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Common Good First

DIAGNOSIS OF THE DIGITAL LANDSCAPE IN SOUTH AFRICA – SKILLS, INFRASTRUCTURE AND AVAILABLE TECHNOLOGIES

WP2: Diagnostic study – digital landscape in South Africa

Deliverable 2.4: Consolidated diagnosis of the digital landscape in South Africa

Isabella Venter and Leona Craffert, University of the Western Cape

Darelle van Greunen and Alida Veldsman, Nelson Mandela University

Marina Candi and Hallur Tor Sigurdarson, Reykjavik University

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1 Introduction

This is a consolidated report covering a survey of the digital landscape in South Africa, a comparison between conditions at the start of the Common Good First (CGF) project in 2016 and its end in 2019, and a summary of the project's impact and benefits for participating regions in South Africa.

1.1 Background

The world is yet again poised on the brink of a revolution—the Fourth Industrial Revolution. It is postulated that this new technological revolution will fundamentally and exponentially change the way people live and work. Some of the aspects that will drive this new revolution are: artificial intelligence, 3D printing, the Internet of Things, quantum computing, storage capacity and knowledge being accessible to all at the click of a button. This revolution, if not embraced and anticipated, could minimise or even derail all the potential it brings for development and innovation.

> *"Information and communication technologies (ICTs) are the backbone of this revolution. The future of countries, businesses, and individuals will depend more than ever on whether they embrace digital technologies. And many of those who stand to gain the most are not yet connected"*[1].

In his book "Sapiens: A Brief History of Humankind"[2] Harari suggests that approximately 70 000 years ago *homo sapiens* went through a "cognitive revolution", resulting in *homo sapiens* becoming the only animal capable of large-scale cooperation. According to the author this revolution is based on our ability to share stories, and build upon information, and it is this storytelling ability that truly distinguishes us as humans.

The CGF project—Common Good First Digital Storytelling for Social Innovation—has focused on supporting South Africa's social innovation sector by implementing and establishing a digital platform for strengthening, showcasing and disseminating social innovation projects through digital storytelling. Furthermore, the social innovation training modules included in the project, aim to enhance participants' digital skills and in that way contribute to decreasing the digital divide in local communities.

[1] Extract from WEF Global Information Technology Report, 2016

[2] Yuval Noah Harari, (2011). *Sapiens: A Brief History of Humankind*, Vintage, London (ISBN 9780099590088)

1.2 Approach

To describe the digital landscape in South Africa (ZA) we consult publicly available information on current ZA digital policies, frameworks, and broadband infrastructure. This includes global indices on the digital landscape (inclusive of South Africa) and validated ZA information on access, skills and behaviours. An understanding of the digital landscape in ZA has assisted the CGF group in several ways in the design of the project to address the needs of local communities; for instance, in recognising challenges in broadband access and stability, costs, devices, and potential usage preferences. An understanding of the digital landscape in ZA, and the changes it is undergoing, continues to be essential for sustaining and adapting the CGF platform.

2 South Africa as an emerging economy

Although South Africa is classified as a developing country, plagued by high levels of poverty, in some ways it is also comparable to advanced economies. It is recognised as one of the most unequal countries in the world[3]. Pockets of highly advanced technology infrastructure can be found in the bigger cities and metropolitan areas, while access to even basic technologies is lacking in large parts of the country. For example, tertiary hospitals, universities and other sophisticated research entities, are located in metro areas, while people from rural communities have to travel great distances to access primary healthcare services at rural clinics or attend Further Education and Training (FET) Colleges.

Although South Africa has a strong private sector and fiscal resources, the high and persistent unemployment rate (29%)[4] renders even basic services inaccessible for a large portion of the population. Most (55.5%) of the total population lives below the poverty line—this translates to over 30.4 million South Africans[5]—while a large proportion has very low educational levels and lacks the e-skills required to use new technologies and services. In an attempt to level the playing field, the South African government invests in the country's poor through a variety of types of social grants.

The past decades have seen the migration of people from the rural areas of South Africa to the cities. For instance, since 2000 and until 2019 the urban population has increased steadily from 55.8% to

[3] The World Bank. (2018). Overcoming Poverty and Inequality in South Africa: An Assessment of Drivers, Constraints and Opportunities. The World Bank

[4] Source: Business Tech - https://businesstech.co.za/news/business/332527/south-africas-economy-doesnt-have-a-long-time/ (Retrieved 02/08/2019)

[5] StatsSA. (2017). Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2015. Statistics South Africa. Pretoria, South Africa: Statistics South Africa.

approximately 63%.[6] There are various reasons for this urbanisation but the main reasons are employment opportunities and education.

South Africa has one of the most advanced and largest telecommunications markets on the African continent and has an approximate GDP of $357 billion.

2.1 Entrepreneurship Climate

The Global Entrepreneurship Monitor (GEM) study collects data from over 100 countries to map entrepreneurship (i.e., entrepreneurial behaviour and attitudes in national contexts). The graph below shows the status of the entrepreneurial ecosystem in South Africa compared with the averages for the GEM countries in 2016. Based on this information, South Africa was not far from the average of GEM countries (see Figure 1). However, despite having strong physical infrastructure, engaging in entrepreneurial activities does not connect very firmly to cultural norms. This suggests a need for initiatives to support entrepreneurial activities and potentially influence cultural norms towards increased entrepreneurship. At the same time, there appear to be few government entrepreneurship programs.

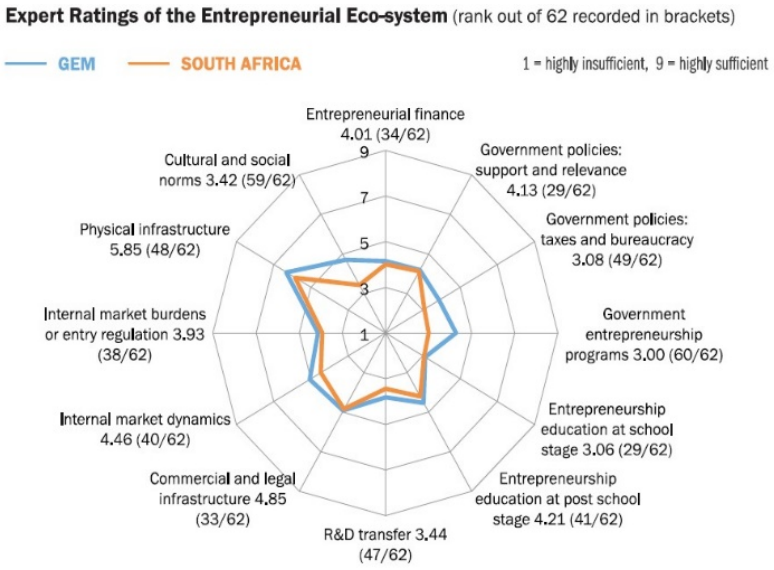


Figure 1: Expert Ratings of the Entrepreneurial Eco-system in South Africa[7]

[6] Source: Worldometers - https://www.worldometers.info/world-population/south-africa-population/
[7] http://www.gemconsortium.org/report/49480

Mapping the GEM data for the participating countries highlights a difference between necessity based entrepreneurship—where entrepreneurial activity is high but GDP per capita is low—and opportunity based entrepreneurship—where entrepreneurial activity is high and GDP per capita is high (see Figure 2). In colloquial terms, necessity based entrepreneurship can be seen to occur when entrepreneurship is the only option for survival, whereas opportunity based entrepreneurship can be seen to occur when people have the opportunity to make their dreams of entrepreneurship come true. South Africa is positioned in the necessity based entrepreneurship end, where entrepreneurial activity might help individuals but will have less of an impact on the regional economy. Therefore, initiatives intended to spur entrepreneurship, while also spurring growth in South Africa should focus on harnessing people's dreams and aspirations to effectively start new businesses.

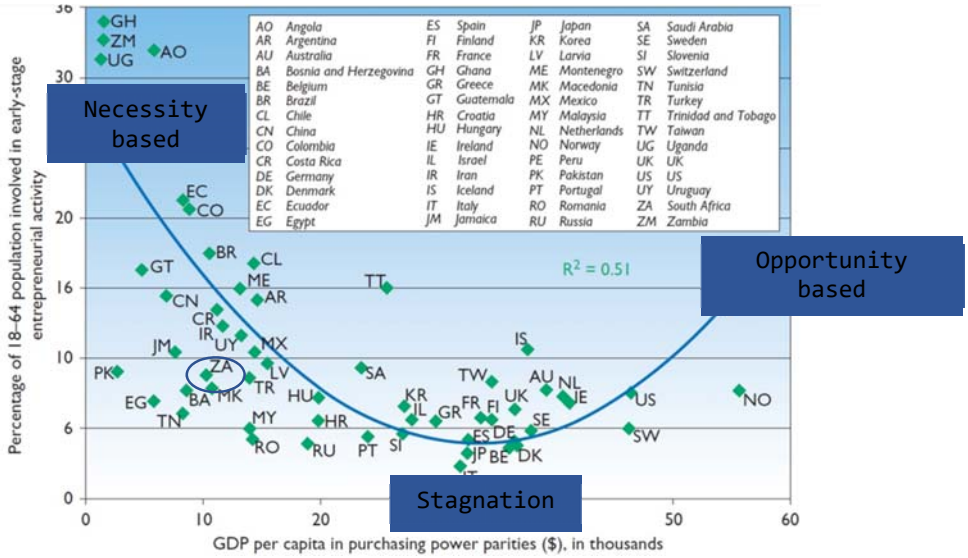


Figure 2: GEM data (2015)

Unfortunately, South Africa did not participate in the most recent GEM exercise, but data are available for 2017. In 2017, ZA's economic development level remained classed as efficiency-driven. There are indications that positive perceptions of entrepreneurship have increased by about 6% and total entrepreneurial activity increased by about 20%. Meanwhile, GDP per capita went down every year between 2011 and 2016, it grew between 2016 and 2017, but is expected to decline again.

Thus, entrepreneurship appears to have increased as GDP per capita decreased. Although this might be seen as an indication of increased necessity-based entrepreneurship, the trend has actually been

for a higher proportion of opportunity-based entrepreneurship, which is now 50% more prevalent than necessity-based entrepreneurship. In 2015/2016, opportunity-based entrepreneurship was 10% more prevalent than necessity-based.

3 South African ICT performance as reflected by selected global indices

Broadband and advanced information and communication technologies are increasingly regarded as key drivers of economic growth and development. For this reason, these technological developments have been integrated into prominent international reform agendas such as the Sustainable Development Goals, the World Summit on the Information Society and ICT specific forums such as the International Telecommunication Union (ITU). Various global indices have been developed to determine and rank the readiness of countries pertaining to the optimal deployment, adoption and utilisation of ICTs by citizens, businesses and government. The network readiness of countries is assessed and presented in the form of indices and can be utilised to track performance of individual countries, to compare countries with one another and to guide decision making and spur action.

Three of these international ICT indices are of particular relevance for this overview and will be discussed in detail. The first index is the Global Information Technology Report (Networked Readiness Index) launched in 2001 by the World Economic Forum in partnership with INSEAD and Cornell University. The second index is the ICT Development Index published by the ITU and the Web Index, published by the World Wide Web Foundation is used as the third reference.

3.1 World Economic Forum's (WEF) Networked Readiness Index

Between 2001 and 2016 the World Economic Forum (WEF) published an annual Networked Readiness Index (NRI). This index can be described as an instrument to assess a country's preparedness to capitalise on the benefits of emerging information and communication technologies (ICTs) and broadband.

