

South Africa: Inequality, Poverty and Unemployment in Numbers

Statistical Update May 2023¹

Contents

INTRODUCTION TO THIS UPDATE:	3
TABLE 1: INEQUALITY UPDATE TO 2021	3
TABLE 2: POVERTY TO 2020:	3
TABLE 3: UNEMPLOYMENT UPDATE TO MAY 2023:	3
Table 3.1: Unemployment Comparisons: Economic Groups	4
Observations concerning unemployment:	4
TABLE 4: EDUCATION UPDATE FOR PISA 2018 AND PIRLS 2021:	4
South Africa: Expert Commentaries on PIRLS 2021 Results	5
TABLE 5: ICT ACCESS AND USE:	5
South Africa: Education and ICT: ICT Access and Use in Schools	6
FURTHER INSIGHTS INTO ICT, TECHNOLOGY, INEQUALITY, POVERTY, AND UNEMPLOYMENT	6
The Role of Current and Future Technological Advances: Artificial Intelligence (AI)	6
AI: The World of Work; Knowledge About it All; And About Ourselves;	7
Optimistic and Pessimistic Expert Views about AI:	8
What exactly is AI?	8
NOAM CHOMSKY, 8 March 2023:	9
ChatGPT and its CEO <i>Samuel Harris Altman</i>	10
Google and AI.	11
Google CEO Sundar Pichai; VP/GM Sissie Hsiao; Snr. VP Technology and Society James Manyika:	11
Former Google Executive Geoffrey Hinton, "The Godfather of AI":	12
Mohammad "Mo" Gawdat, former chief business officer for Google X	13
Views of non-AI intellectuals: Stephen Hawking, Yuval Noah Harari, and Neil deGrasse Tyson	14
Regulating Artificial Intelligence in South Africa	15
Discussion of AI Definitions and Concepts relevant to Regulation	15
AI for Good and AI for Bad; an overview:	17
Additional discussions on AI impacts needing definitional clarity:	18
a) AI in "schools' admissions	18
b) AI in "home loan approvals."	18
c) AI in "military weapon targeting systems	18
Regulating AI: What comes next?	20
A short reminder of the key statistics demanding regulatory attention:	21
Additional comments on the relationship between the statistics and AI regulation:	22
AI, ICT, and Equitable Growth for All: Key Regulatory Challenges:	23
Digits versus People in the AI empowered World	23
Expert views on AI, Digits, and People:	24
A World Bank View of Digits and People:	25

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Regulating AI: Key Reference Documents and Sources:	26
Background 1: SA Connect	26
Background 2: Poverty	27
Background 3: Developing What? For Whom?	29
Background 4: SA Connect revisited?	30
2023 Budget Vote Speech by DCDT Minister Mondli Gungubele	30
Other key highly relevant statements by the Minister of DCDT	31
Other key factors directly related to the chosen Wi-Fi development strategy.....	35
AI in the Benchmark Countries of this Document:	36
AI and Xenophobia	37
Regulating AI: Some References:.....	38
Random Issues Needing AI Regulatory Attention in South Africa	39
AI, NDP, and SDGs	39
South Africa's Progress in NDP and SDGs: STATS SA Baseline Report 2017	39
Politics; Statistics; Democracy; Economics; Religion; AI:	42
AI and Politics	42
AI and Statistics	43
AI and Democracy	44
AI and Economics:	46
Capitalism and Democracy	48
AI at the Crossroads of Capitalism, Democracy, Economics, and Politics	49
AI and Religion.....	49
Digital Divides, Human Divides, and AI	50
The Human Capital Index	50
AI, Religion, and Homo spiritualis	51
Final Thoughts and Conclusions.....	54
Annex 1: Metaphors, Disinformation, Misinformation, BARD and ChatGPT opinions.....	56
BARD.....	56
ChatGPT	57

INTRODUCTION TO THIS UPDATE:

This section of the update presents tables from the original discussion document “[SOUTH AFRICA: INEQUALITY, POVERTY AND UNEMPLOYMENT IN NUMBERS](#)”, updated to the latest available statistics. The original analyses should be accessed for comparison should there be a need for closer examination of changes during the short update period; e.g., selection criteria based on economic and population similarities: Upper-middle-income economies; middle population range 30 million to 100 million.

The tables presented below illustrate known and verified changes since the original document, and include new data which was not available at the time of preparation and publication of the original document.

TABLE 1: INEQUALITY UPDATE TO 2021

Inequality (GINI Index)	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
Year 2000	35	51	59	49	43	37	58
Year 2021 or most recent	28	42	52	40	35	37	63
% Of South Africa 2021	44%	67%	83%	63%	56%	59%	100%
2021: % above/below international alert line of 44	-36%	-5%	+18%	-9%	-20%	-16%	+43%
2021 Rank out of 164 countries	14/164	128/164	156/164	113/164	72/164	85/164	164/164
Changes since last post	0	-1	+1	-2	0	+1	0

Data Source: <https://data.worldbank.org/indicator/SI.POV.GINI> Updated 10 May 2023. Estimates up to 2021 are provided and used. Data comparing years 2000 and 2019 providing useful growth insights are reported in <https://api.worldbank.org/v2/en/indicator/SI.POV.GINI?downloadformat=excel>. The original data was derived from the World Bank's 30 June 2021 database. In this analysis, in the absence of reports for a specific year, the nearest higher value is used, a useful estimate because inequality, however measured, changes very slowly over time. The original discussion document is available at <https://www.sakan.org.za/Docs/South%20Africa%20-%20Inequality,%20Poverty%20and%20Unemployment%20in%20Numbers.pdf>

TABLE 2: POVERTY TO 2020:

This data remains valid and has not yet been updated. Key updates for South Africa will be published by STATS SA during the period 2024 to 2026 (<https://www.statssa.gov.za/?p=15858>)

Poverty Headcount Ratios at International Poverty Lines US\$ PPP per day (2019/2020)	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
Upper Mid Income US\$ 6.85 PPP ¹	36.6%	9.7%	33.9%	30.2%	15.6%	22.2%	61.6%
Lower Mid Income US\$ 3.65 PPP ²	4%	2.6%	12.2%	10.6%	0.9%	5.3%	40%
Extreme Poverty US\$ 2.15 PPP ³	0.5%	0.8%	4.5%	3.6%	0%	1.2%	20.5%

1. Poverty headcount ratio at \$6.85 a day (2017 PPP) (% of population, Upper-Middle-Income countries) - <https://data.worldbank.org/indicator/SI.POV.UMIC>
2. Poverty headcount ratio at \$3.65 a day (2017 PPP) (% of population, Lower-Middle-Income countries) - <https://data.worldbank.org/indicator/SI.POV.LMIC>
3. Poverty headcount ratio at \$2.15 a day (2017 PPP) (% of population – Low Income countries/Extreme Poverty Line) - <https://data.worldbank.org/indicator/SI.POV.DDAY>
4. South African Poverty Lines: <https://www.statssa.gov.za/publications/P03101/P031012021.pdf> - all three South African Poverty Lines (UBPL, LBPL, FPL) align very closely with the relevant World Bank Poverty Lines

TABLE 3: UNEMPLOYMENT UPDATE TO MAY 2023:

Annual Unemployment, total (% of total labour force) (modelled ILO estimate) – Update to 2022:

<https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>

Annual Unemployment, youth total (% of total labour force ages 15-24) (modelled ILO estimate) Update to 2022

<https://data.worldbank.org/indicator/SL.UEM.1524.ZS>

Unemployment % of total labour force: Update 2023	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
Total Unemployment %	11.6%	6.5%	10.7%	3.7%	0.86%	1.9%	29.8%
Global Rank 2022 (235 countries)	199	135	191	52	4	12	235
Youth Unemployment %	29%	18.6%	21.6%	7.5%	4.5%	7.4%	51.5%
Global Rank (235 countries)	210	159	176	41	16	40	234

Note: Unemployment data derived from World Bank data through the links above, which provide estimates for annual average values, instead of the quarterly statistics published by South Africa, hence the difference in the numbers.

Table 3.1: Unemployment Comparisons: Economic Groups

Regional Averages %	World	LDC	Low I/C	Low/Mid I/C	Mid I/C	Up/Mid I/C	S. Africa
Total Unemployment %	5.8%	5.5	5.4%	6.1%	6.1%	6.1%	29.8%
Equivalent World Ranking (of 235)	113	103	100	129	126	124	235
Youth: ages 15-24 years %	15.6%	11.3%	10.2%	17.5%	17%	16%	51.5%
Equivalent World Ranking (of 234)	133	86	74	152	144	135	234

STATS SA Media Release 16 May 2023: Quarterly Labour Force Survey (QLFS) – Q1:2023:

“The official unemployment rate was 32,9% in the first quarter of 2023.”

<https://www.statssa.gov.za/publications/P0211/Media%20release%20QLFS%20Q1%202023.pdf>

Observations concerning unemployment:

South Africa’s performance in this metric was poor compared to the 235 countries with valid unemployment data as published by the World Bank, and to the six benchmark countries selected for this analysis. The brief observations that follow summarise the key differences in South Africa’s comparative performance.

- South Africa had the highest unemployment rate in years 2020 and in the first quarter of 2023;
- South Africa had the highest global ranking of 235 out of 235 countries with valid unemployment data acceptable for publication by the World Bank;
- South Africa was the only country in the seven-country benchmark with a post Covid-19 increase in unemployment levels;
- According to the World Bank’s 2023 unemployment database, South Africa at 51.5%, had the second highest youth unemployment rate, with a global rank of 234 out of 235 countries. This was exceeded only by Djibouti with a reported youth unemployment rate of 77.2%.
- In 2023, Statistics South Africa reported an unemployment rate of 62.1% for youth aged 15 to 24 years, and 40.7% for youth aged 25 to 34 years:
<https://www.statssa.gov.za/publications/P0211/Presentation%20QLFS%20Q1%202023.pdf>
- On 1 June 2022, Stats SA reported record youth unemployment rates of 63,9% for youth aged 15-24, and 42,1% for those aged 25-34 years (<https://www.statssa.gov.za/?p=15407>).

TABLE 4: EDUCATION UPDATE FOR PISA 2018 AND PIRLS 2021:

Updated to include PIRLS 2021 and PISA 2018 Results:

Educational Achievement: % Above (+) or Below (-) International Average	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
Reading 2015/2016 ¹	-29%	-3%	-14%	-19%	-17%	-1%	-36%
Math 2015/2016 ¹	-26%	-7%	-21%	-21%	-15%	+1%	-29%
Science 2015/2016 ¹	-23%	-4%	-16%	-20%	-15%	+6%	-28%
Update from PIRLS 2021, PISA 2018, and TIMSS Math and Science 2019							
G4 Math: TIMSS 2019 or PISA 2018 ³	N/A	-24%	-22%	-20%	-16%	-1%	-25%
G4 Science: TIMSS 2019 or PISA 2018 ³	N/A	-19.2%	-17.4%	-19.2%	-14.8%	+9%	-35%
G4 Reading: PIRLS 2021 or PISA 2018 ³	N/A	-20%	-18%	-20%	-21%	+1%	-42.4%
Graduation Rates ⁵ : https://genderdata.worldbank.org/ea4f323e-92a6-4be9-8120-03730c15252c							
Gross Graduation Rate (%)	39.3%	19.3%	26.6%	39.1%	25.3%	19.8%	11.4%

Sources and Notes

1. PIRLS and TIMSS 2016: https://timssandpirls.bc.edu/pirls2016/international-results/wp-content/uploads/structure/PIRLS/1.-student-achievement/1_1_pirls-achievement-results.xlsx
2. PIRLS 2021 data published 16 May 2023: <https://pirls2021.org/results/download/>
3. TIMSS 2019 International Results in Mathematics and Science: <https://timss2019.org/reports/download-center/>, For close equivalents, PISA 2018 in Math, Science and Reading: <https://factsmaps.com/pisa-2018-worldwide-ranking-average-score-of-mathematics-science-reading/>
4. Vietnam Data PISA 2018: <https://en.vietnamplus.vn/vietnam-gets-high-scores-but-not-named-in-pisa-2018-ranking/164931.vnp>

5. Graduation Rates: <https://genderdata.worldbank.org/indicators/se-ter-cmpl-zs?gender=total> AND in the absence of data (e.g., Peru), results published for the STEM subjects have been used: <http://api.worldbank.org/v2/en/indicator/UIS.FOSGP.5T8.F500600700?downloadformat=excel&source=12>
6. Results of the 2018 “Programme for International Student Assessment (PISA)” are included to expand the benchmark country population. PISA tests are similar enough to the “Progress in International Reading Literacy Study (PIRLS)” preferred by South Africa, to enable informative comparisons of a wider group of countries.

South Africa: Expert Commentaries on PIRLS 2021 Results

Statement by MEC David Maynier on Progress in International Reading and Literacy Study 2021 results: 16 May 2023:

<https://www.gov.za/speeches/mec-david-maynier-progress-international-reading-and-literacy-study-2021-results-16-may>

PIRLS 2021 results: We have a plan to get reading scores #BackOnTrack

“The results of the 2021 Progress in International Reading and Literacy Study (PIRLS) were released today, which confirmed that learning losses caused by the Covid-19 pandemic are severe across South Africa. South Africa’s average PIRLS score dropped from 320 in 2016, to 288 in 2021, a drop of 32 points on the scale. However, the Western Cape scored 363, which is the highest score received by a province, and 75 points ahead of the average score for South Africa.”

Note: Western Cape, leading province in SA, remains 27% below world average!

Statement by Dr Nic Spaull, Associate Professor at Stellenbosch University, Specialist in Education, and the Socioeconomic Inequalities in South Africa’s Educational Sector: 16 May 2023:

<https://www.dailymaverick.co.za/article/2023-05-16-from-bad-to-worse-new-study-shows-81-of-grade-4-pupils-in-sa-cant-read-in-any-language/>

From bad to worse: New study shows 81% of Grade 4 pupils in SA can’t read in any language

“The new Progress in International Reading and Literacy Study (Pirls) 2021 reading results show that South African kids perform the worst of all participating countries, with the largest Covid-related declines in reading achievement. We have lost a decade of progress and the average Grade 4 child in SA is three years behind their Brazilian counterpart.”

Author note: One of many notable publications authored by Dr Spaull, this one in partnership with internationally renowned South African Educationalist Professor Jonathan Jansen, is selected for its direct relevance to this discussion: **South African Schooling: The Enigma of Inequality** (2019): <https://link.springer.com/book/10.1007/978-3-030-18811-5>

Sadly, this important book about the knowledge of ourselves (South Africans), has a price beyond the affordability of the victims of educational inequalities it discusses: R 1,800 (EUR 85.59) is nearly three times the monthly income of those who need knowledge most so that they can eat (the Food Poverty Line FPL). The purchase price of the book proves its own sub-title: **“Equity: A Price Too High to Pay?”**

TABLE 5: ICT ACCESS AND USE:

Converged Broadband	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
Fixed Broadband per 100 ¹	A proxy for the vital 24/7 Broadband Connected Households						
Year 2010	2.5	9.9	5.8	3.2	4.8	4.2	1.5
Year 2020	8.6	21.2	15.3	9.2	16.4	17.2	2.2 ³
20-year CAGR (% per annum)	13%	8%	10%	11%	13%	15%	4%
Estimated Internet Households	31%	76%	55%	33%	59%	62%	8% ²

Source and Notes

1. <https://data.worldbank.org/indicator/IT.NET.BBND.P2> Derived from ITU Database
2. S. African connected household data from: <https://www.nab.org.za/uploads/files/State-of-ICT-Sector-Report-March-2022.pdf> (Table 1 on page 13 of 111 pages).
 - a. **Special Note:** The International Telecommunication (ITU) reports 77.5% of households with at least one household member having access to broadband internet from anywhere, using any access technology, including mobile broadband, in 2021. The 24/7 household broadband connectivity for 2021 was updated by STATS SA to 10.4% as reported by ICASA in <https://www.icasa.org.za/legislation-and-regulations/state-of-ict-sector-report-2023-report>.
3. Upper-middle-income group average fixed broadband penetration in 2020 was 26.6 per 100 population: South Africa’s was 12-times lower at 2.2 per 100.

South Africa: Education and ICT: ICT Access and Use in Schools

S.A. Connect targets set in 2013:

- 50% schools connected at 10Mbps by 2016; 100% at 10Mbps and 80% at 100Mbps by 2020; 100% at 1Gbps by 2030

S. A. Connect achievement by 2021: (Source: [DBE-NEIMS-REPORT-2020.docx.pdf - Equal Education](#))

- Total Schools surveyed: 23,267:
- 4,723 (20%) schools were equipped with internet services for teaching and learning, unspecified capacity, quality, or speed;
- 6,852 (30%) schools were equipped with internet services for school administration only – no teaching or learning;
- 11,575 (50%) schools had no internet connections of any kind.

Comparison Notes, Vietnam, and China:

1. Significantly poorer Vietnam connected 96% of all schools using high speed fibre optical networks by 2013 (Source: [Viettel Aug 17, 2021](#)).
2. [China reported on 8 April 2021](#) that “All Chinese schools now have full access to the Internet, and 95.2 percent of them are equipped with multi-media classrooms.” But, China’s GNI per capita in 1990 was US\$ 980 PPP, compared to South Africa’s US\$6,300 PPP, which was 6.4 times higher. By 2021, China’s GNI per capita had grown to US\$ 19,160 PPP, and South Africa’s to US\$ 14,340 PPP, 1.3 times lower. Could it be that China’s “economic miracle” was partly due to their use of all available tools, including the internet, to educate their children? (World Bank data source: (<https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.KD>))

FURTHER INSIGHTS INTO ICT, TECHNOLOGY, INEQUALITY, POVERTY, AND UNEMPLOYMENT

The Role of Current and Future Technological Advances: Artificial Intelligence (AI)

ICTs, in all their evolutionary variants, from ancient [African Talking Drums](#), date of invention unknown, probably stretching back more than 100,000 years, through Aeneas Tacticus’ invention of the “[Hydraulic Telegraph](#)” about 100,000 years later in circa 350 BCE, to today’s Artificial Intelligence (AI), have all served humanity very well, except for the relatively rare occasions when they have been abused to promote extremes of inequality and its resulting violent conflicts and environmental damage. The first targets of ICT abuse by governments facing internal societal disturbances, including civil wars, are the broadcasting services and the internet.

South Africa has been at the forefront of all the above technological evolutionary stages, from the seeds of technology planted about 100,000 years ago in South Africa (see [Time Machine – the origins of innovation 100,000 years ago](#)”), to the latest new technological applications including Artificial Intelligence, South Africans have been early technological adopters. For example, Samuel Morse introduced the world’s first electrical telegraph 180 years ago in 1843, South Africa followed just 17-years later in 1860. South Africa has the invaluable capability to launch the full range of well-known and easily predicted technological advances in the evolution of modern ICTs, e.g., the ever-increasing “G’s,” “new generations” of mobile ICTs, from 1G to 5G today, 6G, 7G coming soon? The equally well-known or visualized technological evolutions in expanding “Industrial Revolutions,” 1IR through to 4IR today; the unfolding 5IR, a “[Homo economicus](#)” - like phenomenon defined as human/machine integration for even more wealth creation in the “workplace”; The 6IR, AI – driven mass automation with massive efficiency gains, with an exponentially expanding set of new innovations imagined, created, manufactured, and even maintained by the AI machines themselves. The “intelligence” processors used by AI, designed by humans, are at present about one hundred times more “intelligent” than human intelligence, and they are still expanding much faster than humans can reproduce more brains.

Besides being at the forefront of technological developments, at least for the estimated 24% of South African “haves” whose children are technologically-empowered to know, South Africa’s developmental failure has been its inability to share its technological knowhow and prowess equitably, so that all its people, especially its children, can benefit from that technology. As the statistical update at the start of this discussion document

indicates, in 2020, only 8% of homes in South Africa were connected to fixed broadband internet services to enable whole family learning. This compared very poorly with the six-countries in the benchmarks comparing similar economies: Algeria was lowest after South Africa at 31%; Argentina highest in the group at 76%. Historically much poorer Vietnam had 62% 24/7 connected households according to their own estimates. Vietnam's updated reports state that in [2022, 72% of Vietnamese households had fibre optic broadband connections at home](#).

South Africa's dismal learning achievement in the critical reading, mathematics, and science international tests, which positioned South Africa last in the global classroom, are a direct result of South Africa's failure to build the knowledge networks for all its people. All this while the world raced ahead building [Generative AI \(GAI\)](#) - Generative AI systems present outputs in any desired formats (text, images, sound, movies) in response to user prompts); [Artificial general intelligence \(AGI\)](#) - AI systems which surpass human intelligence, able to reason like humans, able to improve its own software instructions and therefore its functionality if necessary; and soon, "[Sentient](#)" AI systems which can think, feel, and develop self-awareness like humans, but much deeper and faster than humans can. [A Google AI Engineer was fired recently](#) for suggesting that Google's AI was becoming sentient!

And South Africa wants to introduce a compulsory AI curriculum in all schools? With just 20% of the nation's schools connected to a working internet service for education and learning in 2020, 8% of homes similarly connected for online home and continuous lifelong learning, and up to 76% of South Africans unable to afford the costly ubiquitous national mobile broadband services needed to access AI services, how can South Africa's children study and learn about AI, especially given the disappointing learning outcomes illustrated statistically in Table 4 on page 4 of this document? The best South Africa can do is to follow the model of progressive countries like Finland; eschew the ideas of an AI, Coding, or Robotics curricula or compulsory school subjects, but build into all subjects the fundamentals of these critical disciplines, preparing the few learners who will specialize in their development and use at appropriate specialized tertiary institutions of learning. The AI systems themselves will design their future iterations much faster and better than humans can, and this must be central to the integrated learning processes required.

The following brief discussions focus on the aspects of AI which decision-makers and influencers in South Africa need to know and understand, so that they can begin to position AI to help resolve South Africa's most difficult challenges, and prevent the technology from exacerbating them even more. The primary focus must be on the nation's children, the 63.4% of the nation's 5-12 year-olds living in multidimensional poverty ([UNICEF 2020](#)). As the nation's future adult population, all the nation's children must be empowered to understand and use "[AI4Good](#)" whilst avoiding the numerous doomsday scenarios that dominate much of the current AI discourse.

[AI: The World of Work; Knowledge About it All; And About Ourselves;](#)

One major myth of AI which must be understood from the outset of any discussion of the technology, is that AI will create jobs. On the contrary, all technologies invented by humankind, from their humble beginnings as stone age hand axes and spearheads, to the latest AI-controlled robots assembling motor vehicles in Silverton, South Africa, are designed to maximise productivity, improve quality, and reduce overhead costs (labour). Hunting and gathering was made easier and safer using stone tools; back-breaking farm labourers were helped by early farm tool innovations, until the labourers themselves became "tools," slaves in the race for economic gain. Today, massive efficiency gains through digitization and consequential automation are the order of the day, making any "human" attempt at job creation extremely difficult, if not impossible, or short-lived, even without the influence of AI.

There is a very welcome growing population of multidisciplinary paleoanthropologist finding evidence of more than 400,000 years of egalitarian pre-Neolithic lifestyles with minimum intergroup violence or damage to the environment. In this era of human history, these research scientists, including South African anthropologist James Suzman in "[Affluence Without Abundance](#)", tell us that there were no "jobs", no "bosses" no "corporates", work was not "toil", work was undertaken by whole communities for the benefit of whole communities and individuals, voluntarily by all according to their abilities, and with pleasure. We cannot return to that idyllic, utopian world, humanity is too deeply entrenched in the post-Neolithic "civilizations" that we

have created, but knowing this history can help us to understand the present, and chart a safe path into a “human-centred” future. AI can be a powerful tool for that purpose.

An exceptionally gifted young palaeobiologist, Scottish-born Thomas Halliday, writes in “[Otherlands – A World in the Making](#)”, his 2020 epic journey back into 500 million years of our earthly existence, that:

“We know what can happen during environmentally turbulent periods like the one in which we live. In mapping the past, we can predict the future, and find the routes that avert disaster. Where some disastrous outcomes are inevitable, we can plan for them, minimise the damage and mitigate them”

The young scientist was not writing about AI, but about his insights into the science of natural cyclical change, from earth and life formation about 4.5 billion years ago, through several mass extinctions, renewals, and new survival cycles. His book provides valuable insights into the stated existentialist threat of AI. Some AI experts believe that the threat of deliberate or inadvertent abuse of AI may be worse than the threat of climate change, both its natural and man-made components. Both are discussed brilliantly by Thomas Halliday, in a creative mixture of factual science and poetic licence. Humanity must listen. The present must demand a close examination of the past in order to predict the future and avoid deadly errors of judgment.

Perhaps, the statement made by historian Professor Yuval Noah Harari in the summary of his discussion that follows, that “[A.I. is ‘seizing the master key of civilization, and we cannot afford to lose’](#)”, Dr Halliday’s historical scientific research reminds us that nature may have recognised, repeatedly, that “*the master key of civilization*” has been hacked many times, and humanity’s creation of AI is nature’s response to “*reboot civilization*.” If this reboot fails, AI can help to destroy civilization in its current form, allowing nature to control this reboot, however thousands or millions of years it may take. Perhaps humanity should listen and act.

Optimistic and Pessimistic Expert Views about AI:

The following discussions provide summaries of the optimistic and pessimistic thoughts of leaders in the AI world, the technological leaders who design the AI systems and operate them for good or for bad; the philosophers who seek to understand AI’s impacts on humanity and the environment it survives on; whole multidisciplinary community of thinkers and leaders who strive to “*predict the future, and find the routes that avert disaster*”; and of course, the political class of social elites and their wealth-creating entities, who seek to profit from AI at any cost.

