



# CONNECTING THE FUTURE

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## Digital Enablement:

Bridging the Digital Divide to Connect People and Society



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# Executive summary

Like air and water, connectivity has become so pervasive that it is weaving its way into every aspect of life. A Better Connected World is taking shape – it is destined to profoundly influence every individual, organization and industry. Today, for both developed and developing countries, the availability of powerful technologies – such as mobile broadband, cloud computing, Big Data and the Internet of Things – is redefining the opportunities for the haves and have-nots. Everyone and everything is connected: between businesses, between people, between people and things, and between things, Huawei is committed to building a better connected world and is driving this concept forward to turn it into reality and bridge the digital divide.

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New technologies possess extraordinary power to transform, empower and do good, improving lifestyle, economic growth, and social development; empowering people and transforming communities

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New technologies possess extraordinary power to transform, empower and do good, improving lifestyle, economic growth, and social development; empowering people and transforming communities. Since 1987 Huawei has worked relentlessly with our customers to overcome digital divides, narrowing differences in access to connectivity, digital services and tools across the world. By building more than 1,500 networks in 170 countries we've brought affordable Internet connections as well as smartphones and enterprise services to people across diverse economies, and helped provide more than a third of the world's population with access to digital services.

More than 87% of the world's population is within range of a mobile signal<sup>1</sup> (55% for 3G networks)<sup>2,1</sup> though there are still up to 1 billion people<sup>3</sup> unconnected to any form of telecommunications. An even greater challenge is that still only a third<sup>2,2</sup> of those living in emerging economies use the Internet - compared to eight out of 10 in developed economies. There are at least six key barriers, one of which is the lack of digital literacy – the ability to use digital tools with purpose and fluency. Typically a concern in developed

markets with groups such as the elderly or the lower income, it is now being recognized as a major issue in developing markets too. In a survey carried out by McKinsey, the top reason given by African consumers for not accessing the internet is not lack of access itself but lack of digital skills.

Why does this matter? Bridging the digital divide can deliver many things to different people - some will benefit from better access to healthcare, others will enjoy safer transport, profit from greater productivity or cherish improved education, thanks to wearable technologies, connected sensors, and mobile video, among others. The fact is that a lack of digital awareness and skills means that many underserved communities still remain oblivious to the digital tools available to them, or don't know why (or how) they should use them.

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Up to 1 billion people are unconnected whilst only a third of those living in emerging economies use the internet

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<sup>1</sup>Measuring the Information Society Report, 2014, ITU. <sup>2,1,2,2</sup>Digital Inclusion, 2014, GSMA. <sup>3</sup>Estimate based on ITU and GSMA data.

## Key barriers

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One thing has become clear during our research: access is an important, but only small, part of the equation. There are four key aspects to digital enablement: availability, affordability, appetite and ability. Within each of these there are important nuances but we identified six key barriers to be addressed:

1. The capability of a network connection as well as basic physical access
2. Cloud applications and services that meet locally relevant needs
3. Business models for successful solutions must increase the value of being connected as well as reduce the costs
4. A lack of awareness of the benefits of the internet and a growing fear of using the internet and some of its applications
5. Serving those with restricted abilities and impairments
6. Digital literacy.

need to overcome a set of common execution challenges: for them to be truly effective, they need to be replicable and scalable; they need to deliver measurable results to be sustainable; and they need to leverage strategic partnerships. Too often, solutions are failing not because they are not tackling the relevant barriers but because they do not address these execution challenges.

## New challenges

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As more networks are built, and internet connections and smartphones become more affordable, digital divides are narrowing. But at the same time they are becoming deeper and tougher to bridge, as a report by the Economist Intelligence Unit warned in 2013. The power of new digital technologies means that dramatic changes in how people, communities and industries operate can happen almost overnight.

disadvantaged, increasing social inequality and turmoil.

Building on Huawei's extensive interactions with customers, employees, governments, social enterprises and many other stakeholders, this report reflects a group of strategic recommendations in executing digital enablement solutions (see page 17). Addressing the aforementioned execution challenges to overcome the six key barriers to digital enablement requires taking the same approach that brings successful commercial digital products and services to market.

- **Ideation:** In the solution development process ask the right questions, understand existing solutions and standards, be crystal clear on the role of ICT, work out your business model, and identify your strategic partners;
- **Prototype and pilot:** Stress test business models according to quantifiable metrics, pivot where necessary, and pinpoint your value;
- **Launch and scale:** Plan for mass rollout from inception, make solutions valuable, and partner strategically to develop replicable scalability;
- **Manage and retire:** Consider lifecycle management from the beginning, build a sustainable ecosystem, and prepare for the next opportunity.

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“The problem is that while the [mobile for development] sector has enjoyed continued growth in the number of services over the last 5-7 years, scaling up services still proves to be a challenge and sustainable business models continue to be elusive.”

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### Scaling Mobile for Development, GSMA, 2013

Some barriers will be more prevalent across certain population segments (lack of access will impact rural communities the most whilst lack of digital literacy is more likely to hold back the elderly or those with disabilities), and this will dictate which digital enablement activity is most urgent. Local political, economic, social, legal, environmental and demographic factors have a strong influence too. But whatever the activity, all digital enablement solutions

This also means that the difference between those without access to such technologies is even more dramatic and it's more difficult to catch up as others speed ahead.

We face a stark choice. Enabled by technology, disadvantaged groups can radically improve their lives and contribute to a better society. Or, unable to benefit from technology, these groups become more economically and socially

## Conclusions

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Precisely because the digital divide is deepening between the digitally enabled and the digitally excluded, it's never been more urgent to provide digital enablement. The power of digital technologies to transform the lives of people and communities is now so great that governments,

regulators, the technology industry and business leaders need to work together to break the barriers causing the digital divide and meet the challenges of scale, value and building working partnerships.

- **Divides are getting deeper.** Powerful new technologies have the potential to create unprecedented digital divides almost overnight creating even greater separation between those with and without access or the skills to exploit them.
- **Business models that create value are critical, even if what's on offer is 'free'.** Poor and disadvantaged groups often targeted for digital enablement should be treated like any customer. They need to be convinced that they can benefit in order to "invest" in a digital enablement solution, whether it actually costs them money or not.
- **It's time to shift from ideation to a focus on scaling-up.** Digital enablement solutions need to run

on market principles. They must be built for scale and industrialization.

- **Everyone wins when value is delivered, but the understanding of value also needs to change.** Better outcomes result when everyone has something to gain from digital enablement, but gain is not about raw financial returns, it's about delivering benefits across people and communities.

## About this report

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This report is the result of many conversations and ideas, and it reflects many different opinions. It discusses Huawei's global experiences and the views of more than 150 thought leaders who shared their insights during an extensive program of interviews, surveys and seminars conducted around the world. This report is structured to reflect:

- Why digital enablement is a worthy goal and the urgency of bridging the digital divide.

- The key barriers to achieving digital enablement.
- The main challenges to executing successful digital enablement solutions.
- Which strategies work and what pitfalls to avoid.

Throughout we provide example of interesting solutions around the world, and in the appendix we provide more findings from our research into the barriers as well as the country-specific situations. We also would like to thank those listed who contributed to our research (see Appendix 3).

Not least, we hope that the contents inspire you to join us and our partners in Building a Better Connected World.

We welcome feedback and comments on the white paper to [digitalenablement@huawei.com](mailto:digitalenablement@huawei.com)

# The urgency of digital enablement

At the beginning of the 21st century, public technology policies focused on solving the communications access problem: physical network access as well as the affordability of using a device and network. The digital divide refers to the unequal ability to access and use ICT. These are still concerns, but today's challenges are more complex.

Secondly, the quality of the applications and services increasingly matter. The network and device only exist to provide services to users—from simple voice or text enabling communications between people to advanced data-based services enabling a better and more productive life. But a lack of locally relevant, quality and accessible services for many users is limiting the

In this white paper we use the term Digital Enablement to describe the result of benefitting from ICT, with the purpose of overcoming the gap between the individuals, communities and economies that are digitally enabled and those who are not.

Connecting those who are unconnected or unable to use their connection is just the first step towards bridging the digital divide. Creating increasing value from that connection through providing people and organizations with relevant skills and services is the second necessary step towards digital enablement and without this the digital divide will actually deepen.

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“Mobile-cellular and Internet penetration rates have grown strongly, but the digital divide between the rich and the poor is growing... The digital divide is particularly pronounced with respect to Internet use and quality of access.”

**The Millennium Development Goals Report, 2015, United Nations**

Firstly, the quality of the network and device increasingly matters. There is an increasing divide between those with a slow 2G connection and those with a fast 4G or fixed broadband connection; those with a feature phone and those with a smartphone. This divide is growing rapidly as typically urban areas and developed economies invest in faster internet speeds. In the future, it may be those with a connected health device and those without.

benefits they can achieve through digital technologies. These are often the very people that could most benefit from these services: those who do not have quality education or healthcare systems, those with poor infrastructure and geographic difficulties, or those with poor eyesight, hearing or mobility. Though not always necessary, many services are built for—or operate best with—high internet speeds.

## The digital divide is getting deeper

In fact, a report by the Economist Intelligence Unit in 2013 commissioned by Huawei found that the divide is getting deeper. It may be narrowing (with less people as far behind as a decade ago due to the growth of mobile networks, smartphones and a plethora of local services in particular), but it is also

certainly deepening. The ITU estimates there are still 1 billion people not connected to a telephone at all, and an additional 3 billion people not connected to broadband internet<sup>4</sup>. Due to a number of positive trends (see Appendix 2), more people are connecting every day, particularly in

Huawei has seen such technologies radically change how humans interact with each other and with their environment. But with such extraordinary scope for human impact, there's an even greater risk of isolation if these increasingly powerful digital technologies aren't

social, economic and environmental benefits for those who are a part of it. But for those individuals, communities, villages, cities or even countries that may not get to that future, the picture looks bleak. Gaps in life expectancies, skills, economic growth, and productivity with their better connected counterparts will grow dramatically.

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“Vodafone examined the potential of mobile technology to positively impact farmer’s livelihoods across their markets and found they could increase agricultural income by \$180bn; they also estimate 1.8 million Disability Adjusted Life Years (DALYs) could be avoided by using mobile in tackling maternal health complications and new mobile solutions could increase workers’ livelihoods by US\$7.7 billion by 2020”

**Vodafone Connected Farmer, Connected Women and Connected Worker reports**

developing markets, but even by 2020 GSMA expects that around 48% of the population<sup>5</sup> will still be offline. It is those people that are getting further behind and thus not benefitting from life changing services.

Used to their full potential, digital technologies such as mobile broadband, cloud computing, big data and the Internet of Things can help address the most pressing human challenges, enrich our lives, and stimulate commerce improving the health of the poor, supplying knowledge to the ill-educated and enhancing productivity for the busy.

Huawei’s Global Connectivity Index finds that a 20% increase in ICT investment will grow GDP of a country by 1%. The ITU has shown that there is an important relationship between ICT development and other development indicators in developing countries<sup>6</sup>.

available to individuals and to society at large. Imbalances can now emerge extremely fast as digital technologies become easier to deploy for some, but many will be left behind either because they cannot access these new technologies - or even if they can – will lack the skills to benefit from them.

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“It will be essential to address the widening digital divide. Only then will the transformative power of ICTs and the data revolution be harnessed to deliver sustainable development for all.”

**The Millennium Development Goals Report, 2015, United Nations**

In our Global Connectivity Index report, we look at the potential of a better connected world in just 10 years from now with connected vehicles, connected infrastructure, connected citizens, connected healthcare and more. This is a future that can bring tremendous

A quantum leap for one group of new technology adopters means that non-adopters are now further behind, and it is becoming even more difficult to catch up. This is not just an issue for rural areas of developing countries; in developed countries anywhere between 5-15% of adults are still not online—they are at a tremendous disadvantage compared to their peers. In these countries—as will also be the case in developing countries—it is often specific groups that are missing out: the elderly, poorly educated, or low income as well as those who find the internet physically difficult to use. This is important as often these are the groups that could most benefit from the Internet;

it can help overcome the existing physical or social challenges these groups face. We need to redouble our efforts to bring them into the connected world.

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<sup>4</sup>ICT Facts and Figures, 2015, ITU. <sup>5</sup>GSMA Intelligence. <sup>6</sup>Measuring the Information Society Report, 2014, ITU.

## A Collaborative and Urgent Effort is Necessary

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Competition is healthy and necessary to develop solutions, but at the same time coordination and alignment are important to speed up progress and reduce the divide. Targeted and planned efforts are necessary for those who are digitally excluded.

Whether it is setting policies, coordinating approaches, setting standards, developing technological solutions, rolling-out services, measuring impact, or outreach to consumers, there is a role to play for

governments, nonprofits, academics, ICT companies and the broader private sector.

5G networks, the internet of things, advanced cloud analytics and more to everyone, no matter rich or poor,

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A study in one region of the UK sought to quantify the social benefits from superfast broadband: it estimated benefits from telehealth of up to 16.9m GBP, 9.1m GBP from online learning, and up to 27.1m from moving just 5-10% of excluded individuals off benefits and into employment using teleworking<sup>7</sup>

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It is urgent that we take action now before it becomes even harder to reduce the divide. The next 5 years represent a crucial opportunity to bridge the gap. To bring the power of

young or old, urban or rural, male or female. There is much to be done and it is imperative we do it together, quickly, and effectively.

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<sup>7</sup>Net Gain: The Value and Impact of Superfast Broadband in Cheshire, Warrington and Halton, Regeneris



# Key Barriers to Digital Enablement

Supplementing the more than 100 interviews we did across the World, was a quantitative assessment of the barriers at a country level (see Appendix). What is clear is that the relative importance of each varies a great deal between countries as well as within countries and even within households. The supply and use of technology is highly dependent on the local political, economic, social, legal, environmental and demographic factors.