In particular, the report assesses the factors, policies and institutions that assist countries in leveraging ICTs for increased prosperity. All these dimensions are combined to obtain a global ranking in the form of the Networked Readiness Index (NRI[8]) reflecting the network readiness at country level. The NRI

[8] http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf (Global Information Technology Report, 2016) accessed online 20/4/2017

therefore provides the means to benchmark ICT readiness and use in different countries. The NRI is a composite indicator consisting of four categories or sub-indexes (see Table 1).

Table 1: Networked Readiness Index sub-categories

Sub-index	Pillars
Environmental sub-index: political and regulatory environment in countries in support of ICT uptake	Political and regulatory environment (9 indicators) Business and innovation environment (9 indicators)
Readiness sub-index: the readiness of a society to utilise affordable ICT infrastructure and digital content	Infrastructure (4 indicators) Affordability (3 indicators) Skills (4 indicators)
Usage sub-index: the actual use of ICTs by various stakeholder groups	Individual usage (7 indicators) Business usage (6 indicators) Government usage (3 indicators)
Impact sub-index: the social and economic impact that ICTs generate	Economic impacts (4 indicators) Social impacts (4 indicators)

In the 2016 assessment, South Africa was ranked in 65th position amongst 139 world countries, and was identified as one of the seven "top movers" (5th position), next to Italy (from 55 to 45), the Slovak Republic (from 59 to 47), Kuwait (from 72 to 61), Lebanon (from 99 to 88), Ivory Coast (from 115 to 106), and Ethiopia (from 130 to 120). This position is almost entirely the result of improvements in infrastructure and affordability. See

Table 2 for detailed information about performance per sub-index.

Table 2: The performance of South Africa on the WEF e-Readiness index between 2012 and 2016

Overall & Sub-index / Pillars	2016	2015	2014	2013	2012
Overall	65	75	70	70	72
A. Environment sub-index	33	31	31	33	34
1. Political & regulatory environment	26[9]	24	20	21	23

[9] A score in green indicates a performance well above the country average, that compares well with better performing countries.

2. Business & innovation environment	65	55	53	55	50
B. Readiness sub-index	69	102	98	95	94
3. Infrastructure	44	85	68	59	82
4. Affordability	74	107	112	104	94
5. Skills	95[10]	95	97	102	101
C. Usage sub-index	75	67	70	72	76
6. Individual usage	77	68	78	81	96
7. Business usage	32	30	30	33	34
8. Government usage	105	105	103	102	89
D. Impact sub-index	93	92	89	92	81
9. Economic impacts	57	58	49	51	59
10. Social impacts	112	110	113	112	98
Participating countries	139	143	148	144	142

According to the report, South Africa's digital transformation is mostly business driven: it performs better in business usage (32nd), then individual usage (77th), and then by government usage (105th). Despite a strong regulatory environment, South African government and government services make limited use of ICT.

[10] A score in red indicates a performance well under the country average and compares with the countries towards the bottom end of the index.

Table 3: WEF e-Readiness index of African and BRICS countries

Country	WEF NRI 2016	World Position	WEF NRI 2015	World Position
Sub-Saharan Africa				
Mauritius	4.4	49	4.5	45
South Africa	4.2	65	4.0	75
Seychelles	4.0	74	4.0	74
Rwanda	3.9	80	3.9	83
Cape Verde	3.8	85	3.8	87
Kenya	3.8	86	3.8	86
Namibia	3.6	99	3.5	102
Botswana	3.5	101	3.4	104
Ghana	3.5	102	3.5	101
Cote d'Ivoire	3.4	106	3.2	115
BRICS Countries				
China	4.2	59	4.2	62
Russian Federation	4.5	41	4.77	41
India	3.8	91	4.70	89
Brazil	4	72	3.9	84

Correspondingly, the measured impact of technology use on society (e.g., education, health progress, and active civil participation) is limited and ranks 112th, the lowest of all the pillars. Economic impact also receives a low score (57th). The report states that mobile tariffs have more than halved and broadband tariffs dropped slightly, contributing to the reduction of barriers to adoption[11].

[11] Source: World Economic Forum – http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf (Global Information Technology Report, 2016) accessed online 20/4/2017

The performance of South Africa against other African and BRICS countries is presented in Table 3. As can be seen, South Africa fares second best among sub-Saharan countries while demonstrating a similar performance to China and second to the Russian Federation.

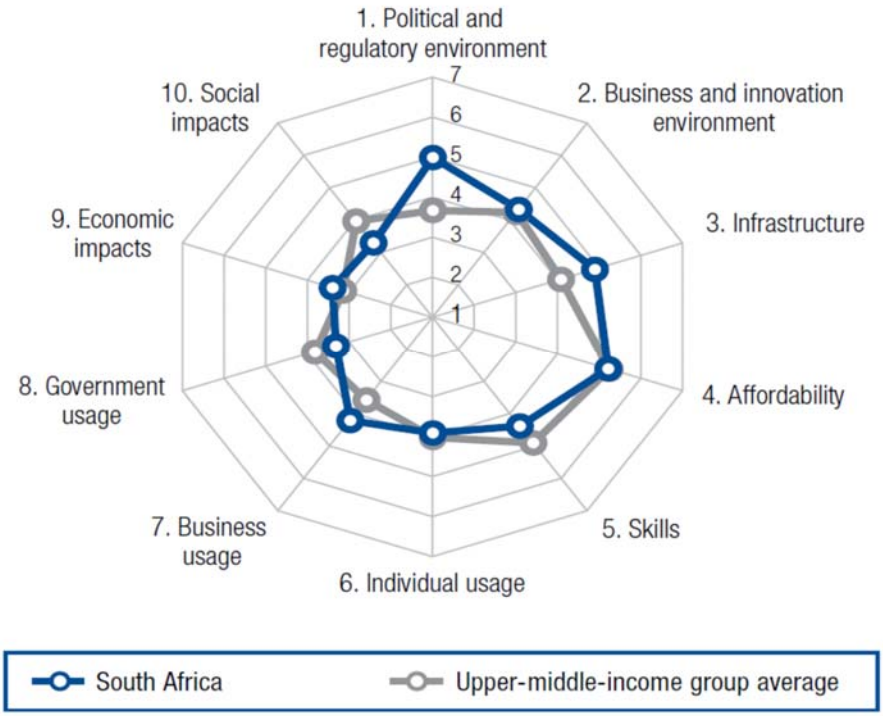


Figure 3: South Africa's pillar averages compared to upper-middle income group average

Compared to the upper-middle-income group average, South Africa's performance on the nine pillars constituting the NRI is almost on par with the group average of participating countries, see Figure 3. The performance of the political and regulatory environment, infrastructure and business usage is slightly higher than the group average while skills, government usage and social impacts are slightly lower than the group average.

3.2 ICT Development Index (IDI)

From 2009 until 2017, the ITU has published the ICT Development Index (IDI) yearly. This is a composite index consisting of eleven indicators combined into one benchmark. This index compares and monitors developments in ICT between countries over time.

The aim of this index is to determine:

1. The level and evolution over time of ICT development within countries;
2. Progress in ICT development (in developed and developing countries);
3. The digital divide;
4. The development potential of ICTs and its contribution to growth and development within countries, recognising available capabilities and skills.[12]

The conceptual framework guiding the index is described as a three stage model consisting of the following stages:

Stage 1: ICT readiness – *reflecting the level of networked infrastructure and access to ICTs*

Stage 2: ICT intensity – *reflecting the level of use (including capability and skills) of ICTs in society*

Stage 3: ICT impact – *reflecting the results/outcomes of more efficient ICT and effective ICT use.*

Thus, the index consists of three sub-indexes:

ICT Access: (Weighting of 40)

- Best cost efficiency solution for Africa
- Mobile-cellular telephone subscriptions per 100 inhabitants
- International Internet bandwidth (bit/s) per Internet user
- Percentage of households with a computer
- Percentage of households with Internet access

ICT Use: (Weighting of 40)

- Percentage of individuals using the Internet
- Fixed-broadband subscriptions per 100 inhabitants
- Active mobile-broadband subscriptions per 100 inhabitants

ICT Education: (Weighting of 20)

- Mean years of schooling
- Secondary gross enrolment ratio
- Tertiary gross enrolment ratio

[12] ICT Development Index conceptual framework and methodology, 2016, http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2016/methodology.aspx

Table 4: The IDI 2017 and 2016 for the top African countries compared to selected countries

Country	IDI 2017	World Rating (2017)	IDI 2016	World Rating (2016)	Movement
Iceland	8.98	1	8.78	2	1 up
Russia	7.07	45	6.79	43	2 down
Brazil	6.12	66	5.89	67	1 up
Mauritius	5.88	72	5.51	75	3 up
China	5.60	80	5.17	83	3 up
Seychelles	5.03	90	4.80	92	2 up
South Africa	4.96	92	4.91	88	4 down
Cape Verde	4.92	93	4.83	91	2 down
Botswana	4.59	105	4.51.	102	3 down
Gabon	4.11	114	3.62	118	4 up
India	3.03	134	2.65	138	4 up

As can be seen in Table 4, South Africa compares well with BRICS and the rest of Africa. The 2017 report concludes that: *"South Africa is at the forefront of the region's technological development with the latest broadband technologies and wide coverage. This has been enabled by a suitable regulatory framework and a competitive private sector-driven market. Cost remains an issue due to significant duplication in backbone networks, with a need to move to a cost-based open access regime."*[13]

3.3 The Web Index (World Wide Web Foundation)

The Web Index created by the World Wide Web Foundation is based on the premise that Internet access: (1) contributes to knowledge, information and skills acquisition; (2) enables broader political participation; and (3) lowers the hindrances for small- and micro-entrepreneurs to be competitive and succeed. The latest report from 2015 includes a ranking of "economic empowerment", combining sets

[13] Source: *Measuring the Information Society Report 2017* – Volume 1 (https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf, accessed: 13/5/2019)

of data to determine how the Web has contributed to job creation, livelihoods and growth. Although poor countries could theoretically perform just as well or even better than a wealthy country on this dimension of the index, it is in practise led by wealthy countries.

Table 5: South Africa's Web Index according to Web Index Report 2014-2015

	The Web Index (overall index)	Universal Access (sub index)	Freedom & Openness (sub index)	Relevant Content (sub index)	Empowerment (sub index)
South Africa*	#45	#45	#38	#56	#49

South Africa ranks #45 overall of 86 countries worldwide; just below Peru (#43) and China (#44), but just above the Ukraine (#46) and the United Arab Emirates (#47). The country's lowest ranking is for relevant and local content and the country's lowest score (31.89 points out of 100) is for economic empowerment of the Web. The two main factors with explanatory power for countries' empowerment score, the report states, are education level and inequality.

