

# The role of ICT in tackling South Africa's Sustainable Development Challenges<sup>1</sup>

## Can ICT help to deliver South Africa's Sustainable Development Goals?

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### Abstract

*Information and Communications Technologies (ICTs), irrespective of their predecessor names or technological components, have always been highly valued as tools for the survival and growth of humanity. From the throbbing rhythms of the "Bush Telegraphs" documented in Henry Stanley's diaries and reports<sup>2</sup> as he searched for David Livingstone in the late 18<sup>th</sup> century African bush, through Samuel Morse's "What hath God wrought" telegraph message implying the massive impact on humanity that his invention would have, to today's Internet of Things (IoT) that already outnumbers the total human population by several orders of magnitude, ICTs have become "virtual extensions" of the human species. ICTs are known to be invaluable tools that enable social and economic development and cohesion, and the reduction of most challenges that face humanity. In 2016, virtually all the world's governments adopted and agreed on a set of seventeen Sustainable Development Goals (SDGs) to "transform our world" – a "universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity". This paper discusses how ICTs can be positioned to further that universal call to action with specific reference to South Africa, based on the time-tested recognition that ICTs are vital tools for the amelioration of all challenges identified in the seventeen Sustainable Development Goals.*

## 1. INTRODUCTION AND BACKGROUND

On May 3, 2018, Dr William Lehr, of the Massachusetts Institute of Technology (MIT) introduced the relationship between ICT and the SDGs as follows:

**Why ICTs are critical for sustainable development:** *"Information and communication technologies (ICTs) are accelerators, amplifiers, and augmenters of change. They make it feasible to more flexibly and dynamically reconfigure, and hence transform all aspects of how resources are produced and used, fundamentally restructuring economies and redefining how we interact with each other and the world around us".* Source: [ICT4SDG May 3<sup>rd</sup> 2018](#)

South Africa faces severe challenges in all aspects concerning the relationships between the ICTs and the SDGs mentioned or implied by Dr William Lehr in his highly informative opinion piece:

- The production, distribution, and use of resources, including ICT resources, is a major challenge that positions South Africa as the global inequality leader in income, access to information, and a wide range of other socioeconomic resources essential to human wellbeing and growth;
- The comparatively sluggish economy in which growth is severely retarded by the nation's deep socioeconomic inequalities, renders it nearly impossible to "fundamentally restructure" the economy without severe socio-economic-political upheavals;
- The legacy of the historical socio-political construct of Apartheid remains, adding extreme complexity on how South Africans interact with each other, and with the rest of the world. Deep highly visible divisions along ethnic, economic, educational, gender, ideological, linguistic, and racial lines often lead to highly divisive political discourse and segmentation with actual and potentially violent mass action public responses. The triggers and targets of such mass action range from inadequate public service delivery,

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<sup>1</sup> Prepared for the ICT Infrastructure Conference, 28 – 29 August 2019 at Emperors Palace Convention Centre, Johannesburg, South Africa. See Conference Programme [here](#); Presentation [here](#).

<sup>2</sup> African Talking Drums, a.k.a. the "Bush Telegraph" as described by Henry Stanley: <https://wol.iw.org/en/wol/d/r1/lp-e/101997526>

through demands for job protection and living wages, to xenophobic violence that targets “the other”, irrespective of “the other’s” ethnic origins or pigmentation.