We cannot only focus on the availability of the connection, the affordability of the device, or the usability of a service. If one thing became clear during our research it was the nuances and complexity of closing the digital divide. But not only is each country different but each consumer and each enterprise is different so we must seek a deeper understanding of the barriers to digital enablement.

## Understanding the barriers to digital enablement

To do this, we identified four overarching barriers holding back consumers from digital enablement, each with two components. These are:

- **Availability:**
  - 1) access
  - 2) capability
- **Affordability:**
  - 3) value
  - 4) cost
- **Appetite:**
  - 5) awareness and desire
  - 6) fear
- **Ability:**
  - 7) digital literacy
  - 8) individual restrictions

We reviewed each of these 8 barriers across the physical network connection (the network connection

level), the device that connects to the network (the device level), and the applications and services that are provided on or through the cloud (the cloud applications level<sup>8</sup>), providing an assessment of all 24 specific barriers (see Appendix). We encourage readers to read this in depth, but here we summarize the 6 key barriers.

### 1. The capability of a network connection as well as basic physical access

Availability is not only about physical access—where there has been great progress in recent years—but also the capability of that access.

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One billion people still don't have access to basic telephony

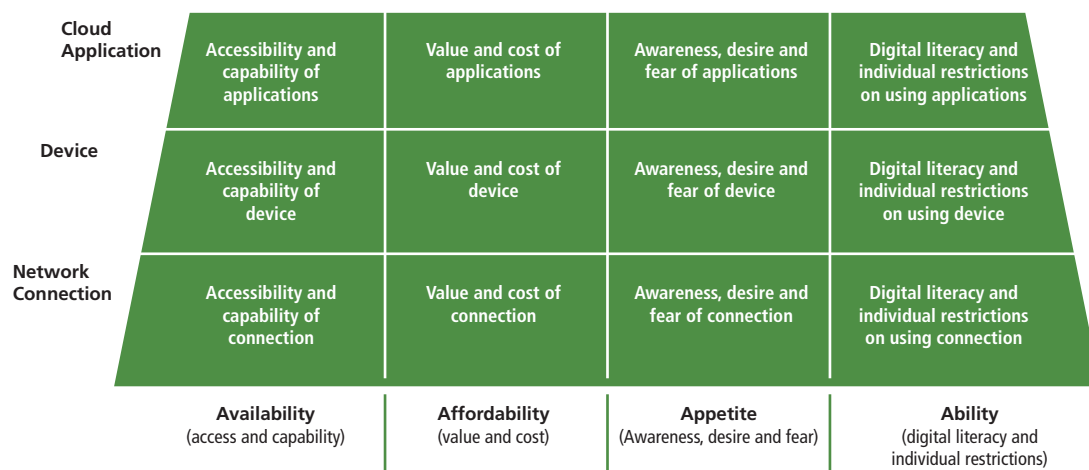
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Around 13% of the world's population still live out of range

<sup>8</sup>We use the words cloud applications in this report more than service, as the word service may be confused with customer service or general service provided to support networks or devices. Here we specifically mean applications and services that utilize a network and device to add additional value to a user. <sup>9</sup>Measuring the Information Society Report, 2014, ITU.

**Fig. 1: The barriers to Digital Enablement**

There are four main barriers to digital enablement: Availability, Affordability, Attitude and Ability. To achieve digital enablement, each of these barriers needs to be addressed at three levels: of the network connection, the device and the cloud application



Source: Huawei

of a mobile network connection<sup>9</sup>, however the key barrier is the lack of a capable network which has a reliable power supply, consistent access, high speed, and low latency. An accessible, capable network connection is fundamental to digital enablement. The availability of high speed networks and advanced capabilities of ICT in more densely populated areas is arguably making the digital divide wider.

**2. Cloud applications and services that meet locally relevant needs**

There are now close to 2,000 services specifically providing development benefits over mobile phones, according to GSMA. But many of these services are not accessible or are not providing the capabilities that many consumers need which is a major barrier. Locally relevant content in local languages is part of the solution to providing a capable service meeting consumers' diverse needs. Women and girls are a large and often

disadvantaged group that frequently are unable to access traditional services or who need services specifically to meet their needs.

**3. Business models for successful solutions must increase the value of being connected as well as reduce the costs**

Many solutions are unsustainable because they do not generate revenue, and free solutions often suffer from a lack of ownership or take-up among consumers. Solutions do need to provide services that are valued by end-users or other customers but they must also find a way to pay for the solutions. Increasing the value provided is one option, so consumers are willing to pay for them; another is to reduce the costs or make the costs easier to afford such as by spreading payments out over time. There needs to be a business model for how a solution will be paid for and cover its costs. If a service improves a

user's economic situation or meets a pressing need, no doubt the user can then afford the service or find a way to. Furthermore, by not being razor-focused on value for end users, too many solutions focus only on the technology and not the situation it will be implemented in or what else is needed alongside it for the technology solution to succeed.

**4. A lack of awareness of the benefits of the internet and a growing fear of using the internet and some of its applications**

There are many in developing and developed countries who are not interested in going online, and even more who only use a few online services due to lack of awareness of the benefits of other services. And for some, such as the elderly, getting people online is only the first step. The real challenge is keeping them active online. But security and privacy of information over networks and on

devices, and the use of data by service providers are increasingly mainstream concerns for users. Increasingly certain groups of users are not willing to share information such as health, or may not trust service providers with financial details. Many users also worry about children seeing unsafe content, the sending of hate messages, stalking or cyberbullying.

### **5. Serving those with restricted abilities and impairments**

Using a device can be a major barrier for many; though there are some customized devices and user interfaces that can make this easier they are not available to all. There are major barriers for many disadvantaged groups to use the majority of the services online—not least the ability to read the online content for the 700 million

illiterate adults—though Natural Language Recognition services and new device technologies may offer valuable solutions particularly if they become available in local dialects and languages. Those with restricted abilities such as the physically or mentally disabled, many elderly, or

that the top reason<sup>10</sup> Africans do not access the internet is a lack of digital skills. Some successful solutions have been rolled out in developed countries but there are few addressing this in the developing world where it may be even harder to solve due to cultural and literacy barriers. Meanwhile those

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## Digital literacy remains a major challenge

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the illiterate are a major underserved group, yet one that could benefit tremendously from ICT.

### **6. Digital literacy**

For many new to smartphones with a plethora of icons, not only can they be hard to navigate but also bewildering and can scare some people off using their device.

A McKinsey survey in 2013 found

in the developed world are rapidly advancing their digital skills to create websites and code so they can drive their domestic ICT industries forward and develop a career within them.

This is a gap that is dramatically widening: whilst students across the UK are learning how to code, many students in the developing world are not in school or have teachers who cannot even use computers.

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<sup>10</sup>Consumers: Life online McKinsey & Company, January 2013.

# Solution execution challenges

Understanding the barriers to digital enablement helps understand what kinds of solutions are needed. However, when digital enablement solutions do get off the ground, there are three major challenges that can impair their success. Understanding these challenges and overcoming them are fundamental to achieving fast results.

These execution challenges are:

- **Replicable scalability:** building for scale
- **Measurable sustainability:** demonstrating impact and business model
- **Balanced partnerships:** leveraging strategic partnerships

## Replicable scalability

Inability to move beyond a pilot is the rule, not the exception. From telemedicine and tele-education to data analysis and training solutions,

problem of duplication escalated to a point where the government felt compelled to issue a moratorium on new mHealth pilot solutions - and this in a country with only one doctor for every 25,000 inhabitants.

“Only 80 of 1,822 products and services tracked by GSMA as of December 2014 were present in more than one country”

**Mobile for Development Impact Products and Services Landscape Annual Review. GSMA, March 2015**

it is embarrassingly easy to find pilots that have never scaled up, whether government-, corporate- or NGO-run.

Not least, there is also palpable frustration over an excess of pilots (known as pilotitis). In Uganda, the

It's not clear if some initiatives were ever designed to scale up. Some start with seed funding, but nothing else is forthcoming to progress to the next stage (see diagram). Unsustainable pilots may achieve some impact during their limited implementation,

## mClinica business model scales

The power of mClinica lies in its network, which in turn provides scale. The healthcare sector in the Philippines is representative of so many in emerging markets – deeply fragmented. Whilst a handful of big pharmaceutical companies dominate the market, it is a disparate group of community pharmacies that actually distribute medicines without systems to monitor which products are being sold and to whom, and in what quantity. This means the pharmaceutical companies have no clear picture of the market. Even worse, medicine prices are high driven by ever-growing distribution costs. The power of mobile technology allows mClinica to connect drug companies to their distributors, pharmacies and patients. It has scaled up to build a network of 1,400 pharmacies in the mClinica network (and therefore the pharmaceutical companies) reaching 20 million customers.

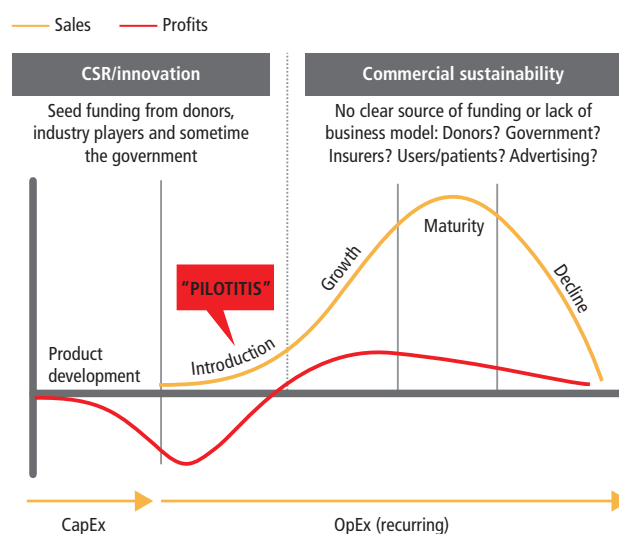
This solution will scale because there is a clear business model behind it. By providing their mobile phone number, patients receive a discount on their medicine with the pharmacy being reimbursed by the pharmaceutical company. Patients also receive tips and reminders via their phone on keeping up with their medicine which has had proven health impact—as well as the benefits from lower costs and higher quality of medicines, and pharmacies improve customer loyalty. The pharmaceutical companies though are the main paying clients here: they pay fees in order to reduce distribution costs, get access to valuable patient data and insights, as well as access to customers that they may not have been able to sell to previously.

The solution is replicable. It is currently running a pilot in Vietnam and plans to move its scalable model to Indonesia and Myanmar.

but they are often unable to influence broader thinking by demonstrating successful approaches, and certainly, a lack of peer communication and consideration of similar initiatives is causing duplication and wastage of effort and resources in our view.

Pilots are often so overly resource-intensive that they can be too expensive to scale-up using the same approach, and each pilot is undertaken in isolation without involving other partners that may help with scaling-up later. Ultimately too many pilots focus on proving a solution's technical ability or social impact without testing a business model that allows the pilot to be replicated or scaled-up. It may not be a problem if 90 percent of tech startups in the US fail, but in efforts to address the digital divide where much more is at stake; we are wasting time and precious resources that could be dramatically improving lives.

**Fig. 2: mHealth PILOTITIS**



Source: Catalysing mHealth Services for Scale and Sustainability in Nigeria, May 2015, GSMA

covering program costs but a 2011 study of 280 solutions by Hystra<sup>11</sup> found more than half were still young and/or not financially sustainable, and a similar proportion were entirely reliant on charitable funding. The

be viewed only in a pure financial sense, but also in terms of tangible and intangible benefits generated for all stakeholders. Even with services free to users, the funders that are paying the costs should gain value, not just the beneficiaries. For example, individuals may value a free government healthcare device and advice line, but the government also benefits by lowering its direct and indirect healthcare costs. In this case the government contribution is more of a service fee with a measurable benefit in return. The Tinder foundation's work in the UK to provide digital skills to marginalized individuals enables those individuals to access health knowledge digitally and reduces the treatments costs that the donor, the National Health Service, would otherwise end up paying further down the line. There's nothing wrong with getting something back; in fact, it's something to aim for and will increase the likelihood of the funder continuing to fund the service, creating sustainability.

“While mHealth in Nigeria is flourishing, it faces various challenges, such as fragmentation, lack of sustainable funding and suitable business models, which would allow mHealth to move from introduction/pilot to growth stage”

Catalysing mHealth Services for Scale and Sustainability in Nigeria. GSMA, May 2015

### Measurable sustainability

Our research found three interrelated concerns for solutions to be sustainable: an economically viable business model, users that value a service in order to continue using it, and proof of success.

In theory, every digital enablement solution should have a business model that makes provision for

GSMA currently reports that 42% of the mobile for development services it tracks are reliant on charitable funding (though this is an improvement on the 74% pre-2009) and their survey of 61 telecom operators in 2014 found 57% agreed that a lack of right business models was the biggest barrier for services.<sup>12</sup>

Business models should generate long-term value, and value shouldn't

<sup>11</sup>Leveraging Information and Communication Technology for the Base Of the Pyramid, 2001, Hystra. <sup>12</sup>Scaling Mobile for Development, August 2013, GSMA

## Reengineering basic education

In Kenya, Bridge International Academies can prove that it can provide high quality education for \$6.00 per pupil per month. Consequently, its 400-strong network of low-cost private schools and nurseries is growing at light speed: Bridge opens a new school every 2.5 days. It aims to teach 10 million children within the next 10 years, and serves just shy of 120,000 today.

To do this, Bridge has invested heavily in a system that uses ICT to standardize and scale the entire lifecycle of high-quality education delivery. This includes how academies are built, teachers are selected and trained, and lessons are delivered and monitored for improvement.

