SOUTH AFRICA in the DIGITAL AGE

Delivering mass digital inclusion through a crisis

A knowledge document compiled by Genesis Analytics in partnership with Digital Pathways at Oxford University

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Introduction

The digital economy is delivering new inclusive development pathways to address the wicked challenges of poverty, inequality and unemployment across the developing world. However, over half the global population does not make use of the internet in the course of their daily lives.[1] While internet access has been improving steadily since the early 1990s, this means that an enormous segment of the population does not have access to the growing income-generating and social welfare opportunities delivered through the digital economy.

Fast and affordable broadband, and the services that it enables, are critical during the COVID-19 pandemic and its aftermath to enable the marginalised to protect their health, complete their education, build new skills, and access incomes. Broadband connectivity is particularly important in this context because the kinds of learning- and earning-from-home activities that people need to undertake require stable and high-speed internet connections. By providing everyone with access to affordable broadband internet (and the devices, tools and content they need to derive benefit from it), developing countries can generate inclusive growth by allowing a much broader range of citizens to support their livelihoods through the digital economy.

The *South Africa in the Digital Age (SADA)* initiative was convened to address the opportunity of scaling income-generating work through the digital economy. Through a process of joint solutioning with a large number of stakeholders across South Africa, SADA developed a forward-looking economic blueprint for the country in the form of a strategy primer. Universal digital inclusion was identified as the first imperative the country must get right to deliver an inclusive tech-driven development pathway. Genesis Analytics and Digital Pathways at Oxford University have partnered again to provide a concrete plan for the country to realise this imperative. All of this work informed the development of the country's national ICT and Digital Economy Masterplan.

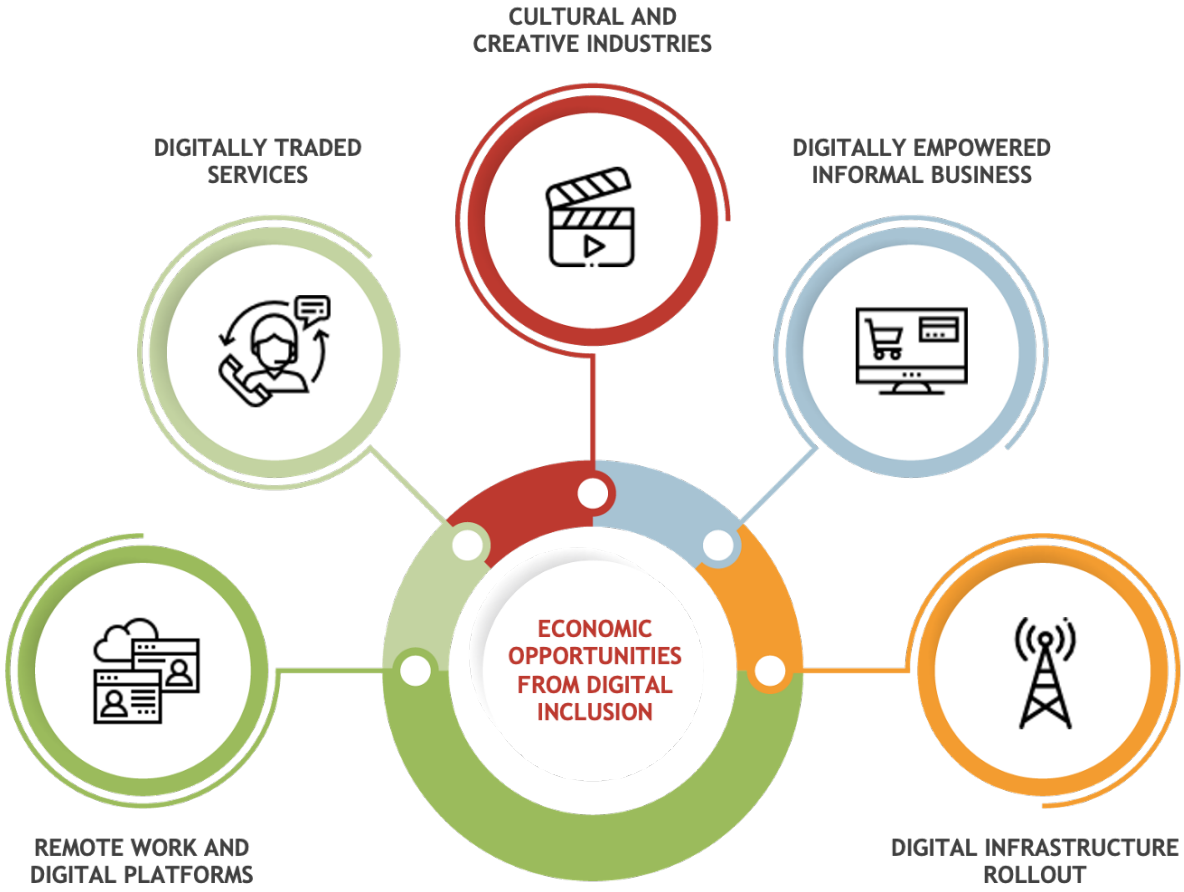
In this paper, the key learnings from the SADA process are captured to inform approaches to achieving universal digital inclusion in other developing contexts. This begins by exploring the components of digital inclusion which matters, particularly in the challenging context of global crisis. It then explores some of the solutions that can be used to put these components in place, with examples from South Africa explored. Lastly, it captures some of the key process learnings from the SADA initiative to inform how the process of driving digital inclusion can be replicated in other developing country contexts.

Digital inclusion in a challenging global context

The desperate need to communicate, work and trade virtually during the COVID-19 pandemic has demonstrated the immense job-creation value that the digital economy can unlock. The digital economy's novel sources of work have been demonstrated during the COVID pandemic where physical engagement was severely limited and businesses of all types had to adjust to virtual methods of production and consumption. Once the pandemic has abated, it is anticipated that the demand for digital services and delivery channels will continue to grow as their efficiency and cost-reduction gains are now being evidenced at scale. Some of the key opportunities for developing countries to generate income through digitally connected citizens are shown in the diagram below.

[1] From Our World in Data, the share of the world population using the internet in 2016 was 46%, cited data sources are ITU World Telecommunications Development Report via the World Bank Development Indicators, online, available: https://ourworldindata.org/internet

Figure 1: Economic opportunities stemming from digital inclusion



Once connected, marginalised citizens can participate in work-from-home and digital platforms income-generating opportunities. During the pandemic, a number of businesses have shifted to remote working models which allow a broader range of people to access work opportunities irrespective of where they are located. In South Africa, for example, Amazon Web Services is seeking 3,000 remote customer support agents for those who have a 10mbps fixed line broadband connection to their home.

Global digital services are becoming one of the most job-rich and expandable exports. This includes a range of B2B services, such as contact centres, as well as personal and social services such as online English tutoring and long-distance care. For example, South Africa is on track to create more than 500 000 new digitally traded export jobs in the next 10 years.

