Common Good First

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

Darelle van Greunen, Isabella Venter, Leona Craffert , Alida Veldsman, Marina Candi and Hallur Tor Sigurdarson

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1 Introduction

1.1 Background

The world is now again 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; 3-D printing; the Internet of Things; quantum computing; storage capacity and knowledge being accessible to all at the click of a button. This exponential change—if not embraced and anticipated—could minimize or even derail all the potential it has for development, innovation and could minimize the benefits that it could bring.

> *"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].

Harari in his book "Sapiens: A Brief History of Humankind"[2] suggests that—approximately 70 000 years ago—homo sapiens went through a "cognitive revolution," resulting in homo sapiens being the only animal who is capable of large-scale cooperation. According to him this "cognitive 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 project—Common Good First Digital Storytelling for Social Innovation—is aimed at growing the South African social innovation sector by establishing a digital platform for showcasing social innovation projects. It is anticipated that the project will contribute to the enhancement of the e-skills capability of selected community groups in South Africa therefore hopefully contributing towards decreasing the digital divide in these areas.

1.2 Our approach

The brief for this study was:

1. To conduct a preliminary diagnosis, carried out by partners and associated bodies, to contextualise the digital elements of the project and help define its activities.

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

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

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2. At the end of this activity, a more detailed diagnosis will be made in collaboration with the Advisory and Evaluation Committee and WP 1 in order to identify the principal needs of the region and existing best practices in the field of digital innovation.
3. In the final phase of the project, a second comparative report will be produced, taking into account changes in the digital landscape.
4. The results of these activities will be consolidated and presented as a report on the Common Good First website.

To describe the digital landscape in South Africa (ZA) it is necessary to interpret publicly available information on current ZA digital policies, frameworks, and infrastructure (broadband). This includes global indices on the digital landscape (inclusive of South Africa) and validated ZA information on access, skills and behaviours.

2 South Africa as an emerging economy

Although South Africa is classified as a developing country, it has the characteristics of both advanced and developing economies. Pockets of highly advanced technology infrastructure can be found in the bigger cities and metropolitan areas, while access to even basic technologies are lacking in large parts of the country. For example, tertiary hospitals, universities and other sophisticated research entities, are located in metro areas, while rural communities have to travel great distances to access primary healthcare services at rural clinics or attend Further Education and Training (FET) Colleges.

South Africa has a strong private sector and fiscal resources. The high unemployment rate (26.5%) renders even basic services inaccessible for a large portion of the population. Most (53.8%) of the total population of 56 million people, live below the poverty line 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 equal the playing field, the South African government invests in the country's poor, through different types of social grants.

The past decade also saw the migration of people from the rural areas to the cities. In 2006, 40% of the total population stayed in rural communities. This figure dropped to 35% in 2016. There are various reasons for this urbanisation but the main reasons are employment opportunities and education.

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

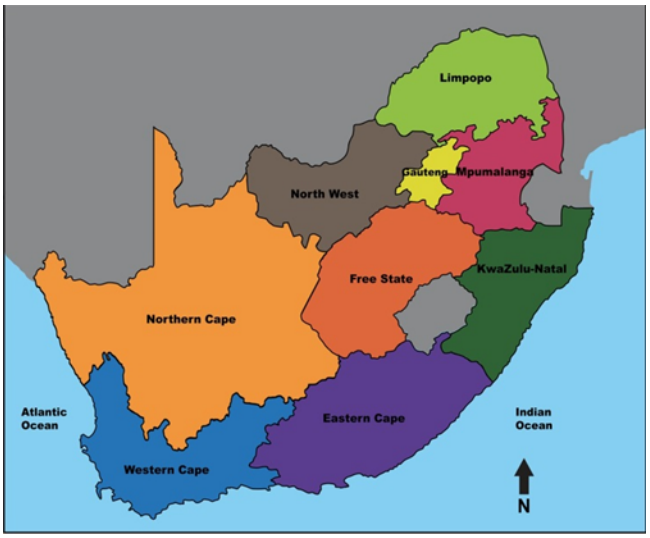

Figure 1: Provinces of South Africa[3]

South Africa has a typical federal government structure spread over three tiers of government:

- National
- Provincial, and
- Metro or municipal

Reporting on the South African digital landscape requires an understanding that the implementation of national policies is typically implemented at the provincial level. Provinces have the freedom to develop province specific implementation strategies though 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 Tele-Communications 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. It was therefore decided to focus mostly on the National initiatives.

[3] https://mycyberwall.co.za/get-smart/history/grade-5/provinces-south-africa

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2.1 Global Entrepreneurship Monitor Report and South Africa

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. Based on this information, South Africa is not far from the average of GEM countries (see Figure 3). However, despite a strong physical infrastructure, engaging in entrepreneurial activities does not connect very firmly to cultural norms. At the same time, there appear to be few government entrepreneurship programs. However, the former suggest a need for initiatives to support entrepreneurial activities and potentially influence cultural norms towards increased entrepreneurship.

