

BRINGING AFRICA ONLINE



Connections that make the leap

Rapid communication advances could help everything from commerce to healthcare, says **Pamela Whitby**

Transformative in nature, information communication technologies (ICT) are the backbone of every sector, and in many respects the glue that binds them together. In Africa, however, it is a combination of both traditional and new technologies that's driving the growth in financial services to the unbanked, e-health to the ailing and adaptive e-learning platforms to schools in far-flung rural areas.

Speaking at the Telegraph's Future of African Broadband summit, Education Secretary Justine Greening – until recently Secretary of State in the UK Department for International Development (DFID) – pointed to the “almost instantaneous impact” that connectivity innovations are having in sub-Saharan Africa.

With a growing understanding of the economic and societal benefit that connectivity can deliver, connecting Africa more fully in the 21st century is high on the agenda of politicians, business leaders and aid organisations alike. It is also viewed as pivotal to realising the United Nations' Sustainable Development Goals (SDGs). From ending extreme poverty and hunger at the top of the list to delivering universal health coverage and quality education and combating climate change, all by 2030, the UN's ambitious 17-point plan represents a huge opportunity to drive the connectivity agenda.

In the mobile space, things are moving fast and predictions are difficult. The example of South African telecoms operator MTN estimating in 2001 that only 15m Nigerians would be able to afford mobile handsets is a case in point. In November 2014 there were 136m active phone lines in Nigeria and just 0.2pc were fixed. So, with Africans becoming wealthier – though hard to define, the African Development Bank (AfDB) classifies 350m Africans today as middle class – it's a region that a growing number are finding too compelling to ignore. McKinsey's *Lions on the Move* report cements the point.

“If the internet were to follow a path similar to mobile telecoms in Africa, iGDP could account for as much as 10pc of total GDP by 2025 or more than \$300bn, roughly the size of Nigeria's economy today.”

Economic growth goes hand-in-hand with job creation, and in 2014 the mobile ecosystem supported 4.4m jobs; that number is expected to rise to 6m by 2020.

Joseph Mucheru, cabinet secretary in Kenya's Ministry of Information, is strongly focused on job creation and in particular for the growing youth segment – hence national government's focus on driving digital literacy in schools. Today there are 200m people aged between 15 and 24 in Africa and 20pc are unemployed,

Just surfing Access to the internet means wider educational opportunities

“Connectivity already has a phenomenal impact on unlocking challenges we never thought possible”

Justine Greening

according to the UN Development Programme Human Development Index. With rising discontent leading to youth protests witnessed recently in places such as Senegal, Tunisia and South Africa, this is arguably one of Africa's most explosive issues.

The UK government is playing its part and has already doubled bilateral spending on driving growth and jobs on the continent which, says Ms Greening, is directly linked to internet connectivity. The ability to deliver online content in turn generates data, which can help drive transparency and this, she continues, is already having a “phenomenal impact on unlocking challenges we never thought possible”. Among these are the ability to tackle corruption (a priority for DFID), use of GPS mapping technology to identify the scale of trachoma risk, a major cause of blindness in the region, as well as improve literacy levels in Kenya by 36pc.

To a greater or lesser degree, African governments are playing their part in creating the right enabling environment for driving ICT adoption and innovation. And today there are 314 tech hubs concentrated in five countries – South Africa, Kenya, Nigeria, Egypt and Morocco. One of the most successful is Nairobi-based iHub – out of it has come Weza Tele, a financial services tech company that was sold

to South African financial services provider AFB last year for \$1.7m. Also in Kenya, IBM has benefited from support by the Kenya government to the tune of \$10m. In 2013, it opened what is said to be the first commercial technology research laboratory on the continent, in the “Silicon Savannah” as Nairobi has become known; a second lab has now opened in Johannesburg.

Ultimately, firms such as IBM are in Africa to drive profits, something about which Mr Mucheru, a former Google lead for sub-Saharan Africa, is pragmatic, providing that government ensures the right checks and balances are in place to protect the rights of citizens, especially the most needy. For Ms Greening, women in sub-Saharan Africa, who are 30pc less likely than men to own a phone, fall into this category of pressing need. “This isn't some niche issue, it's half the population,” she says.