Digital technologies are creating new avenues to market for the cultural and creative industries. Digital technologies are increasingly being used to disrupt the power of traditional gate-keepers in publishing, music, film and visual arts and craft through internet-based access to markets and by monetizing content creation. In South Africa, these industries contribute 2.5% of jobs – roughly the same as mining – and when including indirect jobs this increases to 6.72%.[2]

The informal sector, which is typically large in developing countries, can be empowered through digital tools and channels. Many people earn an income in the informal sector through small business operations such as corner shops, food outlets, hair salons and transport services. These businesses tend to be run in a cash-based economy primarily through face-to-face transactions. A suite of digital tools

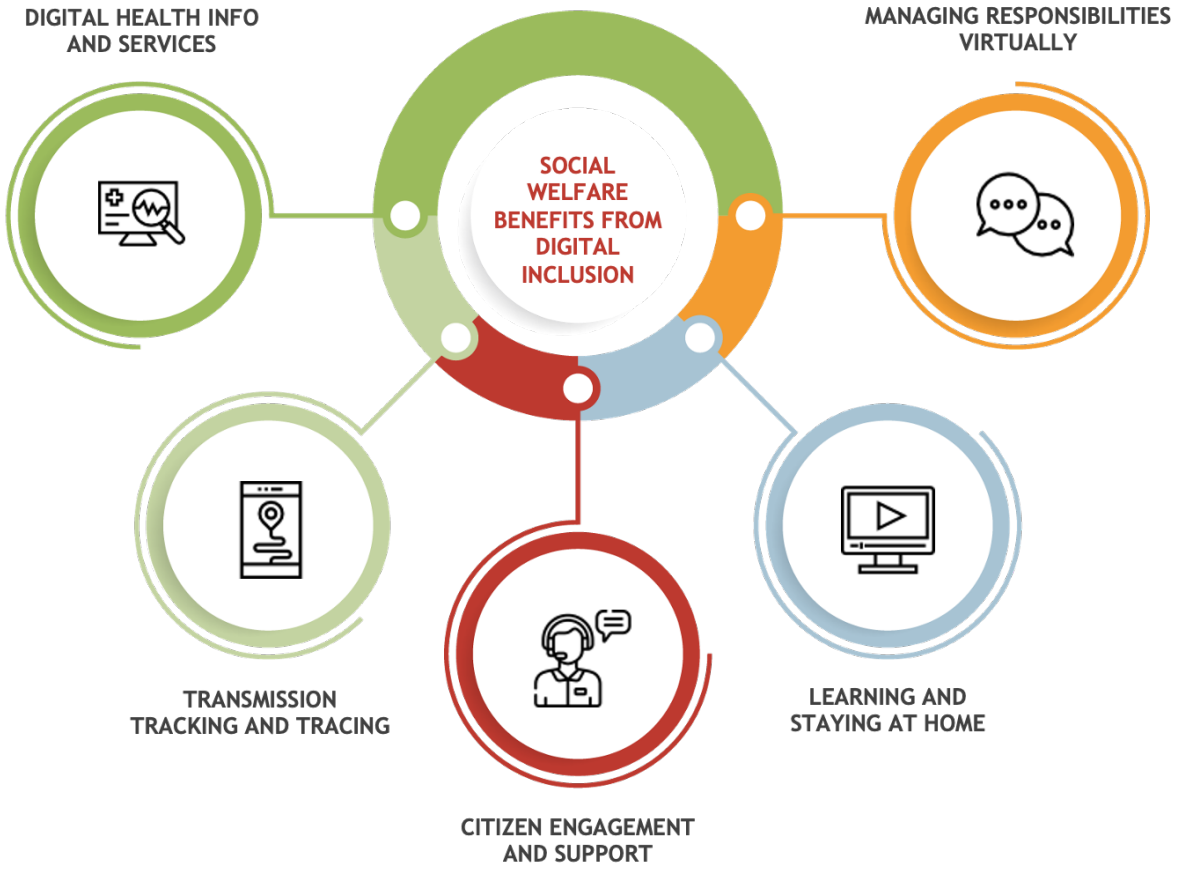
[2] Haines, R. Lutshaba, U & Shelver, A (2018) Cultural and Creative Industry Trends. South African Cultural Observatory, for the Department of Arts and Culture

are becoming available globally to assist small business owners to run their operations more efficiently, access new customers markets and connect to supply chains that are beyond the immediate geographic location of where these businesses tends to operate.

The rollout of digital infrastructure required to meet these digital inclusion needs is a job creator in its own right. The deployment of the backbone telco infrastructure by the state and last-mile connectivity infrastructure in the form of fibre to the home, public WiFi hotspots and 5G coverage by the private sector will all provide jobs in manufacturing, construction, installation, repairs and maintenance, and ongoing services. In South Africa, for example, this is likely to generate at least 50 000 new jobs over the next 10 years.

In addition to economic opportunity, the large humanitarian response to COVID-19 illustrates how critical digital inclusion is in supporting people's social wellbeing. Most governments have instituted a range of regulations that limited economic and social interaction to slow the spread of COVID-19. For many people, this limited or eliminated access to income - the impacts of which were hardest felt by the economically and socially vulnerable. Digital channels are a critical means for individuals to remotely access social services and other mechanisms that can be used to mitigate the challenges of staying at home. Some of the key social welfare benefits from digital inclusion are shown in the diagram below.

Figure 2: Social welfare benefits stemming from digital inclusion



Health information and support services can have significantly greater reach when delivered along digital channels. These highly accessible digital channels are also critical in promoting health-positive behaviours. For example, the Department of Health in South Africa developed a WhatsApp chatbot that allowed people to access information about healthcare and testing services and facilities. The MenConnect and WomenConnect WhatsApp chatbots, for example, promote adherence to HIV

treatment and testing for men and provide pregnant women with personalized health information and emotional support. The private sector also used digital platforms to deliver remote diagnostic services.

By tracking people's movements and interactions, digital technologies can help slow the transmission of infectious diseases. Contact tracing systems that warn individuals when they have come into contact with others infected with COVID-19 can prompt self-isolation and therefore slow transmission. These contact tracing systems can therefore be an important source of information that helps to monitor and track the spread of infections.

The digital world offers effective means of citizen participation in government processes and the delivery of government services and information. This might be through the digital delivery of welfare, by allowing for applications for welfare support through digital channels, or through the targeted nudging of citizens to access support programs. These technologies also provide innovative avenues for citizen engagement in government processes and can be used to enhance government accountability. For example, GovChat in South Africa is a WhatsApp chatbot that allows citizens to report on local municipal service delivery failures. The platform was used to allow South Africans to submit social grant applications digitally rather than in person during the COVID pandemic.

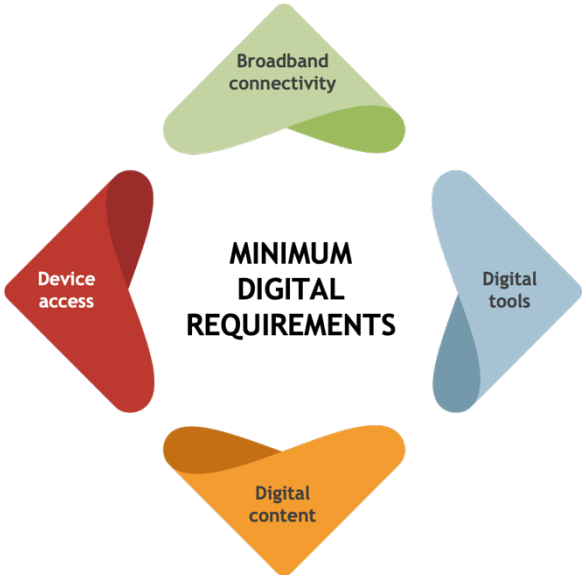
Digital connectivity makes it easier for people to comply with the COVID stay at home imperative while continuing to learn. Internet access provides people with opportunities to be productive or access entertainment. Content such as news and articles, videos, and movies are the most widely consumed digital media. These offer people the chance to pass time and focus their attention on uplifting or

People are increasingly reliant on devices and the internet to manage household responsibilities and daily activities. These channels are becoming the go-to means of communication as they work in real-time and at extremely low cost. WhatsApp, for example, provides families and friends with a way of staying in touch - particularly important during periods of isolation such as the COVID pandemic.