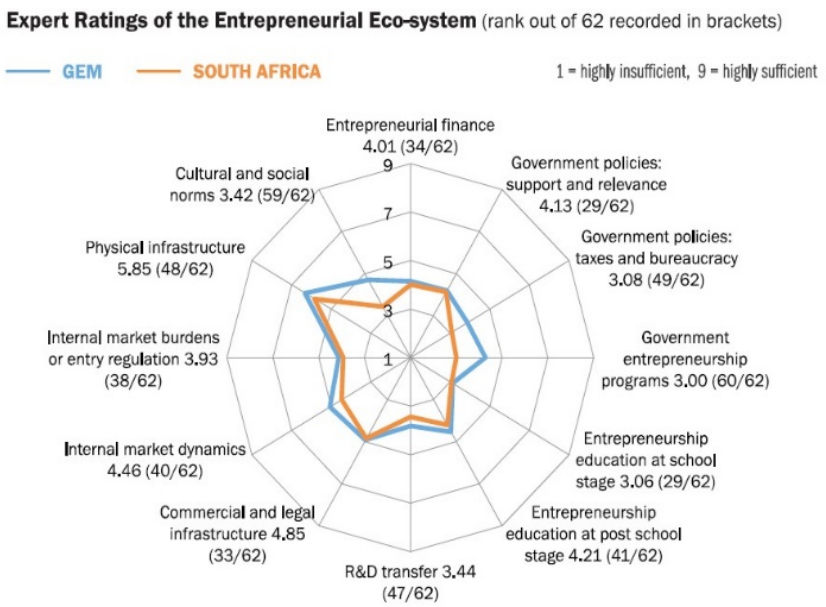

Figure 2: Expert Ratings of the Entrepreneurial Eco-system in South Africa[4]

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

[4] http://www.gemconsortium.org/report/49480

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4). 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 to the regional economy. Therefore, initiatives intended to spur entrepreneurship in South Africa should focus on harnessing people's dreams and aspirations to effectively start new businesses.

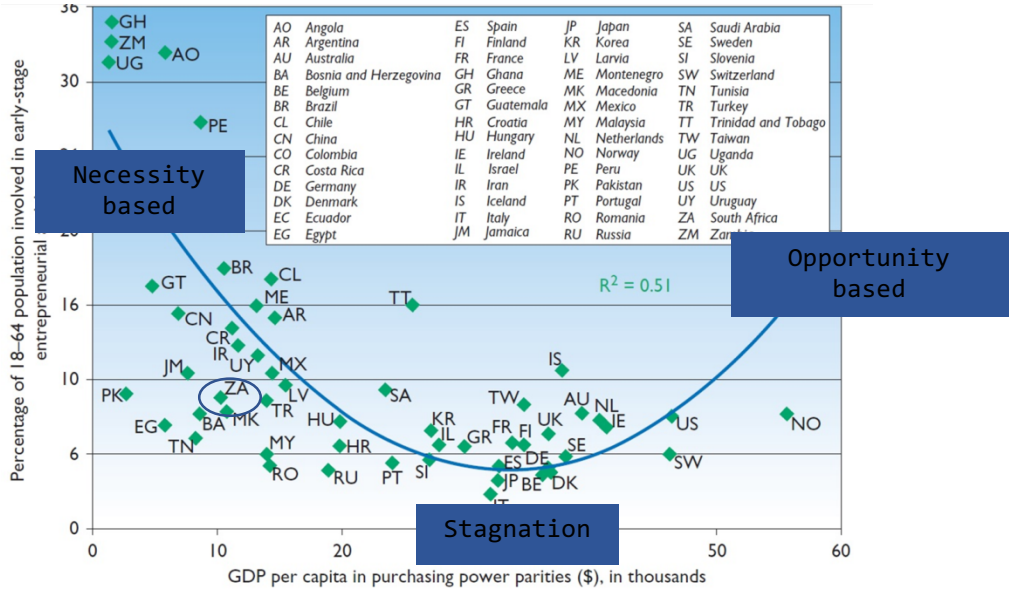

Figure 3: GEM data

3 South African ICT performance as reflected by selected global indices

Broadband and advanced information and communication technologies are increasingly regarded as being a key driver of economic growth and development. For this reason these 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 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.

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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 (WEF) e-readiness[5]

Since 2001 the World Economic Forum (WEF) publishes annually the 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 ICTs and broadband.

In particular, the report assesses the factors, policies and institutions that assist countries in leveraging information and communication technologies (ICTs) for increased prosperity. All these dimensions are crystalized into a global ranking in the form of the Network Readiness Index (*NRI*[6]) reflecting the network readiness at country level. The NRI 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: Network 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)

[5] Source Global Information Technology Report 2016

[6] http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf (Global Information Technology Report, 2016) accessed online 20/4/2017 (p.3)

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In the 2016 assessment, South Africa improved to 65th position amongst 139 world countries, and is identified as one of the seven "top movers" (5th position), next to Italy (from 55 to 45), 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 drastic change is almost entirely the result of improvements in infrastructure and affordability. See Table 2 for the detailed performance per sub-index.

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

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[7]	24	20	21	23
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[8]	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

[7] A score in green indicates a performance well above the country average, that compares well with better performing countries.
[8] A score in red indicates a performance well under the country average and compares with the countries towards the bottom end of the index.

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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 best 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.

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

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Country	WEF NRI 2016	World Position	WEF NRI 2015	World Position
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[9].

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 in sub-Saharan countries while demonstrating a similar performance to China and second to the Russian Federation.