But Ms Greening is pragmatic too and, though she is not without critics, argues strongly that the way forward for a rising Africa is in partnerships between government, business and non-governmental organisations such as the initiative involving DFID, the Kenyan government, satellite communications provider Avanti Communications and others. “For me it is not a question of ‘either/or’, it is both and more,” she says.

Why education in Africa will leave no stone unturned

Smoothing out inequality of schooling between rich and poor pupils and urban and rural areas is a huge task for governments, but the advent of communications technology is bringing change

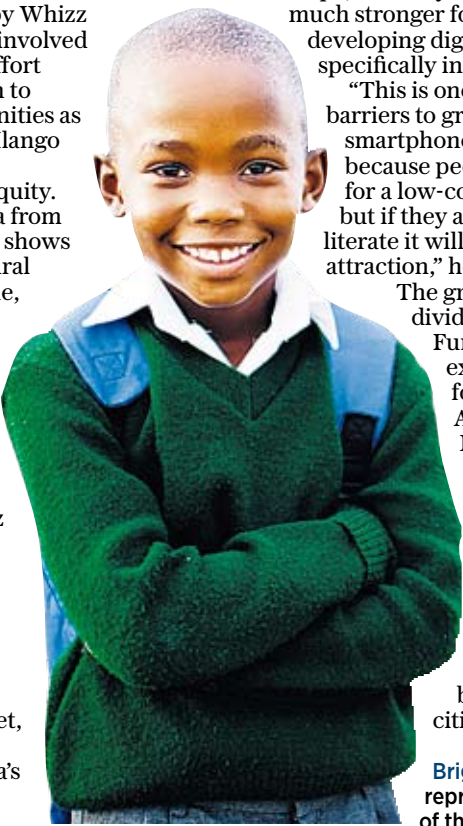
The African proverb that says: “Instruction in youth is like engraving in stone,” speaks directly to the painstaking yet potentially long-lasting work that lies ahead for the continent’s educators.

According to Unicef, today half of the world’s 59m out-of-school children live in sub-Saharan Africa, with a third of these in West and Central Africa. Across Africa, school completion rates are poor and children also achieve low literacy and numeracy scores. The situation is particularly dire in rural areas, with children twice as likely to be out of primary school than their urban counterparts. In the west African country of Niger, for example, 83pc of children in urban areas attended primary school in 2012 versus just 45pc in rural areas in the same year.

Despite global efforts, girls remain the most disadvantaged. A recent Unesco report finds that no country in sub-Saharan Africa had achieved gender parity at primary and secondary level. Of the 18 countries with fewer than 90 girls for every 100 boys enrolled in primary school, 13 are in sub-Saharan Africa.

Data gathered by Whizz Education, a firm involved in a multilateral effort to bring education to 200 rural communities as part of Avanti’s iMlango project, further highlights the inequity. “Our learning data from the past two years shows that children in rural Kenya, for example, are four years behind their equivalent in the top private schools in Nairobi,” says Richard Marett, founder and chief executive of Whizz Education.

Increasingly, however, there is growing recognition of the role that ICT, and specifically broadband internet, can play in “instructing Africa’s youth” in rural areas. Kenya’s



Bright hope Children represent the future of the region

Digital Learning Programme, begun by the government in 2013 with the promise of equipping all 22,000 public primary schools with 1.2m digital devices by the end of 2017, is a case in point. Playing its part in phase one of this multi-stakeholder effort is Kenyan mobile operator Safaricom, which is delivering free Wi-Fi into the first 150 schools.

“Sometimes in business it just feels right to do something, even if it isn’t going to yield immediate profits,” says Bob Collymore, chief executive of Safaricom, “and this was one of those ‘investing now for the future’ moments.”

Philanthropic though this might sound, Africa’s “biggest resource,” a fast-growing youthful population of 226m, is expected to double by 2050, a point not lost on Mr Collymore. Safaricom is seeing strong growth in data usage, which has more than compensated for the loss of voice revenue but market penetration is, he says, “much higher among the youth than of people my age”.