BuddeCom[14] reports that in terms of the media and entertainment sectors, South Africa is a regional leader considering the convergence of telecom and information technologies. It is thus expected to contribute to the reduction of the cost of telecom products. South Africa leads in areas of electronic banking, social media, online retail, mobile banking, and cloud computing. The country successfully implemented online tax filing (in 2011 already more than 99 percent of tax returns were filed electronically), car registration, and driver's license renewal[15]. However, South Africa still lags behind African countries in the development of e-applications such as e-health, e-government as well as e-learning. [16]

[14] https://www.budde.com.au/Research/South-Africa-Telecoms-Mobile-and-Broadband-Statistics-and-Analyses

[15] Offline and Falling Behind: Barriers to Internet adoption. McKinsey & Company, 2013

[16] Source: https://www.budde.com.au/Research/South-Africa-Digital-Economy-and-Media-Markets-Statistics-and-Analyses

4 Short overview of relevant South African digital policies and frameworks

South Africa is a quasi-federal country as it is a unitary state with federal tendencies and specific governance arrangements, based on a system of co-operative governance[17].

Reporting on the South African digital landscape requires an understanding that the implementation of national policies is typically at the provincial level. Provinces have the freedom to develop province-specific implementation strategies guided by national frameworks. Furthermore, there is not necessarily a direct correlation between national and provincial departments. For example, the national Broadband Policy resides in the National Department of Telecommunications and Postal Services, while implementation of this policy in the Western Cape Province resides with the Department of Economic Development and Tourism whereas in the Eastern Cape this responsibility resides with the Eastern Cape Development Committee. This report's focus is mostly on the national initiatives.

[17] Source: https://www.oecd.org/regional/regional-policy/profile-South-Africa.pdf

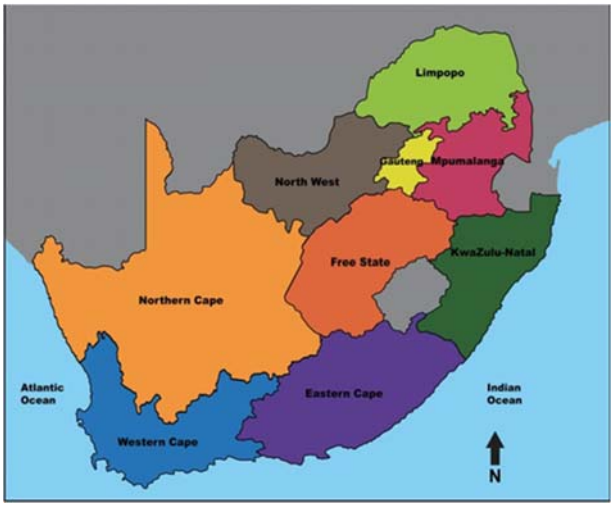


Figure 4: Provinces of South Africa[18]

4.1 Key national Policies

The National Development Plan (NDP) was published in 2011, providing a framework and guiding principles for the development of the country towards 2030. The vision pertaining to information and communication technologies is stated as:

> *"a seamless information infrastructure by 2030 that will underpin a dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous".*

At the core of this will be

> *"a widespread communication system that will be universally accessible across the country at a cost and quality that meets the communication of citizens, business and the public sector and provides access to the creation and consumption of a wide range of converged applications and services required for effective economic and social participation"*[19].

It makes ample provision for the enabling role of ICTs for the benefit of the development and economic growth of the country. It states that ICT

> *"development will continue to transform economic and social activities, and how individuals and communities communicate and function. Its impact on each sector of society and each area of service delivery will depend on how uptake is addressed"*[20].

[18] Source: https://mycyberwall.co.za/get-smart/history/grade-5/provinces-south-africa
[19] Government notice (no.953), DOC, 2013, p.5 (Government Gazette no. 37119)
[20] National Development Plan; Vision for 2030, p.171

A major obstacle for the utilisation of broadband Internet connectivity is the high domestic cost. The vison that South Africa should be in a position to attain and use knowledge effectively is affirmed.

> *"To this end, the institutional arrangements to manage the information, communications and technology (ICT) environment need to be better structured to ensure that South Africa does not fall victim to a digital divide"*[21].

The NDP furthermore stipulates the necessity for improving equitable access by stimulating demand.

The vision of the country pertaining to the information and communication (digital) landscape is in particular supported by four recently approved and published white papers, namely (a) the South African Broadband Policy, (b) the National Integrated ICT Policy (white paper) as well as the (c) White paper for post-school education and training and the (d) ICT Research, Development and Innovation Roadmap.

These policies and the intent or key foci are listed in Table 6.

[21] NDP Executive Summary, 2013, p. 23

Table 6: Relevant national policies

Policy/Framework	Date	Reference to ICT infrastructure, available technologies and skills
National Development Plan (NDP)	2011	Development Vision for 2030
ICT RDI Roadmap Towards Digital Advancement: Road mapping South Africa's ICTs future Department of Science and Technology	2013	The roadmap identifies a two-fold intent: - Increase public and private investment in RDI in ICTs - Framework to plan and coordinate technology development for investment decision-making
South Africa Connect South African Broadband policy Department of Telecommunications and Postal Services	2013	The SA Broadband policy gives expression to the vision of the NDP, with particular reference to information communication infrastructure and access. Amongst others, the following targets are envisioned: – 2016 target – 50% Internet coverage (5Mps) – 2020 target – 100% penetration rate for broadband – 2030 target – 1 Gigabyte per second It provides for skills development within the basic education and post-school sectors, both in government and sectoral programmes. It also provides for adult e-literacy as well as youth development[22].
National Integrated ICT Policy White paper	2016	ICT is viewed by Government as a way to enable the socio-economic renovation of South Africa in an inclusive manner. The white paper proposes several ways to guarantee that "*everyone in South Africa, regardless of who they are, where they live or their socio-economic status can improve the quality of their lives through accessing the benefits of participating in the digital society*"[23]. It addresses the following: – ICT infrastructure, networks, and scare resources (universal services and digital literacy) – Promotion of digital uptake (fair competition and quality of service) – The Internet (creating trust) – The postal sector (supporting industry growth throughout the value chain)[24].

[22] South Africa Connect: South African broadband policy
[23] National integrated ICT Policy White Paper, 28 Sept, DTPS, p. 1
[24] National integrated ICT Policy White Paper, 28 Sept, DTPS, p. 5

Policy/Framework	Date	Reference to ICT infrastructure, available technologies and skills
		– An almost fully e-literate society is envisaged for 2030. The Deputy Minister of the Department of Telecommunications and Postal Services has just announced that DTPS has "begun the process of promulgating legislation" that will enable the implementation of this policy.[25]
White paper for post-school education and training Department of Higher Education and Training	2016	The paper sets out a vision and strategies towards 2030 with the aim to improve the capacity of the post-school education and training system. This is done in view of meeting the needs of South Africans. Some of the goals identified in the white paper refer to ICTs: – Extend ICT infrastructure in South Africa equitably – Plan and implement teaching and learning interventions using ICTs, carefully Capacity building mechanisms will include: – The growth of an e-skills framework for post-school education and training; – Enable development of institutional and inter-institutional ICT policies

The South African Government has an ambitious goal to realise 100% broadband access by 2020. There is a clear commitment to utilise ICTs as a key enabler of socio-economic development and to deliver services (such as government, information and educational services) to citizens. Despite positive developments in terms of appropriate policy formulation in facilitating this commitment, South Africa is still characterised by ineffective regulation and policy implementation (Gillwald *et al*., see footnote).

5 Infrastructure and available technologies

5.1 Infrastructure

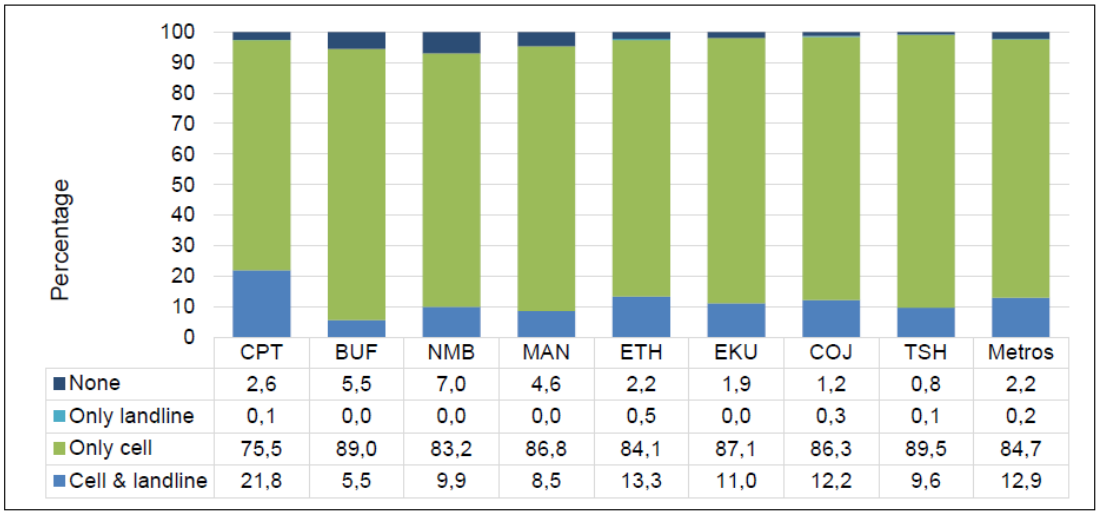
Discussions on digital technologies, including ICTs are generally accompanied by an understanding of the infrastructure and this often relates to aspects such as network and signal coverage, connectivity, proximity, devices, quality and accessibility. This report touches primarily on Internet and mobile

25 http://www.itweb.co.za/index.php?option=com_content&view=article&id=161418&A=ITG&S=IT+in+Government&O=E&E=3-326982&catid=260#.WQm8gdmYOu4.twitter (accessed 3 May 2017)

access among households in South Africa. More information on infrastructure in the South African context can be found in reports such as that of Research ICT Africa (RIA)[26].

5.1.1 Stats South Africa: Household Survey 2017

Looking at households in the metropolitan areas of the country in 2017, it was more common for those in Nelson Mandela Bay (7%), Buffalo City (5.5%), and Mangaung (4.6%) to not have access to communication media, namely landlines and cell phones (see Figure 5)[27].



	CPT	BUF	NMB	MAN	ETH	EKU	COJ	TSH	Metros
None	2,6	5,5	7,0	4,6	2,2	1,9	1,2	0,8	2,2
Only landline	0,1	0,0	0,0	0,0	0,5	0,0	0,3	0,1	0,2
Only cell	75,5	89,0	83,2	86,8	84,1	87,1	86,3	89,5	84,7
Cell & landline	21,8	5,5	9,9	8,5	13,3	11,0	12,2	9,6	12,9

Figure 5: Households with a functional landline and cellular phone

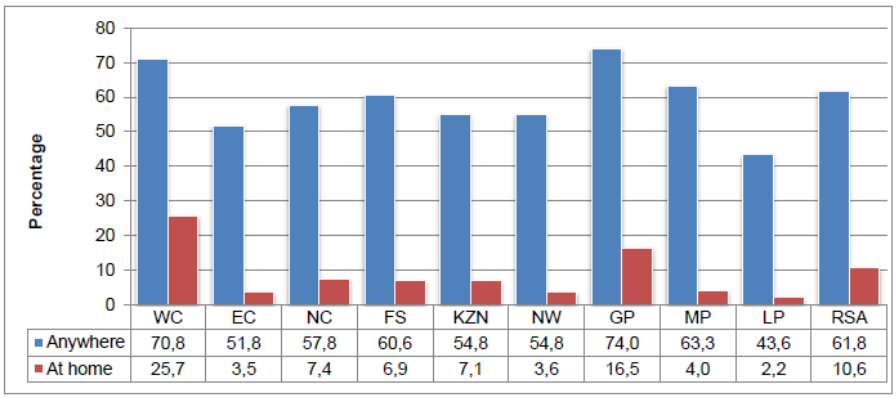
As many as 84.7% of South African households in metropolitan areas use only cellular phones at home—75.5% in Cape Town , 86.8% in Mangaung, 87.1% in Ekurhuleni, and 89% in Buffalo City. With respect to the combination of cellular phones and landlines in homes, households in Cape Town at 21.8% and eThekwini at 13.3% had the highest prevalence (Statistics South Africa, 2018, see footnote).