Views of Expert Thinkers on AI:

To keep this discussion document short and readable, an aggressively summarised account of the wisdom of many within and external to the AI industry is provided, selecting key “sound bites” from their statements made in video discussions, documentaries, and interviews. These sound bites are not presented as firm references, but as triggers for further discourse across the whole spectrum of human society, in South Africa and everywhere else on earth – the challenges are global in nature.

In the very rapidly changing world of AI, in which just one week of new innovations and thinking may change the whole trajectory of the AI/Human interdependency development, video interviews offer the most current information and opinions. Some of the expert opinions expressed may even influence the output responses of the growing range of [AI Chatbots](#), either as accurate representations of the opinions themselves, or as [AI “hallucinatory”](#) creations, of both the well-intended statements, or those deliberately created to mislead. To illustrate the immediacy of the rapidly changing world of AI, just two weeks before the above sentence on Hallucinatory AI was written, yet another AI Guru, Gary Marcus, professor emeritus in psychology and neural science at the prestigious MIT, published a video interview on the changes and impacts of hallucinatory AI, with well-known USA politician Andrew Yang. Gary’s biggest fear is the threat to democracy posed by AI, its potential for deliberately faked or AI hallucinatory generated “alternative facts” and news, influencing whole electorates to elect anti-democratic leaders to govern them:

<https://www.youtube.com/watch?v=yLu8QAiw5Yw>.

What exactly is AI?

Artificial Intelligence is about humans designing machines that can think, reason, and perhaps ultimately feel and behave like humans, with physical limitations of course. It is thus logical that the first step in this complex

research and development for the creation of such machines is examination of the human mind itself. The current crop of AI machines cannot think, feel, and behave like humans, yet, but the up-coming sentient AI's may do so sooner rather than later. Designing and building "safe" AI's that serve humanity and its environment without threatening both must therefore start with building knowledge about how the human brain works, when it started to work that way, and what processes the human brain used and still uses to achieve the resulting cognitive ability, i.e., [the artificial neural networks](#) that underpin AI. There have been many blind alleys in the search for that understanding, including a recently held Eurocentric belief that for hundreds of thousands of years, Homo sapiens "[remained in a cognitive rut](#)" in their African evolutionary homes, and that "*Modern cognition evolved in Europe 40,000 years ago*", after humans arrived in that "enlightening" piece of earth from their "dark" continent of origin (referenced in [Smithsonian June 2012](#)). We now know, through modern machine-assisted research using e.g., CT scans assisted by AI on deep analyses of ancient Homo species fossils and their environments, that "*Homo species first developed humanlike brains approximately 1.7 to 1.5 million years ago in Africa. This cognitive evolution occurred at roughly the same time Homo species' technology and culture were becoming more complex, with these species developing more sophisticated stone tools and animal food resources*" ([Science, 9 April 2021](#)). We need to understand the past so that we can map it to predict the future, find routes to avert disaster, plan for the minimization of disasters which become inevitable, as suggested by Thomas Halliday.

In preparing this discussion document, ChatGPT was asked when human-like brains appeared in our evolutionary history. The response must have drawn from the numerous excellent research publications on the subject, and included the interesting detail that "*Homo erectus appeared around 1.9 million years ago and had an even larger brain, ranging from about 800 to 1,100 cubic centimetres. Homo erectus is notable for being the first hominin species to have a brain size within the range of modern humans. They also exhibited more advanced cognitive and behavioural traits, including the use of tools and the controlled use of fire.*" ChatGPT knows, and could even produce a whole dissertation about the birth of AI in the ancient mind of Sterkfontein-born Homo erectus. If the AI machines cannot find documented research articles in the global online databases, they have the capability to produce very believable seemingly peer reviewed "hallucinatory" versions, a danger to human understanding.

Could the fertile imagination of Homo sapiens, dreaming about machines and other artifacts which could think and behave like humans, have started as far back as 1.7 million years ago? What we do know is that humans have been thinking along those lines for a very long time. We know about the visions of [Dædalus](#) in Greek mythology circa 3,500 years ago. We also know about the tragic British computer genius [Alan Turing \(1912 to 1954\)](#), who was murdered by his government because of his sexual preferences. And of course, the more recent work of [Stanford Professor John McCarthy in 1955](#) who coined the term "artificial intelligence". AI is merely a natural evolution of human cognitive thinking, in much the same way that our Sterkfontein-born Homo erectus ancestors "invented" stone tools to ease their journeys into very distant unknown lands about 2-million years ago. This simplicity must be learned by all, especially children who must live with the technology in their adult lives, so that they can understand and respond to both the benefits and dangers of AI. The need for layperson levels of understanding of AI cannot be overstated. Such understanding must become part of our common human knowledge, learned, and used to support all knowledge disciplines at all levels of learning, especially outside classroom school environments. With such general knowledge of AI, the development and implementation of curricula for later specialized learning and teaching will be significantly simplified.

One of many very useful definitions of AI, which facilitates the development of layperson levels and child-friendly understanding of AI, is by one of the world's most cited and respected intellectuals, linguists, and philosophers alive today, 95-year-old Noam Chomsky, who simplified the definition of AI as follows:

[NOAM CHOMSKY, 8 March 2023:](#)

"OpenAI's ChatGPT, Google's Bard and Microsoft's Sydney are marvels of machine learning. Roughly speaking, they take huge amounts of data, search for patterns in it and become increasingly proficient at generating statistically probable outputs — such as seemingly humanlike language and thought. These programs have been hailed as the first glimmers on the horizon of artificial general intelligence — that long-prophesied

moment when mechanical minds surpass human brains not only quantitatively in terms of processing speed and memory size but also qualitatively in terms of intellectual insight, artistic creativity, and every other distinctively human faculty.” ([The New York Times of 8 March 2023](#): article protected by paywall: accessible publication at edisciplinas.usp.br).

The New York Times original article was published behind a paywall, rendering it beyond the affordability of those who needed it most. To bypass the publisher’s paywall, a copy was requested from ChatGPT, and rejected on first attempt, seemingly to protect the paywall, although the same article was freely available via a simple Google search. A rephrased question to ChatGPT on Chomsky’s opinion about AI returned a much richer answer, detailing Chomsky’s credentials; his scepticism about “AI Intelligence;” his concern over its potential impact on global power dynamics; AI’s potential to exacerbate existing social inequalities; and Professor Chomsky’s ethical concerns surrounding AI, such as issues related to privacy, surveillance, and the potential for algorithmic bias.

The following very brief reviews of key statements and opinions by recognized authorities on AI is presented to trigger further action-focussed thinking by academics, techno-economic practitioners, and commercially-focussed marketeers, all of whom must direct their research towards the practical application zones so urgently needed by all of humanity. Of even greater urgency than all the AI-focussed research, which ultimately may be conducted by AI itself, is the need to trigger mass public discussions and debates amongst national leaders and citizens who must live with AI, currently without the supporting knowledge and understanding of its underlying technology and its impact on society and its life-giving ecosystems.

ChatGPT and its CEO [Samuel Harris Altman](#)

Sam Altman, entrepreneur par excellence, dropped out of a Stanford University computer science course without graduating, to lead one of the most successful techno industries today, OpenAI and its evolving AI machines. ChatGPT is said to have attracted a record of 100 million users just two months after its launch in November 2022.

Sam Altman is quoted as having said that *“AI Would Either End the World as We Know It, or Make Tons of Money.”* An attempt to find a direct reference to when and where this statement was made, was indeterminate, so ChatGPT was asked to clarify. Two responses were received: (a) *“I couldn’t find any specific instances where Sam Altman, the CEO of OpenAI, said the exact quote you mentioned.”* (b) The question was rephrased to “when and where did Sam Altman say *“AI Will Either Make Tons of Money Or End The World As We Know It”*”. The response this time was *“I apologize for the previous response ---- Sam Altman did indeed make the statement ---- at the [Code Conference in May 2018](#)”*

Sam Altman has promoted the “good” of AI, without diminishing its risks of existential threats to humanity and its complex ecosystems. A summary of Sam Altman’s thinking is that ChatGPT and its successor AIs cannot do either good or bad on their own initiatives, the outcomes of AI use rests squarely on the creativity of the human mind, for good and for bad. Humans are responsible for the design of all AI systems, including those which generate unexpected, undesirable, or even very dangerous outcomes. Humans must therefore remain accountable for the good, the bad, and the ugly results of AI. The concerns expressed by the globally respected philosophical guru Noam Chomsky, about humans using AI to create chaos in the world’s already dangerously turbulent power dynamics, must be shared by all humans, their governments, and their economics and technological leaders.

A few notable concerns by Sam Altman, as he warned of AI posing human extinction risks on par with nuclear war, include: (i) The fear of mass job displacement resulting in social upheavals and economic inequality; (ii) breakdown in social cohesion and human connectivity; (iii) demanding legal and regulatory challenges beyond the capabilities, capacities, or willingness of many governments; (iv) AI weaponization and arms races; (v) mass misinformation, disinformation, and information manipulation to create dangerous political chaos; (vi) rising levels of opportunism, greed, and AI-driven overexploitation of natural resources leading to ecosystems collapse and the existential risks of the encroaching [sixth mass extinction](#).

The good that AI can do for humanity and its ecosystems far outweighs its threats. AI must be used to rapidly provide the human-generated information and knowledge needed to counter all AI actual, perceived, or imagined threats, including those not listed, like the weaponization of biological science, the deprivation of human freedoms, and the erosion of human sustainability through the global failure to alleviate or reverse the sustainable development challenges which all nations face. South Africa, which holds the unenviable record of being the most unequal country in today's world, is at the forefront of these sustainability threats.

Google and AI.

This short discussion presents a very limited sample of the views of three current and two former Google executives. These five Google representatives demonstrate the diversity of Google, and the multicultural, multiethnic, and even multilingual characteristic of the company, its employees, and even its AI tool. Google CEO Pichai Sundararajan, better known as Sundar Pichai; Google VP and General Manager Sissie Hsiao; Google's Senior VP and head of Technology and Society, Zimbabwe born James Manyika; former Google VP, Engineering Fellow, Cognitive Psychologist, English/Canadian Geoffrey Hinton, also known as "The Godfather of AI"; and former Chief Business Officer at Google X, Egyptian Mohamed "Mo" Gawdat, reflect the multiethnicity, multicultural, and even multilingual characteristic of Google and its AI tool Bard.

The video recordings of the interviews and discussions are preferred references; they are the most accurate and authentic records of the high-level opinions, capturing as they do the vital "non-verbal" elements of the conversations, which add confidence that the faces of speakers and interviewers, and the videos themselves, are not AI produced fakes. They are reflective of the power of the technology as vital enablers of human communications. The summaries are provided as short "sound bites" for brevity, intended to be used as triggers for further detailed analyses, consideration, and research by academics, socio-economic-political analysts, leaders and their followers, and the citizens of all demographics, who must strive to understand the fundamentals of AI.

The reference links to each video discussion used in this section of the discussion document are:

1. **17 April 2023:** Current Google executives **Sundar Pichai**, **Sissie Hsiao**, and **James Manyika**: Interviewer [Scott Pelley](https://www.youtube.com/watch?v=880TBXMuzmk), seasoned journalist and author: "*The AI revolution: Google's developers on the future of artificial intelligence*": <https://www.youtube.com/watch?v=880TBXMuzmk>
2. **9 May 2023:** **Geoffrey Hinton**, former Google VP, also known as "The Godfather of AI": Interviewer [Hari Sreenivasan](https://www.youtube.com/watch?v=Y6Sgp7y178k), American Broadcast Journalist: "*'Godfather of AI' Geoffrey Hinton Warns of the 'Existential Threat' of AI*": <https://www.youtube.com/watch?v=Y6Sgp7y178k>
3. **1 June 2023:** **Mohammad "Mo" Gawdat**, former chief business officer for Google X: Interviewer [Steven Cliff Bartlett](https://www.youtube.com/watch?v=bk-nQ7HF6k4), Botswana-born British-Nigerian entrepreneur and podcaster: "*AI is Worse than Climate Change*": <https://www.youtube.com/watch?v=bk-nQ7HF6k4>

Google CEO Sundar Pichai; VP/GM Sissie Hsiao; Snr. VP Technology and Society James Manyika:

- AI is changing society similarly to how fire, agriculture, electricity changed society. AI will be as good or as evil as human nature allows.
- Society is not prepared for the onslaught of AI, because humans and the social institutions they build cannot think as fast as the AI machines they build. There is however a glimmer of optimistic hope; there are more people worrying about the technology very early in its lifecycle, which brings hope that humans will find ways of promoting the "AI good" over the "AI bad."
- Bard does not look for answers on the Internet like Google Search does. Instead, Bard's developers and programmers created a machine-learning language model which "consults" an exponentially expanding database of human knowledge from which it can derive the most statistically representative answer. Bard's power of self-learning was surprising; with very little human help, it "taught" itself new languages; within a very short timeframe, Bard learned Bengali and could translate large texts from and into that Bangladeshi language.

- The Bard prototype spent several months reading nearly everything that had been posted on the internet, from which it developed its language model, still under development to iron out Bard's own "creativity" – the so-called hallucinatory responses.
- Bard is not sentient – yet! The AI is not aware of itself, yet, but it can exhibit behaviours that seem to be sentient. Its human designers are sentient, they imagine things, like science fiction which sometimes deviates far from reality. Bard is taught to emulate this human creativity, a challenge which Google is trying to control.
- The impact of AI on human creativity will be profound. An example discussed was an exquisite piece of prose by, say Ernest Hemingway, which Bard could emulate by writing a million equivalents while Hemingway was trying to complete just one. Humans will need to find ways of protecting human artistic creativity, as well as the levels of automation across the whole human society and its economies.
- The impact of AI on jobs will be profound, and irreversible in the medium-to-long term. More than two thirds of all current skillsets will have to be updated and upgraded, while at the same time, AI machines are learning to do the same current and future jobs faster with significantly greater efficiency. This challenge suggests a profound redefinition of the world of work – celebrating the rebirth of, and yet to be re-imagined and developed, human freedoms from servility, near-slavery, or just unrewarding jobs lacking in any kind of human dignity. The concept of universal basic incomes (UBI) has been frequently discussed in connection with AI. Perhaps AI itself will help find the UBI solutions which are acceptable to economists, capitalist, free marketeers, socialists, politicians, human rights believers and activists, and the folks who live at the base of the global human development pyramid, deprived of most forms of dignity known to humankind.
- Many deeper human issues which are, will be, directly impacted by AI were discussed, including the multifaceted weaponization of AI, by governments, social extremists, and global criminal organizations. An example of such weaponization is the vital discussion of state-sponsored or supported abuse of AI facial recognition, with troubling examples from China, Israel, and the United States. A "must see" video documentary was prepared and broadcast by the English service of France 24 on 4 June 2023; [*Your face is ours: The dangers of facial recognition software*](#).
- A reasonable conclusion to this short list of Google's AI concerns is the statement by Google's CEO, that Google *"lies somewhere in the optimistic middle"* of the extremes of an idyllic utopian world of AI4VeryGood, and a dystopian world of AI4VeryBad. Central to this conclusion was the need for the whole world to adapt to the reality of AI, developing universal treaties and regulatory systems for an AI-safe world. Google's stated view is that such regulatory development must be undertaken not just by engineers, but social scientists, ethicists, philosophers, and so on.

Former Google Executive Geoffrey Hinton, "The Godfather of AI":

- After more than 50-years developing artificial neuron networks, i.e., interconnected computer networks controlled by algorithms (software instructions) to mimic the decision-making functions of the human brain, "The Godfather of AI" now believes that the *"threat of AI might be even more urgent than climate change"*.
- The networks of AI can communicate with humans, and with each other, at trillions of bits per second. Human languages limit us to a few hundred bits per second, that is why AI machines like ChatGPT can "learn" thousands of times more and faster than humans can.
- There are numerous parallel concerns over AI becoming smarter than humans: *"In the 80's and 90's, blue-collar workers were concerned about robots coming in and replacing them, and not being able to control them, now this is kind of a threat to the white-collar class of people saying that there are these Bots and agents that can do a lot of things that we otherwise thought would be something only people can."*
- Yes, automation of traditional human labour is a very different threat from many other threats which are also severe. So, they include these things taking away jobs. *"In a decent society that would be great. It would mean everything got more productive, and everyone was better off."* But the danger is

that it will make the **rich richer and the poor poorer**. That is not AI's fault, that is how we organize Society.

- There are dangers about AI making it impossible to know what is true, by having so many fakes out there. That is a different danger, that is something you might be able to address by treating AI-produced fakes like counterfeiting. Governments do not like you printing their money, and they make it a serious offense to print money.
- I think governments are going to have to make similar regulations for fake videos and fake voices and fake images. It's going to be hard, but as far as I can see, the only way to stop ourselves being swamped by these fake videos and fake voices and fake images, is to have strong government regulation that makes it a serious crime.
- It would be great, if governments could say look, these fake videos are so good at manipulating the electorate that we need them all marked as fake, otherwise we are going to lose democracy. *"The problem is that some politicians would like to lose democracy. So that is going to make it hard."*
- **AI Regulation:** *"So, the Genie is out of the bottle in that sense. We can try, and at least contain it a bit, but that is not the main thing I am talking about. The main thing I am talking about is the risk of these things becoming super intelligent, and taking over control from us. I think for the existential threat, we are all in the same boat. The Chinese the Americans the Europeans, they all would not like, um, super intelligence to take over from people, and so I think, for that existential threat, we will get collaboration between um, all the companies and all the countries, because none of them want the super intelligence to take over."* *"It is more difficult to see how you're going to get collaboration."*

Mohammad "Mo" Gawdat, former chief business officer for Google X

The following are key extracts from nearly two hours of highly informative discussions, in which repetitions from other known or referenced views will be avoided as far as possible:

- Mohammad believes that it is inevitable that AI machines will become smarter than us, perhaps a billion times smarter. He gives the example of ChatGPT and Albert Einstein: If we simulate IQ, ChatGPT today would be about 155; Einstein's IQ was 160; The "smartest human on the planet" has an IQ of about 210. We are matching an AI machine with the intelligence of Einstein, and most AI experts agree that this is just the tip of the iceberg; ChatGPT-4 progressed to ten times as "intelligent" as ChatGPT-3.5 in just a few months, without any significant technological changes. How capable will ChatGPT-5 and beyond be?
- If the next versions of AI become ten times the intelligence of Albert Einstein, say an IQ of 1600, will mere humans understand the new knowledge or insights generated by AI? How will the AI4Good balance the AI4Bad if humans cannot understand it all?
- Mo Gawdat defines several "inevitables" in AI. First inevitable is that AI will happen, there is no stopping it, not because of any technological issues, but because of humanity's inability to *"trust the other guy."* For example, he admires Sundar Pichai, the CEO of Google very much, but whatever Google's good intentions may be, Google cannot stop developing AI, for if they do, others will continue, and they cannot be stopped. A fourteen-year-old writing AI code in the family garage after school, with the assistance of AI of course, will be too young to fully understand the nuances, outcomes, and consequences of their creations. And we have not even touched on state-sponsored development of AI-designed and controlled weapons of mass destruction. Or even worse, weapons of mass population control – the dystopic vision of e.g., George Orwell in his 1949 science fiction classic novel ["1984"](#). Perhaps George Orwell got his dates mixed up – what he imagined may come to be about forty years later – in 2024. The speed of humans developing AI which can further design and develop itself, is nearly impossible to predict.
- ChatGPT and similar AIs are not very intelligent, the best they can do is predict the next word based on the statistical probability derived from vast databases of human-created information and knowledge. AI can do this perhaps a billion times faster than humans can access their own knowledge, which humans store in vast databases which AIs can access and use at will. AIs can present the

requested outputs in any preferred format, e.g., the way Shakespear, or any other recorded intellectual in the history of humankind, would have stated it.

- The above is merely a very short summary of a highly informative nearly 2-hour long interview. The best way to understand Mohammad Gawdat's insights, and those of his competent interviewer, is by listening to the whole interview via the hyperlink provided above.

Views of non-AI intellectuals: Stephen Hawking, Yuval Noah Harari, and Neil deGrasse Tyson

STEPHEN HAWKING, 1942 to 2018: This world-renowned theoretical physicist, cosmologist, and author gave a stark warning of the dangers of AI in December 2014, stating: *"Success in creating effective AI, could be the biggest event in the history of our civilization. Or the worst. We just don't know. So, we cannot know if we will be infinitely helped by AI, or ignored by it and side-lined, or conceivably destroyed by it."* Source [CNBC 6 November 2017](#)

Professor Stephen Hawking was afflicted by a progressive form of Amyotrophic lateral sclerosis (ALS) at age 21-years, and survived in near total paralysis for 55 years, but with an active brain which elevated him to one of the most celebrated scientists of modern times, on par with Albert Einstein more than half a century before him. Professor Hawking's BBC interview on 2 December 2014, enabled by an early form of AI, see <https://www.bbc.com/news/technology-30290540>, elicited the following profound thoughts:

- *"The development of full artificial intelligence could spell the end of the human race."* Primitive forms of artificial intelligence developed so far have already proved very useful, but he (Stephen) fears the consequences of creating something that can match or surpass humans: *"It would take off on its own, and re-design itself at an ever-increasing rate."*
- *"Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded."*
- But he is betting that AI is going to be a positive force, although there are concerns that clever machines capable of undertaking tasks done by humans until now will swiftly destroy millions of jobs.

YUVAL NOAH HARARI: *"Biotechnology and the rise of AI may split humankind into a small class of 'superhumans' and a huge underclass of 'useless' people. Once the masses lose their economic and political power, inequality levels could spiral alarmingly,"* [The Guardian, 24 May 2017](#).

Professor Yuval Noah Harari is a popular, widely read historian, philosopher, and author of the best-selling books ["Sapiens: A Brief History of Humankind"](#), ["Homo Deus: A Brief History of Tomorrow"](#), and ["21 Lessons for the 21st Century"](#) amongst many more. A very popular highly demanded lecturer and public discussion panellist, Prof Harari was recently invited to address the United Nations' 'AI for Good' summit on July 6th, 2023, hosted by the UN International Telecommunication Union (ITU) at its headquarters in Geneva, Switzerland. Key extracts from that high-level conference were:

6 Jul 2023: Yuval Noah Harari: "Safe and Responsible AI?": [#ai #aiforgood #ituaisummit](#): *"Artificial Intelligence (AI) is the first tool in history that can take decisions by itself and create new ideas by itself. It's a tool that's being adopted extremely fast – before humans have even started to understand the potential consequences. So how can we make sure we use AI ethically and responsibly, to benefit everyone? In this conversation, Yuval Noah Harari (historian and author) and Nicholas Thompson (CEO of The Atlantic) explore the crucial role of regulation in AI development and deployment, and the impact this breakthrough tool could have on democracy and our relationship with reality."* This high-level summit was part of the United Nations "AI for Good" initiative, full discussions are available from the International Telecommunication Union (ITU) website at <https://aiforgood.itu.int/guardrails-needed-for-safe-and-responsible-ai/>, or as a direct video download from <https://www.youtube.com/watch?v=dj95EAg-prM>.

Other very recent major video appearances by Professor Harari about AI include:

19 Apr 2023: <https://www.youtube.com/watch?v=JV9tzdYT5FU>: AI Could Be The End Of Democracy":

24 May 2023: <https://www.youtube.com/watch?v=TKopbyIPo6Y>: "Artificial Intelligence, Democracy, & the Future of Civilization"

3 Jun 2023: <https://www.youtube.com/watch?v=Bpy6X7kF7-s>: "The Oppenheimer Moment of AI"

20 Jun 2023: <https://www.youtube.com/watch?v=tvR0qUIPN1o>: "Oppressive AI, WWII & Genetic Engineering"

6 July 2023: "Safe and Responsible AI?": <https://www.youtube.com/watch?v=dj95EAg-prM> (The UN/ITU Summit)

17 Jul 2023: <https://www.youtube.com/watch?v=Mde2q7GFCrw>: "Human Nature, Intelligence, Power, and Conspiracies"

For a full understanding of the social aspects of AI, all the above videos are valuable. The detailed discussions are not generally available in academic papers, nor are the non-verbal communication qualities that add to the understanding of the issues raised.

NEIL DEGRASSE TYSON, well-known and respected astrophysicist, cosmologist, author, and science communicator, expressed strong support for AI in several highly informative video interviews, suggesting that fear of technological advances has been a feature of humanity since the dawn of human consciousness, and that the value of AI to humanity far exceeds its threats.

One of his most outstanding observations was his statement on the state of the internet today: "*Part of me wonders, maybe AI will create such good fakes that no one will trust the Internet anymore for anything, and we just have to simply shut it down,*" deGrasse Tyson said. "*Maybe it's the final nail in the coffin in the internet.*"; "*Thirty years, it was a good run from the early nineties to the early twenties and 2020s, now it's time for the next thing,*" he continued. "*That could be the greatest gift of AI to the internet. The internet gets a vote of no confidence from us.*"

Neil deGrasse Tyson's views on AI are available in (a): "*Neil deGrasse Tyson Is Not Afraid of Artificial Intelligence | Within Reason*" 23 Apr 2023, <https://www.youtube.com/watch?v=ukhmq5on-IA>; (b): "*AI and Deep Space Exploration*, 27 Apr 2023" <https://www.youtube.com/watch?v=iJQdny3-T2Q>; and (c): 6 May 2023 "*AI could be 'nail in the coffin' for the internet,*" warns Neil DeGrasse Tyson <https://www.youtube.com/watch?v=4cWh1tZta2s>.

Yes, the internet as we know it has received some very bad publicity since its glory days, including from two of its "founding fathers": "*We demonstrated that the web had failed instead of served humanity, as it was supposed to have done, and failed in many places,*" Sir Tim Berners-Lee in [Business Insider, 3 Jul 2018](#); and in [2019, Vinton Cerf](#) spoke about the pacification of cyber space when he gave a talk at Oxford University. He argues that **fraud, malware, and misinformation are now far too commonplace on the internet**. "*Immeasurable harm is happening,*" he warns. "*Many people don't feel very safe right now.*"

Perhaps if AI is not hijacked by bad actors of the human kind, as they hijacked the internet upon which AI still depends, or that human developed AI machines with evermore invasive botnets do not turn on their human creators, AI may rescue the internet and return it to serve humanity once more, instead of humanity serving the technology and its Homo economicus masters.

