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Digitalisation – the best hope for South Africa and its small firms

PROMOTION AND DEVELOPMENT OF SMALL BUSINESS IN SOUTH AFRICA, COVID -19 AND BEYOND

SBi The big voice of small business

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The SBI welcomes feedback on this research and the resulting suite of papers, which can be submitted to Ms Leandre Swart at leandre@smallbusinessinstitute.co.za

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Glossary of Terms

A distinction between digitisation and digitalisation

Terms like digitisation, digitalisation, the digital economy, the e-conomy, digital transformation and the fourth industrial revolution are used loosely in the literature and should not necessarily be used interchangeably.

Digitisation refers to the conversion of analogue information (a paper document, for instance) into a digital format (a scanned pdf) to store or transmit. Anyone who has visited a traffic department office recently would be able to identify a candidate for digitisation.

Digitalisation refers to the evolutionary transformation that occurs when we use digitised content and especially data to affect the way we interact or work. Using new technologies to assess data to solve problems, advance efficiencies or innovate has been embraced particularly in sectors such as finance, media, agriculture, and health where ongoing disruption of business-as-usual is becoming the norm.

Characteristics of the digital economy

The digital economy describes economic output linked to technology, whether transforming business or manufacturing processes, commercial transactions or professional interactions.

The expansion of a digital economy is driven primarily by digital data. UNCTAD has documented that Global Internet Protocol (IP) traffic, which serves as a proxy for data flows, grew from about 100 gigabytes (GB) per day in 1992 to more than 45,000 GB per second in 2017. By 2022 global IP traffic is projected to reach 150,700 GB per second, fuelled both by people coming online for the first time and by the expansion of the Internet of Things (IoT).

The US Bureau of Economic Analysis takes it further, identifying three aspects of a digital economy:

a) digital-enabling infrastructure for a computer network to exist and operate;
b) e-commerce, which includes digitally ordered, digitally delivered, or platform-enabled transactions (B2B, B2C and peer-to-peer or P2P); and
c) digital media, which refer to content that users in the digital economy create and access, including free digital media and big data.

The Revolutions

Digitisation and automating processes would characterise aspects of the third industrial revolution, whereas the fourth industrial revolution (4IR) makes way for data-driven projects merging physical, digital and biological fields.

The linkages and dependence upon previous 'revolutions' are indisputable. Water and steam power mechanised production during the first industrial revolution. Electric power fuelled mass production in the second, and the third used electronics, IT, and the internet to automate production. The technologies of 4IR are entirely dependent on the functioning of the third industrial revolution of computerisation and automation, which is, in turn, intrinsically connected to contemporary forms of the second industrial revolution's energy technology. This is a digital revolution fusing technologies and blurring the lines between the physical, digital and biological. The enormous differentiator between 4IR and the previous three is its velocity, scope and impact, according to Sandeep Dadlani, Global Chief Digital Officer at Mars Inc. Tech entrepreneur Marc Andressen adds, "As the rate of evolution increases software mutates much faster; prices can come down in various industries. Anyone who can write software can become an entrepreneur and go after these opportunities."

The fourth industrial revolution, or 4IR most often makes references to the following technological advancements:

a) Artificial Intelligence (AI) analyses data to generate insights and predict behaviour using algorithms as the CEO of Britegaze, which invests in South African AI businesses explains, there are approximately 44 zettabytes of data in the digital universe with an excess of 2.5 billion gigabytes generated on a daily basis. AI processes, learns from, reacts, and to a large extent autonomously take decisions based on the data it has ingested. From voice recognition to commercial and productivity improvements. AI subsets include Machine Learning (a programme that modifies itself when exposed to new data) and Deep Learning ('neural networks' or sets of algorithms delivering increasingly-remarkable accuracy in things like sound and image recognition, recommendations). Notably Deep Learning has been heralded for beating humans in the ancient game of Go. In April, The South African National Blockchain Alliance (SANBA) will be one year old. We look forward to its year in review.

b) The Internet of Things (IoT), refers to sensors or meters or chips in objects capable of sending data. The devices gather the data they collect and can apply what they learn. Examples are health or activity trackers (your cycling route or your herd-of-goats locator); soil and irrigation conditions in your fields, household security and consumption monitoring like smart water meters.

A report by Ericsson in 2018 revealed that, "In 2018, there were more "things" (8.6 billion) connected to the Internet than people (5.7 billion mobile broadband subscriptions), and the number of IoT connections are forecast to grow at 17% a year, to exceed 22 billion by 2024. UNCTAD's Digital Economy Report estimates that by 2025 an average connected person in the world will interact with IoT devices nearly 4,900 times per day, or the equivalent of one interaction every 18 seconds.

c) Robotics have many industrial applications on production lines but are also employed for industrial floor scrubbers (and Covid-19 sanitisers), agriculturally to weed, hoe and harvest and even for home cocktail mixers.

d) 3-D printing is also referred to as additive manufacturing. Objects are 'printed' in layers according to a digital model. Uses have been found for 3-D printing in automotive parts,

jewellery, fashion items, and eyeglasses. Large-scale printers extrude concrete and are capable of building a small house in less than 24 hours (watch: https://www.youtube.com/watch?v=wCzS2FZoB-I)

e) Biotechnology is the application of living organisms to product development. Medical uses include genomics and the development of vaccines, antibiotics and pharmaceuticals. Green biotechnology assists with plant propagation, biofuels and waste elimination. Enzymes can be used to eradicate hazardous chemicals and pesticides. Baking bread transforms a living organism, yeast, into a beloved carb.

f) Cloud Computing offers computing services, especially, storage, databases, servers and various forms of software over the internet. It reduces cost and the need for in-house expertise. Many cloud services are particularly useful to SMMEs by providing application tools without expensive licenced software. In a paper from SME South Africa, contributions to the growth of a small business might include increased productivity, data security, collaboration, efficiency and flexibility of work practices.

Did you know? South Africa has the largest 3-D printer in the world. Using titanium powder (costing up to R7. 5 million to fill it), it can build objects requiring a certain amount of complexity like aircraft or missile components and medical implants, or prostheses.

g) Blockchain and its applications extend far beyond cryptocurrency, for which the digital, trust-based, distributed ledger technology is best known. The ledger system records unalterable transactions applicable to transparent and traceable supply chains (to confirm SMME participation or a 'proudly South African' product, for instance); digital identification, reputation, or credit ratings; property rights through land title and transfer deeds; intellectual property and copyright protection; medical recordkeeping and aid disbursement.

Smart contracts housed on the blockchain to create, check and enforce agreements between users can have a positive financial impact on small businesses. Invoicing, paying employees or bills, settling interest fees, handling inventory fulfilment can all be covered in a smart contract, but perhaps most important that by ensuring businesses are paid on time, smart contracts can transform cash flow security. The contracts can also be used as collateral for credit and remove barriers to trade.

Abbreviations

4IR	Fourth Industrial Revolution
AfDB	African Development Bank
AI	Artificial Intelligence
B2B	Business to Business
B2C	Business to Consumer
CAIR	Centre for Artificial Intelligence Research
CCRED	Centre for Competition, Regulation and Economic Development
CSIR	Council for Scientific and Industrial Research
DCDT	Department of Communication and Digital Technologies
DSBD	Department of Small Business Development
DST	Department of Science and Technology
EU	European Union
FB	Facebook
FICA	Financial Intelligence Centre Act
FMCG	Fast-moving Consumer Goods
GB	Gigabytes
GDP	Gross Domestic Product
GNI	Gross National Income
ICASA	Independent Communications Authority of South Africa
ICT	Information and Communications technology
IEC	Independent Electoral Commission
IFC	International Finance Corporation
ILO	International Labour Organisation
IMF	International Monetary Fund
IoT	Internet of Things
IP	Internet Protocol

IT	Information Technology
NPC	National Planning Commission
NPO	Non Profit Organisation
OECD	Organisation for Economic Co-operation and Development
QR code	Quick response code
P2P	Peer-to-peer
PPE	Personal Protective Equipment
R & D	Research and Development
SAA	South African Airways
SANBA	South African National Blockchain Alliance
SARS	South African Revenue Service
SBP	Small Business Project
SBI	Small Business Institute
SITA	State Information Intelligence Agency
SME	Small and Medium Enterprise
SMME	Small, Medium and Micro Enterprise
StatsSA	Statistics South Africa
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEN	United Nations Economist Network
US	United States
VC	Venture Capital
WIPO	World Intellectual Property Organisation

Preface

Prior to Covid-19 micro, small and medium enterprises – we refer to all these businesses as SMEs for brevity – constituted by far the majority of businesses in South Africa. Over 98% of all employing firms in the country employed fewer than 250 people, including medium-sized businesses, and the majority of firms (66%) were, according to our research published in 2018, micro businesses with ten or fewer employees. While there is no reliable data to inform us of how many survived, we are certain that SMEs remain in the majority, as they are around the world, despite rising liquidations and distressing turnover numbers due to the impact of the Covid-19 pandemic and the lockdown measures to contain it.

And yet instead of seeing SMEs as the engine room of our economy despite all the lip service paid by government and big business to them, they are forever treated as an economic widget. Policy and regulations are made for big businesses with large compliance departments, years of much-documented hostility by government is directed at big business, sweeping all 'business' together in unhelpful generalisations; and though much ink has been spilled writing about an enabling environment, there has been insufficient understanding applied to what this should look like.

