rating" models, which provide reduced cost or free access to certain services selected by the platform owner.

Zero-rating models: user analysis

Zero-rated data plans, provide cheaper (or even free) access to limited content on the Internet, and have been celebrated by some for creating more affordable access. Others contend that these plans are not creating "Internet" access at all, but only making it cheaper to access certain content, consequently skewing competition in their favor. The heated debate around zero-rating requires that we examine it in more detail in this report and ask the question:

Are zero-rated plans facilitating access, of what kind, and to what extent can the trade-off between access and competition be given a utilitarian justification?

Economic theory on the bundling of information goods tells us why user valuation of specific content like Facebook or WhatsApp, as well as the Internet "as a whole," is central to determining the efficiency and welfare implications of zero-rating.

At the heart of these enquiries is the user—her needs, valuations and perceptions. Yet all we have to go by is broad-brush and predictive anecdotes about "new users in developing countries." There is an urgent need for country-specific data on how the target demographic is actually responding to these plans.

Here we present some user-research conducted by Amba Kak that begins to address this question, with a focus on the particular types of zero-rated plans on offer in India. In 2015 three included.

- Limited packs: Access exclusively to certain online content for a fraction of the price of regular all-access plans. Accessing external content attracts notoriously high base-rate charges. For example, for WhatsApp and Facebook packs in India (priced lower than the all-access monthly plan) users get unlimited access to WhatsApp/Facebook but if they open any other website or application they are charged from their calling credit at base-rate.[59] Sprint also introduced a "Facebook-only" plan in the US.[60]
- Free walled-garden: Access to a selection of websites for no charge at all, i.e., without being subscribed to a data plan. Access to content outside of this "walled garden" incurs charges at base-rate. For example, "internet.org" or Google's "Freezone."[61]

58 Dahlberg, "Expanding Digital Divides Research."

59 Dhapola, Shruti, "Not Just Airtel Zero: Facebook to WhatsApp, Everyone Has Violated Net Neutrality in India."

60 Knutson, "Sprint Tries a Facebook-Only Plan."

61 Duncan, Geoff, "Is Google 'Free Zone' Internet Altruistic Service for Emerging Economies or Something Else?"

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- Un-metered: Use of certain applications/websites is un-metered and does not count towards monthly volume caps—"Pay X amount for X GB of data per month, but the use of Facebook is unlimited!" For example, T-Mobile un-metered certain music streaming websites in the US.[62]

For this research we looked exclusively at the limited-pack zero-rating offerings, conducting interviews with representatives from four telecom companies, 11 recharge shop retailers, and 18 users to gauge the response to these plans.

Using qualitative comparative analysis as a methodological tool, users were categorized based on their responses to zero-rated plans. Group 1 consisted of those that had a negative view of zero-rating and Group 2, those that had a positive view of zero rating.

Group 1: Why users had a negative view of zero-rating

Four reasons dominated why Group 1 had a negative view of zero-rating. Namely, fear and suspicion about billing practices; the idea of the "emergency"; the value of procuring media content and finally, the value associated with exploring the Internet.

Many participants in this group voiced fear and suspicion about billing under zero-rated plans. This was echoed both in participants who were familiar with the Internet and had years of experience, and equally from those who had just begun using it. With the former category, it was more a fear of the unknown. Participant "A", a 27-year-old homemaker, is only two weeks old to the world of the Internet. She subscribed because she wanted to be on a WhatsApp group with her siblings who live in a different state:

"I wouldn't go for this Whatsapp only plan—I'm still new and I don't want to run into any trouble. What if I watch a video or get a photograph and then end up with my calling credit wiped out?"

For mature users, it was a suspicion of telecom companies falsely billing. Participant "I", with a year of experience and mature use of the Internet gave several reasons why zero-rated plans wouldn't work for him, but among them was a suspicion of telecom billing in general:

"With these mobile data plans, unlimited plans are the safest. No restrictions. The moment you have restrictions you don't know when you'll be tripped up by the telecom companies. They just want to make money."

In fact, he expressed a strong preference for "unlimited" plans versus those with volume caps of any kind. In the past he said he had experiences with money being "mysteriously deducted" and being informed that he had exceeded limits without any message warning him.

Even users who were well aware of billing methods on data plans, complained that it was easy to be confused.

"What if I click on an ad on Facebook by mistake, or some news link? It happens. I'll end up spending more than I would have saved with this pack",

said participant "K".

Participants with limited familiarity with the Internet said their use of Internet was restricted to WhatsApp, or Facebook. Some said this was because they had no curiosity about exploring the Internet and they had subscribed to data plans only to communicate with friends via these applications, while others said it was lack of skills that prevented them from using anything else since they were still new to the Internet. That the very same participants said they wouldn't opt for WhatsApp or Facebook plans that are seemingly tailored to their exact needs was surprising and counter intuitive. When probed about this apparent inconsistency, participants talked about the potential for an emergency that would force them outside of the WhatsApp-Facebook environment. The following quote is indicative:

Participant B:

"But what if there's an emergency?"

Researcher:

An emergency? Like what? You say you only use Whatsapp.

Participant B:

"Yes, mostly. But maybe once or twice a month, I need some information which only Google can give me…like the other day my sister needed to know results to her entrance exams."

Others echoed similar feelings. In fact, multiple participants used the word "emergency" in English (the use of certain English words interwoven with Hindi among native Hindi speakers is not uncommon). Most examples involved using search engines to find critical information—like addresses of institutions, examination or job results.

62 Statt, "T-Mobile Will Let You Stream Netflix and HBO without Using up Your Data."

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continued

In fact, after initially proclaiming that they used the Internet only for WhatsApp, when questioned about the WhatsApp plan they would volunteer instances where they had, in fact, used search engines to find crucial information. Although such occasions are rare, users appeared to value this ability especially in the context of information that you may not find elsewhere.

"Today many things you can only find through Google, so it's good to have the option otherwise you will end up behind in the race."

This particular quote is telling of a larger theme in the interviews—not having the Internet for information seeking was linked to the potential loss of economic prospects. The idea of the "emergency" makes sense particularly in the context of these participants having no other means of accessing the Internet.

Knowledge of WhatsApp and Facebook was present across participants, and all used at least one of these on a regular basis. These applications were the primary motivation behind the decision to subscribe to mobile data for the first time. WhatsApp, in particular, was referred to as a cheaper alternative to text messaging, as well as more entertaining due to group messaging and the ability to exchange photographs, videos, and music files. Facebook, too, was a way to connect with friends and even make new ones through "browsing profiles."