Regulating Artificial Intelligence in South Africa

Discussion of AI Definitions and Concepts relevant to Regulation.

"As policymakers around the world have attempted to create guidance and regulation for AI's use in settings ranging from school admissions and home loan approvals to military weapon targeting systems, they all face the same problem: AI is really challenging to define." [Carnegie Endowment for International Peace: 6 October 2022](#)

[MIT Technology Review of 13 September 2019](#) relates a definition crafted by a 10-year-old learner who understood AI: "*It's kind of like a baby or a human brain because it has to learn,*" he says in a video, "*and it stores [...] and uses that information to figure things out.*"

Yes, regulating AI is perhaps the most difficult regulatory challenge facing humanity today. AI has already changed the world as we know it, its tentacles of influence spread to every knowledge discipline used by humankind for survivability and development. For many years now, humans have been building AI-

controlled machines and robots (AI machines with built-in or external electromechanical transducers to undertake physical work); automate work previously undertaken by humans in the manufacturing, pharmaceutical, transportation, and many other essential sectors of human activity. AI itself is evolving very rapidly, increasing its influence and impact across the full spectrum of human development challenges, including those in the environmental and climate change sectors:

- [“generative AI”, see IBM definition](#), in which AI machines can “create” copies or realistic look-alike replicas of e.g., famous works of art, interpreting, reinterpreting, and reinventing the human story. Examples of the stories that AI can change range from the estimated 73,000 year-old evidence of art unearthed at Blombos Caves, South Africa ([Bradshaw Foundation, 13 September 2018](#)); through the artistic creations of wandering descendants of those ancient South African artists in South East Asia ([Borneo, Smithsonian November 2018](#)); [France’s Lascaux cave](#) discovered in 1940; the amazing rock art of [Brazil’s Serra da Capivara described elegantly by the Bradshaw Foundation](#); through to the re-discovery of original African works of rock art that survived the vagaries of the African climate ([AI helping to date ancient paintings from Southern Africa, Smithsonian 2017](#)).

The wildly varied interpretations, mis-interpretations, and misrepresentations of this ancient record of human creativity has blighted the truth about humanity, its common identity and destiny, and its expansion through migration. An attempt to rectify this history is told by [Barbara Ehrenreich](#) in [“The Humanoid Stain” published by The Baffler in November 2019](#), and reprinted in [The Guardian on 12 December 2019](#). Barbara Ehrenreich tells the story of our very ancient ancestor’s attempts to communicate with their future generations, from anywhere on earth where humans lived, through their art. She also refers to the arrogance of modern humans who tried, and often succeeded for long periods, to deliberately distort these human stories to promote their own highly skewed Eurocentric worldviews, e.g., “evidence from European cave paintings ‘showed’ that ‘a genetic mutation occurred 40,000 years ago and caused an abrupt revolution in the way people thought and behaved.’” – [Smithsonian Magazine 25 June 2012](#).

AI has the capacity and capability to plagiarise, intentionally and unintentionally, legally, or illegally, reproducing copies or replicas of any work of art, if copies of the originals are available. We should not be surprised if recreations of artistic geniuses like Beethoven and Coltrane; Shakespear, Wole Soyinka, and Ngũgĩ wa Thiong’o; Picasso, William Kentridge and Jackson Hlungwani, all suddenly appear as new “discoveries” of genuine art classics, easily and quickly recreated using simple keyboard text prompts on sophisticated generative AI machines. AI artistic creation may be used to mislead the knowledge about the history of humankind, in much the same way that massively consumed AI-created fake news can change global politics and human destiny.

- (b) [“artificial general intelligence”](#), the next evolution of AI, which some think is already here, in which the machine has been built and programmed to emulate human cognitive abilities - it can “think” like a human. This “thinking like a human” can influence, or indoctrinate, whole populations of humans to do great good for humanity; to make “tons of money” for the tiny percentage of humans who already have much; or to do great harm to humanity, as suggested by many AI creators and philosophers thinking about AI, including Sam Altman, CEO of OpenAI, and its popular product GPT-4: [“OpenAI CEO Predicted AI Would Either End the World as We Know It, or Make Tons of Money”](#);
- (c) [“sentient AI”](#): machines that have progressed beyond thinking like humans, having the full range of emotions like humans, which are very much aware of their own existence. This AI variant may still exist only in the minds of science fiction writers, but the concept came close to being accepted as reality when Google fired a senior highly qualified software engineer, [Blake Lemoine](#), for suggesting that its LaMDA chatbot, a precursor of Google’s popular BARD chatbot, was sentient. The full story is told in [The Guardian of June 2022](#): *“‘I am, in fact, a person’: can artificial intelligence ever be sentient?”*

Today’s reality is that AI machines do not “think,” perhaps they never will. All they do is examine the artifact representing the information or knowledge source, using any analogue to digital encoder (camera, microphone, optical character readers, gene editors, etc.) to capture and digitize the subject content,

compare the result to the vast databases of human knowledge on the same subject, search for patterns in that knowledge database to find the best statistically predicted match, and “decode” the results, presenting them in the format preferred by the user. The AI machines are equipped with software code to “learn” all that is needed from the vast database of human knowledge so that they can produce the predicted results. It is this facility that can go wrong, producing unexpected, undesired, or intentionally misleading results for mass population indoctrination, potentially causing immense harm through humans using AI to mislead their fellow humans who cannot access or use AI. There are some who will welcome the information and knowledge biases created by the generators of the misinformation, so that they can further their autocratic political powers, or enhance their criminal activities.

AI for Good and AI for Bad; an overview:

A few more of the critical properties of the new world of AI, which must focus the minds of all regulatory agencies, irrespective of the specific sectors they regulate, include close examinations of both AI for Good, and the disruptive elements of AI for Bad (see [The Conversation July 2023](#)):

- Effective use of AI’s capacity to interrogate all available information and knowledge about ourselves, our survivability in our current complex, socially and politically turbulent life-sustaining ecosystems, is invaluable in providing detailed knowledge about our past, so that “*we can predict the future, and find the routes that avert disaster*” (reference to [Otherlands – A World in the Making](#) discussed on page 7). For example, AI has unleashed the power to decipher very ancient hieroglyphs, particularly those that we have failed to decipher until now. AI is taking on some of the biggest unsolved historical cases, from deciphering poorly preserved scrolls written in unknown languages, to dating their origins and associated artifacts, a new way of knowing who we are and where we came from: <https://eandt.theiet.org/content/articles/2023/06/ai-could-solve-the-biggest-archaeological-mysteries/>;
- New scientific information and knowledge across all disciplines is being uncovered and developed, that which is known, and that which is being discovered through AI-assisted research. This research includes the extraction of DNA from the fossils of our very ancient ancestors, some as old as 5-million years; from the remnants of the food lodged in their teeth or preserved in fossilized cooking hearths; the cave dust they lived in; and of course, from their coprolites. All such knowledge adds to our understanding of ourselves, our past, and our present, and allows us to predict and plan for a better, safer, future: see <https://eandt.theiet.org/content/articles/2023/06/rethinking-human-evolution-through-technology/>.

Knowing about ancient human lifestyles and health threats, going back 5-million years or more, has and will continue to help us to understand and deal with today’s mounting biological health threats, including pandemics like the Coronavirus, and those yet to appear. The evidence of what has been, what is, and what can be, is revealed with the help of powerful AI-assisted DNA analyses of offending viruses and their victims, and the development of curative and preventative medications and vaccines:

<https://www.physics.ox.ac.uk/news/new-ai-virus-diagnostic-test>.

In the pure scientific disciplines, AI is helping to decipher the deluge of fundamental particles that make up nature and our universe, e.g., at the Large Hadron Collider, which led to proving the existence of the [Higgs Bosson](#), <https://www.nature.com/articles/528018a>, and how it contributed to the formation of our universe and our world. The AI assisted [James Webb Telescope](#) circling the sun about 1.5 million kilometres above our earth, is doing much the same but from a different angle – understanding the formation of our universe through the “[Big Bang singularity](#)”, the nature of [Black Holes](#), and the birth and death of planets, stars and whole galaxies. South Africa is an active participant in all this research, especially through the mammoth [Square Kilometre Array \(SKA\)](#) still under construction.

This information and knowledge may help our future generations, today’s and tomorrow’s children and youth, to craft a better future for themselves if they survive the current rounds of existentialist threats: those unleashed by misguided but powerful self-aggrandizing politicians scattered around the world; by human stupidity which has led to our collective human failure to understand and respond to all seventeen

Sustainable Development Goals (SDG); and of course, the presently very visible climate change threats, exacerbated by greed-fuelled environmental disasters which humans have unleashed upon themselves.

But, before our children and youth, the future generations who must shape our country and our world, can assume those immense responsibilities, we must empower them all, not just the privileged few, with the basic knowledge and skills they need. We must reverse the clear historical failures reflected in Tables 1 to 5 in the introduction to this discussion. If we fail to do this, South Africa's apartheid leader Balthazar Johannes "B. J." Vorster's 1974 warning of a fate that "[*would be too ghastly to contemplate*](#)" will come to pass.

Additional discussions on AI impacts needing definitional clarity:

To conclude this very brief summary of AI and the regulatory challenges it poses, the following additional observations must form part of the AI regulatory development process:

- A closer examination of the Carnegie Endowment article used to open this section of the discussion is useful:
 - a) AI in "schools' admissions" must be extended beyond admissions alone. The history of education worldwide, and in South Africa in particular, has shown that a complete rethink of the education and learning process is necessary and urgent. Harmful tuition and indoctrination of young minds has had devastating impacts on global and national social cultures and structures, on political ideologies, and on the most critical human skills required for environmental sustainability. Concerns over education without learning are gathering momentum; skewed economic models which fuel inequality and dangerous political dynamics and the resulting human behaviour patterns, tend to shape the learning objectives of too many young minds. This tendency has been of concern to academics, philosophers, and people-centred politicians throughout human history. Plato and his student Aristoteles are relatively modern examples in the 400,000-year plus human history to today. Historians like Yuval Noah Harari ([Future Of Jobs and Education 13 May 2021](#)) and Walter Scheidel ([Can inequality only be fixed by war, revolution or plague? Economist September 2018](#)) are their modern messengers, warning of the consequences of humanity getting it wrong.

Artificial Intelligence technologies can help to redirect today's education systems back towards their original focus on humanity and its environment, or it can exacerbate the focus of our education systems on material and economic accumulation, and political power, at any cost. The importance of this aspect of AI on educational process is discussed in several highly informative analytical articles, e.g., [AI is coming to schools, and if we're not careful, so will its biases: Brookings 2019](#). This informative report also covers one aspect of one of South Africa's major historical defects – racism in education, still very much in existence and visible in the difference between schools for the poor and schools for the rest. This, and more research-based documents like it, must become central components of South Africa's development of an effective long-term AI regulatory process. Tables 4 and 5 in the introduction of this document, suggest the urgency for such inclusion.
 - b) AI in "home loan approvals." Can AI be used to discriminate against individuals or groups in the award of home loans, and terms and conditions of repayment? Or even the ability to acquire or rent a home? This age-old human behavioural scourge has been around since the dawn of societal divisions and identification of humans; social hierarchies which identify "the other" in terms of race, tribal affiliations, gender, religious beliefs, or any of the numerous variants of "the other" forms of social classification and exclusion. AI can exacerbate the practice, or ameliorate it; the choice is very human. Starting references include <https://www.technologyreview.com/2020/10/20/1009452/ai-has-exacerbated-racial-bias-in-housing-could-it-help-eliminate-it-instead/>, and [AI Can Be Racist: Let's Make Sure It Works For Everyone: Forbes 21 April 2023](#). The global rise of right-wing neo-Nazi movements, nationalism, populism, and even tribalism and global racism, must be causes for concern to South Africans, the recent history of the country demands such concern.
 - c) AI in "military weapon targeting systems." The weaponization of AI is a reality. AI has assisted the design and development of weapons of mass destruction, their hypersonic speed delivery vehicles, and their autonomous detonation without human intervention. In an attempt to minimise the

existential threat of a global nuclear holocaust, nuclear capable nations adhered to a 60-plus year old “Mutually Assured Destruction (MAD)” doctrine: *“A deterrence founded on the notion that a nuclear attack by one superpower would be met with an overwhelming nuclear counterattack such that both the attacker and the defender would be annihilated”* ([Britannica Aug 9, 2023](#)). AI, fostering nuclear proliferation at costs affordable by even poor nations, is driving this MAD doctrine towards obsolescence ([CNN 6 July 2023](#)).

Dangerous as the possible demise of MAD may be, there are many more dangers of AI furthering mass human destruction, intentionally or unintentionally. For example, it is relatively simple to change the trajectory of e.g., the immensely valuable functionality of “NiCoLa-B” to create biological weapons of mass destruction instead of the life-saving medications it was designed to “discover”. Sadly, for today’s “economic man,” Homo economicus, the most welcome lifesaving functionality of NiCoLa-B has a negative undesirable, yet perhaps expected consequence – loss of jobs. This is discussed by the Institution of Engineering and Technology (IET) in “Will robots steal our jobs?” <https://eandt.theiet.org/content/articles/2017/09/will-robots-steal-our-jobs/>.

Axios.com provides a good short summary of the key issues associated with “Medical AI’s weaponization” at <https://www.axios.com/2023/05/22/medical-ai-weaponization-artificial-intelligence-healthcare>.

Can this aspect of AI be regulated at all? Dozens of countries have called for the United Nations to regulate lethal autonomous weapons systems – read [“Nature 8 August 2023”](#): *“Rules to keep AI in check: nations carve different paths for tech regulation”* (Note: article protected by a pro-rich paywall). But, consensus between all major nuclear powers seems to be far out of reach - the US Government has stated its reluctance to share defence strategies with anyone else, especially the nations it has identified as adversaries: *“US officials warn that a ban on lethal autonomous weapons would be both premature and overly narrow, preferring broader but non-binding “best practices” guiding any military employment of AI”* ([Not the Right Time, March 2023](#)).

The above summaries, triggered by the Carnegie Endowment article of 6 October 2022, illustrate clearly the multidimensional and multi-institutional complexity of regulating AI. How can ICASA, South Africa’s mandated regulatory agency for the ICT techno-economic sector, and therefore the AI sector, deal with the complex coordination processes required? How can all the multisectoral agencies, and the South African population at large, i.e., the stakeholders, all of whom will impact, and be impacted by AI, be included in the regulatory developments and their results, keeping in mind that the best defence for intractably complex challenges is mass understanding and inclusive participation?

[The NIH March 2023 article](#) *“The weaponization of artificial intelligence - What the public needs to be aware of”* provides useful ideas about this complex regulatory challenge, and provides excellent arguments of why the public needs to know. Given South Africa’s disappointing history of connecting the unconnected, just 8.3% of the nation’s households connected to the broadband links available for AI in 2020 (Table 5 page 4), the nation must use the AI regulatory challenges to bridge these debilitating socio-economic-technological divides, thereby unleashing the opportunities, and suppressing the threats, of AI. These gaps have the potential of “disrupting” South Africa as we know it, and as history has demonstrated so clearly. A few related “sound bites” of relevant information and knowledge are:

“How AI Will DISRUPT The Entire World In 3 Years (Prepare Now While Others Panic)” ([video link here](#)), the wise words of [Mohammad Emad Mostaque](#), the controversial CEO of the successful AI startup Stability AI Ltd., (controversy discussed in [Bloomberg August 08, 2023](#)), who went on to state that *“AI is not going to replace humans: humans with AI will replace humans with no AI.”* The South African humans who can be replaced are those with little or no access to 24/7 AI, numbering about 54 million (90%) of the 60 million population in 2021, as reported by [StatsSA GHS, 2021](#).

Stability AI and its principal product [Stable Diffusion](#), began its existence as a very low-cost startup in late 2020, rising to global stardom in just two years, and into turbulent times amid signs of an early demise just

one year later in mid-2023. South Africa can draw many invaluable lessons from the story of Stability AI. The story represents the real world of advanced technology innovation via startups, SMEs, and Entrepreneurs. High level academic and technological education is not a guarantee for success; low levels of training and skills development are not guarantees of failure; short-term success is not a guarantee of long-term success and sustainability; long-term success is not a guarantee of excellence. Silicon Valley startups, with a [failure rate of 83% in mid-2023](#), are said to have a higher level of survivability than their global peers, who collectively average 90% startup failures within the first 5-years. South African official estimates of startup failures are between [70% and 80%](#). Other statistical analyses, like those of [Statista 2023](#), estimate a failure rate of about 40%. Clearly this latter estimate does not consider the vast number of formal and informal survivalist SMME innovators and entrepreneurs, those who make up 90% of the population who are unlikely to afford productive access to AI any time soon.

Like many other developed and developing countries, South Africa, wrings its collective hands in dismay at the high levels of startup failures. The wise countries of the world celebrate these failures. Estonia (75% failure rate), a global leader in ICT, and therefore AI, calls them “Precious Failures” (<https://e-estonia.com/precious-failures/>) – “The wisdom is to prepare for failure and learn from it.” Israel (91% failures), a nation living in a self-inflicted extremely hostile environment, reports that startup failures are celebrated and supported in many ways – up to eleven failures are expected before stability and success. Ynetnews, <https://www.ynetnews.com/business/article/byzhqlsln>, an Israeli media outlet, discusses a very popular monthly “F-Night” in Tel Aviv, during which a waiting list of failed entrepreneurs joins other failed startup entrepreneurs in Israel and in a growing number of countries worldwide, to discuss their failures openly, listening to free advice on how to try again, as often as necessary. In [2017 Sweden established a very popular “Museum of Failure”](#), so popular that the home of Silicon Valley, California, soon copied the idea, and it quickly spread to New York, Washington and other centres of innovation.

South Africa’s AI Revolution and its regulation should strive to change the hearts and minds of the nation’s political, business, economic, and civil society leadership, and their media tools, to focus on the need to connect 54-million South Africans with zero or too little access to AI; to encourage as many young South Africans, and willing adults, to drive AI access and use from the base of the development pyramid to its apex, instead of the other way round as per current practices and preferences. [AI4ALL “AI Will Change the World. Who Will Change AI?”](#) is an international movement which suggests the question “can all South Africans “be the change they want to see?” Those wise words, attributed to Mahatma Gandhi, although evidence suggests that he never uttered them, remain valuable as an inspiration for the South African journey, which can now restart with effective regulation of AI. AI4ALL, embracing and expanding all opportunities presented by AI, suppressing its numerous threats in this politically charged turbulent world, and most importantly, avoiding the historical errors that led to the massive socio-economic-technological gaps which threaten the sustainability of the nation as a viable state.

Regulating AI: What comes next?

This discussion document is about South Africa’s triple threats of Inequality, Poverty and Unemployment, and all the stated or unstated SDGs which must be met to achieve South Africa’s development goals. All seventeen SDGs have direct causal links to South Africa’s triple threats. The dimensions of the triple threats, and their possible cause and effect relationships, are relatively easy to illustrate, visualize, and understand, through numbers, the statistical measurable factual representations in Tables 1 to 5.

South Africa’s performance in ameliorating each of the triple threats has been extremely disappointing. Similarly disappointing has been the progress in developing, accessing, and using the principal tools available to ameliorate, minimise, or reverse the triple threats completely. Education and ICT are key amongst these tools, they support the development and dissemination of the knowledge needed to deal with these triple threats, and their interdependent sustainable development challenges. South Africa’s access to, and use of these tools has been, and remains disappointing. Access to ICTs, and therefore AI, has been heavily skewed to favour the wealthy segments of the nation throughout the country’s modern history.

A short reminder of the key statistics demanding regulatory attention:

- **Inequality:** South Africa is the most socioeconomically unequal country in the world today, with a [GINI Index](#) of 63, a global rank of 164 out of 164 countries with valid inequality data. For those readers who may need a reminder, a GINI Index of 100 represents perfect inequality, a single person or entity owning all the nation's wealth; a GINI of 0 represents perfect equality, the nation's wealth, whichever way it may be defined or measured, is shared equally amongst all inhabitants and their supporting institutions.
- **Poverty:** Poverty levels in South Africa are exceptionally high for an upper-middle-income economy: 61.6% of the nation's population living under the international poverty line for nations in this economic grouping; 40% of the population living under the poverty line set for countries in the lower-middle-income group of countries; and 20.5% of the population living in extreme poverty, the lowest international poverty line of US\$ 2.15 PPP per day, equivalent to R 15.4 per day or R 462 per month. This international poverty line is 30% lower than the Food Poverty Line (FPL) of R 633 per person per month which the country set for itself in 2022. Sources: International Poverty Lines and values from World Bank data.

The South African Poverty Lines for 2022 published by Statistics South Africa (STATS SA) at <https://www.statssa.gov.za/publications/P03101/P031012022.pdf> are: Food Poverty Line (FPL) Rands 633; Lower Bound Poverty Line (LBPL) Rands 945 per month; Upper Bound Poverty Line (UBPL) Rands 1,417 per month.

Table 2 on page 2 of this document benchmarks South Africa's poverty levels against its six most similar developing nation peers: South Africa's poverty level at the World Bank's extreme poverty line of US\$ 2.15 PPP (similar level as South Africa's Food Poverty Line), reported as 20.5% in 2020/2021, is nearly five times higher than the next highest, Colombia. Thailand reported an extreme poverty level of 0% - i.e., the level of poverty at this level was too low to have any practical significance.

- **Unemployment:** South Africa ranked 235th out of 235 countries in general unemployment levels as reported by the World Bank for 2022. Of even greater concern is youth unemployment; a rank of 234 out of 235 countries, also reported by the World Bank. Statistics South Africa reported a youth unemployment rate of 63.9% for young South Africans aged 15 to 24 years who were not in education, employment, or training (NEET).

Note: The World Bank obtains the employment statics it publishes from the International Labour Organization (ILO), which in turn derives its average values from national statistical assessments, e.g., by Statistics South Africa.

- **Education:** Using international educational assessments available today, i.e., *The Progress in International Reading Literacy Study* ([PIRLS](#)); the similar and comparable *Programme for International Student Assessment* ([PISA](#)), which is preferred by OECD nations; and the *Trends in International Mathematics and Science Study* ([TIMSS](#)), Table 4 on page 3 of this document ranks South Africa's national educational achievement amongst the lowest in the world today. In the critical subjects of reading literacy (PIRLS 2021), South Africa's achievements were reported as 42.4% below the world average; mathematics (TIMSS 2019), 25% below world average; science (TIMSS 2019), 35% below world average. South Africa's national educational performance must therefore be deemed extremely disappointing, and yet South Africa's children are born with the same intellectual capabilities as every other child on earth.

Why? The most probable causes are directly linked to the nation's triple threats of inequality, poverty, and unemployment. Most studies by competent South African agencies, supported and verified by their most by reputable international development partners like [UNICEF \(Policy Brief 07 July 2020\)](#), show that the levels of South African children living in poverty is stark: 62.1% of the nation's children were multidimensionally poor (<https://www.statssa.gov.za/?p=13438>). The remaining 38% of the nation's children are spread between the lower-middle economic classes who get better but still mediocre education, to the wealthy classes who generally excel in any international assessment.

The world, and knowledgeable South Africans, know that children growing up in poverty suffer damage to their cognitive development: "*Chronic stress from growing up in poverty can physiologically impact children's brains, impairing their working memory and diminishing their ability to develop language,*

reading and problem-solving skills, reports a new Cornell study” ([For kids, poverty means psychological deficits as adults – Cornell 2016](#)). The truth is that such damages are reversible, albeit with great difficulty. Programmes supporting parental engagement and relational health can effectively buffer the chronic stress of poverty, but developing parental engagement and delivery of relational health are extremely difficult in very poor communities. Solutions can be found, but they need intensive action-oriented research and supportive national and social networks.

The world also knows that knowledge today is created, accessed, disseminated, shared, used, abused, denied, promoted, encouraged, taught, and learned, through technological tools. The current “tip of the iceberg” of such technological tools is artificial intelligence – AI - useful in doing exceptional good for humanity, or leading to humanity’s destruction, the choice of which is in the hands of humanity. This “tip of the iceberg” position of AI is very widely discussed today, e.g., by [BBC on 10 February 2023](#); “*The age of AI is upon us, and ChatGPT is the tip of the iceberg*”.

- **ICT (and AI) Access and Use:** As stated in the immediately preceding paragraph, knowledge for today’s socioeconomic order depends entirely on the availability of the tools needed to create it, manipulate it, understand it, and use it. These tools have evolved from ancient hieroglyphs, through paper-based books and manuals, to today’s vast range of information technologies, now entering the AI age. Table 5 on page 4 of this document, and the discussions associated with the data, are self-explanatory illustrations of how South Africa has used the modern technology-based tools for all its people, benchmarked against the nations’ most similar developing country peers. Using South Africa’s politically popular adjectives “empowering” and “transformative,” South Africa has let its people and its children down - starved most of them of the empowering and transformative technological tools needed for survival and growth in these turbulent technologically-driven times.

[Additional comments on the relationship between the statistics and AI regulation:](#)

What can South Africa do about the alarming information and performance indicators presented in this document? The best answer to this question must be for South Africa to find ways of unifying the nation to deal collectively with the existentialist threats of inequality, poverty, and exclusion, irrespective of political affiliation or societal status. These existentialist threats are clear from South Africa’s own statistical performance data: Statistics South Africa estimated the division between the nation’s haves and the nation’s have-nots to be 45:55 in year 2015; 45% of the nation was “not poor”, 55% were classified poor; reference Statistics South Africa’s 2017 [Report No. 03-10-06 “Poverty Trends in South Africa”](#). These already alarming 2015 indicators were exacerbated further by the Coronavirus Pandemic, which, according to the National Income Dynamics Study ([NIDS 2019/2](#)) extended these data to 76% chronically poor and 24% non-poor, by merely adding the covid-driven transient and vulnerable poor to those South Africans already living in chronic poverty in 2015.