It is one year on since government introduced the lockdown measures to contain Covid-19. The Small Business Institute (SBI) with support from mining house Exxaro has undertaken research in a Covid-19 world to analyse the situational environment for SMEs in South Africa. Conducted by SME research specialists, SBP, we provide a deeper understanding of the key barriers affecting SMEs and propose a set of recommendations aimed at addressing these problems. Our suite of papers is built on a review of a vast array of decisive studies and an assessment of critical barriers affecting SME performance based on available evidence. South African SMEs face many structural barriers to their formation, growth and expansion. All businesses, especially SMEs were having a tough time of it before the appearance of the novel coronavirus pandemic. There will be no point to layering clever, forward-looking initiatives on top of a foundation that has impeded business growth for decades in South Africa.

While "the business of business is business" as Milton Friedman might say, the multiplier effects of business on a country's development and prosperity for all its people are well documented. Business activity creates jobs, cultivates inter-firm linkages, enables innovation and technology transfer, builds human capital and physical infrastructure, generates tax revenues for governments, and, of course, offers a variety of products and services to consumers and other businesses. And it is in SMEs where the true spirit of enterprise is embodied. Under the right conditions, a vigorous and thriving SME community can enhance competition, entrepreneurship, job growth and spur economy-wide efficiency and innovation.

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Over the past year, an inordinate amount of energy and effort has been devoted to trying to formalise enterprises that are not caught up in the net. Any firm that sells a product or service contributes to our fiscus through the VAT tax they pay on inputs. All circulate money in the economy. One of the papers in our series has sifted through the rationale for formalisation and the pros and cons of the informal-formal continuum and where good policy to support *any*

business along its journey to sustainability might focus. Another will clearly spell out what South Africa requires to truly enable businesses to start, run and grow, accommodating hiring along the way. We will offer a comprehensive distinction between 'inclusive localism' and the localisation debate underway and provide insight at the local level from two case studies focusing on strong local business chambers that are helping to bring hope and economic revival back to their local towns. The results stemming from the case studies give a fascinating view of a whole range of real-life examples. For government, and big business too, the case studies address questions about how to optimise what can be done immediately and the role that local champions play in harnessing people's energies to help bring about positive change, especially in decaying small towns. Answers to these questions are important in helping to rebuild businesses for the future in a world of new realities.

In this paper, we demonstrate that the future is here. Continuous innovation is central to economic prosperity. If we embrace it with urgency and purpose, and not just by publishing strategies or regulations to try and govern it inappropriately our economy will revive, jobs will be created, and businesses will become more productive in a virtuous cycle.

Digitalisation – the best hope for South Africa and its small firms

Introduction

The onset of Covid-19 and simultaneous hard lockdown rang the death knell for thousands of South African small businesses. As the pandemic eased then surged again, provoking a tighter lockdown and additional uncertainty, many more had to close their doors (most reliable current estimates suggest between 15% and 19%). But more than a few of those that survived found ways to adapt and change how they conduct business, what or how they sell, and some intrepid and truly entrepreneurial souls started new businesses during the crisis. The most successful looked to digital tools for salvation.

Many business owners with the requisite grit responded to the needs of the country by making and selling masks and other PPE equipment, or shifting stock to make way for 'essential' items they were permitted to sell. Others, in digital or data-related industries, developed tech-based products or services like medical or contactless payment apps, or new uses for 'wearables', part of the Internet of Things (IoT) wave gathering pace. Those who reacted quickly adopted new ways to sell, or manage their staff, operational and financial information using digital technologies, products (especially cell phones), or services like social media platforms and the cloud. Their pivots included changing their value propositions, delivery channels, or customer base.

As with the Small Business Institute's (SBI) first in these series of papers, researchers reviewed more than 100 papers, surveys, newspaper reports and case studies issued during the months behind us, all with a focus on some aspect of digitalisation. Deciding what to include in this paper required wielding a merciless scalpel. Looking at digitalisation through the lens of small and medium sized firms, the prospects for job creation and the government that regulates them meant the excision of excellent research into the characteristics of the so-called fourth industrial revolution, the exciting advances it presages and countless recommendations for how it can best be deployed, taxed, or regulated to guarantee our security and privacy.

This is an exploration of how technology can and has transformed SMEs and their chances for survival and could be an important key to differentiation and unlocking recovery and growth, particularly for small towns and rural areas. We also look at governance and policy making and the challenges they present for SMEs and digitalisation.

Refer to the glossary provided for definitions and explanations of some of the concepts discussed below. We also offer brief stories in the narrative of South African businesses and the 'techno-preneurs' or 'Covid-preneurs' running them who took the plunge, embracing the next normal.

Because SMEs were failing before Covid-19, we argue that South Africa cannot and should not go back to the old normal. To successfully empower a nation ready to leap ahead will require an urgent understanding of how best to unleash entrepreneurial innovation. It will require a government willing to lighten the heavy hand of over-regulation and relinquish the idea of 'controlling' the fourth industrial revolution or how businesses embrace its tools. And government itself must dip its toe into the future by modernising its approach to serving the public.

As Albert Einstein once said, "We cannot solve our problems with the same thinking we used when we created them."

The future is here and the case for digitalisation

Why do modern day cars almost never break down? Because the data collected over the years and in real time on the car itself enables design improvements and accurate problem prediction. Data is the differentiator: starting with collection and visualisation and then using analytics to link the cyber and the physical worlds – Harry Teifel

As incredible as it may seem now, there was a time when industry analysts were certain that You Tube would never make a profit. Three things changed its future: the smartphone, giving us a video camera in our pockets, high-speed internet and cheaper data.

The fourth industrial revolution differs from the previous 'revolutions' in many ways, but chiefly in respect of its velocity, scope and impact. Simultaneous innovations combine to drive further innovation and the pace of change becomes exponential.

Digital guru Harry Teifel reminds us of the other distinctive element of 4IR: "We are in an era where sustainability, productivity, and exponentiality are no longer just defined by physical objects. It is defined by data. We can now exponentiate data, which has phenomenal power."

Collecting and processing data and converting it into digital intelligence is referred to as digital capital. Observers insist it has overtaken intellectual property in global value chains pointing to digital or data-driven firms topping the stock exchanges and attracting investment. Data can be used simply to improve and target product lines to customers, or solve highly complex problems.

Benefits from harnessing the future

Countries that develop the infrastructure and expertise for data analysis and deployment will have the best chance to innovate for public service delivery, better and cheaper products and employment opportunities to make and distribute the goods or provide services. Importantly, as recently noted in South Africa's 2018 Ease of Doing Business report, digitalisation can remove red tape through government platforms that enhance the business environment. Standard Bank says it offers opportunities to "leapfrog traditional developmental stages and circumvent abundant logistical and regulatory obstacles to wider reform." And the Brookings Institute believes that AI, the Internet of Things (IoT), and blockchain can enhance opportunities for data gathering and analysis for more targeted and effective poverty reduction strategies. The World Bank's report on accelerating digital transformation in Zambia suggests that leveraging data and digital systems will improve sector-specific outcomes in secondary towns and rural areas. Further, the use of data analytics correlates with improved labour productivity, an important component in corporate investment, higher wages and job creation.

A white paper by IBM on Marketing Trends for 2017 noted that 2.5 quintillion bytes of data were created then every day. It added: "To put that into perspective, 90% of the data in the world today [had] been created in the last two years alone."

5G networks will process around 1,000 times more data than today's systems, and next year Google's new sea cable will connect Portugal and South Africa. With an estimated 20 times the capacity of current cables serving us, we can expect to see even more latency-sensitive products and services to be developed and adopted. Then in 2023, a submarine cable project called 2Africa will connect the UK to most of coastal Africa and the Middle East. Enthusiasts claim the new venture will offer more than the total combined data capacity of all subsea cables currently serving the continent.

PWC estimates that the digital economy may contribute as much as 24% of global GDP in the next five years, or a staggering $18.2 trillion. And if the World Bank's predictions are correct, Africa can expect its internet economy to contribute up to $180-billion, or 5.2% of the continent's GDP, driven by a combination of better payment options, further inroads by mobile tech, and mobile money tech adoption. At the same time, they say increasing access for people to the digital economy by 10% (currently 40% on the continent) would pump up GDP per capita by 2.5%. Closer to home, Accenture has suggested that if South Africa embraces and enables a digital economy it could boost total GDP in the coming years by 3%.

Digital transformation also accommodates what Lwazi Bam, head of Deloitte Southern Africa calls collaborative consumption, or the sharing of assets. In an article for the World Economic Forum on Africa he cited Nigeria's Hello Tractor as a good example of this. Its business matches tractor owners with farmers who can't afford them through a booking agent online – an Uber for farm machinery, if you will. South Africans have embraced the sharing economy through ride-hailing or crowd-funding and prior to the novel coronavirus, Airbnb generated some R8.7-billion in economic impact for South Africa, but we lag other nations with far more creative applications.

Jobs, the economy and investment

Job creation will be affected in myriad ways from digitalisation. But maintaining the status quo could well be a recipe for adding to the unemployment figures since services and investment will flow out of the country not in.