Focusing on Internet access, 61.8% of households in the country had at least one individual who had access to or used the Internet. Gauteng province had the highest prevalence with 74% of households, followed by the Western Cape with 70.8% and Limpopo had the least at 43.6% of households (see Figure 6)[28].

[26] Gillwald, A., Mothobi, O., & Rademan, B. (2018). Policy Paper no.5, series 5: After Access. The State of ICT in South Africa. Research ICT Africa.

[27] Statistics South Africa. (2018). General household survey. Statistical release P0318. Pretoria, South Africa: Statistics South Africa.

[28] Statistics South Africa. (2018). General household survey. Statistical release P0318. Pretoria, South Africa: Statistics South Africa.



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Anywhere	70,8	51,8	57,8	60,6	54,8	54,8	74,0	63,3	43,6	61,8
At home	25,7	3,5	7,4	6,9	7,1	3,6	16,5	4,0	2,2	10,6

Figure 6: Households with access to the Internet [29]

Considering the different geo-locations in the country, households in the cities had the most access and those in rural areas had the least access to the Internet. More specifically 17.4% of households in metropolitan areas, 8.4% in urban areas and only 1.7% in rural areas had access to the Internet. Households, in most cases, had access to the Internet in other places such as at work (16.9%) or through an educational institution/intermediary for example an Internet café (11.5%) with Gauteng and the Western Cape being the most likely to afford such access and Limpopo along with Northern Cape being the least likely[29].

[29] Statistics South Africa. (2018). General household survey. Statistical release P0318. Pretoria, South Africa: Statistics South Africa

5.2 Available technologies

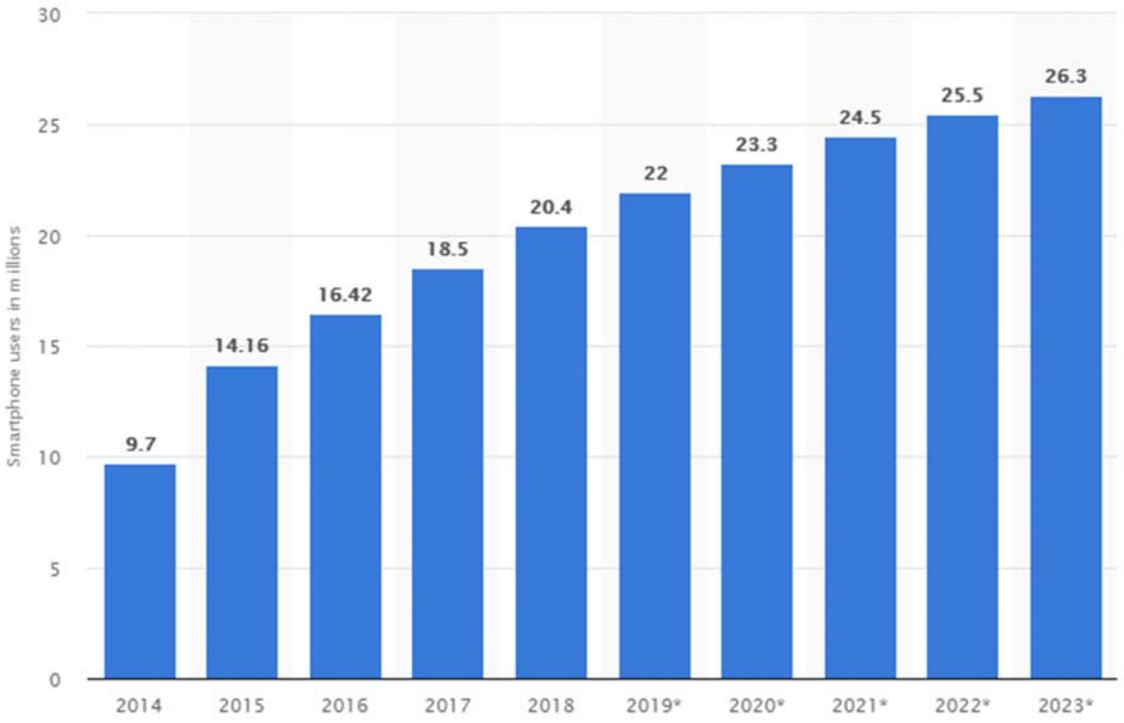


Figure 7: Smart phone users in South Africa 2014 – 2023 (estimation from 2019)[30]

In 2014 cell phone ownership in South Africa was similar to that of the United States[31]. However, only 34% of adult South Africans had smartphones that could access the Internet, compared to 64% in the United States.

According to Statistics South Africa (2018) Gauteng (66.4%) had the highest percentage of households using mobile devices, followed by Mpumalanga (61.6%) and the Western Cape (61.5%) (see Figure 8). The following provinces were Free State (58.6%), Northern Cape (56.1%), North West (53.7%). The lowest percentage of households using mobile devices were found in KwaZulu-Natal (50.9%) and the Eastern Cape (50.5%).[32]

[30] Source: Statista (https://www.statista.com/statistics/488376/forecast-of-smartphone-users-in-south-africa/, accessed 13/5/2019)
[31] http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/
[32] Statistics South Africa. (2018). General household survey. Statistical release P0318. Pretoria, South Africa: Statistics South Africa.

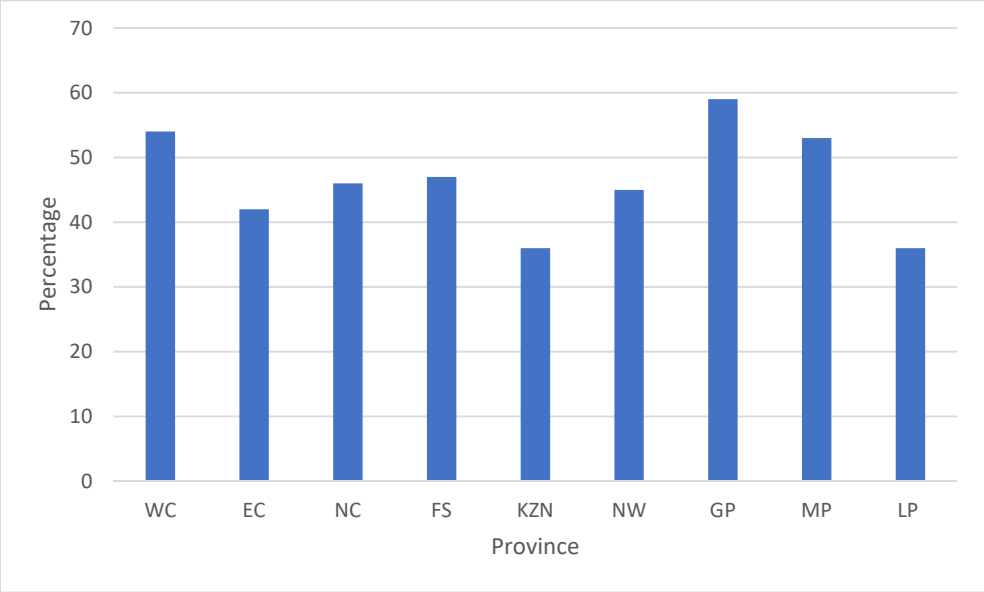


Figure 8: Households using mobile devices

6 Affordability

6.1 Cost and speed comparison

The South African ICT sector is growing, encouraged by widespread (92%) use of mobile phone. However, ZA's smartphone penetration is only 51% and thus this high ownership rate can distract from the low levels of smartphone use[33]. Internet access provides significant economic opportunity to individuals and the country. Only about a third of South Africans can afford to own a smartphone and use it to access the Internet. Levels of affordability of these devices and the communication services they offer are very low compared to countries similar to South Africa. This is mainly a result of sector policies, which invite neither investment nor institutional arrangements encouraging competition[34].

Table 7: Mobile expenditure as a share of individual income

South Africa	Global
24.7%	< 5%

[33] https://www.pewresearch.org/global/2018/10/09/majorities-in-sub-saharan-africa-own-mobile-phones-but-smartphone-adoption-is-modest/

[34] *Understanding the Market and Access Gaps Present in South Africa's Broadband Internet Sector, Alan Cameron, 2016.*

Affordability of Internet services is a significant challenge in ZA. On average, a citizen in ZA spends 24.7% of their income (see Table 7)[35] on cell phone usage. It is problematic to use GNI per capita or the median of monthly income to assess ICT affordability in South Africa because of the country's high Gini index. According to the Mail and Guardian, South Africa "*is one of the most consistently unequal countries in the world*"[36]. This may explain why the significant affordability challenge does not always become as explicit in all studies of the ICT landscape in South Africa.

Even in terms of the BRICS (Brazil, Russia, India China and South Africa) countries, South Africans pay considerably more for their data (see Figure 9).

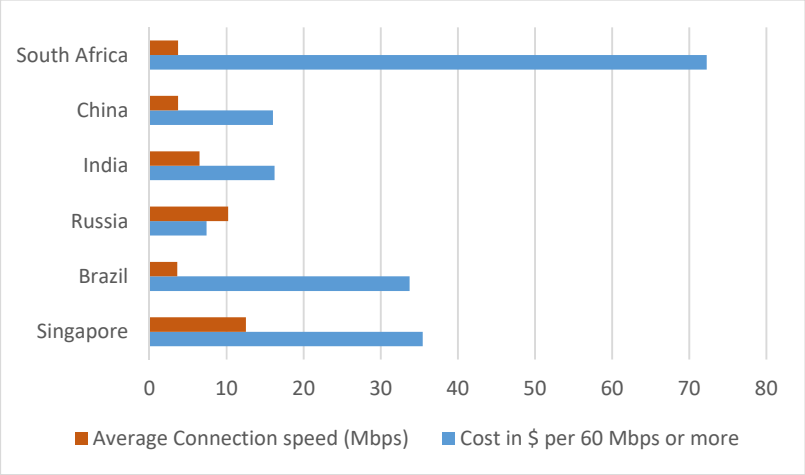


Figure 9: Cost and speed comparison: $ per Mbps[37] [38]

6.2 Low Income and affordability[39]

The costs of mobile devices are seen to be decreasing and a data plan, which is more accessible to people within the growing middle-class range, is in view. Yet it does not cover the full demographics of South Africa. Low income and affordability continue to present a challenge to many of the

[35] *Western Cape Digital Readiness Assessment: An assessment of broadband infrastructure, policy ad regulation, skills, affordability, access and use amongst citizens, business and government in the Western Cape, (2015*).
[36] https://mg.co.za/article/2015-09-30-is-south-africa-the-most-unequal-society-in-the-world
[37] Numbeo. (2018). *Prices by Country of Internet (60 Mbps or More, Unlimited Data, Cable/ADSL)*. Retrieved 09 18, 2018, from Numbeo: https://www.numbeo.com/cost-of-living/prices_by_country.jsp?displayCurrency=USD&itemId=33
[38] Akamai Technologies. State-of-the-internet, https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q1-2017-state-of-the-internet-connectivity-report.pdf, last accessed 2019/03/14
[39] *Offline and Falling Behind: Barriers to Internet adoption, McKinsey & Company, 2013.*

population that are still offline. The total cost of ownership, which includes: the cost of a device, the cost of data plans, taxes, etc. has an impact on the adoption of cell phones and access to the Internet.