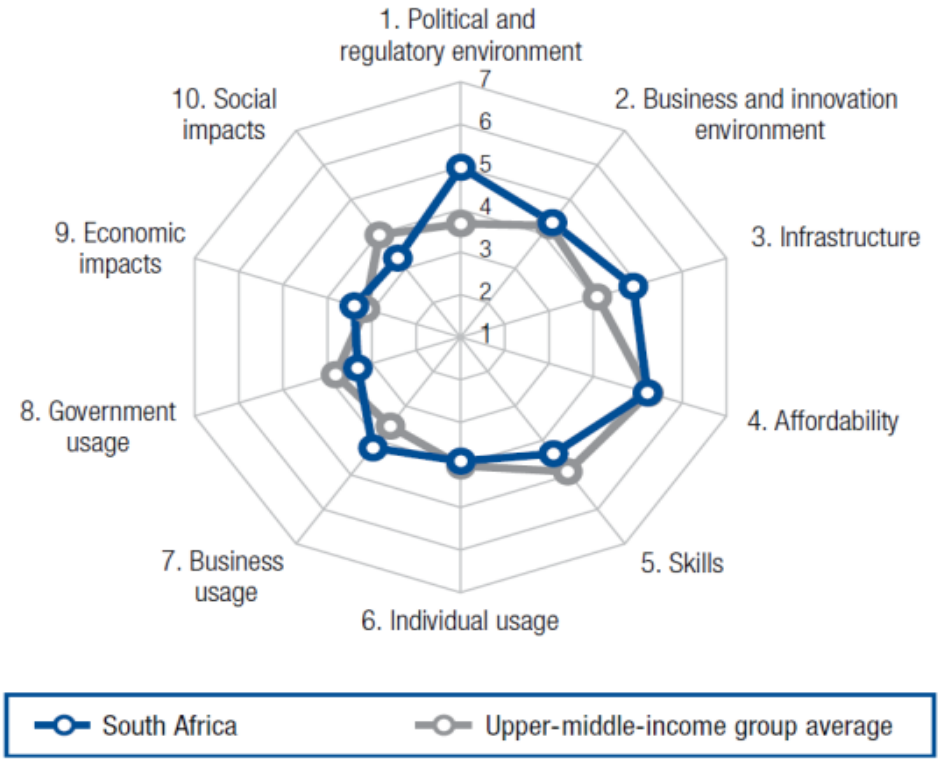

Figure 4: South Africa's pillar averages compared to Upper-middle income group average

[9] [9] http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf (Global Information Technology Report, 2016) accessed online 20/4/2017

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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. 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)

Since 2009, the ITU has published the ICT Development Index (IDI) yearly. It 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 it contribution to growth and development within countries, recognising available capabilities and skills.[10]

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.*

The index consists therefore 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

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

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— 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

Table 4: The IDI2106 of the top African countries compared to their world ranking

Africa	IDI 2016	World Rating (2016)	IDI 2015	World Rating (2015)	Movement
Korea	8.84	1	8.78	1	_
Russia	6.95	43	6.79	42	1 down
Brazil	5.99	63	5.72	65	2 up
Mauritius	5.55	73	5.27	73	_
China	5.19	81	4.8	84	3 up
Seychelles	5.03	87	4.77	85	2 down
South Africa	5.03	88	4.70	86	2 down
Cape Verde	4.60	97	4.23	99	2 up
Botswana	4.17	108	3.79	109	1 up
Kenia	2.99	129	2.78	129	_
India	2.69	138	2.50	135	3 down

As can be seen in Table 4, South Africa compares well with BRICS and the rest of Africa. In term of the developing countries South Africa performs slightly better than the average of 4.07.

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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 contributes to: (1) 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 includes a ranking of "economic empowerment", combining sets 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 Ukraine (#46) and United Arab Emirates (#47). The country's lowest ranking is for relevant and local content. However, 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 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[11]. 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. [12]

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

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

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4 Short overview of relevant South African digital policies and frameworks

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"*[13]

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"*[14].

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"*[15].

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 three 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

[13] Government notice (no.953), DOC, 2013, p.5 (Staatskoerant no. 37119)
[14] National Development Plan; Vision for 2030, p.171….?
[15] NDP Executive Summary, 2013, p. 23

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

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.[16].
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*"[17]. 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)

[16] South Africa Connect: South African broadband policy
[17] National integrated ICT Policy White Paper, 28 Sept, DTPS, p. 1

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Policy/Framework	Date	Reference to ICT infrastructure, available technologies and skills
		– The postal sector (supporting industry growth throughout the value chain)[18]. – An almost fully e-literate society is envisaged for 2013. 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.[19]
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 Africa 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 the 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[20].

[18] National integrated ICT Policy White Paper, 28 Sept, DTPS, p. 5

[19] 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)

[20] Find the original text RIA

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5 Infrastructure and available technologies

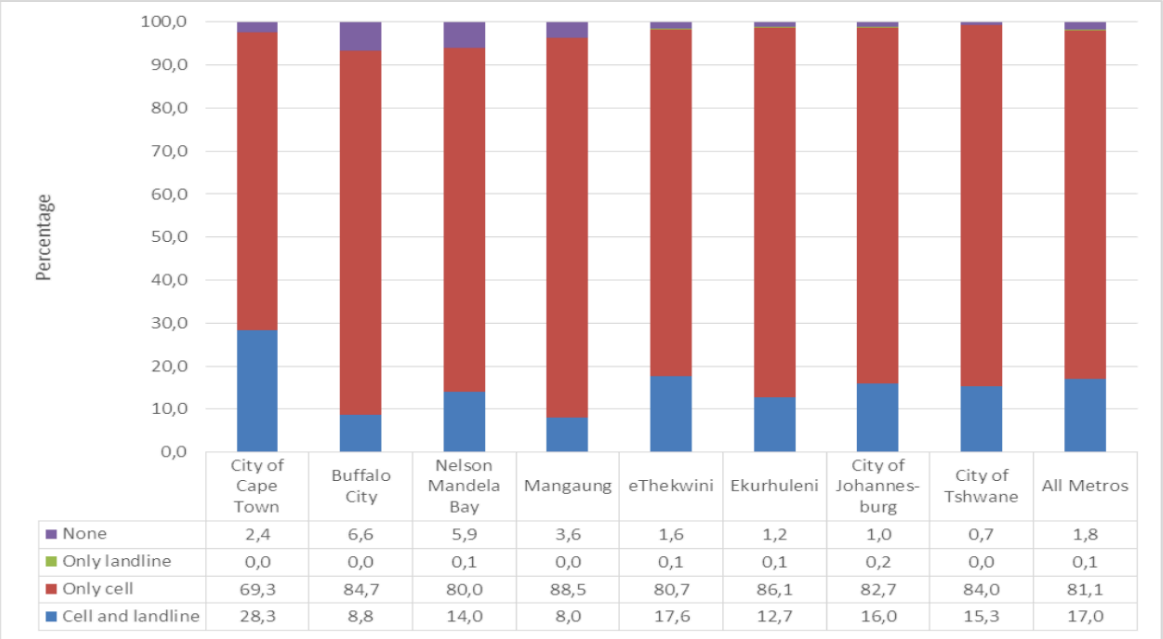
5.1 Infrastructure

"While smartphone usage has increased, SAARF AMPS 2015A reports that close to half of the adult population recorded not having personally used a smartphone in the period from December 2014-June 2015. Only 22.3 % of adults in LSM 1-4 said they had used a smartphone over the period compared to 78 %of adults in LSM 8-10)" (p.16 of White Paper).