To harness this “demographic dividend” and help to reduce youth unemployment which stands at more than 20pc, Mr Collymore argues for a much stronger focus on developing digital literacy, specifically in rural areas.

“This is one of the biggest barriers to growth in smartphone connectivity because people can save up for a low-cost smartphone but if they aren’t digitally literate it will have no attraction,” he says.

The growing digital divide is a concern for Funke Opeke, chief executive and founder of West African telco MainOne.

“Before we built our cable we talked about a digital divide between regions but now we are seeing another digital divide between coastal cities and larger

cities where infrastructure exists”.

The link between basic infrastructure and connectivity is important, says Zlatina Loudjeva, PricewaterhouseCooper (PwC) director for infrastructure and cities for economic development. “There is no point putting laptops or tablets in schools with no electricity, running water or functioning toilets,” she says.

The question then is this: how does Africa resolve the infrastructure issue in schools in the most cost effective way, using the most recent and cost effective technology? Ms Loudjeva is clear that it isn’t the role of private-sector companies [such as Avanti, Safaricom or Whizz] to create basic infrastructure or to regulate the education system, but there is a place in Africa for targeted, integrated public/private sector partnerships.

The issue becomes thorny over the question of how education can be funded when governments are cash strapped, with critics questioning the role of the private sector in developing countries. In fact, top of Unesco’s list of recommendations going forward is that education should be free – really free.

Ms Opeke, who has a degree in electronics and electrical engineering, is an evangelic advocate of the importance of education and the impact it can have on economic development. Her argument is that broadband technology brings the cost of education down, and makes it available in a non-discriminatory way.

“It’s really about getting to the people who are disenfranchised, who don’t have the opportunities and getting them into the mainstream,” she says. “Deploying high-speed broadband technologies to rural areas will drive faster adoption of ICT and internet in schools, help government get services online and drive economic growth as a result.”

Is this happening fast enough? Whizz education’s Mr Marett says few governments globally have fully understood the power of ICT delivered via the internet, but that is changing. “The idea that we can do something with ICT to address every child’s individual learning needs is coming into consciousness,” he says.

Like engraving in stone it may take longer than expected but the political kudos that will come with lasting results may just make it worthwhile.



Data-sharing revolution that can help to solve ‘mission impossible’

The tricky logistics of large classes of all ages and across wide areas can be addressed with internet learning and instant analytics

Take a typical primary school in the UK and it’s not unusual to find a four-year range in mathematics ability. In Kenya, by contrast, where classes can have more than 100 pupils aged from six to 20-something, that ability range can vary by as much as seven years.

“In this scenario, delivering a lesson that is relevant to all pupils is, quite frankly, mission impossible,” says Richard Marett, co-founder and chief executive of UK-based Whizz Education, a “virtual maths tutor”, and one of the partner’s in the Avanti-led iMlango project.

But as artificial intelligence and adaptive learning technologies delivered via the internet come of age, Mr Marett argues that “it will be possible in future to provide

a private tutor to the poorest children on earth”.

Avanti-led projects such as iMlango (a Swahili derivative meaning doorway or portal) and iKnowledge are playing their part in this by delivering high-speed “connected” education via satellite to disadvantaged children in rural schools.

In Kenya, iMlango is one of the projects that has received funding under the Girls Education Challenge (GEC), a £355m initiative of UK Department for International Development (DFID). It aims to improve educational outcomes for 150,000 children, 50,000 of whom are marginalised girls, in 195 schools over a two-year period.

Similarly, iKnowledge in Tanzania is equipping 250 schools in underserved areas with ICT infrastructure and teacher-training content. The provision of training and educational e-learning content is a core element of both projects.

“By providing students and teachers with the technical solutions to connect in real-time to maths programmes such as

Whizz, iMlango is proving that targeted, integrated partnerships can work as a development model in Africa,” says Zlatina Loudjeva of PwC, which manages the GEC on behalf of DFID.

