

Western Cape Digital Readiness Assessment 2015

An assessment of broadband infrastructure, policy and regulations, skills, affordability, access and use amongst citizens, business and government in the Western Cape.



Western Cape Digital Readiness Assessment 2015

Western Cape Digital Readiness Assessment was developed by Research ICT Africa (RIA)



In partnership with the University of Cape Town and University of the Western Cape





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Acronyms and abbreviations

Capex capital expenditure
CMA Cape Metropolitan Area
CSSR call set-up success rate
DCR dropped call rate

DEDAT Department of Economic Development and Tourism

DEI Digital Economy Index EA enumerator area

EIU Economist Intelligence Unit GDP gross domestic product GNI gross national income

GSM Global System for Mobile Communications

HHI Herfindahl-Hirschman Index

ICASA Independent Communications Authority of South Africa

ICT information and communications technology

IDI ICT Development Index IP Internet Protocol

ITU International Telecommunication Union

MTR mobile termination rate
NRI Networked Readiness Index
Opex operating expenditure

OECD Organisation for Economic Co-operation and Development

R&D research and development RIA Research ICT Africa

SMEs small and medium-sized enterprises

TRE Telecommunication Regulatory Environment

USOs universal service obligations
WCBI Western Cape Broadband Initiative
WCG Western Cape Government

WEF World Economic Forum

Glossary

Base of the pyramid (BoP) – globally referred to as individuals living on less than USD2.50 a day; this report, however, adopts the 2012 South African National Planning Commission Development Plan poverty datum line, which is defined as households with income of less than R432 per month per household member, which is roughly equal to USD52.50.

Call set-up success rate (CSSR) – the fraction of the attempts to make a call that result in a connection to the dialed number (due to various reasons not all call attempts end with a connection to the dialed number); this fraction is usually measured as a percentage of all call attempts made.

Digital readiness – preparedness to embrace technology in its entirety.

Herfindahl-Hirschman Index (HHI) – an index that determines the degree of concentration in the market.

Likert or Perception scale — a psychometric scale commonly involved in research; the term is often used interchangeably with rating scale.

Long-term evolution (LTE) spectrum – commonly known as 4G LTE, a standard for wireless communication of high-speed mobile data; it is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed.

Ookla's Net Index – the median ratio of actual download speed to the download speed subscribed to ('promised speed').

Quality of service regulation – a regulatory framework defining the minimum set of standards that service providers in the telecommunications sector must meet.

Regulation of access to wholesale voice and data – the global trend in price regulation is ex-ante wholesale regulation to ensure competitive access to facilities.

Spectrum allocation – the regulation of the use of radio frequency bands of the electromagnetic spectrum.

Telecommunications Regulatory Environment (TRE) Assessment – a diagnostic instrument for assessing the performance of policy and laws affecting the telecommunications sector and the various government entities responsible for their implementation.

Universal access – all members of a population have public access to quality and affordable communication systems and services.

Universal access and service regulation – the provision of a regulatory framework for the design and implementation of universal access and service provision and the administration of its allocated funds.

Universal service — an entire population is able to privately subscribe to and use particular communication systems and services of a certain quality, in an individual, household or institutional capacity.

Universal Service and Access Agency of South Africa (USAASA) – the USAASA has the sole mandate of promoting the goals of universal access and service.

Universal service obligation (USO) — the mandate to provide a certain level of services to every resident of a country.

Executive summary

The Western Cape Digital Readiness Assessment provides a baseline against which to measure the progress made by the Western Cape Broadband Strategic Framework. This envisages a catalytic broadband environment driving co-ordinated and integrated action across the provincial government, among citizens and throughout the economy. While one of the key objectives relates to the development of broadband infrastructure, the plan acknowledges the demand-side factors that will determine its success. The readiness of citizens, the government and business to optimise the social and economic benefits associated with broadband extension is a key determinant of its success. This readiness assessment, therefore, extends beyond an assessment of networks and information and communications technology (ICT) services and applications to the policy and regulatory environment, the skills base within the province and to issues of affordability, access and use, to provide a baseline assessment of the current digital readiness of the province.

The Digital Readiness Assessment indicates that the Western Cape outperforms the rest of South Africa in a number of key indicators, but that it also shares many of the sub-optimal national policy outcomes constraining the development of a networked economy and society.

Various factors account for the Western Cape's position of relative strength. Like the rest of South Africa, it is characterised by high levels of poverty and inequality, but the Western Cape has higher levels of economic and social development than most other provinces. Urbanisation levels are higher, at over 50 per cent, and the provincial economy is relatively industrialised, with a well-developed services sector. With a population of around six million, the Cape Metropolitan Area (CMA) is South Africa's second-wealthiest metropolitan area after Gauteng. The importance of broadband to economic growth and job creation in the province is recognised in the provincial government's economic policy and the Western Cape Broadband Initiative (WCBI) — a multimillion rand plan to roll out broadband to every municipality, community and public facility. Significant steps have already been taken to address infrastructural deficits in the implementation of the policy, which includes connecting all schools and municipalities, and the installation of public Wi-Fi at government facilities.

Human development

Although basic education and health systems are extensive in comparison with other parts of the country, the province (like the rest of the country) is plagued by the poor quality of basic education, particularly in mathematics and science, and low throughput rates in tertiary institutions. These negative human development conditions are the key constraint on informational development in the Western Cape as they are nationally.

The Western Cape is characterised by early adoption of leading technologies by high-income users (both individuals and corporates) in patterns similar to developed economies around the world, while the less affluent households, individuals and informal sector businesses reflect the slower adoption patterns typical of developing countries. Forty-four per cent of households in the Western Cape have Internet access and use the Internet regularly; for individuals, the figure is 57 per cent. While this is low by developed economy standards, it is high in comparison with the rest of South Africa, which stood at less than 20 per cent (RIA 2012). Emerging positive trends are captured in the share of individuals who access the Internet through a mobile device in a public space, but the figure can still be considered comparatively low at 35 per cent for a lower-middle-income economy.

The baseline study depicts a positive score in terms of power supply from the main grid in the province, but the majority of those connected in poorer communities are illegally connected. ICT equipment as a household asset is relatively uncommon, with the ownership of laptops as low as 5.1 per cent in Khayelitsha (one of three under-serviced areas targeted for broadband provisioning in the WCBI, and part of a more in-depth baseline analysis) included in this report.

Although the unemployment rate is as high as 34.8 per cent in the less affluent areas, few individuals are self-employed.

Many of the factors that contribute to the province as an attractive investment destination also derive from the political status of the country as it has developed over the past two decades. This includes relatively high levels of political stability, the rule of law, independence of the judiciary, and constitutional protections of property and human rights.

Informational development

The jurisdiction of several of the factors constraining the desired expansion of broadband as a platform for economic growth and development in the province, on both the supply and the demand side, also derive from national policy. This is the case for telecommunications policy, public sector ICT procurement, science and technology, and higher education required in the ICT sector.

The Western Cape government has some ability to mitigate negative outcomes in these areas through the implementation of provincial and nationally aligned policies in the critical areas of broadband deployment and human development. While infrastructure roll-out and demand-stimulation measures can be implemented in the short to medium term, many of the human development challenges require long-term, inter-generational strategies. There is, of course, evidence of the role that ICTs can play in the support and fast-tracking of both educational and health development initiatives. These are prioritised in the WCBI, particularly in strategies to connect schools to broadband in line with the national broadband policy, 'South Africa Connect', and the provincial education strategy of 'connecting schools' under the 'Connected Leadership' project.

As indicated, however, demand stimulation is as important as supply-side infrastructure strategies, and the most effective way to stimulate demand is by ensuring the affordability of communications services. The Western Cape household and individual user survey undertaken for the purposes of developing indicators for this assessment reveals that average expenditure on communications services by individuals in the Western Cape is around 20 per cent of income, way above the United Nations recommended maximum of 5 per cent used in the International Telecommunication Union (ITU) ICT Development Index (IDI). The prices of broadband devices and services are arguably the primary inhibitor of widespread broadband adoption and use.

Demand stimulation

Although tariffs for mobile and fixed broadband services and wholesale services are applied nationally by operators and are regulated at the national level, the commitment by the province to roll out public Wi-Fi at public institutions, efforts at 'smart procurement' for public sector networks and services, and deploying public networks in areas marginalised from services are currently all indirect strategies that have the potential to mitigate the high cost of communications and to stimulate uptake and use of online services.

Formal businesses in the Western Cape surveyed for the purpose of this assessment indicated that as a business input cost, communications were regarded as high. Other research shows that this is a major determinant of where multinationals locate their regional hubs. Together with labour costs, the cost of communication is a major factor in the location of business processing, outsourcing operations and IT-enabled value added services that have the potential to drive job creation.

Other than these infrastructural interventions, demand-stimulation strategies have not been pursued sufficiently by the province. With regard to creating an environment conducive to investment, entrepreneurship and innovation, much can still be done by the province. Businesses identified a dearth of venture capital and little awareness of leading-edge technology in the province as factors inhibiting competition and innovation.

While the Western Cape outperforms national indicators with regard to the critical skills required in a knowledge economy, such as considerably higher matric pass rates, the figure for those with tertiary education is only marginally higher than the very low national average of less than 20 per cent. This is despite the province boasting four tertiary institutions, and the identification of software and applications development and ICT incubators in provincial strategies. Beyond some private and non-profit initiatives, there are few incentives to locate software and applications development, and other IT-enabled businesses, in the province.

Government e-readiness

With regard to government use of ICT, despite the WCG putting alot of emphasis on connecting employees, internal deployment of ICTs is surprisingly low. Although governments in some of the most network-ready countries, such as Scandinavia, South Korea, Japan and Singapore, are often role-models for ICT adoption, in less developed economies the public sector tends to lag behind the formal private sector, and is frequently a late adopter together with the mass of the population, who tend to be poor and not well educated. Although the government is the largest single consumer of ICT, the public sector at national level has tended to reflect developing country trends, with some pockets of ICT excellence, such as the South African Revenue Services, one or two provincial governments and the larger metros developing ICT strategies. Public sector adoption and application in South Africa is generally regarded as far behind the corporate sector, scoring poorly on e-government indices such as that of the UN (93 out of 198). The Western Cape scores relatively well in the use of e-government in this digital assessment, with evidence drawn from a municipal ICT readiness survey and a provincial web analysis. This score reflects a sustained ICT programme with the City of Cape Town metro for over a decade, and a strong provincial strategy over the last few years, including a progressive broadband plan for a connected province.

The mixed impact that ICT has on economic and social development in the Province illustrates the exponential leap that is still required for the region to become a leading destination for investment, IT development and research and development (R&D) excellence and innovation. Many of the necessary supply-side conditions for take-off have been met, or at least the bottlenecks associated with them identified. Plans to address those remaining are underway. However, even when these are resolved this will not be sufficient for the Western Cape to take off, without addressing the key demand-side issues — affordability, human

development, high-level skills, production of content, local language government services and relevant applications. It is these that drive take-up, connect people to each other, citizens to governments, businesses to suppliers, R&D and innovators to capital, creating jobs, economic growth and development.

The Western Cape, with its concentrated urban populations, the relatively high education level of its school leavers (who have English competency) and the successful ongoing implementation of the provincial broadband infrastructure, could leverage some of these provincial endowments to ensure more positive social and economic outcomes in future. Were such new public investments to exploit the considerable private and public network investments in the province, ambitious targets in the national broadband policy, South Africa Connect, of connecting all schools and clinics with 10 Mbps by 2020 could be met. With provincial municipalities already performing relatively well, with 82 per cent connected at 4 Mbps, the policy intention of locating public Wi-Fi at every public office — which can be accessed by over 90 per cent of the provincial population — would mean that the province scores positively on infrastructure measures.

There are several areas where the Western Cape can influence positive broadband outcomes:

- development of skills at different levels (school, tertiary and specialised skills) to support the widespread adoption of ICT associated with improved efficiency and innovation;
- roll-out of public communication networks to increase and enhance service delivery through improved efficiencies in government;
- creation of jobs through incentivising the location of international company headquarters in the Western Cape, and business process outsourcing in the province through low communications costs and availability, and improved public access;
- lowering the cost of broadband by improving public access, leveraging extensive private investment for smart
 procurement, and opening public networks to third parties to offer competitive services that will drive down prices and
 make available high-speed, low-cost bandwidth for research, development and innovation;
- the WCG's broadband plan and implementation, which can serve as a laboratory for local government, other provinces and national government, and, if successful, could be a role-model for formal and informal businesses in the province that appear not to be unreceptive to ICT innovation;
- setting up the province as an innovation hub through incentivising the collaboration and engagement of the four tertiary institutions in the Western Cape, amongst themselves, with business and with the provincial government; and
- open access terms and open data for public networks, or public investment in private networks, to enable third-party
 traffic, which could drive the entry of competitive services that would, in turn, reduce costs, stimulate demand, extend
 consumer choice, enable citizen participation and build the critical mass necessary to enjoy the network effects associated
 with economic growth and development.

1. Introduction

Research ICT Africa (RIA) together with UCT and UWC was commissioned by the Western Cape Government (WCG) to undertake a digital readiness assessment of the province, and to conduct an impact study of broadband roll-out for Khayelitsha, Mitchell's Plain and Saldanha Bay. The project is divided into two broad phases, the first of which was undertaken in 2014. The final impact analysis, on the basis of the baseline survey conducted in 2014, of broadband initiatives in the three specified under-serviced areas will be undertaken in 2016.

The first phase had the following five main components:

- Developing methodologies, identifying indicators and determining data availability, and building a framework for a digital readiness assessment of the Western Cape. A desk study was undertaken to establish which of the World Economic Forum (WEF) Networked Readiness Index (NRI) indicators could be applied at the provincial level and whether this would be a useful benchmark to determine the digital readiness of the Western Cape. An assessment of the indicators and the available data concluded that adopting the WEF NRI, as it stands, would not provide a very different picture for the Western Cape than that of the current WEF South African report using national indicators. As a result, an alternative framework to assess the digital readiness of the Western Cape was proposed. This allows the study to make far greater use of more accurate and timely demand-side survey data, and has produced a tool for government planning, monitoring and evaluation that is more appropriate to a developing country context and that recognises the dual nature of the Western Cape economy, which, like the rest of the country, includes an advanced formalised sector and an extensive informal economy, much of which is survivalist. Few of the indicators identified are available at the provincial level. In order to gather the necessary information, the following studies were undertaken:
- A survey of ICT access and use. This survey was conducted at the household and individual levels for the Western Cape, in order to provide demand-side data that are representative of the province. It included an in-depth baseline survey in three areas with limited broadband Khayelitsha, Mitchell's Plain and Saldanha Bay with the intention of conducting a broadband impact assessment in 2016.
- A perception survey of formal businesses. A perception survey, similar to that of the WEF but
 with more focus on ICTs (and at the provincial level), was conducted among formal businesses in the
 Western Cape. An informal business survey was also conducted alongside the household and
 individual survey to gauge access to and use of ICTs among businesses. This survey, although not
 representative, is indicative of the current state of ICT access and use and will be the basis of a
 follow-up panel-data study.
- A government e-readiness study. A desk study and web analysis were combined with
 administrative data gathered from various local and provincial government sources to assess
 ICT access and use. Demand-side data on access to and use of e-government services were also
 collected from individuals, households, and formal and informal businesses.
- A digital readiness assessment of the Western Cape. Using the wider framework of the WEF NRI, the data from the studies discussed above were used to populate the revised indicators in the four broad categories of the digital readiness assessment environment, readiness, use and impact. This includes assessment of the policy and regulatory environment, much of which is determined at the national level but which impacts on investment, delivery and performance in the province. In the other three categories, provincial data were collected and, where available, indicators at the provincial level were compared against national and global indicators.

This report concludes the first phase of the project and presents the findings on each step in the assessment of the digital readiness of the Western Cape, which together provide a baseline assessment of the state of ICT in the province that can be used for future assessments.

The report is structured as follows:

The remainder of section 1 provides background by way of an international, continental and particularly
national and local context for the project, in terms of technology trends, policy and practice. It also
conceptualises broadband and its social and economic impact for the purposes of this study.

- Section 2 discusses the methods and approach used in carrying out the assessment of the digital readiness of the province.
- Section 3 presents an assessment of the digital readiness of the province, with a discussion of the demand- and supply-side indicators used in the assessment and an analysis of the outcomes.
- Section 4 presents a discussion on the assessment of current ICT access and use in Khayelitsha, Mitchell's Plain and Saldanha Bay, and supply-side indicators used in the survey that will be employed in the broadband impact assessment in 2016. The informal sector data collected in the survey, which is only indicative, not representative of the province, will also be used to assess the impact on informal business through a panel-data method that will be applied in 2016.
- Section 5 provides conclusions and policy recommendations.

1.1 Background

As a sector, ICT provides important direct opportunities for manufacturing, service provision and job creation, but its main contribution to economic development is to enhance communication and information flows that improve productivity and efficiency (NPC 2011). For this reason, any state seeking to meet the information and communication needs of a modern citizenry must have access to affordable, high-speed broadband — an ecosystem of interlinked networks, services, applications and content that provides the backbone to a modern economy and its connections to the global market (DoC 2013).

There is increasing evidence of links between investment in electronic communications infrastructure and secondary improvements in the economy enabled through information and transaction efficiencies. There is also evidence that such network effects or positive multipliers only kick in once uptake of services reaches critical mass. Besides constraints around affordability and skills, the prerequisite for this to occur is consumer access to high-quality broadband services capable of supporting rapid growth in traffic at competitive prices. Research suggests that under such conditions, an increase of 10 per cent in broadband penetration can result in a 1 per cent increase in GDP output, and arguably more in developing countries (Kim, Kelly, and Raja, 2010). Gillwald, Moyo, and Stork (2013) note that economic growth and job creation are linked to a rise in broadband penetration. While broadband impact studies vary on the exact contribution made to economic growth, there is enough evidence to support claims that increases in broadband penetration correlate with increases in GDP, new jobs, broadening of educational opportunities, enhanced public service delivery and rural development. If the necessary conditions are put in place and the broadband targets proposed in the policy are met, a high-level assessment of the impact of a relatively conservative broadband investment figure of R65 billion indicates that over ten years more than 400 000 jobs could be created and over R130 billion contributed to GDP in South Africa (Katz, 2013). Increased broadband access opens up investment opportunities, thereby facilitating growth and development. In general, access to broadband leads to improved productivity, and promotes innovation and the creation of new products and services (Stork, Calandro, and Gamage, 2014).

As awareness of the positive externalities associated with broadband penetration has spread, governments throughout the world have sought to reduce the digital divide between those able to enjoy these benefits and those marginalised from services. The implications of the unevenness of broadband diffusion are amplified at the national and sub-national levels in an increasingly meshed global economy. With broadband networks regarded as a necessary condition for the development of knowledge economies and information societies, network availability and quality of service are increasingly significant policy issues in meeting national economic and social needs and in ensuring the global competitiveness of nations, cities and regions (DoC, 2013).

Yet, broadband penetration in Africa is very low, and increased access to the Internet has mainly been through mobile services. At a household level, ADSL Internet connectivity, the primary technology used to roll out broadband in more mature economies, where only an upgrade of the copper network is required, is only common in South Africa, with about 22 per cent of households with a working Internet connection using ADSL services. South Africa also recorded the highest fixed-line penetration and Internet penetration rate among the 12 countries surveyed by RIA in 2012 (RIA Database, 2012). As the RIA surveys and other studies confirm, mobile broadband is the primary way in which the majority of Africans are accessing the Internet. The opportunities and innovations enabled by the proliferation of mobile services has resulted in unprecedented levels of financial inclusion through mobile money and mobile banking (m-banking) in Africa, and these will be further enhanced by mobile broadband access (ITU, 2012).

With increasing evidence of links between investment in electronic communications infrastructure and improvements in the economy, broadband has become crucial to broad economic stimulus packages, economic growth strategies, and the rationale for projects such as the WCBI throughout the world.

1.1.1 Broadband in Africa

Many of the assumptions underpinning global indices, such as the WEF NRI and the Economist Intelligence Unit (EIU) Digital Economy Index (DEI), are informed by political, economic and social conditions pertaining to more mature Northern Hemisphere

markets. Broadband, in particular, has evolved very differently in the Global South, presenting quite different public policy and regulatory challenges. Assumptions about the primary means of broadband access, as well as the cost and quality of fixed versus mobile broadband services underpinning 'best practice' broadband policies, are challenged in the African context. With far lower GDPs per capita and generally higher costs associated with the extension of networks (the building of primary infrastructure such as roads and power), issues of affordable access to these critical high-cost digital infrastructures present the central challenge for African policy-makers.

Unlike in developed markets, where fixed services are the dominant broadband platform, in Africa mobile networks provide the primary means of broadband access. As with voice services, where massive demand was met through the wireless revolution that transformed communications on the African continent, demand for Internet use by those unable to access the limited ADSL services available on the continent has been met by mobile service providers. While the established telecommunications markets in the North, where access and ADSL-upgradable copper networks or cable networks were almost universal at the advent of broadband, in Africa most fixed-line networks reached less than 1 per cent of the population and access via fibre remains negligible (Gillwald and Calandro, 2014).

This dependence on the usually monopolistic provisioning of fixed infrastructure for broadband delivery constrains Internet penetration. With limited fixed-line infrastructure, the fixed-line operators on the continent do not enjoy the economies of scale enjoyed by operators in the North (or by the mobile operators in the South). In most African countries, the incumbents also usually had a monopoly on undersea cable access, with international bandwidth costs constituting up to 80 per cent of the costs of local Internet service providers, all of which contributed to the high cost and lack of affordability of Internet services — major inhibitors of broadband diffusion.

Like many African countries held hostage by the incumbent monopoly on international bandwidth, since 2008 with the introduction of undersea cable competition in South Africa, the availability and pricing structure of the industry has changed significantly. This both enabled and was driven by the introduction of mobile broadband technologies. Constantly reducing prices for smarter devices and services as well as marketing and pricing innovation have fuelled the uptake of broadband services. The immediate relief provided by wireless and mobile services to bandwidth-starved consumers across the developing world has already resulted in a massive rise in data traffic. The critical infrastructure issue in South Africa, as elsewhere in Africa, is no longer international bandwidth but the development of the terrestrial backbone and backhaul networks for a bandwidth-intense data environment and a high-quality local access network for business (Gillwald and Calandro, 2014).

With no monthly line rental charges and installation fees, and convenient prepaid charging options, in addition to the lower set-up costs of mobile compared to fixed data, particularly for low data use and uneven consumption, the dominance of mobile is unsurprising. For these reasons, many households opt to use a 3G dongle/modem or mobile handset to access the Internet, instead of setting up an ADSL connection, which is often simply not available and if it is, it is unaffordable.

Although this data service vacuum was filled by mobile operators offering 2.5G and then 3G services, significant mobile broadband take-up remained constrained initially by the requirement of a computer into which GSM 2.5G and 3G dongles had to be plugged. The advent of Internet-enabled mobile phones changed that. Mobile broadband is now not only the primary means of access to the Internet in Africa for individuals, unlike in developed economies, it is also generally cheaper and faster than fixed services (RIA, 2013).

Immediate solutions to the lack of broadband provided by mobile technology are filling communication gaps that will not be met by fixed lines for years, in terms of infrastructural planning in South Africa. However, this dependence on wireless technology in the access network, which is inherently less stable than fixed broadband technologies such as xDSL and fibre, has longer-term implications. Not having ubiquitous, reliable, always-on, high-speed connectivity in an economy affects a country's global competitiveness in the longer term. While data services are being used increasingly to make voice calls, and private paid-for SMSs are giving way almost entirely to free instant messaging services, thus generally meeting the needs of ordinary users, the lack of development of always-on, high-speed, quality bandwidth in the access networks (the 'last mile') required by business, public institutions and citizens affects the country's 'informational development' negatively — a key determinant of global competitiveness (Castells and Himanen, 2014).

Also fundamentally different from policy formulation and regulation in the voice environment is the way in which the shift into a data- and content-rich environment makes demand-side issues far more significant. No longer can policy and delivery be concerned solely with supply-side infrastructural issues. As Internet-based services start to permeate every aspect of social and economic life, exclusion increasingly represents a denial of fundamental rights, such as the right to information and freedom of expression, which, in turn, exacerbates inequalities. For policy-makers, users and, indeed, expropriators of new media, the policy issues have become fundamentally more political, raising questions around access to the Internet, as well as the cost of communications, which limits use. An additional inhibiting factor is the lack of skills to optimally use new communications

technologies, and not simply to receive information but also to produce it. The Human Rights Council of the United Nations General Assembly (2011) has been spurred by these global digital developments to declare access to the Internet a basic human right that enables individuals to 'exercise their right to freedom of opinion and expression'.