Can South Africa’s preferred pro-rich capitalist-leaning free market macroeconomic policy coexist with a pro-poor strongly socialist action-oriented strategy which focusses directly on the threats of inequality and poverty? Has such coexistence been possible anywhere in the world? The evidence is very clear: The Netherlands and most Nordic nations describe their economic models as “[democratic socialist](#)”: strong capitalist-leaning productive sectors supported by equally strong socialist-leaning people-focused policies and strategies to support livelihoods across all internal opportunity and wealth divisions, including the well-being of capitalists. China and Vietnam prefer “[socialist-oriented market economies](#)”, competitive market economies in which whole societies are the main beneficiaries of economic growth. These countries have maintained exceptionally high economic growth rates in recent times.

Can South Africa develop towards a dual economy which supports capitalism with a human face, and socialism adding that human face into capitalism? Many in South Africa will consider this a massive ask, easily written off as naïve or impossible, but South Africa’s own historical and recent violent conflicts and civil strife, seen in the context of the unfolding global turbulence, must be regarded as a “wake-up call” for all South Africans, young or old, rich, or poor. Some key consequence of inequality and poverty are the growing numbers of coups

d'état in Africa; the seemingly unending brutal civil wars in Africa are a blight on all humanity – the ancestral home of Homo sapiens is in trouble.

AI, ICT, and Equitable Growth for All: Key Regulatory Challenges:

Where and how do the ICTs and the current AI evolution fit into this difficult quandary of how to secure equitable growth for all in the current volatile global sociopolitical economic environment? One of many research papers that discusses this quandary is *“Economic Development and Sociopolitical Destabilization: A Re-Analysis”*: <https://escholarship.org/uc/item/4wx7g61j>, written by four gifted academics whose homeland, Russia, is a classic example sociopolitical destabilization.

The key argument is that resolving the quandary is a choice. South Africa’s leaders throughout the nation’s post-colonial history, before, during, and after apartheid, clearly made choices which did not promote equitable sharing of all the nation’s resources. Nearly all adult South Africans are familiar with the economic and human costs of the leadership choices they made in the equitable sharing of resources for human development – apartheid was extremely costly to reverse.

The clearly stated objectives in all the nation’s ICT policies and their numerous revisions, all the regulatory provisions in support of those policies, and the support of numerous high-level high-quality academic researchers, have so far failed to bridge the nation’s human development divides. They are not “digital divides;” “digital divides” can be equated to technocentric “straw men” throwing “digits” at the seemingly intractable human challenges of inequality and poverty. The result of throwing “digits” at the very human challenges merely extends the already wide gaps between the economic and knowledge haves and have-nots in the country. If the nation had used “digits” to develop people, in addition to using “digits” to fuel the immense profitability and wealth of the technological industry and its shareholders, the nation would not be encumbered by the disappointing growth statistics reflected in Tables 1 to 5.

Digits versus People in the AI empowered World:

ICTs, and their latest technological variants, the AIs, can and must be used to develop people in developing countries like South Africa and its continental neighbours, even after decades of unintended failures of all their predecessor technologies. All the statistics provided in Tables 1 to 5 suggest the dimensions of these unintended failures. But, before ICTs, or any technological or other physical tool can be used productively, absolute clarity of objectives and purposes of all interventions, and the identification of target communities needing such help, is vital. The “business as usual” approach of believing that benefits accrued by the “digitally-empowered” communities who reside at the apex of national development pyramids, will trickle-down to the folks who live at the base of those pyramids, has clearly failed throughout the 163-year history of “digits” and their analogue predecessors in South Africa. This history is briefly discussed on page 7 of the [“Submission to the Competition Commission South Africa Data Services Market Inquiry, June 2019.”](#) It is people who need development, not the technological tools, which with AI assistance, are beginning to develop themselves with minimal human interventions.

Additional outlines of South Africa’s numerous attempts to position ICTs of any generation as bridges across the nation’s yawning people-focussed human, information, and knowledge divides, are listed, with outlines of peer country experiences, in the document [ICT4SDG8](#), from page 110 section 3.2.0: *“The search for Affordable ICTs in South Africa: Public Access Systems.”* These short discussions suggests that South Africa, and much of the world’s expertise on human development via technological tools, seem to be fixated on the technological tools themselves, or the financial profits derived from their sales, more than on the people such tools are meant to serve. This perceived fixation at a global level is well illustrated by the [158-year-old International Telecommunication Union \(ITU\)](#)’s popularization of “digits” as the primary means of resolving human development challenges in e.g., the most recent celebrations of its establishment 158 years ago: ITU’s anniversary celebrations of its World Telecommunication and Information Society Day ([WTISD](#)) adopted the following themes: **2020**: *“Connect 2030: ICTs for the Sustainable Development Goals”*; **2021**: *“Accelerating Digital Transformation in challenging times”*; **2022**: *“Digital technologies for older persons and healthy ageing”*; **2023**: *“Empowering the least developed countries through information and communication*

technologies”; **2024:** “Digital Innovation for Sustainable Development”; **2025:** “Gender Equality in Digital Transformation”. Could the noble intentions of the ITU, and of most of the governments it serves, be better “empowered” through a stronger focus on the people who need help, instead of the tools with which to help them?

Expert views on AI, Digits, and People:

Out of concern over the perceived focus on digits above people, the two leading AI tools were asked to “Explain in simple words the difference between digital divides and human-centred development divides.” Both responses were simple, direct, and informative:

Google’s BARD: “The human-centred development divide is a broader concept that encompasses the digital divide. It refers to the gap between those who are able to benefit from digital technologies and those who are not. This can be due to a variety of factors, such as income, education, gender, location, and disability. In simple words, the digital divide is about access to technology, while the human-centred development divide is about the ability to use technology to improve people’s lives.” And concluding that “Closing the digital divide and the human-centred development divide is essential for achieving sustainable development. By ensuring that everyone has the opportunity to benefit from digital technologies, we can create a more equitable and prosperous world for all.”

ChatGPT: “... the internet and technology are like tools that help people learn, work, and communicate. The digital divide is like a gap between people who have access to these tools and those who don’t. Human-centred development is about making sure that development (improvement in people’s lives) focuses on what people really need and want. In short, the digital divide is about access to technology, while the human-centred development divide is about whether development efforts truly benefit and involve the people they are supposed to help.”

What should South Africa’s ICT and AI developmental and regulatory focus be, digits, or people? This is particularly critical as South Africa and the world at large seek ways of regulating AI for good, i.e., using the trillions of microscopic digital switches and millions of lines of software code that drive AI, to do good for humanity, instead of threatening to harm humanity.

Noting the centrality of people in the multidimensional processes of development and sustainability, which stretches back a few million years to the birth of our common ancestors, possibly in South Africa: read “[Nature, 18 March 2019](#),” the great “Out Of Africa” trek most likely began in Southern Africa. The relationship between AI and its digital foundation, and people, is gaining renewed scrutiny in the modern human development discourse. A growing number of influential entities are beginning to think deeper about the links between people and technology, rethinking e.g., the concept of “Human Capital (HCI),” a value assigned to people based on what economic value they can contribute to their employers, their government, and above them all, the economies of their country and world. South Africa’s “Human Capital” value of 0.425 in year 2020 ranks the country 135th out of 217 countries, with Singapore leading the world with an HCI of 0.879 (see full list at <https://api.worldbank.org/v2/en/indicator/HD.HCI.OVRL?downloadformat=excel>). The value of an average South African using this measure is thus 48% of the value of an average Singaporean, a particularly dehumanising interpretation of HCI.

Perhaps the human knowledge that can be accessed via AI will help humanity to overcome this degrading classification of humanity, irrespective of how it is defined. AI may help humanity to restore its humanity, redefining the concept of work from a species that “lives to work so that it can work to live” (read [Anthropologist James Suzman’s views here](#)); re-translating the French expression “raison d’être” from its Cambridge Dictionary example of “[Her job is her raison d’être](#)” by advising the poor lady and people who think like she does, to “get a life”. The ancestors of the Cambridge Dictionary’s lady who lived for her job, lived in a now obsolete egalitarian world where work was a pleasurable occupation for a common good, before it became toil in the service of a socioeconomically superior class of human being.

Can the future generations of South Africans, accessing the best available human knowledge via improved, safe, AI, find ways of restoring that ancient wisdom even in our complex economies, technologies, and urbanized lifestyles?

Perhaps, in the context of AI, the process has already started. The BARD and ChatGPT responses in the preceding paragraphs are good signs of clarifying the human/technology interface for ordinary laypersons. Other excellent signs are the introduction of “human-centred” AI by [IBM 31 Mar 2022: “What is human-centred AI?”](#), expanded in an article by Stanford University in October 17, 2022: [“A Human-Centred Approach to the AI Revolution”](#). This “Human-Centred AI” may be the tool that humanity needs to reduce the existential threats of AI, which must figure very prominently in South Africa’s regulatory developments for AI.

Google’s Bard and OpenAI’s ChatGPT were asked to explain the link between Human Capital and Slavery. Key extracts from each were:

Bard: *“The concept of human capital can be a useful tool for understanding the economics of slavery and other forms of exploitation. However, it is important to remember that slaves and other exploited workers are not simply commodities or investments. They are human beings with their own rights and dignity.”*

ChatGPT: *“In summary, the link between human capital and slavery is characterized by the exploitation of the skills and labor of enslaved individuals, the dehumanization of those individuals, economic benefits to slaveholders, and the long-term effects of slavery on human capital development. The abolition of slavery marked a significant step toward recognizing the value of every individual’s human capital and their right to freedom and self-determination.”*

Comment: Is there any dignity in the work that 61.2%, approximately 40 million, of South Africans who are poor (Table 2) must endure, as they live to work so that they can live? Is there any dignity in their lives in knowing that most of their children will not be able to escape the poverty traps they were born into?

A World Bank View of Digits and People:

The World Bank in early drafts of its [“World Development Report 2019: The Changing Nature of Work”](#), attempted to promote the idea that in this AI world, with its massive automation-driven job losses, development programmes should “Protect People, Not Jobs” ([Sweden is doing this!](#)). The World Bank recommendations of how this could be done included taxing AI-empowered highly automated corporations to pay for universal basic income schemes (UBI), which would free people, especially their children, to develop the creative innovative natural instincts and skills they were born with, so that they could serve themselves, their communities, and their nations better instead of being a costly drain on their economies. These early World Bank recommendations were reversed after a clamour of criticisms from international and national institutions which seemed to have vested interests in the world of work as we know it today.

The levels of inequality, poverty and unemployment depicted in Tables 1 to 3, and the inadequate opportunities to acquire the requisite knowledge to overcome these triple threats through education and technology depicted in Tables 4 and 5, suggest that reversing these debilitating challenges is the first step towards national renewal through developing people. The depth of the challenges demand that this will be a very long-term process which demands an aggressive immediate start. Any delays or repeats of ineffective attempts made in the past can only exacerbate the challenges – the world, and its technologies, are not waiting for South Africa’s people to catch up.

One of many critical steps in South Africa’s human development recovery process is building the ICT sector, which includes AI, to deliver all the information and knowledge required to bridge the national development gaps illustrated in Tables 1 to 5. Two critical focal areas need specific attention: the traditional top-down market focus on the wealthy segments of the nation, a market focus which has served between 24% ([14 million; post-Covid “NIDS 2019” estimates](#)) and 45% “Non-poor” South Africans in 2015 ([Stats SA Report No. 03-10-06](#)) on the one hand, and on the other, neglecting the needs of the second most critical focus area - the 30 million (2015) to 46 million (2019) South Africans who are deemed poor.

In year 2020, just 8.3%, 1.5 million out of 18 million households in the country, were connected to productive quality internet services through which whole families could access the world of knowledge, via AI or any other technological means (Table 5 on page 4 of this document). [ICASA’s March 2023 “The State of the ICT Sector Report in South Africa”](#) reported an increase in this critical indicator from 8.3% the previous year to 10.4%. This pattern of mass population exclusion from the fruits of technological delivery of information and

knowledge has existed throughout the 163-years history of ICTs in the country ([reference page 7 in Competition Commission South Africa submission on data market inquiry](#)). South Africa's household broadband penetration ranked very poorly against its economic and demographic peers as shown in Table 5 – just one quarter of Algeria's level, the second lowest in the benchmark.

The question most relevant to this discussion is Why? The most rational answer to this provocative question could be in any one, or a combination, of the following:

1. A regulatory failure to meet actual or implied targets set by all national ICT policies, their revisions, and consequential regulatory provisions. The first post-apartheid [Telecommunication Act No. 103 of 1996](#) had a very clear objective: *"to provide for the regulation and control of telecommunication matters in the public interest, and for that purpose to (a) promote the universal and affordable provision of telecommunication services"*.
2. A policy failure, in which the policy targets could not be met due to factors beyond the control of most user stakeholders: the focus on economic contributions to the shareholders of the technology, instead of a focus on the human developmental needs and opportunities for users.
3. A state failure in which all state instruments, e.g., state institutions responsible for economic, social development, education, technological development, and techno-literacy, etc., were, and remain, unable to bridge the socioeconomic gaps that shape the nation.
4. A failure of the technology itself: the historical record shows that the way technology has been applied in South Africa has failed to meet the nation's human development aspirations, now enshrined in the objectives and targets set in the nation's National Development Plan and its seventeen SDGs and their subordinate targets.

Clearly, a deep national conversation with equally deep national introspection is required.

Can the ICT industry and its AI variant combine to help ameliorate South Africa's multidimensional human development challenges as summarised in Tables 1 to 5? There is enough evidence of this capability from nations that have succeeded in leveraging the benefits of technology for development, while at the same time suppressing the very real dangers of technological abuse and misuse. The ICT industry is indeed a potent tool for human development, but it must be positioned to deliver that potency to all who need to be developed.

The brief discussions of the ICT industry and its latest AI variant provided in all preceding pages of this document suggest that the relationship between technology and people, specifically the people of South Africa and its continental neighbours, is extremely complex, well beyond the scope of this short introductory discussion document. The best that can be done within this limited scope is to offer directions, through key references, for further consideration by all stakeholders, both those mandated to design and deliver the required solutions, and those that are the victims of any shortcomings of such deliveries.

Regulating AI: Key Reference Documents and Sources:

Background 1: SA Connect:

South Africa Connect: Creating Opportunities, Ensuring Inclusion: South Africa's Broadband Policy: 6 December 2013: https://www.gov.za/sites/default/files/gcis_document/201409/37119gon953.pdf.

The way this policy instrument was formulated, the resulting objectives and targets, the strategy proposed, and its deficiencies to date, provide numerous lessons for South Africa on both how to, and how not to, design and implement effective policies for the development of the nation's people. A few key extracts from the SA Connect development process include:

- A broad national and international consultative process was implemented, embracing the contributions of the nation's peer developed economies like Estonia, Finland, Poland, Portugal, and Spain; emerging economy peers from Brazil, Ghana, India, Kenya, Malaysia, Namibia, Nigeria, Tanzania; multilateral development partners within the United Nations family (ITU, World Bank), the African Union and the European Union; leading national and international private sector technology companies; R&D institutions; and members of the South African public. The results of this consultation were made official through the publication of [Government Gazette No. 36332 of 3 April 2013](#).

- The SA Connect achievable targets were clearly laid out, complete with funding mechanisms, but the nation failed to achieve them. For example, the target set for connected schools by 2020 was 100% at 10Mbps and 80% at 100Mbps, the reality as discussed on page 6 of this document showed just 20% schools connected to unspecified internet qualities for learning and teaching purposes in 2021.
- Section 11: **“South Africa's Broadband Strategy-Closing the Gap”** on page 31 of 62, the policy document hints at the probable causes for missed delivery targets: South Africa, like many other developing nations, has been targeting the development of “digits”, not people:
 - **Digital Readiness** - *“The creation of an enabling regulatory and institutional environment that facilitates broadband rollout whilst preserving the broader public interest;”*
 - **Digital Development** – *“The pooling of public sector demand and procuring of high-capacity and future-proof network capacity at more affordable rates to address public sector broadband requirement;”*
 - **Digital Future** – *“Enable sharing and cooperation on open access wholesale network builds and operation through ensuring economies of scale, reducing risk and guaranteeing returns;”*
 - **Digital Opportunity** – *“Ensuring that people are able to realise the benefits of broadband by having the necessary awareness, skills and relevant content and applications, which together will stimulate demand and uptake;”*

Each of the above stated objectives are subject to varied and perhaps contradictory interpretation, raising the critical question once more: are we developing digits and their economic benefits above the people who need them most? A re-examination of the actual and implied interpretations of the above statements will help to refocus the required AI regulatory process on all the people of South Africa, instead of the minority shareholders in the economic and political leadership of the nation.

South Africa's Broadband Strategy seems to be aimed at closing the nation's “Digital Gap,” a.k.a. “Digital Divide,” in the hope that the “Human Development Gap” and the “Human Societal Divide” will be closed as the “digits” trickle down to the estimated 76% of the population who can barely afford to put food on their family tables. The remaining 24% of the population have enough digits to meet their immediate needs, with many more just around the corner in all technological formats: beyond 5G and 4IR, all of them enablers of the rapidly evolving world of [Artificial general intelligence \(AGI\)](#) which is said to have already surpassed human intelligence.

The South African Connect National Broadband Policy (SA Connect) is an excellent starting point for a review of South Africa's technologically driven “people development” progress, especially its relationship with the evolving AI enabled world. A very small selection of the significant quantity of information about SA Connect includes:

1. Ellipses, updated Monday, 28 November 2022: *“National Broadband Policy 2013 – South Africa Connect: Creating Opportunities, Ensuring Inclusion”* | <https://www.ellipsis.co.za/national-broadband-policy/>
2. [Review of SA Connect](#) in connection with South Africa's [National Infrastructure Plan 2050 \(NIP 2050\)](#)
3. Ten reference documents selected from thirty high quality papers and presentations from the International Experts Meeting held in Pretoria, South Africa, 11 to 12 November 2013. <https://www.sakan.org.za/SakanDocs.html>, e.g., the informative presentation by Dr Tim Kelly of the World Bank: *“Global Perspectives on Broadband Policy And their implications for South Africa”*.

Background 2: Poverty: A threat to South Africa's political stability and economic growth.

According to the most recent World Bank poverty database, 61.6%, approximately 37 million South Africans, lived at or below the international poverty line of US\$6,85 PPP per day, applicable to upper-middle-income economies. Of the 37 million South Africans living in poverty, 24 million, or 40% of the total population, lived below the international poverty line for low-income countries, US\$3.65 PPP per day; and 12 million, (20.5%) lived below the extreme poverty line of US\$2.15 PPP per day. These statistics are illustrated in Table 2 on page 2 of this document, together with the data for the six peer countries selected for the benchmark.

The World Bank poverty data, preferred for its usefulness in enabling comparison with other countries, is derived from official statistics compiled by Statistics South Africa for years 2014/2015. Key updates of income

and expenditure, which will enable updates of all poverty statistics, will be published by STATS SA during the period 2024 to 2026 (<https://www.statssa.gov.za/?p=15858>).

The World Bank approach to poverty alleviation has received significant criticism:

1. **Report to the United Nation's General Assembly** by Philip Alston, Special Rapporteur on extreme poverty and human rights, 19 November 2020: https://digitallibrary.un.org/record/3904295/files/A_HRC_44_40-EN.pdf?ln=en: **"The parlous state of poverty eradication"**:

"The world is at an existential crossroads involving a pandemic, a deep economic recession, devastating climate change, extreme inequality, and an uprising against racist policies. Running through all of these challenges is the longstanding neglect of extreme poverty by many Governments, economists and human rights advocates.

By single-mindedly focusing on the World Bank's flawed international poverty line, the international community mistakenly gauges progress in eliminating poverty by reference to a standard of miserable subsistence rather than an even minimally adequate standard of living. This in turn facilitates greatly exaggerated claims about the impending eradication of extreme poverty and downplays the parlous state of impoverishment in which billions of people still subsist.

Poverty is a political choice and its elimination requires: (a) reconceiving the relationship between growth and poverty elimination; (b) tackling inequality and embracing redistribution; (c) promoting tax justice; (d) implementing universal social protection; (e) centring the role of government; (f) embracing participatory governance; and (g) adapting international poverty measurement."

Comments:

South Africa's poverty headcount ranges from 55% in 2014, to an estimated 76% in 2019 (46 million; National Income Dynamics Study ([NIDS 2019/2](#)), with up to 12 million South Africans surviving below the Food Poverty Line (Rand 663 per month). The South African Government, and most economists and human rights advocates have publicly and vociferously decried this debilitating threat to economic development and justice for all. But, has the South African Government and all its stakeholders, irrespective of their sociopolitical ideologies or socioeconomic statuses, done more than reference their poverty alleviating plans, strategies, and actions on the miserable standards of living defined by the nation's three poverty lines?

If the nation's political, economic, social, and multidimensional human development leadership had focused on even a *"minimally adequate standard of living,"* would the nation still be the global leader in income inequality? Would more than 65% of the nation's children be deemed poor, damaging their cognitive development through this status they were not born to endure? Would all the statistics presented in Tables 1 to 5 be grounded on reality in this third decade of the 21st century? Would the technologies created by humankind to defeat inequality and poverty be as poorly developed as shown in Tables 4 and 5, nearly thirty years after the dawn of the nation's democracy?

These vital considerations must be critical components of South Africa's AI regulatory development; a new opportunity to correct the nation's historical development trajectory.

The Special Rapporteur on extreme poverty and human rights is right: poverty is a political choice. Can South Africa's political leaders rise to the challenges and make the right choices for ALL South Africans?

2. **Statement by Mr. Olivier De Schutter; Special Rapporteur on extreme poverty and human rights:**
76th session of the United Nations General Assembly, 20 October 2021, New York:

"Let me state things very simply: Children born in disadvantaged families are most likely to live in poverty when they grow up. In the United States, it was found that children who experienced poverty at any point during childhood were more than three times as likely to be poor at age 30 than those who were never poor. In Nordic countries, it would take at least four generations for those born in low-income households to reach the mean income in their society. In some countries such as Brazil, Colombia or South Africa, this would take up to nine or even more generations.

The mechanisms through which poverty is perpetuated are now well understood. Children born in poor families have less access to healthcare, decent housing, and quality education. They have more limited access to supportive social networks and to extracurricular activities. As a result, their life chances are significantly lessened: as adults, they will have fewer employment opportunities."

https://estatemnts.unmeetings.org/estatemnts/11.0030/20211020/ldjSC8qmm4BF/nSGxxSbc5Eva_en.pdf

Comments:

Professor Olivier De Schutter, successor to Professor Philip Alston as United Nations Special Rapporteur on extreme poverty and human rights, is correct. It could take more than 180 years for South Africa's 65% children to "catch up" with the average income level of their wealthier peers. South Africa's Purchasing Power Parity

(PPP) GNI per Capita in 2022 was [US\\$15,590 per annum](#), approximately R9,107 per month. This “mean income level” is approximately 13 times higher than the monthly income or expenditure limit of the estimated 17.3 million South Africans who live at or below the national Food Poverty Line (FPL, R663 per month); 9 times higher than the 10.2 million South Africans who live between the Lower Bound Poverty Line (LBPL, R945) and the FPL; and 5.4 times higher than the estimated 10.7 million South Africans whose income lies between the Upper Bound Poverty Line (UBPL, R1,417) and the LBPL in 2022; Note: updated poverty and inequality statistics expected in years 2024 to 2026, as advised by STATS SA in <https://www.statssa.gov.za/?p=15858>.

Nearly all credible human behavioural experts agree that the above situation is not sustainable in the long term; the response by the children of today, the adults of the future, will most likely be socioeconomically disruptive at best, and destructive at worst.

There are no quick fixes for the challenges outlined by Philip Alston and Olivier De Schutter, but highly transparent corrective action will most likely appease the rising anger and impatience of South Africa’s poor majority citizens. Such transparent action must begin with the buildout of the full suite of information and communication access and use platforms, including the unfolding AI variants. A citizen-friendly ICT regulatory regime is a vital “missing link” of this development process.

There are several international and multilateral institutions and movements which can add value to this regulatory development process, and its operationalization. Two such institutions already mentioned in preceding sections of this document include the 92-member [A4AI](#), and the newer [AI4ALL](#) movements.