Digital access is only the first step of the journey to meaningful participation in the digital economy and society. Fast and affordable internet is often seen as the end-goal of digital inclusion strategies, but it should more accurately be considered to be the entry-level condition for digital inclusion. In order for people with affordable internet connections and devices to actually engage in the digital economy, there must be relevant digital tools and content that people can meaningfully use to derive benefit. This includes considerations of digital tools like e-commerce, payments and platforms and their relevance and accessibility in terms of language and local design.

It is useful to think of these factors as minimum digital requirement which must be in place for individuals to access the economic opportunities and social welfare benefits in the digital economy. The four key dimensions of minimum digital requirements are shown in the figure below.

Figure 3: What matters for digital inclusion



- **Broadband connectivity**: the internet connection requirements in terms of technology set (e.g. mobile network, fibre to the home, WiFi hotspot), speed and reliability
- **Device access**: the hardware requirements (smartphone, tablet, laptop) and the software required to run specialist applications or virtual working solutions
- **Digital tools**: the applications and platforms like e-commerce, digital payments, job matching and communications
- **Digital content**: the data and creative information that is generated by and shared on digital platforms and websites which much be relevant and accessible to local users

Broadband connectivity is of foundational importance to digital inclusion. Particularly during the COVID period, households need affordable broadband connections to be able to stream content, use virtual networking tools and conduct work remotely. While mobile networks are important, technologies like fibre to the home and fixed wireless (among others) are providing reliable quality and fast connections at an affordable price point.

In addition, a number of complimentary factors must be in play. This includes affordable digital devices that enable users to learn and earn from home, digital tools like payment, digital ID and ecommerce and relevant content that is accessible in local languages.

To identify what these minimum digital requirements are in different contexts, it is useful to conduct a segmentation analysis of the digitally excluded. This seeks to segment the digitally excluded into archetypal groups and understand each group's demography, minimum digital requirements, accompanying technical requirements and the relevant economic and social benefits unique to each segment. An example of a segmentation analysis conducted in South Africa is provided in the box below.

Box 1: Segmentation analysis conducted in South Africa

Our research and consultative engagements identified six priority segments of digitally excluded persons in South Africa which must be addressed if the triple challenges of poverty, inequality and unemployment are to be addressed. The segments are detailed in the figure below.

Most households constitute a combination of segments such as a mixture of digital nomads, unemployed job seeker, informal business owner and a migrant family member. This means that the internet and device requirements for a household are significantly more than for the individuals. Given that households often share internet connections and devices, the following findings from the segmentation analysis are useful in considering the standard of solutions which must be developed in

The segmentation analysis considered the connectivity, device access, digital tools and digital content requirements for each of the segments, and generated the following cross-cutting conclusions:

Connectivity: most households would require at least 10 mbps broadband internet connection to serve the whole family if connected on the same internet router device. This will ensure reduced level of latency as they access the internet simultaneously for functions like working from home, learning from home, accessing educational content and communication tools. While the majority of the country is covered by 3G mobile networks, which are adequate for many of the tasks the segments need to carry out, mobile data remains prohibitively expensive. Households that can rely on fast and affordable fixed connections to serve the whole household would be able to carry out the tasks effectively and at a lower cost.

Device Access: most household would require a mix of smartphones, tablets and laptops to conduct the range of learning from home and earning from home activities envisaged in the digital economy. While smartphone penetration in South Africa is good, access to devices like tablets and laptops remain low. This is a major inhibitor to households being able to effectively carry out tasks like learning from home and remote working opportunities. Community centres that can provide these facilities, in addition to broadband connections, may provide a viable alternative.

Digital Tools: digital payments and e-commerce platforms as well as online platforms for job searching

While South Africa has a high rate of financial inclusion, this belies the high cost of digital payment transactions and the preference for cash in the informal economy. Given that digital payments and platforms are a key part of the digital ecosystem for business, the informal sector is largely excluded from deriving these benefits as a result. Digital platforms are becoming more common in South Africa, but many platforms are global in nature and do not cater to local requirements and conditions.

Digital Content: a rich range of digital content across the entertainment, learning and information arenas are necessary for households to derive impact from internet usage. The internet has a wealth of

information available in all these areas, but is almost exclusively available in English. The lack of local

Solutions for delivering mass digital inclusion

There are a number of market imperfections and other challenges at play which mean that the four components of broadband connectivity, device access, digital tools and digital content are not adequately in place. This section considers some of the solutions available for addressing these challenges, with examples from South Africa.

Broadband connectivity

There are a number of technologies becoming available for providing broadband connectivity to low-income communities in developing countries. Some of these technologies are already becoming mainstream within higher-income communities, while others are at pilot stage in low-income communities or have yet to be deployed. The table alongside provides a view on some of options and their implementation status in South Africa.

Figure 4: Broadband technology mix analysis in South Africa

	Type of Service	Status	Quality	Cost	Common consumer use-cases
Fixed connection options	ADSL	National deployment in established urban areas – becoming obsolete with emergence of fibre networks	◐	●	Older "Leafy suburbs" Older Gated communities Older Multi-dwelling units
	Fibre to the home	Deployment concentrated in metros and large urban centres – improving affordability but yet to scale into low-income communities	●	●	"Leafy suburbs" Gated communities Multi-dwelling units Mid to upper LSM townships*
Wireless Connection Options	Point-to-(multi)Point Wireless	Increasing deployment for selective more affluent customers	◐	◕	Urban sprawl Small holdings
	WiFi last quarter mile	Pilot deployments at present deployment – yet to scale into low-income communities	◐	◐	Mid to upper LSM townships* Dense, low-mid LSM townships
	Public WiFi	Pilots in certain low-income communities – yet to scale nationally	◔	◔	Lower LSM townships* Public sites in high density, low LSM settlements*
	Fixed LTE/5G	Growing deployment in Metros and large urban areas. Affordability challenge for low income areas.	◕	◕	All urban & peri-urban, mid to upper LSM
	4G/5G mobile services	National deployment – covering low-income communities but with significant affordability issues	◐	●	Occasional users Ubiquitous mobile use
	Satellite	National coverage for deep rural use-cases	◔	●	Affluent rural (e.g. farms and guesthouses)
	TV white space	Conceptual stage – beginning to be piloted			TBD

* Commercial viability still being validated

The first is fibre to the home, which is already being deployed nation-wide in mid-to-high income communities but could be economically viable in an additional 4-6 million households by using cheaper deployment options such as aerial fibre.

The second is public WiFi hotspots which provide individuals with walking-distance access to broadband internet connections. These public WiFi hotspots are already being piloted in a selection of low-income

communities but could be scaled significantly if additional wireless ISPs (WISPs) had the incentive to set them up at scale. The other technologies may prove to become viable options in time.