1.1.2 National broadband policy

The declaration by the Human Rights Council that access to the Internet is a basic human right is acknowledged in the national broadband policy, South Africa Connect, gazetted in December 2013. The national broadband policy gives expression to the vision in the country's NDP to:

"develop a seamless information infrastructure by 2030 that will be universally accessible across the country at a cost and quality that meets the needs 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." (NDP, in DoC, 2013)

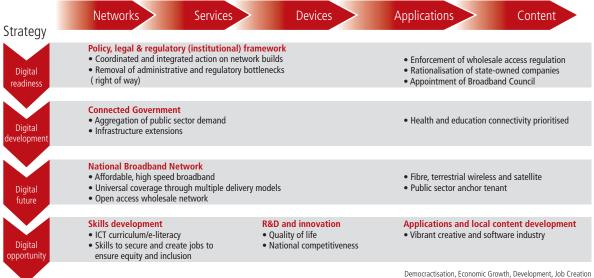
As the NDP indicates, this widespread broadband communication system will underpin a dynamic, connected and vibrant information society, as well as a knowledge economy that is more inclusive, equitable and prosperous.

"This ecosystem of digital networks, services, applications, content and devices, will be firmly integrated into the economic and social fabric of the country. Together these broadband elements provide an enabling platform for economic enterprise, active citizenship and social engagement and innovation. It will: connect public administration to the active citizen; promote economic growth, development and competitiveness; drive the creation of decent work; underpin nation-building and strengthen social cohesion; and support local, national and regional integration." (DoC, 2013)

By creating the conditions in a modern electronic world 'to improve the quality of life of all citizens and free the potential of each person' and, in doing so, to enable equality in the rights, privileges and benefits of citizenship, including the guarantees of freedom of expression and association in the Bill of Rights, the policy further contributes to the promotion of the Constitution of South Africa.

Although a strategy for infrastructure extension is central to the policy, unlike previous policies, it is also cognisant of the need to establish an enabling environment for the roll-out of broadband infrastructure and the creation of associated content, applications and services. It does this by illustrating the intended structure of the industry and the institutional framework necessary for effective regulation of an open, fair and competitive environment. Furthermore, it encourages public and private investment in the broadband network extension that is required to meet the social and economic needs of the country. The arising regulatory framework is informed by the principles of openness, inclusivity, universality and technological and service neutrality. It also acknowledges the need for greater co-ordination between national, regional and local government in meeting these needs.

Application of SA Connect to Broadband Value Chain



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Optimising the benefits of broadband for citizens, business and government will require not only more equitable access to it through ensuring affordability and quality, but will also need demand stimulation by provincial and local government through the active adoption of broadband by the government, improving the connectivity of schools, clinics and municipalities, and the roll-out of a public Wi-Fi network throughout the province, as proposed in the WCBI. Creating a digital economy in the Western Cape is, however, as dependent on the readiness of workers, scholars, teachers, students, nurses and government servants as it is on citizens and consumers in order to optimise these potential benefits. For this reason, static supply-side analysis of the status or impact of ICT will not suffice. Understanding the demand-side has become crucial to meeting the needs of citizens, business and government. Therefore, this research project commissioned by the WCG is vital to building the evidence base for monitoring and evaluating, as well as for planning future interventions.

"As more and more governments, donors, and non-governmental organizations (NGOs) invest in technology to help improve conditions in areas such as agriculture, health, education, and gender empowerment, they need to understand how the communities they are trying to help access and use the technology. Without that understanding, their programs are vulnerable to failure." (Elder et al., 2013)

Despite the reform of the sector resulting in significant growth, this has not been accompanied by a realisation of the primary policy objective of affordable access for all to the full range of communication services that characterise modern economies. South Africa has lost its status as continental leader in voice and data connectivity. While the country's ranking on the ITU ICT Development Index (IDI) has slipped from 72nd in 2002 to 90th in 2013 (ITU, 2002, 2013), the country has also fallen steadily on other global indices (WEF, 2013). An improvement was seen in 2014, with South Africa ranked 70th in the world. In Africa, South Africa now ranks third after Mauritius (48th) and Seychelles (66th), with Tunisia, Morocco and Egypt having lost their rankings among the top African countries with the disruption to their markets following the Arab Spring (WEF, 2014).

1.1.3 Western Cape

The Western Cape, like the rest of South Africa, is characterised by a bifurcated economy — one branch of which is advanced, while the other is developing. Parts of the economy and society have access to cutting-edge technology, sophisticated institutions, including research bodies and universities, an active private and public sector, and fiscal resources. At the same time, in 2010, it was estimated that 20.1 per cent of the population in the Western Cape were living in poverty (WCG Provincial Treasury, 2012). A large proportion of South Africans have weak educational qualifications. Specifically, although 7 per cent of the Western Cape population did not attend any formal education in 2011, 69 per cent had obtained a matric qualification. The drop-out rate in the Western Cape is as high as 38.9 per cent. Page 2011, only 24 per cent of the Western Cape population had completed tertiary education and only 3 per cent had a master's degree or doctorate (WCG Provincial Treasury, 2012). These apparent anomalies have knock-on effects in the ICT sector. South Africa is characterised by early adoption of leading technologies by high-income users (both individuals and corporations) in parallel with developed economies, while the majority of the population, the public sector and most small and micro enterprises simultaneously reflect the slower adoption patterns typical of developing countries (Gillwald et al., 2013).

On the other hand, the Western Cape appears to have higher levels of economic and social development than most other provinces in South Africa. In 2011, 78.4 per cent of the population of the City of Cape Town had access to formal housing (WCG Provincial Treasury, 2012). Electrification is widespread, even in informal settlements and rural areas. In 2011, 87.6 per cent of all households used electricity as an energy source for cooking (WCG Provincial Treasury, 2012). Also, the basic education and health systems are extensive. The economy is relatively industrialised, with a sophisticated financial system that contributes 32 per cent to provincial GDP (WCG Provincial Treasury, 2013). Levels of urbanisation are high, at over 50 per cent, and are increasing (Stats SA, 2012). With a population of 5 822 734 in 2011, the CMA is South Africa's second-wealthiest metropolitan area in terms of GDP, which has a value of R250.281 billion at current prices for 2010,³ amounting to nearly 10.4 per cent of South Africa's GDP (WCG Provincial Treasury, 2012).

The WCG has acknowledged the importance of ICTs in social and economic development and, specifically, the vital role of broadband. In 2012, it launched the WCBI in order to determine the needs of the public and private sectors and to devise strategies to meet them. These strategies have been instituted through a range of interventions addressing household, business and government needs. One project to connect under-serviced communities is the project to provide broadband connectivity through an open-access network (including last-mile infrastructure) based on Wi-Fi mesh enabling broadband services to be

¹ The poverty income indicator used is based on the Bureau of Market Research's Minimum Living Level (BMR report no. 235 and later edition, Minimum and Supplemented Living Levels in the main and other selected urban areas of the RSA, August 1996). However, the City of Cape Town uses a different poverty measure: households with a monthly income of less than R3 500 are said to be living in poverty. In 2009, the proportion of people living in poverty was 34.9 per cent.

² To calculate the drop-out rate, the grade 10 enrolment for 2010 is compared with the grade 12 enrolment for 2012.

³ Almost three-quarters of all Western Cape economic activity is concentrated in the CMA.

delivered to households (citizens) and businesses in Khayelitsha, Mitchell's Plain and Saldanha Bay (WCG Provincial Treasury, 2013). To further drive this initiative, the WCG, the State Information Technology Agency (SITA) and Neotel signed a strategic agreement in 2014 to provide broadband services. These services are expected to reach about 2 000 government sites, including schools, libraries and health facilities over the next two to three years.

Other communities in the Western Cape are also expected to benefit from this project. Neotel will fund the infrastructure roll-out of 384 Wi-Fi hotspots that will cover most of the wards in the province, with the WCG subsidising Internet access for citizens. The hotspots will give individuals the opportunity to access 'limited free' Internet, helping to bridge the digital divide. It is this initiative that has been the focus of the baseline survey undertaken in this phase of the project, and which will form the basis of the social and economic impact assessment of broadband proposed in the next phase.

Although there is a strong local software development industry in the Western Cape, and commitment to broadband development at the provincial government level, the national government has jurisdiction over telecommunications policy. However, in order to promote software development, innovation and entrepreneurship in disadvantaged communities within the province, the Western Cape Department of Economic Development and Tourism (DEDAT) plans to establish a new business incubator.

1.1.4 Conceptualising broadband

As indicated above, conceptions of broadband now go beyond the purely technical notion of a network operating at a minimum transmission speed, as determined by the ITU. Rather, broadband is viewed as an ecosystem that includes networks, the services that the networks carry, the applications delivered and the users. Each of these components has been transformed by technological, business and market developments (Kim et al., 2010). The more functional definitions that have emerged in the last few years allow not only for more specific points of policy and regulation along the broadband value chain but, with the critical inclusion of users, both as consumers and producers, also compel a range of demand-side interventions to ensure optimal exploitation of broadband potential. With such networks, services and content regarded as a necessary condition for the development of information societies and knowledge economies, the costs of not utilising them are high, in terms of both national development and global competitiveness (Gillwald et al., 2012).

Several authors have begun to reconceptualise ICTs, and broadband in particular, as a more organic network than the hierarchical, layered models used to describe communication systems in the past (Fransman, 2006; Kaplan, 2005; Smith and Elder, 2010). This more organic, ecological approach captures the adaptive nature of the Internet Protocol (IP) environment, with its properties of self-organisation, scalability and sustainability, in which new communications systems operate.

Like others, RIA has contextualised the purely technological and infrastructural dimensions of broadband within a broader ecosystem, which includes global and national governance and regulation, operations and users, and which we contend need to transform into a dynamic and flexible yet robust ecosystem if it is to be both sustainable and innovative (Gillwald et al., 2012). This is captured well by Kaplan (2005):

"An ICT ecosystem encompasses the policies, strategies, processes, information, technologies, applications and stakeholders that together make up a technology environment for a country, government or an enterprise. Most importantly, an ICT ecosystem includes people — diverse individuals — who create, buy, sell, regulate, manage and use technology."

This is depicted in Figure 2, which provides a conceptual framework with which to analyse the relationships between different elements, and the outcomes of their interactions. It places users — citizens and consumers — at the centre of the system. Their access to and the affordability of the networks, services, applications and content — now conceptualised as the broadband ecosystem (Kim et al., 2010) — determines the degree of their inclusion in the ecosystem or their exclusion from it. The factors that link these elements and affect access and affordability are those of pricing and quality of service. These, in turn, are an outcome of the market structure and the effectiveness of the regulation, which are themselves determined by the policy and legal framework.

The environment created by these elements, and the nature of the relationships and processes between and within them, determines the conduciveness to the essential investment that is required to drive the growth of the sector and the economy. The levels of efficiency and innovation that enable the evolution of the ecosystem depend on the availability of the skills and competencies of the people and institutions at each node within the ecosystem in order to harness the benefits associated with integrated networks for economic development, as well as social and political engagement (Gillwald, 2012).

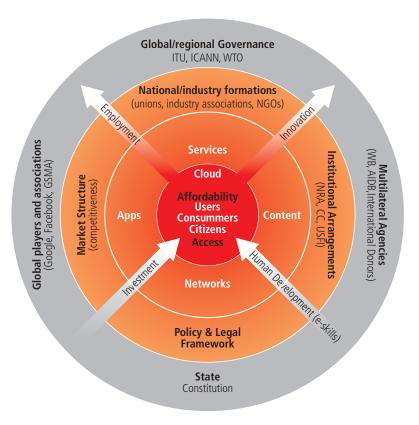


Figure 2: ICT ecosystem • Source: Gillwald (2012)

At the same time, national ICT ecosystems are increasingly part of a wider global ICT ecosystem. The Internet, which is the driver of broadband diffusion, is increasingly a matter of global governance, and most African countries are, at best, observers of decisions taken in global forums, contributing little input with regard to agenda-setting and the prioritisation of issues. In this sense, efforts at greater multi-stakeholder participation in these forums are an important link in the dynamic ICT ecosystem that plays itself out at the national and local level. Local and sub-national developments in response to these global networks, which traverse traditional national borders and make possible direct engagement internationally and locally, also provide significant points for political, social and economic inclusion at the community, city and metropolitan levels (Gillwald, 2012).

The increasingly global nature of network governance, markets, products and services in the communications value chain has prompted global indices over the last couple of decades to measure the performance of different countries in this increasingly important sector of the economy. Notable among these are the NRI compiled by the WEF and the DEI compiled by the EIU.

2. Global ICT indices and assessment methods

The growing awareness of broadband as a driver of economic growth and development has placed it on (and, more recently, at the centre of) global reform agendas, such as the Millennium Development Goals, and ICT-specific forums, such as the UN Broadband Commission and World Summit on the Information Society +10. This has resulted in the development of a number of global indices to determine and rank the readiness or performance of countries in relation to the creation of the conditions for optimal deployment and utilisation by citizens, business and government. The network readiness of economies around the globe has been assessed and presented in the form of indices that allocate rankings to countries. This section of the report discusses some of the main global ICT indices and the measures they use. It also identifies their shortcomings, and presents indicators that are more relevant to the assessment of readiness at the provincial level, while maintaining the overall framework of categories used at the global level. The approach and method used in carrying out the assessment of digital readiness in the Western Cape are also presented in this section.

2.1 The WEF Networked Readiness Index

Every year, the WEF compiles the NRI, which measures not only ICT access to telecommunications and Internet services by individuals, businesses and governments, but also how conducive the political and regulatory environment is, as well as the economic and social impacts of ICTs. The aim of the index is to provide decision-makers with an instrument to evaluate the impact of ICT at a global level and to benchmark ICT readiness and ICT use in different countries. The NRI, thus, is an assessment model of ICT use and impact, which seeks to understand how ICTs are transforming the economy and society. The index embraces features related to access and use that cover not only affordable ICT infrastructure but also digital resources, including software and skills. In addition, it includes proxies for assessing some of the economic and social impacts of ICT. The index, further, seeks to assess how countries leverage ICTs and how they have been benefitting from them in terms of enhanced competitiveness and well-being. Therefore, it can be used to identify areas of policy intervention to boost the impact of ICT on social development and economic growth.

The NRI is comprised of four sub-indices spanning the political and regulatory environment, the readiness of a society to use ICTs, the actual use of ICTs by the various stakeholders, and the economic and social impacts that ICTs generate in society (see Table 1). These sub-indices are made up of 10 pillars composed of 54 individual indicators. The final NRI score is a simple average of the four sub-index scores, with each sub-index an average of the composing pillars (WEF, 2013). This is based on the assumption that all NRI sub-indexes contribute in a similar manner to the networked index.

Table 1: Composition of the WEF Networked Readiness Index

Sub-index	Pillars
Environment: this sub-index 'gauges the friendliness of a country's market and regulatory framework in supporting high levels of ICT uptake and the emergence of entrepreneurship and innovation-prone conditions'	Political and regulatory environment Business and innovation environment
Readiness: this sub-index 'measures the degree to which a society is prepared to make good use of an affordable ICT infrastructure and digital content'	Infrastructure and digital contentAffordabilitySkills
Use: this sub-index 'assesses the individual efforts of the main social agents — that is, individuals, business and government, to increase their capacity to use ICTs as well as their actual use in their day-to-day activities with other agents'	Individual useBusiness useGovernment use
Impact: this sub-index 'gauges the broad economic and social impacts accruing from ICTs to boost competitiveness and well-being and that reflect the transformations toward an ICT- and technology-savvy economy and society'	• Economic impacts • Social impacts

Source: WEF (2013)

Data for 50 per cent of the indicators that make up the NRI are sourced from an Executive Opinion Survey, which captures data of a more qualitative nature. The remaining indicators, which are quantitative, are obtained from other sources, such as the ITU, the World Bank and the United Nations. The Executive Opinion Survey is administered annually through a detailed questionnaire to business leaders in all the economies included in the WEF report.

2.2 The Economist Intelligence Unit (EIU)/Digital Economy e-Readiness Index

Since 2000, the EIU has developed what was previously called the e-Readiness rankings. It assesses the world's largest economies on their ability to absorb ICT and use it for economic and social benefit. From 2010, the study was renamed Digital Economy Rankings to reflect the increasing influence of ICT in economic and social progress (and to recognise that these more mature, developed economies had moved beyond 'readiness').

Seventy countries are covered in this annual benchmarking exercise. Similar to the WEF NRI, the digital economy rankings assess the quality of a country's ICT infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit. The assumption underpinning the assessment is that as a country's use of ICT to conduct its activities increases, so its economy can become more transparent and efficient. The ranking is intended to allow governments to gauge the success of their technology initiatives against those of other countries. It also provides companies that wish to invest or trade internationally with an overview of the world's most promising business locations from an ICT perspective.

More than 100 separate criteria, both qualitative and quantitative, are evaluated for each country by the EIU's team of analysts. These criteria are scored on their relative presence in a country's political or social landscape. The categories, and the individual criteria within them, are weighted according to assumptions about their relative importance in fostering a country's information economy.

The report also uses data from other global indices (some of which are used by the WEF, too), such as the UN e-Government Index.

Both the WEF and EIU assessments are informed by the imperatives for countries to extract the maximum economic and social benefits from the use of digital technology, specifically to:

- ensure the population has affordable access to the highest quality fixed and wireless data and voice connections possible;
- establish ICT as a focal point of education, and ensure that students at all levels learn how to use digital technology to their benefit;
- make possible the widespread online provision of goods and services that offer genuine utility to citizens and businesses;
- encourage greater innovation and entrepreneurship, to create the best chances for ICT-enabled change to filter through the economy; and
- ensure that the legal regime avoids placing undue shackles on the use of technology, while providing adequate protection to people and organisations from its abuse. (EIU, 2010)

Although the priorities vary in different countries, the above principles appear to inform the desire of the WCG to undertake a provincial digital readiness assessment.

More fundamentally, both the WEF NRI and the EIU DEI have emerged through a developed economy perspective, with assumptions about the political and social objectives, broadband pricing and quality, Internet diffusion and institutional capacity of nations.

2.3 Adaptation to regional assessment

Trying to adjust the above methodology to render it representative at the provincial level poses many challenges. Firstly, much of the data required to replicate the study at the provincial level are available only at the national level. To make it globally comparative, the national data are usually drawn from other indices and global reports available from multilateral agency databases. There are often problems with the underlying data, particularly for developing countries, in the global indices. All global indices draw extensively on the ITU data to determine national ICT rankings. This supply-side data provided by operators to governments is generally several years out of date by the time it is incorporated in the index. For example, the WEF e-government survey used in its 2013 report is from 2010. In as dynamic a terrain as ICT, this can result in misinformation for planning purposes. Also, complete data are simply not supplied by some countries (such as South Africa) to the ITU, so their analysis, per force of circumstance, is determined through sometimes ill-informed 'guesstimates'.

Further, sub-national data are seldom available, and methodologies for the collection of such data vary more widely than do those for national indicators, which tend to adopt international standards for their collection. Using proxy information reduces the comparability that is central to the notion of an index, and may introduce errors depending upon the relationship between the proxy, the preferred indicator and other indicators included in the index.

Although there are ongoing international efforts to standardise indicators and to ensure that they are reflective of a cross section of countries, broadband, for example, is reported on in relation to developed economy reporting standards, such as ADSL or fibre, whereas the majority of Africans who have access to the Internet connect to it via their mobile phones. In South Africa, this is about 71 per cent of the population (RIA Database, 2012). The ITU data, however, place South Africa at 41 per cent for Internet penetration, significantly lower than Zimbabwe, as a result of their use of self-assessment by member states of the number of users per subscription. It is really only through demand-side surveys and analysis that reliable sub-national data can be acquired.

The outcome of the desk study undertaken by RIA at the start of this project, showed that only a few of the WEF indicators could be obtained at the provincial level and that, for the remainder, national figures would have to be relied upon. It was concluded, therefore, that calculating a score using this approach for the Western Cape would not vary much from the national figures, and would not be a true reflection of the region's digital readiness. An alternative method for obtaining indicators that would reflect how digitally ready the province is was decided on.

RIA undertook a demand-side survey of access and use at the individual and household level in order to obtain accurate subnational data, which generally are not available from the national data supplied by operators to the government and ITU (the source for the WEF reports) and only very thinly available from census data. In addition, RIA piggybacked on the demand-side survey and conducted an informal sector survey. For completeness, and to ascertain the perceptions of big business players in the province, RIA also conducted a formal business survey, modifying some of the WEF questions in order to capture what would be representative of the Western Cape. A government assessment was also carried out, through the use of administrative data, demand-side data and interviews with stakeholders at the provincial government level, in order to understand the state of connectivity of the public sector, including municipalities, schools and clinics in the province, procurement methods, and the development and availability of e- and m-government services.

Here, RIA presents the method used to develop a digital readiness assessment tool for the province. Using the same sub-indices, the tool draws from some elements of the NRI, adjusted not only where sub-national data are unavailable but also in such a way that the assessment becomes more appropriate and relevant to the conditions in the Western Cape. The four sub-indices of the WEF NRI — environment, readiness, use and impact — are retained. However, as noted above, the indicators and methodology to determine social and economic impact will be fully developed only in the impact assessment following this baseline survey.

In the case of the three sub-indices (environment, readiness and use) where only national indicators are applicable, RIA has updated national data from outdated global indices of the WEF with more recent data, such as are contained in the ITU Development Index and UN e-Government Index, and with up-to-date data from either the national census or the RIA household and individual survey on ICT access and use. Where provincial indicators are applicable, these have been gathered at provincial level through the provincial surveys of individuals, households, and informal and formal businesses.

The indicators have been classified and grouped into the broader categories of policy and regulatory environment, e-readiness and use, with the findings from the various surveys and desk study.

2.3.1 Policy and regulatory assessment

Several of the overall political and regulatory indicators are determined by national legislation and practice, and can be assessed only at the national level, as these include indicators such as judicial independence and the effectiveness of law-making bodies. While some of these indicators will be retained, we contend that the assessment tool requires a stronger ICT perspective in this area. RIA, therefore, in addition to the views gathered from the surveys, uses data obtained from a telecommunication regulatory environment (TRE) survey undertaken by RIA in 2012, which assesses the effectiveness of sector regulation through stakeholder 12 perceptions of seven regulatory dimensions: market entry, quality of service, anti-competitive practices, universal service obligations (USOs), access to scarce resources, interconnection and tariff regulation.⁴

There are areas of activity in the Western Cape over which there is municipal jurisdiction. These were included in the questionnaire adminstered to businesses and were assessed for their impact on digital readiness.

2.3.2 Readiness assessment

In terms of the readiness index, a few of the indicators are obtained at the provincial level. Tariffs, in particular, are set nationally, and there are no regional operators. RIA uses its pricing database for prepaid mobile and data to obtain pricing and affordability indicators. Affordability is determined by assessing average individual expenditure on communications (voice and data) in relation to income measurements from the 2014 individual and household surveys conducted for the Western Cape.

⁴ The TRE assessment is a diagnostic instrument for assessing the performance of policies and laws affecting the telecommunications sector and the various government entities responsible for their implementation.

While the WEF uses secondary enrolment as one of the indicators of skills, this does not disclose how many actually complete secondary schooling. RIA, therefore, looks at the number of matriculants, as well as the percentage of university graduates in the province, as this provides a picture of the success rate at secondary level and the availability of an e-ready workforce and e-ready consumers. Data obtained through the household and individual survey also feed into the skills indicator.

2.3.3 Use assessment

The household and individual access and use indicators that make up the use sub-index are obtained at the provincial level through the 2014 household and individual ICT access and use survey that RIA conducted in the Western Cape. The business survey is used to capture indicators on business-to-business and business-to-consumer use of ICTs. Indicators that feed into the use sub-index from the government level are obtained through an assessment of government e-readiness, using available administrative data. In addition, indicators that look at citizen and business use of e-government services are obtained from the surveys.

2.3.4 Impact assessment

An appropriate instrument to assess impact would be one like the baseline study that was conducted in the three communities where the WCG is to roll out broadband. The indicators that will be used to assess the impact of broadband on development, economic growth and the well-being of citizens are presented in the baseline analysis. Measuring impact at this stage is not feasible, as data will need to be assessed over a period of time with sufficient controls in the study to determine actual impact. A repeat of the provincial demand-side survey will be conducted after a few years, which should begin to reveal trends; to really assess trends, though, longer time series are required. For the purpose of assessing digital readiness of the province at this stage, only some indicators captured in the baseline study are presented.

2.3.5 Indicator assessment

Indicators for which national and global data are available are used to benchmark the performance of the Western Cape. As the values for different indicators come from different quantitative and qualitative systems, and often are not reducible to a single figure or value, the concept of a traffic light has been deployed in order to indicate the relative status of the province on a particular indicator (together with a descriptor of the benchmark used to assess the status). The points requiring policy intervention are then evident at a glance. The colour 'green' is used as an indication of a performance that is better than the benchmark available — a national figure or global average — on that particular indicator. 'Amber' is used to signify a performance that is average or not moving swiftly in a negative or positive direction, but which will alert policy-makers to the need for improvement. A 'red' is used to indicate performance that is below the national or global average, or that the province is on a downward trend from a once positive position; this identifies an indicator that needs immediate attention and intervention.