By applying ICT and production-line methods to achieve continuous improvement, Bridge drives enormous efficiencies both in terms of the overhead costs of running an academy and in terms of increasing the quality of the output.

Technology is embedded in all processes and stakeholder communications between pupils, teachers, administrators and parents.

Too many digital inclusion solutions do not have a feedback mechanism - and feedback is also valuable. Even if a user does not pay 100% for the service or product, they should be encouraged to contribute in some way, providing partial payment, some contribution of their time, or another mechanism that demonstrates commitment and ensures both usage and feedback.

If there is poor understanding of community needs and what they view as valuable, even services that are entirely free won't be successful. Indeed, a recent Brazilian survey found that 50% of rural inhabitants

would not be interested in internet access, even if it cost nothing<sup>13</sup>.

Sustainability (e.g.: self-sufficiency) should be a minimum aim of digital enablement solutions, let alone generating a surplus that can be used to maintain, improve or scale-up services. To be sustainable requires some demonstrable proof of success. In its most primitive form, if a product sells, that shows its value to the buyer. It is the best form of feedback from the market. But even if a digital enablement solution offers free goods or services, some proof of success is required.

Success means different things to different people in a local context, but there has to be a means to measure it. In practice, however, this isn't happening. Proof of success is not just the same as proof of use. The scope of success is broad, and better defined as value-creation. This might be the transfer of important skills, knowledge or an improvement in how things are done in a given community. Ultimately it should demonstrate social or economic benefit, and specify at what cost or level of resources input in order to work out what is the best way to get the most value.

## Calculating social ROI

To assess the success of its digital inclusion programs, U.K. operator BT commissions Social Return on Investment studies.

Such a study determined that its Get IT Together program had created a return of GBP3.70 (\$5.50) for every pound invested. Over a three-year period, Get IT Together helped almost 20,000 people in Britain to get online, particularly the elderly and economically disadvantaged.

Based on its learnings, BT has also designed affordable bundles targeted specifically at these user groups.



<sup>13</sup><http://www.cetic.br/tics/usuarios/2013/total-brasil/A10B/>

Lacking a nuanced assessment of value creation or the pressure of market forces on commercial business models, we suspect that some good programs are not getting the green light when they should, while mediocre ones continue to receive charitable or government funding.

## Balanced partnerships

On-the-ground partnerships are critical to implement digital solutions that have greater local resonance, can reach those in need, and are sustainable. We found three main issues: that very few such partnerships happen, the partnerships are not balanced, and many solutions are not compatible with the wider ecosystem.

Sometimes bringing together partners from different heritages can also generate problems. Often they speak different languages in terms of goals and methods. According to the stakeholders we interviewed, public-private partnerships are by far the most preferred means of engagement, and are seen as the most successful. However, whilst it is rare for non-profits to partner with other non-profits, whom they often feel are competition for funding. It is even rarer for non-profits to partner with for-profits (apart from just taking donations) and so many unique competencies that for-profits can provide to non-profits are under-utilized. Partnerships with government can be even harder. Difficult and time-consuming procurement processes and lack of flexibility are issues. Levels of support also vary for digital solutions across agencies. Some countries have effective national broadband plans

## Leveraging partnerships

M-KOPA has developed an excellent business model, clearly understood its value proposition and developed strategic partnerships across its ecosystem to provide affordable home solar power systems that enable rural users to have lighting and charge mobile phones, a key access barrier in remote areas.

They seek to provide improved social value at lower commercial value. They identified that rural users already spend US\$200 a year on kerosene for their energy needs, so they price their solution at the same point and aim to redirect this spend into their product, rather than requiring their low-income users to find new income to buy their product. Using small regular mobile payments spread out over a long timeframe overcomes high initial up-front costs that consumers could not afford.

They partner with the largest operator in Kenya, Safaricom, to sell their product through their distribution channels; and use Safaricom's M-PESA mobile money system, integrated into M-KOPA's software platform. Their product drives millions of recurring revenue transactions using M-PESA so delivering value to Safaricom.

They work closely with their manufacturer, financing partners to provide working capital, run a large call-center to provide customer service, and have a highly advanced data analytics platform.

They are also exploring a licensing model to expand into new markets whilst ensuring other mobile money services can integrate.

Now they have connected 200,000 homes in 3 countries and are rapidly expanding to meet their goal of 1 million homes by 2018.

and use of e-services, others are rudimentary, according to the UN's E-Government Development Index.

Both sides need to treat such partnerships as commercial and strategic partnerships, providing clear roles, combining unique competencies, and delivering mutual benefit. This is particularly true when engaging the private sector, such as the telecom operators. What's critical in such partnerships is a thorough understanding of the objectives and metrics by which respective public and private partners are motivated and measured.

The final issue is the compatibility of technical solutions between partners. The GSMA finds that often 60% of services are delivered through bespoke apps with only around 17% based on a foundation app

and 5% using an open framework<sup>14</sup>. The duplication is certainly a waste, but more significantly are issues of interoperability. For example, the GSMA finds "The technical standards and clinical protocols used by mHealth technology providers are different, which has led to a system that lacks interoperability and a value chain that is disjointed, limiting the opportunities for broad consumer adoption and national scale"<sup>15</sup>.

<sup>14</sup>Scaling Mobile for Development, August 2013, GSMA. <sup>15</sup>Catalysing mHealth Services for Scale and Sustainability in Nigeria, May 2015, GSMA



# Moving from ideation to commercialization

As these three execution challenges indicate, many digital enablement projects appear successful in prototype, but stumble at scale. In order to overcome these and solve the 6 key challenges to digital enablement, what's needed is a commercialized approach to digital enablement. This means stress testing ideas to find those with the greatest chances of success in terms of replicability, sustainability and stakeholder engagement.

From a digital enablement perspective, commercialization is

about having grand ambitions, but also having a sustainable business model that creates value. Not least, commercialization means having a clear understanding of the value chain and its many permutations in the execution of digital enablement activities.

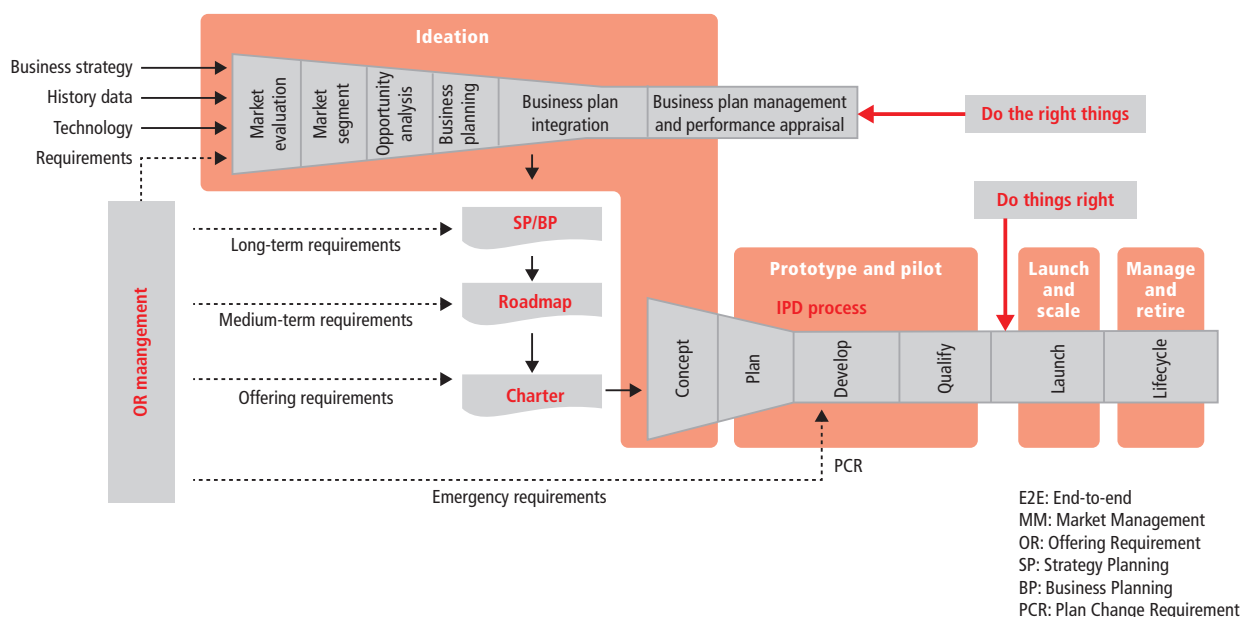
To act on these commercialization imperatives and create solutions that can scale-up, tools and techniques proven in the commercial world can and should be transplanted. Chief among these are proactive

market management and product development (see fig. 3 for an example of how Huawei does this).

These encompass two activity clusters:

- Market Management is Doing the Right Things:** This is making sure that the goal is the right goal: that the solution will meet needs and expectations of the market. Indeed it is making sure there is a need and opportunity for a new and better solution compared to what is already in the market.

**Fig. 3: Huawei's market management and integrated product development approach**





- **Integrated Product Development is Doing Things Right:** This is executing and managing the solution the right way with the appropriate internal and external resources in order to meet the goals over the entire lifecycle of a digital enablement solution.

What's clear is that the funnel of ideas narrows as you go through the required processes. This involves assessing demand-side needs and opportunity analysis over the short to long term, reviewing historical experience, current technology environment, and organizational capabilities. From the very beginning, a profitable business model and an extended lifetime for the project is assumed, and considered in business planning.

As its name suggests, lifecycle management encompasses a range of disciplined processes designed to maximize benefits from the introduction of a new product or service.

Applied to digital enablement, lifecycle management includes:

- **Ideation:** How should stakeholders stimulate the creation, prioritization, and selection of the best concepts for digital enablement solutions? What combination of stakeholders should be involved?
- **Prototype and pilot:** What are the best ways to stress-test a solution to determine its suitability and likelihood of success? What risk factors are relevant? What business model works best?
- **Launch and scale:** What factors determine potential for replication and scaling of a solution? What are the most cost-effective scale distribution methods for such solutions?
- **Manage and retire:** How should stakeholders maximize demographic and geographic usage of the digital enablement solution? How should stakeholders identify signs of program end-of-life? How should they retire (and replace) the solution effectively?

Today, digital enablement efforts are skewed toward ideation and prototyping. Launch and scale garner less attention, while day-to-day

management and end-of-life issues are rarely considered from the planning stage. In this section, we'll walk you through what we've learned from our customers, partners and employees in executing integrated product development for digital enablement.

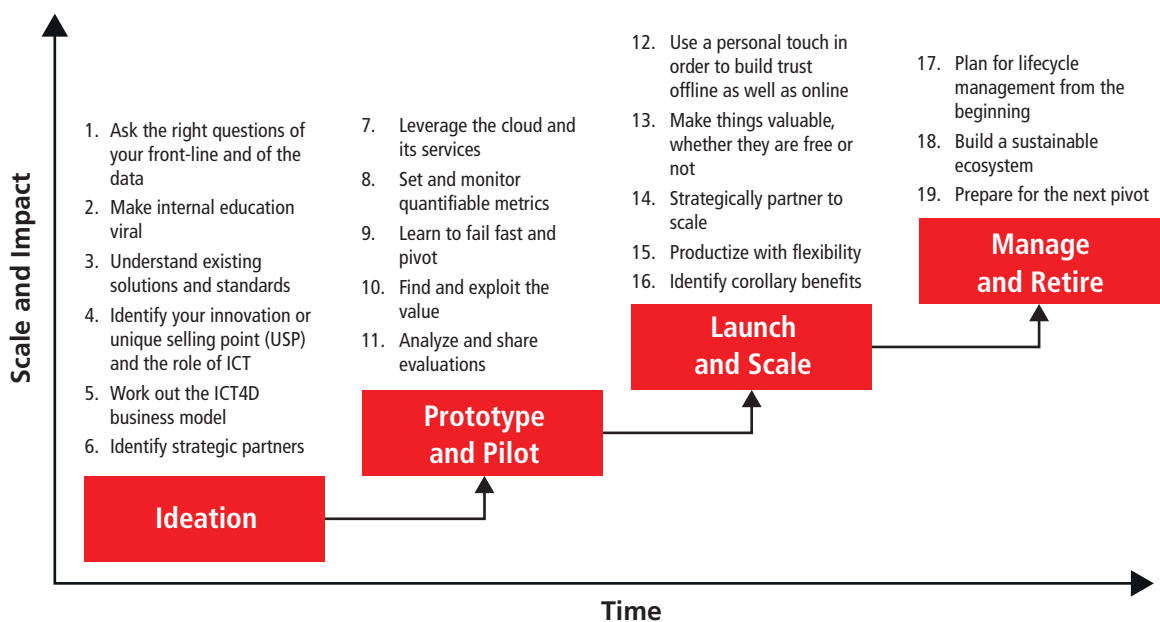
## Ideation

Where do good ideas come from? In Huawei's experience, the process of ideation is collaborative, and the product of many conversations with many stakeholders. It's critical to maintain dialogue with various interest groups, and particularly customers in order to stimulate, prioritize and refine ideas. For example, Huawei routinely establishes joint innovation centers with our customers and works with hundreds of partners across the world.

## Key learnings

1. **Ask the right questions of your front-line and of the data:** Ask the right questions to the right people

Fig. 4: Digital enablement needs lifecycle management



in your organization, especially those at the front line working with customers, and you'll get a better understanding of what is happening already in the market by others, and of what is needed. Identify, capture and analyze data from existing or related solutions, and from the market. Asking the right questions means getting to the root of a problem through multiple uses of "why"; it also means identifying possible solutions using the phrase "what if". Taking away preconceptions and constraints can lead to interesting insights. Refine and validate knowledge of what needs to be done, what is working and not working, and where there are new opportunities.