- The societal divisions listed above impact all seventeen SDGs in many complex interrelated ways; e.g. massive wealth-driven inequalities in education tend to entrench poverty divisions along ethnic and racial lines, reinforce the vulnerabilities of especially the poor to environmental shocks such as climate change and land degradation, and accentuate the vulnerabilities of poor women and children to abuse and discrimination.
- In addressing ICT4SDG, it is necessary to ask the critical question of how ICT can be positioned to “accelerate, amplify, and augment” the socioeconomic changes needed to achieve all SDG and NDP goals and targets. It is clearly not enough to depend on the assumption that the benefits arising from the current ICT4SDG focus on expanding ICT population coverage will “trickle-down” to the marginalized population groups in South Africa, or to the population groups most vulnerable to environmental changes. Internet access in South Africa is already approaching ubiquity ([SA smartphone penetration now at over 80%, says ICASA](#)). Even the poorest citizens prefer to use digital ICT services like WhatsApp and related “Over-The-Top” (OTT) services for their most basic communications, but if the use of these services by the poor is restricted to “putting food on the table” (see section 1.1 of [ICT4SDG2](#) and section 4.3.2 of [ICT4SDG5](#) for details), then even the ICT convergence and digitization taking place will have failed the majority South African population who are poor.
- ICTs do more than just provide tools for sustainable development, they also provide vital early warning signs for looming social challenges, through creditable and fake information and news. In South Africa, emotive headlines such as “[South Africa the Rape Capital of the World](#)” are both [disputed](#) and presented as [verified statistics](#), and yet nearly all available official reports infer that this form of social violence is grossly underreported by South Africa’s law enforcement authorities. A further example of the extent of violence in the country is the 15 July 2019 media report “[As army deployment is delayed, 43 murdered over bloody Cape Town weekend](#)”, suggesting that Cape Town may indeed be the “murder capital of the world”. Irrespective of their authenticity, headlines such as these set national and international perceptions, with potentially devastating impact on social cohesion and economic growth.

Dr William Lehr’s opinion piece is a continuation of a well-known fact – that the information and knowledge accessible through ICTs are powerful drivers of development in all its multidimensional forms. The article is also a timely reminder of how the world, and South Africa, may have missed the opportunities presented by this ICT attribute in the SDG predecessors, the Millennium Development Goals (MDG – 2000 to 2015). Numerous articles promoted the use of ICT for the achievement of all MDGs, but South Africa’s progress in the MDG process was disappointing. [South Africa’s sixth and final MDG Country Report](#) published by Statistics South Africa (STATS SA) reports an achievement of just 19 of the 84 MDG targets the country set for itself. Will South Africa miss its SDG targets in the same way that the country missed the MDG targets in this new round of the development agenda? By missing any of the SDG targets, South Africa will also miss the nation’s own development goals set in the [National Development Plan](#) – the NDP and SDG targets are fully complementary, and should not be perceived as competing agendas.

The key question arising from South Africa’s participation in the SDG process, and therefore in its own NDP development agenda, should be: “*why has the country failed to maximise the role of ICT in national development?*” One possible answer to this provocative question may be gleaned from the [International Telecommunication Union’s](#) (ITU) introduction to the United Nations’ final MDG report of 6<sup>th</sup> July 2015:

### How ITU is helping to track goal 8; and its role in the post-2015 UN development agenda:

*ITU is measuring Target 8F, (of Goal 8: Develop a global partnership for development): ‘In cooperation with the private sector, make available the benefits of new technologies, especially information and communications. ITU is monitoring the 3 indicators that were identified to track this target:*

- *8.14: fixed-telephone subscriptions per 100 inhabitants,*
- *8.15: mobile-cellular subscriptions per 100 inhabitants,*
- *8.16: Internet users per 100 inhabitants.*

All eight MDGs, and all seventeen SDGs that replaced them, are directly related to the human condition and experience, and the natural environment that shapes this condition and experience. With hindsight, how can the three MDG targets above directly influence this human condition and experience, namely the challenges faced by humanity as stated in all the MDGs and the SDGs? The raw “technocentric” indicators listed as MDG indicators by the ITU may be correct for the organization’s mandated obligations, but for countries that face the MDG, and now the SDG challenges daily, the targets lack a “human face”. They depend on the “trickle-down” assumption that having access to fixed telephony, mobile telephony, and the Internet, will contribute towards: (a) the defeat of poverty (SDG1); (b) the reduction of hunger to zero (SDG2); (c) the improvement of health and wellbeing (SDG3); (d) ensuring inclusive, equitable, quality, lifelong learning for all (SDG4); (e) the reduction and elimination of gender inequality and abuse (SDG5); and (f) the achievement of all remaining SDGs. ICTs of any generation, quality or technology, including the full range of 4IR technologies (AI, Biotech., gene technology, quantum computing, etc.), will not deliver on these human development objectives unless and until humanity positions them **directly** to enable them to do so.