3. Western Cape Digital Readiness Assessment

With the roll-out of various broadband initiatives by the WCG, this study provides an analysis of the digital readiness of the province. While employing the framework and some of the indicators used by the WEF in constructing global NRIs for various countries, including South Africa, this study drills down further into the access, use and adoption of ICTs to provide a better representation of the situation in the Western Cape. The digital readiness assessment for the province is informed by a detailed analysis of the ICT policy and regulatory environment, the infrastructure of the sector, and the use of ICTs by citizens at the individual, business and government levels. The data are obtained from RIA's provincially representative household and individual ICT access and use survey, a formal and an informal business survey and a provincial government study. This assessment provides a more informative tool to aid the WCG in its planning and implementation functions.

The study has deployed the WEF's broad categories of sub-indices and pillars to provide an assessment of the digital readiness of the Western Cape, and a broad basis for benchmarking. While the environment, the readiness and the use sub-indices are assessed in detail, the study only provides some indicators that form part of the impact sub-index. A full impact assessment will be possible only once the follow-up of the current baseline study is done in 2016. Each 'sub-index' is analysed separately using both supply- and demand-side data, and making a comparison at the national and global levels where possible.

Table 2: Digital Readiness Assessment

			Da	ata	
Category	Area	Indicator	National	Provincial	Score
Policy & regulatory	ICT policy and regulatory environment	Effectiveness of ICT policy and regulatory environment	-	-0.5	•
environment	Law-making bodies	Effectiveness of ICT law-making bodies	0.2	-0.72	•
	Laws relating to ICTs	Effectiveness of ICT laws	0.8	-0.55	•
		Effectiveness of municipal regulations on cable trenching	-	-0.32	•
	Broadband plans & Internet	Broadband Plan	Yes	Yes	•
	governance	Cyber security	Yes	No	•
		Open data	No	Yes	•
	Intensity of competition in local markets	Effectiveness of national competition law	1.3	-0.28	•
	Independence of the judiciary	Level of independence of the judiciary	1.5	-0.72	•
	Capital	Availability of venture capital	-0.7	-0.61	•
Business & innovation	Availability of latest technology	Awareness of latest technology	1.6	-0.16	•
milovation					

		Data			
Category	Area	Indicator	National	Provincial	Score
Business &	ICT as input cost	International IP-Transit (per Mbps)	-	R350	•
innovation		Local IP-Transit (Metro Ethernet)	-	R475	•
		Input cost of ICT (capex spending as a percentage of total expenditure)	-	2.4%	•
		Input cost of ICT (opex spending as a percentage of total expenditure)	-	2.0%	•
Infrastructure & digital	Telecommunications infrastructure	International Internet bandwidth (speed/wholesale price)	18.1kbps	-	•
content		Coverage (mobile 2.5G+)	-	90.0%	•
		Coverage (3G)	-	75.0%	•
		Access network (% of the population: ADSL)	-	-	•
		Quality of service: average download/upload speed for mobile	6.35kbps	8.7kbps	•
		Quality of service: average download/upload speed for fixed	4.6kbps	4.8kbps	•
		Quality of service: business perception	-	0.47	•
		Internet bandwidth capacity: business perception	-	-0.14	•
	Electricity	Household power connectivity (from grid)	89.2%	95.0%	•
		Reliability of electricity: business perception	-	0.32	•
	Digital content	Digital content production	-	-	•
		Digital content restriction: business perception	-	0.84	•
		Software development	-	-	•
	Individual access to digital content	Using mobile phone to download applications	21.9%	50.3%	•
		Using mobile to access educational materials	-	52.3%	•
		Purchasing goods online	25.3%	41.7%	•
,				,	

	Section of the sectio		Data		The Polyage Transport
Category	Area	Indicator	National	Provincial	Score
Infrastructure	Individual access to digital content	Watching TV/video online	59.7%	66.1%	•
& digital content	Content	Reading newspapers/magazines online	43.8%	45.1%	•
	Competition	Mobile sector competition (HHI)	3,504.86	-	•
Affordability	Telecommunications prices	Mobile cellular tariffs	R53	-	•
		Fixed broadband Internet (1GB)	ZAR 338.99	-	•
		Prepaid broadband tariffs (1GB)	USD 13.7	-	•
	ICT expenditure	Mobile prices (prepaid voice and prepaid broadband) as a percentage of GNI per capita	3.1%	-	•
		Mobile prices (prepaid voice and prepaid broadband) as a percentage of monthly earnings	-	7.6%	•
		Mobile expenditure as a share of individual income	24.7%	20.1%	•
Skills	Quality of education: business perception	Quality of education in general	0.1	-0.19	•
	business perception	Quality of math and science	-2	-0.62	•
	Enrolment & educational attainment rate	Secondary school enrolment rate	89.0%	72.0%	•
		Pass rate for matric	78.2%	85.1%	•
		University graduates as percentage of enrolment	17.4%	24.4%	•
	Literacy levels	Adult literacy rate	83.7%	90.9%	•
Use	Household use	Household with working desktop/ laptop	24.5%	43.7%	•
		Households with Internet access (%)	19.7%	44.0%	•
		Does the household use ADSL to access the Internet?	22.0%	38.9%	•
	Individual use	Share of individuals who own a mobile phone	84.0%	81.9%	•
		Share of individuals who use the Internet	33.7%	57.0%	•
		Share of individuals who access the Internet via a mobile phone	70.8%	93.8%	•
		Share who access the Internet via a computer at a place of education	20.6%	14.6%	•

			Da		
Category	Area	Indicator	National	Provincial	Score
Use	Individual use	Share who access the Internet via a computer in a public space (fixed)	0.00/	26.8%	•
		Share of individuals who access the Internet via a mobile device in a public space (Wi-Fi)	9.8%	35.3%	•
		Share of individuals who use the Internet that are signed up on social networks	75.0%	93.5%	•
	Business use	Business-to-business ICT use	1.6	0.1	•
		Business-to-consumer ICT use	0.8	0.94	•
	Government use	Connectedness	-	20%	•
		Provincial web presence	-	100%	
		Business use and perception	-	0.34	•
		Citizen use (average)	31.5%	32.6%	•
		Informal business use (average)	49.8%	12.5%	•
Outcomes	Formal business outcomes	ICT as an enabler of new business models	1.6	0	•
		ICT as an enabler of new organisational models	1.6	-0.2	
		Use of the Internet for e-commerce	1.6	11	
		Capacity to innovate in ICT	1.6	0.1	
	Informal business outcomes	Financial transaction with suppliers using online banking	3.3%	2.3%	
		Financial transaction with customers using online banking	4.1%	3.8%	•
		Communicate with suppliers via mobile phone	34.5%	38.3%	
		Communicate with customers via mobile phone	24.9%	24.1%	
		Advertising products through social media	3.7%	6.8%	•
	Individuals outcomes	Individuals who search for jobs using a mobile phone	-	35.7%	•
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			Da	ata	
Category	Area	Indicator	National	Provincial	Score
Outcomes	Individuals outcomes	Share of individuals who agreed their mobile phone helps them to find work	33.8%	50.9%	
		Share who agree they use mobile phone to access educational materials	11.1%	37.2%	•
		Share who agree they use mobile phone for health purposes	-	60.3%	•
		Individuals who search for jobs using the Internet	-	48.2%	•

3.1 ICT environment

The environment within which businesses, individuals and other stakeholders operate is important in determining how successful the province can be in ensuring that its citizens achieve the optimal benefit from any broadband roll-out initiatives. This includes the political, policy and regulatory environment that allows business and innovation to thrive. Most of these elements are determined and shaped nationally but, nevertheless, pose constraints on provincial development.

Although the indicators of the NRI of the WEF have been retained, in general, to assess the effectiveness of the ICT environment to boost innovation at a provincial level, RIA has also identified additional and better national and provincial indicators, with a focus on laws and policies relating to the ICT sector, not primarily the business environment as in the WEF NRI.

For example, to determine the state of the ICT policy and regulatory environment, RIA has drawn on the 2006, 2009 and 2011 TRE surveys, perception surveys of ICT policy and regulatory performance conducted among South African stakeholders in the ICT policy sector. Arguably, South Africa's poor performance at national level negatively affects any province's ability to create an environment conducive to investment, job creation and skills development. It is, therefore, important not to lose these national determinants in the Western Cape Digital Readiness Assessment.

In addition to this, the study has engaged businesses through an opinion survey to obtain insight into their perceptions of and interaction with the political, regulatory, business and innovation environments. Questions included in the questionnaire have investigated their awareness, understanding and use of the categories set out in Table 3. The 2014 Executive Opinion Survey of the WEF was used as a baseline to develop an adjusted questionnaire, which investigated the indicators mentioned in Table 3 at a provincial level. Further, 2013 WEF survey results were used for the purpose of comparison with national and global values. WEF figures have been adjusted to a seven-point Likert scale with values from -3 to +3, to compare national and global indicators with provincial indicators.⁵

Table 3: Environment indicators

		Da	ata	
Area	Indicator	National	Provincial	Score
ICT policy and regulatory environment	Effectiveness of ICT policy and regulatory environment	-	-0.5	•
Law-making bodies	Effectiveness of ICT law-making bodies	0.2	-0.72	•
Laws relating to ICTs	Effectiveness of ICT laws	0.8	-0.55	•
	Effectiveness of municipal regulations on cable trenching	-	-0.32	
	\	•	,	

⁵ The Likert scale is a psychometric scale commonly involved in research. The term is often used interchangeably with 'rating scale'.

Table 3: Environment indicators

		Data		
Area	Indicator	National	Provincial	Score
Intensity of competition in local markets	Effectiveness of national competition law	1.3	-0.28	•
Independence of the judiciary	Level of independence of the judiciary	1.5	-0.72	•
Capital	Availability of venture capital	-0.7	-0.61	•
Availability of latest technology	Awareness of latest technology	1.6	0.16	
ICT as input cost	International IP-Transit (per Mbps)	-	R350	
	Local IP-Transit (Metro Ethernet)	-	R475	
	Input cost of ICT (capex spending as a percentage of total expenditure)	-	2.4%	
	Input cost of ICT (opex spending as a percentage of total expenditure)	-	2.0%	•

3.1.1 ICT policy and regulatory environment

The effectiveness of the ICT policy and regulatory environment is determined primarily by national policy, legislation and practice, and its impact on the province can be assessed by the degree to which it enables or constrains the realisation of national policy objectives at the provincial level. The RIA TRE stakeholder perceptions survey undertaken in 2006, 2009 and 2011 has been used to assess the effectiveness of seven regulatory dimensions: market entry, quality of service, anti-competitive practices, USOs, access to scarce resources, interconnection and tariff regulation. National policy, laws and regulations, and administrative requirements, have an impact on the provincial digital environment in respect of prices and quality of service of communications, and on procurement and funding models.

A provincial perspective is provided, however, through the views gathered from the Western Cape formal business survey questions on the effectiveness of ICT law-making bodies and ICT laws. The largely negative view of the environment from the sector-specific national survey and the provincial perception of the national framework reflects South Africa's declining status as the ICT leader in Africa. South Africa led the reform wave that swept across the continent in the 1990s. The country embarked on a major consultative process that resulted in a White Paper on Telecommunications and the consequent Telecommunications Act of 1996, which introduced competition in the mobile market segment and, subsequently, partially privatised the fixed-line incumbent, Telkom, in 1997, as part of a wider strategy to double the network size and provide universal access. This was followed by several amendments to the legislation, enabling the introduction of e-commerce and the convergence of the broadcasting and telecommunication sector regulators to create an environment more conducive to investment. However, this reform effort was undermined by lack of effective policy implementation and flexibility. To date, many policy and regulatory bottlenecks have stifled effective competition in the sector. The result is an uncompetitive market structure, weak institutional arrangements and compromised regulatory effectiveness (Gillwald et al., 2013).

More recently, the South African ICT sector has suffered from leadership discontinuity at the executive level, with no less than six ministers of communications serving since 2009. In May 2014, the Department of Communications was split into two: the Department of Communications, responsible for legislation and other policy initiatives; and the Department of Telecommunications and Postal Services, responsible for the Independent Communications Authority of South Africa (ICASA) and other regulatory bodies. The split of the department has disrupted other initiatives to extend broadband to all parts of the country (as envisaged in the NDP), such as the implementation of the national broadband plan, South Africa Connect. This, together with the short reference to telecommunications in the government's New Growth Path, and the slow start on broadband infrastructure by the Presidential Infrastructure Co-ordinating Commission (PICC), established in 2011 to co-ordinate infrastructure projects across all spheres of government and state-owned enterprises, suggests that ICT is not considered the national priority that one might expect it to be for an emerging economy (Gillwald et al., 2013).

In December 2012, however, the PICC did launch the Strategic Integrated Project (SIP) 15, Expanding Access to Communication Technology, which aims at ensuring access to broadband by all South Africans, with the prioritisation of rural and under-served areas of the country. To this end, a national backbone infrastructure has been proposed, which includes the establishment of points-of-presence (PoPs) in district municipalities, and the extension of InfraCo fibre networks across provinces to link districts. However, while SIP 15 emphasises the need to co-ordinate communications infrastructure activities within state-owned enterprises, private entities, provinces and local government, it lacks an implementation plan, and it does not specify funding and delivery mechanisms. Also, it does not indicate how these initiatives will connect schools.

In the 2011 NDP, the cross-cutting nature of ICT is not captured adequately, being mentioned only in the context of economic infrastructure. Therefore, there is no clarity or coherence in South Africa's ICT policy or 19 strategy, despite the government's pledge to develop a policy referred to as ICT Vision 2020, which was launched in 2009 with the intention of developing an integrated national ICT policy framework. Progress in terms of the initiative was stalled following reshuffles in the Department of Communications and at the executive level. Disjuncture between policy and implementation can be attributed, on the one hand, to the ongoing crises and flux within the ministry and department and, on the other hand, to the poorly drafted 2005 Electronic Communications Act (ECA), which not only lacks any supporting policy document, but which, together with ICASA's lack of capacity and expertise to implement critical regulatory interventions to support market entry and competitor viability, has produced a series of bottlenecks on the path towards a fair and competitive ICT environment (Gillwald et al., 2013).

In an attempt to resolve some of the long outstanding policy and regulatory issues facing the sector, a national ICT colloquium was called in April 2012, which involved a review of regulations and policies regarding telecommunications, broadcasting, postal services and e-commerce services. This resulted in the appointment of the ICT Policy Review Panel, which drafted South Africa Connect, the national broadband policy and plan (DoC, 2013) published for consultation in April 2013 and gazetted in November 2013. However, this flawed and limited policy was not implemented. In December 2013, however, following the appointment of Yunus Carrim, the fourth minister of communications since 2008, a consultative process produced the South Africa Connect policy. In addition, in November 2014, the long-awaited Green Paper from the ICT Policy Review Panel was released for comment. Although some of the bottlenecks and policy problems are identified in the voluminous paper, most of the proposed solutions appear to suggest business as usual, which is not very promising.

The following section assesses some of the major dimensions of telecommunications regulation through the TRE stakeholder perception survey conducted in 2006, 2009 and 2011.

Figure 3 shows that, overall, the South African policy and regulatory environment is perceived to be ineffective by South African stakeholders.

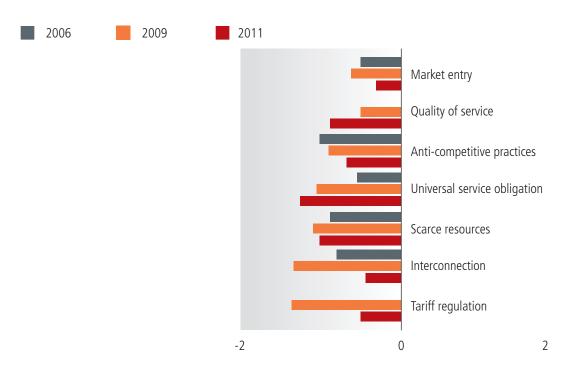


Figure 3: Shifts in perception of the efficiency of the regulatory environment in South Africa Source: RIA TRE assessment data 2006, 2009 and 2011

3.1.1.1 Market entry

The 2011 negative perception of market entry, while less negative than in the previous RIA TRE assessments conducted in 2006 and 2009, relates to the legacy of the policy framework of managed liberalisation that has been pursued in South Africa since the 1996 Telecommunications Act. The policy of managed liberalisation has made it difficult for new entrants to compete effectively with the entrenched incumbent operator, Telkom, in the retail and wholesale fixed-line market. The entry of a second fixed-line operator, Neotel, has neither driven down prices nor greatly extended services outside of corporate niche markets. Although the late entrant Neotel has invested in backbone, it has not been able to really challenge Telkom, particularly in the residential market, where little progress has been made. The incumbent operator is deeply entrenched in the market, and this is compounded by the lack of competitive measures like number portability and local-loop unbundling,⁶ which has not been implemented yet.

Although the market has been liberalised by the ECA, the lack of effective regulation of access to wholesale voice and data has meant that new entrants are unable to compete effectively in these market segments and, by and large, have been unable to push down the cost of communications (RIA 2012b, 2013).⁷ Pricing provides a good indicator of the competitiveness of a market, and is itself an indicator of the effectiveness of the market structure and regulation of the sector (Gillwald et al., 2012).

3.1.1.2 Spectrum

Spectrum allocation in South Africa remains a critical regulatory bottleneck. Late in 2012, ICASA announced its intention to review the national Radio Frequency Plan to ensure that it corresponded to the decisions of the ITU World Radio Conference of 2012 (WRC-12) and the latest ITU radio regulations, and that it was aligned with the Southern African Development Community's Frequency Allocation Plan. On 24 December 2012, ICASA published the second Draft Frequency Migration Plan following consideration of comments made in initial submissions, public hearings and supplementary submissions (ICASA, 2012). The plan includes a framework for the development of a spectrum assignment plan for bands earmarked for migration and those identified in the future national Radio Frequency Plan. The main benefit of the migration to digital terrestrial broadcasting is the amount of spectrum that is freed up for uses other than TV through this process. ICASA has indicated that it plans to release the band from 790–850 MHz for the global IMT-Advanced, effectively creating a new block of spectrum for mobile operators to deploy 4G services. The rest of the approximately 300 MHz of additional freed spectrum is supposed to be used for some additional broadcasting services including high-definition and interactive TV (Song, 2010).

Comment on the Draft Frequency Migration Plan was due in February 2013 but nothing had yet been made public regarding the inputs received (Gillwald et al., 2012).

3.1.1.3 Interconnection and retail tariffs

South Africa remains expensive in comparison to other economies in terms of voice and broadband prices (RIA, 2014a, 2014b). However, investment in high-speed 3G and LTE infrastructure is paying off. The rapidly increasing number of broadband users (and their increasing consumption of data as a result of data-focused business growth strategies) is already taking its toll on the average overall broadband speed in the country. In order to prevent any further degradation of broadband quality, it is imperative that the Ministry of Telecommunications and Postal Service issues the long-awaited policy directive that has delayed the assignment of LTE spectrum (RIA, 2014b).8 Regarding mobile voice prices, the negative perception of the regulation of interconnection is linked to the fact that ICASA's initial downward adjustment of the mobile termination rates (MTRs) – the rate that operators charge each other to terminate calls on each other's networks – in March 2011, and the subsequent reduction in March 2012 did not have the intended outcome of lower prices for consumers. The initial adjustment did not reduce the rate by a margin sufficient to allow smaller operators to significantly undercut the prices of the dominant operators (RIA, 2012b). However, with the MTR enforced at 20 cents by the South Gauteng High Court in March 2014 (and officially gazetted in September 2014), the battle for airtime sales has shifted into a full-scale price war. MTN SA, previously the operator most resistant to pricing pressure from the new entrant, Cell C, in June 2014 beat Cell C's lowest price. Also, mobile operators in South Africa are intensifying the sector trend towards bundled and dynamically priced products. From a benchmarking perspective, a reduction in termination rates brings the South African MTR closer to some of the lowest termination rates on the continent, which have resulted in major retail price reductions (see Table 4).

⁶ Local-loop unbundling (LLU) is a regulatory process that allows multiple telecommunications operators to use incumbent operators' networks (specifically, the copper cables that run from customers premises to the telephone exchange) to provide their own services.

⁷ The global trend in price regulation is ex-ante wholesale regulation, to ensure competitive access to facilities.

⁸ Long-Term Evolution (LTE), commonly known as 4G LTE, is a standard for wireless communication of high-speed mobile data. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed.

Table 4: Mobile termination rates in selected African countries

Country	МТВ		Comment	Source	
	Local currency	FX Q2 2014	US cents		
Kenya	0.99KES	86.2	1.1	From 1 July 2014 according to Addendum 3	CCK (2012) Addendum 3 of determination 2 of 2010- 27th November 2012
Ghana	0.04GHS	3.2	1.3		NCA (2010)
South Africa	0.2ZAR	10.6	1.9	Telkom Mobile and Cell C can charge higher MTRs (i.e. R0.44 or USD0.04)	ICASA (2014)

3.1.1.4 Universal access and service regulation

South African universal access and service regulation, which focuses on programmes aimed at bridging the access gap between rich and poor (as well as urban and rural areas), was perceived as highly ineffective by TRE respondents. Such programmes can be understood as initiatives to redistribute public funds from lower-cost capex and opex urban areas to higher-cost rural and marginalised areas. One of the main reasons for such a negative perception is that the Universal Service and Access Agency of South Africa (USAASA) has been kept alive in each new round of legislation over the last two decades, despite its failure to deliver on its mandate. The worsening in the 2011 perception compared to 2009 and 2006 is linked to recent accusations of financial maladministration by the USAASA board, which was removed from office in 2012. In 2011, the USAASA reported to Parliament that it had failed to meet targets in many of its projects, including: set-top box distribution; broadband infrastructure projects; the development of public access centres; the creation of an access and service strategy; and the development of ICT access and impact indicators. In addition, a clearly defined universal access and service strategy is still lacking, as are guidelines for the application of the Universal Service and Access Fund's manual and standard operating procedures (Gillwald et al., 2012).

3.1.1.5 Quality of service

3.1.1.5.1 Voice

Quality of service regulation was absent in South Africa until 2013, hence the negative TRE perception illustrated in Table 4 for this criterion. However, in May 2013, the South African regulator, ICASA published quality of service reports covering Vodacom, MTN and Cell C's networks and services in Gauteng, the Eastern Cape, the Western Cape and KwaZulu-Natal. The reports showed that the operators were falling short in meeting call set-up success rate (CSSR) targets in a number of provinces. The latest ICASA quality of service report for the Western Cape (2013/2014 Quarter 4) shows that in the Cape Town CBD and International Airport areas, MTN had a CSSR lower than 95 per cent, which is the threshold established by the ITU for a good CSSR. In Somerset West and Stellenbosch, though, both MTN and Cell C fell short in terms of CSSR. Dropped call rates (DCRs) were slightly high for Cell C in the Cape Town CDB and higher still at the airport. In Somerset West and Stellenbosch, none of the three operators under investigation was found to be below the DCR threshold of 3 per cent, while in Worcester, only Cell C was way above this threshold. Figure 4 depicts the Western Cape DCR.

⁹ The USAASA has the sole mandate to promote the goals of universal access and universal service. The objective of the agency are: (a) to provide a universal service and access strategy, policy and leadership; (b) to facilitate interventions in ensuring affordable and equitable access and use; (c) to monitor and evaluate effective use and social appropriation; and (d) the efficient and effective management of the Universal Service and Access Fund.

¹⁰ The CSSR is the fraction of the attempts to make a call that result in a connection to the dialled number (due to various reasons, not all call attempts end with a connection to the dialled number). This fraction is usually measured as a percentage of all call attempts made.