Despite regular use of these applications, it appeared that media content was, by far, the most prominent reason why Whatsapp or Facebook plans did not appeal to mature users. Mature users found tremendous value in the Internet as a source of entertainment. When I explained the Whatsapp plan, one user commented rather cheekily:

"Will they ever make Pagalworld free? Let that happen and then we'll talk."

The website www.pagalworld.com allows users to download Bollywood songs and videos—all unlicensed content (i.e., illegal) and free. Downloading provided the ability to not only consume, but additionally, store media content. For most participants the mobile phone was their first and only media storage device. Others spoke of downloading films through torrents and even watching them on their phone:

"The mobile data speeds in my neighborhood are usually terrible but post midnight they get much better. I usually put alarms for every two hours, through the night, to make sure the download is happening. By the morning full-length film is downloaded!"

Night-time downloading was a common and recurring theme in a majority of the interviews in this group. This testifies to the patience participants had in spending long hours to download media content. The idea of watching on a relatively small screen was not a factor that bothered these participants. The alternative was watching television with the family (which did not offer privacy or the chance to watch what they wanted) or go to the movie theatre (which was beyond their budget).

One participant usually subscribes to a plan for Rs.24 (37 cents), which has only three days of validity but no volume caps. He spends it on downloading media content:

"I'd end up spending 50 bucks going to the hall to watch a movie. Instead I can download 2-3 films at night on the 24 rupee plan and watch on the phone."

This was one of several instances where participants referred to the Internet as "saving" them money they would otherwise spend on leisure activities.

Some users reacted negatively to zero-rated plans simply because they are reluctant to give up the ability to explore and discover all that the Internet has to offer. One user had been using the Internet for a year now. He started with the most basic plan with three-day validity, just to make a Facebook account. In the last year, however, his use of Facebook has become ancillary to his other interests: downloading and "Googling." He would often see that Wikipedia was the first link when he googled something and then one day he decided to "figure out what Wikipedia was all about." Now he's a regular.

"Why would I want to be restricted? You see something you can click it and then click on something else. It's never ending. In a year, I've found many new things"

Other users are much less confident about their own ability. A 32-year-old man, just married, was gifted a data-enabled phone for his wedding. He decided he "might as well" get a data plan and see what the Internet was like. He uses only WhatsApp but has heard of YouTube, and says maybe someday he'll learn.

"I'm not tech savvy, quite an idiot with technology. But the other day my sister-in-law downloaded a song on her phone and then sent it to me on WhatsApp! And there I had it! It was a miracle—so maybe in time I'll also learn."

Demand side barriers
continued

Other users found the Internet to be characterized by unexpected finds. One participant recently migrated from his village in rural Uttar-Pradesh, he had heard that Google maps located any place:

"But my village wasn't on it. I asked a friend and he said that you can put your village on the map but I don't know how. I will learn how to do this."

Group 2: Why users responded positively to zero-rated plans

All but one who responded positively to zero-rated plans had two years or more of experience using the Internet on their mobile phones, had alternative means of accessing the Internet outside of the mobile phone and had high levels of clarity about billing practices. They said they were using zero-rated plans on a "trial basis." Four out of six had access to a computer and Internet connection at home, one had access to Wi-Fi at university and one had no alternative access at all.

The "outlier" of this group of responses (subject M) was a participant who had six months' experience using the Internet, had never heard of zero-rated plans, and whose only use of mobile data was WhatsApp.

These participants appeared relatively more well-off than those in Group 1, possibly in the upper half of the lower-middle demographic—as evidenced by their ability to install Wi-Fi and own computers. Their job descriptions included a clerk in a bank and a salesman at a premier car showroom.

These participants said their main use of mobile data was WhatsApp or Facebook, to chat or browse profiles. Occasionally they would use search engines if on the move. For all other activities, such as media downloads, games, work, writing up and sending documents, they said that using the computer was easier and quicker. One participant invested in an Internet connection at home a year ago, and finds that he has gotten used to "the larger screen, and Wi-Fi is much faster than 2G speeds." It no longer makes sense for him to use the mobile for downloading media content.

On the other hand, many admitted that WhatsApp had entirely replaced text messaging. Zero-rated plans "work out like an unlimited messaging pack" and it made sense to use them for that limited purpose. These participants were confident of their usage patterns. Most claimed that during the day at work they didn't have a chance to use the Internet for more than messaging anyway.

It appeared that they understood the risk of being billed for leaving the zero-rated plan. One admitted that it was easy to be confused or click on links but didn't seem to think this was reason enough not to get the plan.

"You make a mistake once, you wont do it again. I don't think it is such a big deal."

One participant was a WhatsApp-only user who said he had used Google once but never again and only got the plan for the limited purpose of chatting with friends and family from his home-town. His interest in zero-rating was purely based on price—if it was cheaper than his current monthly plan, he said he'd be interested since he never uses anything else anyway. His reasons for not using the Internet were skill-based, a junior police constable, he said he "didn't have time for much leisure anyway" and no interest in "jumping on the Internet bandwagon."

Overall the findings can be summarized thus:

- **Less experienced, low-income users prefer an open, unlimited Internet**. While they stated it was still early to conclude, marketing executives across telecom operators revealed there had been poor response to the Whatsapp/ Facebook bundles. Interviews with users echoed this rejection. The cheap Facebook/WhatsApp bundle was only attractive to those who had alternate means of accessing the "full" internet (i.e., those who had access at home or at university). For their mobile phones, they were happy to just have limited and cheap/free access. While those who didn't have alternate access forms and only had their phones wanted to experience the full Internet and didn't find the limited data bundle attractive. This puts into question the idea that for newer users social media is all they want from the Internet. Critically, this preference is strong enough for most to have rejected zero-rated plans in favor of all-access plans—even when the latter are more costly.
- **Other existing innovations in data pricing had been more successful in responding to the needs of these financially constrained users (compared to limited access/zero rated bundles).** The short duration (1 – 7 days), unlimited access plans appeared to be the most popular. Whether it was the person who wanted to put his village "on the map," quite literally, or the many young students who spent nights awake downloading and watching movies on their mobile screens, or the one who "discovered" Wikipedia through exploration over a few months. The next generation of adopters are young and curious about the ability of the Internet to materially benefit their lives. Limited access curtailed this ability.

Demand side barriers
continued

In other words, for these users "some access is better than none," but the trade-off they are willing to make is how much they use the Internet, not necessarily how much of the Internet they get to use.

- **Lack of clarity about billing was an important factor that emerged from interviews.** Those with low clarity on mobile data pricing complained that zero-rated plans would imply heightened risk of unexpected charges, a risk they were unwilling to take. Marketing executives corroborated that this "confusion" was one reason for the poor response. Even mature users who had this clarity seemed suspicious of telecom companies cheating users and falsely billing them without fault. In this context, restrictions only meant more confusion. Given that this is dissuading users from re-subscribing to these plans, this is clearly a situation where the Indian mobile operators are not helping themselves by leaving their consumers confused.