Box 2: The broadband connectivity solution in South Africa

The Competition Commission released a landmark Data Services Market Inquiry in December 2019. The Commission is of the view that the country cannot focus exclusively on trying to fix mobile competition

even if only in the form of public Wi-Fi, remains an important solution to high data prices now and in

Non-mobile connectivity such as fibre deployment has to date focused on affluent business centres and suburbs, with providers now considering deployment in lower-LSM communities. Irrespective of what

Given that private providers have yet to deploy these technologies into low-income communities - and

The proposed solution is to provide a set of technology-agnostic and performance-based capex

Solution	Rationale
Technology agnostic	Setting minimum technical specifications for providers to be eligible for the incentives - rather than specifying which technologies are to be covered - ensures that all viable participants are considered, and that preference is not given to one set of technology providers over another.
Performance based	Providing grant funding only on the basis of meeting identified technical requirements ensures that private providers are only compensated once the infrastructure deployment has been shown to be successful. This will have different requirements for once-off and on-going infrastructure deployment.
Capex incentives	Operational costs should be covered by the private providers if the business models for serving low-income communities are to be economically sustainable. For many of the technologies described above, the investment in capital equipment is a large barrier for private sector investment and experimentation in low-income communities.

This proposal is being implemented in the form of a broadband connectivity fund within the President's COVID-19 economic stimulus plan with the Department of Communication and Digital Technology. The Fund will be piloted with two funding windows providing technology-agnostic and performance-based capex incentives for direct household broadband connectivity and public broadband connectivity

connections to homes uncapped at R350 per month or less. The minimum technical standards for public

connectivity are broadband connections offered wirelessly in communities uncapped for R5 per day or

for the funding.

Device access

Device access is a fundamental requirement for digital inclusion, however a number of people remain without access to smartphones, laptops and tablets. Addressing the high cost of smart devices in South Africa can be addressed through two types of solutions. The first type aims to make the market cost of smart devices cheaper through a combination of industrial policy interventions and the provision of shared infrastructure. The second type addresses the need for support among vulnerable low-income consumers to access smart devices, even if the market cost decreases.

Reducing the market cost of smart devices can be achieved through industrial policy interventions and the provision of shared community infrastructure. **Providing support to vulnerable low-income consumers** who may not be able to afford purchasing their own smart devices can be addressed through the allocation of devices to households in need.

Box 3: The device access solution in South Africa

While 94% of South Africans have access to at least a feature mobile phone, access to smartphones (58%) laptop or computers (76%), and tablet devices (43%) is limited due to both cost factors and infrastructure concerns.[3] Based on the data above, an additional 9 million South Africans require mobile

relative to peers despite all segments requiring them.[4] This is likely to worsen if the rand continues to

This is partly driven by the production profile of smart devices in South Africa**.** In 2018, Samsung, Huawei and Apple made up 90% of market share for mobile phones.[5] The remainder of the market is captured

local manufacturing capacity for laptops and computers from companies like Mustek and Yekani

Financial payments devices enable access for informal business owners, vulnerable gig economy workers and digital nomads. Fintech companies like Yoco, Sureswipe and Dashpay aimed at providing affordable payment devices to the informal sector, have grown significantly. Yoco has grown to service over 50 000 merchants in South Africa, many of whom are accepting card payments for the first time.[7] However,

The challenge of device access is being tackled by South Africa in the following three ways:

- **Upgrade shared public facilities** that are well placed near points of interest such as schools,

[3] Data from Stats SA, 2019; World Bank Data, Hootsuite Digital 2020, Genesis Analytics Team Analysis, 2020.
[4] This figure is likely more severe if one takes into account income inequality.
[5] Statista Data. 'South Africa Mobile Device Vendor Share 2019.' Available: https://www.statista.com/statistics/980075/market-share-held-by-mobile-phone-vendors-in-south-africa/
[6] DTIC, 2014. 'Support for localisation of IT devices.' Available: http://www.arei.co.za/news/Localization_of_PC-tablet-laptop_Assembly-Oct2014.pdf; Producer examples: Pinnacle, CZ Electronics, Leema Industries, Samsung SA, Hi Sense, Skyworth, LG Electronics.
[7] IOL. 'Yoco reaches 50 000 merchants milestone.' Available: https://www.iol.co.za/technology/yoco-reaches-50-000-merchants-milestone-33570039

for free or at a low pay-per-use fee for use by the public. A number of community centres already exist which can be upgraded to provide computing and smart device facilities with an internet connection. This is being considered as part of the President's Youth Employment Intervention and can be undertaken within 1 year.

- **Device upcycling** is the practice of taking old or obsolete phone models and converting them once again into more current technologies through software upgrades and features. A national programme of device recycling and refurbishing and allocation of devices to households in need provides an avenue for addressing the high cost of purchasing first hand devices. This is being considered as part of the President's Youth Employment Intervention and can be undertaken over the next three years.
- **Local Production of Devices** to contain costs against rising exchange rates and create jobs. South Africa has existing local capacity in the manufacture of devices such as laptops, tablets, TVs, cell phones, and printed circuit boards that can be scaled. This will require further development of the Preferential Procurement Policy Framework Act (2017) by the Department of Trade, Industry and Competition (dtic) which specifies the minimum amount of local content used in manufacturing to ensure that government procurements support local industry. However, the

  industries and firms as an off-taker. This must be a consideration to support local industry through provision of markets. This can be incorporated and harmonised with dtic's manufacturing incentives structure over the next five years.

Digital tools and content

Network connectivity and digital devices combined with digital tools and content create digital ecosystems. These ecosystems are made up of suppliers, customers, trading partners, applications, third-party data service providers and all respective technologies**.** They create value by providing users with a range of digital services and solutions that are particularly suited to requirements of the users in the ecosystem. A typical Chinese individual or merchant, for example, spends a whole day transacting through one of the many Chinese digital ecosystems such as WeChat or Alipay. Social, financial and business activities have been incorporated into ecosystems made up of several sub-applications provided by merchants and other businesses connected to the ecosystem using an API.

China's digital ecosystems rests on four levers including network, device, content and applications. In China, Wi-Fi internet is installed at public spaces and now forms part of society. As of the first quarter of 2020, about 904 million people out of a population of 1,4 billion had access to internet in China, resulting in a fast-growing mobile application market in the country.[8] From a content perspective, China's web and mobile applications are designed first in Mandarin, the official dialect of China spoken by more than 70% of the population, ensuring that most of the country's citizens can conveniently use the application.[9] China's merchant payment systems, an integral part of the digital ecosystems, are often in the form of QR codes and are ubiquitous so much so that most merchants do not accept cash anymore.

In another example, **Kenya's Mpesa has transitioned from a standalone USSD-based wallet and money transfer service to a full-fledged digital financial services platform** that encompass services ranging from merchant payment, loans, insurance, QR code payments, cross-border e-commerce, Google Play store

[8] Data from Statista, 2020
[9] Data from Ethnomed. Available: https://ethnomed.org/resource/chinese-language/

payments, Netflix subscription etc. A range of Kenyans, including those in the informal sector, are using Mpesa to fulfil a range of requirements and activities across their lifecycles.

Millions of people in developing countries still do not leverage digital ecosystems to access economic and social welfare opportunities available in today's digital economy. In South Africa, for example, there is little development of digital ecosystems that specifically cater to users in the informal sector where most people conduct their daily lives. As a result, there is little incentive for users in the informal sector to adopt digital tools. There is therefore a need to create digital ecosystems that specifically cater to the segments of the population that remain digitally excluded, in particular informal businesses. Creating a digital ecosystem around the requirements of the business owners and customers in the informal sector – such as taxi owners, drivers and passengers through taxi associations and the many service providers that provide inputs to the sector - can deliver value for an enormous informal sector that touches the lives of most developing world citizens.