Western Cape Retainability Results

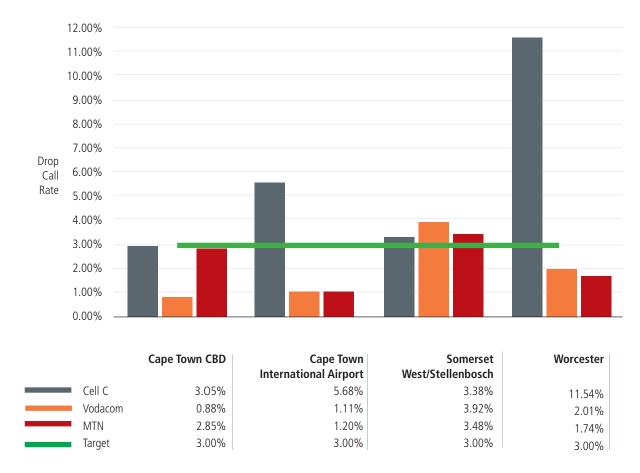


Figure 4: Western Cape dropped call rate • Source: ICASA (2014)

3.1.1.5.2 Broadband

According to the latest report by Ookla, an international broadband testing company, South Africans, on average, receive 87 per cent of the broadband speeds they sign up for, which is only slightly lower than the global average of 87.2 per cent. Ookla's Net Index ranks South Africa 125th out of 194 countries surveyed on the broadband index. 11 The country performs better on the mobile index, where it ranks 56th out of 114 countries. The Ookla findings are supported by a broadband performance study conducted by RIA in all nine provinces in South Africa. The main finding of the study was that South African consumers are not getting the advertised speeds. The study also demonstrated that mobile 3G and LTE services outperformed fixed broadband. The study shows that the median broadband speed for mobile users is around 10 Mbps, whereas the median throughput for fixed-line users is closer to 1 Mbps. Figure 5 compares 3G and LTE services with ADSL and VDSL. It shows that the mobile technologies (particularly LTE) yield higher speed than the fixed-line service plans. Unlike in more developed nations, in South Africa mobile broadband is both cheaper and faster than fixed broadband. However, because of its variability, mobile is unlikely to replace fixed-line connectivity, particularly for consumers needing a stable and reliable Internet connection. In the assessment, the Ookla quality of service measures for Cape Town are used together with the national broadband tariff.

¹¹ The Ookla household promise index is the median ratio of actual download speed to the download speed subscribed to ('promised speed').

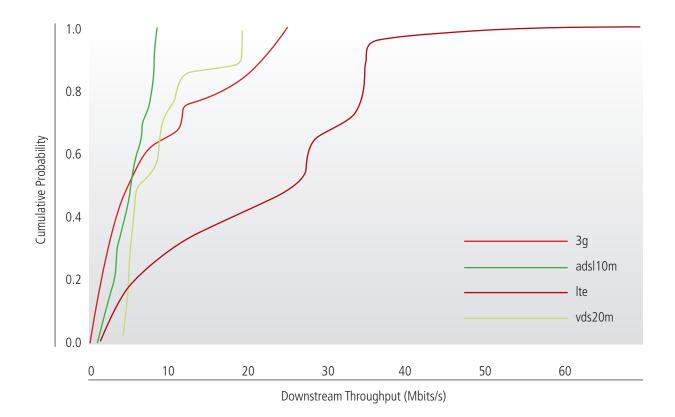


Figure 5: Cumulative distribution of downstream throughput for different fixed-line and mobile network technologies

3.1.2 Effectiveness of policy and regulation based on the formal business survey

The effectiveness of national and provincial ICT policy and regulatory frameworks is assessed also through the formal business survey. Figure 6 shows provincial perceptions gathered by RIA of concerns falling under national jurisdiction, such as the effectiveness of ICT law-making bodies, ICT laws and national competition law. The ICT policy and regulatory outcomes at a provincial level, in terms of investment in innovation and the availability of the latest technology, are assessed through specific questions in the formal business survey on the availability of venture capital and up-to-date technology in the Western Cape.

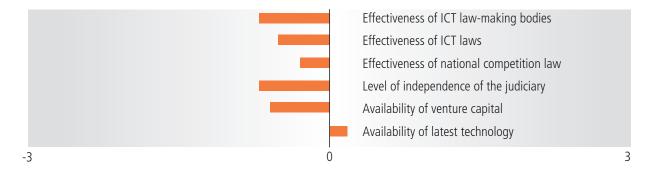


Figure 6: Perception of formal businesses of the ICT environment

Similar to the TRE results, respondents in the provincial survey perceived the ICT policy and regulatory environment to be ineffective. Weak purchasing decisions to foster competition, ineffective political processes leading to the development of ICT policies, and inefficiency in spending public revenue on ICT are some of the main reasons cited by formal businesses interviewed in the Western Cape for the poor performance of ICT law-making bodies. Similarly, the local formal businesses perceive ICT laws (including ICT sector reforms and ICT policy) to be ineffective. At a provincial level, provincial and local governments are considered ineffective in leveraging ICT for regional economic growth (see Figure 6).

The ineffective ICT policy and regulatory context results in a difficult environment for investment at a provincial level. Formal businesses are of the view that venture capital is not widely available in the Western Cape and that it is difficult for entrepreneurs with innovative (but risky) projects to source capital. On a positive note, the latest technology is available in the Western Cape. Companies surveyed indicated that they have enough human capacity for innovation in ICT, and for businesses with innovative ICT ideas and the potential to grow in the Western Cape.

3.1.2.1 Input cost of businesses

In addition, the ineffective ICT policy and regulatory environment results in low levels of investment in ICT at a formal business level. Expenditure on ICT by formal businesses, in terms of both capex (i.e. non-recurring costs like telecommunications infrastructure and computers) and opex (i.e. recurring costs like telephone/Internet bills, etc.), is relatively low in the Western Cape. Formal business survey data show that, on average, the share of input cost of ICT in terms of capex of formal businesses in the Western Cape is 2.4 per cent of their total expenditure. Similarly, the share of input cost of ICT in terms of opex is 2 per cent on average. We have tried to build a baseline in this regard, as there are no available data, and our sense is that this figure is low. This baseline figure will be assessed again in two years' time to see how input costs change.

In terms of input costs of businesses, with the landing of the Seacom undersea fibre-optic cable, the cost of international bandwidth has been cut very significantly by using shorter-distance terrestrial routes and by reducing congestion. International IP transit allows telecommunications companies to obtain interconnection to all Internet service provider (ISP) networks locally and globally. The market is highly competitive, with many suppliers. For this reason, international IP transit is cheaper than national IP transit, which is not as competitive. International IP transit per Mbps, excluding access circuit costs, is ZAR350 (ICASA, 2014). The rate is within the range of acquiring such IP transit services at major centres like Hong Kong, London, New York and São Paulo, which is between USD30 and USD3 (TeleGeography, 2012). Local IP transit, enabling businesses to obtain interconnection to ISP networks in South Africa, costs ZAR475, which is more expensive than wholesale Internet access services.

3.1.2.2 Municipal regulation of ICT

One of the main bottlenecks in rolling out broadband nationally has been lack of regulation at the metro level . There is also a lack of co-ordination at the metro level on rights of way, and the City of Cape Town has been accused of inefficiency. Environmental clearance can take years, and approval of the relevant municipality is needed for each jurisdiction through which the cable passes.

At a local level, the municipal regulation of cable trenching has been perceived as ineffective by formal businesses in the Western Cape. Nevertheless, the City of Cape Town adopted an open-access business approach to fund the public fibre-optic infrastructure and switching centres, despite the network being fully owned by the metropolitan municipality (DBSA, 2012). The City of Cape Town is well placed to invest in this sector, since one of the most significant costs in deploying fibre is the cost of excavation and securing rights of way, which the city already has achieved (Song, 2008). The result is that the City of Cape Town can deploy fibre at a lower cost than can commercial enterprises. Although the city is fully involved in the deployment of the infrastructure — which is publicly owned — and in the operation and facilities management, it will not offer broadband services itself, but will lease excess capacity on its own network on an open-access basis to broadband network providers (Stelzer and Van Wyk, 2012). Electronic Communications Service (ECS) and Electronic Communications Network Service (ECNS) license holders can rent dark fibre pairs between switching centres and connect their own fibre to a switching centre or buy 100 Mbps or 1 Gbps circuits between switching centres (DBSA, 2012).

3.1.2.3 Lack of awareness

While the Cape Town Broadband Infrastructure Project is expected to contain telecommunications costs and to improve the standard of service delivery, this perception of the initiative does not seem to have filtered through to formal businesses in the Western Cape. It appears that part of the problem is that the WCG does not communicate the fact that such programmes exist or what their benefits might be. Leveraging the city's investment will encourage local economic development and avoid unnecessary trenching. Operators can benefit from the network by sharing the same fibre infrastructure, reducing their capex barrier and encouraging competition based on services rather than ownership of the infrastructure.

3.1.3 Broadband plans and Internet governance

The Western Cape policy initiatives and implementation for the purpose of a connected province were assessed as part of the province's e-readiness. Three areas of policy and implementation were assessed: broadband plan implementation; cyber security policy and implementation; and open-data policy and implementation. Table 5 provides a checklist of provincial and national connection policy and implementation indicators, and provides a traffic-light score.

3.1.3.1 Broadband plan implementation

An important indicator for the WCG e-readiness assessment is implementation of the WCBI. Table 5 shows that both province and country have broadband plans in place. Nationally, the South Africa Connect broadband plan provides the strategy and implementation plan but is yet to be put into action. The WCG, in comparison, is in the green, given the steps it has taken to implement the project. The aim of the project is to allow for the government to play a role in providing telecommunication infrastructure and affordable access to communication for all, in a way that contributes to the province's social and economic development goals (DEDAT, 2011). The intention is not only to connect government but also to drive ICT infrastructure development, as well as improving healthcare and education through online access for schools and hospitals. Internal investments were being leveraged for external benefits, as the government sought to be a catalyst for the construction of regional and local backbone networks to all areas (DEDAT, 2013).

Public Wi-Fi will be rolled out to ensure access to citizens, in spite of procurement delays. The free Wi-Fi project aims to connect more than 90 000 residents, targeting underprivileged areas, with the ultimate aim of ensuring that residents in the province have access to free or affordable Internet. Four areas where chosen for the pilot project — Atlantis, Delft, Robertson and the Garden Route. Various non-profit organisations were identified to deliver the service in selected areas. The Delft project, managed by Home of Compassion Ministries, was launched in the first quarter of 2014, with the aim of connecting 22 local schools. Project Isizwe runs the pilot for Atlantis and Robertson. In line with the 'connected schools' initiative, Wi-Fi sites are set up in local schools, which greatly benefits students located in these low-income zones.¹²

Table 5: Broadband plans and Internet governance

Indicator	National	Provincial	Score
Broadband plan	Yes	Yes	
Implementation	No	Yes	•
Cyber security policy	Yes	Yes	
Implementation	No	No	
Open data policy	No	No	•
Implementation	No	No	

3.1.3.2 Cyber security

As South Africa has a large number of Internet users, it has recognised the importance of ensuring a secure online information channel. The Electronic Communications and Transactions Act (ECTA) of 2002 provides a framework for jurisdiction on issues pertaining to cyber security. It stipulates prohibited conduct, including unauthorised access, interception or interference with data and computer-related extortion and fraud. Complementing this, a national cyber security policy framework was developed in 2010 and approved in 2012. The framework was set up with the aim of, inter alia:

- promoting a cyber security culture, and demanding compliance with minimum security standards;
- strengthening intelligence collection, investigation and prosecution;
- preventing and addressing cybercrime, cyber warfare, cyber terrorism and cyber ills; and
- promoting and ensuring a comprehensive legal framework governing cyberspace.

¹²See WCG press release 'Free Wi-Fi project connects 90 000 residents' at: http://www.westerncape.gov.za/news/free-wi-fi-pilot-project-connects-90-000-residents.

¹³Input by Dr S.C. Cwele (Minister of State Security, SRA, Cyber security meeting, 27 March 2014).

Together with the ECTA, the Regulation of Interception of Communications and Provision of Communication-Related Information Act (RICA) of 2002 and the Protection of Personal Information Act of 2013 provide for the punishment of cyber security crimes (Grobler, Van Vuuren, and Leenen, 2012).

While policies and frameworks have been put in place, implementation is still required, as Table 5 shows. For example, the ITU identified the lack of an officially recognised national or sector-specific research and development project setting cyber security standards, best practices and guidelines in the private or public sector. In terms of cyber-security frameworks, the province falls under the national cyber security legislation. Action plans involving cyber inspectors or cyber police, which are identified at national level, to enforce the act have not materialised. Lack of implementation of the cyber security policy framework creates room for criminal opportunities, which the government should be trying to reduce (Grobler et al., 2012).

3.1.3.3 Open data

Nationally and provincially, open-data policies have not been formulated and, therefore, no implementation has taken place. However, the Western Cape does have the only municipality with an approved and implemented open-data policy. The City of Cape Town approved its open-data policy in September 2014, and implemented it by the end of the year (City of Cape Town, 2014), setting a precedent for the rest of the province and the country. The city aims to provide free and easily accessible data via an online platform for citizens and business to use, while, at the same time, improving citizen engagement with the city. The live portal lists among its popular data sets budgets, cemeteries and tenders. A Citizens having access to large amounts of data generated by the provincial government is likely to enhance transparency, which will empower citizens to hold the government accountable (City of Cape Town, 2014). The data available to the public excludes the disclosure of private information about citizens, confidential information and content deemed inappropriate by the open-data steering committee. The policy has been criticised on issues such as defining what exactly is meant by mean by 'big data' and 'data formats', and on dealing with privacy.

3.2 Readiness

The readiness of a region is assessed in terms of the availability of infrastructure, the affordability of various services and the skills levels of its citizens.

In terms of the readiness sub-index assessment, while a few of the indicators, such as skills and infrastructure capacity, are obtained at the provincial level, tariffs, in particular, are set nationally, and there are no regional operators. RIA also uses its pricing database for prepaid mobile and data prices to obtain pricing and affordability indicators. Affordability is determined by assessing average individual and household expenditure on communications in relation to income measurements from the individual and household surveys. The affordability of communications as an input cost of business was established from the informal and formal business surveys.

While secondary school enrolment is one of the indicators for skills in the WEF NRI, this does not reveal the number who actually complete secondary school. RIA, therefore, looked at the number of matriculants in the province, as this provides a picture of the success rate at secondary-school level, and the availability of an e-ready workforce and e-ready consumers. Data obtained through the household and individual survey also feed into the skills indicator.

3.2.1 Infrastructure and digital content production

The infrastructure and digital content production category looks at the availability of ICT infrastructure by analysing a set of ICT infrastructure indicators, such as international Internet bandwidth (speed and wholesale prices), network coverage (kilometres of fibre and number of base stations), access network (percentage of the population covered by 3G/LTE and ADSL networks) and quality of service (average download/upload speed). In addition, household power connectivity (from the grid) has been investigated.

¹⁴ See http://ctcs.capetown.gov.za/opendataportal/.

¹⁵ The Africa Price Transparency Index is available at the following link: http://www.researchictafrica.net/prices/Fair_Mobile_PrePaid.php.

Table 6: Infrastructure and digital content indicators

Area	Indicator	National	Provincial	Score
Telecommunications infrastructure	International Internet bandwidth (speed/wholesale price)	18.1 kbps	-	
	Coverage (mobile 2.5G+)	-	90.0%	
	Coverage (3G)	-	75.0%	
	Quality of service: average download/ upload speed for mobile	6.35 Mbps	8.7 Mbps	
	Quality of service: average download/ upload speed for fixed	4.6 Mbps	4.8 Mbps	
	Quality of service: business perception	-	0.47	
	Internet bandwidth capacity	-	-0.14	
Electricity	Household power connectivity (from grid)	89.2%	95.00%	
	Reliability of electricity	-	0.32	
Digital content	Digital content production	R15,745m	-	
	Digital content restriction	-	0.84	
Access to digital content	Using mobile phone to download applications	21.9%	50.3%	
	Using mobile phone to access educational materials	-	52.3%	
	Purchasing goods online	25.3%	41.7%	
	Watching TV/video online	59.7%	66.1%	
	Reading newspapers/magazines online	43.8%	45.1%	

3.2.1.1 Telecommunications infrastructure

Overall, the telecommunications infrastructure in the Western Cape is perceived by formal businesses to be fairly extensive and efficient. Of households in the Western Cape that have access to the Internet, 38.9 per cent connect via ADSL. International Internet bandwidth is now available from a number of different suppliers, and the prices have dropped exponentially since the end of Telkom's monopoly of international bandwidth access on the SAT3 undersea cable (ITU, 2012 in WEF, 2014). Although international bandwidth is higher than most of the African countries covered by the ITU, there is more bandwidth available, meaning better quality, with prices more in line with middle- and high-income countries.

Nationally, 99.8 per cent of the South African population live within range of a mobile cellular signal (ITU 2007, in WEF, 2014). Specifically in the Western Cape, 95 per cent of the population are covered with 2.5G+ and 75 per cent with 3G (CSIR, 2014), while 4G is generally available only in the metropolitan areas. The access network (last mile) remains a problem, however. According to respondents in the formal business survey, existing Internet bandwidth is not sufficient for businesses to perform their activities or to embark on new business opportunities.

Ookla data on quality of service (download and upload speed) reveal that the average ADSL download/upload speed in the Western Cape is 4.8 Mbps, which is slightly higher than the national average of 4.6 Mbps, but significantly below the global average of 15.7 Mbps. Counter to the global trend where ADSL speed is higher than mobile speed, the 8.7 Mbps mobile average download and upload speed in the Western Cape is higher than the ADSL average speed (and higher than the 6.35 Mbps national mobile average download and upload speed). Also contrary to global trends, the mobile average speed in the Western Cape is faster than the global average speed of 7.8 Mbps.

3.2.1.2 Electricity

Electricity is basic infrastructure that enhances Internet access and use, and, as a general purpose technology, it contributes to greater efficiencies. The Western Cape is well connected to the national electricity grid. According to the RIA household and individual ICT access and use survey conducted in the province in 2014, 95 per cent of households are connected to the electricity grid. This is more than the national figure of 89.2 per cent, although this is likely to have increased since 2012 when the survey was conducted (RIA, 2012a). If the Western Cape wants to be a data warehouse, then a reliable, high-quality power supply is essential. Electricity generation happens nationally, but the distribution happens at a municipal level. The province must have some sort of planning jurisdiction in this regard.

Local respondents in the formal business survey rated electricity supply (in terms of lack of interruptions and lack of voltage fluctuations) as reliable. However, since the survey was conducted, South Africa has been plunged into an energy crisis. Since November 2014, electricity outages have become commonplace, despite peak power demand falling below 2007 levels and actual electricity use being far less than forecast (Eberhard, 2014).

3.2.1.3 Digital content production

The content and media industry in the Western Cape is flourishing. A study conducted by RIA in 2012 on mobile use at the 'base of the pyramid' reveals that the entrepreneurial environment in the Western Cape Province has many success stories, as many start-ups in the mobile applications industry are based in the province (Calandro et al., 2012). In particular, some of the most successful applications for health (Cell-Life), entertainment (be Bozza!), social networking (Mxit) and mobile money (SnapScan) have been developed by start-ups based in Cape Town. According to Wesgro, City of Cape Town and PwC (2013), the City of Cape Town is a preferred destination for investment in companies dealing with software design and development. Some of the attractive factors are good infrastructure, including road, rail, air and sea connections, which are well developed compared to other African cities. In addition, the Western Cape has four universities and a highly attractive environment and variety of lifestyle options (Wesgro, City of Cape Town and PwC, 2013).

According to the ICT satellite account for South Africa, 2006–2011, the national domestic output of content and media in 2011 was R15,745 million (Stats SA, 2014). In this regard, respondents to the formal business survey revealed that there are no undue limitations on the availability of online content, such as censorship or restriction to freedom of expression online.

3.2.1.4 Individual access to digital content

Demand for digital content and software development is boosted by a growing demand for Internet content. The ICT access and use survey data reveals that 52 per cent of mobile phone owners in the Western Cape use the phone to access digital content,

¹⁶ Although the literature on the 'base of the pyramid' generally uses as its measure those individuals living on less than USD2.50 a day, this report adopts the 2012 South African National Planning Commission Development Plan poverty datum line, which is defined as households with income of less than R432 per month per household member, which is roughly equal to USD52.50.

such as educational materials, while 50 per cent use the phone to download applications (RIA, 2014). Of those with access to the Internet, about 66 per cent stated that they watch TV/video online, 45.1 per cent read newspapers or magazines online, and 41.7 per cent indicated that they have purchased goods online. These figures for the province are relatively close to the national figures, particularly in the case of watching TV/video and reading newspapers or magazines online (see Table 6).

3.2.2 Affordability

Affordability is measured in terms of an assessment of national retail prices for mobile prepaid voice and mobile prepaid broadband in relation to gross national income (GNI) per capita, monthly individual earnings at a provincial level, and monthly income at an individual level, as per the latest ITU indicator. While prices are determined nationally, mobile (voice and broadband) and ADSL services may be more or less affordable at provincial level in terms of regional income. Historically, the price of telecommunications services in South Africa has been relatively high, although it is decreasing thanks to regulatory interventions such as a reduction in mobile termination rates and a resulting price war between national mobile operators, which is also impacting on data prices.¹⁷ In addition, the increasing demand for data bandwidth, together with a reduction in the price of smart devices, is resulting in a decrease in the price of data services as well.

Supply-side data at the national level have been compiled through the collection of mobile prepaid voice tariffs obtained from the various operators in the South African market. The analysis is based on the RIA Africa Price Transparency Index, which has been constructed by applying the Organisation for Economic Co-operation and Development (OECD) 40 calls/60 SMS basket methodology (OECD, 2010). In addition, RIA has collected prepaid broadband prices of 1GB, and these data have been presented alongside the fixed broadband Internet tariffs.

ICT survey demand-side data on mobile expenditure and individual income have been used to assess how affordable mobile services (including voice and broadband) are within the province.

Since competition affects the cost of communications and, therefore, affordability of ICT services, the level of competition in the mobile sector has been assessed at the national level using the Herfindahl-Hirschman Index (HHI), which determines the degree of concentration in the market.¹⁸

Table 7: Affordability indicators

Area	Indicator	National	Provincial	Score
Competition	Mobile sector competition (HHI)	3 504.86	-	
Telecommunications	Mobile cellular tariffs	R53	-	
prices	Fixed broadband Internet (1GB)	ZAR338.99	-	
	Prepaid broadband tariffs (1GB)		-	
ICT expenditure	Mobile prices (prepaid voice and prepaid broadband) as a percentage of GNI per capita	3.1%	-	
	Mobile prices (prepaid voice and prepaid broadband) as a percentage of monthly earnings	-	7.6%	
	Mobile expenditure as a share of individual income	24.7%	20.1%	

¹⁷ As a result of a third termination rate reduction which came into force in March 2013 and the more recent MTR enforced at 20c by the Courts last March 2014, the South African mobile voice market has shifted into a full-scale price war which has significantly reduced South African mobile prepaid voice prices.

¹⁸ The HHI number can range from zero to 10 000. The HHI is expressed as: $HHI = s1^2 + s2^2 + s3^2 + ... + sn^2$ (where sn is the market share of the ith firm).

Despite the problems with developing a standard definition of a 'subscriber' in a mobile prepaid environment, and the difficulty of tracking numbers in absolute terms, the South African mobile market is concentrated. The HHI, based on August 2013 market share data, is 3 504.86. The mobile market is dominated by MTN and Vodacom, which in August 2013 had 36.8 per cent and 43 per cent of market share respectively. Cell C, the third operator, which was introduced in 2002, captures a small 17.2 per cent market share. The fixed market is dominated by Telkom, with the new entrant Neotel making very small inroads.

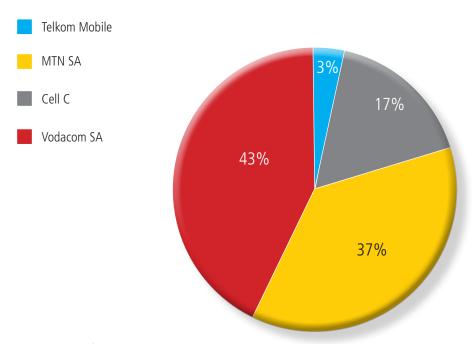


Figure 7: South African mobile operators' market share

Concentrated markets usually result in high prices. Telkom SA has the cheapest product in the mobile sector with Sim-SONKE since Q3 2013; its OECD basket of 40 calls/60 SMS costs ZAR53 (USD4.90).¹⁹ The dominant operators, Vodacom SA and MTN SA, which serve the majority of the South African population, are more expensive than Telkom SA. The OECD basket of 40 calls/60 SMS for MTN SA costs ZAR76 (USD7.08), while the same basket for Vodacom SA costs ZAR122 (USD11.86).

Broadband prices were calculated using 1GB baskets that reflect users' demand for both prepaid mobile data and ADSL services. In the mobile broadband prepaid 1GB basket, Cell C, MTN SA and Vodacom SA have the same matched price of ZAR149. Although mobile broadband prices are still very expensive, they are cheaper than ADSL prices. ADSL 1GB baskets are more expensive because of the cost of copper line installations, monthly line (telephone and ADSL) rentals and connection devices. The cheapest ADSL 1GB basket with an advertised speed of up to 4 Mbps, cost ZAR338.99 (USD31.98) in Q3 2014, and the ADSL 1GB basket with an advertised speed of up to 10 Mbps costs ZAR518.99 (USD48.96). Both baskets are from the ISP MWeb.