Gender and digital literacy

Research has suggested that socially structured gender roles often result in lower digital literacy and skills among women.[63] Indeed, a substantial body of evidence is building on gender inequality in internet access (Donner (2015), World Wide Web Foundation, (2015)/GSMA reports). This is both true for Internet access in general (i.e., irrespective of device) but also mobile Internet. As a result, a vicious circle can emerge where women have less access, and therefore able to develop fewer skills and digital literacy. However, this is a broad generalization with many contributing factors.

First, connectivity and access are different issues. Connectivity is technical, but access is social—and both are complex. In terms of connectivity—The recent World Wide Web Foundation's Women's Rights Online report (2015) finds that in a study of nine cities in nine countries—Cameroon, Colombia, India, Indonesia, Kenya, Mozambique, Nigeria, Philippines, and Uganda—women are 50 percent less likely to be connected than men in the same age group with similar levels of education and household income.[64] Yet connectivity is layered—the WRO report also finds that in slum areas of Maputo, almost six times as many women and men are online as reported in the national ITU average, and in Yaoundé, Cameroon, Internet use is triple that of the country as a whole—therefore, national statistics mask urban/rural differences.

Access too, is a different story. In a study of mobile use amongst female street traders in Kampala, Masika, and Bailur (2015) find that women often make the considered choice not to use their phone if they feel it will disrupt the relationship with their partner.[65] Fatuma, is a 32-year-old Muslim woman selling children's shoes on the pavement near St Balikuddembe market in central Kampala, who bought her first phone with borrowed money, but yet says "at home if you see that the phone won't make you free, it is better you stay without it. Because there are men who are full of anguish that he can demolish that phone the moment it rings because he does not know the caller number and then he tells you that if you want peace in the house, stay off the phone."

We must therefore take into account intersectionality—gender is not homogenous and we must take into account differences of age, income, race, class, urban/rural differences and so on. For example, Sambasivan et al[66] describe how in low- income areas of Bangalore—sisters, daughters and neighbors are the connectors to those less digitally literate, including the older generation. We need to know more about these "early adopters" and their pivotal roles.

Once women are online, cultural and religious norms in some communities can shape the type of access and participation women (especially, unmarried women) can have with digital services such as social networking.

Another area where we do not have enough insight is on cultural and religious barriers (or enablers) to access. In 2008, the Grace Network shared findings from 14 research teams in 12 countries, on ICTs women in Africa. Culture, religion, home/family demands were all key concerns and restricting factors.

63 GSMA, "Accelerating Digital Literacy: Empowering Women to Use the Mobile Internet."

64 World Wide Web Foundation, "Women's Rights Online: Translating Access into Empowerment."

65 Masika and Bailur, "Negotiating Women's Agency through ICTs."

66 Sambasivan et al., "Intermediated Technology Use in Developing Communities."

Demand side barriers
continued

In a survey of 900 mobile data users in Pakistan, 85 percent of men reported using Facebook, while only 47 percent of women did, while 45 percent of women used WhatsApp as opposed to 13 percent of men.[67] Interviews gave an insight into why—WhatsApp was seen as private communication, but Facebook too public for family and social norms. Equally, many of the men interviewed for the same research had multiple Facebook accounts—one for male friends, and another for family, which they explained was "to avoid their male friends being able to see family pictures –particularly pictures of women in their family." On the other hand, religious centers can enable access, as discussed in the context of Indonesia, but this may also shape the content being accessed.[68]

E-government initiatives as an Internet adoption driver

One of the ways of making sure that there is a strong demand side driver to encouraging take up of Internet services when they are made available is to encourage, or mandate, the adoption of e-government services. This methodology has been adopted before in Financial Inclusion, where using technology in the receipt of social payments has been used to encourage the take up of digital wallets, championed by multi-lateral organizations such as the Better Than Cash Alliance.[69]

Broadly speaking, when it comes to government as a driver for Internet uptake, the following four would be among the main areas that have an impact:[70]

- As a creator/provider of local content (e-government services and open data information).
- An enabler of non e-government content (supporting localization initiatives and content developers).
- Indirectly driving (forcing) digital literacy by availing a platform through which e-government services are delivered, compelling those who are not online to get online in order to access such services.

In addition to the above that directly relate to e-government services as a possible driver of adoption, governments' roles extend to other areas including formulating the right policies that enable adoption, subsidizing the cost of devices and services as well as investing in access and backhaul infrastructure.

Landscape of e-Government services in Africa

By the end of 2014, nearly all countries in Africa offered some form of e-government services at different stages of maturity ranging from basic information websites to interactive and connected services.

However, it should be noted that most of these initiatives do not expressly have Internet adoption as an objective, rather to serve internal government objectives such as availing additional channels for service delivery, reducing costs, increasing efficiency and integrating with internal e-government back end ICT systems.

Typically, the implementation of e-government services in Africa has followed three main paths:

- To avail information about services and open an online channel through which citizens can make enquiries, submit documents and interact at different levels with public officials.
- An increasingly important path has been one that focuses on revenue generating services such as applications (for passports, driving licenses, birth certificates, etc.), filing income taxes and customs duties, paying land rates, motor vehicle related revenues, among other services.
- Services that are mainly development oriented and focused on issues such as agriculture, healthcare, education, gender, and civic education. For the greater part most of these services have been implemented in collaboration with donors, the private sector and other partners. Some of these services expressly target marginalized segments of the population, including those in rural areas.

The first two services have largely targeted urban areas where population density and availability of connectivity allows access to these services. Further, a good number of these services are web-based with very few mobile-based services (based on USSD, SMS and applications for smart phones) despite the fact that the majority of users in Africa access the Internet via mobile devices.

67 Schoemaker, Emrys, "'Digital Purdah': How Gender Segregation Persists over Social Media."

68 Wahid, Fathul, Maung K. Sein, and Bjørn Furuholt, "Unlikely Actors—Religious Organizations as Intermediaries in Indonesia."

69 https://www.betterthancash.org/

70 United Nations, "United Nations E-Government Survey 2014: E-Government for the Future We Want."

Demand side barriers
continued

Barriers to e-government use that weaken the case for Internet usage (for the uncovered)

- Digital literacy and awareness.
- Devices and connectivity (and costs).
- Supporting infrastructure—electricity, postal addressing system (for delivery of documents).
- Corruption—implementation of e-government systems (especially those aimed at transparency) frustrated by public servants that benefit from corruption.