The consumer barriers include:

- Consumer purchasing power
- Total cost of ownership for a device
- Challenging national economic environment
- High network operator costs and associated business model constraints
- High device manufacturer costs and associated business model constraints
- High provider and taxes fees
- Unfavourable market structure

7 ICT Usage (Internet and Mobile)

7.1 Internet and mobile phone usage in South Africa

Internet usage in South Africa has increased noticeably since the beginning of the millennium, from 5.5% Internet penetration of the total population in 2000 to 56.2% in 2019[40]. This is far above the African average of 39.8% and on par with the world average of 57.3%. South Africa has the fourth highest level of Internet penetration on the African continent, while Kenya is the clear leader with a penetration of almost 83%.

An 'After Access' study conducted by RIA in 2017 surveyed 16 countries in the Global South exploring patterns of Internet usage and barriers to both access to the Internet and optimal Internet usage even where the individual has connectivity. Compared to voice and SMS, the Internet can be a cheaper and easier mechanism to communicate and find information whether it is via search engines, social media or email, depending on what motivates people to go online. Findings revealed that the type of content sourced was related to both social and economic contexts[41]. Figure 10 illustrates the findings of the RIA study regarding the activities performed specifically by South African Internet users[42].

[40] Internet Usage and World Population Statistics estimates for June 30, 2019. Source: http://www.Internetworldstats.com/ (accessed 01/08/2019)

[41] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.

[42] Gillwald, A., Mothobi, O., & Rademan, B. (2018). Policy Paper no.5, series 5: After Access. The State of ICT in South Africa. Research ICT Africa.

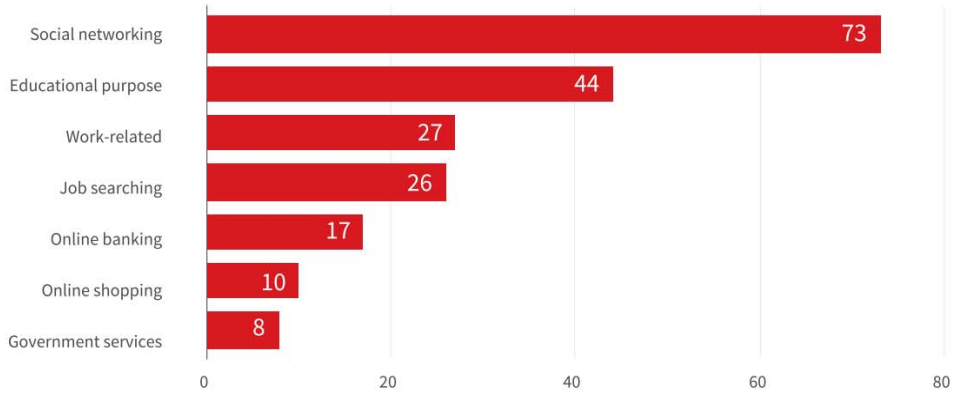


Figure 10: Activities individuals perform on the Internet

While used for a range of educational, work, financial and job seeking purposes, social networking (73%) was clearly by far the most employed use of the Internet. The wide range of activities performed on these social media platforms is particularly notable: 72% of social media users used the platforms to make voice calls, 64% shared video/pictures, 43% accessed educational content, 41% learned other people's opinions or shared their own experiences, and 21% shared self-produced content. Twitter was a particularly interesting case of social media usage in that South African users employed the platform to publicly participate in, contribute to, and influence policy debates and hot topic issues (for example the #FeesMustFall, #DataMustFall and #ZumaMustFall movements). On the other hand, little digital engagement occurs between citizens and government in South Africa despite the emphasis on this as a priority in national e-government policies. Finally, the cross country comparative study also noted that factors such as gender influence Internet usage; while male users preferred to access sport, news and betting content, female users preferred fashion, online shopping and health content[43].

7.2 Barriers to Internet adoption and ICT usage

Multiple factors have been identified as playing a constraining or deterring role in the digital engagement of South Africans. McKinsey and Company[44] provided a useful overview of categories of barriers (see **Error! Reference source not found.**8), reporting that consumers considered low income and affordability to be the most significant barriers for Internet adoption in ZA, followed by the lack of incentives, low user capacity (competences) and infrastructure-related barriers.

[43] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.
[44] Offline and Falling Behind: Barriers to Internet adoption, McKinsey & Company, 2013

Table 8: Barriers to Internet adoption

Barriers	Identified contributing factors
Low income and affordability	Low purchasing power (driven by poverty, high unemployment and lack of upward mobility) High interconnection charges passed on to consumers by operators resulting in high prepaid mobile prices
Lack of appropriate or sufficient incentives	Lack of awareness of the Internet and its benefits Shortage of relevant local content and services Lack of cultural or social acceptance
Skills and literacy	Low levels of digital literacy Low levels of language literacy
Infrastructure	Inadequate coverage or network access Deficient adjacent infrastructure (such as grid electricity and paved roads)

Other organisations have echoed these factors as barriers to ICT usage for South Africans. According to Mobile Economy Africa, South African consumers perceived (i) lack of awareness and locally relevant content (57%), (ii) the lack of digital skills and literacy (24%) and (iii) the high cost of devices and services (affordability – 24%) as barriers to mobile internet adoption[45]. Given these statistics, lack of awareness, limited locally relevant content and failing to see the relevance, value or usefulness of technology must be considered an important and persistent barrier in the South African context. A 2017 study[46] purported that the availability of local content such as local news sites, entertainment and downloadable content will assist in enticing people to use the Internet.

Lack of awareness and limited content does not detract from the urgency of the challenges of both costs and skills. Recent research[47] reaffirmed that affordability of devices and services is the primary inhibitor to Internet use in South Africa. Even where the primary challenge of access to devices and data is overcome, the cost of more sophisticated applications and services often makes it difficult to capitalise on them, thus limiting the potential transformational benefits of technology. This is for example evident in video content—which is data intensive and expensive—often being largely

[45] *Mobile Economy: Africa 2016*

[46] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.

[47] Gillwald, A., Mothobi, O., & Rademan, B. (2018). Policy Paper no.5, series 5: After Access. The State of ICT in South Africa. Research ICT Africa.

inaccessible to South Africans struggling with literacy, but for whom this would be a particularly beneficial form of technology. In this manner, cost constraint intersect with the digital skills and literacy challenges. The role of education and basic literacy has been reported as most salient where Internet adoption (as opposed to ownership of a device) is concerned[48]. Digital literacy should be viewed within the context of the larger educational system. Without a strong education system, whether formal or informal, there will be challenges for digital literacy. Availability and frequent use of digital devices do not ensure effective computer and information literacy, which is not easily developed in the absence of coherent learning programs[49.]

Privacy and security uncertainties have received increasing attention in South Africa in recent years. This includes fear of financial fraud, hacking, harassment and surveillance, as well as concerns over personal safety and theft[50,51] (the latter partially driven by high crime rates). Concerns related to perceived negative, misleading and untrustworthy content online also lead to abstaining from or limiting use of the Internet.

In addition to these challenges, certain vulnerable groups of South Africans are affected by socio-cultural barriers. There groups have traditionally received less attention in the digital inclusion (or exclusion) discourse. As a historically disempowered group[52], women have been disproportionately affected by the more obvious barriers of affordability and skills (as a result of unfavourable positions in the areas of income and education). Additionally, deeply embedded gender-based social norms—'hidden' barriers[53]—present a unique challenge, specific to females. Research has shown socio-cultural gender inequality to contribute to issues of time constraints and power dynamics in relationships, negatively affecting the extent, frequency and intensity of ICT usage of South African women[54,].

[48] Deen-swarray, M. (2016). Toward Digital Inclusion: Understanding the Literacy Effect on Adoption and Use of Mobile Phones and the Internet in Africa. *Information Technologies & International Development*, *12*(2), 29–45.
[49] Source: International Computer and Information Literacy Study (ICILS), 2013
[50] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.
[51] GSMA Connected Women. (2018). *The Mobile Gender Gap Report 2018*.
[52] World Bank. (2014). *Voice and Agency: Empowering women and girls for shared prosperity*. World Bank Group.
[53] GSMA. (2015). *Connected Women - Bridging the gender gap - Mobile access and usage in low and middle income countries*.
[54] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017

Furthermore, skewed perceptions and beliefs associating sophisticated ICT engagement with men may also be detrimental to the digital activity of women[55].

8 South African digital skills and behaviour

As reflected in the 2016 WEF e-Readiness Index, South Africa has made little progress in terms of general skill levels to contribute towards the e-readiness of the country. As a matter of fact, the country performs much lower in the skills category (95th position) compared to the overall 65th position. However, the skills levels reported in the e-Readiness index refer to the general skills levels within the country and are measured as a proxy including information such as the number of years of schooling, secondary and tertiary gross enrolment ratio and the quality of education. These indices do not necessarily assess digital literacy as an independent or separate category and therefore require more in detail discussion.

The recent national policy documents (as discussed under Section 4) identify the need for dedicated digital skills development initiatives across all sectors. The objective being to ensure that South African citizens in general can harness the benefits of ICT for digital inclusion as well as sustained competitiveness in the global digital and knowledge society. In view of accelerating digital skills development on a national level and working towards digital inclusion and competitiveness, the ICT policy made provision for the establishment of a state-owned company (SOC), reporting via an independent Board to the Minister of Telecommunication and Postal Services. The focus of this body is identified as fulfilling a facilitative, catalyst and coordinating role in partnership with all the relevant stakeholder groupings to ensure that the majority of South Africa's citizens are digitally literate by 2030[56].

An overview of the landscape pertaining to digital skills or digital literacy should potentially include aspects such as (i) the definition and understanding of the concept of digital literacy, (ii) digital skills framework(s), (iii) indices to measure individual digital skills level or competence and (iv) national progress in terms of working towards the digital literacy of the country.

[55] Pokpas, C. (2019). *Exploring the access, usage and perceptions of ICT of women in marginalised communities in South Africa.* Unpublished PhD Thesis. University of the Western Cape.
[56] National integrated ICT Policy White Paper, 28 Sept, DTPS

8.1 Digital Skills Framework

Many countries have made significant progress in terms of the development and adoption of digital skills framework(s) to guide the discourse and practice regarding digital skills development, assessment and intervention design. Relevant examples include:

- the ***Go on-UK framework:*** providing a framework for basic digital skills;
- the ***e-Competence Framework for Users*** (e-CF-U 2013): accepted by the European Commission as a formal guiding document, and
- The ***DigComp framework***: produced under the auspices of the Joint Research Centre of the European Commission for application in European and Member states[57].

One of the functions of such digital skills frameworks is to provide a shared understanding of the concept of digital skills, that can form the basis for (i) agreement on the certification and evaluation of digital skills development programmes, (ii) the development of instruments to assess the actual digital skills (competency) levels of individuals, as well as (iii) the development of indices to measure progress made by the collective effort (normally on a national or provincial level). It is also a useful instrument in guiding change initiatives.