From an affordability point of view, South African retail prices for telecommunications services (voice and broadband mobile) are still very expensive for the majority of the population. By using supply-side data²⁰ and applying a modified version of the ITU ICT basket methodology,²¹ the monthly ICT basket as a percentage of GNI per capita is 3.1 per cent.²² At a provincial level, the monthly ICT basket as a percentage of monthly earnings is 7.6 per cent.²³

¹⁹ The exchange rate used is USD1.00/ZAR10.81.

²⁰ Mobile prepaid voice and mobile prepaid broadband supply-side data are based on Q1 2014 prices. See RIA Africa Price Transparency Index, available at: http://www.researchictafrica.net/prices/Fair_Mobile.php.

²¹ The ITU ICT price basket includes three price sets: the fixed-telephone, mobile-cellular and fixed-broadband sub-baskets. The basket is the value calculated from the sum of the price of each sub-basket (in USD) as a percentage of a country's monthly GNI per capita, divided by three (ITU, 2014). In order to compare this result with mobile expenditure as a percentage of individual income (based on demand-side data), RIA has calculated the ITU ICT price basket taking into account only mobile voice (OECD 40 calls/60 SMS) and mobile broadband prices (1GB) from Q1 2014.

²² The annual GNI per capita in South Africa in 2013 is USD7 190 (World Bank, 2013).

²³ The calculation is based on Stats SA monthly earnings of South Africans, 2010 and on Q1 2014 OECD 40 calls/60 SMS mobile prepaid voice and 1GB mobile prepaid broadband baskets. In the Western Cape, 2010 monthly earnings were USD243 (ZAR2 700).

However, using the GNI per capita or the median of monthly earnings is highly problematic as it does not take into account the inequalities in South African society, which is characterised as having one of the highest Gini coefficients in the world. Therefore, a better indicator to assess affordability of ICT services is total expenditure on mobile services as a percentage of individual income, using ICT access and use survey data.

In using ICT survey demand-side data, affordability of mobile services becomes a big concern in the Western Cape. The share of household income devoted to mobile services is rising, which may reduce the budget for food, health or education. On average, citizens in the Western Cape spend 20.1 per cent of their individual income on mobile services (voice and data). Although this percentage is very high, with the ITU indicating that anything above 5 per cent of household income is not affordable, it does demonstrate the value that users attach to communication services.

3.2.3 Skills

The availability of skills is an important indicator in determining the human capital available for business development and for e-consumption, particularly in an information society and knowledge economy. Literacy, as a whole, allows individuals to have the skills, understanding and knowledge required to experience the full benefits and make optimal use of ICTs. 'Literacy is an important consideration in a broader definition of access, and user skills for access implies other kinds of literacy' (Osborn, 2006: 86).

While there has been a decline in the gap between those who have voice services and those who do not, the divide in access to the Internet has widened. This limits access to the range of enhanced services available online, which have become necessary for effective citizenry and consumer participation. Policy and regulation influence the enabling environment for the development of skills; and, on the continent, reliable data and fact-based analysis to inform policy in this area have been lacking. As a result, e-readiness studies that aim to describe a country's ability to participate in and benefit from the information society often use broad macro-level indicators (Schmidt and Stork, 2009).

Many reports on ICT access and use have minimal focus on education and skills, and the few that do, use educational attainment as a form of measurement of ICT skills. Primary schooling is frequently used as an indicator of e-literacy in human development indices, on the basis of the assumption that children get exposed to digital devices at an early age in the Northern hemisphere. However, Schmidt and Stork's (2009) study across 17 African countries revealed that computer skills were widely attained only at the tertiary level. In a study of Internet skills (using both observed capacity and self-reported skills) among US users, Hargittai (2002) finds that education is correlated with Internet skills, with higher levels of education implying more exposure to technology. Deen-Swarray, Gillwald and Morrell (2013) also find that the greater the number of years of education an individual has, the more likely it is for that individual to access and make use of ICTs. Higher educational levels increase the ability to adapt more quickly to new technologies and, in many countries, educational institutions are the first point of affordable access for many users (Kiiski & Pohjola, 2002).

Using ICTs effectively requires strategic skills, which here refer to the ability to use computer and network sources as a means for attaining particular goals and for the general goal of improving one's position in society (Van Dijk, 2005). Strategic skills relate to the gap in the use of ICTs between those who use them primarily for professional and educational development, those who use them mainly for entertainment and those who use them for basic communication (Bonfadelli, 2002). South Africa is no different in this regard.

This study assesses the skills sets in the Western Cape by making use of both supply-side and demand-side data. Quality of education, outputs and overall literacy levels are employed in the assessment of skills of citizens in the province (see Table 8).

Table 8: Skills indicators

Category	Indicator	Source	National	Provincial	Score
Quality of education	Quality of education in general	Formal business survey	0.1	-0.19	
	Quality of maths and science	Formal business survey	-2	-0.62	
Enrolment & educational attainment rate	Secondary school enrolment rate	Stats SA/Western Cape Department of Education/RIA survey	89%	72.0%	
attaiiiiieiit iate	Share of individuals who have completed secondary education as the highest level		65.3%	60.5%	
	Pass rate for matric		78.2%	85.1%	
	University graduates as percentage of enrolment		17.4%	24.4%	
	Share of individuals who have completed tertiary education as the highest level		13.2%	17.6%	•
Literacy levels	Adult literacy rate	Census data/RIA survey	83.7%	90.9%	

The business survey is used to assess perceptions of the quality of education and the quality of mathematics and science in the province. Businesses were asked to respond to questions using a rating of 1 for 'extremely poor' to 7 for 'excellent'. The results were converted using a Likert scale with a range of -3 to +3. The findings of the business perception survey show that in terms of quality of education, in general, the Western Cape performs negatively in comparison to the national figure, while for the quality of mathematics and science education, the province performs better than the rest of the country.

In addition to using the perception survey to gauge the quality of education in the province, the study also draws on provincial and national statistics on enrolment and pass rates. Secondary school enrolment in the Western Cape is recorded at 72 per cent, considerably lower than the national figure of 89 per cent (DBE, 2013). However, the pass rate for matric students in 2013 was 85.1 per cent in the Western Cape, several points above the 78.2 per cent achieved at the national level (DBE, 2013). Also, the share of university graduates from public universities as a percentage of enrolment is higher at the provincial level (24.4 per cent) than at the national level (17.4 per cent) (DHET, 2014).

Adult literacy, measured as the share of individuals (20 years and above) with grade 7 or above as the highest level of education, is about 90.9 per cent for the Western Cape. This is more than 7 per cent higher than for the rest of South Africa (see Table 8). The provincial household and individual use survey shows similar results, with slightly more than 90 per cent of individuals stating that they can read and write easily (RIA, 2014). The survey results show that the share of individuals who have completed secondary schooling as their highest level of education is 60.5 per cent at the provincial level, which is lower than the national figure of 65.3 per cent recorded in the 2012 survey. Those who have a tertiary education in the Western Cape (which includes a diploma, a bachelor's, a master's and a PhD degree) as the highest level attained is higher at 17.6 per cent than the national figure of 13.2 per cent recorded in the RIA 2012 survey (see Table 8).

3.3 Use assessment

In order to address the demand component and be able to generate the household and individual ICT indicators, household, individual and business access and use surveys were conducted. This section draws on the findings of these surveys and uses previous national surveys conducted by RIA, as well as data from the ITU, to assess how the Western Cape performs in terms of citizen access and use of ICTs.

The data obtained at the provincial level from the 2014 ICT Access and Use Survey have been compared against the national figures obtained from a similar survey conducted by RIA in 2012. These figures align very closely with the 2012 Census data.

3.3.1 Household use indicators

The analysis of household use looks at ownership of computers (laptops or desktops), Internet access at home and whether households use ADSL to access the Internet. These indicators are in line with those used by the ITU in presenting country ICT statistics. The Western Cape performs comparatively better than the rest of the country in terms of share of households with a working computer and share of households with Internet access. Even the share of household with internet connection at home accessing it through ADSL is higher at the provincial level (see Table 9).

Table 9: Household use indicators

Category	Source	National	Provincial	Score
Share of households with working desktop/ laptop	RIA surveys/ITU	25.0%	43.7%	
Share of households with Internet access		19.7%	44.0%	
Share of households that use ADSL to access the Internet		22.0%	38.9%	

3.3.2 Individual use indicators

Although the share of individuals in the Western Cape who own a mobile phone can be considered high at 81.9 per cent (RIA, 2014), this figure is lower than the national figure of 84.2 per cent (RIA, 2012a) and the global average of 85.7 per cent, based on a study of 144 economies (WEF, 2013).

Table 10: Individual use indicators

Category	Source	National	Provincial	Score
Share of individuals who own a mobile phone	Individual survey	84.0%	81.9%	
Share of individuals who use the Internet		33.7%	57.0%	
Share who access the Internet via a mobile phone		71.0%	93.8%	
Share who access the Internet via a computer at a place of education		20.6%	14.6%	
Share who access the Internet via a computer in a public space (fixed)		9.8%**	26.8%	
Share who access the Internet via a mobile device in a public space (Wi-Fi)			35.3%	
Share of individuals using the Internet that are signed up for an online social network	Individual survey	75.0%	93.5%	

Note: National figures are based on the RIA 2012 household and individual survey

^{**}The national figure in the RIA 2012 survey was recorded as the share of individuals accessing the Internet through a community centre Internet facility

The Western Cape performs comparatively well in terms of individual use of the Internet. With about 57 per cent of individuals using the Internet, this figure is not only higher than the national level but is also above the global average of 32.8 per cent (ITU, 2013). The Western Cape survey shows that the majority of individuals who make use of the Internet do so via their mobile phones, scoring above the national figure for this indicator. The Western Cape also performs much better in the share of individuals who access the Internet in a public place.

However, the share of individuals who access the Internet at a place of education is very low, and the province performs worse than the country as a whole for this indicator (see Table 10), which illustrates the necessity of the WCG's plan to have Internet access in schools and institutions of learning. It would be interesting to see the progress of this figure as the broadband initiative is implemented.

The study also reveals that online social networking is a driving force behind Internet use among Western Cape residents (see Table 10).

3.3.3 Business use indicators

The assessment of business use of ICTs draws on the formal business perception survey. The formal business survey asked businesses to rate the benefits of ICTs in enabling new organisational and business models, and the extent to which companies have sophisticated ICT-based supply chains. The answers to these questions produced an average ranking for the Western Cape of 0.09 on the Likert scale in assessing business-to-business ICT use (see Table 11). This rating is very low compared to the national average of 1.6 and a global average of 1.0 as recorded by the World Economic Forum (WEF, 2013).

On the other hand, the Western Cape scores higher in terms of business-to-consumer ICT use at 0.94 than the WEF national figure of 0.8 and the global average of 0.5. While this is a positive score for the province, it is below 1.0 and, therefore, is considered average. Business-to-consumer use of ICT looks at the extent to which businesses use the Internet for selling their goods and services, how widely virtual social networks are being used for business activities and the extent to which sophisticated marketing tools and techniques based on ICT are used.

Table 11: Business use indicators

Category	Indicator	Source	National	Provincial	Score
Business-to- business ICT use	ICTs to enable new organisational models	Formal business survey	1.6	-0.2	
	Sophisticated ICT-based supply chains in place			0.53	
Business-to- consumer ICT use	ICTs to enable new business models in the Western Cape			-0.05	
	Business use of the Internet for selling goods and services		0.8	1.06	
	Use of virtual social networks			1.27	
	Use of sophisticated marketing tools and techniques based on ICT			0.48	

Note: *National figures are from the RIA 2012 TRE survey

3.3.4 Government use indicators

The e-government assessment conducted went beyond the WEF business perception of e-government, by providing a holistic picture of readiness from supply- and demand-side perspectives. Indicators for the e-government survey were adjusted from global surveys that have been conducted to assess e-governance, as shown in Table 12.

Table 12: e-Governance indicators

Global survey	Global indicators	RIA indicators
UNECA 2011	Use of ICT by employees of government	Connectedness
	Availability of ICT to government organisations	
	Use of ICT by government	Web presence
SALGA survey 2010	Municipal e-government presence	
ITU (2009)	E-government services to citizens	Citizen use
	E-government services to business	
UNDESA (2014)	Online service index	
UNECA (2011)	Supply of e-government services to citizens	

A report by the UN Economic Commission for Africa (UNECA, 2011) classified e-government indicators in four ways, namely:

- use of ICT by employees of government (for example, use of computers);
- availability of ICT to government organisations (for example, the Internet);
- use of ICT by government organisations (for example, whether a website exists); and
- supply of e-government services to citizens (by publicly accessible websites or services).

These have been used to provide a framework to determine supply- and demand-side indicators for this study. The South African Local Government Association (SALGA) national municipality survey focusing on ICT implementation for service delivery was adjusted to assess web presence at a provincial and local government level. Web presence is assessed for e-government readiness, as it is a way of promoting efficient and effective government by allowing greater access of information for the public and making government more accountable to citizens (SALGA, 2010).

The ITU e-government implementation toolkit of 2009, under the dimension of outreach, identifies e-government services to citizens and to business as indicators for an e-government environment.²⁴ Similarly, the United Nations Department of Economic and Social Affairs (UNDESA) e-government survey has measured the progress of online service delivery by national governments since 2012, on the basis of the following four stages:

- emerging information services government sites for information from government;
- enhanced information services delivery of one- or two-way communication with citizens;
- transactional services government engagement with citizens online; and
- connected services proactive government offering integrated e-services and e-solutions (UNDESA, 2014).²⁵

RIA adjusted and expanded on the indicators from these surveys, in order to develop more accurate indicators of the e-government readiness of the Western Cape, compared to the national and global situation. Overall, the WCG's e-readiness was assessed to include, from the supply side, connectedness and web presence and, from the demand side, the use perspective of formal and informal business and individuals. Indicators for the demand side were derived from the business (formal and informal) and household/individual surveys to assess perceptions and use of e-government services. Supply-side indicators were sourced from the WCG and the RIA e-government desk study conducted in November 2014.

²⁴ The ITU (2009) e-government implementation toolkit also identified three other dimensions – governance, policy and infrastructure.

²⁵ The UNDESA survey also assesses government performance, on the basis of overall technical infrastructure, environment index and human capacity.

3.3.4.1 Connectedness

Table 13: Western Cape government ICT provincial connectedness

	National	Provinical	Score
Government employees with access to the Internet	-	20.0%	•

The UNDESA (2014) e-government report and ITU (2009) e-government toolkit define the infrastructure dimension for e-government from a national perspective, and this is covered in the e-readiness section (3.2.1 above). To take this further, RIA looked at actual government infrastructure for connectedness allowing for e-government services at provincial level, and at local government level through municipalities. On the basis of the information available, infrastructure was assessed in terms of Internet speed and government employee connectedness. According to a provincial needs assessment report, 20 per cent of 8 500 government employees had access to the Internet (DEDAT, 2013). This is less than a quarter of the provincial employees; hence, the score is in the red zone, requiring greater access for provincial employees, in order to ensure efficiency in e-service delivery (see Table 13).

Table 14: Western Cape ICT municipal connectedness

	National	Municipal	Score
Municipalities connected at 4 Mbps	-	82%	

All municipalities in the Western Cape are reported to have Internet connection; therefore, connectedness was assessed according to the Internet speed. The benchmark speed for connections of municipalities was set at 4 Mbps, with 82 per cent of all the municipalities reporting connection at that speed, two municipalities reporting a speed of 10 Mbps and one municipality a speed of 40 Mbps (DLG, 2014). It would be desirable to increase the connection speed of municipalities to at least 10 Mbps.

3.3.4.2 Web presence

Table 15: Western Cape government web presence

	National	Provinical	Score
Presence of functioning website	-	100%	
Updated in the last three months	-	100%	
Multilingual websites	-	0%	•
Deployment of e- and m-government services	-	38.4%	
Portal	-	100%	

For the government to provide efficient services to citizens online, the current web presence of the provincial departments and municipalities also required assessment. Sub-indicators under the dimensions were identified that would capture the overall performance of the province (see Table 15). The UNDESA e-government survey found that, globally, all its member states had working websites, which was indicative 'both of evolving expectations on the part of increasingly connected citizens and the enhanced capacity of governments to utilise ICT in addressing public service needs' (UNDESA, 2014: 48). Table 15 provides a summary of the extent of the web presence of the provincial government. The RIA 2014 WCG web survey found that all government departments had functioning websites that could be accessed from the main provincial website (www. westerncape.gov.za) after typing 'Western Cape government' in any search engine.

The provincial government was making sure that its websites were updated weekly, which illustrated provision by the government of recent information for citizens and businesses to use. The province identifies the importance of e-government

and m-government services as a way of using ICTs to promote efficiencies and free up resources, as well as providing services that benefit citizens, businesses and service delivery providers (DEDAT, 2013).

At a provincial level, all of the websites where in English, resulting in a red score in this respect. The language of delivery and deployment of e- and m-government services is an area of concern, given the multilingual nature of the community in the Western Cape.

E- and m-government services were still to be specified on the majority of the provincial government web pages (only 38.4 per cent of government departments had these services on their web pages). The Western Cape Department of Education offered an e-service platform with a 'find a school' service (see http://wcedemis.pgwc.gov.za/wced/findaschool.html).

Portals, which may be seen as providing the ability to search for a municipality and initiate communication with the relevant individual via email (DEDAT, 2013), were available on all provincial websites. Open portals in the Western Cape are seen as important for citizens to be able to find the right telephone number and e-mail address for a specific service issue (DEDAT, 2013). The information provided on the WCG portal was easy to find, with the relevant people to contact via email listed. However, given the lack of provincial policy on open data, there were no open-data sources that citizens could make use of at the time the survey was conducted.

Table 16: Western Cape municipal web presence

	National	Municipal	Score
Presence of functioning website	-	100.0%	
Updated in the last three months	-	93.3%	
Multilingual websites	-	23.3%	
Deployment of e- and m-government services	-	13.0%	
Portal	-	100.0%	

There has been an improvement in municipal web presence since the SALGA (2010) survey, which found that, nationally, the majority of municipalities did not have functioning websites. At the municipal level, local governments were in line with the Municipal Systems Act of 2000, which requires that government websites be kept up to date; 93.3 per cent of local government sites satisfied this requirement (only two municipalities did not comply). As at the provincial level, language was an issue, with only six municipalities having the option of selecting a local language other than English (which was Afrikaans). Deployment of e- and m-government services was found in only 13 per cent of the municipalities, which indicated the need for deployment of these services. A common available service was an SMS platform where citizens could report crime tip-offs and request emergency information in the case of a natural disaster.

3.3.4.3 Citizen use

E-government e-services are classified as 'government-to-citizen' and 'government-to-business'. These e-services are implemented to improve service delivery and make it more 'citizen-centric', allowing for greater accountability by government to its citizens. The government may supply the services, but the question remains at to the extent to which citizens actually make use of the e-government platform. Following the classification of e- government services, uptake of such services was assessed from the perspective of formal businesses, informal businesses and individuals/households. The sub-indicators to measure use of e-government services are highlighted in the sub-sections that follow.

Table 17: Individual use of e-government services

Share using a mobile phone/Internet	National	Provincial	Score
Use of mobile phones to access government services	-	30.0%	
Use of the Internet for getting information from government organisations	31.5%	40.9%	•
Use of the Internet for interacting with government organisations	-	29.9%	
Use of the Internet for downloading/uploading forms from/to a government website	-	42.6%	•
Use of the Internet to transact financially with government organisations	-	19.5%	

Citizen use of online government services may be an indicator of constraints or success in online service delivery. Table 17 provides a summary of the use of e-government services by individuals with mobile phone or other access to the Internet. In spite of the government launching e-services, the provincial survey shows that uptake is low. The highest figures were recorded for obtaining information from government organisations online and downloading or uploading forms on government websites.

The UN e-government survey states that the use of online transactional services may be limited due to citizens preferring to interact with government representatives on a face-to-face basis, rather than entering information online (UNDESA, 2014). This is an area needing further assessment. Government services online may be limited in accessibility and use, as government websites often do not offer a mobile-friendly browsing option. Given that there is an increased use of mobile phones to connect to the Internet, having mobile-friendly websites is an area that might need to be taken into consideration. Apart from that, limited use of government online services may be attributed to lack of relevant content, as well as language issues. The SALGA 2010 survey pointed out that, nationally, most municipal websites were in English only and, at the time of writing, this has not changed at local level.

Table 18: Informal business use of e-government services

Indicator	National	Provincial	Score
Use of the Internet to transact financially with government	-	7.1%	
Use of the Internet to download or upload documents or forms or applications from or to government	-	21.4%	
Use of the Internet for interacting with government organisations	39.5%	7.1%	
Use of the Internet for obtaining information from government organisations	60.1%	14.3%	

There was minimal use of e-government services by the informal businesses surveyed, as illustrated in Table 18. Although these businesses were not provincially representative, certain inferences can be drawn about the lack of use of e-government services by the informal sector. Barriers cited by individual users, such as lack of relevant content and language issues, may also be faced by informal businesses. The government may need to assess the extent to which the information it provides caters for informal businesses, and whether it is accessible via mobile platforms, as most informal businesses seem to have access to a mobile phone.

Government provision of online services for businesses is seen as a way to improve efficiencies in dealing with the government. As formal businesses use e-government services, a perception survey was conducted that showed how formal business used and perceived ICTs.²⁶ Using data from the business survey, perceptions of online government services were measured on a scale of -3 to 3 (i.e. from highly ineffective to highly effective). Nationally, according to the WEF index assessing business perception of e-government use, South Africa's value was 0.46. This is considered neutral or amber in our traffic-light score.

Similarly, businesses in the Western Cape gave a neutral ranking to most of the questions pertaining to e-service delivery, with the scores ranging from 0 to 0.3 (see Figure 8). The quality of information from the government, use of e-documentation platforms, the submission of feedback and the audio-visual characteristics of the website were seen from a neutral perspective. While the government is meant to improve efficiencies through e-government services, it seems to have little impact on the businesses surveyed (as they expressed no opinion in this regard). The transactional aspect of government was considered to be effective, as businesses were able to transact financially with the WCG. On this aspect of government, business perception of the WCG was scored at an aggregate of 1.14. Globally, the ability of a government to be able to provide transactional services is indicative of progress in service delivery. In the UN e-government online service index, a few countries were seen to have adopted transactional services, but there was no indication as to how these were perceived by users. With regard to deployment of e- and m-government services, businesses perceive this platform to be ineffective, which corresponds to the low score for deployment of such services by the WCG.

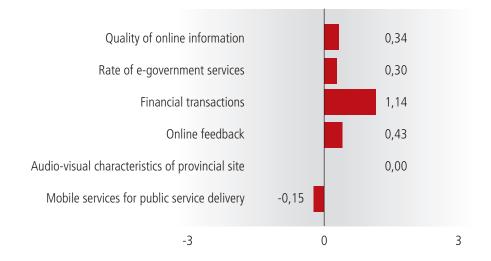


Figure 8: Formal business perception of using e-government services • Source: Business perception survey (2014)

²⁶ See detailed questionnaire for related questions on the RIA website: www.researchictafrica.net.

3.4 Outcome indicators

This section presents the values and scores on a few indicators that look at how the use of ICTs is influencing business activities, transactions and communication. As indicated in section 2, above, this is not a rigorous impact assessment, but rather an outline of findings to determine a baseline as a reference point.

Overall, with the constraints identified in the business survey, ICT does not show a strong impact on the conduct of business or on ICT innovation in the Western Cape. The effect of ICT on new business models in the formal sector was found to be minimal and not enabling of new organisational models, such as virtual teams, remote working and telecommuting within businesses. Conversely, formal businesses in the Western Cape do use the Internet to sell goods and services to consumers.

The informal business study shows that minimal use is being made of ICTs among the informal businesses interviewed. Even the use of mobile phones for communicating with suppliers and customers is very low among the informal businesses surveyed.

It is on individuals' well-being that ICT appears to have the greatest impact, with people's apparent willingness to spend, on average, 20 per cent of their income to access services. The share of individuals who make use of ICTs (the Internet or mobile phones) to access information in areas such as job search, education and health-related issues, however, is also fairly low.

Table 19: Outcome indicators

Area	Indicator	National	Provincial	Score
Formal business outcomes	ICT as an enabler of new business models	1.6	0	
	ICT as an enabler of new organisational models		0.2	
·	Use of the Internet for e-commerce		1.1	
	Capacity to innovate in ICT		0.1	•
Informal business outcomes	Financial transactions with suppliers using online banking	3.3%	2.3%	•
	Financial transactions with customers using online banking	4.1%	3.8%	
	Communication with suppliers through mobile phone	34.5%	38.3%	
	Communication with customers through mobile phone	24.9%	24.1%	
	Advertising products through social media	3.7%	6.8%	
Individual outcomes	Individuals who search for jobs using a mobile phone	-	35.7%	•
	Share of individuals who agreed their mobile phone helps them to find work	33.8%	50.9%	
	Share who agree they use mobile phone to access free educational content, such as free courses	11.1%	37.2%	
	Share who agree they use mobile phone for health purposes	-	60.3%	
,	Individuals who search for jobs using the Internet	-	48.2%	

4. Baseline survey of Western Cape ICT access with special attention to three target communities

The demand-side indicators used in the assessment are from a representative survey of the entire Western Cape. In addition, three areas believed to have low broadband provision, and which have been targeted for broadband extension strategies as part of the WCBI, were subjected to a more comprehensive baseline study to be used in assessing the impact of broadband. The necessary groundwork has been laid in the form of a baseline survey, completed in this phase between July and October 2014.