In order to raise the effectiveness of ICT as *accelerators, amplifiers, and augmenters of change*, South Africa should develop an ICT4SDG strategy for each and every SDG that goes far beyond mere ICT access. Such an ICT4SDG strategy has yet to be developed, if the [Indicator Baseline Report 2017 – South Africa](#) prepared and published by STATS SA is a true reflection of the current national ICT4SDG strategy. This Baseline Report lists only one ICT4SDG target, and a single indicator for its achievement:

- **TARGET 9.c:** *Significantly increase access to information and communications technology and strive to provide universal and affordable access to the internet in least developed countries by 2020.*
- **INDICATOR 9.c.1D:** *Percentage of population covered by a mobile network, by 3G and LTE.*

The “Baseline Indicator Values” reported by STATS SA in this report suggests that this ICT4SDG target may have already been achieved in 2016: 99% and 75% population coverage for 3G and LTE respectively. Will 100% national coverage by any technology, including the over-hyped 5G technologies, contribute directly to the defeat of hunger ([ICT4SDG2](#)), and improve the safety, security, and opportunities for women and children ([ICT4SDG5](#))?

The ICTS can and must be repositioned directly to resolve South Africa’s SDG challenges. The history of ICT development in the country demonstrates clearly that benefits of ICTs will not automatically “trickle down” to the poor at the centre of the SDG challenges, the nation’s ICT4SDG strategies must do much more than just provide access and population coverage of ICT services.

## 2. POSITIONING ICTS FOR ICT4SDG

The first challenge for South Africa’s ICT4SDG strategy is to ensure adequate access to developmental qualities and quantities of ICT services for all South Africans, especially for women and children from economically marginalized communities. South Africa’s ICT history suggests that this has been the major fault line in the use of ICT for development. The nation has always been adept at adopting and innovating around new technologies, but the country has failed dismally to deliver ICTs to all its citizens since the introduction of ICTs in their electronic forms in 1860:

## 2.1. A brief history of ICT development in South Africa over the last 160 years:

- [1860: First telegraph between Cape Town and Simonstown](#), just 16 years after Morse's 1844 launch;
- [1878: First telephone lines in South Africa](#), just 2 years after Alexandra Graham Bell's patent;
- [1879: First undersea cable between South Africa and Europe](#); 89 years later, SAT-1 South Africa to Europe submarine cable launched. Major upgrades 41 years later, Seacom and EASsy submarine cables launched;
- 1898: First RFQ for a [wireless telegraph system](#) intended for use in the Anglo-Boer wars of the late 19th century;
- 1994: 96-years later, South Africa becomes a democracy, introduces cellular mobile telephone services;
- 1991: Launch of dial-up Internet services; 22 years later (2016), 9.6% fixed broadband connected households;
- 2004: 106-years after first wireless usage, ICASA publishes [Spectrum Band Plan for 20MHz to 70GHz](#);
- [2019, March 28<sup>th</sup>](#): 121 years after introducing wireless technologies, the Minister of Communications reiterates the department's commitment to finalising the policy directive on licensing high demand spectrum;
- 2017: Entry Level fixed broadband price basket was 2.73% of GNI per Capita ([Table 4.6 of ITU MIS Report V1 of 2018](#))<sup>3</sup>; The equivalent price basket for 30.4 million (55.5% population)<sup>4</sup> living below the national poverty lines was approximately 23% of average monthly expenditure, falling to 14% for 500MB mobile broadband per month.
- 2019: [MNOs scramble for 5G spectrum](#) fuels "[Big Data](#)" [price competition](#): bundle prices for 20 to 50GB "anytime" data per month range from 26% to 66% of average monthly expenditure levels of 30.4 million South Africans.
- 2019: In a renewed attempt to render national ICT prices affordable by the majority of the nation's citizens, the [South African Competition Commission](#) published its "[Provisional Report on the Data Services Market Inquiry](#)"<sup>5</sup> on April 24<sup>th</sup> 2019. Follow up public discussions and hearings are planned.