The World Bank showed that increased broadband investment of R65-billion in the following ten years could create more than 400,000 jobs and add R 130-billion in the GDP of South Africa. Prior to Covid-19, they calculated that doubling the rate at which the workforce becomes digitally skilled (which cannot be over-emphasised as an important if daunting task for South Africa) could reduce the proportion of at-risk-jobs from 33% to 14% by 2025. Further, UNCTAD research claimed employment of some five million people was created between 2010 and 2015 in the global digital economy and they estimate that investment in technologies as companies innovate to approach six times that of other investments. A SEACOM executive claims "South Africa fares…poorly in terms of locally developed products, both hardware and software. Almost all digital equipment, from processing and storage devices in data centres, to digital communications networks to end-user devices are imported. Genesis notes opportunities

particularly in app-driven task- or job-matching and scheduling services for workers; transport and delivery, especially food delivery; tourism and e-commerce.

Will digitalisation reduce the total number of jobs? It's possible, but it's also worth noting that some of the most digitally advanced countries also have the lowest unemployment rates. Many South African companies are working to minimise the replacement of human capital as they move into more digitalisation. Government could encourage this with tax incentives.

As an example the General Manager for Innovation and Information Management at Exxaro says: "We are targeting up to a 25% improvement in productivity through an enterprise-wide digitalisation strategy that includes adopting a "cloud first" approach with the deployment of scalable digital platforms e.g. for customer and supplier engagement, IoT, advanced analytics, robotics, automation and virtual/augmented reality. We are adopting technologies that will enhance the way our people work, rather than displace them, and upskilling our workforce to be able to operate these new platforms. A cultural drive that trains employees and promotes teamwork is crucial as it minimises the disruptions that digitalisation bring."

Digital talent on the continent is "young and growing fast," according to the e-Conomy Africa Report 2020 issued by the IFC in collaboration with Google. They have counted 690,000 professional developers across Africa with 120,000 in South Africa, or 17%. Taking advantage of this, a social enterprise called Zindi.Africa launched the first data science competition and gaming platform in September. The virtual community assists organisations around the world to tap African data scientists to solve various problems. Examples include predicting the onset of river blindness, online fraud, loan defaults and crop yields.

Before the onset of Covid-19, venture capital in Africa was at an all-time high. The first half of 2020 closed with funding of $493.5-million; fintech start-ups received 54% of the finance. Standard Bank cites estimates that $2-billion was raised in VC equity funding for African tech start-ups in 2019, up by 74% from total funding of $1.16-billion in 2018. Their report numbers 618 active tech hubs in Africa, up notably from 442 in 2018 and 314 in 2016. And the IFC's current Africa portfolio is focused primarily on digital business models driving innovation in priority sectors like e-health, e-commerce, e-logistics, e-supply chains, edtech and agtech, all aiming at reducing cost, increasing quality, and expanding access. The Black Business Council and UBank announced a R1bn investment fund last year, which targets, among other sectors, those enterprises focused on information technology and digitalisation.

The skills challenge

The deputy vice-chancellor at the University of Zululand said in an article published last year that he expected 65% of children entering Grade R to eventually take up jobs that do not yet exist. Three months later, the World Economic Forum released its Future of Jobs report. It listed the top emerging professions as data science and analysis, AI and cloud computing. Amongst the CVs emphasising machine learning capabilities, robotics engineers, and job seekers *au fait* with the IoT, they anticipate that by 2025, people offering analytical and critical thinking, creativity, and flexibility will be as highly valued.

In the world that is becoming, there are no trades. There are just problems to be solved, opportunities to be taken advantage of and to disrupt: to be critically evaluated, and then to be ignited by an idea that strikes the status quo like a bolt from the blue. A university education that equips graduates for this reality is crucial. - Professor Alex Broadbent, Executive Dean, Faculty of Humanities, University of Johannesburg

Sandeep Dadlani, Chief Information Officer of Mars Incorporated agrees, saying softer skills will become more and more important and lists communication, design-team collaboration, understanding context, active listening, negotiation, persuasion, and again, critical thinking. "People need to think about the right problems - what will the supply chain of the future look like?"

These comments serve to throw into stark relief South Africa's abysmal ranking as last out of 50 countries in the 2016 Progress in International Reading Literacy study. The study – which will be updated this year – tests students' ability to read for comprehension in fourth grade. Some 78% of South African pupils in this cohort could not read for meaning. Most strategies, plans and indeed public private partnerships already underway are focusing on improving the skills of the future. With so few young South Africans able to access tertiary education, online education will assume an even greater importance for their future.

For the small business owners needing to pivot during South Africa's hard lockdown, flexible and creative thinking were exactly what saw them through. And they had to move fast. The head of e-commerce at a mobile payments company said, "We saw a three-year adoption cycle get compressed to three weeks." First-mover advantage has perhaps no greater advantage than online.

"Computers are useless, they can only find the answers. The human ability is to find the right questions." - Picasso

How SMEs embraced digital transformation

Prior to the pandemic, small firms were struggling to keep up with technology – tech adoption and tech solutions – to help their businesses. In one of Xero's surveys, 33% of small businesses said they were being left behind because of the pace of technological developments. In another, 45% of small businesses acknowledged they could adopt more technological tools with 52% saying they're "just keeping up". And Xero found that it's not just big business lamenting the low availability of tech skills two-thirds of South Africa's small businesses struggle to find, attract and retain tech talent.

"Across the board, we're seeing entrepreneurs adapting their businesses to the post-Covid-19 era. We're witnessing a remarkable resurgence of creative pivots, side-products becoming main-products, creative partnerships and new product launches." – Fred Roed, Heavy Chef

But suddenly many companies had to close their doors and customers had to stay home. To get products and services – even those deemed essential – into those homes required new strategies. "We had always planned on going on line," one business owner said, "we just never had time. With Covid-19, we had to make the time." Many others did the same as the World Bank's Measuring the Pulse of Firms in South Africa survey revealed: Nearly two-thirds of firms interviewed initiated or increased their reliance of digital solutions.

Arguably the most important tool for countless surviving SMEs has been the cell phone. Smart phones particularly offer a universe of opportunities: services, apps, information, access to markets, education and, importantly, social media platforms to market and now sell products and services. According to StatsSA, households with access to a cell phone at home rose from 76%

in 2011 to 90% by 2018. Similarly, Research ICT says smartphone penetration has grown from 43.5% to some 65% between 2016 and 2019. South African payments company, Payfast, said 66% of purchases this year were made from a mobile device.

Whatsapp, Facebook shop, Messenger, SMS, Twitter, Instagram and tik tok allowed small businesses (whether informal or formal) to show off their wares; communicate with customers; collect their data (important for aspects of 'know your customer', sending newsletters and tailoring their offerings); take their money and arrange delivery. Cell phones not only enabled commercial transactions, but in the early days of lockdown, Phaphama SEDI, a non-profit, student-run organisation managed to conduct an influential survey of small businesses via WhatsApp.

The OECD confirms that digital technology offers SMEs an opportunity to enhance productivity, use their resources efficiently and organise their business process in a leaner way. SMEs have the potential to overcome the barriers they currently face in scaling up and innovating. But during 2020, technology offered more than an opportunity, it was a lifeline.

Examples of South African ingenuity, innovation and hustle

Some South African SMEs were able to extend their offerings in digital environments, especially those relevant for monitoring or treating patients. (This list and those that follow are by no means exhaustive, merely illustrative.) For instance:

- Quro had designed a wearable 'hospital-at-home' service and quickly added biometric Covid-19 monitoring and predictive analytics for rapid response protocols to kick in.
- Ollie health launched during the pandemic to provide telemed consultations with a range of practitioners. It finds those nearby, accommodates 24/7 bookings and filters by medical aid to ensure coverage.
- Another e-health company, Signapps, allows multidisciplinary medical teams to securely share clinical patient information and facilitates communication. During the pandemic, for no cost, the company enabled state hospitals to promote safe practices for health care workers. The UK's NHS recently procured their services.
- LetMeIn, a visitor access management company using Whatsapp and other message apps people already use, launched a chatbot and web-enabled QR Scanning app "CoronaFighter" in March to screen and track symptoms of Covid-19 in the workplace.

Recognising the importance of food security during the lockdown, CCRED researchers urged the adoption of digitalisation in the food industry. "Foodtech covers a range of digitalisation developments including food e-commerce, food management and nutrition. The big potential lies in the digitalisation of logistics and e-commerce in food systems." PayFast reported a 226% year-on-year increase in new business account registrations in the food industry since Covid-19 restrictions were invoked.

- Aerobotics, combines aerial imagery obtained from satellites and drones with its machine learning algorithms to provide early problem detection services to farmers, helping them to monitor their crops, receive early warning of potential risks, and optimise yields. The company received a $5m funding injection in May.
- Darth Kitchens, one of several virtual, cloud, ghost or dark kitchen networks, offers centralised production to several 'restaurants' in Cape Town which fulfil only online orders. The model exemplifies network collaboration sharing wi-fi, rent, security and delivery costs. Data drives the business as the chefs monitor times of day dishes sell, whether a marketing campaign works and whether or not to replace a dish that customers don't want.
- Both 'dark' and light kitchens along with purveyors of groceries have driven enormous growth in the delivery chain. Research group Statista claims that the market for 2020 online food delivery in South Africa was roughly R8.2-billion.
- It became clear during lockdown how vital spaza shops are for South Africa's food security. An app called Vuleka facilitates collective bulk-buying, warehousing and distribution of FMCG goods for spaza shops. In so doing, it builds credit profiles for informal or unbanked business owners, offering loans to purchase stock and enabling them in turn to offer customers the ability to buy on credit. The app collects data about products and customers, selling it back to manufacturers, which provides a revenue stream.