One of the most compelling and transformative aspects of iMlango is this real-time ability to measure and benchmark factors such as daily attendance, the number of students completing lessons and individual progress. This data, a valuable by-product of internet learning, can then be used to analyse progress by class, school, region and even country.

“This is interesting on multiple levels,” argues Mr Marett, “but not least because you can ask the question ‘why am I seeing what I’m seeing right now and how can I adapt to the individual learning needs of every child?’”

Suddenly, “mission impossible” in meeting the needs in a class of more than 100 becomes a lot more manageable, because you can potentially make an adjustment to a programme

“It will be possible in future to provide a private tutor to the poorest children on earth

Richard Marett

Girl power Online Learning helps female students, who are often marginalised



that might make a significant impact when it is actually needed.

“In theory, you can put educational content offline but this would only have a fraction of the impact,” Mr Marett says.

To highlight the point, a recent analysis of live data showed that 30pc of children in the iMlango project were not completing individual lessons versus 11pc elsewhere in the world.

“In an offline programme, we would have waited till the end of a course to analyse the data to find the answer, a bit like revising

for an exam after it’s finished,” says Marett.

Instead, because the data was live, analysts were able to ask why and make adjustments accordingly, at the point of need.

Perhaps unsurprisingly internet and power cuts were two issues that prevented children from completing lessons but in some cases it was a product of iMlango’s success.

In large schools with more than 700 pupils, for example, a strict timetable and limited number of devices meant eager children simply didn’t have enough time on a session. But a simple adaptation to account for these factors saw the number of children completing lessons increase by 10pc over two weeks.

The interactive learning platform is proving popular, with attendance rising by 15pc in some cases and children arriving two hours before school to get into the computer lab. Some teachers even defied a recent national strike and saw the best Year 8 maths results on record as a result.

“There may be a shortage of devices but there is no

shortage of enthusiasm,” Mr Marett says.

While governments globally have not yet fully grasped the data-driven power that internet-enabled programmes deliver, when they recognise the impact on monitoring attendance, individual learning, weather patterns and more, this will change.

“We are all still learning,” says Mr Marett, “but with live data the ability to simulate the actions of a private tutor for every child in the world is only a matter of time.”

These two projects and the obvious beneficial outcomes of them, inspired chief executive David Williams to realise Every Child Online (ECO), a collaboration between communication and education ministries, government sponsors, private corporate social responsibility (CSR) donors and local service providers.

ECO ensures that the community is involved with the sustainable model for digital education for both teachers and students, as well as generating CSR value and results.







AFRICA CONNECTED

It's a numbers game – data is a commodity and mobile drives data. Below are some statistics the data shows, and what the experts predict.

1BN

Africa's population

\$150BN

mobile technology and services contribution to GDP

350M

Africans classified as middle class (1.1bn by 2060)

367M

mobile Internet subscribers

200M

people aged 15–24

4.4M

jobs created by the mobile ecosystem (6m by 2020)

20%

youth unemployment

5.7%

GDP growth generated by the mobile ecosystem (2014)

5%

average GDP growth in Africa between 2013–2015

314

technology hubs in Africa

Sources GSMA, AfDB, International Telecommunications Union, McKinsey, Lions Go Digital

*dates are for 2015 unless otherwise stated



Network power would deliver rural broadband

Africa's sheer size means challenges for online operators but it's time to pull together and share resources, say experts

Delivering ubiquitous, reliable broadband to remote parts of Africa may be technically, geographically and financially challenging but the economic benefits are well documented. According to a 2016 report from the World Bank, in low- to middle-income countries a 10pc rise in broadband penetration accelerates economic growth by 1.38pc. Yet today more than 70pc of Africans still do not have access to the internet, and those who do are concentrated in urban areas, according to a 2015 ITU report, *Measuring the Information Society*. Addressing this rural broadband challenge cost-effectively is a puzzle governments are trying to solve and the private sector is hoping to profit from. Despite revenue and margin pressures, operators across the region have continued to invest heavily to expand network coverage, according to the GSMA, a body representing mobile operators worldwide. In 2014, capital investment totalled \$9bn and is set to reach \$13.6bn (24pc of total revenues) by 2020. As McKinsey's *Lions on the Move* report puts it: "If the internet were to follow a path similar to mobile telecoms in Africa, iGDP could account for as much as 10pc of total GDP by 2025 or more than \$300bn, roughly the size of Nigeria's economy today."