5.1.1 Stats South Africa: Household Survey (2015, which appeared in 2016)

Households with a functional landline and cellular phone

It was more common for Households in Buffalo City (6,6%), Nelson Mandela Bay (5,9%) and Mangaung (3,6%) not to have access to communication media (Landlines and cell phones).



	City of Cape Town	Buffalo City	Nelson Mandela Bay	Mangaung	eThekwini	Ekurhuleni	City of Johannes-burg	City of Tshwane	All Metros
None	2,4	6,6	5,9	3,6	1,6	1,2	1,0	0,7	1,8
Only landline	0,0	0,0	0,1	0,0	0,1	0,1	0,2	0,0	0,1
Only cell	69,3	84,7	80,0	88,5	80,7	86,1	82,7	84,0	81,1
Cell and landline	28,3	8,8	14,0	8,0	17,6	12,7	16,0	15,3	17,0

Figure 5: Households with a functional landline and cellular phone (Stats South Africa: Household Survey,2015)

As many as 81% of South African households in metropolitan areas use only cellular phones at home —Cape Town 69.3%, Mangaung (88,5%), Ekurhuleni (86,1%), and Buffalo City (84,7%). With respect to the combination of cellular phones and landlines in homes, household in the City of Cape Town City of Cape Town (28,3%) and eThekwini (17,6%) had the highest prevalence..

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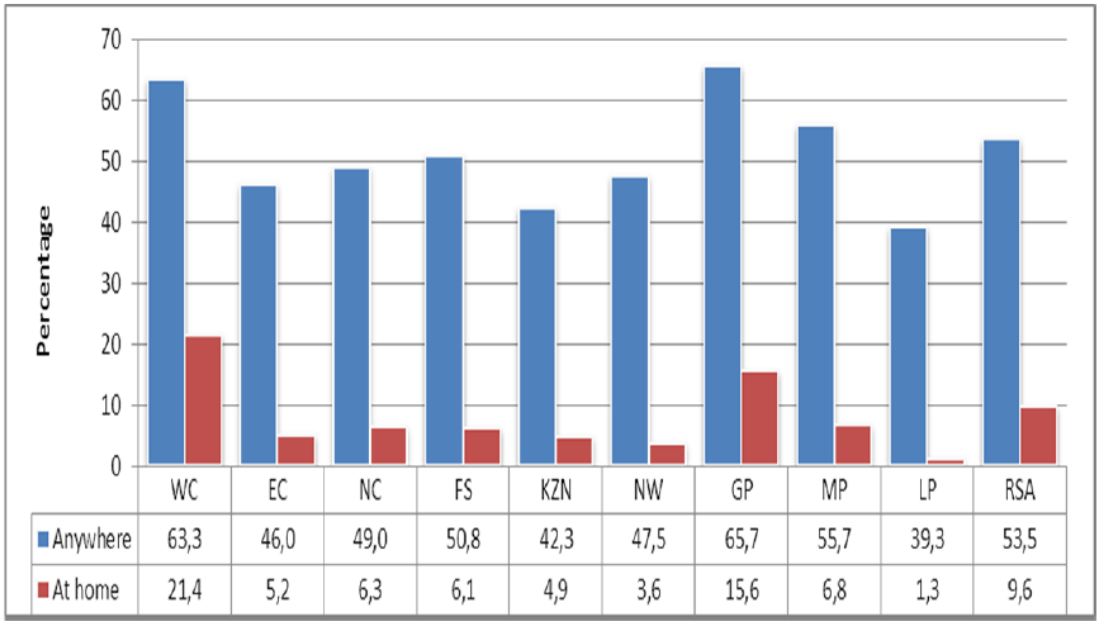
Households with access to the Internet



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Anywhere	63,3	46,0	49,0	50,8	42,3	47,5	65,7	55,7	39,3	53,5
At home	21,4	5,2	6,3	6,1	4,9	3,6	15,6	6,8	1,3	9,6

Figure 6: Households with access to the Internet (Stats South Africa: Household Survey, 2015)

Most South Africans access the Internet either at work (15,1%), or at home (9,7%), or at school/university/college (5,1%).

Households in the cities had most access and rural areas had the least access to the Internets. In the Western Cape (21,4%) and Gauteng (15,6%) of households could access the Internet at home while households in Limpopo (1,3%) had little opportunity to do so. Only 16% of households in metropolitan areas could access the Internet, and less in the rural areas, for example: (1,2%) in the Eastern Cape, KwaZulu-Natal (1,1%), North West (0,9%) and Limpopo (0,5%) could access the Internet. Households, in most cases, had access to the Internet at other places such as: work, Internet cafes or educational institutions with Gauteng and the Western Cape being the most likely to do so and Limpopo the least likely.