The above brief history of South Africa's ICT development is reinforced by the statistical benchmarks that follow. The benchmark countries were chosen on the basis of economic, population, social structural and ICT similarities at the 1960 start of the benchmark period, and for geographic regional representation. Most African countries were excluded on the grounds that their economies and ICT infrastructure growth trajectories are similar or worse than South Africa's, and are therefore deemed to have lower value in the lessons derived from the benchmark.

Developing European countries were excluded due to the numerous benefits most have gained through regional cohesion and cooperation which they derived from regional economic blocks such as the European Union. European countries may also have derived pyrrhic "*victories*" from their internecine wars, according to the theories of a popular modern historian, [Walter Scheidel](#) currently with Stanford University, who argues convincingly that state failures and wars have always been the leading ways of reducing extreme inequalities within and between nations<sup>6</sup>. Fortunately, Walter Scheidel's pessimistic views stand in stark contrasts with the more optimistic views of Economist and Nobel Laureate [Joseph Stiglitz](#)<sup>7</sup>, who suggests that extreme inequality can be contained and reduced through the appropriate positioning of technology: "*We can restructure our economy so as to restore more equitable conditions and govern the Fourth Industrial Revolution in a more sustainable manner....*". Stiglitz's views are shared by Dr William Lehr in the introduction to this discussion.

As Joseph Stiglitz suggests, nations do have a choice of how they counter multidimensional inequalities in their societies. Which "choice" should South Africa make in the nation's drive to achieve all NDP and SDG objectives and targets? Waiting for state failure with or without violence to reduce the nation's world-record income inequalities as suggested by Walter Scheidel? Or repositioning the ICTs to erode the threats as suggested by Joseph Stiglitz?

<sup>3</sup> Measuring the Information Society Report 2018 - Volume 1: <https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-1-E.pdf> (Note: estimates based on comparative prices in US\$ using exchange rate of 14:1)

<sup>4</sup> Poverty Trends in South Africa: <http://www.statssa.gov.za/publications/Report-03-10-06/Report-03-10-062015.pdf>

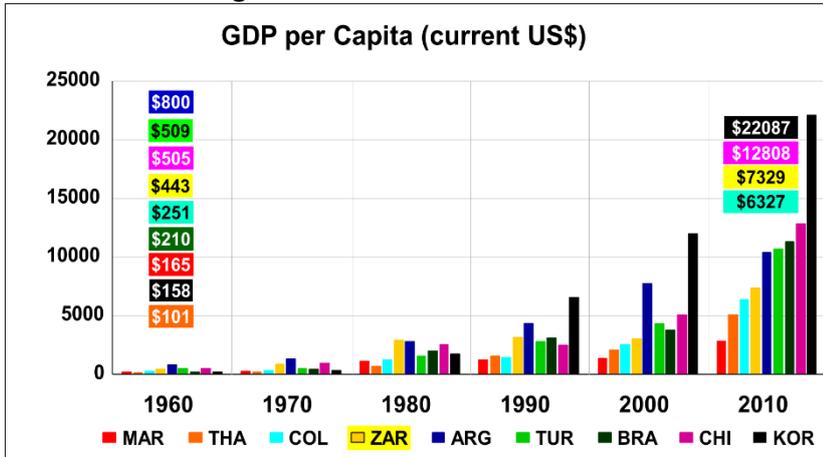
<sup>5</sup> Competition Commission South Africa 24 April 2019: DATA SERVICES MARKET INQUIRY: <http://www.compcom.co.za/wp-content/uploads/2017/09/Data-Services-Inquiry-Report.pdf>