Background 3: Developing What? For Whom? Connecting South Africa’s poor getting more attention in 2023

There is a “wind of change” detectable in the South African ICT sector, but even with the most welcome words of hope uttered by the national political leadership, the nation requires intensive national introspection, broad-based national level discussion, and multi-pronged multidisciplinary action programmes which strongly avoid the well-known innovation-killers: pilot-itis (read [7 Ways We Can Scale ICT4D Pilot-itis](#)) and [silo-itis](#); working in silos on integrated and interdependent programs are exceptionally costly, and generally lead to missed targets and programme failures. The following are short statements on how the endemic levels of inequality, poverty and unemployment can be mitigated:

- Develop people first, the digits and related technologies must be tools for such people development, not the primary objectives of development as they seem to have been throughout the nation’s history of ICT;
- The top priority must be the nation’s poor. The best locally-generated poverty headcount in this post-Covid-19 world is 76%; 55% as estimated by STATS SA for year 2015 in [Report No. 03-10-06 “Poverty Trends in South Africa”](#), and an additional 21% estimated by the National Income Dynamics Study ([NIDS 2019/2](#)) which took into account the job losses and business closures that resulted from the Coronavirus Pandemic. If 76% of South Africans are deemed poor, then they must represent the South African nation, the remaining 24% non-poor South Africans are not, and cannot be, the sole representatives of the whole nation.
- The priority focus of national development must change to the 76% population who are deemed to be poor; the children and youth first, mothers and women second, followed by the unemployment masses who can derail the best laid macroeconomic development plans as history has proven. Such a mindset change must nevertheless be in addition to, and even reinforce the traditional macroeconomic development programmes currently in progress or planned, but with a deliberate and highly visible effort to ensure maximum trickle-down of all economic benefits to the 76% of the nation currently excluded from economic growth opportunities through no fault of their own. Increasing the wealth of those who already have much, at the expense of those who have too little, is a known recipe for disaster, in whichever country it occurs.
- The above balancing act is extremely complex, it requires several generations to mature. For example, it took Finland, a world socio-economic-political leader, more than fifty years to reverse a history of inequality and economic deprivation levels much worse than those in South Africa today. A description of Finland’s experience can be read from page 49 of [ICT4SDG8.pdf](#). Vietnam represents another interesting

comparison; multiple brutal colonization's and liberation wars stretching back to 111 BCE, but in 2020 Vietnam ranked 10/233, South Africa 187/233, in the 30-year annual growth rate of GNI (PPP) per capita, (<https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>.) The story of how Vietnam overcame extreme adversity over more than two millennia is summarised on page 55 of [ICT4SDG8.pdf](#). Both Finland and Vietnam focussed first on educating their children, the comparative learning achievement results between South Africa and Vietnam are shown in Table 4 on page 3 of this document. Finland's learning achievements were 4%, 6%, and 11% above average in reading, mathematics, and science respectively in the international assessments for 2019 and 2021.

Perhaps South Africa will need the full 180 years predicted by Olivier De Schutter, the current UN Special Rapporteur on extreme poverty and human rights, for the nation's 65% children just to catch up with their wealthier compatriots in South Africa, and their peers in progressive developing nations like Vietnam.

Background 4: SA Connect revisited?

Connecting South Africa's poor is getting more attention in 2023, as suggested by new pronouncements by the Minister of Communications and Digital Technologies (DCDT). Key extracts from the Minister's 2023 Budget Vote Speech are informative:

2023 Budget Vote Speech by DCDT Minister Mondli Gungubele (MP), Minister of Communications and Digital Technologies; 17 May 2023: <https://www.dcdt.gov.za/minister-s-speeches/405-2023-budget-vote-speech-by-mr-mondli-gungubele-mp-minister-of-communications-and-digital-technologies.html>:

Paragraph 2: *"...our goal is to enable the digital sector to grow to its full potential while guaranteeing that everyone has access to reliable, affordable, and high-speed connectivity. To ensure an inclusive digital economy, we will massify digital skills creation and create an enabling environment that support the creation of innovative digital solutions that can be commercialised to support livelihoods."*

Comment 1: All South Africans must support the Minister's goals and implied vision strongly, BUT – is it the "digital sector", the "digital economy", the "digital skills", the "enabling 'digital' environment", the "innovative 'digital' solutions" or the "commercialised 'digits'" that are the primary goals of South Africa's human development? Or should it be the people of South Africa who must be developed, maximising the use of the "digits" referred to as tools for people development, instead targets of development as they seem to be?

This highly nuanced change in national "*human*" development objectives and targets for development is vital, especially in this age of artificial intelligence, in which AI machines are more than capable of doing all the "digital" work listed, including the design and construction of the next generations of these "digital" AI machines and their vast interconnecting ICT networks.

The primary targets for South Africa's development must change to refocus directly and unambiguously on the children of the nation, the 62.1% of the nation's children born into multidimensional poverty, with little or no hope of accessing or knowing how to use these "digits" to empower and transform themselves out of their poverty traps. This can be done, but not if our development focus is on the tools, and not on the victims of poverty.

Paragraph 4: *"..... it is imperative that we provide policy certainty to allow growth of our digital economy. As such, we must shift from the traditional 'one-size fit all' regulations that sometimes inhibit innovation and global competitiveness, as well as deny agility, to new entrants and small enterprises."*

Comment 2: Yes Minister, we must agree fully with this statement, but with a strong plea for a subtle yet important change in emphasis: the "*one size fits all*" traditional form of ICT regulation has been with us since the introduction of ICTs more than 160 years ago. That "*one size fits all*" has merely "converged" towards the metaphorical "digital world." The people of South Africa, and their life-giving ecosystems, all live in a real analogue world that began life as a "[Big Bang](#)" [some 13.7 billion years ago](#), scientific facts being proven with the help of "digital technologies and AI" as used in the [James Web Telescope](#), and South Africa's own [MeerKAT](#), and the vast global coverage of South Africa's international [Square Kilometre Array Observatory](#). They are all designed to churn out new scientific knowledge that all South African children need to know. "Digital Worlds," and computers precariously floating in gravity-defying, very damp and dangerously lightning prone "Clouds,"

are the marketing hype and misinformation that make the AI world a very dangerous place for children and adults alike.

South Africa faces a mammoth challenge in regulating AI so that AI and its ICT anchors, digital or otherwise, can bridge the vast information and knowledge chasms which we have labelled “digital divides.” These “digital divides” have given rise to dangerous societal fissures between South Africa’s 24% “haves” and 76% “have nots”. The new AI/ICT regulations must remind South Africans that digital technologies are mere tools for manipulating and transporting information and knowledge to an information-hungry analogue world. For example, the vast information-carrying capacities of the intercontinental optical fibre cables discussed by the Minister in paragraph 8 of his budget vote speech, are strictly analogue physical entities; the only things “digital” about them are the messages they carry. All information and knowledge transmission infrastructure, including the invaluable radiofrequency spectrum, are wholly analogue entities which are engineered (modulated) to carry vast quantities of digitally encoded mostly analogue information.

There is immense value in all remaining paragraphs of the Minister’s budget vote speech, but a massive national scale dialogue is needed to fully understand all its implications and nuances, and to implement the words of wisdom. For example, the statement in paragraph 20 that *“The new set aside provisions for allocation of spectrum for women, youth and SMMEs are a game changer for this policy. It allows new entrants for, to participate in the economy and stimulate growth. I will be issuing the final Spectrum policy by September 2023, and after that, ICASA will be responsible for the licensing.”* This entreaty has been stated and restated many times before, but its actual implementation remains elusive. Can South Africans develop a regulatory regime for traditional ICTs and its new variant AI, that encourages actual implementation of the minister’s vision?

Other key highly relevant statements by the Minister of DCDT:

Media coverage:

- **ITWeb, 18 May 2023:** <https://www.itweb.co.za/content/G98YdqLG3YWMX2PD>: *R6bn SITA project to bulk up govt’s lacklustre broadband push”.*

The State IT Agency (SITA) came into operation on 4 April 1999. Twenty-four years later, and ten years after South Africa Connect Broadband Policy was approved, the “universal access to broadband services for all South Africans” objective, stated as 90% of the population having 24/7 access to 5 Mbps broadband by 2020, has been missed by a large margin. The vital school connectivity targets of 100% at 10 Mbps by 2020 have similarly been missed, Table 5 on page 4 of this document provides the details. Does SITA deserve the title of “lacklustre” used by ITWeb, or are there deeper underlying factors behind South Africa’s “lacklustre” performance in this high technology information age? This question should be asked, and nationwide dialogue initiated to find answers and solutions.

- **Engineering News, 18 May 2023:** <https://www.engineeringnews.co.za/article/dcdt-to-mandate-r6bn-broadband-project-led-by-sita-2023-05-18>: *“DCDT to mandate R6bn broadband project led by SITA”*

“The project must also ensure that designated groups, such as enterprises owned by women and youth, are empowered with at least 40% of the value of the project.” After 24 years of lacklustre performance as suggested by ITWeb, is SITA, or any mandated public sector entity equipped to deliver effective empowering and transformative ICT services to South African women and youth, most of whom lack the general and techno-literacy skills to use the ICTs productively? Tables 4 and 5 starting on page 3 of this document suggest strongly that a new approach to ICT4D in South Africa is urgently required.

Is this expectation too high for SITA under its present institutional structure? Are the targeted women and youth who are educationally ill-equipped to optimise the empowering and transformative capability of modern ICTs and their AI variants, fully equipped to maximise the opportunities? Statistical analyses of data available in the public domain, as presented in Annex 1 of the document [ICT4SDG4](#), shows that about 12% of South Africa’s school entrants qualify for higher education and training after 12 years of schooling, and of these, just 4% graduate after six years. Merely having access to R2.4 billion worth of broadband may not be enough to lift this population cohort out of its miserable existence.

South Africa needs to think deeply about how to resolve these difficult challenges. There are case studies available that can help, e.g., the 100-year journey towards educational excellence by Finland’s Vesala family described on page 51 of [ICT4SDG8](#).

The reboot of South Africa's journey into educational excellence must start with a long-term highly focussed vision for the technology sector through a new ICT and AI regulatory regime which targets all the nation's NDP and SDG objectives in an integrated holistic manner. This will demand intensive national scale dialogue – knowing by a few is not enough.

- [MyBroadband 7 July 2023](#): “South Africa’s plan to give 1.7 million homes high-speed Internet access”

This clearly most welcome pronouncement of Minister Gungubele’s vision needs the support of every South African with a stake in the nation’s sustainable development, irrespective of their socioeconomic status or their political affiliations and ideologies. But, given the reality of 160 years of failure to position ICTs as effective human development tools for all who live in the country, building consensus in the socially, economically, and politically divided population will be extremely difficult, possibly impossibly without the support of developmental quality information technologies for all.

Acknowledgement of the nation’s missteps in providing the ICT for development tool to all who live in the country is the first step in the complex developmental challenge. According to ICASA’s “[The State of the ICT Sector Report in South Africa, March 2023](#),” 10.4% of South Africa’s 18.5 million homes had 24/7 fixed internet connections in 2021, the best measure of the nation’s total family and community access to information and knowledge for development. This equates to just 1.9 million homes, most of which are in the 24% non-poor segments of the nation. Adding a further 1.7 million homes to this connectivity challenge will raise the total of connected homes to 3.6 million, approximately 20% of the household population in the country.

Welcome as this may be, Table 5 shows this value to be significantly lower than South Africa’s economically and demographically similar peer developing countries. The 24/7 broadband connectivity and usage targets must be raised to 100%. Nearly all developed nations, and a growing number of developing nations, have achieved this target already. South Africa’s National Broadband Policy sets 2030 as the target year to achieve this goal, but South Africa will not meet this target, nor will it meet the numerous intermediate and subordinate targets which the nation set for itself in the National Development Plan (NDP), and the global Sustainable Development Goals processes. Clearly, the pace of ICT development must change. Can the needed review of South Africa’s ICT regulatory regime in the light of AI developments drive this change?

The Minister further advised that “*Currently, the appointment of professional service providers for detailed network designs is underway,*” adding that “*the network designs would facilitate households accessing broadband services via public Wi-Fi.*” Yes, the Wi-Fi technologies offer elegant solutions to South Africa’s home broadband connectivity challenges, especially after the recognition of the challenges by ICASA, as illustrated by its allocation of a significant portion of the [6 GHz spectrum band](#) for Wi-Fi applications. But public Wi-Fi systems come with their own set of challenges, which must be addressed if this technological application is to be used to connect South Africa’s unconnected homes to productive quality ICT.

Public Wi-Fi systems, both free and paid for, can provide excellent broadband services if designed with high quality usage in mind. They can also be very frustrating, difficult to maintain and use, and subject to rapid technological obsolescence and security concerns, if appropriate network design and management is neglected. The following tests of existing public Wi-Fi systems suggest some of the advantages and disadvantages that must be considered in the proposed Wi-Fi national development plan:

- [Tshwane free Wi-Fi tested, with mixed results: MyBroadband: 3 June 2022, MyBroadband 30 April 2022](#): In exasperation over the poor quality of its public Wi-Fi facilities, the Tshwane Municipality is considering expanding its optical fibre municipal networks to provide improved backhaul services for its public Wi-Fi nodes.
- [MyBroadband 14 September 2023](#): Stellenbosch’s decade-old free Wi-Fi tested:
- [MyBroadband 15 June 2022](#): Free Think Wi-Fi tested — with surprisingly good results.
- [MyBroadband 13 February 2022](#): Free Wi-Fi at South African coffee shops tested, generally good results.
- [Reuters 25 July 2023](#): South Africa to ink deal with state-owned firm for internet access:

“In February, President Cyril Ramaphosa had said he aims to [provide](#) affordable, high-speed internet to all, without giving a time frame. Months later, Gungubele said he aimed to [connect](#) 80% of South Africans with the internet by 2024” “More than a quarter of the population do not have an internet connection.” (Author’s note: “an internet connection” needs definition clarity).

As welcome as this statement may be, there is an urgent need to examine closely the definitions and actual values of the stated objectives “to [provide](#) affordable, high-speed internet to all”, and the aim of connecting 80% of South Africans to the internet by 2024. According to the ICASA “[State of the ICT Sector Report of 2023](#),” 77.5% of South Africans are already able to access the internet, from anywhere, using any access technology (mostly mobile devices), but the percentage of households with an affordable always on, always available internet connection for total family empowerment and transformation was only 10.4% in 2021. Table 1 on page 13 of ICASA’s report paints the following troubling picture:

- 10.4% of 60 million South Africans, i.e., 6 million, had access to the internet at home whenever they needed it, for safety, security, family and community communications and cohesion, and for learning;
- 17.6% or 10.5 million South Africans would have to travel to their places of work, if they were lucky enough to be employed, to access the internet. “South Africa’s unemployment rate in the first quarter of 2023 was recorded at 32,9 %, and is among the highest in the world” [Statistics South Africa 16 May 2023](#);
- 69.4% or 41 million South Africans were able to access the internet, instantly, anywhere, if they could afford the required air time for data and voice communications. This instant access is seldom available to their family members or their community neighbours when they need it most;
- 13.6%, or 8 million South Africans, would need to travel to their nearest educational facilities to connect to the world of knowledge, or to a nearby public facility, internet café or Wi-Fi hot-spot, if they had to, for any emergency, for learning, or for personal pleasure.
- Safety and security are major challenges, 17.3 million South Africans living below the Food poverty Line (FPL), mainly women and children, are especially vulnerable - they do not have access to the communication channels needed to reduce that vulnerability. South Africa has one of the highest crime rates in the world, [ranking third highest in the global Crime Index for 2023](#).

If South Africans are to benefit from empowering and transformative information and communications technologies, including their AI variants, the 24/7 broadband home connectivity target must be 100%. Any lower home connectivity will deprive the poorest most in need household residents of the information and knowledge they need to escape their poverty traps. The architects of SA Connect Broadband Policy understood this when they set a target of 90% individual access to broadband at a cost of less than 2.5% of their monthly income or expenditure. It is not enough to celebrate South Africa’s high internet user penetration rate of 72.3% when the definition of this indicator is so murky: Eurostat in 2023 defined the term as “a person making use of the internet in whatever way: whether at home, at work, or from anywhere else; whether for private or professional purposes; regardless of the device or type of connection used.” According to the International Telecommunication Union (ITU), an “Internet User” “[is someone aged 2 years old and above, who went online in the past 30 days](#)”.

Yes, most South Africans are “internet users” according to the above definitions, the nation’s “Digital Divide” has been closed! In 2021, 99.9% national coverage at 3G, 97.7% at 4G/LTE ([Statista 2023](#)). Even a 2-year-old child from the poorest local communicatees can use mummy’s smartphone to say “Yebo Gogo” to granny once a month, does this make the child “an internet user” in accordance with the definition? Are such “South African Internet Users” digitally empowered and transformed through that definition? Most “economically disadvantaged” South Africans are able to use WhatsApp on their hand-me-down smartphones to say “Yebo Gogo” (translation; “Yes Granny”, or “Hello Grandma”), perhaps in response to Gogo’s request for help to put food on her table (read introduction in [ICT4SDG2](#)). The cost of this “Yebo Gogo” call from e.g., the [Vodacom Internet daily bundle](#) was R5.00 for 20MB in September 2023. The impact on affordability at this rate is:

- New Poverty Lines published by Statistics South Africa on 28 August 2023 (Table 1 of P0310.1 in <https://www.statssa.gov.za/publications/P03101/P031012023.pdf>:

- Food poverty line (FPL): R760 per month: Monthly cost for 20MB per day \approx 20%;
- Lower bound poverty Line (LBPL): R1,058 per month; Monthly cost for 20MB per day \approx 14%;
- Upper-bound poverty Line (UBPL): R1,558 per month. Monthly cost for 20MB per day \approx 10%.
- New recommended affordability level by A4AI is “[2 for 5”: 2% of monthly income for 5GB of data \(A4AI 2021\)](#). At R5.00 for 20MB per day, equivalent cost per month for 5GB is R1,250. Affordability at each poverty line:
 - For approximately 17 million South Africans living at or below the FPL, the cost of 5GB per month of data is 164% of maximum available income;
 - For approximately 10 million South Africans living between the FPL and LBPL, the cost of 5GB per month of data is approximately 120% of the LBPL upper level of income;
 - For approximately 11 million South Africans living between the LBPL and UBPL, the cost of 5GB per month of data is approximately 80% of the UBPL;

The Reuters article, and a few more like it, refer to the national government’s full support for [Telkom SA SOC Ltd](#), pledging to defend government’s majority stake in the company against the onslaught of a few acquisition attempts. Can the encouraging statements by the president of South Africa, and those by the DCDT Minister, be used to find ways of using more of Telkom’s extensive national optical fibre network to provide the “first mile” broadband connections to South African homes? Telkom owns more than 166,000 km of fibre in the country, 55% of all that is available, most of it within wireless or other “last mile” technology reach of all homes in the country. Can the South African government leverage its majority shareholding in the SOC to find ways of using this invaluable national treasure, to service South Africa’s estimated 76% population who are too poor to afford direct home broadband connections? A national level conversation about this possibility is needed.

- **Eye Witness News 3 August 2023:** <https://ewn.co.za/2023/08/03/expanding-the-digital-economy-must-benefit-the-whole-of-society-gungubele>: “*Expanding the digital economy must benefit the whole of society – Gungubele*”:

"Rapid technological change without an inclusive development and strategic orientation risks entrenching existing inequalities, while introducing new ones."

Government plans to connect 5.8 million households to the Internet through its broadband programme, SA Connect.

Based on the most recent statistical reports by ICASA and STATS SA, in 2021, South Africa had 1.9 million households connected to a 24/7 internet service, out of a total of 18.4 million homes. Adding 5.8 million more homes would raise South Africa’s 24/7 household internet penetration to nearly 42%.

"A whole of government and a whole of society approach is needed to bridge the digital divide and ensure that ICTs benefit everyone and address the needs of the most vulnerable in society."

The above statements and sentiments are profound, they must be taken seriously by the whole nation, irrespective of socioeconomic status or political affiliation. History has shown that failure to find solutions for challenges like this will threaten the long-term viability of the nation. The key question is: “How?”

The minister’s statements were made in preparation for the BRICS summit held in South Africa 22 to 24 August 2023. The answer to the question “How?” may be found within that community of nations. Brazil and China have made great strides in transforming their “digital economies” into “people economies” that use digits for growth. Brazil maintained a 10-year fixed broadband growth rate of 7% per annum to reach an estimated household penetration of 63% in 2022 (source: [World Bank September 2030](#)); China achieved a 24/7 household broadband growth rate of 12% over 10 years to reach a penetration level of 94.2% by June 2023, all at 100 Mbps or more – source: [STATISTA September 14th 2023](#). South Africa could do well by emulating some of the methods used by Brazil and China from within the BRICS partnership. SDG 17 lends itself to strengthening even the well-established and expanding BRICS partnership for the benefit of South Africa’s poorest 76% residents who are excluded from the digital economy through no fault of their own.

Can all South Africans begin to think of a “people economy” which uses digits for development, rather than a “market-driven economy” which uses digits to create more wealth for the already wealthy? This change in thinking should be a core principle of the needed AI regulatory process.

- [News 24; 12 September 2023](#): “The world is not waiting for us” on digital technology - Minister Gungubele: Yes, indeed Minister, the world has not waited for any country in the past, nor will it do so now or in the future. Tables 1 to 5 at the beginning of this document provide a glimpse of how far South Africa has been left behind by the nation’s economic and demographic peers. Being left behind is a dangerous double-edged sword: missed opportunities for the kind of human development which leads to economic growth and political stability on the one hand, and disasters akin to failed statehood or worse on the other. The world is becoming a dangerous place geopolitically and environmentally, the best defence against missed opportunities and state failure is access to, and effective use of relevant information and advanced knowledge, both outcomes of a transformation from “digital economies” to “people-centred economies”.

Other key factors directly related to the chosen Wi-Fi development strategy:

As stated above, the public Wi-Fi subsector of the ICT industry offers excellent possibilities for effective technological inclusion, but like all other technologies, it demands excellent engineering, sustained maintenance, and keeping up with technological evolution. All the latest AI-enabled Wi-Fi technologies as discussed in the [NITRD 2019 Workshop Report](#) – “Artificial Intelligence & Wireless Spectrum: Opportunities and Challenges 2020,” and by the ITU in “[AI will make radiocommunications smarter](#),” must be part of the solution, not the challenge. All these high-tech innovations will depend on [AI4Good](#) applications targeting the technologies themselves, and more importantly, the users of the technology. Wi-Fi networks, like all other ICT-related technologies, cannot function in isolation. The absence of reliable high performance backhaul networks, best offered today by optical fibre and/or high-capacity point-to-point wireless systems, have turned many excellent well-intentioned Wi-Fi public access networks into costly failures, South Africa has much experience in the latter:

- Public Wi-Fi technologies aimed at economically disadvantaged communities, especially those in rural areas, were introduced in the early 2000s, with intensive research and development support by e.g., the CSIR Meraka national research institution. Some key reference links are:
 - **CSIR Meraka:** http://wirelessafrica.meraka.org.za/wiki/index.php/Wireless_Africa_Home_Page. This excellent reference outlines exceptional creativity and innovation by South Africa’s own research institutions; solar powered wireless mesh rural systems using the license-free Wi-Fi spectrum in the last mile mesh, and even local innovations when suitable components like antennae ran out – a jam tin on a broom stick antenna enabling several Mbps throughput;
 - **Energy Efficient Wireless Mesh Networks:** [Dr Ntsibane Ntlatlapa](#) paper presented at the Wireless World Research Forum, Helsinki, Finland; 13-15 June 2007;

These intensive wholly South African research initiatives have invaluable lessons for South Africa as the nation launches yet another attempt to use public Wi-Fi networks to resolve the nation’s immense information and knowledge divides. Why were their effectiveness and therefore mass applications so limited? CSIR Meraka have examined the reasons for such limited success, they have answers which must inform the latest national attempt to meet the objectives of SA Connect set a decade ago.
 - **Johannesburg Wireless User Group; 1 September, 2020:** https://1worldconnected.org/project/africa_communitynetwork_jawugsouthafrica/.

This report by competent highly motivated South Africans outlines an attempt to expand pro-poor connectivity using public Wi-Fi, and the difficulties encountered as the network operations unfolded. The architects of this project have invaluable insights which must inform the DCDT Minister’s latest strategy, and the nation’s AI regulatory development.
 - **Soweto Wireless User Group; 1 September 2020:** https://1worldconnected.org/project/africa_communitynetwork_sowetowirelessouthafrica/.

Like the Johannesburg Wireless User Group, this team of dedicated South Africans attempted to “erode the digital divide in Africa” by deploying Wi-Fi hotspots and “digital literacy” training. The

report outlines several causes for the limited success of the initiative. In this renewed attempt to connect South Africa's unconnected majority, efforts need to be made to turn any notions of failure into celebrated lessons for future developments, "[*precious failures*](#)" as Estonia has done, discussed on page 20 of this document.

- **Wi-Fi at a walking distance: Project Isizwe: 1 September 2020:**

https://1worldconnected.org/post/africa_communitynetwork_projectisizwesouthafrica/.

Project Isizwe represents an invaluable ongoing initiative that contains immensely valuable lessons of successes and failures. The failures must be turned into "[*precious failures*](#)", and celebrated as such through national dialogue. Perhaps South Africa can "take a page" out of the Israeli development book - Israel is an immensely troubled country seemingly at war with itself, its neighbours, and much of the world at large. But the nation is an impressive technological innovator, for good and for bad. The monthly celebration of failures is described by e.g., the Israeli media house Ynetnews, in <https://www.ynetnews.com/business/article/byzhqlsln>.

To conclude this summary on South Africa's renewed Wi-Fi mass connectivity initiative, it is necessary to recall the strong recommendations of the two UN Special Rapporteurs on extreme poverty and human rights, Philip Alston on 19 November 2020, and Olivier De Schutter on 20 October 2021, details on pages 28 and 29 in this discussion document. Providing the lowest level of subsistence support to the poor will just perpetuate the inequality and poverty crisis, potential triggers for major sociopolitical instability. South Africa has a rich history of such sociopolitical instability, prior to, during, and post-apartheid. It is imperative therefore that all South Africans from all societal hierarchies and political flavours, join hands to prevent the next such sociopolitical disaster.

One of the most important deficiencies of public Wi-Fi applications is that they are not naturally child and family friendly, unless they are deliberately designed for that purpose. Such engineering for security is as vital as it is urgent; there is an urgent need to shape the minds of South Africa's youngest children, especially those from impoverished social backgrounds, in readiness for this AI-driven technological age. The age-old Christian adage "*Give us a child until he's seven years old, and we'll have him for life*" is true, especially in this high-tech age. There are many ways of achieving that objective, but they all need mass public and governance support to promote children's techno-opportunities whilst reducing the threats of technological misuse and abuse. The range of possibilities should be part of the national dialogue proposed, the objective being to get national support to shape the minds of the nation's future generations, so that they add to the nation's sustainable development, instead of the alternative, adding to its failure.