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5.2 Available technologies

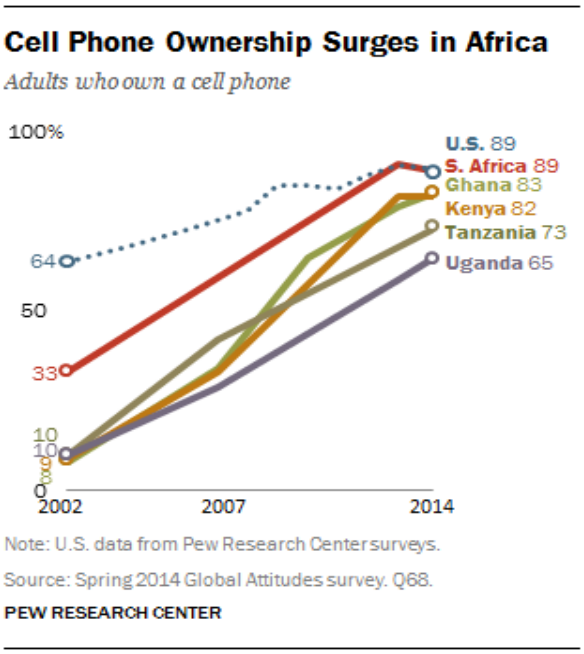

Figure 7: Cell Phone Ownership from 2002 to 2014

In 2014 cell phone ownership in South Africa was similar to that of the United States[21]. However, on 34% of South Africans have smartphones and can thus access the Internet. The most common usage of mobile phones was for sending text messages followed by taking videos and pictures. Other activities requiring Internet access were much less used, or less than 25%.

Households using Mobile Devices

Gauteng (59%) has the highest percentage of households using mobile devices, followed by the Western Cape (54%) (See

Figure). There is consistency with Northern Cape and North West both at (48%). The lowest percentage of households using mobile devices is found in KwaZulu-Natal (36%).

[21] http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/

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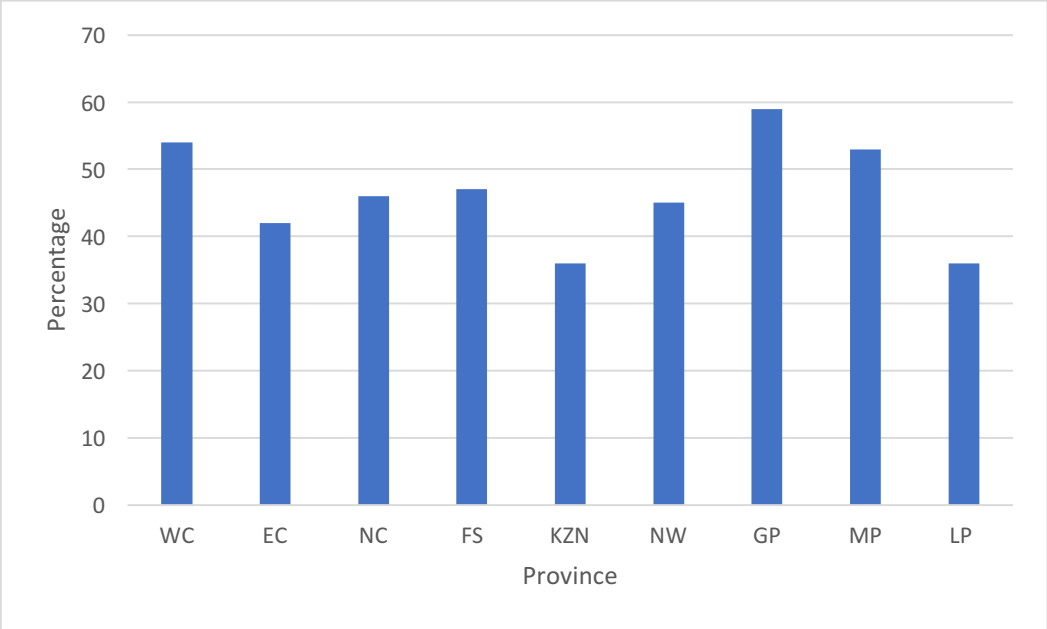

Figure 8: Household using mobile devices

6 Affordability

6.1 Cost and speed comparison

The South African ICT sector is growing, encouraged by the consumer demand of mobile phones where 86% of adults own one. This high ownership rate can distract from the low levels of smartphone use. 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[22].

Table 7: Mobile expenditure as a share of individual income

South Africa	Global
24.7%	< 5%

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

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Affordability of Internet services is a significant challenge in SA. On average, a citizen in the SA spends 24.7% of their income (see Table 7)[23] 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 its high Gini index. South Africa has the highest Gini coefficient in the world (reference). This may explain why the significant affordability challenge does not always become as explicit in all studies of the ICT landscape in South Africa.

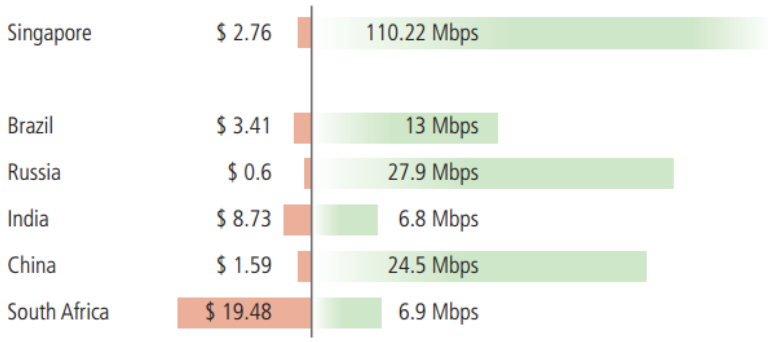

Figure 8: Cost and speed comparators: $ per Mbps[24]

6.2 Low Income and affordability[25]

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 still present a challenge to many of the 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

[23] *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*).
[24] Western Cape Digital Readiness Assessment: Summary Report, 2015
[25] *Offline and Falling Behind: Barriers to Internet adoption, McKinsey & Company, 2013.*

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- High device manufacturer costs and associated business model constraints
- High provider and taxes fees
- Unfavourable market structure

7 Usage (Internet and Mobile)

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 52% in 2016. This is far above the African average of 27.7% and on par with the world average of 54%. South Africa has the fourth most Internet penetration on the African continent, Kenya is the clear leader with a penetration of almost 78%.[26]

A comparative country study that investigated the factors that influence Internet usage, the barriers thereto and the strategies that users adopted to overcome limitations, was done by the RIA[27] in February 2017. Although affordability was cited as one of the biggest challenges to Internet uptake and usage, many other factors were identified having a significant impact on Internet adoption and usage.