<sup>6</sup> "The Great Leveller" by Walter Scheidel 2017: [https://www.unwe.bg/uploads/Alternatives/11\\_Alternativi\\_english\\_broi\\_3\\_2017\\_rev.pdf](https://www.unwe.bg/uploads/Alternatives/11_Alternativi_english_broi_3_2017_rev.pdf)

<sup>7</sup> Joseph Stiglitz: "Inequality, technology and growth: some reflections": [https://adecgroup.it/wp-content/uploads/2017/11/Stiglitz\\_inequalities\\_theadecgroup\\_feltrinelli-UK.pdf](https://adecgroup.it/wp-content/uploads/2017/11/Stiglitz_inequalities_theadecgroup_feltrinelli-UK.pdf)

2.2. South Africa's ICT growth in numbers:

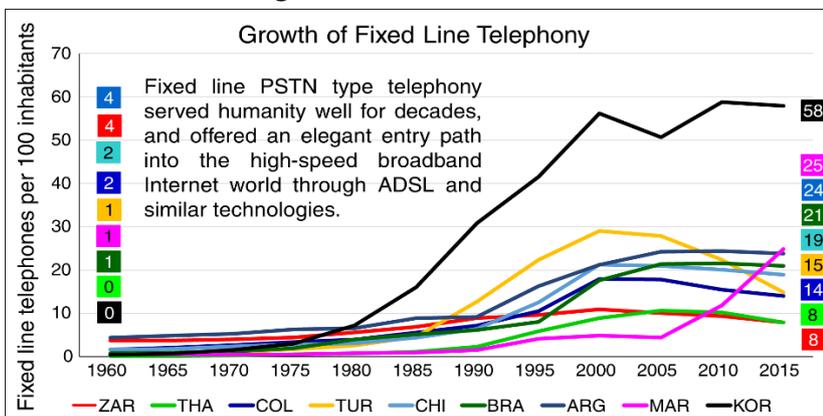
Chart 1: Economic growth 1960 to 2010



South Africa ranked highest in this group in 1980, declined to 6<sup>th</sup> out of 9 by 2010. Could more equitable ICTs have helped?

Source: <https://data.worldbank.org/indicator/ny.gdp.pcap.cd>

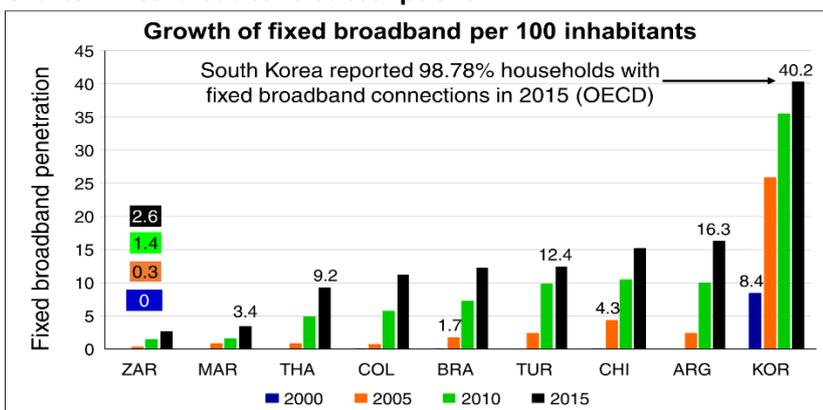
Chart 2: Historical ICT growth



Long term growth trends of PSTN services are indicative of the priority given to equitable inclusive ICT development

Source: [World Telecommunication/ICT Indicators database](#)

Chart3: Fixed broadband subscriptions



Fixed broadband services provide the foundations for all ICT services, including mobiles, but their statistical representations are misleading: S. Korea's 40.2% penetration translated to 99% household broadband penetration in 2015.