Disincentives to use government services (for those who are under coverage but elect not to connect)

- Lack of localized and relevant content.
- Poorly designed content (users cannot navigate or access the right information—UX issues).
- Erratic and inefficient services—websites down, content inaccessible, no responses to enquiries, etc.
- Perception of "window dressing" by government to improve its image.
- Concerns on security (hacking, data privacy, surveillance) and the absence of cyber security and data protection legislation.
- Cultural issues—preference for face-to-face interactions.
- Low levels of trust in online systems—especially where citizens have to provide personal information.
- Payment systems not fully integrated or interoperable.
- Content—static content and poor information (e.g., no open data on government expenditure, demographic information, etc.)

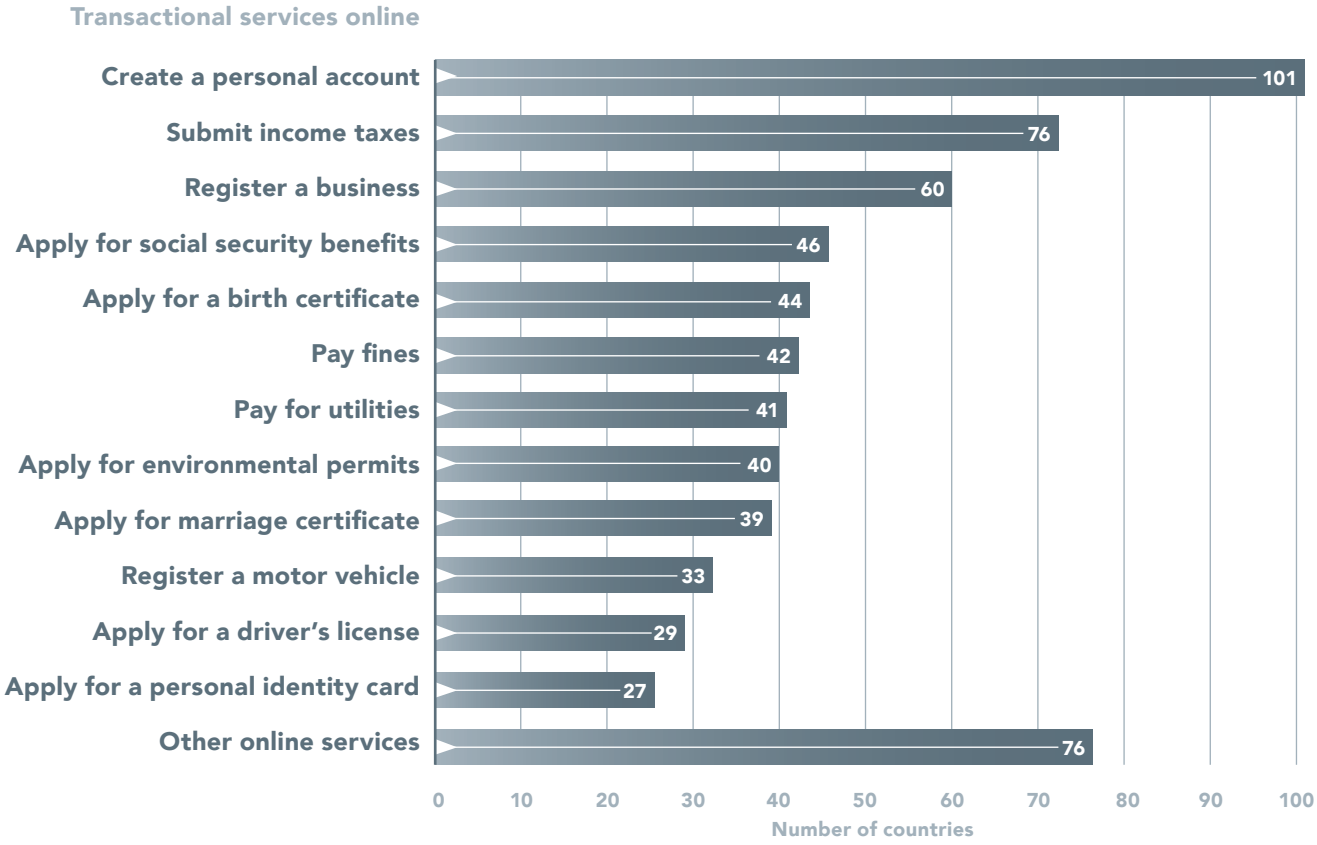
Uptake of e-government services

While e-government content can serve to increase usage and uptake of Internet services, this objective appears largely peripheral in national e-government strategies notwithstanding that increased usage can partly underpin the success of e-government service delivery.

Overall, there is scant information on the levels of awareness of such services, the levels of usage and what impact the introduction of these services has had on adoption of Internet. However, some governments, in a bid to increase uptake of e-government services, have adopted various approaches to ensure greater uptake, with some, these approaches directly addressing access barriers (connectivity and devices) and others relating to content and awareness.

In terms of access, a common trend is to leverage state-owned postal networks and post offices to act as front office service agencies (FOSAs) for various government departments. A good example can be seen in Kenya where the service, Huduma (Kiswahili for "service"), is being gradually rolled out at post offices across the country. Citizens can access a wide range of services including applying for passports, renewing driving licenses, submitting taxes, among others.

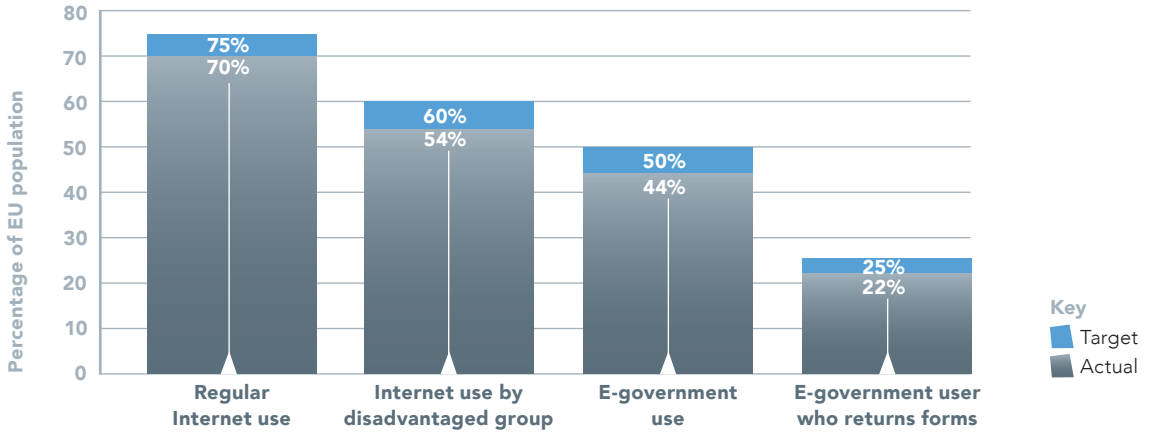
Demand side barriers
continued



Source: United Nations e-Government Survey 2014

Demand side barriers
continued

EU Digital Agenda targets and actual performance 2012[71]



Source: Based on data from: European Commission 2013: Staff Working Document, Digital Agenda Scoreboard 2013, Brussels.