The baseline assessment was conducted across three different districts in the Western Cape: Khayelitsha, Mitchell's Plain and Saldanha Bay. In order to be able to compare the baseline assessment of 2014 and the impact assessment to be conducted in 2016, these areas will be sampled separately for the household, individual and informal business surveys, with the aim of generating representative results in each case. The baseline assessment provides detailed data on the situation in these three locations before the roll-out of specific broadband initiatives, while the follow-up survey proposed for 2016 will be used to assess how the broadband roll-out has affected the citizens, informal businesses and communities at large.

The baseline survey establishes the indicators presented in this section, against which progress will be measured in the third phase of the project.

Table 20: Sample size and demographic breakdown (unweighted)

	Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay
Number of households interviewed	984	379	472	436
Number of individuals interviewed	*976	747	1294	938
Number of males interviewed	434	300	600	426
Number of females interviewed	542	447	694	512
Number of youths (15–24 years) interviewed	92	172	218	168

Note: *there were 8 households for which the individual section was not completed due to either refusal to continue or non-availability of randomly selected individuals

4.1 Communities and indicators

4.1.1 Communities

The main indicators and the communities studied, demarcated as 'enumerator areas' by Statistics South Africa, are listed in Table 21. The table displays the percentage of adults (15 years and older) who are employed or self-employed, and the share who have used the Internet. These same communities will be studied again in the next phase of the project, in an impact assessment determining the progress (if any) in these indicators.

Table 21: Indicators in the communities

Area	Community	Share of individuals employed or self-employed	Share of individuals employed full time	Share of individuals who have used the Internet
Khayelitsha	Silver Town	37.0%	33.3%	36.1%
	Village V1 South	64.4%	60.6%	71.8%
	Ikwezi Park	50.4%	45.8%	31.4%
	Khayelitsha T3-V5	36.8%	31.7%	41.4%
	Khayelitsha T3-V2	47.0%	37.2%	41.8%

Area	Community	Share of individuals employed or self-employed	Share of individuals employed full time	Share of individuals who have used the Internet
Khayelitsha	Harare/Holimisa	56.5%	52.0%	54.4%
Mitchell's Plain	Weltevreden Valley	58.4%	56.5%	72.8%
	Lentegeur	59.8%	55.9%	70.4%
	Lentegeur	67.3%	65.1%	57.0%
	Lentegeur	55.7%	54.1%	59.4%
	Rocklands	46.9%	44.8%	61.0%
	Tafelsig	38.4%	29.5%	57.7%
Saldanha Bay	Saldanha SP	57.8%	54.7%	78.1%
	White City	57.3%	47.0%	47.3%
	Diazville	41.8%	35.9%	31.6%
	Saldanha SP (Industrial)	45.0%	39.7%	47.4%
	Saldanha Bay NU	48.9%	41.8%	12.1%
	Diazville (Middle Pos)	48.8%	41.9%	47.6%
	Diazville (Hopland)	41.7%	29.1%	51.9%

If higher Internet use and higher employment rates are detected in these communities, a sensitivity analysis will be conducted to rule out the possibility that the change was brought about by a change of people living in the EA and other factors not related to the roll-out of broadband.

Table 22 shows some of the indicators from the baseline assessment that will be monitored and assessed during the impact study.

Table 22: Headline indicators

		Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay
Households with electricity	No electricity	3.1%	1.3%	1.4%	1.0%
	Main electricity grid	94.3%	98.2%	96.8%	98.6%
	Other source of power (generator/solar)	2.6%	0.4%	1.7%	0.4%

		Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay
Source of electricity	Municipality/Eskom	52.5%	5.1%	7.9%	92.1%
	Neighbour	25.5%	87.7%	52.2%	0.8%
	Other source	22.1%	7.2%	39.8%	7.1%
Households without access to bank account		8.2%	2.6%	15.7%	13.2%
Household	Laptop	39.7%	5.1%	13.7%	20.4%
assets	Internet access	42.6%	48.9%	63.1%	7.1%
	Refrigerator	91.2%	83.2%	97.5%	94.5%
	TV	91.8%	93.5%	97.6%	94.6%
Share of household members 15 years or older who are either employed or self-employed		52.6%	55.6%	54.3%	53.5%
Share of household members 15 years or older who are employed		46.3%	43.7%	50.8%	47.4%
	Average individual income in ZAR (maximum income including transfers)		2 335.45	2 524.96	3 589.74

4.1.2 Electricity

Accessible electricity remains one of the most essential infrastructures for facilitating economic growth and development. At the micro level, electricity access brings multiple benefits, not only for cooking, heating and lighting, but also as a catalyst for boosting small and medium-sized enterprises (SMEs). Equally important to having access to electricity is the source, which inevitably has implications for reliability, affordability and sustainability. Thus, one progress indicator for the economic well-being of a household is formal access to electricity, directly provided by the municipality/Eskom.

As part of the government's effort to achieve universal electricity coverage, and the need to ensure an effective and efficient supply of electricity, diverse electricity outlet modalities have been deployed.

Data analysis from the survey revealed that the type of electricity outlet used by households to satisfy their energy needs differs by location (see Figure 9). In the Western Cape as a whole, about 45 per cent of households procure electricity directly from the municipality/Eskom (RIA, 2014). While electrification is very high in the Western Cape, the majority of households in Khayelitsha and Mitchell's Plain get their electricity informally from neighbours. This is often more expensive than regular access, which may not be available for various reasons. The situation in Saldanha Bay, where formal dwellings are predominant, is different — 9 out of every 10 households surveyed bought electricity from the municipality.

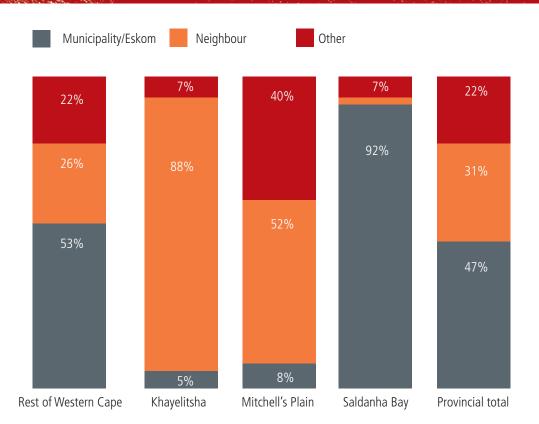


Figure 9: Households' procurement of electricity • Source: Household survey, 2014

The presence of informal dwellings in Khayelitsha, in particular, makes it impossible for every household to buy electricity directly from the municipality. In some cases, these dwellings are situated on land earmarked for land uses other than housing, which inevitably prohibits their connection to electricity, according to stipulations by the City of Cape Town (see Franks and Prasad, 2014). Thus, for these households, and many more informal dwellers, to meet their energy needs, they tend to buy from neighbours who are formally buying electricity from the municipality.

Also, a closer look at Figure 9 shows that the proportion of households buying electricity from sources other than the municipality and neighbours is higher in Mitchell's Plain than in Khayelitsha and Saldanha Bay. These sources may include households using solar heating and generators. There is also the possibility that this may include households using electricity through illegal connections.

4.1.3 Bank account

Across sub-Saharan Africa, the proportion of the unbanked population is still high. According to a recent FinScope report, however, the proportion of banked households has improved considerably. The report indicates that of the 33.7 million South Africans above the age of 16 years, some 22.5 million had bank accounts (see Finmark Trust, 2013). An increase in household access to a bank account implies the gaining of formal employment by one or more household members. A household with no previous access to a bank account obtaining access shows actual or potential progress in economic status.

The survey findings show that the share of households with at least one household member having access to a bank account in the Western Cape is high (see Figure 10). Excluding Khayelitsha, Mitchell's Plain and Saldanha Bay, the Western Cape recorded an access rate of 87 per cent of households. Eighty-four per cent of Khayelitsha households had access to a bank account. The proportion of Mitchell's Plain households with no access to a bank account (16 per cent) can be considered relatively high; it is about five times more than Khayelitsha and twice that of the rest of the Western Cape. This may be attributed to a shortage of gainful employment for households in Mitchell's Plain. In some cases, low incomes and poor saving cultures may serve as a disincentive for bank account ownership.

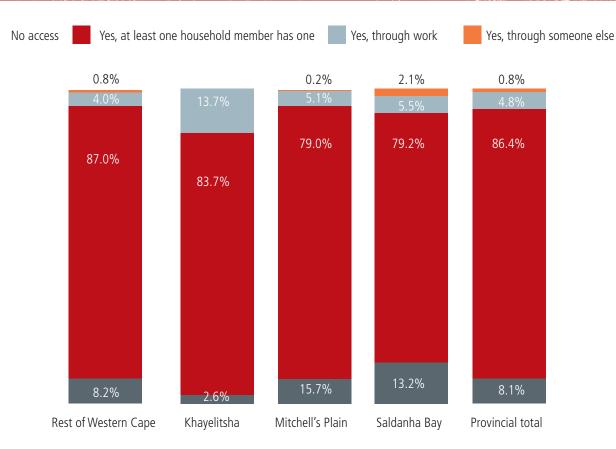


Figure 10: Share of households with access to a bank account • Source: Household survey, 2014.

4.1.4 Assets

Four household assets are used as indicators to assess the quality of life of poor households: a refrigerator, a TV, a laptop and Internet access at home. Internet access is higher than laptop or desktop computer penetration because most South Africans access the Internet via mobile phones (RIA, 2012). Desktop computers are not used as an indicator, since they are being slowly replaced by laptops and tablets for home use. These household assets are looked at in detail below.

4.1.4.1 Refrigerator

When disaggregated by locality, the proportion of households with access to a working refrigerator in Mitchell's Plain (97 per cent) was higher than the other localities surveyed. In Saldanha Bay, about 94 per cent of households surveyed had access to a working refrigerator, compared with 83 per cent for Khayelitsha. For the rest of the Western Cape, nearly 91 per cent had access to a working refrigerator. This implies that the vast majority of households see a refrigerator as a basic household item rather than a luxury one. For the 17 per cent that reported not having access to a refrigerator in Khayelitsha, it may be that they do not have the financial means to purchase and maintain a refrigerator, as these are known to increase the cost of electricity use.

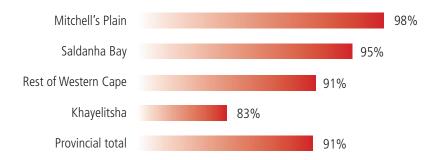


Figure 11: Share of households with a working refrigerator • Source: Household survey, 2014

4.1.4.2 Television set

A television set, like a radio, serves as an important information dissemination tool in the household. As shown in Figure 12, 92 per cent of all households surveyed across the Western Cape have a working TV. In Saldanha Bay and Khayelitsha, 95 per cent and 93 per cent of households, respectively, own a working TV. In Mitchell's Plain, nearly every household surveyed indicated that they own a working TV.

It can be inferred from the data that TV is seen as a necessity in most households in the Western Cape. This may be due to a general preference for digital media and its use as means of recreation for these households.

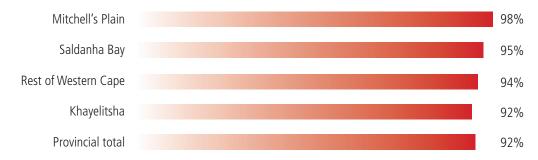


Figure 12: Share of households with a working television set • Source: Household survey, 2014

4.1.4.3 Laptop

According to the RIA 2012 survey, approximately a quarter of households in South Africa have access to a computer. Over 80 per cent of households in the three focus areas do not have access to a working laptop. The figure recorded for households with laptops is as low as 5 per cent in Khayelitsha, which is eight times less than for households in the rest of the Western Cape. Figure 13 shows a comparison of the share of households with a laptop in the different areas studied.

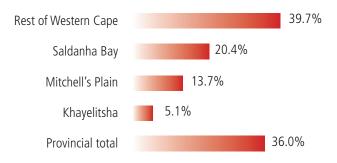


Figure 13: Share of households with a working laptop • Source: Household survey, 2014

4.1.4.4 Internet access at home

The Internet helps to transfer information between different points, and is considered to be a powerful tool for social and economic development. Cloud (1989) indicates that students and academics who do scientific research and prepare projects prefer using the Internet, because it is the easiest, fastest and cheapest way to access the necessary information. On the local front, it is estimated that the Internet industry alone contributes about 2 per cent to the country's GDP, with a projected annual rise of 0.1 per cent (Goldstuck, 2012). Although marginal compared to other sectors of the economy, ICT presents great potential for driving economic growth and productivity, with the removal of current constraints.

The results of the survey indicate that the proportion of households with a working Internet connection is highest in Mitchell's Plain, followed by Khayelitsha. Saldanha Bay recorded the lowest number of households that have a working Internet connection (see Figure 14).

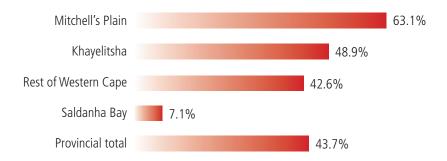


Figure 14: Share of households with a working Internet connection • Source: Household survey, 2014.

The data were analysed further to assess the mediums used by households to access the Internet (see Figure 15). Mobile phones were found to be the predominant medium across all the areas. Mitchell's Plain had the highest number of households stating that household members use mobile phones to access the Internet, followed by Khayelitsha and then Saldanha Bay.²⁷

Making use of USB/Dongles to access the Internet via a laptop or a desktop is not very common in Mitchell's Plain and Khayelitsha. The low ownership among households of computers with which dongles can be used may be a contributing factor to the low use of this medium to access the Internet.

The use of ADSL to access the Internet is comparatively lower than the other mediums. Less than 1 per cent of households in Khayelitsha and less than 5 per cent in Mitchell's Plain make use of the Internet at home using ADSL.

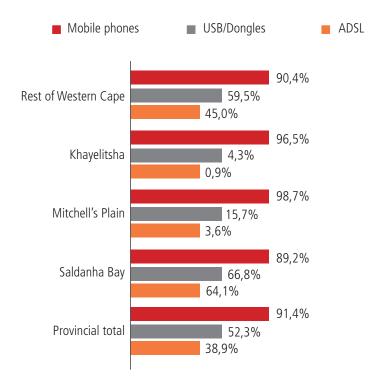


Figure 15: Share of households using a particular medium to access the Internet • Source: Household survey, 2014

²⁷ Analysis for Saldanha Bay is based on less than 10 per cent of households with working Internet connections.

Figure 15 shows that the use of ADSL is comparatively low. This finding is supported by results from the RIA Quality of Service survey. In their study, Gillwald et al. (2012) found that due to the fact that mobile broadband speeds are faster than ADSL, the majority of households tend to subscribe to the former. Internet access via mobile phone has provided, and will continue to provide, a means of addressing spatial disparities of the past by creating more equitable access to online information and services for all. Policy-wise, there is a need for strengthening the infrastructural base for broadband.

In households that have access to the Internet at home, in each of the localities, more than 90 per cent have at least one member using the Internet at home, with most having one or two household members doing so. In Khayelitsha, about 58 per cent reported that only one member of their household uses the Internet at home, compared to 30 per cent for Mitchell's Plain and 35 per cent for Saldanha Bay. Given the fact that not all households that responded own a laptop or computer, it is imperative to note that most use of the Internet at home may be via mobile phones.

Very few household members under the age of 15 are reported to use the Internet at home. Only 7 per cent and 3 per cent of household members below the age of 15 use the Internet at home in Khayelitsha and Mitchell's Plain, respectively. This reveals a rather low use of the Internet amongst children at home, and may be due to the fact that in areas like Khayelitsha and Mitchell's Plain, the proportion of children with access to their own phones is low. As research has shown, children from poor socioeconomic backgrounds are limited when it comes to their access to educational resources such as computers and the Internet at home (Sirin, 2005). This has a policy implication that requires government intervention in order to bridge such gaps between learners from poor families and those from well-to-do families.

4.1.4.5 Individual Internet access

In 2011, more than 8.5 million individuals in South Africa used the Internet (Stats SA, 2012). In the 2014 Western Cape survey, over half of the population in Khayelitsha (54.6 per cent) and Saldanha Bay (52.6 per cent) indicated that they have never used the Internet. The number of people who stated that they have never used the Internet was 37.9 per cent in Mitchell's Plain and 41.7 per cent for the rest of the Western Cape. Considering that the world is currently in the digital age, the share of individuals who still have never used the Internet is high (RIA, 2014).

The majority of individuals in all the different areas first used the Internet on their mobile phones, with the share of those accessing the Internet through a mobile phone being particularly high for Khayelitsha and Mitchell's Plain (see Figure 16).

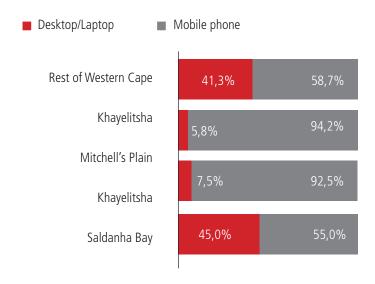


Figure 16: Share of medium through which individuals first accessed the Internet ● Source: Household survey, 2014.

The majority of individuals across all the areas studied who use the Internet access it via their mobile phones. Accessing the Internet from the workplace or at home via a computer is a little-used mode in Khayelitsha and Mitchell's Plain. Access through an educational institution, though comparatively low, is slightly more prevalent in Saldanha Bay. Internet cafes are revealed to be the least-used place of access in Mitchell's Plain, which may be attributed to several factors that could not be captured by the quantitative analysis. Accessing the Internet through a public space via either a computer or a mobile device seems to be among the most common modes of access in Saldanha Bay. In Mitchell's Plain and Khayelitsha, accessing the Internet in a public space via a mobile device is the second most commonly used mode (see Table 23).

Table 23: Where individuals access the Internet (multiple responses)

Mode of Internet access	Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay
Mobile phone	92.5%	96.9%	98.6%	85.1%
Desktop/Laptop at home	58.0%	7.0%	16.1%	25.9%
Desktop/Laptop at work	45.3%	17.5%	15.3%	42.1%
Desktop/Laptop at a place of education	15.7%	16.9%	6.8%	32.3%
Desktop/Laptop at an Internet cafe	32.9%	24.4%	5.2%	52.5%
Desktop/Laptop at a public space	31.5%	19.0%	7.3%	51.9%
Mobile device at a public space	39.6%	27.4%	18.6%	46.8%

4.1.5 Education and skills

South Africa has seen a decline in the number of people with no schooling. In 1996, 19.1 per cent did not have any schooling; by 2011, the figure had dropped to 8.6 per cent (Stats SA, 2012). Similarly, the number of individuals who completed secondary school increased from 16.3 per cent in 1996 to 18.6 per cent in 2007 and 28.9 per cent in 2011. The number of individuals with a tertiary education increased from 7.1 per cent in 1996 to 11.8 per cent in 2011 (Stats SA, 2012).

The education and skills indicator will be assessed, as it plays a role in building a knowledge-based society, and it can also reflect the economic and social status of a particular household and the community as a whole. If the livelihoods of households are increased, they could afford to send their children to school and give them an opportunity to advance their education, skills and abilities.

At the national level, the proportion of children of school-going age (7 to 17 years) who are actually in schooling is high, at nearly 97 per cent in 2011 (Stats SA, 2012). In the 2014 survey conducted by RIA, 41.4 per cent of households in the province that have children of school-going age (6 to 14 years) indicated that none of their children attend school. In Saldanha Bay, about 13 per cent of households surveyed indicated that none of their children attend school. This figure is as high as 33.9 per cent for Mitchell's Plain and 43.1 per cent for the rest of the Western Cape (Table 24). The number of children among households with children of school-going age who are out of school is very high across the province.

Table 24: School attendance, households with children of school-going age (6 to 14 years)

Mode of Internet access	Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay
None of them attend school	43.1%	27.3%	33.9%	12.6%
Not all attend school	11.2%	9.9%	11.9%	30.2%
All attend government school	37.3%	58.7%	52.1%	44.1%
All attend, and one or more attend a private school	8.4%	4.0%	2.1%	13.1%

Source: RIA household and individual survey, 2014

According to the survey, in the Western Cape 2.6 per cent of the sample individuals never attended school. This result is similar to that of the 2011 census, which reported only 2.7 per cent with no formal education/schooling in the province. The number of individuals who never went to school is low across all areas, and this could be because of the free basic education in place, meaning individuals have access to primary education. Khayelitsha recorded the lowest share of individuals who have primary schooling as their highest qualification (4.3 per cent). Secondary level as the highest attained is higher in all areas, and more so in Mitchell's Plain and Khayelitsha, while tertiary education is predominantly low in all the areas (see Table 25).

Table 25: Highest level of education attained by individuals

Level	Khayelitsha	Mitchell's Plain	Saldanha Bay	Rest of Western Cape
None	1.3%	1.3%	3.6%	3.1%
Primary	4.3%	12.6%	17.1%	23.2%
Secondary: matric	72.1%	81.8%	57.5%	37.5%
Secondary: advanced-Level	18.2%	2.2%	13.5%	13%
Tertiary: diploma or certificate	3.3%	1.1%	6.1%	11.5%
Tertiary: BSc or BA	0.7%	0.3%	1.0%	6.6%
Tertiary: master's	0.0%	0.1%	0.6%	4.9%
Tertiary: PhD	0.0%	0.0%	0.0%	0.2%

Source: RIA household and individual survey, 2014

4.1.6 Employment

The employment indicator gives the share of adults in the household who are either formally employed or self-employed (have their own businesses). For those who are, a second employment indicator is used, measuring the full-time, part-time or occasional/seasonal nature of the work. With the possibility of increased access to the Internet through the broadband initiative, it is expected that jobs and other opportunities for economic improvement can be created.

4.1.6.1 Activities involved in over the past six months

In the survey, respondents were asked to list the activities they had been involved in during the six months prior to the survey. Less than half of respondents in the Western Cape stated that they were formally employed, while a little over one-fifth indicated that they were unemployed. Of the three focus areas, Mitchell's Plain recorded the highest number of employed individuals, followed by Saldanha Bay and then Khayelitsha. The highest share of unemployed individuals was found in Khayelitsha. The share of individuals who are self-employed is relatively low across all areas, and is measured at only 5.1 per cent for the province as a whole, which points to the lack of an entrepreneurial culture among residents within the province (see Table 26).

In general, the number of individuals who are either unemployed or not economically active can be considered relatively high across all the areas surveyed. This indicates that there are not many people who are currently contributing to the economy and the dependency ratio is quite high.

Table 26: Activities engaged in over the past six months

Level	Khayelitsha	Mitchell's Plain	Saldanha Bay	Rest of Western Cape	Provincial total
Student or pupil	13.0%	7.2%	10.7%	6.4%	7.4%
Unpaid housework (e.g. housewife)	1.2%	4.7%	13.1%	6.7%	5.8%
Retired	3.5%	12.3%	6.5%	13.2%	11.7%

Level	Khayelitsha	Mitchell's Plain	Saldanha Bay	Rest of Western Cape	Provincial total
Unemployed	34.8%	21.9%	18.2%	19.1%	21.5%
Disabled and unable to work	0.8%	1.3%	2.6%	2%	1.7%
Employed	43.7%	50.8%	47.4%	46.3%	46.6%
Self-employed	3.1%	1.7%	1.2%	6.2%	5.1%

Source: RIA household and individual survey, 2014

4.1.7 Income

The final indicator measures the average income per household members. If broadband does lead to improved economic prospects, then the number of income earners should increase, by virtue of the creation of more jobs over the next two years. More specifically, where broadband Internet adoption is faster, income levels of individuals are expected to rise. According to the RIA 2014 Western Cape survey, the average individual monthly income for the province is ZAR4 338.27.

The survey shows that, on average, individual monthly income is lowest in Khayelitsha at ZAR2 335.45, with a similar figure of ZAR2 524.96 for Mitchell's Plain. Individual income is slightly higher in Saldanha Bay, with an average of ZAR3 589.74, while the average figure for the rest of the Western Cape is slightly over ZAR5 000. This income includes not only salaries from employment but also transfer income. These figures will be assessed again in the follow-up survey to see to what extent there has been a change.