While deliveries came by bicycle, taxi, e-hailing companies and couriers, few delivery methods were available to township residents, highlighting not only the lasting inequities of South Africa's entrenched spatial divide, but another aspect of food security. Several entrepreneurs moved into the space, most notably:

- Abiri, a mapping service, uses drones to convert footage into digital maps of townships to enable easy access. Originally conceived to assist emergency services, tourism operators and business travel, the coronavirus suggested a new urgency for this app and the company is exploring ways to use Artificial Intelligence to speed up its activities. Abiri also developed a commuter feature where users can identify locations of nearby taxi ranks and get directions to them.
- Launched in August, Yethu arranges deliveries to township households and spaza shops using minibus taxis. Customers and taxi drivers (Yethu conducts background checks on drivers) register online, download the app, load a payment method (bank card or prepaid) and can immediately place an order. Customers receive notification of their order and the delivery time (within 12 hours), which they can track in real time. Drivers and customers can rate each other. The service costs R30.

The ride-hailing market for township residents and elsewhere expanded:

- Ambee launched its township based e-hailing service during the pandemic. The service is subscription based; drivers pay a fee and keep the profits they make. Customers use WhatsApp to secure a ride, posting a selfie, their location and destination.
- When business for the 'Local' ride-hailing app collapsed at the onset of lockdown, it shifted its focus and dispatched some 7000 independently contracted vehicles to launch a food and grocery delivery service option called Food, with choices from over 100 stores. Last year, Local began targeting women drivers for women riders, which people hail from the app Her. Her also provides safe transport to the LGBTQ+ community.

e-Commerce thrived in other ways once government reversed its ill-advised ban even though UNCTAD released an e-commerce survey in October 2020, which found that small firms in China were most equipped to sell online and South Africa's the least.

While only a small proportion of South African retail sales in 2019 were virtual (Accenture attributes 1.4% to online shopping), Statista projects a compound annual growth rate through 2025 of 8.2%, with user penetration growing from 41.1% to 53.1% expected during the period. The ILO reported that in the South Africa of about 15 years ago, total retail sales via e-commerce hovered at R2-billion and estimated for 2020 total online retail sales was close to R14-billion – a phenomenal 700 percent increase. WorldWideWorx had forecasted R20bn in online retail sales even before Covid-19 struck. Illustrating the pivots many businesses made, a Mastercard consumer survey had 64% and 41% of its respondents saying they had discovered new sellers through Facebook and Instagram, respectively.

- Facebook accelerated the advent of Facebook Shop, offering digital storefronts to more than 22-million South African FB users.
- Instagram offers product links in story adverts to people and businesses with more than 10 000 followers and 'shoppable posts' upon application.
- Since October, WhatsApp has allowed users to buy products from the chat interface and offers enterprise tools like receipts and confirmations.
- And Google announced plans last year to introduce the ability to buy directly from tutorials or product reviews on You Tube and are asking users to tag products from their clips in preparation.

Most eye-opening was the UN's digital marketing explorer released in May 2020. South Africa was ranked first on the continent with 104 digital marketplaces (they tallied up 630 B2C marketplaces in Africa featuring 1,902 websites). Eighty percent are domestic players. In 2019, Gumtree had over 146-million visitors and Takealot 117-million. Other sites include OLX, cars.co.za, autotrader, makro, chaosads, and bidorbuy with a cumulative total of 652-million visitors.

UNCTAD's Digital Economy Report claims that another value for SMEs on digital marketplaces is linked to data capture and innovation based on customer interaction. For them, the platform economy is "entirely reshaping the business ecosystem of [SMEs]" and changing the firms' connections to other buyers, suppliers, and peers.

Amazon, Takealot, Zando and Superbalist offer space for all kinds of products, services and sales. They handle all the showcasing and marketing of sellers' products, manage the payments, handle online security, and ensure efficient product delivery. In exchange, business owners pay the marketplace a fee, or a commission on sales.

The Presidential Commission on 4IR cited a US study which found that small businesses without an e-commerce presence were twice as likely to have closed during the lockdown.

Digital platforms facilitate commercial interactions between actors, destroying many of the economic barriers preventing markets from functioning optimally and generating inclusive outcomes. Digital platforms remove information asymmetries by digitally aggregating demand and supply, making buyers and sellers visible to one another and standardising prices. Digital platforms also generate trust and credibility by screening buyers and sellers, and through crowdsourced rating mechanisms. Lastly, digital platforms can greatly improve service delivery through more efficient payment transactions and personalised services. – Genesis, draft Masterplan ICT & Digital Economy

"Covid-19 highlighted the importance of e-commerce and the need for businesses to improve their online presence for customers and paying attention to understanding their customers. – Economist Intelligence Unit, The Great Unwinding"

- Kristen's Kick-ass Ice Cream survived lockdown after upgrading its website to accommodate orders, payment and delivery while at the same time marketing on social media and introducing systems using the Cloud, such as Xero, Shopify, Simple Pay and Vend.
- A platform to enable socially conscious shopping, Luntu launched in August, taking advantage of the new reliance on e-commerce. The Luntu Index categorises businesses by their social cause, or ownership. It currently offers 15 product categories, with 24 vendors listed on site. A dashboard app is available for sellers to manage products, tickets, queries, business and sales figure and the site offers a shopping cart and delivery service.
- Kwebo founders saw an opportunity in the gig economy to help individuals who lost their jobs due to Covid-19's impact on the economy, saying it had entrenched the "liquid workforce". The app showcases skills-for-hire (from handyman and cleaning services to accountants and consultants) and provides ratings and analytics, such as booking and billing and payment history. Customers are notified when the service provider is en route. When the customer pays, the money is secured in-app through Kwebo Protect and is released to the vendor when the job is completed and the customer is satisfied.
- The MobiWash Founder used WhatsApp as a booking platform before building an app, which allows customers to book or schedule a car wash. Users select their preferred date, time and location and MobiWash sends a team. MobiWash has also formed a partnership with Kusini water to provide 300l of water to communities in need of clean water whenever a customer books through the app.
- Michanic offers on-demand, at-home car mechanics. Its data-based technology matches mechanics to customers in real-time and offers instalment payments and pensioner discounts.
- ImPowerX Advisory Services is a consulting and training provider in the financial services sector. During lockdown, the company began marketing via social media and offering online financial literacy workshops in partnership with the Financial Planning Institute as well as services in budgeting, debt management, investments and savings. Engaging with listeners on local radio stations about the importance of financial literacy and starting money conversations with children became another service offering.
- Get Law is an online-only legal services platform offering "microtransactions". Twelve attorneys across the country are now providing their services via the platform in 15-minute bundles that can be bought as needed. Self-funded, the company charges for a variety of services. Customers can choose a consultation via Whatsapp, phone, or any of the video-based programmes.

As noted earlier, digital capital – data analysis and visualisation – helps a business make better decisions, identify problems, effect strategic initiatives, and improve relationships with business partners and customers. It allows for personalisation and connection.

"Data is the oxygen of individuals and communities." – Outgoing CEO Richard Brasher when announcing the launch of Pic N Pay Mobile and Boxercom.

Using it to good effect are:

- iTorho Technologies initially focused on catering businesses, but the founder expanded the platform during Covid-19. The site assists SMEs to commercialise skills and improve business using AI to probe engagement on their social media pages. Helps mine company data to unlock financing opportunities.
- Naked is an 'insurtech' start-up offering flat-rate premiums with no hidden fees hoping to access the 70% of drivers in South Africa who are uninsured. By using an AI chatbot and computer vision technology, the company can provide a quote in 90 seconds and cover three minutes after the quote is accepted. When claims are low the company applies any leftover premiums to users' charitable causes.
- Averly uses AI machine-learning and neuroscience technology for the property rental market. The company uses a coded online questionnaire to verify credentials, analyse behavioural history and aggregate other data to generate a score. Averly can also build a history of the rental unit using photographs and repair records to enable tenants to see how effectively the property is managed.
- DataProphet , which has thus far won four international entrepreneur awards, including one of the 100 Most Innovative Artificial Intelligence start-ups of 2020, provides AI services to improve manufacturing by optimising production and supporting 'smart factories'. By collecting data and applying machine and deep learning to predict variances and errors, DataProphet claims to reduce defects and scrap by at least 50% to improve plant efficiency.

Other entrepreneurs are innovating payments and savings:

- Lulapay helps SMEs get their invoices paid faster to more effectively manage cash flow. Launched in May as part of Lulalend, the platform makes use of AI to simplify and speed up the process of getting paid. Lulalend provides advances of between R20 000 to R1.5m, building credit profiles and automating scoring and lending decisions for smaller loan amounts.
- Karri helps organisations collect payments via their app. Parents paying school fees, or money to the tuck shop or for events receive reminders via an app and can pay immediately through partner Nedbank. Waltons Stationery Packs will soon be available and during lockdown launched a feature that allows schools to screen students for Covid-19.
- Forus is a local pioneer in digital finance offering cryptocurrency wallets and interest-free inventory finance for small business in exchange for 3% on turnover collected, triggered by smart contracts. Surplus is directed into the African Wealth Fund for future loans.
- Stokfella is an administrative and payment app for stokvels with a minimum of three savers. It accommodates FICA clearance, provides a template for the group constitution and offers a choice of term investments at variable interest rates.
- SpoonMoney offers savings and credit to groups of women based on the stokvel principle. Spoon Money invests the savings with an asset manager to grow capital and offers training and support via community hubs. Credit is extended to the groups (women invest in groups

of five or more), contributing of R100 per member per month. The loans available are up to three times the total group savings. Automating the lending and savings process is on the cards.