Table 8: What individuals do on the Internet using mobile phones

Individual activity	National
Download applications	21.9%
Purchasing goods online	25.3%
Watching TV/video online	59.7%
Reading newspaper or magazine online	43.8%

Compared to voice and SMS, is Internet a cheaper and easier mechanism to communicate and find information whether it is via search engines, social media or email, depending what motivates people to go online. The study made a distinction between students, professionals and the unemployed. Each of these groupings had different needs and uses for the Internet but in general it related to studies

[26] Source: http://www.Internetworldstats.com/ (accessed 12/4/2017)
[27] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.

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and research, business and financial transactions and job seeking. Crosscutting is the need to communicate with others and find information. Gender also influences Internet usage. While male users prefer to access sport, news and betting content, female users prefer fashion, online shopping and health content.

7.1 Barriers to Internet adoption and ICT usage

McKinsey and Company[28] reports that consumers considered low income and affordability to be the most significant barriers for Internet adoption in SA, followed by the lack of incentives, low user capacity and infrastructure-related barriers (see Table 9).

Table 9: Barriers to Internet adoption

Barriers	Identified contributing factors
Low income and affordability	31% of South Africans live in poverty, urban centres are characterised by high unemployment. The lack of upward mobility in rural areas contributes to low purchasing power. Even though mobile/smartphone prices are below average and median prices in the 20 country comparison, mobile internet prices are high (percent of GNI per capita). IP messaging is still low and 51% do not use it. High interconnection charges are passed on to consumers by operators and results 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 High content, app, and platform costs and associated business model limitations Low awareness or interest from brands and advertisers Inadequacy pertaining to trusted logistics and trusted payments system Difficulty doing business
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)

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

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Digital literacy should be seen within the context of the larger educational system. Without a strong education system, whether it is formal or informal, there will be challenges for digital literacy. The younger generation living within the technological environment often adapt to use of technology faster than their elders.

According to Mobile Economy Africa, South African consumers perceive (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[29]

Availability and frequent use of digital devices does **not** ensure effective computer and information literacy, which is not easily developed in the absence of coherent learning programs[30].

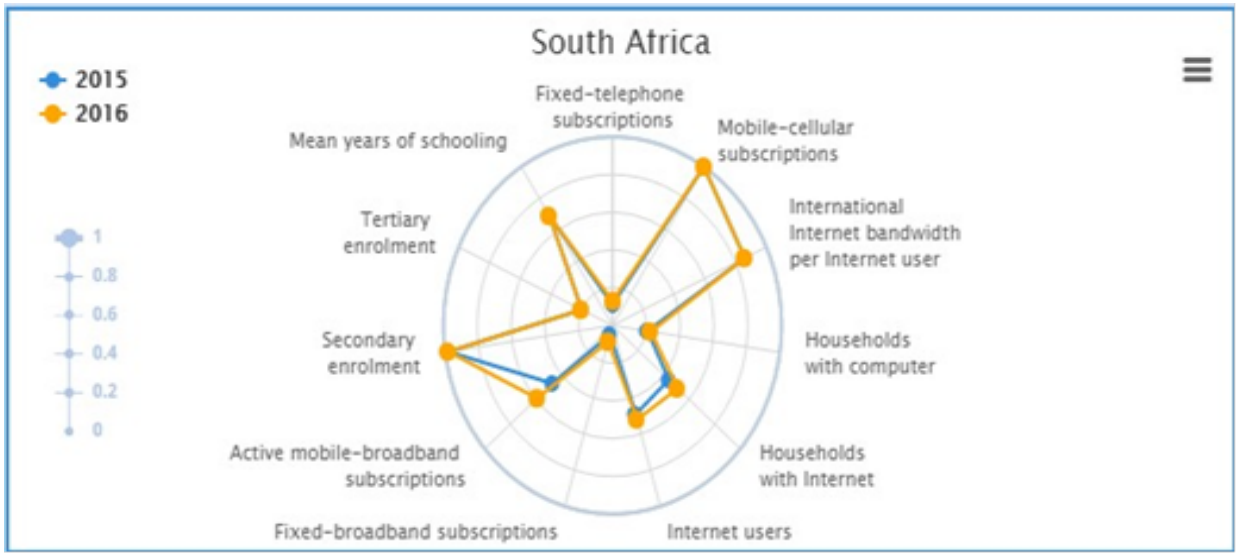

Figure 10: South Africa changes between 2015 and 2016[31]

In a 2017 study[32] that the availability of local content such as local news sites, entertainment and downloadable content will also entice people to use the Internet more. The lack of e-skills and digital literacy, especially amongst the older population as well as mistrust in things that they cannot see prevent the generation from using the Internet. Then there are also privacy and security uncertainties and the fear for financial fraud online that cause people to mistrust online transactions. Cultural barriers and skewed perceptions also hinder people to freely access the Internet.

[29] *Mobile Economy: Africa 2016*
[30] Source: International Computer and Information Literacy Study (ICILS), 2013
[31] http://www.itu.int/net4/ITU-D/idi/2016/
[32] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.

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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 the 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 level 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 to ensure that South African citizens in general can harness the benefits of ICTs 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), the Ikamva National e-Skills Institute iNeSi) 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[33].

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), and (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.