Box 4: The digital tools and content solution in South Africa

The Taxi Industry in South Africa, which moves over 16 million people daily, is largely informal and cash driven and provides a good study of the case for digital ecosystem development in the informal sector.[10] Digital transformation holds great potential to unlock wealth for the sector, the country and most importantly catalyse demand-driven digital inclusion for taxi drivers and users in South Africa.

The sector is organised by regional taxi associations. For example, one Taxi Association operating in the South East Region of Johannesburg generates R475 million (~USD 30 million) annually through its 458 members operating 2100 vehicles across 44 routes.[11] They spend 65% of the revenue (R308m) to produce this income which represents significant value for input providers such as vehicles, tyres, repairs and financial services. Most of this revenue and expenditure is transacted in cash.[12]

A digital ecosystem creates an opportunity for taxi owners and drivers to manage their business on a single platform and access a range of services from input providers formally with more favourable terms than informally. At a high level this platform allows all stakeholders to track the sector based on their needs and access level. It is therefore strategic for catalysing digital inclusion as well delivering value for all stakeholders. The aforementioned association has plans to establish this digital ecosystem for its members with the following features.

Capabilities of the Digital Ecosystem

- Provide every taxi association with insight into their association operations at the micro level.
- Provide the government with data from the taxi industry at the micro level digitally.
- Provide the taxi owners access to track their cars (location, revenue and expenses) digitally.
- Provide car-pooling feature to give drivers access to a wider pool of customers and also make the taxis competitive with foreign brands such as Careem (acquired by Uber) and Plentywaka.
- Value add services such as vehicle financing loans, vehicle insurance, personal insurance and loans to drivers etc can also be provided through the platform.
- Provide a digital payment system to enable customers/passengers to pay using different
- Advertising opportunity in the taxi for operators to earn additional revenue.

Value unlocked

- Real time visibility for all players in the system (government, taxi owners, taxi drivers and passengers) subject to their access level.
- Expanded income stream for the government, corporates, taxi owners and taxi drivers.

[10] Data collected from stakeholder consultations with taxi associations in Gauteng
[11] Data collected from stakeholder consultations with taxi associations in Gauteng
[12] Data collected from stakeholder consultations with taxi associations in Gauteng

- Protection of the South African local taxi industry from foreign companies.

To support the development of these digital ecosystems in the formal sector, industry associations and intermediaries require financial and technical support. The Department of Communication and Digital Technology is in the process of dissolving the Universal Service Access Fund (USAF) and replacing it with a newly formed Digital Development Challenge Fund. The new Fund will include public-private blended funding for projects that drive digital inclusion and development in the country. to address the pressing need for digital inclusion within the informal sector, the Digital Development Challenge Fund should explicitly seek applications from informal sector players, such as taxi associations, to develop inclusive digital ecosystem with relevance to informal sector segments. The types of applicants to this fund would be stakeholders that are looking to develop this kind of ecosystem but require funding to get it off the ground.

South Africa's cultural and socio-economic diversities mean that there is a very broad range of requirements within digital ecosystems. Effectively ensuring inclusion requires digital content be delivered in a range of languages. The dominance of English can be exclusionary as it is the mother-tongue for only 9.6% of the population.[13] Given the important role language plays in identity it is critical that efforts are undertaken to scale the availability of digital content in other local languages. This has traditionally been a costly process requiring the services of an expert translator. However, developments in Natural Language Processing (NLP) offer the possibility of automated translation at lower cost.

Coordinating the automated translation community and other interested parties will be key in unlocking these tools for use in less spoken South African languages. Entities such as the Pan-South African Languages Board (PanSALB) and the South African Translators Institute (SATI) are equally invested in scaling written content across all South African languages. These entities can support and be supported by the automated translation community as they share similar objectives. For example, SATI members could help validate the quality of automated translation outputs and input data. Equally, PanSALB have permanent staff who are expert in translation across all South African languages and who are responsible for pursuing the interests of its speakers.

Scaling the availability of training data is a pre-requisite for supporting automated translation research. These NLP systems are data intensive and require input (i.e. training data) to learn new languages.

this might include fictional literature, government documents, or educational content. Ensuring all publicly accessible government documents are available in all languages will therefore not only help to achieve the objective of inclusion but also provide researchers with much needed training data that can facilitate further inclusion. Crowd-sourcing translations could be another innovative avenue for creating content in multiple languages that can support translation research.

Implementation in complex ecosystems

Implementing inclusive digital economy development initiatives is particularly challenging because of the complex mix of stakeholders and sectors that must be aligned to create impact. This includes the telco and digital infrastructure sector, device manufacturing and assembly, digital skills development, the entrepreneurs that create innovation digital products and services, and the policy and regulatory authorities that govern all of these, among others.

One of the contributions of the SADA initiative has been coalescing these disparate stakeholders around the opportunities for unlocking value through digital inclusion in South Africa. It required

[13] South African Gateway, 2018, *The 11 languages of South Africa*, online, available: https://southafrica-info.com/arts-culture/11-languages-south-africa/

conceptualising and articulating the value at stake, identifying the right stakeholders, setting a shared agenda and finding the right champions in each institution for the proposals to land. In undertaking these tasks, a few **critical success factors** had to be in place:

Credibility and local ownership: when the SADA initiative was convened in early 2019, it was a previously unknown entity. Generating good insights and solutions were not sufficient to establish the credibility of the outcomes – why should anyone listen to what the initiative had to say? To address this, the initiative included local partners with an established brand reputation and convening power within South Africa. It also set up an advisory board comprising high-profile and trusted stakeholders within the digital economy arena, including industry champions, government representatives and members of civil society. Getting the right people to agree to be on the advisory board provided the initiative with a public face and credibility in the local market.

Hypothesis testing and joint solutions: the SADA initiative was much more than a research project. While the core project team conducted extensive research and analysis to identify the key economic opportunities in the digital economy, and the steps required to bring them to fruition, the process did not end here. The analysis was used to form hypotheses which were extensively tested with the stakeholders in the market who were actively involved in building or enabling these opportunities. This was complimented by a joint solutions process comprising six national dialogue workshops. The workshops brought a broad spectrum of stakeholders together to validate the hypotheses and ideate solutions to the identified challenges. This strengthened the identified solutions and contributed to the credibility of the initiative's outputs.

Coalition building and ecosystem development: in addition to the outputs of the initiative, the process itself was inherently valuable in bringing together a set of stakeholders to agree on a common vision and action plan for achieving the vision. The SADA team committed significant time to building relationships with the many stakeholders that were pertinent to implementing the identified solutions, and connecting these stakeholders together where necessary. Even for opportunities where the ecosystem was already well convened, such as the digitally traded services sector, the SADA process helped the sector to re-imagine its job growth potential and agree to a strategy for realising this potential over the next 5 and 10 years.