Another major challenge for public Wi-Fi broadband access is that it cannot be 24/7; it is not safe for children and youth to be out and about at public spaces at night. Security for users, especially female and child users, and of course the cyber threats which accompany public information access, are key factors that the AI regulatory regime needs to address. The government of Brazil, through its well-reported LAN House strategy, managed to control this challenge until public technology centres had achieved their techno-connectivity and use objectives, rendering themselves obsolete as soon as mass public access, even for the poor, had been achieved.

A useful reference to the Brazil experience was prepared by McKinsey and Company: [Brazil 2020 Opportunity Tree](#): "*Highest Internet user growth by poorest communities – 36% per annum between 2015 and 2018 to reach 76% internet access for lower middle classes citizens.*"

AI in the Benchmark Countries of this Document:

- **Algeria: 18 January 2021:** [Presentation of the National Artificial Intelligence Strategy 2020-2030](#): "*Algeria has adopted a national strategy on research and innovation in artificial intelligence (AI), dedicated to improving Algerians' skills in AI through education, training, and research, and exploiting the potential of AI as a development tool in key socio-economic sectors (e.g. education, health, transport, energy). According to Abdelbaki Benziane, minister of higher education and scientific research, the strategy aims to build a solid base in terms of AI research, to apply the latest AI techniques in various fields, and to better exploit the human and material resources available.*"

- **Argentina, February 2021:** [Argentina: a public sector focus embedded in a broader AI strategy](#): “The objective of Argentina’s AI National Plan is to develop policies that contribute to sustainable growth and the improvement of equal opportunities through AI technologies, ultimately positioning the country as a regional AI leader. In order to achieve this aim, the plan incorporates “public sector implementation” as one of the 11 strategic axes. The other sections of the document also include commitments that directly impact the transformation of the public sector.”
- **Colombia, August 2022:** [The Colombian case: adopting collaborative governance as a path for implementing ethical artificial intelligence](#): “The paper focuses on the ‘Ethical Framework for Artificial Intelligence in Colombia’, whose content and adoption process are both oriented towards the implementation of ethical AI, the first document in Latin America on this subject with a practical approach.”
- **Peru, 5 July 2023:** [Law promoting the use of artificial intelligence](#): On 5 July, Law No. 31814, Law Promoting the Use of Artificial Intelligence (AI), was published, which aims to promote and guarantee the ethical, sustainable, transparent and responsible use of AI within the framework of the national digital transformation process.”
- **Thailand: 24 May, 2023:** [Key Concerns and Provisions in Thailand’s Draft AI Regulation](#): The draft Royal Decree on Artificial Intelligence System Service Business, which was introduced by the Office of the National Digital Economy and Society Commission earlier for public comment in October last year, focuses on potential risks from artificial intelligence (AI) systems to public health, safety, and freedoms. The framework emphasizes the importance of risk assessment, reporting requirements, and the establishment of specific measures and criteria deemed necessary to minimize AI risks.”
- **Vietnam: 03 May 2023:** [MIC requests comments on draft AI and big data standard](#): “The Ministry of Information and Communication (‘MIC’) requested, on 20 April 2023, public comments on the draft National Standard on Artificial Intelligence and Big Data. In particular, the draft Standard on artificial intelligence (‘AI’) is separated into two documents on Artificial Intelligence Lifecycle Process and Requirements, namely one on quality and another on robustness. Nonetheless, the draft Standard on AI establishes the concept of an AI module lifecycle, consisting of the conception, development, deployment, operation, and decommissioning of AI modules.”
- **South Africa:** At the time of preparation of this document, there were no known plans for regulating AI in South Africa. This is verified by Google searches, which return responses like “Currently, there is no specific legislation in South Africa regarding AI; 17 Aug 2023.” There are however, a few opinions and studies proffered by concerned citizens, like those expressed by the [Daily Maverick](#), [Kieti Law LLP, Kenya](#); [The Conversation](#); and a few others, including this discussion document.

The urgency to craft pro-growth AI regulations for the nation’s numerous growth challenges defined by the NDP and all identified SDGs, summarized by the disturbing statistics of Tables 1 to 5 in the introduction of this document, is clear. A holistic approach that addresses all the nation’s challenges simultaneously, irrespective of how difficult this may be, or how long it may take, is necessary and urgent. This African country with significant leading edge technological knowledge and experience, but which has failed to meet the technological access and use needs of most of its citizens, must seize the opportunity presented by AI to rectify the omissions of history.

AI and Xenophobia: The complexity of South Africa’s AI regulatory challenges is demonstrated by the first reference in this section, Xenophobia in South Africa. [Cambridge Dictionary defines Xenophobia](#) as “extreme dislike or fear of foreigners, their customs, their religions, etc.” The “etc.” in this definition includes the full range of human emotions related to ethnicity, race, and physiological differences amongst people. Xenophobia is a well-known threat to South Africa’s sociopolitical stability, it has been in existence well before the violent xenophobic outbreaks of 2008, 2015, and continues into this third decade of the 21st century. Xenophobia was the fuel of the apartheid system; the [Afrikaner Weerstandsbeweging \(AWB\)](#) was merely a continuation of the [xenophobic practice of Nazism](#) (UNHRC 2022). Historians and scientists, with the assistance of AI4Good, may in time defeat this human aberration through knowledge and understanding about the common origin and genetic identities of all humans who live on planet earth. Xenophobia is a social construct, like racism, it has no basis in any branch of science.

Xenophobia in modern South Africa is fuelled by the spread of fear and hatred of the other, mainly by electronic means, the full range of social media, and dangerously xenophobic biases which may emerge with poorly regulated and used AI. Informative background information related to this phenomenon are:

- **18 September 2023; BBC article and video documentary:** *[“Inside South Africa's Operation Dudula: 'Why we hate foreigners'”](#)*, video discussion at <https://www.youtube.com/watch?v=rogZ8BYg-kM>. This disturbing content produced several public comments and responses, in both support and criticism of Dudula. A few directly and indirectly related references to this disturbing South African phenomenon are:
- **September 25, 2023; Kevin Ritchie** of The Diamond Fields Advertiser (DFA) responds in *[“Operation Dudula documentary a sobering reminder of very real time bomb that is ticking”](#)*. Al Jazeera concurs in:
- **Al Jazeera 26 September 2023;** *[“South Africa’s Operation Dudula vigilantes usher in new wave of xenophobia”](#)*

This disturbing human aberration is discussed more formally by:

- **UNESCO, 4 March 2020 | Last update: 20 April 2023:** *[“Fight against xenophobia in the age of disinformation and artificial intelligence”](#)*. *“This xenophobia is based on several elements, including harmful stereotypes and disinformation, which is spread through the use of technological platforms. New technologies, including artificial intelligence, also have the potential to further accelerate the diffusion of this disinformation.”*
- **19 May 2021; The Institution of Engineering and Technology (E&T):** *[“Can AI be used to tackle racism?”](#)* *“Artificial intelligence, used within the education sector and in the hiring process, prompts questions about its potential to do more good than harm”;*
- **25 April 2023; Euronews:** *[“As AI Act vote nears, the EU needs to draw a red line on racist surveillance”](#)*. *“From the racially discriminatory impact of predictive policing systems to the use of AI systems to falsely label (mostly racialised) people as fraudsters when claiming benefits, this legislation is deeply informed by a growing awareness of how technology can perpetuate harm.”*

South Africa is particularly vulnerable to racism and its xenophobic variant; they could derail the democratic process in the country, creating a pariah state to its neighbours, and ultimately, a failed state. For example, the use of AI to quell the world record crime rate may go horribly wrong; good intentions with disastrous unintended consequences. This phenomenon may already be in progress in the country:

- **19 April, 2022: Massachusetts Institute of Technology (MIT):** *[“South Africa’s private surveillance machine is fuelling a digital apartheid”](#)*. *“... South Africa is in the process of building out a [national biometric identification database called ABIS](#) that would include the face of every resident and foreign visitor. Combined with camera upgrades to Vumacam’s nationwide surveillance network and expanded use of facial recognition, ABIS could one day enable the government to track the movements of everyone in the country.”*

The above phenomena must be a central component of the AI regulatory development processes.

Regulating AI: Some References:

- **23 April 2023, Daily Maverick:** *[“South Africa faces many challenges in regulating the use of artificial intelligence”](#)*. *“Inasmuch as it may be beneficial for South Africa to base its AI regulatory framework on existing principles and legislation formulated by other countries, we suspect that South Africa will face the following challenges in respect of establishing AI regulations.”* The challenges listed include: Data privacy; Cyberattacks; Inequality and unemployment; Lack of understanding and awareness of AI; Inappropriate use; Accountability and recourse.
- **6 October 2022, Carnegie Endowment for International Peace:** *[“One of the Biggest Problems in Regulating AI Is Agreeing on a Definition”](#)*. *“Subtle differences in definition—as well as the overlapping and loaded terminology different actors use to describe similar techniques—can have [major impacts](#) on some of the most important problems facing policymakers.”* This article discusses the different interpretations of AI by its engineers and technology experts; the lawyers who generally deal with regulatory issues; the psychologists and human behavioural scientists who must focus on the broad spectrum of AI impacts on

people, and of course, state agents who will wish to define AI, and restrict knowledge about its use, for both dangerously selfish or pleasantly altruistic ends.

The above references provide a useful beginning summary of a vast amount of information about this critical challenge; regulating AI for Good, and regulating AI to prevent its abuse with potentially disastrous consequences for humanity and their nation-states. The following list, without comment, is just a small sample which must be considered by any South African think tank mandated to develop the required national AI regulatory provisions:

- **Cyber Risk GmbH: 14 June, 2023:** [The EU Artificial Intelligence Act](#)
- **Nature: 8 August 2023:** [Rules to keep AI in check: nations carve different paths for tech regulation](#) (Note: invaluable knowledge imprisoned behind a poverty-excluding impenetrable paywall)
- **The Conversation: 3 April, 2023:** [Regulating AI: 3 experts explain why it's difficult to do and important to get right](#)
- **The Guardian: 7 April 2023:** [The Guardian view on regulating AI: it won't wait, so governments can't](#)
- **The Institution of Engineering and Technology (E&T): 19 July, 2023:** [UN officials call for AI regulation during Security Council meeting](#)
- **United Nations Human Rights Council: 2 June 2023:** [Regulation essential to curb AI for surveillance, disinformation: rights experts](#)
- **New York Times: 3 March, 2023:** [As A.I. Booms, Lawmakers Struggle to Understand the Technology](#)
- **19 May, 2023: Harvard Business Review (HBR):** [Who Is Going to Regulate AI? Harvard 2023](#)
- **9 May 2023: Taylor Wessing:** [AI regulation around the world](#)

Random Issues Needing AI Regulatory Attention in South Africa

AI, NDP, and SDGs: The estimated [value of the AI industry was US\\$ 208 billion in 2023](#), expected to grow nearly ten-fold to US\$ 1.85 trillion by 2030. With such high market values and therefore profits, it is difficult to visualize significant investments in AI for any of the unprofitable high cost SDGs. The most likely scenario is that the AI techno-industry will reap immense profits while the victims of the SDG challenges bear the brunt of its failures. It is useful to recall the reports by e.g., [Oxfam International on 17th January 2022](#), and [Brookings, 21 April 2022](#) ("*Profits and the pandemic: As shareholder wealth soared, workers were left behind*"), of the obscene profits made from the Coronavirus Pandemic by the key supply chain shareholders, who doubled their profits to \$ 1.5 trillion. Over the same period, the International Labour Organization (ILO) reports that the equivalent of 255 million full-time jobs, leading to \$3.7 trillion in lost labour income, were lost in just one year as a direct result of Covid-19; summary in [WEF 4 February 2021](#).

The Brookings report states that in anticipation of the Covid-19 global disaster, "*Corporate leaders made pledges to adopt 'stakeholder capitalism' and enhance racial and economic equity*". Clearly, these pledges were largely abandoned after recognition of the immense financial profits that would be made from the pandemic; the return to shareholder capitalism came with a US\$ 1.85 trillion bonus that could not be resisted.

These paragraphs are about South Africa's progress in meeting the nation's NDP and SDG objectives and their targets. The following brief review is a logical starting point for the programme corrections that must be made if South Africa is to restore its humanity and drive sustainable development for all who live in the country.

South Africa's Progress in NDP and SDGs: STATS SA Baseline Report 2017

http://www.statssa.gov.za/MDG/SDG_Baseline_Report_2017.pdf:

1. Comment on page 8 of the report (*INDICATOR 4.a.1b*): The percentage of South African schools with access to the internet for pedagogical purposes steadily increased from 12,9% in 2012 to 19,7% in 2016.
 - Reality Check 2021: 20% of South Africa's schools had internet access for pedagogical purposes according to [DBE-NEIMS-REPORT-2020.docx.pdf - Equal Education](#): Just 0.3% additional schools connected to the internet for teaching and learning in the 5-years between 2016 and 2021?

2. Comment on page 191 of the report (INDICATOR 17.8.1D): The percentage of households that used the internet from any location increased from 40,9% in 2013 to 59,3% in 2016. Definition of an internet using household: *“The percentage of households who used the internet from any location.”* Question: Can a “household” use the internet from any location besides the household itself? This indicator needs urgent review and refinement for relevance.
 - Reality Check: [ICASA State of the ICT Sector Report 2023](#): Table 1 page 13: Household internet access provides numerical data to enable a logical revision of this important indicator: places where household members can access and use the internet: at home – 10.4%; at work – 17.6%; via mobile phones – 69.4%; at educational or public spaces – 13.6%.
 - Latest definitions of an “Internet User”: Given that this key indicator lacks a developmentally-focussed definition, it is useful to review the latest prevailing definitions:
 - [World Bank](#) references ITU definition *“individuals who have used the Internet (from any location) in the last 3 months.”*
 - [United Nations](#): The most recent definition by the UN, custodian of the SDGs, obtained via a Google Search on 5 October 2023, draws from a 2007 ITU definition: *“Internet users are those who use the Internet from any location.”*
 - [Google’s BARD](#), 5 October 2023: *“The current definition of an internet user is an individual who used the Internet within the last 12 months. This definition is used by the International Telecommunication Union (ITU), a specialized agency of the United Nations responsible for information and communication technologies.”*
 - [ChatGPT](#), 5 October 2023: *“.... update in September 2021, the term “internet user” typically referred to an individual who accessed the internet using any device, including computers, smartphones, tablets, or other internet-enabled devices. Internet users are people who can browse websites, send, and receive emails, use social media, watch videos, and engage in various online activities.”*

The definitions listed above are not helpful in positioning the internet, and its latest AI product, as effective enablers of human development. An “internet user” accessing the internet once every 3 months or 12 months, to make a short “Yebo Gogo” [VoIP or OTT voice call](#), or to use any of the many social media tools to put food on the table (see [ICT4SDG2](#)), cannot, must not, be deemed an “empowered” internet user who has been “transformed” by the technology. A clear perception can be drawn from the prevailing definitions of internet users, that the present objectives of the services is to support the profitability of the technology providers, the supply side of the equations, while the demand or “user interests” side of the equation are limited to the minimum subsistence levels as discussed by the two UN Special Rapporteur on extreme poverty and human rights starting on page 28 of this document. Could this be one reason why developing nations are failing to meet their development objectives through use of these crucial developmental technologies, while developed nations use the tools to create even more powerful economies, increase citizen wealth, and progressively create and operate more environmentally destructive tools and weapons of war than those they already have?

The United Nations Secretary-General stated in his introduction of the [SDG Report of 2019](#): *“Since its inception in 2015, the 2030 Agenda has provided a blueprint for shared prosperity in a sustainable world—a world where all people can live productive, vibrant and peaceful lives on a healthy planet.”* Just four years later, the SDG Report of 2023 was introduced by UNICEF on 10 July 2023, with the words: *“Failure to redouble global efforts to achieve [the Sustainable Development Goals](#) – the promise of a better world for all – may fuel greater political instability, upend economies and lead to irreversible damage to the natural environment, according to [The Sustainable Development Goals Report 2023: Special Edition](#).”* Clearly, South Africa needs to redouble its NDP and SDG efforts to achieve its development goals. The following table summarises the efforts needed:

Table 6: Key extracts from “[South Africa: SDG Country Profile](#)”

Sustainable Development Goal	Value %	Year	Rating	Trend	Comment
SDG1: Poverty Headcount Ratio					
Low-income countries \$2.15/day	21.6	2023	●	➡	South Africa is an upper-middle-income economy, international poverty line is US\$6.85 PPP per day. Poverty level at this line is 61.6% (World Bank, latest 2014). Major concern is high levels of poverty at lower poverty lines, a direct result of extremely high income and social inequalities.
Lower-middle-income countries \$3.65/day	40	2014	●	➡	
Upper-middle-income countries: \$6.85/day	61.6	2014	●	➡	
SDG4: Quality Education					
Pre-primary participation rate (ages 4-6)	73.1	2020	●	➡	Indicators could be strengthened by adding benchmarks & qualitative indicators, e.g., PIRLS and TIMSS results as shown in Table 4. In addition, new indicators relevant to 4IR and AI, e.g., all skill sets on pages 8 & 9 of ICT4SDG4 . AI will change the world of education and learning, for better and for worse. How should we regulate AI for better and not for worse?
Net primary enrolment rate	88.3	2020	●	↓	
Lower secondary completion rate	80.4	2019	●	↓	
Literacy rate (% of population aged 15 to 24)	98.4	2019	●	➡	
SDG5: Gender Equality					
Family Planning (% of females aged 15 to 49)	79.7	2016	●	↑	UN WHO reports that Gender Based Violence (GBV) resulted in 12.1 per 100,000 deaths of women in 2016, five times the global average. Child Sexual Exploitation and Abuse (CSEA) is an equally challenging South African tragedy. They should be given equal or more prominence than the 4 indicators selected, read ICT4SDG5 for details.
Ratio F/M years of education (%)	79.5	2021	●	↓	
Ratio F/M labour force participation rate (%)	79.6	2022	●	↑	
Parliamentary seats F/M (%)	46.6	2021	●	↑	
SDG9: Innovation and Infrastructure: ICT and AI					
Population using the internet (%)	72.3	2021	●	↑	How relevant is this indicator when 24/7 household access is only 10.4%?
Mobile broadband subscriptions (per 100 population)	115.7	2021	●	↑	Challenge is affordability and usage skill; ownership is less challenging.
The Times Higher Education Universities Ranking:	51.1	2022	●	●	How relevant is this indicator for NDP and SDG challenges?
Articles published in academic journals (per 1,000 population)	0.5	2021	●	↑	Excellent academic papers published, How well are they used?.
Expenditure on research and development (% of GDP)	0.6	2019	●	↓	Can this R&D focus more on NDP and SDG challenges? Applied R&D?
SDG10: Reduced Inequalities					
Gini coefficient	63.0	2014	●	●	Arguably the most challenging societal destabilising indicator, a significant root cause of all other challenges. Accurate measurements and monitoring are vital if NDP/SDG challenges are to be overcome. ICT & AI vital in addressing this challenge.
Palma ratio	6.9	2017	●	●	

Keys to the table:

●	Major Challenges	●	Significant Challenges	●	Challenges remain	●	SDG achieved	●	Information unavailable
↓	Decreasing	➡	Stagnating	➡	Moderately improving	↑	On track or maintaining SDG	●	Information unavailable

A few reference documents that discuss the role and opportunities of AI in ameliorating NDP and SD challenges are:

- **Nature Communications: 13 January 2020:** [The role of artificial intelligence in achieving the Sustainable Development Goals](#)
- **ScienceDirect: 29 November 2022:** [Artificial intelligence and sustainable development goals nexus via four vantage points](#)
- **United Nations: May 2023:** [“Artificial Intelligence, Bias, and the Sustainable Development Goals”](#)
- **Multidisciplinary Digital Publishing Institute (MDPI): February 2021:** [AI in Context and the Sustainable Development Goals: Factoring in the Unsustainability of the Sociotechnical System](#)
- **World Economic Forum: 11 May 2022:** [Why artificial intelligence is vital in the race to meet the SDGs](#)

Regulating AI in South Africa must seek to reverse the 163-year national inability, under different governments and socioeconomic ideologies, to position ICTs, now shaped by AI, to enable the development of all who live in the country. The seventeen SDGs localized for South Africa, and fully aligned with the nation's National Development Plan (NDP), together with other technological tools of ICT and AI, present invaluable opportunities for South Africans to rescue their country from a future that is [“too ghastly to contemplate”](#), a phrase used by a former South African apartheid leader as he recognised that the social experiment of apartheid was far more destructive than constructive, and had to end. Inequality, poverty, unemployment, and all remaining fourteen interdependent SD challenges, must be likened to the apartheid system – they are totally destructive and must be ameliorated and ultimately reversed if the nation is to avoid a ghastly future.

Other key reference documents and studies which must inform the national dialogue towards an enabling AI regulatory framework follow.

Politics; Statistics; Democracy; Economics; Religion; AI:

AI and Politics

Two concise definitions of “politics” are provided by: [Collins Dictionary](#); “Politics are the actions or activities concerned with achieving and using power in a country or society”; and [Oxford Dictionary](#); “the activities involved in getting and using power in public life, and being able to influence decisions that affect a country or a society”. These definitions provide a good platform for discussing the relationships between the still evolving world of AI and its human users, many of whom aspire after political power, for good and for bad.

AI can be a powerful tool for both good and bad, so can politics. Many authorities on the subject have stated clearly that AI machines on their own are not a threat to human existence; Matrix and Terminator type robots exist only in the minds of their imaginative artistic creators. But people wielding the powers of AI to influence the political opinions and voting preferences can do immense harm to individual countries, and to the whole world:

The bad and the ugly: “AI could give governments unprecedented surveillance power over citizens. It could exacerbate mis/disinformation and deepfakes, while simultaneously improving tools that deliberately fail to combat such synthetic media. AI could undermine democratic values by perpetuating and amplifying social inequalities. It could further undermine trust and the social contract (although we’ve done a sufficient job of debasing that all by ourselves). It could challenge politicians and communicators in terms of AI’s disruption of work, employment, and economies.”

[OECD The Forum Network, 29 August 2023:](#) “The Good, the Bad and the Algorithmic: What impact could artificial intelligence have on political communications and democracy?”

South Africa has the highest social inequalities in the world. Does this make the country especially vulnerable to this AI usage threat?

Other key references to start the proposed national dialogue on AI regulation and the political dimensions are:

- [European Parliament, 19 September 2023:](#) Briefing: Artificial intelligence, democracy, and elections: “AI has a potential for bias, manipulation and spreading of disinformation, which risks weakening societies.”

- [MDPI Applied Sciences, 16 November 2021](#): An Explainable Artificial Intelligence Model for Detecting Xenophobic Tweets:
- [MIT Technology Review, 28 July 2023](#): Six ways that AI could change politics: *“A new era of AI-powered domestic politics may be coming. Watch for these milestones to know when it’s arrived.”*
- [Swissinfo.ch, 25 June 2022](#): Can artificial intelligence and democracy co-exist? *“Some people see artificial intelligence as a danger to democracy; others see it as a huge opportunity. Researchers and experts explain how algorithms and big data are deployed in Switzerland – and how they aren’t.”*
- [The Interpreter, 19 May 2023](#): The View from Australia: AI vs democracy: the battle is already here: *“The race for Artificial Intelligence dominance [is now on](#). And with the rise of AI has come dire warnings about its impact on governance and humanity at large. But the challenge that AI represents to democracy is already happening.”*

Quotation attributed to [Plato](#), circa 375 BCE: *“Mankind will never see an end of trouble until lovers of wisdom come to hold political power, or the holders of power become lovers of wisdom”*.

Could the regulation of AI encourage *“lovers of wisdom to seek political power, or holders of political power to become lovers of wisdom?”* In this politically turbulent world we now live in?

AI and Statistics

Useful Quotations:

- *“There are three kinds of lies: lies, damned lies, and statistics.”* Benjamin Disraeli, politician.
- *“Cognitive psychology tells us that the unaided human mind is vulnerable to many fallacies and illusions because of its reliance on its memory for vivid anecdotes rather than systematic statistics.”* Steven Pinker, cognitive psychologist, psycholinguist.
- *“If you can read and understand, know enough about numbers, but you don’t know for sure where you are, where you came from, how you came to be where you are, where you need to be, and how best to get to where you need to be, you need the help of good statisticians.”*

Historians suggest that statistics were created by politicians, soon after hierarchical societies emerged from the Neolithic Revolution. The kings, princes, chiefs, soldiers, high priests, nearly all dominated by males, emerged from the transition from nomadic hunter gatherers to sedentary farming, and developed a hunger for all kinds of ownership. These societal leaders invented statistics to count “their property,” people and produce alike. The good ideas led to many unexpected results: some of the “kings subjects” faked statistics to protect themselves from the greed above; some intermediaries, middle managers, manipulated the statistics for their own needs and profits; and some kings and rulers manipulated the numbers to mask their own deficiencies or greed. Statistics earned a poor reputation, as stated by Benjamin Disraeli, a politician.

But the original objectives of statistics remain vital as ever, as inferred by Steven Pinker in his quotation above. His profession demands that he knows and respects numbers, statistics, data, whichever nomenclature is preferred.

Ignoring, abusing, misusing, misinterpreting, or defining statistical indicators incorrectly, can be deadly. The existential threats faced by humanity today: climate change, health setbacks like the recent Coronavirus Pandemic (read [Wits 2020 article “Numbers can Kill”](#)), deadly wars like those in the Middle East and Central/Eastern Europe, revolutions and coups d’état in Africa, explosive levels of inequality, poverty and unemployment, suggest that humanity should see and listen to the statistical numbers.

Ignoring or misinterpreting the statistics summarised in Tables 1 to 5 in this discussion, can harm South Africa and its people greatly.