High levels of Internet access do not mean high usage of e-government services.

Data on connectivity in the EU compared with usage of e-government services shows that despite relatively high Internet penetration levels (70–80 percent) actual usage of e-government services is around 35–40 percent.

According to a UNPAN report[72]

"e-government uptake rates in Europe greatly diverge among countries; with the gap between the best performing country (Iceland) with over 80 percent and the worst performing country (Italy) with less than 20 percent. Also, national usage rates of United Nations Member States at an advanced e-government development stage vary widely between countries. For example, in Romania, where only 10 percent of e-government users return filled forms, whereas 85 percent do in Denmark.

Further

"In Egypt, e-government service uptake is, however, very low; with only 11.3 percent of Egyptian households being aware of the existence of e-government services and only 2 percent of these households actually using these services (2012). The most commonly used services in Egypt are online payment of public utilities."

While the EU example demonstrates that higher Internet access does not necessarily translate into higher usage of e-government services, in the African context where physical delivery channels could be augmented, and where issues like corruption and the need for transparency need to be addressed, e-government as content that can drive adoption should be considered.

71 United Nations, "Expanding Usage to Realize the Full Benefits of E-Government."

72 Ibid.

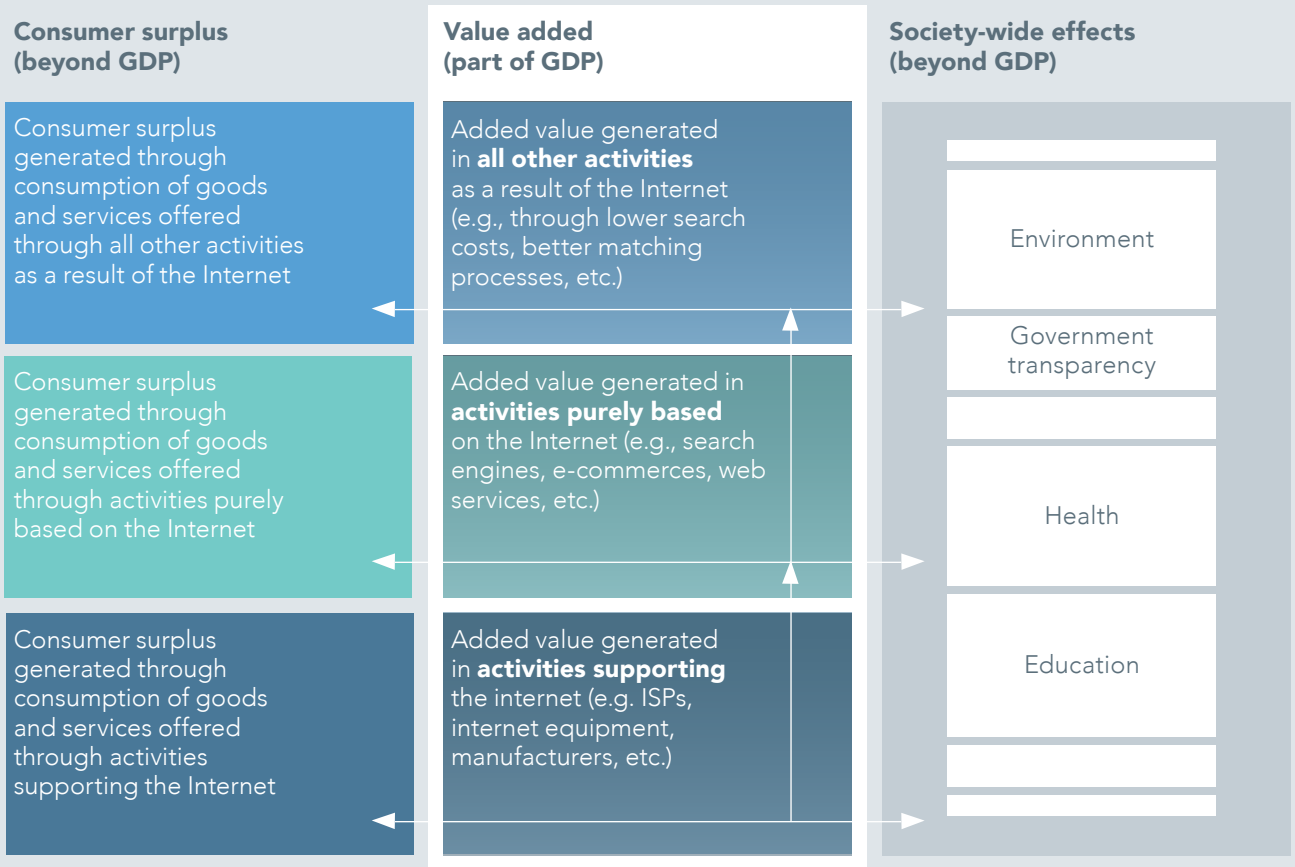
Measuring the impact of Internet access programs

For the past 15 years there has been a wealth of economic research looking to map the impact of the new digital economy. In 2014 the OECD prepared a useful literature review and syntheses of this research that provides us with a useful framework to consider the direct GDP impacts, the consumer surplus, and the societal benefits driven directly or indirectly from the availability of Internet services,[73] as can be seen in the figure opposite from their report:

Measuring the impact of Internet access programs

We will discuss the research into impact more broadly, dealing initially with research into economic impact and then looking for evidence of social impact from research literature.

Indirect impact of internet connectivity – OECD[73]



73 OECD. (2013), "Measuring the Internet Economy: A Contribution to the Research Agenda", *OECD Digital Economy Papers*, No. 226, OECD Publishing, Paris.