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:

— the ***Go on-UK framework*** which can be regarded as a framework for basic digital skills;

[33] National integrated ICT Policy White Paper, 28 Sept, DTPS

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- the ***e-Competence Framework for Users*** (e-CF-U 2013), formally accepted by the European Commission, and
- The DigComp framework, a product of the Joint Research Centre of the European Commission and to be applied in European and Member states. [34]

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).

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

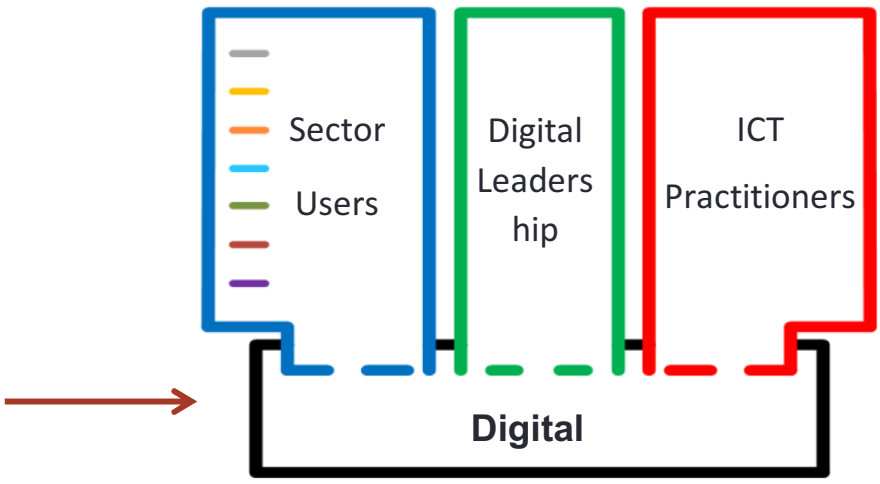

Figure 9:: **Digital Literacy framework**

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*[35]. It is also intended to give impetus to and stimulate the national discourse in terms of a national and locally relevant digital skills framework.

[34] Claassen, W.T. (2016) DSFOne Handbook Draft. UWC publication
[35] Claassen, W.T. (2016) DSFOne Handbook (p.12).

In drafting the DSFOne, recent developments on digital skills framework from UK, Belgium and the European Union have been consulted but with due recognition of the particular 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 (which involves more than just a very basic level of e-skills, but e-skills that can lead to meaningful use in life, work and learning, both for individuals and in small organisations);
- (sector) user skills, which can be generic, or sector- (or profession-) specific (the latter represented symbolically by coloured bars in the framework proposed);
- E-leadership / digital leadership skills;
- ICT practitioner skills (which some people would call "professional skills", although others would reserve the designation "professional" for a certain rigour and style in which practitioners go about plying their trade).

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. 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.*[36]"

8.3 Measurement of digital skills, capability and progress

Similar to the discussion on digital skills framework, several countries have developed national survey approaches and instruments to assess various elements pertaining to citizens' cognisance of the benefits of ICTs, digital skills levels, progress made by targeted interventions and digital-related behaviour.[37] Apart from the household surveys conducted by Statistics South Africa (on access, and use), no national assessment instrument or approach has been defined and

[36] Refer to the glossary of NESPA 2013? (WC to confirm)
[37] Claassen, W.T. (2016) DSF Handbook Draft. UWC

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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 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[38].

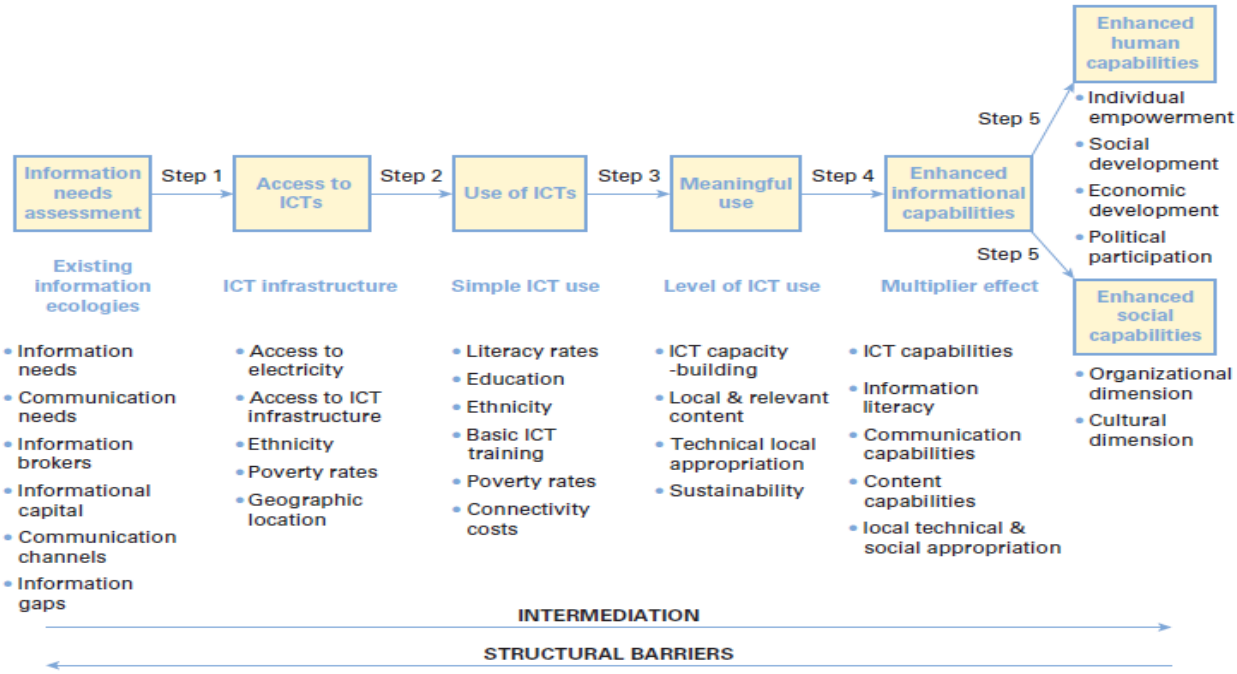

Figure 10: The Gigler ICT impact chain[39]

The Gigler ICT impact chain 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

[38] 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.
[39] Gigler, B-S, (2015). *Development as Freedom in a Digtal Age: Experiences of the Rural Poor in Bolivia*. World Bank Group, (p. 394)

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of ICTs, which leads to (4) enhanced informational capabilities, which eventually culminate into (5) enhanced human and social capabilities (outcomes). Access to 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".*[40]

From as early as the 1980s intermediaries[41] 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 internet). 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[42].