## 2. Make internal education viral:

Don't assume that digital enablement means the same thing to everyone internally. In the ICT industry, things are moving rapidly. It is important to seek out and explain current trends or the latest innovations. Some may be skeptical or unclear of a business case for digital enablement solutions. Use on-the-ground workshops, internal social media campaigns, as well as internal instant messaging and social network systems to build traction and keep people informed and engaged. Build a network of supporters among frontline staff who can engage with others on a grassroots level, including reaching out to customers and partners, so they can be directly exposed and empowered to be your digital enablement champions. Involving internal people early builds buy-in to the process and the ultimate solution you choose to do, making it easier to integrate and implement.

## 3. Understand existing solutions

**and standards:** Avoid the risk of duplication and wastage by reaching out to customers, government and industry groups for guidance, reusable knowledge, and tools. Evaluate existing standards and apps for applicability to a specific solution, including the use of open source versus established industry-vertical standards, and interoperability with other solutions. This is the chance to identify where your customers are and potential partners to reach them. Too many ICT4D solutions develop new technologies or tools from scratch and build all new distribution channels which is inefficient and may hinder scale.

Not least, establish a live relationship with incubators which nurture breakthrough innovation at its earlier stages. Online resources are growing that list existing programs and report on best practices. An example is the GSMA's M4D Impact database which tracks thousands of services for health, agriculture, education and more across the world and has published multiple case studies. Specialist project databases also exist, such as the Center for Health Market Innovations which has identified 1,400 programs or the mHealth working group that tracks 400 projects. In each niche there are existing forums, alliances and emerging standards. Stakeholders should utilize these and other resources and talk to those implementing some of these programs.

## 4. Identify your innovation or unique selling point (USP) and the role of ICT:

Be clear what you will do that is different to what is already happening and why you will

succeed; or be clear what you will build on that already works. One of M-KOPA Solar's innovations is in using micro-payments to pay for solar power on a pay as you go basis, reducing upfront costs. One of Micro Clinic Technologies innovations is providing an entire package customized for rural health clinics including hardware, software, and connectivity at a price point they can afford and reducing financial risk.

Be clear on why you are using ICT in the solution, and how; don't just use ICT for the sake of it, and don't neglect the non-ICT aspects of a solution otherwise the whole solution may not be sustainable. For example, at Micro Clinic Technologies, they also build-up a local field force for sales, training and servicing, creating jobs in the process. Bridge International Academies does not give every child a laptop which would make costs unsustainable, instead focusing on using ICT to improve school management and a laptop for the teacher to improve teaching quality.

## 5. Work out the ICT4D business

**model:** As simple as it sounds, for a development project to be sustainable it needs revenue. It's the lifeblood of every successful business, and in order to generate it, organizations that attempt to narrow the digital divide must have someone willing to pay for their products and services. Don't get caught up in the launch alone. Set out the program with some idea of how it will continue in the medium term. Specifically, think about the required resources over a larger scale of activity and the funding model. In the ideation stage you can develop different options and

**Tool 1: Work out your business model**

### What ICT4D Business Model?

Use this tool to help think through the different options for developing a business model:

- Are there other resources you could monetize to increase your solution's economic feasibility?
- Are there other customers you can consider selling these resources to that increase revenue?
- Are there are other ways you can collect revenue that better meets customers' abilities?
- Are there others who can help you sell or distribute to reach end-users efficiently?

What resource can you monetize?	Who can you sell it to?	How can you sell it?	Who will sell or distribute it?
<ul style="list-style-type: none"> <li>• Product / service</li> <li>• Relationship</li> <li>• Consumer network</li> <li>• Trust</li> <li>• Users</li> <li>• Data / market insight</li> <li>• Space / excess capacity</li> <li>• Venue</li> <li>• Expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Individuals</li> <li>• Affinity groups</li> <li>• Government</li> <li>• Academia</li> <li>• Charities</li> <li>• ICT vendors</li> <li>• Other companies</li> </ul>	<ul style="list-style-type: none"> <li>• One-time revenue</li> <li>• Recurring revenue</li> <li>• Revenue share</li> <li>• Pay as you go</li> <li>• Commission</li> <li>• Freemium</li> <li>• Subsidized</li> </ul>	<ul style="list-style-type: none"> <li>• Direct sales</li> <li>• Agents / franchises</li> <li>• Online</li> <li>• Local independent retailers</li> <li>• Regional chain retailers</li> <li>• Government</li> <li>• Telco operators</li> <li>• Charities</li> <li>• Related solution providers</li> <li>• Unrelated solution providers</li> </ul>

scenarios for business models to test in the next stage.

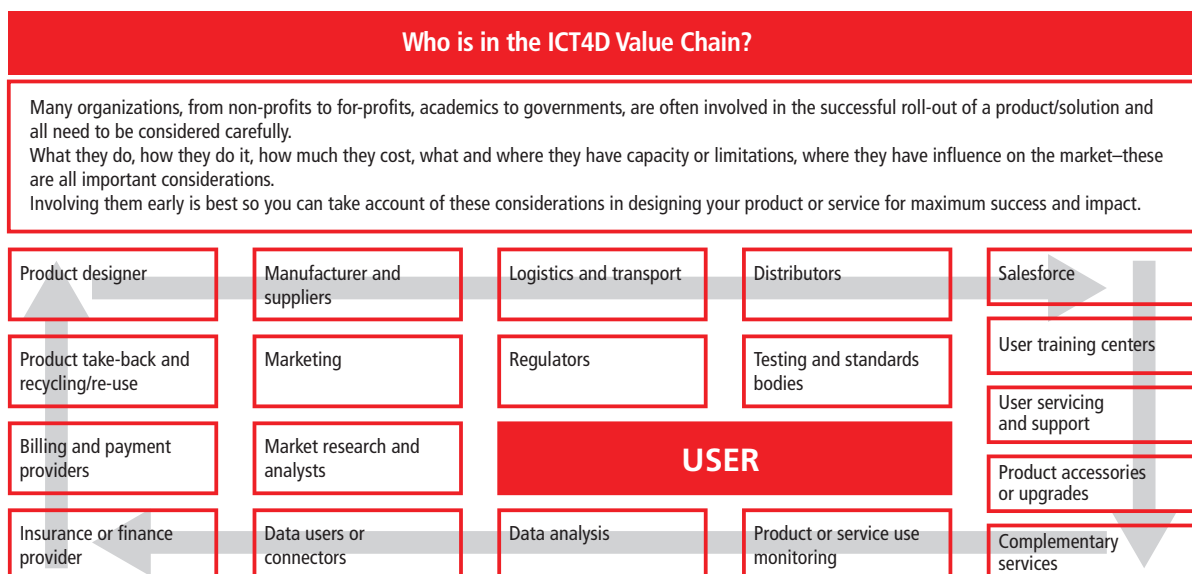
Not least, don't forget that ICT4D models have some unique aspects – and huge potential to achieve scale. Unique aspects include the ability to generate, analyse and sell data, pay for services digitally and distribute services through powerful channels such as telecom

operators - either through their physical networks or their retail sales networks (see tool 1 for ideas on generating a business model). The ICT industry is easily able to utilize business models such as freemium (providing basic functions for free and charging for more advanced functions), advertising-funded, cross-selling and upselling, or high-volume and low-margins,

some of which might be relevant for your solution. Meanwhile the telecom operators are relentlessly seeking solutions to lower churn, increase loyalty, and provide more value-added services to users.

**6. Identify strategic partners:** A business approach requires careful understanding of your value chain and who will supply the product

**Tool 2: Develop your Value Chain**



or services (likely including various levels of suppliers), who will provide the marketing, distribution, sales, after-sales service, and take-back as well as collecting customer feedback, providing financing to the company or to consumers, and many other aspects (see tool 2 for ideas on who in the value chain may matter). Too many ICT4D solutions only focus on the customer-facing software, and neglect to think through the wider value chain and ecosystem. In particular, interoperability of the technology across the value chain may be crucial. Meanwhile, some partners are indispensable to give approval for distribution, credibility to the solution, and for their stakeholder reach; governments and telecom operators are good examples of power partners.

Identify solutions for all these factors, ideally with partners who buy into your vision, have complementary resources you can use, and who will benefit from partnering with you. Partnerships are not easy to develop, but the right partnerships will make or break your program and set it up either for eternal hard work and frustration or efficient and rapid scaling.

## Prototype and pilot

In technology-led industries, filing patents can be an objective measure of innovative capacity. However, the patentability of an idea is not the same as marketability - and making money from a patent requires considerable work in market validation and market making. Prototyping is important in ensuring the resulting solution is fit-for-purpose, yet not all prototypes end up on the market.

The purpose of a pilot is not just to test the solution, but to also test the solution's business model: such as the route to market, the pricing strategy, the partnerships, and the solution quality. Many ICT4D solutions focus too much on testing the technical solution and not enough on testing the business model. Ultimately it is the potential of a business model—resulting in profit or other strategic benefits—that will define if the pilot gets rolled out or not.

## Key learnings

### 7. Leverage the cloud and its services.

Use digital tools to enrich digital programs. The cloud's operational and commercial model exemplifies the commercialization that is mandatory for ICT4D success: Services that can be easily updated, on demand, frequently, remotely and cheaply, with customization easily implemented for different users based on their profiles and locations. Cloud-based service delivery models can also help retain and control the relationship with customers better compared to product delivery models.

### 8. Set and monitor quantifiable metrics:

Write a brief for the pilot, not just the long-term initiative, and establish objectives for each. What are you trying to prove? Who do you want to benefit? How do you plan to promote and execute, and with whom? What's the pilot's cost estimate and schedule? Importantly, what metrics are you going to use to assess success or failure? It's eminently logical to use ICT to implement and measure ICT4D programs, such as gathering real-time data from mobile devices, to simple user behavior surveys online and to analyze data using the cloud's computational power. Don't forget to also do qualitative

assessments to understand context, motivations and reasons behind the data.

### 9. Learn to fail fast and pivot:

If the business model isn't quite right, tweak it. The fundamental purpose of a prototype and pilot is testing; it's not the finished article. That's the attitude that technology startups take. They begin with the kernel of an idea and spend considerable time refining it. ICT is interactive, allowing direct interactions and feedback with users as well as rapid iterative improvements through what's known as A/B testing (providing some users with a slightly different version of the product and using feedback to select the best one). Pivoting is about iterating a business model with elements better suited to market needs. Failure is one step closer to validation and success but be willing to pull the plug if necessary.

### 10. Find and exploit the value:

Understand where you are providing value and how you can provide more value more efficiently to more people (tool 3 provides some ideas). ICT solutions often focus too much on usage statistics and neglect to consider the impact from use. Consider using randomized control trials to compare your impact, and pilot different price points and business models. Are there unintended consequences (negative or positive)? Are there forms of value like data, adverts or complementary products that you can monetize, such as the operators that sell their data to First Access in Africa, which anonymizes and analyses it before selling it to banks to aid credit scoring? The best companies

### Tool 3: Identify the Value

#### Where is the Value in ICT4D Solutions?

Who benefits from the initiative? What type of impact is the result? Impact can be indirect, unintended or consequential, i.e. preventing other problems from happening. ICT can create tremendous knock-on effects and is a true enabler of other industries (consider the sharing economy and peer-to-peer lending that has disrupted and stimulated major industries such as travel, hospitality and finance). ICT can drive transparency and more efficient marketplaces and can dramatically improve customer relations and retention. Understanding value is important in knowing the customers and evolving a sustainable business model. The list could be endless, but a few ideas to get you thinking:

Who benefits directly?	Who benefits indirectly?	How are benefits or savings generated?
<ul style="list-style-type: none"><li>• Consumer/beneficiary</li><li>• Consumer's dependents</li><li>• Government revenue (e.g. tax)</li><li>• Infrastructure</li><li>• Environmental sustainability</li></ul>	<ul style="list-style-type: none"><li>• Efficient market (e.g. better data and better matching of supply and demand)</li><li>• Efficient economy (e.g. less corruption or more competition from more transparency)</li><li>• Cultural change (e.g. women empowerment)</li><li>• Better data</li><li>• Less need for or damage of infrastructure</li><li>• Society from more engaged and empowered citizens (e.g. less crime, more innovation)</li></ul>	<ul style="list-style-type: none"><li>• Economic gains from saving time</li><li>• Environmental gains from savings of travel or waste generation</li><li>• Productivity gains</li><li>• Social and economic gains by reducing long-term healthcare, disability, or unemployment costs</li><li>• Social and economic gains from reducing migration or resource stress</li></ul>

**Tip:**  
1. Look for micro-value or shared value that ICT can help identify and measure.  
2. Is there negative impact you need to mitigate/avoid?

work out how to get commission, up-sell or cross-sell services and increase revenue. Why can't digital enablement solutions be the same?

#### 11. Analyze and share evaluations:

Monitor and document everything. How did the business model stand up? A joy of ICT is the ability to easily generate and analyze data. What were the key strengths and weaknesses? Ask peers, partners and beneficiaries for their opinions. Then use the internet to share your data and findings with the wider community.

## Launch and scale

As a global manufacturer, Huawei knows that a repeatable, quality product demands repeatable quality processes (if it's not repeatable, it's not a process!), the use of common standards and a similar approach with employees and suppliers. We like

scale; that's because a proven product at scale becomes increasingly cheaper to produce (and provide) while it expands its customer base at ever higher speed. This has proven tough to achieve with ICT4D programs and is certainly not possible all the time (indeed the definition of scale can be arbitrary depending on the size of a potential target group), but our stakeholder discussions highlighted some repeatable tactics.