5. Conclusions and recommendations

5.1 Conclusions

Policy and regulatory environment

If one reviews which of the indicators are green and which are red in terms of digital readiness, many of the supply-side issues are positive, with relatively high levels of infrastructure availability both in the backbone and in the backhaul networks. Although ADSL use in the Western Cape is lower than the national average, the wide coverage of the population by mobile broadband means that even the access networks (the 'last mile') are well-covered. However, taking into account the constraining national ICT policy and regulatory environment, and the resulting high prices for telecommunications services, provincial strategies to connect all public offices, to prioritise schools through a fibre-optic infrastructure based on leveraging existing networks and to make available public Wi-Fi at all public offices in line with, and indeed in advance of, national policy, will address the identified infrastructural bottlenecks.

Not only do national ICT stakeholders perceive the South African telecommunications regulatory environment as ineffective, formal businesses in the Western Cape also view national performance in ICT policy and regulation in a poor light. Although it is expected that ICT access will grow, communication costs, as a key input expense for businesses, are still too high, and broadband quality of service too poor, to attract multinational companies to the Western Cape or to be able to generate jobs through business process outsourcing, and generally to support a growing knowledge-based economy. ICT policy outcomes are a function of national policy on market structure and institutional arrangements, resulting in a licensing and regulatory regime that goes beyond the jurisdiction of the WCG. Therefore, it is clear that the national policy and regulatory environment places constraints on provincial development.

Infrastructural interventions alone are not sufficient to enable the growth and development associated with broadband extension in developing economies.

Affordability and quality of service

High prices can have a negative impact on investment in the region, because ICT is a service on which the wider services sector and businesses, in general, depend. Factors like input costs for businesses influence multinationals' decisions about where to locate regional head offices, and whether to invest in ICT-intensive services like business process outsourcing. The high input costs for businesses and the perceived scarcity of the latest technology (access to which is lower in the Western Cape than nationally) are factors that need to be addressed in order for regional implementation strategies to be optimal.

There are several critical areas that would need to be addressed for the Western Cape to become the ICT hub of South Africa. These include not only the ubiquitous availability of affordable and ultra-high-speed broadband; there is significant evidence that it is not technology on its own that drives efficiency, productivity and innovation (whether in the private or the public sector), but rather that ICT can act as an enabler of, and even a catalyst for, other economic and social interventions. The perception of businesses in the Western Cape that there is little venture capital to be found and that the latest technologies are not widely available, both of which seem more prevalent at the national level than in the Western Cape, needs to be addressed. Considering the size of the local economy and its educational endowments, the limited number of innovation hubs, incubators or collaboration spaces, appears to be linked to the absence of a localised entrepreneurial and innovation strategy. Beyond the availability of high-speed bandwidth, the incentives that can be used to make the Western Cape more attractive as a destination for technology development and innovation need to be investigated.

Education and skills

Another critical condition to stimulate development of the ICT industry in the region is widespread availability of basic and specialised skills amongst citizens and consumers, users, producers and scientists, engineers and innovators, scientific and social. Although adult literacy levels in the Western Cape are higher than they are for the rest of the country, basic literacy is not sufficient to allow citizens to participate fully and constructively in a digital economy. Widespread e-literacy programmes are essential, beyond those planned in schools (although these are likely to have the greatest impact). The quality of education, in general, and in mathematics and science particularly, is rated as average by formal businesses. In order for the high-tech sector to expand, higher and advanced knowledge and skills are required, not only for citizens to obtain the optimal benefits from ICT, but also to meet the demands and requirements of the of a modern economy.

Although levels of enrolment in secondary schools are lower than the national rate, which is of concern, the provincial pass rate for matric is higher than the national rate. However, the province still needs to focus on building the skills of its citizens to ensure improvement in this indicator. This is further reflected in the percentage of university graduates that the province produces.

Although provincially the proportion of university graduates, from those enrolled at tertiary level, is marginally more than it is nationally, it is still relatively low for a middle-income country or emerging economy (at just over 24 per cent), and requires interventions at the provincial level to ensure that this is improved, in order to align the Western Cape's available skills set with the demand for skills in a knowledge economy.

Despite this, companies in the Western Cape indicate that they have enough human resources capacity to innovate in ICT. However, this is not reflected in the number of innovation hubs or the output of innovation in the economy. Having a wider pool of the right skills and techniques, should the number of graduates increase within the province, can enhance the capacity of companies to innovate and potentially to exceed current levels of innovation. This can contribute positively to business efficiency in the Western Cape. Therefore, human resources will need to be developed further, and those with ICT skills and tertiary education need to be retained in the region.

Access and use

The Western Cape performs better than the national average in terms of the use and ownership of ICT devices. Mobile phone ownership among individuals is high and, therefore, it is not surprising that mobile phones are the predominant medium through which the Internet is accessed. The use of ADSL to access the Internet is very low nationally, and even lower at the provincial level. Although the use of the Internet at the provincial level is higher than at the national level, it is not high by lower-middle-income country standards, and considering the importance that has been placed on broadband as an economic driver by the province.

The informal business study, although not representative, provides some indication of the level of ICT use in conducting business activities, which is largely disappointing. Very little use is made of online banking and mobile money transfers to carry out financial transactions with suppliers and customers, whereas these technologies are used increasingly by micro-traders elsewhere on the continent. The study shows that the preference in the province is for cash-based transactions. In terms of communicating with suppliers and customers, informal businesses tend to make use of mobile phones relatively more than other ICT devices. This is predominantly through voice, as not much use is made of SMSs. Email is also hardly used as a means of communicating with clients and suppliers. The informal businesses studied also indicated that they seldom make use of the Internet by way of receiving orders or purchasing goods. Informal businesses seem to be more comfortable in advertising their products or business through word-of-mouth rather than using social media, SMS or other mobile phone-aided services.

The low level of use of ICTs among informal businesses is an opportunity to increase productivity by using ICTs. This is partially as a result of the high cost of communications in the country, which inhibits use of basic services by SMEs and individuals, reflecting the poor e-literacy base in the country as soon as one moves beyond basic voice and data services. Even if users do have access to services and can afford them, they may not have the skills to use advanced Internet and value-added services optimally. These are critical demand-stimulation issues that require short-term interventions and longer-term intergenerational educational strategies.

Government e-readiness

Also, while the provincial and municipal governments have progressed significantly toward digital readiness in terms of their internal deployment of ICTs, they have been less successful in digitally preparing their citizenry, whether through the provision of online services, integration of mobile money and non-credit payment systems, or introduction of complete turnkey solutions. It is clear that there is a lack of engagement with and by citizens via online platforms. The absence of relevant content in a sufficient number of local languages (the English language dominates websites) contributes to the low use of government online services and the preference for face-to-face interaction with government officials. School connectivity and public Wi-Fi are amongst the most effective ways of connecting citizens and increasing their participation in online initiatives. In order to create a secure, trusted and expanding ICT environment, in addition to national policy development in the areas of cybersecurity, the province should actively be creating an online environment for e-government and commercial services to flourish. This requires the implementation of good practices in every sphere of governance – in democratic, networked economies the core principle being openness. The first steps taken by the City of Cape Town to develop an open-data policy that not only will enhance transparency and accountability, but potentially will improve opportunities for software, applications and content development, highlight the need for ICT interventions to be understood in the context of an ecosystem, with supply-side measures aligning with demandstimulation efforts that are within the province's jurisdiction and capability, such as connecting schools, creating public Wi-Fi access points for people to interact with government and commercial services. This context of openness to networks, services and the government and its data, for public and commercial application, is key to the realisation of networked societies and the positive multipliers associated with them.

Demand stimulation

The research results demonstrate that the red indicators largely reflect lack of the vital demand-stimulation measures necessary to achieve the critical mass of users, producers and innovators needed in an information economy. For more positive policy outcomes in future digital readiness assessments, the province will need to actively pursue measures that will stimulate demand.

5.2 Recommendations

While the province is encumbered by negative national policy outcomes in the areas of telecommunications and national education legacies – the two critical areas of information development – it has several positive provincial endowments that can be used to leverage its position as a competitive region and a developmental model.

Of the large number of amber indicators, several reflect that performance is not bad, but needs to be smarter, quicker or better in order to improve on the benchmark. More generally, attention needs to shift from infrastructure to the people for whom it is intended. This can be done in some of the following ways:

- ensuring open-access terms for public networks, or public investments in private networks, to enable third-party traffic
 that could encourage competitive services, which would drive down costs, stimulate demand, extend consumer choice,
 enable citizens' participation and build the critical mass necessary to enjoy the network effects associated with economic
 growth and development;
- prioritising the development of skills school, tertiary and specialised to support the widespread adoption of ICT associated with improved efficiency and innovation;
- creating jobs by incentivising the location of international company headquarters and business process outsourcing in the
 province by driving down the input cost of communications, and ensuring competitively priced services and diversity
 of choice;
- continuing to engage on national ICT policy and regulation in order to overcome existing policy and regulatory bottlenecks
 and to increase competitiveness and ICT market efficiency to reduce the costs of services and improve national and
 international quality of service;
- prioritising m-government services over e-government services, which may be used by only a very small portion of the
 population, and these should also be integrated with mobile money and banking services that will enable individuals,
 households and small businesses to transact with the government and participate more effectively in interactive
 online services;
- publicising the innovative deployment of ICTs within the government, which could serve as a role-model to businesses and consumers in the province who, from the formal and informal business surveys, appear to be unreceptive to ICT innovation;
- improving the level of co-ordination between universities, the private sector and innovation hubs, in order to attract more venture capital to the region, which, in turn, would stimulate growth in the creative and software industries;
- retaining highly skilled human resources by making the Western Cape a regional hub for technology development and
 innovation, by incentivising the collaboration and engagement of the four tertiary institutions in the Western Cape,
 amongst themselves, and with business and the provincial government; and
- leveraging existing excellence located in the province, such as the large ultra-high-speed networks required by SKA and the
 universities, to create a global big-data centre of excellence that will stimulate R&D, innovation and evidence for effective
 policy and planning.

The indicators used for this assessment, of which currently 22 are green (mostly relating to broadband infrastructure, but including many that will continue to require attention to retain positive performance status), 35 are amber (which suggests the mere ticking over of things in many areas, several of which need to be green to meet digital readiness thresholds) and 14 are red (indicating underperformance), provide a baseline against which the Western Cape's progress towards digital readiness can be assessed in the future.

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Annex 1: Phase 2 – Measuring the impact of ICT access and use

The two main methodologies commonly used for measuring the impact of ICTs on economic growth are econometrics and input-output models. The economic impact in this section is assessed for three areas: telecommunications adoption, broadband adoption and broadband speed. Figure 17 displays seminal studies for telecommunications, and for broadband impact, grouped by the methodology used.

Economic Impact

	Broadband Adoption		
Telecommunication			Speed
Econometric Testing	Econometric Testing	Input-Output Model	Econometric Testing
Röller & Waverman (2001)	Lehr et al. (2005)	Katz (2009 & 2012)	Rohman & Bolin (2012b)
Waverman, Moschi and Fuss (2005)	Rohman & Bolin (2012a)	Rohman & Bolin (2012)	
Lee, Lavendis and Gutierrez (2012)	Koutroumpis (2011)		,

Figure 17: Seminal studies measuring the impact of ICTs

Economic impact of broadband penetration

Broadband is seen as the catalyst for other sectors to grow as part of so-called general-purpose technology (GPT). Investment in broadband access infrastructure creates jobs and income not only through direct investment, which creates or expands existing network capacity, speed and reliability, but also through the indirect increase of productivity in other sectors.

Summarising from previous studies, it is found that the multiplier of broadband varies between 1.43 to 3.6 depending upon the region investigated and the type of multiplier. The Type I effect measures the impact as the ratio of the total direct and indirect impact, divided by direct impact — (direct+indirect)/direct — while the Type II effect estimates the impact as the ratio of the sum of direct, indirect and induced impact divided by direct impact — (direct+indirect+induced)/direct. The induced effect is due to additional consumption from additional income (Yan, 1968). The input-output model, thus, includes households.

Economic impact of quality of broadband

Rohman and Bohlin (2012b) aim to measure the impact of broadband speed on economic growth for OECD countries. The data for the analysis come from OECD databases and from Ookla, a company that provides broadband testing and web-based network diagnostic applications data on a daily basis. Quarterly balanced panel data for 33 OECD countries during the period 2008–2010 were examined. The study finds that doubling the broadband speed yields an additional 0.3 per cent of GDP growth.

Micro modelling

Impact analysis done at the micro level mainly makes use of econometric modelling techniques. This section reviews some studies on the impact of mobile phones carried out at the micro level.

One of the most widely referenced impact studies at a micro level is a natural experiment on the fishing industry in Kerala, India. The study shows that fisherman were able to reduce unsold catch by 6 per cent, leading to an increase in their profits by 8 per cent, as a result of using a mobile phone to exchange market prices and other related information (Abraham, 2006; Jensen, 2007). A similar study of grain retailers in Niger showed that the use of mobile phones enabled them to reduce price variations across markets by 6.4 per cent and inter-annual market disparity by as much as 10 per cent (Aker, 2008).

Ozowa (1997) and Lokanathan and Kapugama (2012) talk about the different types of information that are required by farmers and other micro enterprises. Among the types of information required are price information, information about buyers and sellers, and information on disease control, fertilisers and pesticides, for the growers in particular. De Silva and Ratnadiwakara (2008) have demonstrated that there is a cost associated with searching for the information required. The cost of searching for this information could be reduced by the use of ICTs. For example, some of the costs incurred are transport costs to seek information. This situation is often worse in rural areas due to the increased distances one may have to travel to obtain the necessary information. In addition, losses are often incurred due to the lack of information. The use of telecommunications helps reduce this cost. The ability to obtain information through the use of telecommunications services is aptly demonstrated in the studies of Jensen (2007) and Aker (2008), where the ability to obtain price information via mobile phones reduced losses and, in some instances, increased revenue and profits in the fisheries and grain markets, respectively.

Access to a mobile phone could also lead to increased co-ordination between various economic actors and, thereby, reduce transaction costs. The use of a mobile phone has been seen as encouraging entrepreneurial behaviour, even among previously unemployed women (Rannu, Saksing, and Mahlakõiv 2010).

These micro studies look at the use of mobile phone interventions for economic and productive outcomes. The following areas of intervention were identified from the review of the literature:

- Infrastructure interventions (access to mobile communication networks): A mobile communication network becomes available to a previously unconnected area/population. The intervention is operator-driven, as only a telecommunications operator is be able to roll out a network. The intervention can be by a new network operator entering the telecommunications market or an existing telecommunications operator expanding its coverage area.
- Access device interventions (access to a mobile phone): An individual or business purchases a mobile phone/SIM card, is gifted one or uses or borrows someone else's mobile phone/SIM card.
- Service interventions (provision of and access to relevant services): Value-added services, such as information about prices, agricultural advisory services and mobile money services, are made available to a population for a fee or at a charge.
- Application interventions: Relevant applications are made available for downloading and use on mobile phones. This is specifically for smartphones and feature phones.

It is not access to a mobile phone per se that might have an economic effect — it is the ability to use the mobile phone to shorten the spatial disparity between economic agents, the ability to gain access to information and knowledge that otherwise would have been inaccessible or unavailable, the ability to connect to and maintain social and business relationships and the ability to co-ordinate with other economic agents at lower transaction costs (Samarajiva et al., 2013). It is to be expected that when a technological intervention is carried out, the way in which it is adopted is important. Only after adoption can its effect be assessed. The primary outcomes below can be impacted on by the introduction of mobile infrastructure, devices or applications:

- individuals income/savings/consumption;
- households household income/consumption;
- businesses profit/productivity; and
- markets price dispersion, waste reduction.

Application to Western Cape impact assessment

Existing methodologies and studies will be applied to the Western Cape study to get a basic idea of policy impacts. For a better understanding of impacts and policy choices, a framework will be developed specifically for the Western Cape. Some considerations for choosing the methodology include:

- •the scope of analysis whether the study aims to investigate the analysis at macro level or micro level;
- •the availability of data; and
- •the unit of analysis industry level versus individual end users.

An econometric modelling technique will be used in conducting the impact assessment. The approach that will be adopted in conducting the impact assessment of broadband roll-out for Khayelitsha, Mitchell's Plain and Saldanha Bay in the Western Cape will draw from some of the models discussed above and include a panel-data analysis based on the baseline assessment and a follow-up survey to be conducted within the Western Cape and combining the equations used. This methodology can be used to assess the impact of broadband on output at the EA and overall community level.

Figure 18 summarises the approach that will be employed in conducting the impact assessment for the identified areas in the Western Cape.

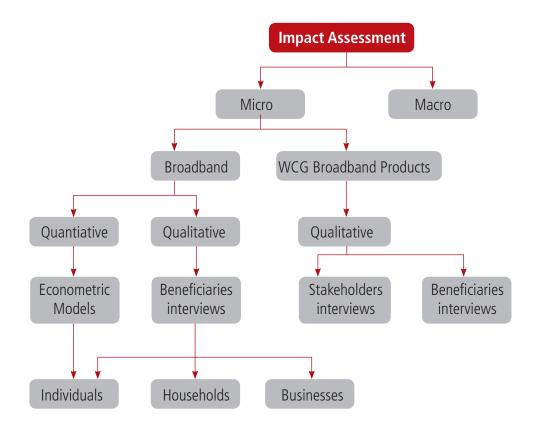


Figure 18: Approach to the impact assessment for the Western Cape

The impact assessment of broadband roll-out for Khayelitsha, Mitchell's Plain and Saldanha Bay will be conducted at the micro level. The assessment of the impact of broadband on the identified communities will be carried out through quantitative and a qualitative analysis. The quantitative approach will employ suitable econometric models, while the qualitative approach will take the form of interviews with beneficiaries in the communities. Analysis will be conducted at the individual, household and business levels. The study will also assess the impact of specific broadband projects rolled out by the WCG. This will take the form of a qualitative analysis based on interviews with critical stakeholders and beneficiaries within the communities.

The study will also use an instrumental variable (IV) estimation to identify the causal effect of broadband roll-out on economic and social outcomes. The IV enables us to explain some of the variation in the estimation. This includes variables other than the broadband roll-out itself that may already have an influence on the dependent variable.

The study will control for various factors, as it is expected that with the introduction of broadband other forces can influence the overall impact in the communities. Some of the factors that will be controlled for include other groups of income earners moving into the neighbourhoods once connected, change in property values in connected neighbourhoods, economic growth and inflation. Municipalities where similar initiatives have been taken and some in which such initiatives have not been taken will be used as control areas for the study. The study will also investigate the presence of operators, network coverage and quality of networks (speed) within the identified areas. These will be recorded during the baseline assessment in 2014 and again in 2016 when the impact assessment will be conducted. This will allow the study to assess the changes that have taken place during this period.

Annex 2: ICT access and use surveys

Government e-readiness assessment

Two sources of data for the supply-side information were gathered from the Western Cape government. The data from the survey of municipalities for the Report on the State of ICT in Municipalities in the Western Cape, 2013—2014, provided a very useful basis for identifying indicators to determine ICT access and use by municipalities. These have been identified as the:

- infrastructure set of local government;
- supply of e-government service to citizens (web presence); and
- internal government capacity to provide e-services.

The department of local government survey provided data on the extent of the government's internal readiness, but did not provide information on web or online presence, which is an important indicator for e-government readiness. To assess the web presence of provincial and local departments, a desk study was conducted that tracked the online accessibility of the WCG. 'Western Cape government' was typed into the search engine, which led to the provincial website. The website provided information on all provincial departments. For local government, municipalities all had their website links on the provincial website that one could follow.

Data collection for citizen use was conducted in the formal business survey, as well as the informal business survey, and the household/individual survey, with questions designed to assess citizen use and, similar to the WEF, formal business perceptions of the effectiveness of e-government services.

Formal business survey

The formal business survey took the form of an opinion survey similar to that administered by the WEF, but with a greater focus on ICTs. An adjusted version of the WEF questionnaire was used to gauge the perception of ICT and how formal businesses use and benefit from ICT.²⁸

The survey investigated seven main areas:

- total expenditure, ICT capex and ICT opex;
- overall perception of the provincial economy;
- company operations and strategy;
- government public institutions;
- education and human capital;
- · corruption, ethics and social responsibility; and
- health.

A sample of 400 businesses was randomly selected from the list of companies in the business register compiled by Stats SA and clustered by economic sectors. The questionnaires were administered both online and by phone. A total of 200 businesses have been surveyed within the Western Cape.

The sample was stratified according to economic clusters, as defined by Stats SA. Specifically, the selection of particular economic activities, and the number of businesses to be included in the survey, was based on the identification of the most relevant sectors in the Western Cape and on the significance of access to ICTs to these economic sectors.

Stats SA provided an over-sampled list of 400 businesses for the Western Cape Broadband Survey (formal business survey), based on the sample frame prepared by Research ICT Africa. The sample for the formal business survey was selected on the basis of the specifications set out in Table 27.

²⁸ The questionnaire draws on the World Economic Forum's Executive Opinion Survey (WEF, 2015).

Table 27: Sample specifications (1)

Economic sector	Sector contribution to regional GDP (%)	Total no. of businesses	No. of businesses in focus areas (KMS)	No. of businesses in the rest of WC
Financial intermediation, insurance, real estate and business services	32	128	96	32
Manufacturing	17	68	50	18
Wholesale and retail trade, catering and accommodation	15	60	44	16
General government services	10	40	30	10
Transport, storage and communication	10	40	30	10
Community, social and personal services	5	20	14	6
Construction	5	20	14	6
Agriculture, forestry and fishing	4	16	12	4
Electricity, gas and water	2	8	6	2
Mining and quarrying	0	0	0	0
Total	100	400	296	104

Source: Western Cape Government Provincial Treasury (2013), based on Stats SA data

After applying the survey specifications, the final sampling frame for the formal business survey comprised 241 362 geographic units (GEOs) in the Western Cape. The economic sector was treated as a first level of stratification. The sampling frame was further stratified by size-group using enterprise turnover as the measure of size (MOS). The main challenge encountered by Stats SA was that to date only 7 per cent of the GEOs in the Western Cape have been updated through profiling and, thus, have GEO turnover. Therefore, enterprise turnover (from SARS) was used as 'proxy MOS' for the GEO. The implication of this is that the size group variable can only be used as a flag to give an indication of a probable size-group of the GEO. As a result, the design for this survey was affected by an absence of the geographical location of businesses.

The table below summarises the number of questionnaires collected for each economic sector.

Table 28: Sample specifications (2)

Economic sector	Sample size	Total questionnaires collected
Financial intermediation, insurance, real estate and business services	64	64
Manufacturing	34	34
Wholesale and retail trade, catering and accommodation	30	30
General government services	-	-

Economic sector	Sample size	Total questionnaires collected
Transport, storage and communication	20	20
Community, social and personal services	30	30
Construction	10	10
Agriculture, forestry and fishing	8	12
Electricity, gas and water	4	4
Mining and quarrying	0	0
Total	200	204

Table 29: Characteristics of the surveyed formal businesses

Indicator		%
Number of employees	<50	33.7
	50–150	19.4
	151–500	14.3
	501–1 000	15.3
	1 001–5 000	14.8
	>5 000	2.6
Approximate total revenue	Up to R50 000	1.1
	Over R50 000, up to R100 000	7.4
	Over R100 000, up to R500 000	5.3
	Over R500 000, up to R1million	9.5
	Over R1million, up to R10million	22.1
	Over R10million, up to R100million	17.9
	Over R100million, up to R1billion	23.2
	Over R1billion	13.7

Formal businesses were well spread across different economic sectors and sizes (in terms of number of employees and in terms of total revenue). The majority of businesses interviewed were relatively small companies with less than 50 employees. Only 2.6 per cent of the businesses surveyed were very large companies with more than 5 000 employees.

The most problematic factor in doing business in the Western Cape is crime and theft, which affects 80.3 per cent of the surveyed respondents (see Figure 19). This is followed by a poor work ethic in the labour force (77.9 per cent) and corruption (68.3 per cent). Conversely, local government was seen as stable and the local bureaucracy efficient.

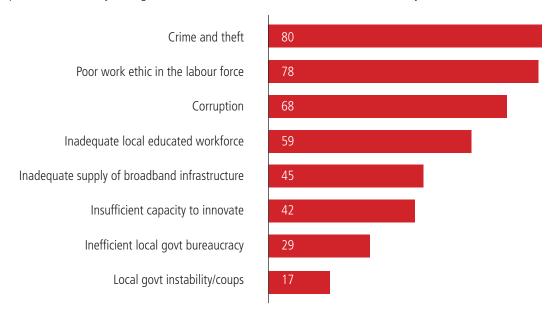


Figure 19: Challenges in doing business in the Western Cape

Informal business survey

To make the assessment tool more appropriate to a developing country context and to support the significant informal sector contribution to the Western Cape, an assessment of business use (and needs) of the informal sector was undertaken. The informal sector survey was piggybacked on the household and individual user survey. The modules in the informal business questionnaire include sections on business statistics related to advertising, strategies and tools, location of the business, number of employees, ICT access, use and expenditure, and banking and mobile money in the informal sector. The survey is not of a representative sample and does not consist of elements that are 'typical' of the population under study. The analysis is, therefore, of a qualitative nature and results can be seen as indicative of the nature and activities of informal businesses in the province.