Millicom, a global digital lifestyle firm with operations in five African countries, is one that is strongly focused on this opportunity. "In some parts of Europe the market is declining but in Africa we are still seeing strong double-digit growth," says Cynthia Gordon, Millicom's chief executive. "We believe that the real growth is going to be in data usage." This trend is mirrored across the industry with GSMA reporting that operators in the region recorded data traffic growth of more than 50pc in 2015. Today data contributes 10pc to Millicom revenues but Ms Gordon expects this to rise to more than a third in the next five years. As a first step, there is a need for better use of existing networks, especially in rural areas where "we're running at quite low utilisation and quite low profitability as a result." Ms Gordon advocates infrastructure network sharing and believes that "this is one of the best ways to reach rural communities in an affordable way". Although there has been some resistance to network sharing from incumbent operators, French telecoms heavyweight Aldo Mareuse, who joined Telkom Kenya as chief executive this year understands the benefits. "Network sharing or open-access arrangements are imperative for the promotion of a greater variety of options for the consumer," he says. "Telcos with dark-fibre capacity should participate fully in the expansion of broadband networks to rural areas."

Bob Collymore of Kenya's Safaricom says network sharing is an inevitable and important step to take. "Instead of standing on



the beach and panicking that the sea might come in, you need to get on the surfboard and ride it," he says. Network sharing's success will be contingent upon hybrid networks, which will be needed to achieve total coverage, and will need to demonstrate efficient use of all participants' capabilities. In order to be a sustainable long-term solution, those organisations working on running such networks will need to ensure that they remain efficient and affordable without compromising on their scale or effectiveness. In markets with limited infrastructure, open-access agreements can spur competition by lowering the cost of entry, as new players don't have to build the network from scratch.

Connected Governments are working to roll out smart cities and villages

However, one challenge to network sharing remains, says Ms Gordon, and this is that some global players that invested heavily in fibre roll-out in Africa continue to charge high prices. "Wholesale pricing schemes are trying to recoup the investment too quickly and that could discourage us from investing," she says. On a positive note, industry peers in Africa seem to be in agreement that from fibre consortium agreements to power-co-location and tower sharing, collaborating to share infrastructure is the best way forward. "Then," says Ms Gordon, "it's just a case of ironing out the practical details country by country." Yet communications policy can vary widely between countries and

“Instead of standing panicking on the beach, you need to get onto the surfboard and ride it”

Bob Collymore

Ms Gordon argues that a common mistake is for governments to impose high taxes on mobile ownership and devices. "This may deliver short-term benefits but entirely misses the huge opportunity for longer-term GDP growth," she says. Mr Mareuse cites the UK wired broadband market as an example of how the right approach can work (the number of unbundled broadband lines rose from just above 100,000 in 2005 to more than 8m by the end of 2012). But he says telecom operators "won't adopt sharing arrangements of their own volition" and need a regulatory prod. In Africa, Kenya and Rwanda are two notable examples among countries where multi-stakeholder programmes are in progress. Telkom Kenya is working closely with government to deliver free internet in all 290 parliamentary constituencies with a strong focus on empowering communities in rural areas. The government is considering investment in wireless and the latest Ka-band satellite broadband technology as alternatives to fibre. This is especially good for hard-to-reach areas where terrestrial costs can be nearly 40 times more than reaching the initial 95pc of the population. Meanwhile, in Rwanda, Millicom is involved in a "smart village" programme, a central aim of the Smart Rwanda 2020 Master Plan. "There is a lot of focus on smart cities in Africa but we are pioneering a way forward to establish the best model for deployment of smart villages which can be replicated across the continent," says Ms Gordon.