Measuring the impact of Internet access programs
continued

Economic impacts

The most quoted piece of research in this area is the work done by the World Bank in 2009 that stated that for a sample of 66 economies, a 10 percent increase in broadband availability has equated to a 1.2 percent increase in GDP.[74] This has probably become the most quoted statistic justifying the output of investment into mobile and digital programs by donors, appearing variously within industry literature from the GSMA and now also in literature from Internet players such as Facebook, who have updated the research with Deloitte and now claim that for every 10 people connected to the Internet one is lifted out of poverty.[75]

The evidence for these claims are now being questioned, with the more recent research in the World Bank's World Development Report 2016 suggesting that the evidence now often shows the converse of what was originally expected, and that productivity, income equality and democracy are potentially declining as mobile and digital networks take hold, rather than increasing as originally expected:

First, firms are more connected than ever before, but global productivity has stagnated. Second, digital technologies are changing the world of work, but also contributing to hollowing out the labor markets and a rise in inequality—most evident in the wealthier countries, though gradually spreading to developing countries. And third, the Internet facilitates broad discourse, but the share of free and fair elections is falling, even as the number of nominal democracies rises.[76]

The WDR2016 report calls for a more nuanced consideration of the economic impact of digital platforms, recognizing that without understanding how digital works with "analogue complements" it does deliver a "digital dividend", but that dividend is not equally distributed, and therefore may not contribute to overall economic improvement and GDP increases.

Caribou Digital's own research into the global flow of revenues within Google and Apple's app stores[77] shows that about 60 percent of all global revenues flow to four countries—the USA, China, Japan and South Korea. App stores—often figured as entirely meritocratic and open platforms—suffer from many factors that make it hard for those outside of these development centers to find an audience and develop a business. These factors include discoverability, the brutal Pareto principle that occurs within apps stores that means if you're outside of the top twenty apps within a store, your chances of even maintaining a small development operation with a couple of programmers reduces to almost zero.

This is even more pronounced in emerging markets, where structural issues—such as the inability for African developers to register for payments from app downloads as Google doesn't support merchant accounts outside of 60 largely developed nations—mean that even if the apps were discoverable, the developers would struggle to earn revenue from their usage.

74 Qiang, Christine Zhen-Wei, Carlo M. Rossotto, and Kaoru Kimora, "Economic Impacts of Broadband."

75 Truong, "Zuckerberg Says the Internet Lifts People out of Poverty, but Is Giving Them Subpar Access.

76 World Bank, *World Development Report 2016*.

77 Caribou Digital, "Winners and Losers in the Global App Economy".

Measuring the impact of Internet access programs
continued

Previous research[78] has pointed to outsourced digital work, such as coding or digital micro-tasks, can provide a revenue stream. But other researchers beg to differ. Mark Graham at the Oxford Internet Institute has researched global incomes on the "Odesk" microwork platform, and although he found large aggregate revenues inbound to countries such as Bangladesh, the Philippines, and India, when broken down into average salaries per worker they equated to around US$5k per year, compared to US$20–100k per year for Odesk workers in the U.S. Whilst cost of living indicators could argue that purchasing parity makes this huge income gap lessen somewhat, when we consider that the transport cost for the product of the labor—digital bits—is virtually zero, there is little justification for such a major disparity in income. If we continue to figure digital outsourcing as a cheaper option, we run the risk of recreating the issues the coffee, garment and other industries have encountered, and may even face a call for a "Digital Fair Trade" accreditation to make sure apps and services use labor which has equitable pay enshrined within it.

All of this research muddies the waters of the impact digital has to economic growth, and we can be less sure of the relationship between providing connectivity and GDP increases than perhaps we were. The WDR2016 report points the way forward, having faith that providing digital connectivity is a good thing, and can provide economic benefits, but only when managed and implemented with a clear agenda towards equity of access and revenue share.

Social impacts

Many would seek to formulate a collective understanding of the social impacts of Internet use in the Global South by distilling a series of causal formulations, that technology X does social thing Y, in context Z. Given the heterogeneity and scale of the Internet as a social phenomenon, each element in these statements is inherently, uniquely complicated.

To begin, the different conceptions of "internet" and "programs" make meta-assertions about programmatic interventions difficult to aggregate. On the "Internet side" As we detailed in the section on demand side barriers, there are many differences between basic Internet access (now available to the 85 percent of people living near a cell tower) and effective, skilled, sustained engaged use. There are different affordances between feature phones, smartphones, and personal computers, and between unlimited and metered connections.[79] The content and services and social connections available to an Internet "user" who speaks and reads a global language like English, French, or Chinese are demonstrably better than those available to users who speak thousands of "smaller" languages.[80]

Similarly, there is a spectrum of programmatic interventions, from efforts from regulators to promote competitive markets and/(or) universal service, through specific programs targeting vulnerable or marginalized populations, with subsidies, training, content, design, or social support.

78 Dalberg, "Digital Jobs in Africa: Catalyzing Inclusive Opportunities for Youth".

79 Donner, *After Access: Inclusion, Development, and a More Mobile Internet.*

80 Graham and Zook, "Augmented Realities and Uneven Geographies".

Measuring the impact of Internet access programs
continued

Meanwhile, those Ys—those impacts—are myriad as well. The "social" impacts of internet use are often at cross purposes, both within and between communities. Introverts may use the Internet to avoid going out. Extroverts may use a social app to find lots of new friends. Does the Internet "make" us go out or stay in? Activists might find new audiences, the police might find the new activists. Does the Internet "encourage" dissent, or threaten it? We're reminded of an old yarn that whatever one wanted to say about India (in all its massiveness) the opposite was probably also true.[81] The Internet is amenable to a similar charge.

Thus several sage voices approach causality carefully, at broad levels. For example, Barry Wellman suggests that the Internet affords "networked individualism", helping individuals more effectively manage the lives they want to live, rather than the lives their families, groups, clans, or communities might compel them to live.[82] Manuel Castells would call the Internet a boon for the forces of progressivism, affording agency and identity to movements and communities around the world.[83] In the development terrain, where there is a particularly acute desire to get to those (replicable, scalable) comments that X does Y in context Z, Kentaro Toyama builds on de Sola Pool, Titchener and McLeod, and other researchers, proposing we view internet and other digital technologies as "enablers" of human action and agency—accelerating and attenuating the complexity of human societies in multiple directions at once.[84]

"Does the Internet "encourage" dissent, or threaten it? We're reminded of an old yarn that whatever one wanted to say about India (in all its massiveness) the opposite was probably also true.[81] The Internet is amenable to a similar charge."

The societies in the previous sentence was intentionally plural, because the elusive causal statements that X does Y often are bounded by the Z of context; what "works" in Brazil may not work in Azerbaijan. The discussions of gender in earlier sections portray some of this variability, as well.

We think these general frames, echoed most recently in the World Development Report,[85] are particularly helpful in guiding policymakers towards positions where they can see both positive and negative.