### Key learnings

#### 12. Use a personal touch in order to build trust offline as well as online:

ICT is powerful, but humans often still value a personal touch. In the dash to market and sell online, many ICT4D solutions ignore the human aspect of relationships. Use hyperlocal partners to sell into local communities. As Bridge Africa found in Cameroon (and the Tinder Foundation with a network of 5,000 local community

partners across the U.K.), there is no substitute for feet on the street if you want to build trust and boost takeup in a local community. Remember partner strategically, NGOs, local social enterprises and academic institutions may possess a stronger brand cachet and trust than you—and working with them may be faster and a better route to scale than seeking to do this alone. Obtaining trust early on will pay dividends later by improving customer loyalty and driving word-of-mouth promotion.

#### 13. Make things valuable, whether they are free or not:

Focus on value creation, not only price or cost. While the beneficiaries of digital enablement may be on a low income, this doesn't mean that services should necessarily be free. Indeed, demanding some form of payment or contribution (such as of time, or a deposit) to use a service only underscores that value is being

supplied. Even if something is free (paid for by a government or third-party, for example), there must be a business model behind it with the payer receiving value, not just providing donations, so that it is likely they will continue to pay for it and it can be sustainable.

The ICT industry is notorious for focusing on users first and hoping to work out a business model later. It might work in Silicon Valley but is rarely as easy with the bottom of the pyramid. If around half or more of all ICT startups are failures (some believe it is more like 90 percent) in the Valley it may not affect many people beyond the founders and the investors, but in ICT4D each solution that ends prematurely could cause social hardship or represent a missed opportunity to improve lives.

Unfortunately the development community is also notorious for giving services for free and then ending a project a few years later, often having failed to get traction. Hystra Consulting, which works with businesses and social entrepreneurs, studied 280 ICT4D projects and found that 136 relied completely on donor funding to cover their operating costs, while 35 were partly subsidized. It is critical that ICT4D solutions buck both problems.

Nothing provides clearer evidence of a project's value than a base of paying customers, and this proof of success creates a demonstration effect (and source of funding) that makes scaling up vastly easier.

**14. Strategically partner to scale:** It takes time to build up a brand, sales force, or even local employee base in a new market. Find

partners with these assets already that you can leverage to speed up growth and reduce risk. ICT solutions can often scale quickly, but can also be copied quickly, so protect your brand and IP. Identify how you will scale. Will you want to put boots on the ground, develop a joint venture, license your solution, create an alliance of local implementation partners, try to reach customers directly through the internet, or find another method that works to scale up? Different approaches work for different business models in the business world; it is the same for digital enablement. Huawei's approach to develop Authorized Networking Academies and Authorized Learning Partners with colleges and universities in more than 30 countries around the world has enabled the training of three million people. Huawei provides support such as marketing, content, delivery platform and expert trainers (much of which is delivered digitally), but the partners do much of the implementation and share in the benefits.

**15. Productize with flexibility:**

Countries, cultures, languages, ethnicities; all are different and scaling requires adapting your software and hardware to local needs. Understand and adapt to those needs but don't lose sight of the need to productize to be efficient. Personalization can be crucial in building customer loyalty and can be achieved at low cost with modern data collection and analysis tools coupled with appropriate algorithms and machine learning. Not only does low cost personalization enable scaling, it is a virtuous circle; as a solution scales it then gains more and better data and can improve

its personalization. However, don't neglect to address—and communicate with users about—privacy and security concerns.

Bridge International Academies' strength is in its systemization to reduce costs, increase quality and improve speed of scale-up. Huawei's SEEDS for the Future program has grown to over 40 countries and reached 10,000 students with different partners in each country but the same model, approach and role from Huawei. How are you systemizing to strengthen your operations and business model?

**16. Identify corollary benefits:** When there are multiple beneficiaries and multiple benefits, digital enablement programs really take off. By definition, corollary or consequential benefits aren't always planned, but should be sought out. A program may subsidize Internet access for one set of beneficiaries, but other members of the community can use it too. Equally, social value-added services may not generate revenue for a telecom operator, but offer other benefits such as higher customer loyalty – a considerable value considering the cost of acquisition versus retention. Both hard and soft benefits should be evaluated in order to quantify potential value to be generated over the long term

## Manage and retire

Just as the lifespan of a smartphone is expected to be limited, so the same expectation should apply to digital enablement programs. Over time, technology infrastructure and software needs maintenance, upgrade

and occasional replacement—moving to a service or leasing model rather than a product or sales model can help better manage costs, customer relationships, and environmental impacts. Equally, some successful programs achieve their goals, while stakeholder needs change. If so, what next? All of these issues require ongoing oversight to maximize the value of digital enablement programs.

## Key learnings

**17. Plan for lifecycle management from the beginning:** Huawei is an advocate for cloud services; assuming users can access their data or applications when they need to, they enable much faster and cheaper upgrading of software as well as monitoring of usage. So, we recommend hosting solutions

online. Also consider building in upgrades, insurance, guarantees or service contracts from the beginning to improve product and service maintenance whilst also maintaining customer relationships and improving customer satisfaction.

**18. Build a sustainable ecosystem:** Not only can a support ecosystem double as a sales channel, it helps customers use the solution appropriately to get maximum impact, can obtain useful information for future solutions, and helps set-up future sales. Consider your launch partners. Are they able to provide longer-term support? Don't neglect offline and in-person support mechanisms, but do use ICT smartly—use remote monitoring or messaging systems

to provide customer service, build in remote diagnostic capabilities, and look for other means to build a feedback loop with beneficiaries to track satisfaction, correct issues and capture suggestions for improvement.

**19. Prepare for the next pivot:** Stay connected to your wider stakeholder network and keep learning. Keep tabs on adoption and usage rates or whatever measures you detailed from launch. Use these analytics to assess if goals are still being met, or if it's time for a change. Share your experiences and be on the lookout for the next opportunity. Proactively plan your pivot into a new community or extension of services. Restart the process and repeat.



# Conclusions

**It's never been more urgent to provide digital enablement because divides are getting deeper.** Powerful new technologies have the potential to create unprecedented digital divides creating even greater separation between those with and without access or the skills to exploit them. Mass segments across developed and emerging economies are under threat, notably the old and the poor. We face a stark choice. Enabled by technology, disadvantaged groups can radically improve their lives and contribute to a better society. Or, unable to benefit from technology, these groups become more economically and socially disadvantaged, increasing social inequality and turmoil.

**Business models that create value are critical, even if what's on offer is 'free.'** Like any customer, beneficiaries of digital enablement solutions must be convinced that they can benefit in order to "invest" in a program, whether literally or figuratively. In an audit, even the World Bank – a major sponsor of digital inclusion activities – found

that up to 70% of the technology projects it funded may have achieved other goals, but failed to increase access for the poor or underserved areas, and it is certainly not alone. Grant-based approaches to ICT4D are popular, but not necessarily the most successful.

**It's time to shift from ideation to a focus on commercialization.** Digital enablement solutions need to be run on market principles. They are not experiments, and should be built for scale and industrialization. Like any commercial product and service taken to market, they have a lifecycle with specific stages to manage and metrics to evaluate. And like any product or service, no solution should be launched without a fleshed out "business" plan.

**Everyone wins when value is delivered, but the understanding of value also needs to change.** Digital enablement is not about raw financial returns, but about creating a ripple effect across people and institutions, both public and private. Successful solutions can

provide to users, their families, their communities, their governments and beyond. Value may be tangible or intangible; current or future; and may reduce opportunity costs as well as solving a current problem. Understanding the tremendous value of digital enablement fully will inject new momentum into efforts, identify new business models, and foster new partnerships.

Alone, pure philanthropy, such as donations of money, services and new or refurbished equipment, is not the right response. Instead, better outcomes result when everyone has skin in the game, through mutually beneficial objectives established for all stakeholders. Indeed, Huawei's stakeholder research highlights that programs with business models and public-private partnerships have the best track record of scalable success. Digital divides won't go away, but we can make the gaps much smaller. By focusing on digital enablement, we can also achieve bold objectives that truly bring dramatic benefits to individuals' lives and entire economies.

<sup>5</sup>IEG (Independent Evaluation Group). 2011. Capturing Technology for Development: An Evaluation of World Bank Group Activities in Information and Communication Technologies. Washington, DC: Independent Evaluation Group, The World Bank Group. [http://ieg.worldbankgroup.org/Data/reports/ict\\_evaluation.pdf](http://ieg.worldbankgroup.org/Data/reports/ict_evaluation.pdf)



# Appendix 1: Quantitative research and country profiles

Starting in January 2015, Huawei ran a research program in association with global ICT analyst house Ovum that involved studying the extent of the digital divide in 12 countries. These countries – Brazil, Egypt, India, Indonesia, Kenya, Mexico, Myanmar, Nigeria, Russia, South Africa, Turkey, UK – were chosen as representative markets. Myanmar symbolizes a market where access to communications infrastructure is at its most basic, while the UK represents a market where, despite a mature landscape in terms of communications infrastructure, there is still a deep divide between those who regularly use digital services and those who do not.

Broadly speaking, the research was conducted in two ways – (1) via desk research and (2) via field research.

## Quantitative Research

Huawei produced a series of Digital Enablement Indicators for each country to assess where the digital divide gaps are at their widest in each country, and therefore where

the needs are most prevalent (see table 1).

As explained in chapter 3 we developed a framework across 4 overarching barriers for digital enablement. In addition to the qualitative assessment (below) we also undertook a qualitative assessment for our sample of 12 countries. This charts the journey from helping bridge the digital divide to promoting digital inclusion and empowering digital enablement.

The table below shows the indicators used to assess digital divide needs for the 12 countries:

## Access

It should be no surprise given that household broadband penetration is less than 1% in Myanmar, Kenya and Nigeria, and that mobile broadband coverage still reaches fewer than one in three people in Myanmar, India and Indonesia that access remains the single largest barrier to bridging the digital divide.

Also impeding access is quality of service: mobile Internet speeds are particularly low (less than 5Mbps) in Myanmar, India, Indonesia and Egypt, whilst in Brazil mobile Internet speeds are disappointingly low at 6Mbps, slower than Kenya and South Africa.



Barriers	Indicators	Sources
Access	Broadband coverage (fixed / mobile)	Ovum
	Service penetration (fixed / mobile)	ITU
	Internet speeds (fixed / mobile)	Ookla
	Smartphones as % of population	World Economic Forum
	Internet access in schools	Web Index*
	Electrification	Regulators
Affordability	Cost for broadband as % of income (fixed / mobile)	Ovum
	Call costs	ITU
	Tax on devices	AT Kearney
	Smartphone availability	GSMA
	Computer affordability	IMF
Appetite	Content in local language	Web Index*
	IP / Internet users	World Economic Forum
	IPv4 penetration	CIA Factbook
	Usage of social networks	World Economic Forum
	E-participation	UN E-Government Survey 2014 (for E-Participation)
	Government online maturity	UN E-Government Survey 2014 (for government online maturity)
	Accessibility of digital content	World Economic Forum
Ability	Adult literacy	Web Index*
	Youth literacy	World Economic Forum
	Use of ICT to improve education outcomes	Web Index*
	Training of teachers in using ICT	Web Index*
	Training of health workers in using ICT	Web Index*

Note: \*Web Index 2014-15, as published by World Wide Web Foundation

## Affordability

Mobile data services are high in many of the 12 markets surveyed, especially Kenya, Nigeria and South Africa, where mobile broadband costs are 9%, 7% and 3% of average income, respectively. The cost of fixed broadband services is almost prohibitive in Kenya and Nigeria at 44% and 17% of average income, respectively, and, alongside poor communications infrastructure, helps to explain why household DSL penetration is less than 1% in both countries.

Many governments still tax mobile services harshly, which has an impact

on take-up: in Turkey, according to GSMA over 70% of tax revenues raised from the mobile sector came in the form of mobile-specific taxation. This comes from a combination of VAT, communications tax, activation

and usage fees. The high taxation does have an impact on usage with the proportion of Internet users in Turkey lower than South Africa despite greater mobile broadband coverage in Turkey.



Digital divide country challenges				
Country	Access	Affordability	Appetite	Ability
Brazil	Poor QoS Low fixed penetration / BB coverage	High tax		Relatively low level of adult digital literacy
Egypt	Poor QoS Electrification	High tax High device costs	Limited ICT services for farmers Little localized content	Low level of ICT training amongst teachers Low level of adult digital literacy
India	Poor mobile coverage Low s/phone usage	High broadband usage costs	Little localized content	Low level of adult digital literacy
Indonesia	Poor QoS Electrification Coverage	High device costs High broadband usage costs	Limited ICT usage in healthcare services	Low level of ICT in education Low level of ICT training amongst teachers
Kenya	Poor mobile/fixed coverage Electrification	High broadband costs High device costs	Low levels of e-government Little localized content	Low levels of youth digital literacy
Mexico	Low s/phone penetration	High mobile broadband data tariffs	Low social media usage	Low level of ICT training, healthcare workers/teachers
Myanmar	Poor mobile /fixed coverage Poor QoS Electrification	High broadband usage costs	Low levels of e-government Little localized content	Low level of ICT training amongst healthcare workers and teachers
Nigeria	Very low fixed penetration Poor QoS	High broadband usage costs	Low levels of e-government Little localized content	Very low levels of digital literacy
Russia	Rural coverage		Low social media usage	Low level of ICT in education
South Africa	Rural coverage	High data costs	Limited ICT usage in healthcare services	Low level of ICT training amongst teachers
Turkey	Rural coverage	High tax High device costs	Low levels of e-government services and e-participation	Low ICT training amongst healthcare workers
UK	Rural coverage	Call / data costs for low-income		Youth digital literacy relatively low

Key		
Significant challenge	Mid-sized challenge	Minimum challenge



Turkey also suffers from affordability of devices: the cheapest smartphones cost twice the average monthly GDP per capita of Indonesia and three times that of Myanmar. Of the 12 countries surveyed, only Kenya has more expensive low-cost PCs.