For more information about Avanti and the ECO initiative, visit tgr.ph/avanti or avantiplc.co/eco

Broadband in the vanguard of education

The more communications networks that are rolled out in Africa, the more educated the population will become, says **Vaughan O’Grady**

To develop and deliver a truly purposeful and sustainable corporate social responsibility (CSR) programme is challenging. Every Child Online (ECO) brings together satellite technology, Wi-Fi, solar power, ICT and unique CSR funding concepts, offering affordable, sustainable broadband to thousands of schools and communities across Africa. According to some estimates, less than a third of the population in sub-Saharan Africa today has internet access and 38 million children are not in school. Government, NGOs and private groups are willing to help but the cost can be prohibitive. The internet can make access to education and other services easier and faster, if it can be delivered in a cost-effective way. And very soon it could be. In September, Avanti launched ECO, an initiative to provide fast, affordable broadband internet to isolated schools and communities across sub-Saharan Africa. A number of factors have contributed to make this possible. The European Space Agency (ESA) has contributed €10.7m (£9.7m) to help connect 1,400 sites across sub-Saharan Africa over the next two years using ECO. Equally important are the technology and business models that make ECO viable. In recent years, new-generation high-frequency Ka-band satellites have been launched. For the first time broadband can be supplied across Africa by satellite at very low cost. The next technological advances are on the ground: the point of

presence (PoP) to which the satellite transmits and a high-throughput VSAT (a dish-shaped terminal) to receive fast satellite broadband. The VSAT connects to a modem and in turn a computer and Wi-Fi access point (inside the school). A cable then runs from the modem cabinet to a Wi-Fi transmitter on the roof for local loop connectivity. This means children can access online e-learning powered by solar cells with few or no running costs. There’s also an innovative business model that means the school acts as a central point for the rest of the community. The scheme’s initial infrastructure will be funded by government sponsors and CSR donors. The school receives a subsidised broadband service, which it hosts and maintains, as well as reporting faults to the national service provider, which is paid to install the PoPs and is responsible for maintaining them. Each national network is operated and maintained on a partnership basis by local service providers, whose brand will be carried by the school. David Williams, chief executive officer of Avanti, says: “The aim of ECO is to create something new, something that will address a need across an entire continent. The right products, the right partnerships and the right business models can together create an economically viable and lasting way to deliver broadband to rural Africa.” Essentially, ECO will provide subsidised broadband for connected schools for an extended period, but it is also partly subsidised by its provision of high-speed Wi-Fi hotspots to help otherwise unconnected community members and local businesses get online. To do so comes at a charge, albeit an affordable one. These community members download an application,



Moving forward Investment is needed to bridge communications gaps in Africa but a huge market is waiting to come online



The aim of ECO is to create something new that will address a need across an entire continent

David Williams

which allows them to buy broadband credits that can be used or traded. The revenues generated help to offset the cost to both Avanti and the service providers and also supports the provision of more infrastructure. There’s also a significant CSR opportunity in this scheme for service providers. Donations of ICT equipment and support for a school can be tracked with professional monitoring and evaluation including photography and impact reports about the difference they are making. Avanti is confident that extended support will bring more sponsorship and customer access advantages. The ECO business model sees government and CSR donors delivering initial funding of around \$5,000 (£4,000) per school. However, take-up on a wide scale will bring that down. Scale will drive affordability and investment, which in turn, will drive wider internet access. The plan is already proven in Avanti’s role as lead in delivering through the iMlango and iKnowledge projects. Avanti and its UK partners, the Department for International Development (DFID), and UK Space Agency (UKSA), have already funded the installation into hundreds of schools with more planned in partnership with existing Avanti service providers. Many ministries, technology companies, NGOs and service providers have already expressed support for ECO. Among fans is the European Space Agency (ESA), whose support has been pivotal in making it happen. Magali Vaissiere, its director of telecommunications and integrated applications says: “We look forward to working with Avanti in sub-Saharan Africa to support better education outcomes and to unlock new business opportunities for local service providers and European industry technology providers.”