Characteristics of informal businesses

Business ownership type is the first step in establishing a business. According to Carysforth and Neild (2000), there are four main types of business ownership: sole proprietorship (business with one owner), partnership (two or more owners), corporation and limited liability company (a hybrid entity that combines favourable aspects of the corporation and partnership). The choice of type of ownership determines what the business can and cannot do and, most importantly, it determines how the established business is taxed. The businesses interviewed were mainly sole proprietorships (74 per cent) and partnership (22 per cent). Most of the businesses indicated that they used their own savings to finance the business, with a few indicating that they used money loaned from friends or relatives. Over half of the informal businesses interviewed stated that they decided to start a business as, otherwise, they would have been unemployed.

The increased connectivity to power in South Africa is also reflected in the findings of this study at the various levels. About 81 per cent of the informal businesses interviewed indicated that their business premises had electricity, with 77.4 per cent of them stating that the main electricity grid was their source of power. The nature of these informal businesses prevents them from keeping standard financial records, and close to half of those in the study did not keep any form of records of their business finances. Access to a bank account was found to be very low among these businesses, with only about 29 per cent indicating that they had a bank account.

Inadequate education has consistently been identified as a primary inhibitor of entrepreneurial activity in South Africa. Herrington, Kew, and Kew (2009) show that people with matric and tertiary education are more likely to start up a business than are people with no education. They further find that having a tertiary education increases the probability of a person owning or managing a business. Chiliya and Roberts-Lombard (2012) show that the education level of the business owner is directly proportionate to the profitability of the business.

Although the study of informal businesses in the Western Cape cannot be used to analyse the province representatively, results reveal that secondary education was the highest level attained by the majority of owners of the businesses interviewed (about 48 per cent). Over 80 per cent of the business owners had a secondary education or less.

The businesses interviewed trade mostly within their local communities, indicating that the majority of their suppliers and customers are within 50 kilometres of the location of the business. Financial transactions, between the businesses and their customers and suppliers, are mainly in cash. The businesses also show a preference for face-to-face communication with suppliers and customers, as opposed to using technology such as mobile phones for communication.

ICT access and use among informal businesses

Less than 10 per cent of the businesses surveyed stated that they had a working fixed-line telephone connection and, while most claimed that they did not use a fixed line because it was not available in their communities and that they had no need for it, others mentioned the high cost of obtaining a fixed-line phone. Interestingly, though, about one-third of the businesses indicated that they intended to make use of fixed-line telephones in the future, and were willing and able to spend, on average, ZAR100 a month on a fixed-line phone. Only 6 per cent of the businesses stated that they owned a computer; the majority found no need for them in their businesses.

The mobile phone was identified as one of the main forms of technology used for business purposes amongst the businesses interviewed, with about 70 per cent indicating that they used mobile phones to conduct their business activities. However, they mostly used their private phones for business purposes, rather than having a dedicated business mobile phone. The businesses stated that they did use their phones for sending and receiving SMSs for business purposes, and mentioned that they found the mobile phone very important for business activities. On average, the businesses spent ZAR200 a month on voice services on their mobile phones and ZAR23 a month on data services.

Only about 10.5 per cent of the businesses indicated that they had access to the Internet, with the majority of these accessing it through their mobile phones. The businesses stated that they used the Internet mainly to acquire information about goods and services. Most of those not using the Internet did not see the need for it, though about 42 per cent indicated that they would use the Internet in the future.

Although the informal business sample is not a subset of a statistical population and, therefore, does not accurately reflect the entire population, it gives an idea of what businesses at the micro-level look like and how they conduct their business activities.

Household survey

This part of the report analyses the major household-level attributes in the selected case study areas. The principal objective is to investigate how household variables affect the use of broadband/Internet facilities. The interaction effects that were examined helped to explain the effects of household characteristics on broadband development by illuminating the most likely pathways through which these variables operate. This information is also useful for predicting who is most likely to benefit from public policies to improve community infrastructure, education and health care.

Household attributes Source of electricity

Access to electricity remains one of the most essential facilities for guaranteeing economic growth and development. At the micro level, electricity access brings with it multiple benefits, not only for cooking, heating and lighting, but also as a catalyst for boosting SMEs. As important as having access to electricity is the source, which inevitably has implications for reliability, affordability and sustainability. It is in view of this that data on households' sources of electricity were captured.

As shown in Table 30, the main electricity grid is the dominant source of electricity for nearly 95 per cent of households across the entire Western Cape. When compared with the 2011 census data at the provincial level, a similar pattern is observed, where about 93.4 per cent of households indicated using electricity for lighting, which is approximately 10 per cent higher than the national average of 84.7 per cent (Stats SA, 2012). It is apparent from the above that the Western Cape, in general, is highly electrified, compared to the national access rate and to the eight remaining provinces.

Table 30: Source of electricity for households

Source	Rest of Western Cape	Khayelitsha	Mitchell's Plain	Saldanha Bay	Total
No electricity	3.1%	1.3%	1.4%	1.0%	2.9%
Main electricity grid	94.3%	98.2%	96.8%	98.6%	94.8%
Generator	0.1%	0.0%	0.4%	0.0%	0.1%
Solar	0.2%	0.0%	0.2%	0.0%	0.2%
Other	2.2%	0.4%	1.1%	0.4%	2.1%
Total	100%	100%	100%	100%	100%

Source: WC Household Survey, 2014

Household assets

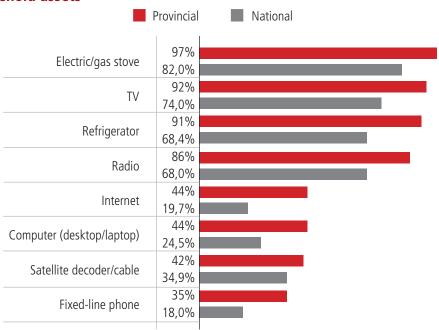


Figure 20: Comparison of access to different assets in households in the Western Cape and South Africa Source: RIA (2012, 2014; Stats SA (2012)

Households' access to working fixed-line phones, on the aggregate, was very low (about 35 per cent): only 1 per cent in Khayelitsha, four times less than in Saldanha Bay, 37 per cent for the rest of the Western Cape and 39 per cent in Mitchell's Plain, the highest.

These findings are a general reflection of a downward spiralling of fixed-line penetration in South Africa. Apart from the fact that fixed-line infrastructure is not readily available across the entire Western Cape or country-wide, the advent of mobile telephone networks, as well as the high broadband Internet penetration, has significantly displaced the use of fixed-line phones among households. Reporting on broadband penetration in South Africa, Goldstuck (2012) observed a significant growth in the number of broadband subscriptions, from 3.6 million in 2010 to 8.2 million in 2012. Goldstuck (2012) further indicates a disproportionate broadband subscription for fixed-line and mobile phones, about 1 to 8 respectively.

Of the households surveyed across the entire province, 91 per cent had access to a working refrigerator. This is about 4 per cent more than that obtained from the 2011 census data for the Western Cape and about 23 per cent more than the national average of 68.4 per cent. This means that households' access to a refrigerator is high amongst survey respondents. Households' access to working electrical or gas stoves was 97 per cent in Mitchell's Plain, the highest when compared to

Saldanha Bay (94 per cent), Khayelitsha (83 per cent) and the rest of the Western Cape (91 per cent). At the provincial level, 91 per cent of households indicated having access to a working electrical or gas stove, whereas 9 per cent had no access. This indicates that having access to a working electrical or gas stove is seen as a basic necessity by the majority of households interviewed. Those who indicated that they did not have access to a working electrical or gas stove possibly rely on cheaper alternatives.

At the household level, owning a radio has been identified as vital for accessing relevant information, besides the recreational benefits it brings. In all, 86 per cent of households surveyed had access to a working radio. This is quite high when compared with the 2011 census average of 69 per cent for the Western Cape and 68 per cent at the national level. It also deviates from an observed decline in the ownership of radios over the years. For instance, the 2011 census report observed that whereas access to radios in the Western Cape was about 83 per cent in the 2007 Community survey, a significant decline of about 14 per cent is observed over a space of four years. The reason for the increase observed in this survey's analysis may be that households that had a radio that was not working during the 2011 census have had it repaired and it is working now. It may also be that the survey was skewed towards households that had access to a working radio.

A television, like a radio, serves as an important information dissemination tool in the household. As shown in Figure 20, 92 per cent of all households surveyed across the Western Cape have a working television in their homes. This is higher than the 2011 census provincial and national averages of 85 per cent and 74 per cent respectively.

Analysis of field data showed that, unlike radio and TV, household access to a working satellite decoder or cable is low among survey respondents. Of the households surveyed in the Western Cape, only 42 per cent reported having access to a satellite decoder or cable.

The turn of the millennium witnessed tremendous advances in technological innovation and, consequently, triggered wide use ICTs. Today, ICTs, particularly the Internet, have been found to be useful catalysts for addressing everyday social problems (Birkenbihl, 1999).

Having access to a computer (desktop or laptop) at the household or individual level is viewed as a vital resource due to its multiple benefits. Results from the survey showed that about 43.7 per cent of all households surveyed in the Western Cape own either a desktop or a laptop. This is roughly 19 per cent higher than the national average of 24.5 per cent obtained for the RIA 2012 survey. Households with access a desktop computer number about 27 per cent, while those with a laptop computers number 36 per cent across the province. This shows a general shift to more sophisticated computers such as laptops, but may not account for households that do not own a desktop because of their socio-economic situation.

Working Internet connection

At the national level, the 2011 census data showed that about one-third of households had access to working Internet, lower than the average of 44 per cent for the Western Cape. Of these, 52.3 per cent made use of USB/Dongles to access the Internet through a laptop or desktop, whilst 38.9 per cent used a router linked to ADSL to access the Internet. Using the mobile phone to access the Internet remains prevalent in the province, with about 91.4 per cent of household members accessing the Internet through their mobile phones.

In households that have access to the Internet at home, more than 90 per cent have at least one member using the Internet at home in each of the localities. However, only about 21 per cent of households indicated that they have at least one member below the age of 15 using the Internet at home.

Individual survey

This section analyses the individual survey, in order to understand individuals' skills sets, education level, economic activities and employment of ICTs.

Level of education

South Africa has seen a decline in the number of people with no schooling. In 1996, 19.1 per cent did not have any schooling. The number dropped to 8.6 per cent in 2011 (Stats SA, 2012). Similarly, the number of individuals who completed secondary school increased from 16.3 per cent in 1996 to 18.6 per cent in 2007 and 28.9 per cent in 2011. The number of individuals with a tertiary education increased from 7.1 per cent in 1996 to 11.8 per cent in 2001 (Stats SA, 2012).

According to the survey, 2.6 per cent of individuals in the Western Cape never attended school, while 19.3 per cent had a primary education. This result is similar to the 2011 census, which reported only 2.7 per cent of individuals with no formal education/ schooling in the province. More than 60 per cent of the respondents throughout the Western Cape had secondary (matric and A-level) as their highest qualification. Of these, 48.2 per cent had matric and 12.2 per cent had A-Level. The percentage of

individuals with a tertiary education is low at 17.5 per cent, with 8.9 per cent holding a diploma or certificate. The share of individuals with a bachelor's degree is strikingly low (4.9 per cent) in the Western Cape as a whole.

The totals for highest education-level completed by individuals in the Western Cape dropped consistently from secondary schooling to PhD degree. This is significant because it shows that the higher the up ladder of education, the fewer the individuals who progress. This could be a result of the need to become employed as soon as possible and, therefore, forego further education, or due to opportunities for individuals with secondary education, or the responsibilities that individuals have to shoulder, such as taking care of siblings, the sick and the elderly.

Activities involved in over the past six months

The largest group of respondents (46.6 per cent) in the Western Cape indicated that they had been employed in paying jobs over the previous six months, while 21.5 per cent stated that they were unemployed. Of the total number of respondents in the Western Cape, only 7.4 per cent were students or pupils.

Generally, the small share of employed individuals in the province indicates that over half of the population (53.4 per cent) are unemployed or are not economically active. Hence, it is possible to conclude that there are many people who are currently not contributing to the provincial economy, and the dependency ratio is very high in the province.

Access to bank accounts

Over half of the respondents (78 per cent) in the Western Cape have a bank account either with a formal bank or with the post office. While the majority of the respondents have a bank account, there are still many individuals without a bank account, close to 22 per cent of the province's population. It is perhaps fair to argue that individuals who do not have a bank account are unlikely to save. Yet, given the considerable number of people unemployed in the Western Cape, the numbers are not surprising.

Access to and use of ICTs

- **Public phones:** The use of public phones has been on the decline and the survey results for the Western Cape show no different. About 90 per cent of respondent throughout the province stated that they had not made use of a public phone (including umbrella phones, call boxes and container phones) in the previous three months. The response is similar across the various areas, with 97.1 per cent in Mitchell's Plain, 93.7 per cent in Saldanha Bay, 89 per cent in the rest of the province and 72.9 per cent in Khayelitsha indicating that they had not used a public phone in the previous three months. The low number of individuals who use public phones attests to a large percentage of people who own and use mobile phones.
- **Desktop:** Only about 15 per cent of the respondents in the Western Cape own a computer. This figure is also relatively low in all the areas, with Khayelitsha recording the lowest at 2.2 per cent, Saldanha Bay recording 10.9 per cent, Mitchell's Plain 11 per cent and the rest of the Western Cape the highest at 18.2 per cent. This could be because of the number of people who do not know how to use a computer or as a result of people not seeing the importance of a desktop, especially given that many of the people may be in insecure employment.
- **Laptop:** A laptop is still very much considered a luxury good, as is evident in areas like Khayelitsha and Mitchell's Plain, where as little as 3 per cent and 7 per cent of individuals have a laptop. At the provincial level, only 21 per cent of individuals own a laptop.
- **Tablet:** Very few respondents own a tablet. Only 12.5 per cent of the respondents throughout the Western Cape own a tablet. Apart from the rest of the province, which has a double digit ownership (16.7 per cent), all the three other areas have a less than 2 per cent ownership. It is fair to reason that people who do not own a laptop are unlikely to own a tablet, as this is also regarded as a luxury item, given the relatively high cost of living in South Africa and the high poverty rates in some of these communities.

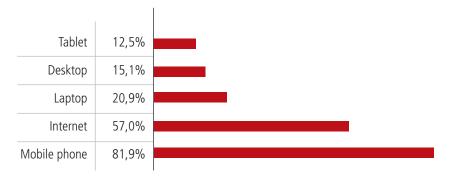


Figure 21: Share of individuals that access and use a particular ICT device/medium in the Western Cape

• **Frequency of computer use:** More than half of the respondents throughout the Western Cape (53.4 per cent) have never used a computer, with only 26 per cent of respondents using a computer on a daily basis. It is significant to note that only a small proportion of individuals in the Western Cape use a computer regularly.

Table 31: Frequency of computer use

Frequency	Khayelitsha	Mitchell's Plain	Saldanha Bay	Rest of Western Cape	Total
Never used one	77.4%	65.1%	55.8%	46.9%	53.4%
Once a month	6.0%	17.9%	15.2%	8.4%	9.5%
Once a week	7.8%	6.7%	12.3%	12.2%	10.9%
Daily	8.8%	9.9%	16.2%	32.5%	26.2%

Source: RIA Survey, 2014

- **Mobile phones:** The number of mobile phone users in South Africa dramatically increased from 32.3 per cent in 2001 to 73.3 per cent in 2007 and 88.9 per cent in 2011 (Stats SA, 2012). The report also indicates that the Western Cape has the third-highest number of mobile phone users in the country, with 88.9 per cent. The survey results show that 81.9 per cent of residents in the Western Cape have a mobile phone. The figures are also relatively high in comparison to other ICT devices for the different areas. The share of individuals with a mobile phone in Saldanha Bay is 81.6 per cent, 77.2 per cent in Mitchell's Plain, 74.8 per cent in Khayelitsha and 84 per cent in the rest of the province.
- Internet: In 2011, more than 8.5 million individuals in South Africa used the Internet (Stats SA, 2012). From the survey results, only 57 per cent of individuals in the Western Cape have made use of the Internet. In Mitchell's Plain, this figure stands at 61.9 per cent, in Saldanha Bay 47.2 per cent and 45.4 per cent in Khayelitsha. The greater percentage of individuals in the Western Cape who use the Internet started using it on a mobile phone (67.3 per cent), compared to 32.7 per cent that first used the Internet on a computer. One reason for this phenomenon could be that individuals have greater access to mobile phones than to laptops or desktops. Most individuals who use the Internet in the province have been doing so for 5 or more years. This is also the case for the rest of the Western Cape, while in Saldanha Bay and Mitchell's Plain the majority of those using the Internet have been doing so for the last 2 to 5 years and in Khayelitsha, Internet use seems to have become prevalent only in the past 1 to 2 years.

Involvement in social media

Online social networks are becoming an increasingly important aspect of the Internet and the ICT industry. The emergence of online social networks such as Facebook, Twitter, LinkedIn, Skype and Mxit have created a virtual space for friends, families, colleagues and even people across different ethnicities and geographies of the world to connect and engage. Such platforms have served as important tools for driving business, mobilising development action and as a repository for information sharing, as well as contributing to broader democratic governance.

Against this background, the survey also asked individual household members whether they were signed up to any online social networks. Data analysis from the survey showed that in the whole of the Western Cape, about 93.5 per cent of respondents that use the Internet were signed up for one or more online social networks. Online social network patronage in all three focus areas was also quite high; with Mitchell's Plain recording the highest at 98.4 per cent and Saldanha Bay the lowest at 84.8 per cent.

Evidently, online social network patronage across the board is somewhat high, with the exception of Khayelitsha and Saldanha Bay. Since using these platforms entails using the Internet, it is possible that in areas like Khayelitsha and Saldanha Bay, Internet access is slightly lower (45 per cent and 47 per cent, respectively) in comparison to the provincial average (57 per cent). Also, limited Internet infrastructure, such as Internet cafés, in these areas may have contributed to the low access observed. It is important, however, to note that patronage of such online platforms may be influenced by age and sometimes by interest. Thus, patronage of online social networks could be high among younger people, and much lower among older people.

Reasons why Internet was first used

Social networking is the main reason for starting to use the Internet in the Western Cape (48.5 per cent) and across the focus study areas. Mitchell's Plain recorded the highest share of individuals that used the Internet for social networking purposes at 89.7 per cent, followed by Khayelitsha (58.7 per cent), Saldanha Bay (50.4 per cent) and the rest of the province at 38.7 per cent. In the province as a whole, only 20.6 per cent started using the Internet for work-related purposes and 16 per cent for educational purposes. This, once again, indicates how social networking has contributed to Internet use. The low shares in the other categories could be because of the low participation in tertiary education and the kind of jobs that individuals engage in, which may not necessarily and directly require Internet use.

Annex 3: Household and individual survey methodology

This section presents the methodology used for the baseline assessment conducted in Khayelitsha, Mitchell's Plain and Saldahna Bay, within the wider survey of ICT access and use in the Western Cape This includes the individual, household, and informal sector surveys. The survey provides demand-side data gathered at the provincial level through the representative surveys of individuals and households; the informal business survey, although not representative, is indicative of the current state of ICT access and use, and will form the basis for a follow-up panel-data study. The demand-side measures collected from these surveys are incorporated with the qualitative assessment of the policy and regulatory environment, a formal business perception survey, together with an assessment of government access and use of ICT within the Western Cape, using available supply-side data to develop relevant indicators for the Western Cape Digital Readiness Assessment.

Sampling

Random sampling was performed in four steps for households and five steps for individuals, using the 2011 Census Sample Frame from Stats SA. This was used to randomly select enumerator areas (EAs). To attain a more in-depth understanding of household and individual access and use of ICTs, fewer EAs where randomly selected in the three focus areas (Khayelitsha, Mitchell's Plain and Saldanha Bay), but more households and individuals were interviewed within each EA. In total, five EAs were selected in each area and a target sample of 100 households in each EA, including all individuals 15 years and older within a selected household.

Step 1: The national census sample frame was split into the following five strata –

- enumerator areas (EAs) for the Western Cape (excluding EAs from Khayelitsha, Mitchell's Plain, and Saldanha Bay);
- EAs from Khayelitsha;
- EAs from Mitchell's Plain; and
- EAs from Saldanha Bay.

Step 2: EAs were sampled for each stratum using a simple random sampling method.

Step 3: A listing was compiled for each EA at the household and the business level. The listings served as sample frames for the simple random selections of households and businesses.

Step 4: 100 households were sampled using simple random sampling for each selected EA in Khayelitsha, Mitchell's Plain and Saldanha Bay. In EAs where less than the targeted 100 households were listed, all households were included in the sample. Twenty households were randomly selected in the EAs for the rest of the province. All businesses listed in EAs were included in the sample, as there were generally less than the targeted 20 per EA.

Step 5: All household members 15 years and older were interviewed in the EAs in Khayelitsha, Mitchell's Plain and Saldanha Bay, while for the rest of the Western Cape, only one household member was randomly selected, on the basis of simple random sampling from all members 15 years or older and visitors staying the night at the house.

Sample size

The desired accuracy for the survey is set to a confidence level of 95 per cent and an absolute precision (relative margin of error) of 5 per cent. The population proportion (P) is set conservatively to 0.5, which yields the largest sample size (Lwanga and Lemeshow, 1991). The minimum sample size for each stratum is determined by the following equation (Rea and Parker, 1997):

$$n = \left(\frac{z\sqrt{p(1-p)}}{c}\right)^2 = \left(1.96\sqrt{\frac{0.5(1-05)}{0.05}}\right)^2 = 384$$

Inserting the parameters for the survey yields the minimum sample size per stratum for the simple random sampling. Due to the sampling method chosen for the survey, the minimum sample size has to be multiplied by the design effect variable (Lwanga and Lemeshow, 1991). In the absence of empirical data from previous surveys that would have suggested a different value, the default value of two is chosen for the design effect (UNSD, 2005). This yields a minimum sample size of 384 for each stratum. Since the census sample frame received from Stats SA did not provide a rural-urban breakdown, the rural and urban strata were combined and, as a result, a sample of 50 EAs was drawn from the general sample frame; therefore, the results will be reported for the rest of the province and not by a rural-urban split. The following make up the strata:

- Khayelitsha;
- Mitchell's Plain;
- Saldanha Bay; and
- rest of Western Cape (excluding Khayelitsha, Mitchell's Plain and Saldanha Bay).

The minimum sample size is 1 920 households. The proposed sample size is 2 500 households. This approach provides representative results for the rest of the province as well as the three priority areas. Clustering will be along EAs as defined by Stats SA.

Table 32: Survey sample

	Households	EAs
Khayelitsha	500	5
Mitchell's Plain	500	5
Saldanha Bay	500	5
Rest of Western Cape excluding Khayelitsha, Mitchell's Plain and Saldanha Bay	1 000	50
Total	2 500	65

Survey tool

The survey tool was designed to align with global standards, specifically the ITU Manual for Measuring ICT Access and Use by Households and Individuals (see ITU, 2014), including all indicators required by the Partnership on Measuring ICT for Development, with its mandate from the World Summit on the Information Society. Other relevant indicators that attempt not only to assess access and use but also to understand the factors of marginalisation from ICTs complemented these indicators. The additional indicators include: willingness and ability of non-users to pay for services; income elasticity of demand; multiple SIM card ownership; and Internet adoption, with a focus on mobile Internet. The questionnaire also includes an extra module that captures the capability of individuals in using ICTs, which will be used for the impact assessment in phase 3 of the project.

The household, individual and informal business questionnaires were programmed for Android devices, set up to automatically identify the co-ordinates at which the interview would be conducted, so that error reporting was prevented so far as possible and tested for any bugs.

Weighting

Two weights are constructed for households and individuals. The weights are based on the inverse selection probabilities and gross up the data to a representation of the provincial level when applied.²⁹

²⁹ See UNSD (2005: 119) for a detailed discussion on sampling weights.

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Household weight:

$$HHw = DW^* \frac{1}{P_{HH}^* P_{EA}^*}$$

Household selection probability:

$$P_{HH} = \frac{N}{HH_{EA}}$$

EA selection probability:

$$P_{EA} = M^* \frac{HH_{EA}}{HH_{STRATA}}$$

Individual weight (individuals 15 years+):

$$INDw = DW^* \frac{1}{\underset{HH}{P * P * P *}{P *}}$$

Where:

DW = design weight compensation for over-sampling and under-sampling of EAs;

HH = number of households in strata

i = number of household members interviewed.

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