As can be expected, the implementation of complex initiatives can be fraught with unexpected challenges. It is useful to take into account **what went wrong, and the mitigating strategies employed** as the initiative was implemented:

Shifting priorities in a global pandemic: during the course of its work, SADA established a strong relationship with the South African Presidency, in particular regarding their work tackling South Africa's large youth unemployment crisis. In the midst of planning for a programme of work focused on digital inclusion to enable South Africans in townships and rural villages to access economic opportunities, the COVID-19 pandemic struck. The priorities of the team in the Presidency rapidly evolved to addressing the immediate need for delivering social welfare benefits and humanitarian relief to vulnerable South Africans. SADA had to be agile in adapting its approach and focus to the pressing need for digital technology to aid in the COVID recovery process, as well as the longer-term economic upliftment benefits of the digital economy to remain a relevant and trusted partner. In particular, the SADA focus on digital inclusion had to shift from just enabling economic opportunities, such as learning and earning, to enabling the range of social welfare benefits that the digital economy can deliver to remain relevant.

The peculiarities of institutional budgeting processes: SADA was afforded the unique opportunity to assist the Presidency in conceptualising how the digital economy should form part of the country's employment stimulus plan in the wake of the COVID-19 crisis. To address the dire need for employment

creation, the President set aside R100 billion (~ USD 6 billion) of the national government budget to support this stimulus plan.[14] This provided a unique opportunity to allocate funds to improving digital connectivity across South Africa so that more people could access learning and earning opportunities in the digital economy. However, the institutional funding process required that the funds be spent within the current financial year or risk the fund-receiving institution's financial record with the National Treasury being negatively affected. As a result, SADA spent a large amount of time verifying how much funding could realistically be absorbed in the current financial year to provide comfort that accepting the funds would not negatively affect the government's budget allocation. This was done through extensive private sector engagements to test what private broadband connectivity providers could realistically absorb in the current financial year.

Making decisions with a scarcity of information: one of the challenges that the SADA initiatives is tackling is the urgent need to extend fast and affordable broadband connections across the country to drastically increase internet uptake from the current level of ~50% of the population. Making decisions about how best to achieve this is difficult in the absence of readily available information regarding the costs of deployment for various technologies, the number of households where the economics of broadband infrastructure deployment are viable, and the willingness of consumers to pay for internet services in low-income communities. South Africa has very limited learning from past examples and other international examples, while useful, exist in very different contexts. To address this, the SADA project team conducted extensive engagements with private broadband providers to understand the economic drivers of their service offering, and then compare this with available demographic data on household density and affordability. In many cases where low-income households are not currently spending on broadband internet connectivity, proxies had to be used such as spend on mobile network data or DSTV[15] spend. Still, planning and design decisions had to be made with scarce data. SADA therefore proposed that the broadband initiative be run as a pilot to test and learn what works before scaling up nationally.

In reflecting on how the SADA initiative panned out, there were a number of **inflections points throughout the process where external events and influences were leveraged** to create momentum and buy in and help the findings of the initiative land with key stakeholders:

Taking advantage of the policy interest in the 4IR: in 2019 President Ramaphosa established a Presidential Commission on the Fourth Industrial Revolution (PC4IR) to assist government in taking advantage of the opportunities presented by the digital industrial revolution. The task of the PC4IR, which is chaired by the President, is to identify relevant policies, strategies and action plans that will position South Africa as a competitive global player.[16] This has translated into a keen policy interest in the 4IR at all levels of government, and a clear mandate for the South African government to deliver on digital economy development. SADA was able to take advantage of this momentum, presenting its ideas at the country's national 4IR conference, engaging with the Presidential 4IR Commissioners, and providing inputs to the Department of Communication and Digital Technology which has been mandated by the President to deliver on the country's 4IR objectives.

[14] South African Government, 2020, *President Cyril Ramaphosa: South Africa's Economic Reconstruction and Recovery Plan*, Online, Available: https://www.gov.za/speeches/president-cyril-ramaphosa-south-africa's-economic-reconstruction-and-recovery-plan-15-oct

[15] DSTV is a satellite-based television service in South Africa with a high penetration in low-income communities. It offers a bouquet of TV channels which could be substituted by OTT streaming services available on the internet, such as Netflix and Showmax.

[16] The Presidency of the Republic of South Africa, 2019, *President appoints Commission on Fourth Industrial Revolution*, online, available: http://www.thepresidency.gov.za/press-statements/president-appoints-commission-fourth-industrial-revolution

Having a clear landing spot and home for policy inputs: in addition to the PC4IR, the Department of Communication and Digital Technology was mandated by the President to formulate a national ICT and Digital Economy Masterplan for the country. The Masterplan sets out the key areas of opportunities for South Africa to realise its development objectives through the digital economy, and the practical steps required to support this. SADA was able to provide the Department and its technical advisors with significant input on the digital inclusion elements of the Masterplan. This has now been incorporated into the Masterplan which provides the Department with a clear action plan for driving broadband connectivity, device access and digital tools and content development in South Africa.

Supporting the blind spot between strategy formulation and implementation: developing strategies are a necessary but insufficient condition for achieving impact through digital inclusion. There is often a blind spot in the step between making strategic plans and implementing them which does not receive much attention or funding. The bridge between strategy formulation and implementation is detailed design work setting out how a proposed course of action should materialise – including how it should be implemented, by whom, and at what cost. This is an area that governments often struggle with, but do not receive much support for development partners for. SADA invested significantly in this blind spot for the broadband connectivity plans in South Africa, providing forward thinking and guidance on the design and implementation of the Broadband Connectivity Fund. This is helping the process move swiftly from strategy to implementation.

Conclusion

The activities of the SADA initiative represent an important step forward for South Africa to become a digitally empowered nation. The SADA process has generated a number of lessons along the way relevant to digital inclusion and digital economy initiatives in other developing country contexts.

Firstly, digital inclusion is not just about access to the internet. There are a number of factors beyond connectivity which determine whether people derive benefit from access to the internet, including device access and the relevance and accessibility of digital tools and content. However, connectivity is of foundational importance and, to an extent, the issues of device access and digital tools and content are partly solved when there is increased demand from more internet users. Moreover, internet connectivity is not just about access to an internet connection. Given the demands of users to learn and earn from home, stream content online and conduct complex transactions, broadband connectivity has become the new universal standard which all developing countries should be aspiring towards.

Secondly, the digitally excluded and their needs cannot be considered as one homogenous group. Digital exclusion occurs in different contexts, and for different reasons, and the connectivity, device and tools/content needs of various groups of the digitally excluded can vary greatly. Thinking about digital inclusion plans in the context of different segments of the digitally excluded is a powerful tool for understanding the minimum digital requirements that must be in place for a country to realise the economic opportunities and social welfare benefits that the digital economy can deliver.

Lastly, digital inclusion and digital economy initiatives have to be credible, agile and design-oriented to translate into impact. These initiatives must have local ownership and credibility to be believed in a local context, with a clear landing spot in government for the outcomes to be adopted and implemented. They must also be flexible in taking advantage of, and responding to, the events and influences which will inevitably arise as the process unfolds. And most importantly, they must address the blind spot between strategy formulation and implementation where government stakeholders require assistance with the detailed design and planning for implementation of the required actions.

Appendix: a segmentation of the digitally excluded in South Africa

It is difficult to imagine the solutions required to achieve universal digital inclusion in South Africa when considering the digitally excluded as a single group. Disaggregating the digitally excluded into their composite segments helps to understand each group's demography, minimum digital requirements, accompanying technical requirements and the relevant economic and social benefits unique to each segment. Segmentation is therefore the process of dividing a broad target group into subsets of persons with similar wants and needs.