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. 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[43].

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[40] Gigler, B-S, (2015). *Development as Freedom in a Digtal Age: Experiences of the Rural Poor in Bolivia*. World Bank Group, (p. 392).

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

[42] Gigler, B-S, (2015). *Development as Freedom in a Digtal Age: Experiences of the Rural Poor in Bolivia*. World Bank Group.
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[43] The Western Cape Government is probably most advanced in this respect with Cape Access reach being assessed on an annual basis.

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8.5 The nature of the digital divide in South Africa

Although ICTs or digital technologies have boosted growth in many countries, expanded opportunities for individual, communities and countries improved services delivery, it is also true that the aggregate impact (digital dividends) has fallen short and is unevenly distributed[44]. The digital divide refers to this disparity, to the fact that some people, countries or communities have easy access while others are underserved[45].

However, with the rapid development of the information society, stimulated by the growth of the Internet, it is important to realise that old challenges (such as differences in access and adoption) will remain while at the same time new challenges or new divides are emerging.[46]

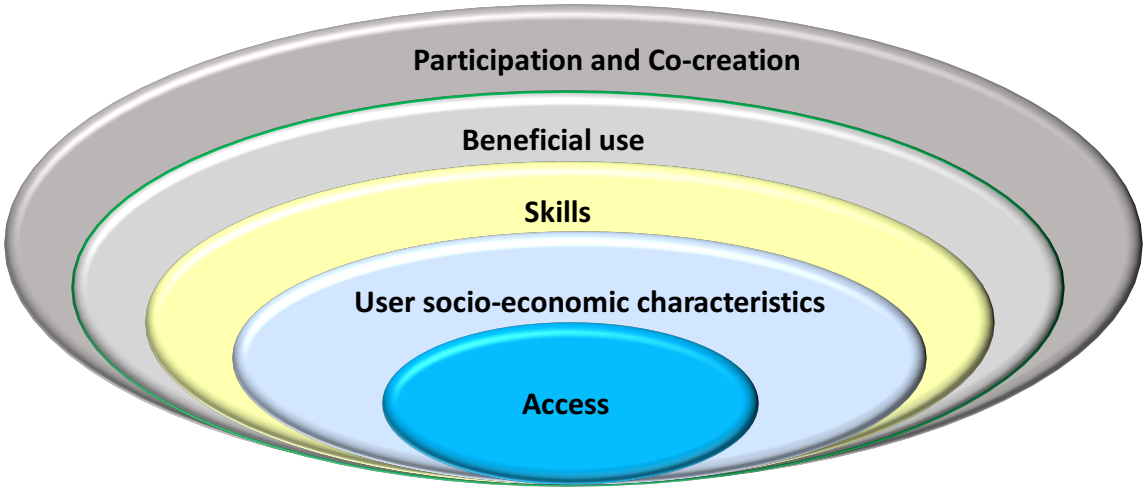

Figure 11: Five levels of the digital divide[47]

Various factors can contribute towards the creation of the digital divide and some examples are provided below:

- Age: Older people generally use ICTs less than younger people
- Gender: Persistent gender difference in online usage
- Education: Level of education and literacy remain core challenges

[44] Digital Dividends Overview, World Band Report, 2016, p.2)
[45] Flew, T. (2015). New Media
[46] Andreasson, K. (2015)., p.xxi
[47] 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.

- Mobile: Mobile devices provide opportunity to bridge the gap, yet, differences in technology, speed and usage create new divides
- Useful usage: What people use ICTs for (use versus meaningful use)

The levels of the ICT usage and exploitation are depicted in Figure 11

Within the South African context, typical factors such as location (rural vs urban), cost of access and device, level of education, socio-economic standing, gender and forming part of a vulnerable group contribute towards the digital divide in the country[48]. 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) a significant percentage is still struggling to overcome the access barrier.

In South Africa, mobile cellular and broadband prices are amongst the highest in the world[49]. The Government has allowed this to happen rather than addressing the challenges of inequality, unemployment and poverty by using its superb telecommunications infrastructure. The report states that: According to the 2015 Web Index,

> *"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 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."*[50]

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:

[48] *Internet Use Barriers and User Strategies: Perspective from Kenya, Nigeria, South Africa and Rwanda.* RIA February, 2017.
[49] Web Index Report 2014-2015 (http://thewebindex.org/report/#9._case_studies, accessed 11/04/2017)
[50] Web Index Report 2014-2015 (http://thewebindex.org/report/#9._case_studies, accessed 11/04/2017)

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- mHealth4Afrika, which is a maternal health patient management system linked to clinical sensors. The objective of this project is to address maternal and newborn healthcare delivery in Africa.
- Ncediso™, which 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 fisherman 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. A collaborative initiative between the University of the Western Cape (Co-Lab for e-inclusion and social innovation) and University of Gent (Belgium) and Mzumbe University (Tanzania) for the development of mobile applications and platforms for a location-based goal orientated exchange of information within trusted communities.

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10 Conclusion

The digital landscape as described in this report clearly reflects the complexity of the South African context. On the one-hand South African individuals and corporations (high-end user) 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 this project [51].

51

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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