### Appetite

UK and Russia have the highest Internet penetration of the 12 countries. It is no accident that both countries also score highest on local language content, which generates an immediate relevance and sense of engagement with a broad set of users. UK also scores highest in usage of social networks, government online services and e-participation, according to figures published in the Global Information Technology Report, published by the World Economic Forum.

Conversely, in countries where there is the least amount of content available in the local language – Myanmar, Nigeria, Kenya, India, Indonesia and Egypt, appetite for



Internet usage is also low (in India and Indonesia, fewer than one in five use the Internet). The level of e-participation is particularly low in Kenya and there is a dearth of government online services in Nigeria.

### Ability

According to data published by the World Wide Web Foundation on

its Web Index based on in-market surveys, Indonesia, Myanmar and South Africa all have very low scores in terms of use of ICT to improve education outcomes. The training of teachers in using ICT have similarly low scores in South Africa and Egypt. In South Africa, secondary education enrolment rates are very high, and so the fact that ICT is used in such a limited capacity seems to be a wasted opportunity.



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70% of respondents to a survey in India stated that lack of awareness is the main reason for them not using the Internet

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## Qualitative Research: Country Profiles

Huawei conducted over 100 in-market interviews to evaluate digital divide priorities in each of the countries. Interviews were held with telecoms operators, government bodies, regulators, NGOs, social enterprises and local Huawei staff.

Next are mini-profiles of eight of the countries, each comprising comment on our Digital Enablement Rankings, key digital divide priorities and a highlight digital divide initiative. These eight markets offer a good cross-section of the interviews conducted.

### Brazil

#### *Digital Enablement Indicator Rankings:*

According to these indicators, the biggest barrier to greater digital inclusion in Brazil is affordability, coverage in rural areas and broadband speed. Tax on mobile services remains high at 37% and mobile data costs represent over 2% of average income, higher than in Indonesia or Turkey.

- **Access: 3rd/12**
- **Affordability: 5th/12**
- **Ability: 4th/12**
- **Appetite: 2nd/12**

#### *Digital Divide Priorities*

- Connecting remote areas - there still exist many unconnected cities and villages.
- Data from Web Index suggests Brazil scores very highly in terms of ICT training for healthcare professionals, but less well in ICT training for teachers.
- Improve broadband speed.

#### *Highlight:*

Embratel has brought connectivity and digital content to 120 schools

in remote areas. In co-operation with the Communications Ministry, the operator has supplied socio-educational content free of charge to 12,000 points of connectivity of the government program via terrestrial and satellite links, mainly to rural schools, hospitals and municipalities. The idea of such a program is (a) to increase connectivity in schools in remote areas and (b) just as importantly to show how ICT can have a positive impact on education grades.



Source: [www.starone.com.br/en/interinas/responsabilidade/](http://www.starone.com.br/en/interinas/responsabilidade/)

### Indonesia

#### *Digital Enablement Indicator Rankings:*

According to these indicators, the biggest barrier to greater digital inclusion in Indonesia is digital literacy as exemplified by ICT being used very little to improve education outcomes. Lack of literacy comes with poor communications infrastructure (especially in remote areas) and expensive devices. Even the cheapest smartphones on the market can equate to 8% of monthly per capita GDP.

- **Access: 8th/12**
- **Affordability: 9th/12**
- **Ability: 10th/12**
- **Appetite: 6th /12**

#### *Digital Divide Priorities:*

- The Indonesian government has an objective of 60% broadband penetration by 2019.

- It has also set itself targets of improving awareness and education around the benefits of the Internet and ICT.
- One of the reasons Indonesia scores highly in digital appetite is the extent to which social media is used in Indonesia: This is primarily the case amongst younger users in urban areas, but the government is keen to replicate this across other demographics. The Indonesian government scores quite well on its use of the Internet for government services, which in turns means that e-participation in Indonesia is higher than countries such as India, South Africa and Turkey.

#### *Highlight:*

We highlight two interesting initiatives, one tackling affordability and the other digital literacy/awareness:

- The Indonesian government funds mobile vehicles (M-PLIK) as affordable mobile Internet cafes charging US\$0.11 per hour.
- Indosat is working in partnership with the Sampoerna Foundation, which helps to fund digital inclusion programs; they are currently providing support for 500 micro-businesses. Programs are deemed a success if these businesses can become independent of funding within two years.

### Kenya

#### *Digital Enablement Indicator Rankings:*

According to these indicators, the biggest barriers to digital inclusion in Kenya are cost and access with both these factors impacting the appetite to use digital services. The cost of mobile broadband data services is very high – at about 9%

of income – and even low-cost PCs and smartphones remain very expensive compared to average incomes. These factors, added to a poor communications infrastructure, contribute to the fact that there is limited content available in local language and very low levels of e-participation, suggesting the appetite for digital services is low. Interestingly, Kenya scores highly on digital literacy and in particular on the use of ICT to improve education outcomes.

- **Access: 11th/12**
- **Affordability: 12th/12**
- **Ability: 5th/12**
- **Appetite: 10th /12**

*Digital Divide Priorities:*

- The Kenyan government aims to build broadband infrastructure to ensure 90% mobile broadband access and 25% broadband hotspots coverage by 2017. In addition, it has set a target of 100% broadband coverage in schools and hospitals across the country.
- The Kenyan government has created an ICT Authority (ICTA) to drive digital inclusion and to empower its citizens to access digital government services, and help businesses use ICT to improve production and services.
- The creation of ICTA is important as Kenya currently scores poorly for the number of government online services, below India and Indonesia. E-participation in Kenya is also currently low – lack of access and expensive data services are impacting the appetite for digital services.

*Highlight:*

It is unsustainable to deliver quality education at a price point accessible to families in Africa living on US\$2 a day or less. Bridge International

Academies was founded in Kenya on the basis of delivering quality education to precisely this market segment. Investment has been put largely towards technology to manage “back-office” systems, enable teachers to provide high quality education, and provide detailed monitoring and evaluations. The first such academy was opened in 2009 and by the end of 2014 there were close to 400 such academies.



Source: Bridge International Academies

## Mexico

*Digital Enablement Indicator Rankings:*

According to these indicators, the biggest barriers to digital inclusion in Mexico are digital literacy and awareness. Mexico scores poorly in levels of ICT training for teachers and health officials. This is holding back the extent to which ICT is positively impacting education outcomes with Mexico lagging India and Kenya.

- **Access: 5th/12**
- **Affordability: 3rd/12**
- **Ability: 7th/12**
- **Appetite: 4th /12**

*Digital Divide Priorities:*

- Mexico Conectado Project aims to connect 250,000 public sites by 2018 (most of them schools).
- Mexico’s Digital National Agenda is responding to the need for digital literacy amongst all 14-18s. Perhaps this agenda can take on the

important task of ensuring teachers are more ICT literate.

*Highlight:*

Enova is a social enterprise that designs, implements and operates educational centers and, since launching 2009, has been responsible for improving the digital skills of 360,000 (Feb 2015) young adults and children through a network of 70 centers. The centers are run by Fundacion Proaccesso, which is dedicated to the promotion of digital inclusion.

This is important as, although Mexico is one of the largest economies in the world, it still struggles with developing an effective and accessible education system.

## Myanmar

*Digital Enablement Indicator Rankings:*

According to these indicators, the biggest barriers to digital inclusion in Myanmar are access and awareness. Coverage fixed Internet services is below 1% and mobile network coverage is restricted mainly to urban areas. Because of this, Internet usage is very sparse, not helped by very little content being available in local language.

- **Access: 12th/12**
- **Affordability: 11th/12**
- **Ability: 11th/12**
- **Appetite: 12th /12**

*Digital Divide Priorities:*

- Primary need is to improve infrastructure as more people come online and have access to mobile devices.
- Insufficient local content is holding back popular usage of the Internet and digital literacy amongst general population is very low.



- Both Telenor and Ooredoo are required to build rural telecenters, according to licensing regulations. They need to work closely with government bodies and NGOs to run local initiatives emanating from these telecenters, which will serve to create greater digital literacy.

*Highlight:*

Telenor has established 15 telecenters in Myanmar. It plans to roll out 200 across the country all with PCs, printers, scanners and Internet connectivity. They are run by local entrepreneurs and are usually close to schools. The main objective of the centers is to provide exposure to digital services to whole communities.

These centers will be a success if they lead to the creation of more local content and a wider range of users, including women, children, farmers and the elderly. As the government looks to engage more directly with rural citizens, the position of telecenters becomes even more important in building awareness of digital services.

## South Africa

*Digital Enablement Indicator*

*Rankings:*

According to these indicators, the biggest barriers to digital inclusion in South Africa are digital literacy and awareness. Given a relatively mature communications infrastructure, it is a little surprising that e-participation is low and suggests a lack of digital literacy in South Africa. Scores are low in South Africa for ICT usage in schools and in terms of teacher ICT knowledge; until this improves, digital literacy across the mass market will be hampered.

- **Access: 6th/12**
- **Affordability: 6th/12**
- **Ability: 8th/12**
- **Appetite: 8th /12**

*Digital Divide Priorities:*

- A National Broadband Policy aims to connect underserved populations in rural and urban areas.
- The Government is increasingly working with private entities to run projects ranging from ICT training for teachers to free Wi-Fi networks to increase ICT usage and improve digital literacy.

*Highlight:*

Ukufunda Virtual School, established by the South African Education Ministry, UNICEF and local social network Mxit, provides a complete personal learning solution with online curriculum, teacher training, tests, and updates for parents in South Africa accessible for free without data costs. The model works across platforms such as laptops, desktops and mobiles.

The school concept began in September 2014 and, by February 2015, more than 100,000 learners and 5,000 teachers had registered across over 8,000 virtual schools. Initiatives such as this should help to raise ICT awareness and digital literacy across underserved areas.



Source: <http://get.mxit.com/ukufunda/>

## Turkey

*Digital Enablement Indicator*

*Rankings:*

According to these indicators, the biggest barrier to digital inclusion in Turkey is affordability. Standards of digital literacy are high and access to communications is good, but the high cost of mobile services has an

impact on the appetite for digital services. Tax on mobile services is very high and the cost of even the cheapest smartphone is significantly higher than in the other 11 countries covered in this research.

- **Access: 4th/12**
- **Affordability: 8th/12**
- **Ability: 3rd/12**
- **Appetite: 5th /12**

*Digital Divide Priorities:*

- Like all the other countries, there is a priority to connect rural parts of Turkey.
- The Turkish government's project FATIH is supplying students at schools with tablets and classes with smart boards (65inch smart touch boards) to make education more interactive. The budget is \$8.3bn.
- FATIH forms an important part of the government's digital literacy program to help the digitally excluded (disabled, elderly, women in rural areas) to use technology and people's digital skills to improve employability and create an ICT community.



*Highlight:*

Turkish software association YASAD established an Entrepreneurship Training Center and Incubation Center, GEMIM, to act as a platform for software developers to accelerate new digital applications and services.

This is an important program in promoting digital literacy and awareness, especially as local entrepreneurs will provide digital services that are locally relevant. It is initiatives such as this that will encourage more local content and

in turn, should result in increased Internet usage and e-participation.

## UK

### *Digital Enablement Indicator Rankings:*

The UK is by far the most mature country surveyed and, while it has one of the most competitive broadband markets in the developed world, there are still digital divides to address. On the positive side, the UK has the highest proportion of fixed broadband connections, with headline speeds of 30Mbps. At the end of 2014, Ofcom reported that around 18% of UK households had no home access to the Internet, fixed or mobile. Although the availability of broadband services is improving, specific challenges remain for some consumers and businesses which include, rural availability, city not-spots and the availability of superfast broadband to small and medium sized enterprises (SMEs).

- **Access: 1st/12**
- **Affordability: 2nd/12**
- **Ability: 1st /12**

- **Appetite: 1st /12**

### *Digital Divide Priorities:*

- The UK is aiming for superfast fiber broadband for 90% of premises by 2020.
- The Digital Inclusion Charter aims to get those people currently offline, online and to keep them online. The focus is on those on low income and the elderly.
- Access may be an issue for some but the greater concern is around digital awareness and demand creation for digital services. There needs to be a clear motivation for some to learn digital services.
- Government is looking to use e-government services to engage with citizens – an example of this is the government's NHS participation program to encourage citizens to engage with medical professionals online.

### *Highlight:*

The Tinder Foundation's NHS: Widening Digital Participation program has increased usage of

health information online through its training program, run by 400 centers engaging with hard-to-reach groups, including homeless people. The objective is to ensure that those who are digitally excluded and may actually need health services the most are not marginalized from engaging with medical professionals.

In its third year, the program has so far reached over 230,000 people to raise awareness of digital health resources and trained over 140,000 people to manage their health online.



Source: [www.tinderfoundation.org](http://www.tinderfoundation.org)



# Appendix 2: 10 Trends that will affect digital enablement

We have a long way to go to achieve digital enablement for all. Here are 10 trends that may help speed up progress.