Segmenting the digitally excluded provides the opportunity to consider the daily life cycle each segments, their use cases and overall requirement for the internet which informed the segment's minimum digital requirements and the economic and social benefits they stand to gain if they are digitally included. Formulating the segments involved triangulation of data and insights from:

- Existing literature on digital exclusion in South Africa
- Analysis of the StatsSA Quarterly Labour Force Survey
- Analysis of data from Harambee employee surveys
- Interviews with experts who work directly within the segments of digitally excluded persons in South Africa
- Interviews with digitally excluded persons in South Africa
- Interview with representatives of associations related to digitally excluded persons, such as taxi associations

For each of these segments, the segmentation analysis identifies the minimum digital requirements that must be in place for these individuals to access the economic opportunities and social welfare benefits in the digital economy across four dimensions. These dimensions are broadband connectivity, device access, digital tools and digital content.

Ambitious Students

The Ambitious Students are aged 3 to 30 and include students in early childhood development centres to students in post graduate programs in universities. According to a UNESCO report, there are 3.5 million students in pre-primary, 7.8 million in primary, 4.9 million in secondary and 5 million in tertiary education as at 2017.[17] Ambitious Students are based in both urban and rural areas and their top income sources are from friends and family. The

[17] Data from UNESCO Institute for Statistics.' Available: http://uis.unesco.org/en/country/za

COVID-19 pandemic has caused many students to turn to home schooling and digital learning options due to the disruption to the school curriculum when learning institutions were closed.

Opportunities

- **Ability to continue learning online despite the closure of learning institutions**: students have been one of the most hit in the pandemic as all schools have had to shut down in the wake of the crisis. Some have reopened while giving students the option of leaning online. Access to the internet for students to learn online will complement the efforts of schools who have now adjusted to the new normal by teaching online.
- **Communicate remotely with teachers, family and peers**: access to the internet will create an opportunity to stay connected to teachers, family and peers in a cheap and affordable manner.
- **Increased adherence to social distancing**: access to the internet for this segment affords them the capacity to consume online based entertainment, therefore keeping them at home in line with the social distancing advice.

Minimum digital requirements

Connectivity: Students across all levels of education require a minimum of 3G connectivity (~3mbps) to access digital learning materials from home, health information as well as entertainment materials. Streaming live online learning content such as video lectures may require faster speeds. Students require at least SMS functionality on features phones or WhatsApp (or a similar app) on smartphones for basic communication with teachers, family and peers.

Device access: While learning and development can be done with a basic smartphone, access to an entry level laptop or tablet will deliver a better learning experience for students. However, for other use cases applicable to students, a basic smartphone will suffice.

Digital tools: Student require platform to access good quality learning content that connects them to peers and provides interactive learning experiences. There is a wealth of online learning tools becoming available in South Africa, particularly given the sharp spike in demand during the COVID pandemic.

Digital content: This includes learning materials, entertainment videos, music and podcasts that can be saved on the phone or that can be accessed on digital platforms like YouTube, Google podcasts, Netflix, Showmax, , Spotify, Google music, iTunes etc. The vast majority of this content is available in English, rather than local African languages, and most content is designed to be compatible with smart devices rather than feature phones.

Digital Nomads

The digital nomad segment aged 21-40 are mostly single and urban-based. They are relatively well-educated and provide high-skilled labour. They are often creatives who produce and sell digital content, freelancers (writers, coders, designers etc.), and business support services experts (call centre agents).

Opportunities

- **Income generation through remote and online work**: South Africa's language, time-zone, and academic quality creates an opportunity for young digital nomads to leverage the employment opportunities presented by global freelance platforms. With freelance platforms such as Up-work and Fiverr connecting freelancers to more than 180 countries, digital nomads can earn a living working from South Africa on jobs based outside South Africa. In addition, operators in the global business services sector are shifting to remote working opportunities for their staff. For example, Amazon Web Services has just announced an additional 3000 remote customer agent jobs in South Africa, growing its workforce in South Africa to 7,000[18].
- **Income savings**: Digital nomads will save a significant portion of their income by eliminating transportation fares and other expenses that come with the daily commute to work.
- **Increased adherence to the social distance advice**: Working from home will give digital nomads, and many other office workers, the capability to stay at home and observe social distancing.

Minimum digital requirements

Connectivity: Digital nomads need a high quality, reliable and stable broadband internet connection of a minimum speed of 10mbps. A call centre agent working remotely cannot afford to lose internet access for a second. Amazon Web Services requires remote agent job applicants in South Africa to provide evidence of a dedicated uncapped fibre line with 10mbps download and 5mbps upload speed. Communication for digital nomads often take place on platforms such as Slack, Zoom and Google Meet and they require a high level of bandwidth to remain stable while being used.

Device Access: Creatives need PCs with high processing power at a minimum of 8 GB RAM and 512 GB internal memory as well as specialized software such as Adobe Creative Suite or Autodesk.

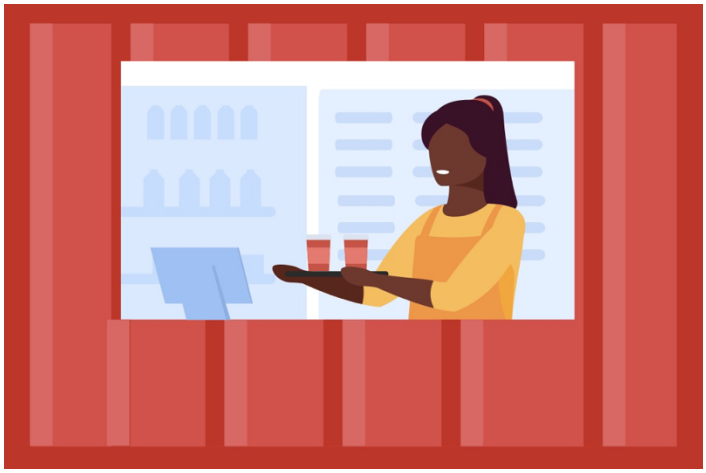
Digital Tools: Digital nomads rely on digital platforms to find work and receive payments digitally. These may include global freelancing platforms such as Upwork and Fiverr, or corporate crowdsourcing platforms like Topcoder. Remote workers often require specialised software platforms provided by their employer to ensure safety and optimal customer experience.

[18] Reuters. 'Amazon to hire 3,000 people in South Africa for customer service roles' Available: https://www.reuters.com/article/us-amazon-com-safrica/amazon-to-hire-3000-people-in-south-africa-for-customer-service-roles-idUSKBN23P1RE

Digital Content: Digital Learning has become critical to digital nomads to advance their chosen skill set or develop a new one. This is particularly so for individuals looking to re- or up-skill to shift into a new digital field of work.

Informal Businesses

The informal business owner is typically aged 25-50 years are can be based in urban and rural areas. They are mostly school education and their top income sources are from trading. They are exposed to income volatility as a result of economic shocks such as the COVID-19 pandemic. Informal businesses in South Africa typically include spaza shops, hair salons, fast food outlets, table-top traders, hawkers, school mama stalls, mechanics, and taxi drivers and operators.



Opportunities

- **New suppliers and customers**: Access to the internet to use e-commerce applications can provide informal businesses with access to suppliers and customers outside the business' geographic proximity. Appropriate e-commerce tools will help informal businesses to be more resilient pandemics by allowing them to diversify their value chains. For example, FinMark Trust has created a new product called Redshift aimed at connecting spaza shop owners to their customers digitally.[19] The electronic transaction trail created by these platforms also assists informal businesses to access credit by providing a financial profile which can be included in credit scoring.
- **Increased operational efficiency through digital business management tools**: A number of digital tools are becoming available to provide informal businesses with advice and learning content on improving their business management.