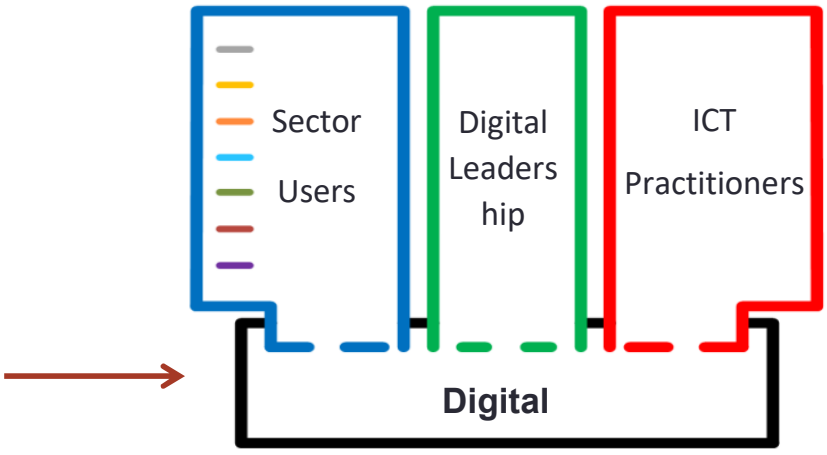


Figure 11: Digital Literacy framework

[57] Claassen, W.T. (2016) DSFOne Handbook Draft. UWC publication

In South Africa, this discourse is still in its infancy. The Digital Skills Framework One (DSFOne), a comprehensive digital skills framework, has only recently been made available as a first draft for discussion in the South African context.

The purpose of this comprehensive framework is to provide a synoptic view of digital skills "*to help facilitate the understanding that digital skills today are pervasive in all areas of work, learning and life*"[58]. It is also intended to give impetus to and stimulate the national discourse in terms of a national and locally relevant digital skills framework.

In drafting the DSFOne, developments on digital skills framework from UK, Belgium and the European Union have been consulted. Cognisance has furthermore been taken of the trajectory in South Africa as a mobile first country.

8.2 Defining digital skills and digital literacy (e-literacy)

The DSFOne distinguished between the following skills grouping or types/levels of e-skills:

- e-literacy or digital literacy: this refers to a very basic level of e-skills that can lead to meaningful use in life, work and learning;
- (sector) user skills: generic or sector/profession specific (e.g. digital skills applicable to teachers, tourism operators, health practitioners);
- e-Leadership/digital leadership skills: the ability of leaders to understand the impact of technology on their businesses/institutions; to guide/facilitate their institutions towards digital maturity;
- ICT practitioner skills: typical "professional" ICT skills (i.e. software engineers, architects).

Although digital skills refer to all the blocks on the digital skills framework, namely digital literacy, sector user skills, e-leadership skills and ICT practitioner skills, the ***Common Good First Project*** predominantly relates to the digital or e-literacy levels of citizens in general.

[58] Claassen, W.T. (2016) DSF One Handbook (p.12).

The following generic definition of digital literacy or e-literacy is applicable:

> "*The ability of individuals to use digital tools and facilities to perform tasks, to solve problems, to communicate, to manage information, to collaborate, to create and share content and to build knowledge, in all areas of everyday life and for work"*[5960]

More recently the concepts of media literacy[61] and data literacy[62] are argued to be included in the basic understanding or conceptualisation of digital literacy.

8.3 Measurement of digital skills, capability and progress

Similar to the discussion on digital skills frameworks, several countries have developed national survey approaches and instruments to assess various elements pertaining to citizens' cognisance of the benefits of ICT, digital skills, progress made by targeted interventions and digital-related behaviour.[63] Apart from the household surveys conducted by Statistics South Africa (on access and use), no national assessment instrument or approach has been defined and implemented as yet, to measure the digital skills levels of citizens or to measure progress made in terms of digital skills interventions and the stimulation of demand.

8.4 The nature of the digital divide in South Africa

Although ICTs or digital technologies have boosted growth in many countries, expanded opportunities for individuals, communities and countries and improved service delivery, it is also true that the aggregate impact (digital dividends) has fallen short and is unevenly distributed[64]. The digital divide refers to this disparity, to the fact that some people, countries or communities have easy access while others are underserved[65].

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[59] NESPA 2013 http://inesi.org.za/research-and-policy/upload/nespa2013execsummary.pdf

[60] https://www.nemisa.co.za/wp-content/uploads/2017/09/14EMISA-INeSI-Edition14-2016-email.pdf

[61] Van Audenhove, L., Mariën, I., Craffert, L., Grove, W. (2018). South Africa's e-Skills Policy: From e-Skills to Media Literacy? In: Cunningham, P., Cunningham, M. (Eds). IST-Africa Conference Proceedings, Botswana, 9-11 May 2018. IIMC International Information Management Corporation. ISBN: 978-1-905824-59-5. (Web of Science Core Collection-Conference Proceedings Citation Index).

[62] Van Audenhove, L. (2018) Data Literacy in the Smart City. At: UNESCO Global Media and Information Literacy Week: Media and Information Literate Cities: Voices, Powers, and Change Makers 2018, October 24-31, Kaunas, Lithuania, paper, presentation, abstract in proceedings

[63] Claassen, W.T. (2016) DSF Handbook Draft. UWC

[64] Digital Dividends Overview, World Band Report, 2016, (p.2)

[65] Flew, T. (2015). New Media

However, with the rapid development of the information society, stimulated by the growth of the Internet, it is important to realise that old challenges will remain while at the same time new challenges or new divides are emerging.[66] The divide illustrates the imprint of pre-existing inequalities that present themselves as old challenges such as differences in ICT access and adoption. The new divides are based on the fact that these technologies do not always reach the less affluent, disenfranchised, and vulnerable groups. The more affluent and well-educated people often have convenient access to ICTs and possess the skills and competences to use them for socio-economic development, among other benefits. However, for people who lack the education, digital skills and understanding of ICT benefits, ICTs can exacerbate existing digital divides.

The issues influencing the digital divide are multidimensional. It is therefore necessary to focus on other aspects of the divide apart from narrow concepts of physical access, for example, skills and motivations to use ICTs. The digital divide can be grouped in several categories which include[67]:

- Access: physical access to ICT.
- Socio-economic characteristics: relating to education and literacy levels, occupation, income and demographics, such as gender and age, that influence ICT access and use. Other characteristics in this category that influence the divide include the quality of the connection and the relevance of the content, information and language used.
- Skills: possessing the digital skills and competences needed to use ICTs meaningfully.
- Beneficial use: ICTs alone are just machinery, but when they are combined with motivations, goals and the user's digital skills for specific purposes, they become powerful tools for development.
- Participation and co-creation: addresses the differences that exist among people regarding their contribution to the production of ICTs, their services and content.
- Geographic location: existing inequalities and historical imbalances can present themselves geographically in a 'digital form'. These disparities can occur at a global level (developed vs

[66] Andreasson, K. (2015)., p.xxi

[67] Van Dijk, J. A. G. M. (2017). Digital divide: Impact of access. The International Encyclopedia of Media Effects, 1, 1–11.

developing countries), at a regional level (areas in the same country), and even locally in communities.

The levels of the ICT usage and exploitation are depicted in Figure 12.

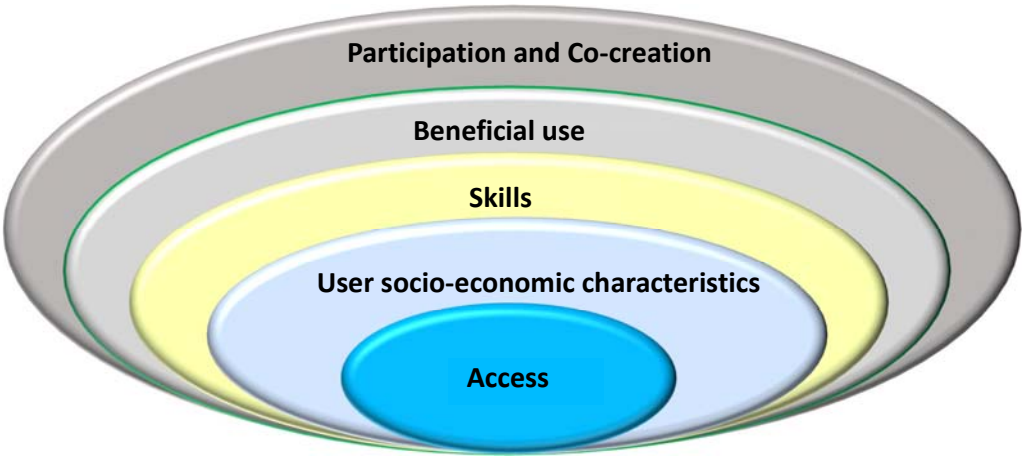

Figure 12: Five levels of the digital divide[68]

Within the South African context, typical factors that contribute towards the creation of the digital divide in its different forms are strongly linked to more traditional twentieth-century social exclusion[69]. These factors include, low income and education levels, unemployment, and social isolation. Furthermore, location (rural vs urban), cost of access and device, socio-economic standing, gender and forming part of a vulnerable group contribute towards the digital divide in the country[70]. Whereas parts of the population (typically the more affluent) have already progressed to the beneficial use of ICTs, leading to enhanced human and social capabilities (as per the Gigler model, see Figure 12) a significant percentage is still struggling to overcome the access barrier.

According to the 2015 Web Index report, mobile cellular and broadband prices are also amongst the highest in the world:

> *"Internet uptake has grown relatively fast in recent years with the spread of smartphones, but users are disproportionately affluent and well-educated. Less than 20% of those beneath the poverty line are Internet users, according to*

[68] Millard, J. (2015). The Digital Divide and the Global Post-2015 Development Debate. In K. Andreasson (Ed.), Digital Divides. The New Challenges and Opportunities of e-Inclusion (p. 16). Boca Raton: CRC Press.
[69] Gillwald, A., Mothobi, O., & Rademan, B. (2018). Policy Paper no.5, series 5: After Access. The State of ICT in South Africa. Research ICT Africa.
[70] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.

household survey research. Three-quarters of users are urban and over 40% are fluent in English. Hence, under the current policy regime, it is hard not to conclude that technology is deepening economic and social inequalities in South Africa."[71]

8.5 From digital skills to meaningful use

In reviewing the digital landscape of South Africa cognisance should also be taken of the thematic development that occurred over the past few years in terms of the digital inclusion discourse. Initially the discourse focused on access, infrastructure and skills but has now moved to the understanding that unless individuals have the necessary motivation (agency and capabilities) to engage with ICTs to address particular needs or to achieve identified objectives, concrete benefits or tangible offline outcomes will be limited[72].

The Gigler ICT impact chain (see Figure 13) unpacks or describes the process from access to actual beneficial outcomes in a five-step model including the necessary conditions to move from one phase to the next. The steps involve progressing from (1) access to ICTs, to the (2) use of ICTs, to the (3) meaningful use of ICTs, which leads to (4) enhanced informational capabilities, which eventually culminate into (5) enhanced human and social capabilities (outcomes). Access and skills to use ICTs are necessary but not sufficient for beneficial outcome. The relationship between people and technology (ICTs) is:

"much more complex and indirect in nature, whereby the impact on people's well-being depends to a large extent on a dynamic and iterative process between people and technology within a specific local, cultural, social, and political context".[73]

[71] Web Index Report 2014-2015 (http://thewebindex.org/report/#9._case_studies, accessed 11/04/2017)
[72] Helsper, E.J. & van Deursen, A. (2015). Digital Skills in Europe; Research and Policy. In K. Andreasson (Ed.), *Digital Divides. The New Challenges and Opportunities of e-Inclusion.* Boca Raton: CRC Press.
[73] Gigler, B-S, (2015). *Development as Freedom in a Digtal Age: Experiences of the Rural Poor in Bolivia*. World Bank Group, (p. 392).