As mentioned earlier, many reports confirm that scholars and SMEs work from a low base for digital and comprehension skills in South Africa. The African Development Bank (AfDB) laments that the country is "so far behind countries like Kenya."

"Soon the world's best education will be online. Anyone disciplined and conscientious enough to listen to podcasts, explore the Khan academy, read blogs will have an edge." Economist Tyler Cowen

Edtech projects targeting digital skills development include Code for Change, an NPO working with South African high schools to teach coding and front-end web development. Microsoft is partnering with the Gauteng provincial government to train young people in digital skills and 100,000 teachers. And Absa is sponsoring students enrolled in classes offered by training NGO WeThinkCode. During lockdown, the Sasol Foundation teamed up with the basic education department and Africa Teen Geeks to support online classes.

Entrepreneurial ventures include:

Lockdown inspired Sponge*in, an* online platform offering subscription video-on-demand content for students and professionals interested in classroom and industry-related subjects. Users can watch lessons and revise content for grade 12 in seven subjects and watch41 inspirational videos about various careers. The founders refer to the app as a 'Netflix' for learners and have plans to expand the courses for grades 10 and 11 in 2021.

Prior to lockdown, Think Camp, which started in 2018, offered week-long 'bootcamp' extracurricular courses in App Development, Coding, Robotics, Minecraft & Game Design for Grades 2 - 11. Now teaching online classes once a week, their Rocket Hour tutorials use various platforms and languages as well as design work to expose and prepare children for the jobs of the future.

Worth is an edtech business that delivers financial education to employees and customers through its online training portal. The company created a new course around Covid-19 developed for households that have suffered a financial shock.

The incubator and investment arms of Naspers, after reporting a 54% revenue increase in edtech platforms increased its total investment last year to over $1-billion.

"The pandemic may be the purest test of the world's progress towards digitalisation. We have a clearer view on how dynamic digital economies can contribute to economic resiliency during a time of unparalleled global turmoil, and can be positioned for recovery and change." Dean of Global Business at The Fletcher School

Governance

Just as there is a distinction between digitisation and digitalisation (see glossary) the journey between e-Government and a digital/digitalised government is spread out along a continuum.

e-Government generally refers to an improvement in the efficiency of and interaction between government agencies using technology to provide government documents and services online and help the left hand know what the right is doing. e-Government includes information services, the accommodation of download and upload services, transaction services, participation and community services (also known as e-Democracy) as well as one-stop services or portals.

A digitalised government, on the other hand, signifies a more fundamental transformation to an agile public sector that is citizen-centric, solving challenges for people on the ground who need it most, by improving responsiveness and accessibility. Using advanced technologies to deliver efficient and targeted services and formulating sound policy, innovation, transparency (vital for building trust) and using data for the public good are its hallmarks. Leveraging data and digital systems by government to improve sector-specific outcomes in secondary towns and rural areas was highlighted in the World Bank Zambia study. Digital government fundamentally removes the many indignities of queues.

Assisted, smart decision making and lower costs

The African Development Bank (AfDB) highlights how data in particular will drive important technologies for a digitalised government and businesses. "Drones, satellites, cell phones, robots and sensors are used to gather data in various forms and, when analysed, can enable people, businesses and governments to make data-driven and predictive analysis" and can improve efficiencies in government functions like "transport, healthcare, energy, water, waste management, telecoms, housing or general security."

SA government's strategy from SITA emphasises the importance of smart government with the technical skills to "enable large scale management of city infrastructure for traffic management, energy consumption management, and ease of doing business enablement functions such as smart contracts, permits, licences and intellectual property registrations." It also points out that setting up payment and technology platforms can enable more efficient management of payments for SMEs doing work with the government, regularly lambasted for its inability to enforce its stated objective of paying SMEs within 30 days.

With digitalisation, government can not only reduce the cost of doing business for SMEs, but lower its own transaction costs. The IMF estimates that collectively, by introducing digital systems in the public service, emerging economies could save between $220-billion to $300-billion annually, or 0.9 to 1.1% of GDP.

The OECD asserts that compliance costs for SMEs can be ten to 30 times greater than for large firms. Here in South Africa SBP has found that on average, a small business owner spends nine working days (equivalent to 75 hours and as much as 8% of turnover) a month dealing with red tape and Phaphama SEDI asserts that the administrative cost of regulatory compliance is

estimated to be R216 000 a year. As noted earlier, digitalisation can remove red tape through government platforms and enhance the business environment by opening portals to facilitate licensing and the documentation required for various forms of compliance by SMEs.

Intellias, a software development company provides examples of digitalising governments benefiting civil servants and the public:

- The Jamaican government is automating data collection and the verification process to speed up pension pay-outs.
- Estonia, well-known for its advances in societal digitisation saves over 844 *years* of working time annually using online document management systems.
- Nigeria's e-ID card system saved that country $1-billion on civil service remuneration while Estonia (again), by introducing a digital signature, has saved 2% of GDP.

A well-known citizen-centric e-government model is that of Singapore. eCitizen organises government information and services under 'life-events'. For instance someone 'moving house' would find forms to report change of address and private sector removal services. The business site allows applicants to make a *single* application to the range of agencies involved in granting relevant licences and permits.

Kenya's ministry for ICT and Youth Affairs, offers a digital economic strategy encompassing firstly a digital government.

Govtech

The idea of "govtech" and public sector modernisation is also gaining adherents around the world. With the aim of supporting inclusion, govtech – whether hardware or software developed for governments – harnesses connectivity and relies essentially on digital IDs, e-payments and national data registries to improve public service and reduce administrative burden. Innovation labs are spreading, especially in cities. Many countries have begun piloting flexible procurement rules, regulatory 'sandboxes', govtech funds and tax incentives.

GovStart, for example, is a growth programme developed in Denmark to help tech start-ups with products that have "powerful public sector applications" transform the public sector. In France, President Macron is hoping to put the state in a "start-up mode," by incubating start-ups within government agencies and deploying a €700-million fund to incentivise the public sector to innovate on their government's behalf. Israel, Britain, Denmark, Portugal, and Poland have all set up govtech challenge programs through which government agencies collaborate with entrepreneurial SMEs for solutions. For Denmark's Minister for Industry, Business and Financial Affairs, "the Danish govtech program is a new approach to adopt new technology in the public sector. But it is also a great opportunity for tech companies to understand our operations and demands." Alas, in South Africa, http://www.govtech.co.za leads us only to a 2019 conference programme.

Assessments of our government's readiness to launch a digital transformation drive

If, as most economic historians will argue, technological innovation and adoption has been the main source of economic progress and resilience throughout the world, it's not surprising that there is a high level of consensus linking economic growth to innovation. However, along with infrastructure blockages in the path to digitalisation, including delayed spectrum allocation and the high cost of data, much of the literature referred to government's insufficient planning to prepare South Africa for the growing economy of the future.

Despite the development of strategies aimed at 'enabling' and 'transforming' and 'accelerating', it is in the execution that South Africa sadly falls short.

The Presidential Commission 4IR emphasises how necessary it is for government to rise to the challenge: "A failure to respond to the nature of these technological changes as well as their related infrastructural requirements, will pose a threat to South African industries, the relative wellbeing of South African people and their ability to participate in the world as equals."

As much as 60% of the population pays more than the affordability benchmark of 2% of GNI per capita, according to the World Bank and pre-paid customers are charged far more by their service providers than those with contracts. ICASA has shown that in 2020, a data bundle of 1G cost R100 to R 120 if pre-paid as compared to R 40 to R79 if contracted.

The OECD warns that failure to ensure widespread digital access and effective use risks deepening inequalities and may hinder efforts to emerge stronger from the pandemic.

And so if digitalisation is our best chance for recovery, let alone future growth and the inclusiveness both imply, South Africa's strategies and plans certainly acknowledge that we need to be ready, but are we? Governments make a costly mistake when they confuse "digital initiatives" with "digital strategies" say the compilers of the National Readiness Index.

The National Planning Commission's (NPC) Digital Futures - South Africa's Digital Readiness for the Fourth Industrial Revolution was particularly harsh: It cited institutional failures ranging from the botched digital migration and 'debacle' over the release of spectrum allocation, delayed for nearly a decade, to weak political appointments, corruption and lack of leadership. It also highlights suboptimal policy and regulatory initiatives, fractured and territorial departmental planning (or lack thereof), poor data collection and the lack of investment in research and development. The document is peppered throughout with terms like 'stasis', 'incapacitated', 'compromised', 'paralysed' and 'ideological rigidity'.

The World Bank tells us that, "South Africa is already a key digital entrepreneurship player in Africa, serving as a 'hub' for many initiatives and investments on the continent, but its leadership is being increasingly challenged, as it is being held back by key policy, regulatory and human capital bottlenecks." The report suggests that we're losing ground to the likes of Kenya, Rwanda, Botswana, and Nigeria.