Trend	Example	Consequence
1 Technology innovation in fixed broadband internet.	New technologies like G.Fast as well as FTTx that can bring higher speeds and/or lower costs of connections.	Lower costs and faster roll-outs to those without broadband connections as well as expanded speeds to those with older technologies.
2 Technology innovation in mobile communications.	New satellite or unmanned aerial vehicle technologies. New uses of unused broadcasting frequencies and wi-fi.	Lower costs and faster roll-out to expand access for those in rural and isolated areas.
3 Expansion of pay-as-you-go renewable energy.	Low-cost solar power systems for home or small building use which are paid for in small amounts regularly.	Electricity that is cleaner and cost competitive with existing fuel sources that can power electronic devices.
4 Growth in use of advanced analytics	Analysis of images to detect skin cancer and of large amounts of data to predict weather impacts on crops or the spread of diseases.	New actionable information and knowledge as well as smarter systems to improve health, education, agricultural productivity and more.
5 Growth in smart phone adoption.	Low-cost smart phones that can access the internet and use capabilities such as accelerometers, cameras and GPS for \$30-\$50 and payable through affordable installments.	Timely, affordable, relevant and accessible information and services and improved abilities to communicate.
6 Improvements in machine learning.	Machine learning provides new, intelligent and future-orientated information to users by analyzing existing data. Coupled with speech recognition, it can enable a smart phone to be navigable by voice only.	Access to the internet for the illiterate and visually impaired as well as better user experience and smarter lives for all users.
7 Growth in social media, crowd sourcing and user generated content.	Social network services, such as Facebook, information services, such as Wikipedia and YouTube, and local information sites such as Bridge Africa.	Provision of local content and services in local languages and relevant to local users.
8 New services leveraging peer-to-peer technologies to drive collaborative consumption.	Services enabling sharing or direct purchase of transportation, accommodation, daily goods as well as peer-to-peer money lending.	New sources of income, better use of infrastructure, and more efficient provision of services.
9 Lower costs and new capabilities of sensors and expansion of the Internet of Things.	Low-cost sensors that can detect water, heat, movement, light etc and communicate results to other devices.	New and better information from monitoring and controlling physical things electronically leads to more efficient use of resource and transportation; improved prevention, detection and treatment of health; and smarter operations of cities, workplaces, homes amongst others.
10 Expansion of government influence over ICT use.	Use of ICT to provide government services and deliver public services, and regulations that provide new spectrum or investment for expanding connectivity.	More efficient access to and delivery of public services at lower costs to greater populations as well as increased access to connectivity.

# Appendix 3: Detailed assessment of barriers to digital enablement

In the appendix we provide a more detailed assessment of each of the 24 barriers to digital enablement described in our previous framework:

**Availability:** 1) Access to network connection; 2) Capability of network connection; 3) Access to device; 4) Capability of device; 5) Access to applications and services; 6) Capability of applications and services

**Affordability:** 7) Cost of network connection; 8) Value of network connection; 9) Cost of device; 10) Value of device; 11) Cost of applications and services; 12) Value of applications and services

**Appetite:** 13) Awareness and desire of network connection; 14) Fear of network connection; 15) Awareness and desire of device; 16) Fear of using device; 17) Awareness and desire of applications and services; 18) Fear of using applications and services

**Ability:** 19) Individual restrictions on using a network connection; 20) Digital skills to use a network connection; 21) Individual restrictions on using a devices; 22) Digital skills to use a device; 23) Individual restrictions on using applications and services; 24) Digital skills to use applications and services.

## Availability

Understanding availability is not just about physical access but also the capability of that access—to the network connection, device and application and service. The availability and advanced capabilities of ICT in more densely populated areas is arguably making the divide wider.

### *Availability of network connection*

A user needs access to a network and 450 million people still live out of range of a network connection. However a user also needs a capable network which has a reliable power supply, consistent access, high speed, and low latency. An accessible, capable network connection is fundamental to digital enablement.

to share infrastructure between operators in some markets may help reduce costs. Many governments also utilize Universal Service Funds as a means of investing in extending network access to areas that may not be commercially viable.

### **2. Capability of network connection:**

Lack of power supply is a major problem in many rural areas, as shown by Mexico, where half of schools have no Internet access and a fifth have no electrical power. Uncertainty of access is also a concern. For example, satellite can offer sorely-needed connectivity in the most difficult areas, but stormy weather often affects reception, and connection speed and quality may be poor. In Brazil, the government has provided 12,000 free satellite

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One billion people still don't have access to basic telephony.

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### **1. Access to network connection:**

Conditions are very challenging where there is low population density in geographically remote areas. Rolling out fixed or mobile broadband to these populations can be difficult and costly per user, particularly in rural and emerging markets, though recent efforts

connections to schools, but this includes areas where the rainy season lasts for up to six months.

The speed of a connection is important—the ability to download videos for educational purposes for example—but in the future speed and latency (the response time of

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## Quality of access constrains human end economic potential

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the network) will be even more important for individuals, small businesses, and local institutions such as clinics, schools, and government-run infrastructure such as transport and utility networks. Then there is the need for a quality connection for the ICT industry itself to grow: consider the limited digital engagement available to a talented software developer in fiber-poor North Africa versus their counterpart in fiber-rich Singapore.

### **Availability of device**

Users need ready access to a device that is capable of powering digital enablement services.

**3. Access to device:** A user needs access to a device that they may own, borrow from a friend or family member, or share with others in a public venue. Some users, such as women, are restricted from owning—or even accessing—devices due to local cultural and religious norms.

Users also need a power source to charge that device. There are now more than 20 pay-as-you-go solar power services across the world providing affordable power systems to those off the grid that they can use to

charge their mobile devices as well as power lights or kitchen equipment.

**4. Capability of device:** Much of the world has a feature phone but they are increasingly upgrading to smartphones which are coming down in value. This is crucial as the capability of a smartphone is only just being understood: with their fingerprint readers for identification purposes, GPS for location-based services, NFC functionality for payment services, as well as cameras, sensors and apps, there is so much that a device can enable. Without these functions, many digital enablement services cannot fulfill their potential.

### **Availability of applications and services**

There are now close to 2,000 services specifically providing development benefits over mobile phones, according to GSMA. But this is still not enough and many of these services are not accessible or are not providing the capabilities that many consumers need.

### **5. Access to applications and services:**

Locally relevant content in local languages is part of the solution. Today, more than 55% of Web content is in English, and no other language accounts for more than 6%, according to W3techs. But as some have found, local content is a

huge business opportunity: In India, award-winning mobile publisher Newshunt offers content in simple words in local languages including news and e-books in 12 languages to an audience that's 50 million strong and growing.

### **6. Capability of applications and services:**

To provide a capable service, it must meet consumers' diverse needs. Some farmers may need information on pesticides for vegetables, others information on building a greenhouse for fruits, or which crops to plant in a drought. Platforms that enable user-generated content can help, and there is an important role for e-government services.

Educational content needs to be in sync with the local curriculum and education tests for users to get the most benefit out of them. Often, education solutions focus only on technology, ignoring other practical matters like the need to factor in energy and data costs, let alone the fundamentally important non-ICT needs such as qualified teachers, healthy students, or school facilities. There is a narrow definition of education, with few solutions to help students work out what career is right for them, develop soft skills, or provide lifelong learning. KPIs are lacking and systemic assessments

## Hitting the road

In Indonesia, the government has set up 5,700 District Internet Service Centers (PLIK) offering free Internet access. For remote communities in areas where it is not economically feasible for service providers to build infrastructure, the government is funding mobile Internet cafes called M-PLIK. These souped-up vans (2,000 vehicles are planned) provide Internet access via satellite. M-PLIK are affordable, charging only \$0.11 per hour, though they are reliant on government subsidies to cover their costs. A positive aspect of the initiative is that it exposes people to the Internet and provides it cost effectively. The small charge goes some way to make the service appear more desirable to local people, driving up usage.

M-PLIK's future challenge is to cover its costs and provide better Internet service. It also needs to drive users to local commercial Internet café providers instead of competing with them.

**Mobile internet cafes can make Internet access more affordable at \$0.11 per hour.**

not commonly performed to understand how ICT is influencing what really matters: improving grades, learner confidence, or creativity, for example.

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“Education programs must focus on teachers, learners and parents”

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#### UN agency

Women and girls are a large and often disadvantaged group that frequently is unable to access traditional services or who need services specifically to meet their needs. In several countries, for example, prevailing cultural norms limit or exclude female exposure to education. But digital tools can offer a solution which enables private remote learning while also preserving traditions. In Egypt, the Misr El-kheir

Foundation brings the school to the girl, so they can study from home using a tablet. Teachers then visit a couple times a week to provide guidance.

#### Affordability

Affordability is certainly about cost—of a network connection, device or application and service—but it is also about value. It is important to reduce cost, but even more important to increase the value of a service. If a value is greater than cost, the chances are a market will develop and consumers will work out a solution.

#### Affordability of network connection

Affordability of a network connection is a significant barrier, particularly to the poor or disadvantaged, though there are innovative solutions to addressing it.

**7. Cost of network connection:** The cost of connection remains a major barrier. For those earning less than a dollar a day, even the costs of phone calls and text messages can be substantial, but the main barrier are data costs. In Mexico, six out of 10 mobile phones in use are smartphones, but two-thirds are used only on Wi-Fi for Internet access in order to avoid data charges.

Governments often incorporate solutions into national broadband network plans such as subsidizing Internet access centers as a way of making access more affordable. Blending paid and free services is a proven approach. With Russia’s rural broadband rollout, every village with more than 250 residents is receiving a Wi-Fi hotspot (with free access to government sites and low rates for others) with the aim that after residents experience the

### Educating young refugees

Access in the right place at the right time can also help redress imbalance. Huawei’s work with the Vodafone Foundation has created an “Instant Network” project has developed a mobile base station that can be easily transported to a disaster zone

**Student attendance rates have risen by 15%**

and provide much needed communications services to relief and emergency services and local populations.

With the UN High Commissioner for Refugees, Vodafone and Huawei are providing tablets with pop-up network connectivity, enabling children in refugee camps to resume their education. It takes less than half an hour to set up a Vodafone Instant Classroom. Each digital school in a box contains a laptop, 25 Huawei MediaPad tablets pre-loaded with educational software, a projector, a speaker and a 3G hotspot modem. Crucially, the digital classroom can run for a day without mains electricity.

In Dadaab, Kenya, the refugee settlement is the world’s largest. Among its population are 18,000 young Somali refugees between the ages of 7 and 20. Since rolling out tablet-based lessons, student attendance rates have risen by 15%.



Source: Vodafone Foundation Instant Network Schools programme

## Zero rating helps overcome the cost barrier

The poorest are often the most dependent on their mobile phones and can use up their limited mobile data allowances fast, according to the Pew Research, a U.S.-based think tank. But zero-rating data – an approach often used to access advertising and social media sites – could support needy communities in various ways.

In South Africa, the Ukufunda program is an initiative between UNICEF, mobile social network Mxit, the state education bureau, and local operator Cell C. Cell C zero-rates data so students and teachers can access rich educational resources (including the official curriculum), messaging and calendar functionality, teacher development material, counseling and support services, a virtual library, and career guidance.

Internet.org, led by Facebook and a group of mobile technology firms, has helped more than 3 million people access the Internet in the Philippines, working with mobile operator Globe. Offering free data access to its apps, making it easier for people to register for a data plan and get a loan for their plan, helped double the number of people using mobile data on Globe's network and grew their subscribers by 25%. In Paraguay, with TIGO, Internet.org grew the number of people using the internet by 50% over the course of the partnership and increased daily data usage by more than 50%. But replication of such programs depends on local regulation and beliefs.

1. Pew Research Center, 2015. US Smartphone use in 2015, <http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/>.

**Zero-rating of data by local telco carrier has led to an increase in data usage in Paraguay by more than 50%**

Internet they will be willing to pay to install it in their homes. In Turkey, the government provides a physical Internet House in each village with full-time staff, equipment and data provided. The challenge for these solutions is to systematically monitor their use for effectiveness and socioeconomic impact, and routinely tweak and adapt them to local needs and desires to provide maximum value.

Service providers can also play an important role in establishing innovative new business models that can help to reduce the cost of connections to end-users. One such example is the concept of zero-rating data - not charging data fees to access certain services, also known as sponsored data - where a company may pay your data costs for you to access their websites. Based on growing evidence, this could

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The challenge for these solutions is to tweak and adapt them to local needs and desires to provide maximum value.

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have huge potential to address the affordability barrier, specifically among the growing number of poorer smartphone users (see sidebar)

Another innovative business model example is FreedomPop which offers a free mobile data plan in the US to more than a million users and is expanding internationally. The company makes money from selling users additional data beyond the amount offered free of charge and additional services for which it will also charge.

### **8. Value of network connection:**

Increasingly mobile operators and social innovators are developing solutions that provide value to users just by having a network connection, before users get to actually using services. These include health insurance provided by Tigo in Senegal or Telenor in Pakistan in order to attract customers or reduce churn. Loyalty schemes are also popular; the mobile-based rewards program run by m.Paani in India gives users points every time they spend money on their phone (and elsewhere) that they can redeem for basic services. Finally it is important to note that for

many consumers the mobile phone has enabled their first ever bank account and could soon become a form of identification in of itself enabling users to gain social benefits for example.

### **Affordability of device**

Device affordability is primarily about cost, but there are some unusual aspects of value that are worth considering too.

**9. Cost of device:** The affordability of devices is still a barrier, but as handset prices continue to drop, and second hand devices enter the market in volume, this is not the issue it once was. The availability of mobile micro-payment and leasing schemes is taking the bite out of device costs; whilst many shared access points (including public libraries or telecenters such as those run by Telenor in Myanmar) also provide use of devices. Government removal of taxes on smartphones, computers and tablets has also helped in some countries. Separately, as well as telecommunications operators, providers of services from banking to health or education are looking to highly-subsidise or even hand-out free devices as a way to incentivize and



lock in users to their digital services (the subsidies are understood as a user acquisition or marketing cost). Governments often provide computers or tablets that children can use in schools to improve their education, and it might be they will even provide fitness bands to use in gym class to improve their health in the future.