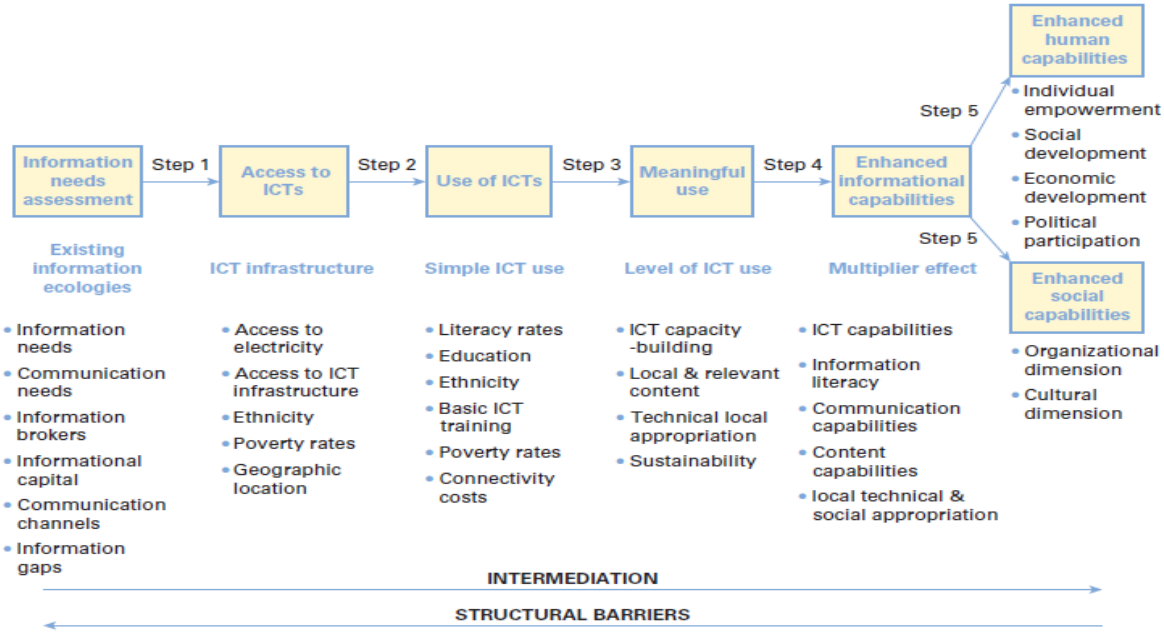

Figure 13: The Gigler ICT impact chain [74]

From as early as the 1980s intermediaries[75] such as telecentres, e-centres or community centres played an important role in facilitating individuals and communities access to and use of ICTs (initially as access to computers and then progresses to access to the Internet). The purpose of these intermediaries includes social innovation, which entails combining social elements with technological solutions for socio-economic development[76]. Research confirms the valuable role they play in facilitating and assisting individuals and communities along the process of progressing from accessing and using ICTs towards enhanced human and social capabilities[74].

The intermediaries facilitate the education, connectivity, and digital skilling of individuals, which helps them to develop themselves and their communities. They empower individuals with the skills and capacities that make them more employable, entrepreneurial and capable of generating an income to improve their quality of life[77]. As trusted information sources, the intermediaries also act as catalysts of information and knowledge that can create choices and opportunities for individuals in underserved

[74] Gigler, B-S, (2015). *Development as Freedom in a Digital Age: Experiences of the Rural Poor in Bolivia*. World Bank Group, (p. 394)

[75] Intermediaries are generally understood to fulfil a brokerage or mediating role between communities and the outside influence (ICTs in this respect).

[76] Haché, A. (2011). Under the radar: The contribution of civil society and third sector organisations to e-Inclusion. Seville, Spain: European Commission.

[77] Rissola, G., & Garrido, M. (2013). Survey on eInclusion actors in the EU27. Seville, Spain: European Commission.

communities. In many developing countries these intermediaries facilitate individuals use of ICTs for employment and income generating activities. By providing access to the Internet, the intermediaries also enable individuals to search and apply for vacancies advertised online as well as use the computers to type and print their curricula vitae (CVs), motivation and application letters. These intermediaries also support local (formal and informal) small businesses in the communities by for example facilitating individuals' use of the Internet as a source of information and to search and apply for tenders and business loans.

South Africa is no different in the sense that many intermediaries are indeed fulfilling an ICT-related brokerage role within communities, providing access to and digital or e-literacy related interventions for citizens outside the formal work sector. In essence, these intermediaries play the roles of capacity building, small business and entrepreneurial support, job placement centres, information hubs as well as provide social support services towards facilitating the digital inclusion and meaningful use of ICTs among marginalised individuals in the country[78]. Within the country's ICT policy, these intermediaries are therefore considered key drivers of ICT promotion and access, and the capacity-building of individuals[79]. These intermediaries are typically categorised as (i) private or for profit intermediaries (such as Siyafunda), (ii) public funded initiatives – such as e-centres within communities, municipal access centres such as libraries (Cape Access, Smart Cape, etc.) and (iii) 3rd sector intermediaries such as international and national NGOs, CBOs, religious organisations and many more.

Universities (either through the academic departments or community engagement initiatives), parastatals (such as the HSRC, CSIR), Foundations, Corporate Social Investment projects and ICT services providers (e.g. Microsoft, Google, InfoTel etc.) are also active in this space.

Unfortunately, a national perspective on the actual reach and impact of digital literacy interventions (especially for public funded intermediaries) is difficult to gauge as a national aggregation framework and system and an e-literacy assessment index are yet to be developed[80].

[78] Katunga, N. (2019). *Communicating for development using social media: A case study of e-inclusion intermediaries in under-resourced communities*. Unpublished PhD Thesis. University of the Western Cape.
[79] Western Cape Government. (2015). Western Cape broadband initiative. Accelerate Cape Town Workshop. Cape Town, South Africa: Western Cape Government.
[80] The Western Cape Government is probably most advanced in this respect with Cape Access reach being assessed on an annual basis.

9 Innovative Initiatives

The South African landscape is characterised by pockets of excellence in digital innovation and social innovation leveraging off digital technology. The following three initiatives are good examples of such pockets of excellence.

1. The Centre for Community Technologies is aimed at promoting radical development of the human potential of particularly disadvantaged communities through the use of technologies. Some of these innovative interventions or solutions are:
   - mHealth4Afrika, which is a maternal health patient management system linked to clinical sensors. The objective of this project is to address maternal and new-born healthcare delivery in Africa.
   - Ncediso™, which is a diagnosis and look-up tool for community healthcare workers.
   - School Health Assessment App, which is a child health assessment tool used by school nurses
   - Mental Health App, which is a self-management tool for mental wellbeing.
   - Adult Primary Care Guidelines, which is a symptom-based diagnosis and treatment tool.
   - POMA, which is an observation and monitoring system for the aged.
   - Geo Mapper, which is a TB and HIV tracking tool.
   - Zanempilo, which is an electronic healthcare record system for mobile healthcare units.
2. The University of Cape Town in collaboration with the small-scale fishing communities, developed "Abalobi", which is a mobile app suite and programme that enable fishermen and women to log their daily catch, communicate within their community via an integrated chat platform, share and export their data, record income and expenditure as well as a "Safety-at-sea" system and info hub with the latest fishing regulations etc. Abalobi has already been deployed in six sites in South Africa.
3. The Western Cape CoLab for eInclusion and Social Innovation (co-funded by NEMISA), applied an innovative co-creation process to develop the serious game *Ultimate Celebrity Manager* aimed at teaching youth (age 15-21) to manage their online identity and safety. Partners in the co-creation process involved the CoLab team, government, third sector stakeholders, local community youth representatives and Sea Monster (an award-winning Cape Town based game design studio). This process has produced a mobile game concept fusing the casual appeal of virtual pet apps with the familiarity of social networks. It includes detective-style gameplay and simple puzzle solving to promote fun while educating users around the subject of Digital Identity Management. The game,

which has specifically been designed not to use large amounts of data, is available on the Google Play Store or Apple App Store [81].

10 Conclusion

The South African digital landscape as described in this report clearly reflects the complexity of the South African context. On one-hand, South African individuals and corporations (high-end users) were early adopters of leading-edge technologies in a manner that is comparable to developed economies. However, despite these advances, as well as innovative and ground breaking solutions (Snap-scan, e-tax, etc.) the majority of the population faces real access and adoption barriers. South Africa follows a mobile first technology trajectory creating opportunities for innovative approaches such as the CGF project [82].

[81] Ultimate Celebrity Manager, Western Cape CoLab for Digital Inclusion & Social Innovation, downloadable at: https://www.wcapecolab.org/downloadgame

[82] http://www.researchictafrica.net/publications/Other_publications/2012_Mobile_Use_at%20the%20Base_of_the_Pyramid_(South_Africa).pdf (p. 22)

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Common Good First

COMPARATOR REPORT ON THE STATE OF DIGITAL LITERACY

WP2: Diagnostic study – digital landscape in South Africa

Deliverable 2.3: Comparator report on state of digital liter*acy* in participating regions at the end of the project

Isabella Venter and Leona Craffert, University of the Western Cape

Darelle van Greunen and Alida Veldsman, Nelson Mandela University

Marina Candi and Hallur Tor Sigurdarson, Reykjavik University

This deliverable consists of two parts. First, a tabulated comparison of a number of key metrics at the beginning of the CGF project in 2016 and the end of the project in 2019. Second, a summary of the direct achievements of the project and current and future benefits to the provinces involved.

11 Metrics comparison

The following tables provide comparisons of a number of key metrics for South Africa along with notes on these metrics and their changes during the course of the CGF project.

Table 1: General conditions

Metric	2016	2019	Notes
Unemployment	26.5%	27.1%[83]	South Africa has a persistent unemployment rate, with an average of about 25% during the last 20 years.
Population living below poverty line	53.8%	*	Unemployment is the number one reason for poverty in South Africa
Population in rural areas	35%	37%[84]	The urban population has been steadily increasing in the past decades, e.g. from 55.8% in 2000 to 63% in 2019.
GDP (billons)	$357	$386 (estimate)	GDP Growth was 1.4% in 2017 and 0.8% in 2018. In 2019 GDP per capita ranks no. 32 of 196 countries, but no. 91 in GDP per capita[85]

*Newer data are not available.

[83] Q4, 2018, source: Trading Economics - https://tradingeconomics.com/south-africa/unemployment-rate)
[84] Source: Worldometers - https://www.worldometers.info/world-population/south-africa-population/
[85] Source: Countryeconomy.com - https://countryeconomy.com/gdp/south-africa

Table 2: Entrepreneurial environment.