In December, the National Planning Commission published its Review of Economic Progress, which provides plenty of examples where good intentions have delivered almost laughable results, most notably that over 35 000 government agencies need to be digitally connected (970 have been connected since 2017, but "It is not clear whether these sites are operational and/or what impact there has been."). They estimate the funding requirement to be between R30-billion and R80-billion with a pitiful R581-million allocated from the 2020/1 to 2022/3 budget.

Written a year before the NPC's December paper, the World Bank's SA Digital Economy Diagnostic found that while a National e-Government Central Portal had been launched to improve online services, as a part of new "e-Government roadmap", neither relevant government departments had maintained a registry of what has been achieved. "Therefore, it is not immediately possible to take stock of how many services have been automated and at what level."

The African Development Bank refers to inconsistent policy and regulatory failure in key enabling areas, particularly the telecommunications and energy sectors, which have hamstrung South Africa's readiness for more widespread 4IR adoption. And even if South Africa's e-government services, e-education, e-health, or smart metering for energy and water and smart lighting were more developed, they "cannot benefit those who have the greatest needs mainly due to limited access to the internet."

The Eskom elephant in the room

Bandwidth and spectrum allocation aside, access to the internet first and foremost requires power. The many services that digital transformation is dependent upon, especially base stations, data warehouses and cloud providers, not to mention the ability to charge a cell phone, cannot operate without a stable, affordable power supply. Every hour of load-shedding and every tariff increase diminishes South Africa's prospects for success and increases the costs of doing business. As the AfDB has it, "the inability of the [energy] sector to guarantee a stable supply of electricity presents a major challenge to the ailing economy and curtails the opportunities of the 4IR." In the recently published World Bank South Africa Enterprise Survey 2020, businesses overwhelmingly cited electricity as the primary business environment constraint.

Challenges outweighing progression

The Accounting Officer in his introduction to the Department of Communications and Digital Technologies' strategic plan, which takes us through to 2025, acknowledges an additional herculean task of harmonising objectives across the myriad actors: "We will also prioritise the development and implementation of the Digital Economy Masterplan which will require cooperation from multiple stakeholders including our SOEs as well as the private sector, industry and other government departments." Orchestrating and harmonising such an effort will require what the UN cites above and beyond financial commitments in its rankings for countries' e-government development: "A country's political will, strategic leadership and commitment to advance digital services..."

The Presidential Commission on 4IR contains a useful section which compares international focus and priorities for digital transformation, as does the DCDT strategic plan. In that document, the minister emphasises "interventions to achieve the outcome of enabling transformation policies and strategies". It is telling, however, to compare this to the simple, clear aim of Malaysia, cited in the same document: *Act* [our emphasis], Create, Transform.

In a speech in 2020, the DCDT minister highlighted many correct drivers of digital transformation: the licencing of the high demand spectrum; fast-tracking the rollout of broadcasting digital migration; digital government; building a big data economy; skilling the nation; and institutional reforms.

However, in a presentation to Parliament in February 2021, the deputy minister described actions and challenges around some of the projects envisioned by the National Integrated ICT policy white paper tabled in 2016. The report references amending the Electronic Communications Act to expand access to digital services and give ICASA more flexibility to regulate and the licencing of the Wireless Open Access Network for 30 March 2021. But far more strategy development, master plan development, policy drafting, and consultation seems to be underway than any activities that would suggest an urgency to digital transformation. Indeed, one of the 'achievements' listed is the billions of rand (R177-billion according to the NPC's December review) invested by the private sector in connectivity and the 'cost of communication'.

Even without Covid-19 and the acceleration of digital technologies offering us the chance to unlock our economy, small businesses surveyed by Xero identified lack of government support (32%), load-shedding (32%) and political uncertainty (16%) as their most pressing worries.

The NPC warns that even digitising the public sector will depend on a massive change-management (skills and mindset) exercise not only within the moribund State IT Agency, but also across various agencies of government. SITA, according to the AfDB was "riddled with poor performance and widespread corruption and maladministration… A new CEO (the 18th in almost as many years) started a turnaround seen at SITA but it was not completed before he left in 2019 after not renewing his contract." The NPC concluded, "The adoption and use of ICT by the public sector in South Africa has been notoriously bad."

The desirability of Public-Private Partnerships

Perhaps it is no wonder that the NPC's December 2020 paper says, "The capabilities for oversight and implementation of digital public platforms is very limited…[and] should shift to one that relies on government as procurer and regulator but perhaps not as implementer."

However CEO of technology group Altron Mteto Nyati points out, "It doesn't come naturally for government to partner with business." Altron was awarded a R1.2-billion broadband contract by the City of Tshwane and had to go to court when the city tried to cancel it (Altron won). The Altron contract was the first of the government's IT projects to be funded by commercial banks, important, according to Nyati because, "We know our metros and district municipalities don't have the funds for these critical projects."

"We don't necessarily need more new plans. We need implementation and execution because that is what is going to get us out of the mess we're in." – Mteto Nyati

Observers' cautious if not scathing assessment of South Africa's preparedness is unfortunately supported by most relevant international rankings where we have repeatedly lost fast-moving ground. Below are some of South Africa's Rankings related to digital readiness and innovation:

Index	Metric	Ranking
BDRC Continental and Global Competitiveness Report	Competitive pricing. "Mobile data in SA is the most expensive out of the African continent's six leading economies."	97th out of 106 countries 111th out of 172 countries
Bloomberg Innovation Index	R&D intensity, manufacturing value-add, productivity, high-tech density and patent activity	50th out of 60 countries
Cisco Digital Readiness Index	Scores countries based on seven metrics. SA ranked 106th in investment, 100th in human capital and 70th in technology investment	78th out of 141 countries
Fletcher School at Tufts University's Digital Intelligence Index	Looked at 160 different indicators, including drivers like digital trust, experience, evolution, economic resilience, infrastructure, e-commerce, inclusivity, the digital state, and institutions.	SA was classified as a 'Watch Out' Economy, in the lower quadrant of 42 countries. We face both low digitalisation and momentum, with "digital weakness on most fronts."
Global Innovation Index 2020 Cornell, Insead, WIPO	Examined 80 indicators, grouped into innovation inputs and outputs	SA ranked 60th out of 131 countries. 49th for innovation inputs, but 68th for innovation outputs, 107th for ease of starting a business.
International Telecommunication Union's Information Society Index	Readiness, intensity and impact – becoming information societies. Also says broadband speeds are 10% of those in countries such as South Korea and Singapore.	104th out of 144 countries (we were 78th in 2002 and 92nd in 2018)
Network Readiness Index	Looks at 60 metrics across technology, people, governance and impact.	76 out of 134 countries
UN 2018 e-Government Development Index	Looks at 'access characteristics', such as the use of IT, infrastructure and educational levels. *"Many of SA's data were outdated or non-existent."* (this comment may prejudice the ranking, but it makes an important point)	68th out of 193 countries
WEF Global Competitiveness Report	Assessment of digital skills among the population. South Africa was cited as one of the countries seeing the largest decline of digital skills relevance.	116th out of 140 countries
WEF Global Competitiveness Report	South Africa was also ranked lowest on rethinking 'labour laws and social protection for the new economy and the new needs of the workforce	42.90 (on a zero-100 scale)
World Bank Human Capital Index (2018, last for which rankings were available)	Evolution of human capital - health and education outcomes, ranking below peers with less income.	126th out of 157 countries

Small pockets of e-Government are available in South Africa (certainly one of the best examples is the National Treasury's https://vulekamali.gov.za), but there is a long way to go before digitisation is behind us and our government is able to apply the elements of the fourth industrial revolution to the way it serves us. It's time to bring in the private sector as so many countries have done with resolve.

Policy confusion doesn't help

Policy and regulation in South Africa flounder in respect of digitalisation the NPC says, because the 'policy cycle' doesn't keep up with the pace of technological or scientific change. In addition, "policies in South Africa tend to lack regulatory clarity". For example, while a clear and integrated data governance framework is required to provide a safe and secure environment for citizens and enterprises to transact online, "laws dealing with part of the governance framework are legislated without reference to each another, with some even facing constitutional challenges."

The United Nations Economist Network (UNEN) megatrends report calls for commitment to an "experimental, comprehensive approach to policy design through forward-looking policies that are fit for purpose, contextually relevant, and facilitate greater cooperation across seemingly unrelated policy areas. Sadly, these mutually reinforcing policy areas are often addressed through siloed policy interventions."

Several reports also cited multi-jurisdictional confusion, as acknowledged by the DCDT Accounting Officer. There is no better example than South Africa's lack of a national database of addresses. This became evident, as mentioned above, as one of the challenges township residents had ordering food deliveries during lockdown and for contact tracing. In an article on the Conversation website, two academics suggest any of the following were contenders for the responsibility of developing and maintaining the database:

"The Post Office is often considered coordinating custodian, though municipalities maintain data for their areas. Home Affairs is another, since it maintains the population register. The Department of Planning, Monitoring and Evaluation in the Presidency should be considered because of its overarching mandate and the key role of addresses in governance. Others include SARS, StatsSA, IEC and the Financial Intelligence Centre and the Department of Health with the Covid-19 geocoding challenges."