81 *The Economist*, "Contrary India" http://www.economist.com/node/5133493

82 Wellman, "Little Boxes, Glocalization, and Networked Individualism".

83 Castells, Manuel, *Networks of Outrage and Hope: Social Movements in the Internet Age, 2nd Edition.*

84 Toyama, "Technology As Amplifier in International Development.

85 World Bank, *World Development Report 2016.*

Measuring the impact of Internet access programs
continued

Without these frames, policymakers are caught between two frustrating partial views. The first is to subsist on statements so vague that they are unconnected to causal processes on the ground, such as the great assertions that an XX percent rise in Internet use will cause a YY percent increase in GDP. Or that the Internet facilitated the great social upheavals around the Arab Spring. We're NOT suggesting these are not the case, but cautioning against closing the books too early on these issues. Neither statement directly addresses the role of technology in addressing inequality, or marginalization, or entrenched poverty; returns (economic and social) in both formulations may reside with urban elites not the rural poor.

The second is to elevate contextually specific instances to axiomatic status. Nothing typifies this second approach more totally than the curious case of the Keralan fishermen.[86] Jensen's great paper offered a new and elegant real-world natural experimental support for the law of one price—that for a certain set of fishermen in Coastal India, the arrival of cell towers reduced price heterogeneity, reduced waste and increasing both profits and customer surpluses. But the development community (and cell phone industry) seized on this study, and those fishermen became stand-ins for all market actors, everywhere. Subsequent studies with different communities in the same location (poor fishermen, women) and in adjacent communities in Kerala and Karnataka suggest the experiment might have been more contextually bound then its boosters might have hoped.[87]

The field desperately needs more studies, not just of fishermen but of people representing different structural positions in value chains of production, and in the cultural processes of meaning-making and agency. Careful meta-reviews and theory may help make the most of the evidence base we have, a base that is growing all the time, but there is a need for more research, at scale, to explore whether we can go beyond the general approaches outlined above.

"The field desperately needs more studies, not just of fishermen but of people representing different structural positions in value chains of production, and in the cultural processes of meaning-making and agency."

86 Jensen, "The Digital Provide".

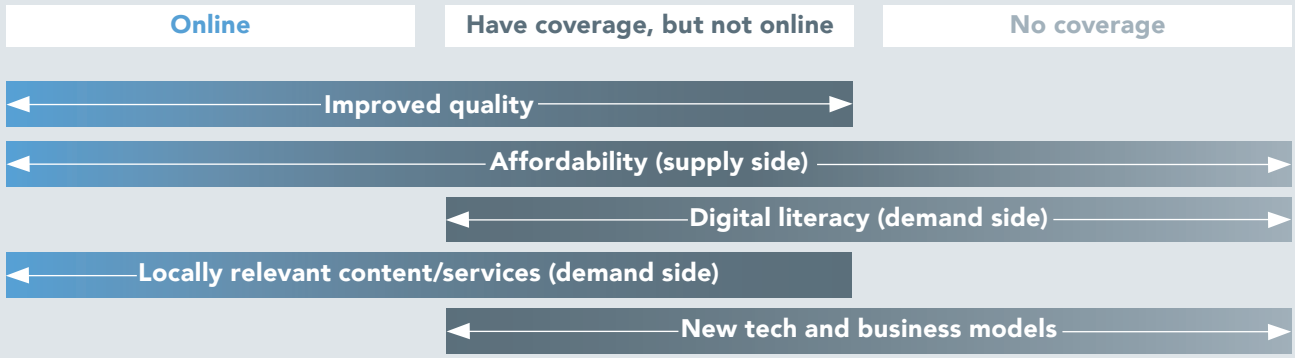
87 Steyn, Jacques and Mohan Das, "Claims of Mobile Phone Use by Kerala Fishermen Not Supported by Fieldwork"; Srinivasan and Burrell, "Revisiting the Fishers of Kerala, India".

The role of the donor community in addressing these barriers

The role of the donor community in addressing these barriers

Addressing the end-user barriers

During the expert interviews for this report, Ann-Mei Chang, the Executive Director of the Global Development Lab at USAID,[88] proposed the following methodology to consider the role of donors in addressing access barriers:



This is a useful way of developing donor strategies to addressing the supply and demand side barriers discussed above.

Driving the adoption of e-government services

Among the issues for consideration to take e-government to the next level and nurture greater adoption include:

- More focus on delivering mobile-based e-government services. At the outset using SMS and USSD and gradually, as citizens become used to these channels, moving to mobile and Internet-based systems. Currently the majority of e-government services are not optimized for mobile.[89] For the portion of the population that have access but lack compulsion, this can help drive adoption.
- Focus on e-government services in rural areas that address issues such as poverty reduction, job creation, gender equality, and informal business support. Such services should be preceded by grass-root awareness campaigns on the availability of such services as well as the benefits that accrue to rural communities.
- Avail more open data to ensure greater citizen participation and visibility of what the government is doing. Open data can also be leveraged for research, education, and marketing—and for the latter this is something that can be monetized by individuals seeking to utilize market information to position products and access specific markets (e.g. agriculture information, demographics, etc.)
- Make ease of use a priority including the interface (user experience), ability to access the right information, use of a central registry to avoid duplication of data entered. Those currently connected are underwhelmed when they cannot find the right information or when Web sites are inaccessible, thereby preventing them from repeat visits.
- Emphasis on more localized content. For the better part across sub Saharan Africa most content is in English, French, or Portuguese. Governments should consider delivering some essential services in second and third widely spoken languages, especially for rural areas.
- Support the implementation of Internet Exchange Points (IXPs) to keep traffic local and partly address the cost of bandwidth. This also addressed the end user experience in terms of speeds and availability.
- e-government portals with simplified dashboards that allow quick access to services.

88 https://www.usaid.gov/who-we-are/organization/ann-mei-chang

89 "While most governments have introduced e-government services in the developing countries, optimising the websites for mobile usage and making them easier, faster and more intuitive to use still remain the key challenges in increasing their usage." (GSMA Intelligence 2014, 26)

The role of the donor community in addressing these barriers
continued

Addressing gender issues

Donors can look at addressing what are chronic gender disparities in access to, and participation on, digital platforms in a variety of ways. Many programs have addressed the supply side, such as the GSMA's mWomen program[90] which has worked with mobile operators to make sure that supply channels take gender issues into account, for instance by creating female vendors in countries where it is unacceptable for women to buy in a shop from a male sales assistant. We have concentrated below on what we consider to be a synthesis of current approaches and needs:

- Genuinely think about and prioritize gender in ICTs—not just as a tick-box exercise—because evidence has shown that women are often the best channels of information (in health, education, and so on) and have most to gain from profiting in small businesses in which ICTs play a large role (for example, the Grameen Phone ladies[91] in Bangladesh). Mapping the proven gains and ascertaining the actual barriers are the first challenges.
- Differentiate between connectivity and access. Women may have connectivity (e.g., have a mobile phone) but may be afraid to use it or be prevented from doing so (access). Both need to be researched—what are the barriers to connectivity? What are the barriers to access? Gender and ICT literacy is not just about women—it is about the whole ecosystem, including researching and addressing male attitudes towards the females in their family having internet access, ICT education at school level, and broader male/female roles in the households.
- Think about and investigate intersectionality in gender—gender is not a monolithic entity. In theory, women should help other women but lack of willingness to teach others or share is gender neutral—what may prevent and/or encourage women from sharing information/knowledge about ICT access with other women?
- With increasing use of non-text based media (for example, pictures, Instagram feeds, shared WhatsApp images, videos, etc.), invest major resources into how these are influencing young women, particularly 15-24-year-olds with issues such as peer pressure, self-esteem, and bullying.
- After conducting scoping studies, invest in training courses or materials on how children/youth can help older female family members (e.g. mothers/aunts) in learning how to use ICTs such as mobile phones. What kind of context-specific terminology/teaching methods are already being used by children to help their challenged older female family members? How can they be scaled, and made simple and accessible as an aid for these children as intermediaries? What partnerships would technology companies have in this? Return after a period of time (six months?) to assess the effectiveness of this semi-formal training.
- Deploy a wide range of research methods from randomized control trials to focus groups and ethnography to reach a broader understanding of findings—surveys are valuable for broad sweeps of insights but may not be the most effective to build rapport and obtain a granular, in-depth understanding.
- Follow the stories, particularly building on our Digital Lives research, of a small number of women who have used WhatsApp for job-seeking (as we found this the most used social media for job-seeking). What did they do, how did they do it, what was the critical success factor?
- Assess the proven gains/wins of ICT access for women versus the negative side. Is the desire to improve their lives—a better job, relationships, travel, relocation from rural/urban, between different cities or out of the country—a positive, driving force or damaging to their lives?
- Research religious affordances and barriers to women adopting ICTs. Again, one of the findings in Caribou Digital's Digital Lives research[92] was the use of social media to share inspirational, religious sayings. To what extent could religion be empowering (in the sense of sharing quotes and so on) but also present challenges?
- A new but timely and very much needed field of research—what are the economic and social gains of business and sales for women through online platforms such as WhatsApp, OLX and so on? Again, evidence from our Digital Lives research showed use of these for small-scale income gain, such as selling shoes, and desire to sell more (home-made products), but there is insufficient research on this. The benefits may not necessarily be purely economic. One researcher from Sudan, looking at online sales from women in Sudan states "the social aspect of the business turns out to be more important as it helps distract them from the social isolation of being a housewife."[93]

90 http://www.gsma.com/mobilefordevelopment/category/programme/connected-women/

91 Cohen, "What Works".

92 Caribou Digital, "Digital Lives in Ghana, Kenya, and Uganda".

93 Steel, Griet, "The World in Your Hands".

The role of the donor community in addressing these barriers
continued

Addressing the regulatory barriers

	Main policy and regulatory Issues	Key stakeholders	Suggested actions and outcomes
Spectrum and licensing	No clear policy on use of unused and unlicensed spectrum for under-served areas No policies or guidelines on TV and GSM white-space spectrum in underserved areas Absent, unclear, arbitrary or slowly evolving policies on rural access	African Telecommunications Union International Telecommunications Union National and Regional Regulatory Authorities, ICT Ministries (via RECs)	**Suggested Action:** Engage regulators to review current access gaps and underscore how unlicensed (and unused) spectrum can close last-mile gaps. Leverage strong case studies (e.g., Rhizomatica) to share on what other regulators are doing and the positive impact on rural access **Desired outcome:** Framework for allocation and unlicensed spectrum in rural areas

The role of the donor community in addressing these barriers
continued

	Main policy and regulatory Issues	Key stakeholders	Suggested actions and outcomes
Universal Service Funds	Rural access gaps still exist in terms of last-mile access USF mostly used for services, devices (shared access centers) and some applications (and not core access infrastructure) Lack of alignment and collaboration with MNOs and other players when seeking to close access gaps. Government USF initiatives to address health, education, government service delivery, and business opportunities not supported by basic prerequisites (electricity, literacy, devices)	National Regulator Mobile operators Ministry of ICT Parliamentary ICT Committee	**Suggested Action:** Engage stakeholders to review the success (or lack thereof) of USF usage and explore how to support new access models via subsidies and PPPs **Desired outcome:** Framework to prioritize new access models (including waivers on spectrum licensing for community networks)
Taxation	Cost of devices and services Cost of equipment (impacts operator and other players coverage ability) and impacts cost of end user services	Parliamentary Finance Committee Ministry of Finance Ministry of ICT	**Suggested Action:** Workshops and research to engage stakeholders in discussions around the benefits of removal (or lowering) of import duty and VAT on devices and network equipment. Further, removal (or lowering) of excise duty on airtime and mobile money transactions **Desired outcome:** Lower cost of devices, services and infrastructure roll out.

The role of the donor community in addressing these barriers
continued

	Main policy and regulatory Issues	Key stakeholders	Suggested actions and outcomes
Infrastructure (last mile and backhaul)	Shift from competition models for network investment to collaborative model to ensure greater coverage. Government subsidies for national backhaul (as a utility like power)	Ministry of Planning Ministry of Trade and Industry National Investment Authorities Ministry of ICT	**Suggested Action:** Promote discussions that seek to institute a separate infrastructure framework for rural areas. Include PPPs (government, MNO + donor/community) as part of the model **Desired outcome:** Framework within which both governments and operators actively support innovative ways to address rural access via backhaul and last-mile access subsidies or access to existing networks

Whereas the above table suggests country level engagement, other avenues exist to address multiple countries and stakeholders at once including Regional Economic Communities (RECs) like EAC, ECOWAS, and SADC as well as Regional Regulatory Authorities (RRAs) such as EACO, WATRA, and CRASA. By using these platforms, donors can expect to achieve faster consensus building among different stakeholder groups.

Thus donors could seek to be involved in the events organized by these bodies and initiate the suggested actions. Further, alongside existing events, donors can host parallel workshops for capacity building, awareness creation, and sharing case studies of various best practices.

It is strongly suggested that prior to such engagements with stakeholders, that donors undertake deep dive research into the respective areas (e.g., rural access gaps and success of USF, impact of taxes on uptake, etc.) and understand the current state of play in order to present factual positions to the stakeholders.

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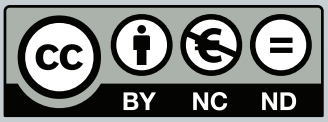

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