Source: [World Bank Fixed broadband subscriptions \(per 100 people\)](#)

The charts above are largely self-explanatory, however, it is useful to pause and re-examine the well-known relationships between ICTs and economic development, e.g. how South Korea used ICT and related technologies to “leap-frog” from a GDP per capita of just US\$158 per annum in 1960 (South Africa was US\$443), to US\$22087 in 2010 (South Africa was US\$7329). Could South Africa's economic growth have been faster with supportive equitable ICTs that reduced the economic burden of poverty and inequality?

## Household Internet Access:

24/7 household internet access is vital for family/community cohesion, safety and security, and for learning, especially for children. If individual connectivity is not possible, can opportunities from access in public spaces offer possibilities? Such a model is described in [ICT4SDG5](#) and related ICT4SDG documents.

- Of the 15 million South African households in 2013, 2 million (71%) in the wealthiest quintile had 24/7 Internet access at home;
- Of the remaining 13 million households, 0.87 million had 24/7 Internet access at home; more than 12 million households (±42 million citizens, 80%) did not.

Source: <http://www.statssa.gov.za/publications/Report-03-18-05/Report-03-18-052013.pdf>

The data for 2016 as reported by ICASA in March 2018 was as follows:

Households with 24/7 Internet Access at home (2018 STATS SA update)	9.5% (10.4%)
Household members who access the Internet at work	15.8%
Household members who access the Internet via mobile networks only	53.9%
Household members who access the Internet at public spaces (2018 STATS SA update)	9.8% (10.1%)

### 2.3. Concluding observations on South Africa's ICT growth history:

South Africa has an excellent record of very early adoption and innovation around new ICT technologies, and a dismal record in the equitable distribution of ICT-based development opportunities. The charts and comments in the table above demonstrate this latter national criticism well. Throughout the history of South Africa's ICT growth, from their introduction in 1860 until today, the national ICT infrastructure has tended to serve only the wealthiest 10% of the nation. The GDP per capita and ICT growth comparisons between Argentina, South Africa and South Korea provides stark yet informative insights:

Argentina	South Africa	South Korea
PSTN: 1960 = 4.4%: 2015 = 24%	PSTN: 1960 = 3.7%: 2015 = 8%	PSTN: 1960 = 0.4%: 2015 = 58%
Fixed BB: 2000 = 0%: 2015=16.2%	Fixed BB: 2000 = 0%: 2015=2.6%	Fixed BB: 2000 = 8.4%: 2015=40.3%
BB connected households: 2000 = 0%      2015 = 52%	BB connected households: 2000 = 0%:      2015 = 10%	BB connected households: 2000 = ± 30%:    2015 = 98.8%

The economic growth trajectories of the nine benchmark countries depicted in Chart 1 correlate closely with the respective ICT growth trajectories for each nation.

In the ICT growth trajectories discussed above, there is little mention of the mobile ICT sector, a near-ubiquitous form of ICT delivery which has become the de-facto mode of ICT access. This lack of specific focus on mobile services is deliberate: mobile phones have become central to South Africa's strive for equitable access to developmental quality ICTs, but the sub-sector is mired in controversy and hype related to affordability and perceived superiority over fixed ICT infrastructure – wired and wireless ICTs are intricately interlinked and interdependent. While mobile phone operators canvass, plead, or sue for more spectrum to expand and modernise their network infrastructures, a significant number of South African citizens can only afford to use their mobile phones to plead for help from their wealthier extended families – e.g. to “*put food on the table*” (see discussions in [ICT4SDG1](#), [ICT4SDG2](#), and [ICT4SDG5](#)). The mobile ICT sector must receive special attention in the development of effective ICT4SDG strategies, attention which is beyond the scope of this short discussion paper.