"Little could be as important for uplifting people and generating growth than providing a legal and regulatory environment that promotes ongoing technological change and the freedom to innovate." - Michael Mandel, in Your Regulatory Strategy IS Your Innovation Strategy

The paper from the IFC and Google states that regulatory inconsistency can complicate or impede market access and limit investment opportunities for SMEs, affecting start-up viability and investment decisions.

So does a government that funds with the one hand and reallocates with the other.

Lack of consistent, determined funding priorities

Already facing precarious financial positions when Covid-19 hit, the June 2020 Supplementary Budget reduced or suspended programmes vital for preparing South Africa to provide the requisite infrastructure, skills and investment in a digital future. While relief to South African families and businesses was unquestionably essential, some of the reallocation choices might have been short-sighted.

Among the cuts were the following:

- ✂ R1.4-billion from Science and Innovation
- ✂ R2-billion from Basic Education and another R9.8-billion from Higher Education
- ✂ R739-million from Technical and Vocational Education and Training (TVET) colleges
- ✂ R111-million from Communications and Digital Technology
- ✂ R500-million to connect more people to the power grid
- ✂ R312-million for community libraries
- ✂ R200-million for StatsSA

Cuts totalling R295.4-million to science bodies caused the Financial and Fiscal Commission to respond: "Science and Innovation cannot be relegated to outer years allocations as it will play a pivotal role in determining the new economy and our global competitiveness." The spending reductions also prompted concern from legislators in parliament that the country may not meet its research and development (R&D) targets.

R&D is one of the few government priorities complemented by the African Development Bank when referring to, among others, the Square Kilometre Array and the Centre for High-Performance computing. "Taken together, these initiatives by the State compensate enormously for low R&D investments by the private sector." However, the World Bank's survey claims 22.6% of firms in South Africa spend on R&D.

The patent environment

While data is somewhat unreliable, the World Intellectual Property Organisation (WIPO) tracks patents filed by residents in South Africa and abroad. And while local patents have flatlined, if not declined over the past decade (both applications and grants), those awarded to South

Africans in other jurisdictions have increased markedly, rising from approximately 35% of all patents granted to 71%.

Patents filed overseas may attract higher costs (further penalising SMEs), but they afford better protection and often a quicker turnaround time. For example, in the decade of data examined by two UCT academics in a paper on innovation and intellectual property, two of the patents awarded in 2008 were from applications filed in 1988(!). The average time between filing an application and receiving a patent is 13.5 months; most are held by individuals (44.8%) followed by companies (private and public), accounting for another 39.5%

Patents are only a proxy for innovation, but a paper some years ago in the South African Journal of Science argued that the current intellectual property rights regime fails to support the objectives of the national innovation system. Indeed, in a UCT paper on innovation and intellectual property, the authors say the data they examined "strongly suggest that the existing patent system in South Africa plays a key role in stifling – rather than stimulating – innovation. All of this emphasises that this is not the time to sacrifice investment in our public research institutions and universities.

The Department of Science and Innovation's white paper concurs, offering a number of policy ideas to improve the environment for innovation including a "broader conceptualisation of innovation, and supporting a whole-of-society approach to innovation…to ensure that all policies related to innovation (e.g. trade, competition, education and procurement policies) work together to support innovation in South Africa." They also target more support for businesses, particularly small and medium enterprises

Thapelo Montong, a patent attorney, writes that it is not clear in South African patent law whether innovations developed with AI and machine learning can be patented without a human name attached since current law recognises only natural persons.

On average, according to the NPC, SA firms spend seven times less than their American counterparts on R&D, which factors into our ranking of 50 out of 60 in the Bloomberg Innovation Index. Kenya spends 30% more per capita on research and development than South Africa. However, Genesis lists the following as South Africa's current areas of competitive advantage in the digital marketplace, indicating at least some level of R&D spend: silicone processing for fibre optics, integrated circuits, solar, set top boxes, low-cost tablets, phones and automotive parts.

Akhona Damane, who heads up the Office of Digital Advantage at the CSIR asserted in 2019 that the government intended to introduce tax breaks for companies investing in R&D. At that time, the DST-funded Centre for Artificial Intelligence Research (CAIR) had won the bid to host the 32nd International Joint Conference on Artificial Intelligence in Cape Town in 2023.

Economist Dani Rodrik argues that governments should be more involved in R&D innovation since the private sector depends on government funding of basic science and research labs. It also relies on scientific talent trained in universities with the support of public funding. The state also provides innovators with commercialisation rights through the system of granting patent system underpinned by contract law.

The Vice-Chancellor and Principal of the University of Johannesburg is also critical of some of the current programs involved in pushing local innovation because they don't bring in enough people from

other innovative countries. He says, "In South Africa, innovation, by its very nature, cannot be restricted to a nation. It has to be a system that absorbs knowledge from outside

Further budget cuts

The Science bodies whose funding were cut included: CSIR, National Research Foundation, Academy of Science of South Africa, SA National Space Agency (just as they had begun work for the DSBD to geo-tag spaza shops in need of assistance), Human Sciences Research Council, and the Technology Innovation Agency

The National Research Foundation was also singled out, incidentally, by the NPC to drive "digital policy research and data collection required for local, evidence-based policy on the country's more immediate digital environment."

Four months later, the knife came out again with the medium-term budget, slashing allocations to the tune of R310.6-billion over four years. Another R1-billion is to be withheld from higher education and training.

The quality of South Africa's education and digital skills training threaded its way as a principle concern through the majority of the research. From fourth graders' inability to read for comprehension to the unmet requirements of businesses seeking to hire digitally-savvy employees, to the indices measuring our place in the world, robbing Peter to fund Paul's R10.5-billion business rescue plan for a failed airline does not in any way demonstrate a government committed to digital skills development.

In the same budget the Independent Communications Authority of South Africa received R84.-million for the licensing of high-demand spectrum, which Altron's CEO, at least, is confident will be distributed by the (latest) March 2021 deadline.

The fiscal requirements of continued SAA and Eskom bailouts (another tariff hike for Eskom power five times the current inflation rate was announced in 17 February underwriting another R10-billion) coupled with the devastation wrought by the pandemic on the economic activity of businesses and families, the gaping hole of lost tax revenue resulting from government's ban(s) on the sale of cigarettes and alcohol means the a R213-billion shortfall in tax revenue this year. This leaves most observers very little hope that even with the best will in the world South Africa's spending priorities will again not match the demand for what a transition to a digital economy will require.

The budget announced in February 2021 confirms this. While the nation's health and social security should of course take priority in the time of Covid-19, it was disappointing to see very little commentary about, and further cuts for the departments that matter to, digitalisation. With R8.8-billion for the department of Science and Innovation (roughly the same as last year's appropriation) and R3.4-billion for Communications and Digital Technology (a loss of R2.3-billion), we wonder how serious this government is about embracing the fourth industrial revolution.

And then there is corruption

The insult heaped on the injury, of course, came from Kimi Makwetu's last Auditor General report laying out for what he termed poor financial management by public institutions opening the door to corruption in PPE procurement and considerable misallocation of several of the relief programmes. All the more reason South Africans, if not their government, would be relieved to

have a digitalised government: e-governance and the openness and transparency that characterises it is an effective tool to hammer closed some of the windows currently open for corruption. Of course a digitised government needs digitally-connected citizens with whom to interact.

What next?

Red tape and the enabling environment

The SBI has, over the years, emphasised that red tape – or administrative burden – ranks high up on any list for entrepreneurs along with late payments an enormous challenge. Small business concerns regarding the compliance burden relate not only to the volume of regulatory requirements and poor administration, but also the frequency of regulatory change. SBI has called on (both) of the ministers for small business to enact Section 18 of the Small Business Act, which would require regulatory impact assessments whenever a new policy, regulation or law were contemplated, making each and every minister a minister for small business. Never before has 'thinking small first' mattered as much as it does now.

Fortunately Intellidex reminds us that robust businesses are built in tough economies. They presented findings last year to back up the sentiments expressed by the SBI and the late entrepreneur Richard Maponya: "Government should create an enabling environment that makes it easy to run businesses, but no more than that. Laws and regulations can help businesses, but bureaucratic red tape hampers enterprise."

The OECD tells us, "Better regulations would crowd in business investment, *technology adoption* [our emphasis] and human capital accumulation, leading to multiplicative effects." Prof Richard Walwyn and Laurens Cloete agree, saying, "Where there is limited technological capability the focus should be on creating an enabling environment."

The EU confirms that SMEs face considerable difficulties when confronted with the extremely complex legal, financial and administrative environment set up by government. "This complexity of legislation, rules and taxation is the main reason why SMEs go out of business or into the underground economy."

The African Development Bank puts it succinctly: "The government's role is to create an enabling environment for investment and innovation."

One of the most compelling arguments for opening up an enabling environment for innovation and small businesses comes from academic Adam Thierer, who calls for 'permissionless innovation'.

Smart innovation policy begins with a particular disposition toward experimentation, risk-taking, and even failure. For innovation to blossom, entrepreneurs need a clear green light from policymakers that signals a general acceptance of risk-taking—especially risk-taking that challenges existing business models and traditional ways of doing things - Adam Thierer

The principle of permissionless innovation has fuelled the success of modern economies, he says, and could "power the next great industrial revolution, if governments would just get out of the way." A recent example of this, was the rapid development – and approval – of the various Covid-19 vaccines.

Several papers point out that the rapid rise of online reviews and reputational feedback mechanisms demonstrate that laws are not the only mechanism for regulating new technologies, or the products and services distributed through them.