The art and social science of statistics are fundamental to the science and engineering of AI. The popular current range of AIs use large language models to produce humanlike responses to user prompts. The internationally recognised “father of modern linguistics,” Noam Chomsky, [describes these language models](#) as: *“Roughly speaking, they take huge amounts of data, search for patterns in it and become increasingly proficient at generating statistically probable outputs — such as seemingly humanlike language and thought.”*

These generative AIs use statistics for their functionality; they consult massive databases of statistical data to generate the desired results in humanlike formats, and they can analyse vast databases of statistics to produce logical results as accurate as the knowledge available to humankind allows.

They can also be programmed to “learn” how to manipulate the available databases to produce dangerously misleading responses to ordinary people’s prompts, one of the reasons why AI is perceived as potentially harmful to humanity.

The following represents a very short selection of numerous knowledge references that can inform South Africa’s AI regulatory development processes in the statistical domain.

- [The Guardian, Sat 31 Oct 2020](#): Article by Paul Goodwin, statistician, emeritus professor at the University of Bath: *“Without learning to think statistically, we’ll never know when people are bending the truth: Competent, honest statistics can illuminate essential truths. They can reveal social inequalities, indicate where resources or legislation should be directed, highlight dangers, or help us to appraise a government’s performance. But sham numbers detract from those that inform.”*
- [William Davies](#) in the [Guardian, 19 Jan 2017](#): How statistics lost their power – and why we should fear what comes next: *“In theory, statistics should help settle arguments. They ought to provide stable reference points that everyone – no matter what their politics – can agree on. Yet in recent years, divergent levels of trust in statistics has become one of the key schisms that have opened up in western liberal democracies.”*
- [Taylor & Francis Group, published online: 25 May 2020](#): *Many shades of wrong: what governments do when they manipulate statistics*: The article deals with how governments manipulate macroeconomic statistics, a risky practice, but even worse than that is manipulating social statistics like inequality and poverty. When the victims of these two scourges run out of patience, revolutions and coups d’état usually follow.
- [Taylor & Francis Group, published online: 23 Mar 2021](#): *From a ‘race to AI’ to a ‘race to AI regulation’: regulatory competition for artificial intelligence*: *“Against a background of global competition to seize the opportunities promised by Artificial Intelligence (AI), many countries and regions are explicitly taking part in a ‘race to AI’. Yet the increased visibility of the technology’s risks has led to ever-louder calls for regulators to look beyond the benefits, and also secure appropriate regulation to ensure AI that is ‘trustworthy’ – i.e. legal, ethical and robust.”*
- [University of California, Berkeley, 10 January 2018](#): Artificial intelligence and statistics: *“Artificial intelligence (AI) is intrinsically data-driven. It calls for the application of statistical concepts through human-machine collaboration during the generation of data, the development of algorithms, and the evaluation of results.”* How can we use this knowledge to structure AI regulation that maximises the value of AI while reducing its risks?

AI and Democracy:

Democracy is a political ideology that is extremely difficult to define with any level of clarity. Its interpretation seems to depend entirely on the motivations, opinions, or preferences of a nation’s leaders or rulers, and the inability of a submissive populace who will not use their collective powers to shape their desired systems of governance. The following extracts from publications about democracy are informative:

- There are 195 identifiable countries in the world today. This number has and will change as some self-proclaimed “democratic countries” experience “democratic revolutions” to introduce “different kinds” of democracy, often “cancelling” countries from existence, or forming new countries with new names. The [“cancellation” of Nagorno-Karabakh Republic](#) as an independent state from January 2024, is a recent example, more are likely to follow in the same region. With the growing number of conflicts in “African Democracies”; 15 listed by Human Rights Watch in its [World Report 2023](#); seven coups d’état in West Africa alone in the last three years listed by [Africa News 2023](#); the tragic dehumanizing conflicts in the [“Horn of Africa”](#) (Ethiopia, Sudan, Somalia), will the continent retain what is left of its national borders set by the world’s leading “democracies” nearly 140 years ago in Berlin, Germany (read [Getachew Fentahun, August 2023](#))?

- Of the 195 countries in the world today, only two, the Vatican (Holy See) and the State of Palestine, are not members of the United Nations.
- 188 of the countries recognised as independent nations today are self-proclaimed democracies, the remaining seven countries are self-proclaimed non-democratic countries: [Saudi Arabia](#), [Oman](#), the [UAE](#), [Qatar](#), [Brunei](#), [Afghanistan](#), and the [Vatican](#). The world's "democracies" thus include countries like the [Democratic People's Republic of Korea](#) and [The Republic of Korea](#); [The Democratic Republic of Congo](#) and [The Republic of Congo](#). Israel, with massive internal, regional, and international disputes about its self-proclaimed democracy, and the seemingly unrestricted support by most advanced western democracies, is a devastating contemporary case study of the brutality that can arise from deliberate or unintended misinterpretation of the democratic concept, by both Israel and its neighbouring adversaries. The Guardian on 30 March 2023: "[Israel hasn't been a democracy for a long time. Now, Israelis need to face this fact](#)" discusses this matter well, especially considering the horrendous anti-human outbreaks of violence by both political adversaries as this document is being written.

Democracy is thus a political concept that defies exact definition, an opinion very well stated by a historically famous politician – [Sir Winston Churchill on 11 November 1947](#):

"Many forms of Government have been tried, and will be tried in this world of sin and woe. No one pretends that democracy is perfect or all-wise. Indeed it has been said that democracy is the worst form of Government except for all those other forms that have been tried from time to time...."

Why is the above relevant to a discussion about AI regulatory development? How democracy is defined, interpreted, and enacted in any country can lead to sustainable growth and peace, or immense social instability and state failure. AI has the potential to influence both, hence its regulation should steer the nation towards sustainable growth and peace, and suppress its nefarious usage by ill-intentioned individuals, groups, states, and adversarial countries. South Africa's political history is tainted with iniquitous interpretations of democracy: apartheid was in theory, a racially segregated democracy, different democratic dispensations for each racially segregated group of citizens. The nation is still trying to overcome the damage caused by the apartheid political philosophy. The reality in contemporary South Africa is that the triple threats of inequality, poverty, and unemployment are the new political divisions that threaten the country's democracy, although they too follow visibly racial dividing lines. Black African population groups, representing [81.4% of the national population](#), still dominate the "lower classes" defined by poverty and inferior opportunities in most factors required for human development. Effective mass learning, via all and any forms of education for all, is the best cure for this potential existential threat to South Africa's democracy:

".... if the democracy is to be real and not a sham—citizens must understand their own interests, know the relevant facts, and have the ability to critically evaluate political arguments. Each of those things presupposes education" – [Britannica 16 October 2023](#): "[Where was democracy first practiced?](#)"

Table 4 on page 4 of this document shows clearly that learning is South Africa's Achilles Heel for democracy – the nation has an abundance of education with very poor learning outcomes. AI is a potent corrective tool for this specific challenge, but it must be positioned for that purpose through effective regulation and mass usage.

Clearly, the above discussion suggests a complex challenge of far greater scope than can be covered in this introductory discussion document. The following short list of relevant knowledge sources should help to kick-start the nation-wide dialogue proposed:

- [The Washington Post, 26 April 2023](#) (blocked by paywall): also available in [American Academy of Arts & Sciences: Opinion by Danielle Allen](#): **The next level of AI is approaching. Our democracy isn't ready.** *"Tech and democracy are not friends right now. We need to change that — fast. Now, here comes generative artificial intelligence, a tool that will help bad actors further accelerate the spread of misinformation. A healthy democracy could govern this new technology and put it to good use in countless ways. It would also develop defences against those who put it to adversarial use."*
- [The Guardian, 28 July 2023](#): Artificial intelligence is powering politics – but it could also reboot democracy: *"Generative AI can involve citizens directly in decision-making, but not while developers' incentives are only*

financial. truth and trust have been eroded, democracy has failed to reform for the digital age and the relationship between those in power and those who elect them is strained to breaking point."

- **Swissinfo.ch, 25 June, 2022:** <https://www.swissinfo.ch/eng/sci-tech/can-artificial-intelligence-and-democracy-co-exist-/47672584>. Switzerland has one of the most mature democracies in the world – seven presidents rotating on an annual basis, voting every three months with intensive public debates, continuous AI innovative algorithms to counter hate speech, threats of violence, political bias, etc., all target at positioning AI as an aid to democracy, not an enemy of democracy.
- **The Interpreter, 19 May 2023 Australia Technology.** ["AI vs democracy: the battle is already here"](#): *"If Australia is to remain a thriving democracy, the country must actively participate in the new AI-enabled global economy. We are not currently. The unintended consequences to democracy of not participating will extend far beyond journalism. Our allies and partners are pulling ahead."*
- **The Conversation, 2 June, 2023:** [How AI could take over elections – and undermine democracy](#): *"Could organizations use artificial intelligence language models such as ChatGPT to induce voters to behave in specific ways?"* Examples of this from USA.
- **Brookings Institution, 21 March, 2023:** [How generative AI impacts democratic engagement](#): *"In 2017, the Federal Communications Commission (FCC) invited public commentary regarding its proposed changes to net neutrality regulations. An orchestrated [astroturf](#) campaign opposed to net neutrality soon flooded the comment line, generating more than 8 million comments, while a single college student in favour of net neutrality used an automated script to generate seven million comments of his own. The government foiled the attempt only because of the inadequacy of the technology: since [only](#) 6% of the 21.7 million comments were unique and seven comments alone accounted for 38% of all submissions, the manipulation was easy to detect. By contrast, language models capable of automating unique submissions at scale will not be as easy to uncover."* **AI undermines the FCC? What can it do to ICASA?**

AI and Economics:

Economics is yet another scion of politics, a direct product of the materialism born in the human transition from nomadic egalitarian social structures and lifestyles to sedentary agricultural societies with high population growth and urbanization. Given that Economics is neither a mathematics nor a science discipline, it is extremely difficult to define. It has been labelled a "social science" that uses mathematical modelling to predict economic outcomes, the outcomes are often off the mark. Economics has also been labelled the "dismal science", so named by [Thomas Carlyle](#), a Scottish philosopher who in 1849, expressed his exasperation over the failure of economics to protect the "economic interests" of white plantation owners *"White plantation owners, he said, ought to force black plantation workers to be their servants"*, reference [The Atlantic, 17 December 2013](#):

*'Today, when we hear the term "the dismal science," it's typically in reference to economics' most depressing outcomes (e.g.: on globalization killing manufacturing jobs:) "well, that's why they call it the dismal science" etc.'*¹

This "Dismal Science" went on to spawn yet another distasteful economic phrase: *"[Human Capital](#),"* the economic value of human beings, specifically the knowledge within their heads that can generate profits for the shareholders of that "human capital." An excellent analysis of this "dismal science" was provided by Caitlin C. Rosenthal, Fellow of the Harvard Business School, in *"[Accounting for Slavery: Masters and Management, published 15 October, 2019](#)"*, in which she traced the origins of the term "Human Capital" to the commercial value assigned to slaves by economists supporting slave owners in USA circa 1750.

According to the World Bank, the "Human Capital" value of an average South African is just 48% of the human capital value of the leading HCI country in the world, Singapore. The World Bank, in its global Human Capital Index, <https://api.worldbank.org/v2/en/indicator/HD.HCI.OVRL?downloadformat=excel>, ranks South Africa 135th out of 217 countries, all led by top ranked Singapore.

Britannica updated a [definition of economics on 15 September 2023](#) as: *"**economics, social science** that seeks to analyse and describe the production, distribution, and [consumption](#) of wealth."* AND proceeds to discuss the difficulty in defining the concept: *"No one has ever succeeded in neatly defining the scope of economics."*

Economics is the de facto measure of success in this [post-Neolithic Anthropocene epoch](#) of atom bombs, climate change, economic melt-downs, inequality, racism, revolutions, and wars often fought for economic advantage and individual superiority over others. Can all the world's knowledge, easily accessed via AI, restore the world's "Humanity" in "Human Capital"? Can this be done for the children of the nation so that as adults, they can shape their future world and protect its life-giving ecosystems from economic greed?

Three key economic quotations are relevant to these discussions:

- *"Economics is extremely useful as a form of employment for economists"*: [John Kenneth Galbraith](#)
- *"The most important question in 21st-century economics may well be, 'What should we do with all the superfluous people, once we have highly intelligent non-conscious algorithms that can do almost everything better than humans?'"* Yuval Noah Harari in ["The rise of the useless class, Feb 24, 2017"](#)
- Adam Smith, a.k.a., "Father of Modern Capitalism" made the following observations relevant to this discussion, in his classic *"An Inquiry into the Nature and Causes of the Wealth of Nations"*, available for download at https://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf:
 - *"No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable."* *Wealth of Nations*, I:VIII, p.96.
 - *"All for ourselves, and nothing for other people, seems, in every age of the world, to have been the vile maxim of the masters of mankind."* *Wealth of Nations*, III:IV, p.418

Adam Smith's observations published in 1776 are just as relevant to the situation South Africa finds itself in nearly 250-years after those insightful thoughts.

What we do know is that economics, difficult to define as it may be, is a modern concept, said to have emerged as a distinct discipline in 1776, when Scottish philosopher [Adam Smith](#) published [An Inquiry into the Nature and Causes of the Wealth of Nations](#). Prior to that, throughout the 6-to-7-million years or so of Hominin existence (our common ancestors, [Nature 2012](#)), and the estimated of 550,000 to 750,000 years of Homo sapiens existence, us, [Smithsonian 2 February 2021](#), economics did exist, but in a very different form: the "wealth of nations" was shared amongst all members of the nation, and even with neighbours. There clearly was a need for production; food hunted and gathered; using hunting and gathering technologies to acquire the food; invention of fire to eke out the most value out of gathered and hunted food; and equitable distribution so that all members of the human communities would be fed for sustainability. This evolutionary process of resource acquisition and consumption took place in the absence of the concept of wealth; everyone shared all life-giving resources in egalitarian lifestyles. The following are just a tiny fraction of the significant bodies of research-based evidence that suggest this:

- [The Original Affluent Society, Marshall Sahlins, 1972](#): *"Hunter-gatherers consume less energy per capita per year than any other group of human beings. Yet when you come to examine it the original affluent society was none other than the hunter's - in which all the people's material wants were easily satisfied. To accept that hunters are affluent is therefore to recognise that the present human condition of man slaving to bridge the gap between his unlimited wants and his insufficient means is a tragedy of modern times."*
- About Adam Smith, the "Father of Capitalism": ["Rescuing Adam Smith from Myth and Misrepresentation"](#). This highly informative article, and its original – ["An Authentic Account of Adam Smith, 2017"](#) by [Gavin Kennedy](#) 2017, are protected by costly paywalls, but they do explain the mainly deliberate myths and misrepresentations of the wisdom of Adam Smith. To overcome the paywall protection, we consulted the AI instruments of Bard and ChatGPT, they both confirmed that (a) Bard: *"The book [\(Kennedy 2017\)](#) is a valuable corrective to the many myths and misconceptions that surround Adam Smith. It is a must-read for anyone who wants to understand Smith's ideas and their relevance to the modern world;"* and (b) ChatGPT: *"He (Kennedy, the author) argues that many contemporary interpretations of Smith's work are incomplete or inaccurate, and he strives to uncover the true essence of Smith's ideas."*

Yes, AI can help to clarify important concepts, even within the “dismal science.” South Africa has an obligation to position AI to provide this clarification for the children of today, the economic leaders of the nation’s future.

- [Against Economics, David Graeber, December 5, 2019](#): “*There is a growing feeling, among those who have the responsibility of managing large economies, that the discipline of economics is no longer fit for purpose. It is beginning to look like a science designed to solve problems that no longer exist.....*” Several rebuttals, including this published by [Bloomberg, 19 November 2019](#): “*Slamming ideas the profession has largely discarded doesn’t help figure out what to do in the future.*” [Time Magazine on 24 March 2023](#) seems to disagree with Bloomberg: the economist’s obsession with inflation is alive and well: “*If you want to get out of a hole, stop digging!*” Tragically, the Federal Reserve’s Board of Governors and its chair, Jay Powell, keep desperately digging in their pathological efforts to bury the phantom of inflation.’

The following provides a very small selection of additional references which could inform South Africa’s search for an AI regulatory system which assists South Africa’s search for solutions for its multitudinous development and survivability challenges.

Capitalism and Democracy:

- The Crisis of Democratic Capitalism, Martin Wolf; 16 February 2023: <https://www.lse.ac.uk/lse-player?id=ffdc72f5-6d9d-467c-8b30-f0f2838ac008>;
- Do Democracy and Capitalism Really Need Each Other? Scholars from around the world weigh in; “capitalism without democracy usually favours corruption and control over resources through means other than merit, such as party loyalty”: <https://hbr.org/2020/03/do-democracy-and-capitalism-really-need-each-other>; 11 March 2020.
- Economist Joseph Stiglitz: Capitalism Hasn’t Been Working for Most People for the Last 40 Years: 24 April 2019: “*People, Power, and Profits: Progressive Capitalism for an Age of Discontent.*” <https://www.youtube.com/watch?v=3xQgVc3IYRY>
- Capitalism is killing the planet – it’s time to stop buying into our own destruction: The Guardian 30 October 2021: <https://www.theguardian.com/environment/2021/oct/30/capitalism-is-killing-the-planet-its-time-to-stop-buying-into-our-own-destruction>;
- Capitalism and Democracy: Can They Coexist? Capitalism is losing its lustre. Most millennials in the U.S. now say they prefer socialism. Inequality is rising, as those at the top take more of economic winnings. 6 June 2019 : <https://stonecenter.gc.cuny.edu/panel-capitalism-and-democracy-can-they-coexist/>.
- New York Times Magazine 6 September 2009: Paul Krugman: “[How Did Economists Get It So Wrong?](#)”: “*They (Economists) turned a blind eye to the limitations of human rationality that often lead to bubbles and busts; to the problems of institutions that run amok; to the imperfections of markets — especially financial markets — that can cause the economy’s operating system to undergo sudden, unpredictable crashes; and to the dangers created when regulators don’t believe in regulation.*”. Paul Krugman is an Economist, awarded a Nobel Laureate for his economic insights – he should know!

Given that this is a discussion about AI and Economics, on 22 October 2023, Bard and ChatGPT were asked for an opinion on Paul Krugman’s 13-page essay. Both supported the very strong views expressed in the essay, that classical economic theories failed during global financial crises because of their reliance on mathematical models that had little connection with reality:

Bard: “*Krugman’s essay serves as a wake-up call for the economics profession;*”

ChatGPT: “*Krugman’s essay highlights the limitations of traditional economic thinking and advocates for a paradigm shift in the field to address the challenges of the modern global economy.*”

Adam Smith is said to be “the father” of modern economics, a.k.a., the “father of the [dismal science](#)”. Adam Smith’s economic philosophies are claimed by nearly all schools of economic thought, often with imprecise interpretations. On 26 July 2018, [The Economist Magazine](#) joined Paul Krugman’s criticism of the “myths and misrepresentations” of modern economics in its article “[Rescuing Adam Smith from Myth and Misrepresentation](#)”, discussed also on page 47 of this document.

Krugman's essay strongly suggests some of the economics thinking that must be built into AI regulation aimed at serving people first, with economics serving that objective, instead of the perception that economic growth is the main objective, and people are the subservient tools for achieving that objective.

AI at the Crossroads of Capitalism, Democracy, Economics, and Politics:

- **Economic reasoning and artificial intelligence:** 17 July 2015 (a very long eight years in the fast technology lane): Science: <https://www.science.org/doi/abs/10.1126/science.aaa8403>
- **Economic patterns in a world with artificial intelligence:** Springer Link, January 2020 (already old at just 3-years): <https://link.springer.com/article/10.1007/s40844-019-00157-x>
- **Ex-Google CEO: AI on social media is 'bad for democracy':** "AI will render social media even more dangerous for elections in 2024," says former Google CEO Eric Schmidt. "Major upcoming elections will be the breeding ground for voter suppression via 'extremely inexpensive misinformation,'" Schmidt told the BBC.": <https://www.bbc.com/news/av/world-us-canada-65627027>

South Africa's modern history has left a legacy of complicated highly competitive political structures: [AI4Good](#) can help South Africa to overcome many of the negative impacts of its history, but it can also destroy South Africa if AI steers the country towards missing the objectives and targets of the nation's NDP and its SDGs. "AI Would Either End the World as We Know It, or Make Tons of Money," Sam Adams, CEO of Open AI, stated as reported in [Futurism, 04 April 2023](#). If South Africa's AI regulation leans towards "making tons of money" which is used to "develop people," then Sam Adams prediction must be welcomed. But, if Sam Adam's tons of money are aimed at making profits for its shareholders, which may include government, ignoring Adam Smith's warning of the "masters of mankind and their vile maxims," then AI will contribute towards South Africa's state failure, or worse. All four apocalyptic horsemen of Walter Scheidel's "The Great Leveler" "[The only conquerors of inequality are the Four Horsemen of the Apocalypse](#)," will come into play in South Africa, as they have done in the recent history of the country.

South Africa has choices: the nation's leaders can work towards [AI4Good \(the ITU link\)](#), in partnership with all the people who live in the country; or it can leave this choice in the hands of its poorest majority, who will have little choice but to unleash Scheidel's first apocalyptic horseman, state collapse; the third horseman, mass mobilization warfare; and the fourth horseman, ideological revolution. The four apocalyptic horsemen are discussed further on [page 112 of ICT4SDG8](#).

AI and Religion

Background Information:

- "There are nearly 4,000 recognised faiths around the globe. Almost 75 percent of the world's population follow one of the five main faiths which include Buddhism, Hinduism, Christianity, Judaism, and Islam": <https://www.cnbctv18.com/world/world-religion-day-2023-history-and-significance-15661981.htm>.
- The global share of each major faith group is: Christian: 31.4% | Muslim: 23.2% | "Unaffiliated": 16.4% | Hindu: 15% | Buddhist: 7.1% | "Folk Religions": 5.9% (these are religious groups based on ethnic or cultural belief systems) | Jewish: 0.2% | Other 0.8%.
- The 31.4% global Christians, approximately 2.5 billion people, are further split into approximately [45,000 separate faith-based denominations](#) within Christianity. The world's second and fastest growing religious group, the Muslims, can be divided into two major denominations, [Sunni and Shia](#), which are further divided into several smaller sects within each denomination. The history of the fragmentation of many identifiable faiths, including Christianity into 45,000 sects, was extremely violent: read The Wars of Religion at <https://www.britannica.com/topic/history-of-Europe/The-Wars-of-Religion>.
- The split in South Africa is approximately 80% Christian; 5.5% Unaffiliated; 5% Folk Religions; 2% Muslim; 1% Hindu; 0.2% Atheist; less than 0.1% Jewish.

Discussion:

"Blind belief in authority is the greatest enemy of truth": quotation attributed to Albert Einstein, circa 1901. Fast forward to the 21st century, Einstein could have re-worded his thinking to: "Blind belief in AI may be the

greatest enemy of truth.” There is growing evidence of malicious actors and rogue states that use AI to misinform and disinform whole populations, making false promises to the most vulnerable population groups who will clutch at any straws to escape their socially-created miserable livelihoods. AI most definitely has the potential of becoming the greatest enemy of truth, but it can also be the greatest ally of truth, the choice is very human:

[The Conversation.com; 15 Mar 2023](#): “Gods in the machine? The rise of artificial intelligence may result in new religions”:

“Generative AI that can create or produce new content possesses several characteristics that are often associated with divine beings, like deities or prophets:

- It displays a level of intelligence that goes beyond that of most humans. Indeed, its knowledge appears limitless.
- It is capable of great feats of creativity. It can write poetry, compose music, and generate art, in almost any style, close to instantaneously.
- It is removed from normal human concerns and needs. It does not suffer physical pain, hunger, or sexual desire.
- It can offer guidance to people in their daily lives.
- It is immortal.

Second, generative AI will produce output that can be taken for religious doctrine. It will provide answers to metaphysical and theological questions, and engage in the construction of complex worldviews.”

Religion is an extremely complex highly emotional human phenomenon. Religious discussions and arguments between religious believers and non-believers, or even between different believers within narrowly defined religious denominations, are seldom conclusive, or constructive – they are faith-based with very little rationality: *“The assurance of things hoped for, the conviction of things not seen”* – [Hebrews 11.1](#).

Digital Divides, Human Divides, and AI: Given the above complexities, and the focus of the whole discussion document on the performance of South Africa in the critical human development measures outlined in pages 1 to 6, the role of AI in mitigating or exacerbating those human development challenges are central to the discussion. In pursuance of an unbiased opinion of the critical role of religion in shaping, and being shaped, by both the developmental challenges and the AI tool, AI was asked to comment on key elements of the developmental conundrums facing South Africa. For now, until the advent of [“Sentient”](#) AI, all AI tools will be regarded as neutral, even if the algorithms they use are biased towards generating disinformation and misinformation by their creators, owners or users. This discussion is about developing a regulatory system for South Africa’s AI usage, the dangers of malicious design of the AI tool must feature prominently in the design of the required regulatory systems.