**10. Value of device:** Beyond the services that devices enable, a physical device can provide other value too; one of the most common uses of devices, even in the developed world, is as a camera. In the developing world the torch and radio functions are often highly treasured.

### ***Affordability of applications and services***

Ultimately the most important aspect of digital enablement is the value the digital services provide compared to their cost. Digital services can be provided at much lower cost than many offline services, and often with more success and impact.

**11. Cost of applications and services:** Ultimately services need to have a viable business model to be sustainable, but many services are able to be provided for free though business models that may include subsidies from governments, advertisers, data purchasers or other users (so called “freemium”) to enable provision of services at zero cost to many users. Other services seek to make costs manageable through smaller regular payments (paid for by airtime) or irregular payments (such as in-app purchases). And where users do not pay costs directly, they pay indirectly: whether it is packaged into their bill, or provided to keep a customer from switching service providers.

There is often a link between the cost and value of a service: free services may not be the best, and they certainly run the risk of not being sustainable. Services that are entirely free are sometimes used well, but just as often such solutions are poor quality or suffer from a lack of ownership or take-up among local citizens. Indeed, a recent Brazilian survey found that 50% of rural inhabitants would not be interested in Internet access, even if it cost nothing. Meanwhile some of the best and most popular services are often paid services, but paid at a price that is affordable for the targeted user.

**12. Value of applications and services:** The crux of digital enablement: the education, employment, health, entertainment and other services delivered through a device and over a network. This is where the impact is, and it is these services that are most impactful, particularly for those in the developing world that may not have alternative services offline. The list of services is endless but there has been proven impact in areas as diverse as using digital services to help smokers quit, reducing corruption and even getting clean drinking water (by managing supply and demand

as well as payments). Value can also be achieved by reducing costs compared to non ICT alternatives, or by reducing opportunity costs. The ease of developing services through apps, hosted in the cloud, is bringing hugely valuable services to users. The services that are not valuable will fade away and newer, more valuable, services will develop.

### **Appetite**

The appetite and willingness to use ICT is primarily about awareness and desire, but also needs to account for a user’s fear from any risks that might arise.

### ***Appetite of using a network connection***

In general most people across the world are aware of telecommunications networks but a significant minority is not willing to use them for the internet, and there is an increasing level of fear of using them.

**13. Awareness and desire of network connection:** With the incredible growth of network coverage across the world, there is very high awareness and desire to be connected to a basic telephone

### **Door-to-door community selling succeeds**

In Cameroon, where barely 5% of the population uses the Internet, door-to-door advocates are persuading local people to go digital.

Employed by Bridge Africa, a group committed to driving up digital literacy and enablement, the door-to-door “salesmen” show people how they can use the Internet to advertise and sell their goods on social media platforms.



Maxine Moffett, Bridge Africa

This pragmatic approach not only works, but it’s paying for itself. Bridge Africa’s business model covers its outreach costs by earning commission from selling Internet access via Huawei dongles to local operator MTN’s network.

network but there are many who are not interested in going online. On one level, this is because of a lack of awareness and desire to benefit from the services, but even before that in the developing world there are still many people who are unaware of the internet and where overcoming this demands hyper-local and personal approaches (see sidebar). In the developed world, there is a fundamental assumption amongst some people that the internet is not helpful for them. In the US a 2013 Pew survey found that 23% of offline adults live in a household where someone else uses the internet at home.

Notably in developed countries, getting people online is only the first step. The real challenge for some segments such as the elderly is keeping them active online. One approach is to focus on people's daily needs, to improve routine tasks or deliver better experiences, such as simplifying shopping by doing it online or keeping in touch with relatives via video. Incentives can also work, such as requiring people to go online to obtain social benefits, for example, or providing them with rewards if they go online.

#### **14. Fear of network connection:**

Security and privacy of information over networks are increasingly mainstream concerns for users and can be real reasons for new users not to connect, or for some existing users to curtail their online activities. In addition many communities, particularly in emerging markets which are exposed to base stations for the first time, retain a fear of the electromagnetic frequency (EMF) radiation given off by telecommunications network equipment even though scientific studies have shown this

to be unfounded. For example in July 2015, Indian telecom operator BSNL reported complaints from local residents around MEF which slowed down the construction of new base stations.

#### ***Appetite of using a device***

The attractiveness of a device is not a barrier of note, but the fear of owning and using a device remains an issue.

#### **15. Awareness and desire of device:**

With such a diverse range of devices available and wide-scale marketing efforts, there are very few people who cannot find a device that interests them.

**16. Fear of using device:** There are several reasons why users may fear using a device. One of which relates to the risk of theft. In 2013, mobile phone theft represented up to 40% of all thefts in cities such as New York, though this has begun to decline after manufacturers built in "kill switches" making it devices inoperable if remotely deactivated. However theft of mobile devices still remains a big concern amongst consumers, particularly with the potential for the data on devices to be stolen and used fraudulently. Finally there is still a fear, particularly amongst parents, of the EMF radiation given off by devices and how that may affect their children. It is possible that this issue may become an increasing barrier once wearable technologies become more commonplace.

#### ***Appetite of using applications and services***

There is a major lack of awareness over which services exist and frequently a lack of desire from many segments of the population to access them; meanwhile there is an

increasing fear over the use of some services.

#### **17. Awareness and desire of applications and services:**

Stimulating desire for digital services is proving to be a challenge across many communities and many are not aware of the services in the first place. There may be a plethora of services available but there are challenges in marketing them to consumers (many development oriented services lack the marketing budgets of some commercial services) and demonstrating benefits. A survey by McKinsey in 2013 found that 69% of respondents in India cited the lack of awareness as the main reason for not using the internet. Many consumers may only use their device for basic search or social networking functions—the GSMA reports on an Infodev survey in 2012 in Kenya that found awareness of using mobile money service M-PESA is high but few people use other applications. Desire for a service is often based on perception, and in many countries the internet—or a mobile phone—is only perceived very narrowly, or as a service for a niche group.

Developing local content may increase the desire to use these services, but there's too often a lack of awareness of what's already available, whether it is the Worldreader online library of e-Books, containing a collection of over 15,500 books in no less than 43 languages, or the 750 free certified courses on ALISON, which has already attracted more than 5 million learners of all ages.

#### **18. Fear of using applications and services:**

There is a growing element of fear that holds some back from engaging digitally. This can include a lack of trust and credibility of the service providers, concern over certain

content that is available online, such as pornographic content, as well as fear of how services can be used, such as sending hate messages, stalking or cyber bullying. Digital resilience needs to become a core life skill, according to work conducted by the UK Internet advocacy group Parent Zone and Virgin Media.

There are increasing fears over how service providers store and use information, as well as general fears of fraud, identity theft and the security of services in light of frequent reports of hacking and thefts of information. There are also fears of overspending on phone calls or data packages that can hold back usage. Fear of technology is a factor that shouldn't be overlooked. Many people are afraid of what they do not understand, or cannot physically see. For example, making a financial transaction online requires a large element of trust, compared to paying in cash.

## Ability

A user may have a restriction on this or her ability to use ICT, such as being illiterate, or having a physical or mental disability or impairment. The elderly in particular are a key group that often faces physical and psychological barriers to using ICT. Users may also be unable to use ICT because they lack digital skills (known as digital literacy).

### **Ability to use network connection**

Connecting to a network can be a significant barrier for those with individual restrictions or those who lack such experience or digital skills.

**19. Individual restrictions on using a network connection:** Many telecom operators are required by

their licenses to ensure those with impairments can easily sign up to a network and can understand the costs or terms and conditions; some operators go further than others driven by the business case in connecting those users.

### **20. Digital skills to use a network connection:**

It may seem obvious to some, but to those new to using ICT, understanding different mobile networks, service plans, connecting to wi-fi and understanding the difference may not be intuitive. Connecting to fixed broadband can still be tricky and confusing with some providers, meanwhile most users struggle to know how many megabytes of data they need or use, yet that is important in understanding their connection costs and overall usage.

### **Ability to use device**

Using a device can be a major barrier for many; though there are some customized devices and user interfaces that can make this easier they are not available to all.

### **21. Individual restrictions on using a device:**

Off-the shelf devices do come with certain accessibility features that can help those with poor sight but for many they will need customized user interfaces or customized devices. These do exist but are certainly not easily available for many people, and there is still room for improvement. A case in point: touch screen phones are particularly difficult for the blind to use. Some new technologies are being developed, for example the one using Shape Memory Alloy technology in India. In the meantime, social enterprises like Project Ray and Protection and Ease (a Chinese company) have sold tens of thousands of customized Android interfaces that make a smartphone radically easier for blind people to use.

**22. Digital skills to use a device:** Digital literacy remains a major challenge in many countries. Smartphones and tablets may be easier to use than traditional computers, but still with a plethora of icons and swiping, not only can they not initially be intuitive to navigate but also bewildering and can scare some people off using their device. A McKinsey survey in 2013 found that the top reason Africans do not access the internet is a lack of digital skills. There are different stages of digital literacy, from using a voice phone to using a device's functions to using the internet to access services all the way to then creating content and services online.

There have been some successful initiatives in developed countries by BT, Barclays and the National Health Service, as examples from the UK. All three have business reasons for their efforts: increasing subscriber numbers, moving customers to lower-cost mobile banking services over branch services, or finding more effective ways to reach certain population groups that need health advice. Some companies have developed specific hardware or software products and services such as Mindings or Breezie that are simpler to use than typical smartphones or tablets. But in developing countries, there has been limited attention to this issue and few initiatives or organizations are working on it. This will need to change: Digital literacy will be more difficult to solve in developing economies due to greater cultural and literacy barriers.

### **Ability to use applications and services:**

There are major barriers for many disadvantaged groups to use the majority of the services online—not least the ability to read the content online—but at the same time



tremendous opportunities to use services that could overcome their specific disability or impairment. Meanwhile some services can be overcomplicated to use and not intuitive which can put many people off.

**23. Individual restrictions on using applications and services:** There are more than 700m illiterate adults worldwide. The inability to read is a major hindrance to the use of many digital tools and services. In some North African countries, for example, a quarter of the population is illiterate.

In the rush to provide Internet based solutions, tried-and-tested voice-based services are often neglected. Yet IVR and Natural Language Recognition, with services resembling Google Now, also offer valuable solutions. In particular, they could not only aid

the disabled and illiterate, but also help people with limited education to engage digitally, particularly once services are available in local dialects and languages. In one example, the Turkish government has given thousands of blind people a customized smartphone with a specialized talking GPS service that enables highly accurate walking instructions.

**24. Digital skills to use applications and services:** Even after a user can master the digital skills to use a device, there is still a substantial skills gaps in making the most out of services: from creating written content to using online video or gaming editing software, and then to creating simple websites. Unless people are digitally fluent, their use of digital tools will remain hesitant and sporadic.

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## Digital literacy remains a major challenge

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Though not a fundamental skills, the ability to code and master advanced ICT skills will enable consumers to develop a career and income in the burgeoning ICT industry. In most countries there is forecast to be a shortage of ICT skills in the near and mid-term.

Technology and standards evolve rapidly. This is a concern as people decide whether or not to invest time and money in training. Those designing training programs must ensure that they've kept up to date with the latest trends.

# Appendix 4:


## Organizations interviewed

Alison  
Ashoka  
Avea, Turkey  
Bharti Foundation, India  
Bodhi Health, India  
Bridge Africa, Cameroon  
British Red Cross  
BSR  
BT  
Cairo University, Egypt  
Cherie Blair Foundation  
Communications Ministry, Brazil  
Competition of Robot Design, Egypt  
Competitive Intelligence Unit, Mexico  
Cyber Security Association, Turkey  
Department of Communications, South Africa  
Department for Culture, Media and Sport, UK  
Department for International Development, UK  
Deutsche Telekom  
Embratel  
Ekgaon Technologies  
Facebook  
GSMA  
Government Digital Service, UK  
Health Enabled  
ICT Authority, Kenya  
Indosat, Indonesia  
Informatics Association, Turkey  
Innovation Hub, South Africa  
International Federation of Red Cross  
Internet.org  
Isizwe, South Africa  
ITU  
JOYWO, Kenya  
Kenya Red Cross Society  
KIO Foundation, Mexico  
Mastel, Indonesia  
MegaFon Foundation, Russia  
Micro Clinic Technologies, Kenya  
Ministry of Commerce, India  
Ministry of Communications, Turkey  
Ministry of Communications & Informatics, Indonesia  
Mikado, Turkey  
Ministry of Economy, Mexico  
Ministry of Education, Mexico  
Misr-El Kheir, Egypt  
Mozilla  
MPaani, India  
MTN  
Myanmar Centre for Responsible Business  
National Digital Agenda, Mexico  
National Health Service, UK  
NPC, UK  
Ooredoo Group  
Ooredoo Myanmar  
O2, UK  
Orange  
Orange Kenya  
Ovum  
Pesinet, Mali  
Phandeeyar, Myanmar  
Proacceso Foundation  
Project Hub, Myanmar  
Projeto Saúde & Alegria, Brazil  
RLabs, South Africa  
Rostelecom, Russia  
Safaricom, Kenya  
Sampoerna Foundation  
Save the Children South Africa  
Semear Foundation, Brazil  
SOS Children's Village  
Techsoup  
Telefonica Foundation, Brazil  
Telefonica Foundation, Mexico  
Telenor Group  
Telenor Myanmar  
Telkom, South Africa  
Tinder Foundation, UK  
TUBISAD, Turkey  
UN Development Program  
UN Foundation  
UNICEF South Africa  
USAID, Myanmar  
VimpelCom  
Virgin Media, UK  
Vodacom, South Africa  
Vodafone Egypt  
Vodafone  
Wayra UnLtd Academy  
XL Axiata, Indonesia  
YASAD, Turkey

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