Thierer prescribes several antidotes to the tendency to over-regulation. He would have governments:

- Rely on existing legal solutions and the common law to solve problems.
- Adopt targeted, limited legal measures for truly hard problems.
- Evaluate and re-evaluate policy decisions to ensure they pass a strict benefit-cost analysis (compare to the recent National Small Enterprise Amendment Bill about to be tabled in Parliament which presented neither a cost-benefit analysis nor a business plan)

The NPC added an important consideration in the December review, namely that regulators should adopt a 'life-cycle' approach. This would entail a comprehensive review of how compliance affects businesses of different sizes and capabilities. While the Commissioners targets the objective of regularising all businesses, the SBI would rather emphasise that at each stage of a business' life, regulations should accommodate the dynamism and innovation allowing businesses to scale and contribute to the country's economic growth and employment.

Encouraging flexibility and innovation

"Constraints inspire creativity, urgency drives action." – Yoco on Twitter

Once upon a time, in 1999, the EU published a paper on then-new technology and SMEs. Their conclusions remain true today: SMEs are generally more flexible than big businesses in adapting to new situations and market conditions. As a group, they offer considerable advantages for employment, and they can be leaders in applying new technologies.

The deputy minister of Trade, Industry and Competition agrees, "Innovation and digitisation will be necessary conditions for building this economy and will help build the various Small, Medium and Micro Enterprises of the new economy" and should be "at the forefront of driving economic recovery in the aftermath of the Covid-19 pandemic."

The 4IR is also developing at an astonishing pace, says the African Development Bank. "While there are great opportunities, if Africa does not get ready, it will surely widen the gaps between the have and have-nots, the skilled and unskilled, the rich and the poor. For this reason alone, attempting to maintain the status quo is not an option. It requires Africa to unite – policy makers, the private sector and citizens – to build the infrastructure, cultivate our energy and creativity, and mobilise the finance to capitalise on the 4IR opportunity."

Importantly, the IFC/Google collaborators suggest: "Given the technology-related regulatory challenges governments are facing, it is important for entrepreneurs, investors, and policymakers to continue dialogue, encouraging environments where digital start-ups and businesses can thrive."

Recommendations to government

- Prioritise long-term investment in digital and relevant softer education and skills development for students, the employed requiring re-training, and the teachers who teach them;
- Build the requisite and affordable digital infrastructure to achieve economic advancement and inclusion; let the private sector help. Enable and incentivise them to do;
- Seek public-private partnerships in respect of building 'govtech' solutions to e-governance, innovative institutions, and execution of digitalisation;
- Rapidly accelerate the procedures for green lighting large-scale renewable power projects;
- Commit to responsive, citizen-first governance and progress rapidly to a digitalised government;
- Ensure procurement procedures are online and transparent to enhance efficiency and minimise corruption;
- Constrain the regulatory environment to fewer and better laws with clear policy objectives and targets, paying heed, as the NPC suggests, to a "regime is conducive to small business needs and abilities." Regulation should not simply require compliance, but promote:
  - innovation and competitiveness, i.e., entrepreneurship
  - job creation
  - digital platforms for e-commerce proliferation and mobile payment options
  - digital financial services
  - the adoption of emerging technologies
  - harmonising and easing cross-border trade
- Hold yourselves accountable
- Finally, "Ensure that the views and concerns of small businesses are more effectively articulated in decision- and policy-making structures. Policy-making and regulatory design needs to be more responsive to the needs of small business". (NPC).

Resources

Research papers, surveys, strategies and policy documents

Africa's tech hubs giving universities a stiff challenge
African Development Bank - Digitisation, Small Businesses at the Base of the Pyramid and post- Covid-19 World: Lessons from Kenya
African Development Bank – Potential of the fourth industrial revolution in Africa
African Development Bank – Unlocking the potential of the fourth industrial revolution in Africa. Country case study: South Africa
African Marketplace Explorer: The Landscape of B2C Online Marketplaces for Physical Goods in Africa
Brookings 'Foresight Africa' – Capturing the fourth industrial revolution: A regional and national agenda
Connection Telecom – Digital Tools, The Technology Driving Big Advantages for SMMEs
CSIR – Science and technology in support of small, medium and micro enterprises
Deloitte: Digital services tax in Africa – the journey so far
Department of Communications and Digital Technologies – Strategic plan 2020-2025
Department of Communications and Digital Technologies – The National Integrated ICT Policy White Paper
Department of Science and Technology White Paper (pre-Covid)
DTIC Strategic Plan
European Union Parliamentary Report: New technologies in small and medium-sized enterprises (SMEs)
Fletcher School at Tufts University: DIGITAL IN THE TIME OF Covid Trust in the Digital Economy and Its Evolution Across 90 Economies as the Planet Paused for a Pandemic
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Heavy Chef interview: Prof Marwala on the real reason entrepreneurs should care about artificial intelligence
Industrial Development Think Tank – Combatting Covid-19: the promise of foodtech in South Africa
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[Kenyan] ICT Ministry Seeks to Recognize 'Gig' Economy in Draft Digital Strategy on
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Standard Bank – 10 years on Reviewing the trends driving South Africa's allure
Standard Bank blog The role of digitalisation in kickstarting African economies
StatsSA Statistics of Liquidations and insolvencies, November 2020
StatsSA Three facts about small business turnover in South Africa
The Small Business Site: You don't need a website to start your online business
The UN Conference on Trade and Development (UNCTAD) Digital Economy Report 2019
UNCTAD survey Covid-19 and e-commerce
United Nations Digital Economy Report
United Nations ECA – African businesses shifting towards new technologies in response to Covid-19 pandemic
United Nations Economic Commission for Africa - Digital Transformation in a post-Covid world: Africa continues to trail other regions
Vodacom Fast Forward: The fourth space awaits you
Vox EU/ The Centre for Economic Policy Research: Data are a development issue
Wamda: The future of SMEs after Covid-19
WB Embedding Digital Finance in e-Commerce Platforms during the Covid-19 Pandemic
WEF South Africa's SMEs should be first in line for a digital upgrade
WEF: Future of Jobs report
WEF/Project Syndicate - Private or public: What's really driving technological innovation?

World Intellectual Property Organisation – Patents: World Intellectual Property Indicators 2018
World Bank: Measuring the Pulse of Firms in South Africa Results from the COVID-19 Business Pulse Survey
World Bank: South Africa Digital Economy Diagnostic
World Bank: Enterprise Surveys: South Africa 2020 Country Profile
Xero State of Small Business ZA
Yoco Small Business Pivot Guide
Yoco: The Small Business Pivot: Pandemic-inspired reinvention (54)

Articles and blogs

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Entrepreneurs launch online platform to help youth employment
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Naspers Foundry's big vision for small tech
Articles from www.disrupt-africa.com
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African tech startup funding passes $700m in record-breaking 2020
Skilled people needed for organisations to benefit fully from advanced technologies
Industrial blockchain expected to reach $2bn/y revenue in 2025
Visa adds partner toolkit, new fintechs to fast-track programme to help restore global economy
Large-scale IoT use can improve services, quality of life and resource efficiency
Kagiso Capital invests in local IoT commercial technology development company
Articles from www.iol.co.za
How SMEs can leverage e-commerce to grow their business
High data costs still hamper local SME growth
Connectedness is important for the survival of SMMEs
Cape Town ranked among world's top emerging start-up ecosystems
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How bitcoin helps businesses in Africa
Yethu app delivers goods to township households and spaza shops using minibus taxis
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McKinsey urges SMEs to turn to tech
New app connects customers to SMEs
Mastercard intros SME-in-a-Box to help businesses go digital
Vodacom equips more SA women farmers with digital skills
Articles from https://htxt.co.za
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3 new South African-made smartphones to launch in 2020
Big growth for Takealot and Mr D Food
Big spike in online shopping in South Africa – But not at Black Friday levels

Bolt launches cheaper ride hailing service in South Africa
Cape Town-based tech startup receives prestigious international award
Free coding training launched for South African high school students
Free online tech courses launched for unemployed South Africans
Government's plan to teach coding and AI at South African schools
How much it costs to build and host a website in South Africa
How South Africa's curfew has changed online and food delivery
If the South African government wants entrepreneurs, it needs to put its money where its mouth is
How to launch an online business in South Africa
Further Africa: Is FinTech the wildcard to African SME recovery?
International Trade Centre: Covid-19: The Great Lockdown and its Impact on Small Business
Luno acquired by the world's biggest blockchain investor
New R500-million AI fund launched in South Africa
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This South African tool tells if you are a good tenant
Operators and ISPs: What Ramaphosa must really do to improve broadband in South Africa
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Cape Town entrepreneur launches local food delivery app
Enabling growth in the digital economy: lessons for and from South Africa
Female student entrepreneur wins UCT Shark Tank programme
Local fintech startup aims to financially assist SMEs
New free edtech app developed by local entrepreneurs
SA entrepreneur wins Student Entrepreneur of the Year Award 2020
SA security startup selected to join African Early Stage Investment Summit
SA SME wins prestigious humanitarian award and €1-million
SA tech startup expands platform to provide e-hailing service for women
South Africa's first STEM digital school
Finalists in Stellenbosch Network's Ideas for Change Challenge
Township entrepreneur to launch South African e-hailing service