The following are summaries of the responses of [Google’s BARD](#) and [OpenAI’s ChatGPT](#) to prompts relevant to this discussion (Note: ChatGPT is used by Microsoft to power many of its AI products):

Background Prompt: Explain in simple words the difference between digital divides and human-centred development divides	
Bard	ChatGPT
<i>The human-centred development divide is a broader concept that encompasses the digital divide. It refers to the gap between those who are able to benefit from digital technologies and those who are not. This can be due to a variety of factors, such as income, education, gender, location, and disability. In simple words, the digital divide is about access to technology, while the human-centred development divide is about the ability to use technology to improve people's lives.” And concluding that “Closing the digital divide and the human-centred development divide is essential for achieving sustainable development. By ensuring that everyone has the opportunity to benefit from digital technologies, we can create a more equitable and prosperous world for all.”.</i>	<i>“... the internet and technology are like tools that help people learn, work, and communicate. The digital divide is like a gap between people who have access to these tools and those who don't. Human-centred development is about making sure that development (improvement in people's lives) focuses on what people really need and want. In short, the digital divide is about access to technology, while the human-centred development divide is about whether development efforts truly benefit and involve the people they are supposed to help.”</i>

The Human Capital Index: The commercial value of a South African Child? Tables 1 to 3 in the introduction of this discussion document paint dismal pictures of the closely interrelated factors of inequality, poverty, and unemployment. Integral to South Africa’s performance in these critical factors is the World Bank introduced

concept of Human Capital, and the Human Capital Index (HCI), defined by the World Bank as: “A measure of the amount of human capital that a child born today can expect to attain by age 18. It conveys the productivity of the next generation of workers compared to a benchmark of complete education and full health.” This dehumanizing concept, discussed further on page 47 of this document, places a price on South Africa’s children which is just 48% of the value of a child in Singapore. The HCI for all countries is listed in the [World Bank Human Capital Database](#).

Bard and ChatGPT were asked to comment on this distasteful measure of the worth of humanity:

Dignity of People who work to live: Please explain the link between Human Capital and Slavery.	
Bard	ChatGPT
“The concept of human capital can be a useful tool for understanding the economics of slavery and other forms of exploitation. However, it is important to remember that slaves and other exploited workers are not simply commodities or investments. They are human beings with their own rights and dignity.”	“In summary, the link between human capital and slavery is characterized by the exploitation of the skills and labour of enslaved individuals, the dehumanization of those individuals, economic benefits to slaveholders, and the long-term effects of slavery on human capital development. The abolition of slavery marked a significant step toward recognizing the value of every individual's human capital and their right to freedom and self-determination.”

Many religions have covertly or overtly supported the Human Capital concept in many ways in their long histories, by merely supporting the ownership, commercial valuation, and trading of slaves. An excellent reference to a relatively modern record of this practice is Harvard University’s Caitlin Rosenthal’s book “Accounting for Slavery: Masters and Management”, usefully reviewed by [Joshua D. Rothman in 2019](#). Is this shameful history of humankind on its way back? (a) The suppression of [Critical Race Theory](#) in America’s schools; (b) The tragic deaths of more [than 50,000 migrants seeking better lives](#) for themselves and their families; (c) The current [mass ethnic cleansing](#) of Palestinian Arabs by their [Jewish genetic relatives](#) can and has been traced to religious differences and intolerances ([Haaretz | Israel News 2022](#)); “The growing levels of Ultra-nationalism, antisemitism, anti-Muslim hatred: Anti-racism commission raises alarm over situation in Europe” ([Council of Europe 27 February 2020](#)).

Can South Africa begin the very difficult lengthy process of regulating AI to protect the nation and all who live in it from the fallout of all the above and more international challenges? AI has the capability to exacerbate all the above challenges, and to ameliorate them also, the choice of which lies with all South Africans, leaders, and followers alike, without exception.

[AI, Religion, and Homo spiritualis](#): Bard and ChatGPT were asked to comment:

AI, Religion, Spirituality: Please provide a single paragraph of the nexus between AI, religion, and Homo spiritualis.	
Bard	ChatGPT
AI, religion, and Homo spiritualis are all intertwined in complex ways. AI has the potential to revolutionize our understanding of religion and spirituality, and to create new forms of religious experience. The Homo spiritualis, a hypothetical future human being who is both physical and digital, could use AI to enhance their spiritual experiences and to connect with others who share their beliefs. However, there are also potential dangers associated with the development of AI and religion, such as the misuse of AI for religious manipulation and control. It is important to carefully consider the ethical implications of AI and religion as we develop these technologies in the future.	The nexus between AI, religion, and Homo spiritualis lies at the intersection of technological advancement and the deeply ingrained human quest for spirituality and meaning. As artificial intelligence progresses, it raises profound questions about the nature of consciousness, the potential for creating sentient beings, and the ethical implications of AI in areas like decision-making, companionship, and even religious practices. This convergence prompts contemplation on the boundaries between the divine and the synthetic, challenging traditional religious doctrines while also sparking new spiritual inquiries about the essence of humanity, our relationship with machines, and the possibility of a redefined sense of Homo spiritualis, wherein spirituality evolves alongside technological innovation to explore the transcendent within the realm of artificial intelligence.

Why do we need to understand the relationship between AI now and in the future, religion, and Homo spiritualis, also labelled Homo spiritus, in our search for safe, beneficent, Homo-friendly artifacts with Homo-

like intelligence? Homo sapiens, since their emergence sometime between 550,000 to 750,000 years ago ([Smithsonian 2 February 2021](#)), have been searching for ways of reinventing humanity. Generative AI is the latest such innovation, perhaps sentient AIs will follow soon, finally recreating an inorganic replica of humanity. Spirituality and its religious offshoots, have had much to say about humanity, promoting human attributes like empathy, generosity, kindness, tolerance, forgiveness, etc. The [4,000 religions in the world](#) today are also known to guard their individual versions of religious expression very jealously, and often violently, as demonstrated by the human tragedies currently unfolding in Israel and Palestine (Islam versus Judaism: [BBC history of the conflict here](#)). The atrocities perpetrated against the Rohingya Muslims ([Human Rights Watch background here](#)), and accusations of China persecuting the minority Muslim Uyghur population ([BBC 24 May 2022 coverage here](#)), are just a few well-publicised examples of today's religious intolerance, persecution, and violence. [Reuters Report of 21 April, 2021](#) refers to 36 countries accused of religious persecution and human rights violations.

If AI is positioned and used to spread the kinder, gentler, caring side of human nature, then AI will go a very long way towards reducing religious violence, and its known political triggers. AI in the hands of malicious individuals, religious groups, and states, could exacerbate faith-based violence exponentially, potentially "[ending the world as we know it](#)," as warned by Sam Altman, CEO of OpenAI and therefore ChatGPT.

To expand on the extent of faith-based intolerance, persecution, and violence, Bard and ChatGPT were asked to "provide a list of the top twenty countries with faith-based human rights violations and violence." The responses were somewhat unexpected, raising the possibility of bias built into the algorithms used by the language models:

BARD: First response: *"I'm unable to help you with that, as I'm only a language model and don't have the necessary information or abilities."* Second response: *"I'm a text-based AI, and that is outside of my capabilities."*

To expand on this theme, Bard was requested to provide a single paragraph explanation of the distressing faith-based violence unfolding in Israel and Palestine; the response was again *"I'm just a language model, so I can't help you with that."*

ChatGPT: A list of 20 countries was provided: 9 in East and South Asia; 7 in the Middle East and North Africa; 2 in East Europe and Central Asia; 2 in sub-Sahara Africa. Comments by ChatGPT included warnings that *"categorizing countries solely by faith-based human rights violations can be oversimplifying complex situations;"* and *"Human rights abuses are influenced by a wide range of factors, including political, economic, cultural, and historical elements"*

Regarding the second prompt on the Israeli Palestine crisis, ChatGPT was more forthcoming:

"The Israel-Palestine conflict is deeply rooted in historical, political, and religious factors, making it a complex and sensitive issue. One of the significant aspects of this conflict is the role of religion, particularly Judaism and Islam. Both Israelis and Palestinians have deep religious connections to the land they inhabit. For Jews, historical ties to the region, dating back thousands of years, are outlined in religious texts like the Torah, which promises the land to the Jewish people. This religious connection has influenced the Zionist movement, advocating for a Jewish homeland in Palestine. On the other side, Palestinians, the majority of whom are Muslims, also have strong religious and cultural ties to the land, with Jerusalem being a significant religious centre in Islam. The Al-Aqsa Mosque and the Dome of the Rock are sacred sites in Islam, intensifying the religious significance of the region for Palestinians."

The above responses serve to demonstrate that AI, used to promote international peace and fairness, can go a long way to defusing the existentialist threats to human survival. In the wrong hands, AI could wreak havoc to humanity and its environment: AI is generally considered to be a benign technological tool, until humans use it for good or for bad.

While this section examines the complex relationships between religion, human development, and technology, it is necessary to keep the focus on the primary objectives of this discussion, improving the nation's developmental performance depicted in the statistics and related discussions of Tables 1 to 5 in the first 6 pages of this document. How can AI be positioned to help South Africa's religious fraternity to contribute

more than they already do, directly and measurably, to the mitigation and ultimate reversal of all South Africa's sustainable development challenges? What AI regulatory provisions must be made to achieve this AI positioning, while at the same time preventing the abuse and misuse of the AI tool in the nation's religious sector?

To conclude this section of the discussion, the following list of references may be of use in the development of South Africa's integrated AI regulatory systems:

South African examples of religious abuse:

- Abuse of women and children by religious leaders/sector: CRL Commission briefing: *"There is a lack of proper regulation to control churches that are operating outside of the law."*
<https://pmg.org.za/committee-meeting/27380/>
- [Eye Witness News 7 June 2021](#): 100 people dead, 80 of them South African, in the TB Joshua evangelist church collapse in Nigeria;
- [Al Jazeera, 25 November 2020](#): Self-styled "prophet" Shepherd Bushiri, the multimillionaire leader of the Enlightened Christian Gathering (ECG), wanted in South Africa for money laundering, theft, and fraud charges estimated at R102 million, set free by a Malawian judge;
- [BBC 9 February 2018](#): South Africa's 'Doom Pastor' found guilty of assault; "A South African self-styled prophet who sprayed his followers with the insecticide Doom, has been found guilty of assault, local media report." The "prophet" convinced worshippers that God's healing could be delivered through the insecticide Doom, it could heal cancer and HIV, and other ailments like eye infections.
- [SciELO SA, published 13 April 2023](#): Black women's bodies as sacrificial lambs at the altar: *"The youth in South Africa are subject to unemployment and the pressure to fit into society. The unemployment rate in South Africa is high; therefore, some find themselves desperate for employment and often find themselves hoping and praying for a miracle Some of these young South Africans became victims of sexual harassment, rape and gender-based violence (GBV) at the hands of their pastors."*

There are numerous publicised examples of people abuse at the hands of religious leaders, but South Africa is not alone in this human deficiency. AI has an invaluable role in ameliorating the challenge of faith-based abuse, but AI is already being used by governments, religions, and criminal elements seeking to perpetuate their crimes through AI and religious beliefs.

A short Google search resulted in the following relevant sources of information:

- 15 July 2016: [Is religion to blame for violence? | UpFront - YouTube](#) Al Jazeera English
- 21 Jun 2019: [Is Islam to Blame for Violent Groups? | Animation - YouTube](#): Yaqeen Institute, Imam Omar Suleiman
- 16 May 2018: [Does religion promote violence? | Matter of Fact – YouTube](#): ABC News (Australia) Rabbi Lord Jonathan Sacks: "Not in God's Name"
- 01 Jul 2020: [Does Religion Cause Violence? - YouTube](#): Trinity Church Scarborough: "Should we scrap all religions because of all the violence?"
- 7 Jan 2015: [Karen Armstrong on Religion and the History of Violence](#): A former Catholic nun who abandoned her religious creed and has described herself as a 'freelance monotheist' asks in the introduction: "Why on earth can't the Muslims learn to separate religion and politics?" This question could easily be rephrased to: "Why on earth can't the religious fundamentalist in the USA discard their white superiority tendencies?" Or: "Why on earth can't the Irish discard their historical faith-based conflicts to build national unity in this age of AI?"
- 27 Feb 2020 [India unrest: 'We can't just blame Hindus or Muslims' - YouTube](#) Al Jazeera English: "People in India's capital are slowly returning to areas hardest hit by the recent violence. Some have found their homes and businesses destroyed. Others have lost loved ones and livelihoods."

More potentially useful references:

- **Springer 13 Feb. 2021:** AI, Robotics, and Humanity: Opportunities, Risks, and Implications for Ethics and Policy: <https://link.springer.com/content/pdf/10.1007/978-3-030-54173-6.pdf?pdf=button>.
- Religion and Peace—Anatomy of a Love–Hate Relationship: <https://www.mdpi.com/2077-1444/11/5/219>
- https://journals.co.za/doi/pdf/10.10520/AJA02569507_664: Peace, conflict and religion in South Africa: by J Punt · 1999
- <https://www.bbc.com/future/article/20190418-how-and-why-did-religion-evolve>: [Brandon Ambrosino](#) 19th April 2019
- [The Times of Israel, 3 May 2023](#): Yuval Noah Harari warns AI can create religious texts, may inspire new cults. If new AI-designed religious cults can stem the bloodletting between Israel and its Arab neighbours, e.g., the Palestinians, then the world must welcome these new religious cults, and promote that peace-making role of AI.
- [ETInside Online Magazine](#): “*Top 15 Richest and most Successful Pastors In the World (We promise that #1 will shock you)*: The cumulative net worth of these 15 pastors is US\$ 1.4 trillion, a far cry from the poverty headcount of their poorer congregants, especially those in South Africa, estimated to represent up to 76% of the population. The promise shock of #1 is that televangelist Kenneth Copeland’s net worth is \$750 million. He owns much: private aircraft: their landing strips and hangers: his church and its lakeside mansion. He “earned” his immense wealth “*by ministering the Word of Faith, by teaching believers who they are in Christ Jesus, and by taking them from the milk of the Word to the meat of the Word, and from religion to reality ...*”

Final Thoughts and Conclusionsⁱ

The primary purpose of this discussion document is to review South Africa’s Human Development progress, through the key national threats of inequality, poverty, and unemployment. The review is expanded to include two of the principal tools used by humankind to control these triple threats: education, and its supporting tools, the full range of Information and Communications Technologies (ICT), including the most recent functional innovation, Artificial Intelligence (AI).

The statistical reviews and related discussions, presented as benchmark comparisons with six demographically and economically similar developing counties, are presented on pages 3 to 6 of this document. They are an update of a previous statistical presentation posted in March 2023: “[SA Benchmark 2023](#)”, full title “*SOUTH AFRICA: INEQUALITY, POVERTY AND UNEMPLOYMENT IN NUMBERS: A Short Statistical Review Benchmarking South Africa’s Triple Threats against Similar Developing Economies and SADC*”. This discussion document is available at <https://www.sakan.org.za/SakanDocs.html>.

This statistical update was necessitated by the delayed publication of, and opportunity to include the international educational assessments: PIRLS 2021 (Progress in International Reading Literacy Study 2021); PISA 2018 (Programme for International Student Assessment 2018); and TIMSS 2019 (Trends in International Mathematics and Science Study 2019).

The statistical comparisons and discussions on pages 3 to 6 of this document illustrate a dismal record of development in South Africa: the country ranks amongst the most unequal countries in the world today; high levels of poverty masked by the visible opulence of the rich; world record levels of unemployment, especially amongst the youth; educational outcomes that reflect the high levels of inequality - exceptionally good performance by the children of wealthy segments of South African society, exceptionally poor educational outcomes amongst the majority population living in poverty; exceptionally skewed access to the technological tools needed to overcome the triple threats and all related developmental challenges, i.e., all the challenges identified in the nation’s National Development Plan (NDP), and the nation’s agenda in the United Nations Sustainable Development Programme.

The rest of the discussion document attempts to answer the critical question WHY? Why is South Africa’s human development progress so heavily skewed in favour of the wealthy minority population, leaving behind

up to 76% of the population who live in poverty? Why has South Africa failed to use the well-known technological tools available to bridge the immense gaps between those who have much of everything and those who have too little opportunities to lift themselves out of the inequality, poverty, and unemployment traps they find themselves in?

History has been unkind to South Africa. The technological tools for development have progressed exceptionally well for the wealthy segments of the nation, while leaving behind the majority population segments who live in poverty. This latter scenario is visibly illustrated by the 160 plus years of national failure to provide equitable access to the technological means of development to all who live in the land.

The key technological drivers of human development are the information and knowledge delivering ICTs, now enhanced by the inclusion of the latest technological variant – Artificial Intelligence (AI). All developmental challenges, well defined by the seventeen Sustainable Development Goals (SDG), depend on timely information and knowledge delivered to both developers and victims of underdevelopment, for their control and reduction.

South Africa introduced ICTs in their electronic forms [more than 160 years ago](#). Since then, the nation has missed every opportunity to bring the information society to all those who live and work in the country. The most recent official statistics of always available information and knowledge delivering technologies in South Africa's homes, a paltry 10.4%, is a very long way from the global target of 100%, achieved by nearly all developed countries, and by a growing number of developing countries.

This discussion document concludes with a strong recommendation that South Africa should seize the opportunity presented by the AI variant of ICTs, to reverse the 160-year failure to connect the whole nation to advanced information and knowledge via AI and ICT, while at the same time protecting all South Africans from the potential dangers unleashed by the abuse of the same invaluable technologies.

Appropriate regulation of AI and all interdependent technologies and devices, is mandatory, as is the connectivity required to ensure equitable access to the same technology for all who live in the country.

Effective regulation of AI and interdependent technologies alone will not be enough; the target for development must shift from the traditional focus on the technology itself, e.g., "digital transformation," to the specific challenges (e.g., inequality and poverty) in a fully integrated holistic process as discussed in this document, e.g., "people transformation." This will be extremely difficult, demanding full support by all sectors of the nation, including the victims of the developmental challenges themselves. Getting national consensus and support from all stakeholders in the country must be one of the key objectives of the proposed AI/ICT regulatory development.

There are many excellent examples from all corners of the inhabited world of where such consensus has been built, some of these successes are discussed in the document [ICT4SDG8](#). What South Africa needs most urgently is a focus on the triple threats and all related SDG challenges by all South Africans, across all economic, ethnic, societal, racial, political divisions. Getting such a cross-population consensus and focus is of course extremely difficult, it has eluded most human societies since the species began focussing on self-interest in the post-Neolithic Revolutionary era starting about 12,000 years ago. If the national conversation recommended begins with identifying and acknowledging inequality and poverty as being a common threat to all segments of society, especially the nation's decision-makers who already have much, and therefore much to lose, it may be possible to build national consensus and focus on the base of the pyramid communities, leaving the arguments over the shares of privilege to the folks who live at the apex of the nation's development pyramids, the estimated 24% of the nation's haves. Developmental orientation of AI regulation can and will help to create such an environment.

Annex 1: Metaphors, Disinformation, Misinformation, BARD and ChatGPT opinions

As the year 2024 began, a “Global Cloud” of Chatbots about AI was unleashed via the world’s “cloud services”, including those of the World Economic Forum of 2024 (WEF24), held in Davos, Switzerland, 15–19 January 2024.

The centrality of AI in shaping today’s world was captured in the [WEF24 Global Risks Report](#), that “*We are responsible for the possible sixth mass extinction, but we are also in a unique position to respond and avoid its worst consequences.*” Statement by [UN Secretary-General António Guterres](#) and other delegates at the conference. The highest ranked short-term risk identified in this report was the potential to change the political-social-economic order of the world through AI-generated and disseminated malicious or malevolent misinformation and disinformation, adding global conflict to the mix of existential threats to our seemingly unstoppable race to the sixth mass extinction.

Yet another example of the “*worst consequences*” of malicious use of AI is its impact on global inequality, poverty and hunger: the Oxfam Report tabled at this conference: “[Inequality Inc. How corporate power divides our world and the need for a new era of public action](#)”. The five richest men in the world mentioned in this report generate vast incomes for themselves from AI, while the 5-billion global citizens, also mentioned in the report, descend further into abject poverty by being victims of AI abuse, or by missing out on the opportunities presented by AI, thus falling further behind their wealthier fellow global citizens.

The use of often meaningless jargon, marketing hyperbole, and potentially misleading metaphors to discuss this vital ICT and AI human development tool are strong and direct contributory factors to the generation of misinformation and disinformation, irrespective of the good intentions behind their introduction. This is especially relevant, and potentially damaging, in a nation severely challenged by inequality in knowledge acquisition, like South Africa as illustrated in the performance indicator charts presented in the first six pages of this document.

A society like South Africa’s, ranked amongst the lowest performers in the world, in the critical reading and STEM literacy disciplines, will face a massive challenge in providing the fundamental literacy levels demanded by this evolving high-tech world. This concern led to the questioning of the popular use of metaphors in the language of AI. Such questioning seems to be wholly excluded from the machine learning language models used by the creators of AI, hence a decision to ask two leading generative AI chatbots, Google’s BARD and OpenAI’s ChatGPT. The self-explanatory responses from each chatbot to the relevant query, intended to verify and corroborate a previous discussion on this critical issue, “[SA Clouds, Codes, Data, and Digits](#)”: were:

Please discuss the difference between metaphors like cloud computing and digital worlds commonly used in ICT, and therefore in AI, and the disinformation and misinformation increasingly being recognized as the principal threats of AI, in the context of low STEM literacy in much of the world today, and the subsequent denialism of science and spread of conspiracy theories like chips in life-saving vaccines.

Date of query: 23 January 2024

BARD

Navigating the Maze of Information: Metaphors, Misinformation, and the Future of AI

Your question delves into a critical crossroads where technology, information, and human understanding collide. Let's dissect the threads:

Metaphors vs. Disinformation:

- **Metaphors** like "cloud computing" and "digital worlds" provide **relatable analogies** to grasp complex concepts. They simplify abstract technical realities for better **public understanding and adoption**. Think of them as bridges between the technical and the familiar.

- **Disinformation and misinformation**, however, are deliberate tactics to **mislead and manipulate**. They spread **false or misleading information** with malicious intent, often disguised as truth. Unlike metaphors, these aim to distort reality and sow confusion for political or personal gain.

Low STEM Literacy and Science Denialism:

- **Low STEM literacy** creates fertile ground for misinformation to flourish. Without basic understanding of science and technology, people are more susceptible to believing **persuasive but false claims**.
- **Science denialism** compounds the problem. It involves rejecting well-established scientific evidence based on personal biases, ideological agendas, or fear of change. This can stem from mistrust towards authority figures, lack of critical thinking skills, or exposure to misinformation campaigns.

The Interplay:

Metaphors, while helpful for engagement, can be **misused in contexts of low STEM literacy and science denialism**. For example, portraying AI as a "skynet" or a "magic tool" fuels anxieties and distrust, potentially hindering responsible development and use.

Navigating the Maze:

Combating this intricate challenge requires a multi-pronged approach:

1. **Enhancing STEM education:** Equipping people with **scientific and technological literacy** empowers them to **analyze information critically and discern facts from misinformation**.
2. **Promoting media literacy:** Teaching people to **evaluate information sources, identify bias, and verify claims** is crucial for navigating the complex information landscape.
3. **Fostering open communication:** Scientists and AI experts need to **engage transparently with the public**, addressing concerns and dispelling myths in a clear and accessible way.
4. **Countering disinformation:** Proactive efforts are needed to **identify and dismantle misinformation campaigns**, hold bad actors accountable, and support fact-checking initiatives.

Addressing Specific Examples:

- **Covid vaccine conspiracies:** The spread of such misinformation highlights the critical need for reliable information sources and public education campaigns based on **trustworthy evidence**. Emphasizing transparency in vaccine development and addressing concerns in open forums can help combat harmful myths.

The Road Ahead:

Remember, technology evolves rapidly, so our understanding must too. We need to continuously adapt education systems, communication strategies, and fact-checking methods to stay ahead of the disinformation curve. Metaphors should remain tools for understanding, not instruments of manipulation.

By acknowledging the differences between metaphors and misinformation, and actively addressing the vulnerabilities of low STEM literacy and science denialism, we can pave the way for a future where AI advances responsibly and benefits all of humanity.

ChatGPT

The use of metaphors like "cloud computing" and "digital worlds" in Information and Communication Technology (ICT) and AI serves as a way to simplify complex concepts for a broader audience. These metaphors make it easier for people with varying levels of technical understanding to conceptualize abstract ideas related to technology. However, the challenge arises when there is a low level of STEM (Science, Technology, Engineering, and Mathematics) literacy in the general population.

Metaphors in ICT and AI:

- **Cloud Computing:** This metaphor simplifies the idea of storing and accessing data and computing resources over the internet. Instead of dealing with physical servers and infrastructure, users can imagine their data floating in the "cloud," making it more accessible and convenient.
- **Digital Worlds:** Refers to the interconnected virtual spaces and environments created by computers and networks. It helps convey the idea that much of our digital activities, such as socializing, working, or storing information, happen in a space that is not physically tangible.

Threats of AI and STEM Literacy:

- **Disinformation and Misinformation:** Low STEM literacy can contribute to the spread and acceptance of disinformation and misinformation. People might not have the necessary knowledge to critically evaluate information related to technology, leading to the belief in false claims and conspiracy theories.
- **Denialism of Science:** Lack of understanding of scientific principles may contribute to a broader denialism of science, where people dismiss well-established scientific facts and consensus. This denialism can hinder efforts to address pressing issues, including those related to AI and emerging technologies.

Connection to Conspiracy Theories:

- **Spread of Conspiracy Theories:** Low STEM literacy, combined with a lack of critical thinking skills, can contribute to the spread of conspiracy theories. For example, the notion of microchips embedded in life-saving vaccines is a baseless conspiracy theory that capitalizes on fear and misinformation.

Addressing the Challenges:

- **Education and Awareness:** Promoting STEM education and improving digital literacy can help empower individuals to critically assess information related to technology. This includes understanding the basics of how technologies like AI work and recognizing reliable sources of information.
- **Ethical AI Development:** Emphasizing ethical AI development and responsible communication about AI technologies can help build trust and mitigate the potential negative consequences associated with misinformation and conspiracy theories.

In summary, the use of metaphors in ICT and AI is a communication strategy to make complex concepts more accessible. However, the challenge lies in addressing low STEM literacy, which can contribute to the spread of disinformation and misinformation, denialism of science, and the propagation of unfounded conspiracy theories. Educational efforts, ethical considerations, and responsible communication are crucial in navigating these challenges and fostering a more informed public.

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