Metric	2016	2019	Notes
Economic development level	Efficiency-driven[86]	Efficiency-driven	South Africa's economic development level remains classed as efficiency-driven.
Perceived entrepreneur-ship opportunity[87]	40.9%	43.2%	Positive perceptions about entrepreneurship have increased by about 6%.
Total Early-stage Entrepreneurial Activity (TEA)[88]	9.2%	11%	TEA has increased by about 20%, which is a substantial increase.
TEA gender ratio (F/M)	60%	69%	
GDP per capita	$6483	$6050	GDP per capita has gone down by about 7%
Opportunity/ Necessity motive	1.1[89]	1.5	

As can be seen in Table 2, entrepreneurship has increased as GDP per capita has decreased. Although this might be seen as an indication of increased necessity-based entrepreneurship, the trend has actually been for a higher proportion of opportunity-based entrepreneurship, which is now 50% more prevalent than necessity-based entrepreneurship. In 2015, opportunity-based entrepreneurship was 10% more prevalent than necessity-based.

[86] Classification of economies by economic development level is adapted from the World Economic Forum (WEF). The factor-driven phase is dominated by subsistence agriculture and extraction businesses, with a heavy reliance on (unskilled) labor and natural resources. In the efficiency-driven phase, an economy has become more competitive with further development accompanied by industrialization and an increased reliance on economies of scale, with capital-intensive large organizations more dominant. As development advances into the innovation-driven phase, businesses are more knowledge-intensive, and the service sector expands. http://weforum.org.

[87] Percentage of adults who have positive perceptions about starting a business (aged 18-64)

[88] Business setup to 3.5 years of operation

[89] Source: Global Entrepreneurship Monitor (GEM) 2015-2016 report

Table 3: Digital literacy conditions.

Metric	2016	2019	Notes
Network Readiness Index (NRI)	#65	*	In 2016 South Africa had risen to 65th position amongst 139 world countries, and was identified as one of the seven "top movers" (5th position). This drastic change was attributed largely to improvements in infrastructure and affordability.
ICT Development Index[90] (world position)	#88	#92[91]	The most recent report concludes that "South Africa is at the forefront of the region's technological development with the latest broadband technologies and wide coverage. This has been enabled by a suitable regulatory framework and a competitive private sector-driven market. Cost remains an issue due to significant duplication in backbone networks, with a need to move to a cost-based open access regime."[92]
The Web Index (World Wide Web Foundation)	#45	*	South Africa ranks #45 overall of 86 countries worldwide. The country's lowest ranking is for relevant and local content and the country's lowest score (31.89 out of 100) is for economic empowerment of the Web. The two main factors that explain this are believed to be education level and inequality.

* Newer data are not available.

[90] ICT Development Index conceptual framework and methodology, 2016, http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2016/methodology.aspx

[91] 2017. Source: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf

[92] Source: *Measuring the Information Society Report 2017* – Volume 1 (https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf)

12 Direct project achievements

The CGF project is designed to grow from local initiatives with local outreach. Vital for this purpose are the e-skills initiatives which this project funds, as well, in some cases, as digital storytelling circles and taught modules, developed to enhance participants' social innovation skills and improve digital literacy. Following from that, the CGF online platform makes it possible to create a network – and impact –both national and international.

In this section we discuss local CGF activities, involving the establishment of digital and social innovation (DS-SI) laboratories, in particular. The laboratories are established to run courses to enhance digital literacy and train people in DS and assist them in forming and disseminating their social innovation (SI) stories. The following summaries are based on interviews with South African CGF participants (five universities) involved in setting up the digital laboratories. Interviewees where asked questions to gain an understating of the current situation of setting up and running the laboratories. The interviews were conducted in May 2019. Updates were obtained in follow-up contact in August 2019.

12.1 University of the Western Cape (UWC) – Cape Town

12.1.1 DS-SI Laboratory

On April 24, 2019 UWC held an event to launch and create awareness around UWC's digital laboratory. The main lab, containing the required equipment, is located on campus and will be open to students and people outside UWC. The staff running the lab will be trained at Rhodes University (RU). The organizers of UWC's lab will recruit students to become teachers or mentors at the lab. In addition to the lab on campus, a so called "pop-up" lab will be made available. This is a mobile and temporary lab with 12 workstations, that can for instance, be set-up in different townships in and around Cape Town.

12.1.2 Outreach

Between six and seven connections have been made with local actors with trusted footprints in local communities. These can potentially become hosts and run the pop-up laboratory. One of the intermediaries within the Atlantis area is already engaged in formalising the relationship with UWC, by means of a Memorandum of Understanding. The CGF project has already had considerable impact at UWC, and raised awareness among faculty and management. For instance, members of the faculty that have been working with DS, and have begun to bring DS to bear on social innovation. The CoLab is in the process of finalising UWC's first accredited short course on social innovation to be hosted

within the Information Systems Department.-The university is currently revising its innovation strategy and policy and social innovation has been included as an integral part of the new strategy. The objective is to strengthen the university's capability and capacity in social innovation research and application. Finally, an agreement has been made with a local newspaper to share weekly social innovation stories from the CGF platform, when it has been made available.

12.1.3 Challenges

Locating the relevant networks of social innovators has been challenging and Cape Town is a huge city, making it difficult to reach all areas of the city and its surroundings.

12.2 University of Johannesburg (UJ) – Gauteng Province

12.2.1 Digital Laboratory

The lab will be launched on September 12, 2019. UJ has 4 campuses, but the lab will be located on the Soweto campus. Here, there is the easy access to local communities and relevant staff. The organizers are also looking for additional sponsorship – such as from Microsoft and Apple – to fund additional equipment.

12.2.2 Outreach

UJ ran a pilot for Common Good First, in which 5 social innovation projects were developed. Consequently, they now have 2 digital stories that can be uploaded. In September, 7-8 profiles/stories are anticipated and an additional 10 stories are expected to be completed in October. CGF has created university wide interest among faculty and students. The increasing interest in DS has influenced students, capturing their honours research in digital stories. A collaboration with a TV station (a music channel) has been established. The channel will broadcast digital stories for educational purposes. Digital stories will also be broadcast on big screens in the canteen at UJ.

12.2.3 Challenges

Finding dedicated space for the lab proved challenging. The organizers have faced additional logistic problems, including finding resources to administrate the lab. The promotion of the lab – creating hype – is an ongoing challenge, which will need to happen through self-promotion.

12.2.4 Main victories

In light of the shortage of on-campus physical facilities, finding space and securing it was a significant milestone for setting up the lab.

12.3 University of the Free State (UFS) – Free State Province

12.3.1 Digital laboratory

The lab was launched with an event on May 10, 2019. A permanent lab is now located on campus in Bloemfontein. A second permanent, but smaller, lab will be located on the QwaQwa campus. There are plans to establish a mobile pop-up lab made available to people in different areas, in shorter periods. The first pop-up lab is planned in Trompsburg, a poor rural area, where UFS' medical faculty already has connections.

12.3.2 Outreach

Approximately 50 people showed up for the launch of the lab in May. The event contributed to the necessary institutional buy-in. The following training sessions have been held:

- Training session for entrepreneurs – 25 farmers
- Training session student entrepreneurs – 9 students
- Training in digital stories (University of Hasselt) – 10 students
- Digital Story circle – 7 staff

12.3.3 Challenges

As in other cases, finding space was challenging and required locating key stakeholders and potential allies of the project.

12.3.4 Victories

Success in in creating institutional attention and momentum for DS and SI. This is true for increased research interest, but there is also a realization of value of DS and SI in UFS' management. Correspondingly, there is an approved alignment of social innovation with the university's strategic emphasis. Contributing to the institutional success is the realization that DS complements the old South African tradition of oral story telling.

Permission has been obtained from the Faculty of Health to launch the Trompsburg Common Good First Mobile lab. All medical students are obliged to complete a week of practical community work and each group of four will complete a digital story

12.4 Nelson Mandela University (NMU) – Eastern Cape Province

12.4.1 Digital laboratory

Lab launch date was May 10, 2019. There are three labs, one is permanent and on campus. There are also two mobile pop-up labs. The on-campus lab supports students and social innovators. The two pop-up labs are to be located in Masifunde, in the Walmer township, and Gelvandale in the northern area of Port Elizabeth. Three individuals are dedicated to the work and training taking place in the labs.

12.4.2 Outreach

Approximately 30 community groups have been introduced to the CGF platform, and 7 profiles have been uploaded so far with more expected. There is substantial support and enthusiasm for the CGF platform from people in and outside of NMU's campus. NMU is also interested in adopting the CGF platform into its curricula.

12.4.3 Challenges

Creating awareness for the platform is an ongoing challenge. The high cost of using internet is a persistent challenge for online activity in South Africa, and it has not improved significantly in the past few years. Older generations prefer to use computers, while the younger generations prefer mobile phones, this has consequences for how the platform is going to be used.

12.5 Rhodes University (RU) – Eastern Cape Province

Prior to CGF, Rhodes University already had an active community engagement function working with DS. Due to this experience they also run train-the-trainer courses for the other South African universities involved in CGF.

12.5.1 Digital laboratory

RU has a permanent laboratory on campus, open to students, faculty and persons from outside the university. RU has hired two trainers that will run the 3-day DS course. RU runs two so called "semi-permanent" DS labs outside the university's campus. One is the Josa Youth Hub and the lab will be located there, at least until September, 2019. The other is the ADC Centre, training underprivileged children in digital literacy, but also focuses on building new businesses. Both are located in townships and both can be considered as SI projects in themselves. Finally, RU's intent is to offer more mobile pop-up DS facilities manned by experts from the university.

12.5.2 Outreach

RU has run 6 DS train-the-trainer courses, with approximately 75 participants. The Josa Youth Hub lab has approximately 20 people participating in a longer process, where DS and SI are involved. The ADC Centre is already training a group of 10 people in DS. The community engagement team at RU makes a significant contribution to CGF with their previous 75 established partnerships in Grahmstown.

12.5.3 Challenges

Internet connections are not reliable in areas outside of RU's campus and digital literacy is a challenge, especially in the townships.

12.5.4 Victories

Identifying 3 competent facilitators to run DS-SI labs and successfully running 6 train-the-trainer courses. CGF has had a good influence on the community engagement at RU and raised awareness around social innovation.

12.6 North-West University – North West Province

12.6.1 Digital laboratory

A mobile lab is in the process of being set up. Launch is planned in 2020 and there are plans to hold story circle events.

12.6.2 Challenges

NWU has 3 campuses, which are located about 300 km apart, so coordination is challenging. But having a mobile lab should enable engagement on all 3 campuses. A single mobile lab in a province of this size will only be a drop in the ocean. NWU has plans to find an external sponsor to expand their footprint.

12.6.3 Victories

Despite the fact that the NWU lab is not yet up and running, they were able to upload 6 profiles and 4 digital stories to the CGF platform with the assistance of consortium members from UFS and NMU.

13 Summary of CGF achievements

Table 4 provides a summary of the planned quantifiable achievements of the CGF digital labs as of September 10, 2019. And Table 5 provides a summary of the realized achievements at the end of the project, all of which exceed the planned achievements.

Table 4: Summary of planned digital lab achievements.

	Profiles	Digital stories
UWC	15	6+
UJ	7	5-6
UFS	25	10-12
NMU	15	10
RU	15	6+
NWU	6	4
GCU	15	4-6
TOTAL	98	45-50

Table 5: Summary of realized digital lab achievements.

	Digital labs	Profiles	Digital stories	Persons who benefited*
UWC	2	13	4	35
UJ	1	9	3	150
UFS	5	34	18	60
NMU	2	18	13	40
RU	8	22	6	120
NWU	1	6	4	25
GCU	0	9	5	15
TOTAL	19	111	53	445

**conservative estimates*