Minimum digital requirements

Connectivity: Access to 3G internet connectivity is the minimum requirement for this segment for business transactions. Informal business owners also require access to digital connectivity to maintain communication with their family and peers. Typically, 2G connectivity will suffice for SMS and 3G/4G connectivity for WhatsApp, at least for basic communication with business associates, customers, family and peers.

Device Access: Informal business owners ideally need a smartphone with 3G or 4G LTE connectivity. They need a smartphone to manage accounting software and make use of digital payment plug ins.

Digital Tools: Informal merchants making use of digital payments would need a POS device, QR code platform or at least an account number to accept digital payments. There are several third-party

[19] Techcentral. 'Supporting small businesses in South Africa with digital distribution.' Available: https://techcentral.co.za/supporting-small-businesses-in-south-africa-with-digital-distribution/97545/

platforms that informal businesses can leverage to sell their products online such as Takealot and WhatsApp business which is already becoming mainstream.

Digital Content: Financial education and business skills training is critical for this segment. There is a local language requirement to communicate better to informal business owners in townships and rural villages. Studies in Kenya have shown that a mixture of Swahili and English is appropriate. In South Africa, Harambee experienced much better engagement with trainee by translating learning content into the major local languages.

Unemployed Job Seekers

The unemployed job seekers segment is broad and includes a range of educational profiles from matriculants to graduates. Aged 18-50, based in both rural and urban areas and owners of digital devices, they have the potential to perform income-generating work but are yet to secure a job. According to Stats SA, there are 7.1 million unemployed persons, out of 23.5 million persons in the labour force as at the end of Q1 2020[20]. This is likely to worsen as a result of the lockdown and social distancing efforts.

Opportunities

- **Identifying and applying for work opportunities online**: The biggest barrier for unemployed job seekers is the mass confusion that sets in while identifying the right opportunity channels, identifying the right job role that they should be training themselves for, accessing the right content to upskill themselves without the "luxury" of a mentor and the appropriate physical or digital learning environment. Platforms which help candidates make sense of this can offer tremendous value.
- **Preparing CVs and submitting job applications digitally**: Access to the internet and the appropriate hardware will allow unemployed people to prepare their CVs and complete their applications digitally rather than having to spend their limited income printing CVs and travelling to job applications.
- **Accessing upskilling opportunities to increase the likelihood of employment**: Access to the internet will provide unemployed people with the opportunity to access digital learning content to increase their employability.

Minimum digital requirements

Connectivity: Access to 3G internet connectivity will be required at the minimum to satisfy the use cases of unemployed job seekers, such as digital learning and job applications.

[20] Stats SA. Quarterly Labour Force Survey Q1, 2020

Device Access: Preparing CVs and work applications digitally require at minimum a smartphone. However, access to a computer or a laptop is required to fill most job applications conveniently and create CVs. An ICT initiative that has been receiving increasing attention in South Africa is that of the telecentre and the related concept of the Multi-Purpose Community Centre (MPCC). The South African government is strongly promoting the diffusion of these MPCCs throughout the country, particularly in rural areas. Unemployed job seekers in rural areas who do not own a laptop or phone can use the community centre for preparing CVs and job applications.

Digital Tools: Unemployed job seekers need access to consolidated information portals on job opportunities. For example, Harambee has launched the **sayouth.mobi** platform which is an anchor of the Presidential Youth Employment Initiative – this platform is data free and provides young people with resources on finding the right job for them.

Digital Content: This segment requires access to digital learning content to upskill themselves and improve their likelihood of employment.

Gig Economy Workers

Gig economy workers are typically low-skilled workers, aged 25-50 years. They are mostly urban-based because their work opportunity is in cities and towns. They are often not post-school educated and are owners of digital devices as their work depends on smartphone applications. This segment includes persons that earn their income from digital platforms such as Airbnb, Uber, deliveries, SweepSouth, Kandua, etc. This segment could include mothers who now provide intensive childcare and home-schooling in the pandemic which could have been done by a gig worker, such as a P2P tutor.

Opportunities

- **Increased income opportunity**: As the lockdown level is consistently relaxed by the government, work activities are picking up for this segment at a slow pace. There is an opportunity for gig economy workers to earn an income if they have a smartphone and access to the internet through platforms that match supply and demand for low-skilled services.
- **Access to customers**: Access to the internet combined with a smartphone will enable gig workers to connect with their clients/customers and reach them using GPS without having to have a personal relationship with them or invest effort in marketing.

Minimum digital requirements

Connectivity: Gig economy workers require 4G LTE connectivity to access digital platforms and use GPS navigation on a smartphone. They also require access to digital connectivity to maintain constant communication with their family and peers. Typically, 2G connectivity will suffice for SMS and 3G/4G connectivity for WhatsApp for basic communication with family and peers.

Device Access: Gig economy workers require at least a smartphone with GPS capability to access digital platforms. Popular GPS tools in South Africa include Google Maps and Waze.

Digital Tools: Gig economy workers rely on digital platforms to earn an income. The digital platforms often have in-built merchant acceptance features for payment. Therefore this segment do not require a POS machine, but they need a formal banking account. In some rare occasions, customers prefer to pay cash or send the fees directly to the gig worker's bank account.

Digital Content: Gig economy workers require further training to transition into higher-value positions and more intellectually demanding job roles. This is often provided by the digital platforms, but digitally through their apps.

Migrant families

The migrant family segment includes over 3 million persons who have migrated to South Africa according to the International Labour Organization. [21] This segments also includes persons that migrate from rural South Africa to urban cities and towns almost on a daily basis for work reasons in order to earn an income and send money home for subsistence. They are often not users of digital devices. This segment has a high income-volatility due to economic shocks, such as the COVID-19 pandemic, as their top income sources are remittances, social grants like SASSA and low to medium skill jobs. Globally, the World Bank has predicted that remittances will decrease by 20% during the pandemic and the most affected would be the small ticket size receivers as they constitute the largest number of receivers.

Opportunities

- **Managing household responsibilities:** Managing household responsibilities remotely through digital communication tools such as WhatsApp or SMS is important for families that do not live in the same household, and can reduce the exposure of families to COVID-19.
- **Digital remittances**: Access to the internet or basic connectivity to remit funds from urban-based work family members back to families in rural areas or outside the country using digital payments creates an income opportunity for dependent families while maintaining the necessary level of social distancing. It provides an alternative to costly methods such as physically transferring cash with friends and family members.

Minimum digital requirements

Connectivity: Access to 3G internet connectivity is the minimum requirement for this segment to satisfy their use cases of digital payments and digital communication.

[21] Data from International Labour Organization, 2019

Device Access: Migrant families require at least an entry level smartphone to satisfy their basic needs. Specifically a 2GB RAM and a 32GB Internal memory smartphone is appropriate for this segment.

Digital Tools: The migrant family segment relies on remittances for subsistence and also relies on digital remittances to send money to their families in and out of South Africa in the pandemic. This can be done using USSD on a feature phone or a mobile transfer on a smartphone.

Digital Content: As high-risk individuals due to travel requirements, migrant families require health information from the government sent as SMS or through reliable sources on the internet.

SOUTH AFRICA in the DIGITAL AGE

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