The single crisis facing South Africa's transition towards an Information Society is the challenge of ICT affordability. The complexity of this challenge is illustrated by the simple observation that all current attempts by government or the ICT industry are unlikely to resolve the crisis: the depths of inequality, poverty and unemployment in the country are far too high for traditional ICT delivery methods to resolve. The key features of the challenge are:

- **Inequality:** South Africa is the global leader in income inequality, with a world record GINI Coefficient of 63, which is significantly higher than the globally recommended GINI Coefficient alert line of 40.
- **Poverty:** With more than 30 million South Africans, representing more than 50% of the population, surviving below the national and international poverty lines, finding a solution for the nation's ICT affordability crisis is urgent but extremely difficult.

- **Unemployment:** With [global record levels of unemployment](#) positioning South Africa second only to the West Bank and Gaza in adult levels of unemployment, and South Africa's youth unemployment levels that rank amongst the top 5 countries with the highest levels of youth unemployment, the likelihood of South Africa's poorest population generating enough income from employment to afford developmental qualities and quantities of ICT services is extremely remote.
- **ICT Affordability:** In the series of ICT4SDG documents under preparation, the draft document [ICT4SDG5](#) focussing on gender inequality, provides an analysis of STATS SA's "[Poverty Trends in South Africa](#)" report of 22 August 2017, concluding with an estimated average monthly expenditure level of ZAR768 for 30.4 million South Africans in 2015. At the internationally recommended level of ICT spend of 5% of income or expenditure, this translates to ZAR38.40 per month, and just ZAR 19.20 per month at the SA Connect recommended level of 2.5%.

Are there any national policy, regulatory, ICT sector structural interventions, or national ICT industry business models or technological applications that can meet these ICT price targets for more than 50% of the nation's citizens? The historical record of South Africa's ICT development suggests that there are none under the current ICT supply and development strategies. New highly creative and innovative solutions for pro-poor ICT delivery are required, urgently.

### 3. CONCLUSIONS

All technological developments throughout human history, from pre-historical stone tools, through the so-called First Industrial Revolution (1IR) to today's Fourth Industrial Revolution (4IR), had one common purpose: to ease the workloads and improve the productivity of humans. Technology succeeds very well in doing this, but humans are much slower at socioeconomic and lifestyle adjustments to accommodate these gains. The primary purpose of the ICT4SDG strategies is to bridge that gap, by positioning technology, specifically the ICTs, to help nations and their societal formations to "*more flexibly and dynamically reconfigure, and hence transform all aspects of how resources are produced and used, fundamentally restructuring economies and redefining how we interact with each other and the world around us*". The ICT4SDG strategies discussed in this document must be specifically aligned with the needs of South Africa, and its National Development Plan.

South Africa is ready once more to introduce leading edge ICT technologies in the form of 5G, IoT, and related 4IR systems, but will this resolve South Africa's multidimensional ICT4SDG challenges? The South African Government believes that policy and regulatory interventions, including those by the Competition Commission, are the best approach to addressing these challenges. Some representatives of the national ICT Industry on the other hand believe that removing government entirely from the ICT development process is the best approach, see e.g. "[High data prices? Blame government](#)" by the Free Market Foundation. Given the deep inequalities, none of these approaches will succeed in providing fully empowering and transformative ICT services to the poor at R38 per month or less. A completely new approach is needed, one which follows the thinking of the most prescient thinkers of this century, Albert Einstein, who advised that "*We can't solve problems by using the same kind of thinking we used when we created them*". The primary purpose of this discussion document is to promote the desire and commitment to change South Africa's way of thinking about ICT4D, at the "political" government and public sector levels, and perhaps of greater importance, at the commercial ICT industry levels.

This discussion document is only the start of this complex change process. There are numerous opportunities in the commercial, policy, regulatory, and technological domains that can resolve South Africa's ICT4SDG challenges, but a new kind of thinking is required to render these opportunities effective in the face of historical shortcomings. Possible approaches are being developed in the series of ICT4SDG documents under preparation, specifically [ICT4SDG5](#) which recommends specific activities, processes, and even technological applications to respond to SDG5 as well as all other SDG challenges. A directly related discussion document, a submission to the [Competition Commission's Data Services Market Inquiry](#) on the cost to communicate, is available for scrutiny via the hyperlink provided.