# South Africa - Inequality, Poverty and Unemployment

Leveraging Technology to Mitigate the Triple Challenges<sup>1</sup>

On 14<sup>th</sup> March 2023, a 17-page document titled "South Africa: Inequality, Poverty and Unemployment in Numbers," was posted online at <a href="https://www.sakan.org.za/Docs/SA Inequality\_Stats.pdf">https://www.sakan.org.za/Docs/SA Inequality\_Stats.pdf</a>, with the objective of promoting a national conversation about a people-centred development approach based on verified statistical data, for South Africa, and by extension, for the county's neighbours in SADC and the rest of Africa. This update of that discussion document has been posted online at <a href="https://www.sakan.org.za/Docs/SASDG24.pdf">https://www.sakan.org.za/Docs/SASDG24.pdf</a>. The update exposed new dimensions of South Africa's NDP and SDG challenges, all of which suggested extreme complexity and a need for deeper analyses of the challenges, objectives, and targets, specifically their interconnected and interdependent causal relationships. This extreme complexity extends deep into the annals of human history and its relationship with its habitat – ancient and contemporary human errors of judgement which continue to shape the growth and survival trajectories of humankind, as well as the changes humans inflict on the environment which directly impacts that survivability.

The complexities of the challenges identified in this update reach far beyond the scope of this document, and beyond the capabilities and willingness of contemporary socio-economic-political worldviews to implement even known and tried solutions. The best that can be done within the limitations of this discussion document is to begin to build first level understanding of the challenges, dubbed the Sustainable Development Challenges (SDC), defined in Annex 3. From that understanding, South Africans can begin to predict the future with some certainty and find routes to avert disaster (reference Thomas Halliday, page 9 of this document).

The supporting evidence about the extent and scope of the SDC complexity suggest that crafting and implementing practical solutions demands extremely long timeframes to overcome the barriers imposed by humanity itself. The numerous societal divisions amongst and between humans makes it nearly impossible for most countries to craft the vital interconnected networks for collaboration, communications, coordination, and cooperation, the four Cs of development, which are essential for sharing critical information and knowledge for development. The most logical starting point must therefore be a focus on the core challenges themselves, which include the triple threats, the raison d'être of this document. The focus must also be on children and youth, who may need the full 180 to 270 years suggested by UN's Olivier De Schutter on page 30 of this document, to understand and act on the knowledge and wisdom they have acquired. Modern human development history has shown a skewed focus on the tools used to defeat the triple threats, and the economic benefits derived from their use. South Africa should remember, from its own recent history, that "*Poverty is the parent of revolution and crime*" – <u>Aristotle nearly 2,030 years ago</u>.

This document begins with a review of the key statistical indicators of inequality, poverty, and unemployment in contemporary South Africa, and the principal tools preferred for their mitigation - education and the technologies of information and knowledge dissemination and use. The discussion then proceeds to discuss the causal relationships between the humans creating and impacted by these sustainable development challenges, and the tools and processes humans use to mitigate them.

The discussion document concludes with: (i) Annex 1: The use and abuse of metaphors in the techno industries; (ii) Annex 2: The potentially deadly conflict between humans and nature; (iii) Annex 3: The definition and complexity of the Sustainable Development Challenges. Annex 3 includes: Key reports verifying the complexity and interconnectedness; discussion of models to deal with such complexity; Division of Labour and Expert Silos as one of these complexities; and Knowledge Sharing and Academic Elitism which determines the effectiveness of all tools.

The three AI platforms ChatGPT, DeepSeek (chosen for its open-source feature), and Gemini, were used liberally to fact-check critical content; to generate global consensus on contentious issues; and to minimise the potential for bias. The document provides extensive references in hyperlinks.

Annex 3 is particularly pertinent, recommended as a starting point to read and understand the whole document, especially the complexity of the Sustainable Development Challenges facing South Africa.

<sup>&</sup>lt;sup>1</sup> Draft for Discussion and Comment: written by <u>Walter brown</u>: Final online posting: Johannesburg March 2025

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# Statistical Updates and Discussions

This section presents tables from the original discussion document "<u>SOUTH AFRICA: INEQUALITY, POVERTY</u> <u>AND UNEMPLOYMENT IN NUMBERS</u>", updated to the latest available statistics. The original analyses should be accessed should there be a need for closer examination of changes during the short update period, or reminders of the definitions or underlying assumptions like the basis used for selection of the countries used in the benchmark (Upper-middle-income economies within the mid-population range of 30 million to 100 million).

The tables presented below illustrate known and verified changes since publication of the original document:

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	2004	F 0/	.1.00/	00/	200/	1.60/	. 420/									
international alert line of 44	-36%	-36%	-36%	-36%	-36%	-36%	-36%	-36%	-36%	-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									

# TABLE 1: INEQUALITY UPDATE TO 2021

Data Source: <u>https://data.worldbank.org/indicator/SI.POV.GINI Updated 10 May 2023</u>. Estimates up to 2021 are provided and used. Data comparing years 2000 and 2019 providing useful growth insights are reported in <u>https://api.worldbank.org/v2/en/indicator/SI.POV.GINI?downloadformat=excel</u>. 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 <a href="https://www.sakan.org.za/Docs/South%20Africa%20-%20Inequality">https://www.sakan.org.za/Docs/South%20Africa%20-</a>%20Inequality,%20Poverty%20and%20Unemployment%20in%20Numbers.pdf

# Addendum February 2025: South Africa's Inequalities from alternative sources and measures:

The United Nations University World Institute for Development Economics Research (UNU-WIDER):

https://www.wider.unu.edu/sites/default/files/Data/WIID\_28NOV2023.xlsx

Inequality	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa
GINI Coefficient (year)	28 (2012)	42 (2021)	52 (2021)	40 (2021)	35 (2021)	37 (2020)	62 (2017)
Palma Ratio	1:1	2:1	3.5:1	2:1	1:1	1.6:1	7:1

South Africa: STATS SA Statistical Release P0100: Online publication 29 January 2025: Figure 3.10 on Page 46

https://www.statssa.gov.za/publications/P0100/P01002022.pdf									
Year 2006 2009 2011 2015 2023									
Palma Ratio: Top 10% / Bottom 40%	13:1	13:1	12:1	11:1	7:1				

The Palma Ratio: The Palma Ratio compares the income/expenditure/wealth share of the top 10% of the population (the richest) to the equivalent share of the bottom 40% of the population (the poorest). The Middle-income population shares the remaining 50% of national income or wealth. A ratio of 1:1 is considered ideal; a higher ratio indicates income or wealth inequality.

# 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 (<u>https://www.statssa.gov.za/?p=15858</u>)

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 <sup>1</sup>	36.6%	9.7%	33.9%	30.2%	15.6%	22.2%	61.6%
Lower Mid Income US\$ 3.65 PPP <sup>2</sup>	4%	2.6%	12.2%	10.6%	0.9%	5.3%	40%
Extreme Poverty US\$ 2.15 PPP <sup>3</sup>	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. South Africa is an Upper-Middle-Income economy.

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) <u>https://data.worldbank.org/indicator/SI.POV.DDAY</u>
- 4. South African Poverty Lines: <u>https://www.statssa.gov.za/publications/P03101/P031012021.pdf</u> all three South African Poverty Lines (UBPL, LBPL, FPL) align very closely with the relevant World Bank Poverty Lines

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

# 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

**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: <u>https://www.statssa.gov.za/publications/P0211/Presentation%20QLFS%20Q1%202023.pdf</u>
- 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 (<u>https://www.statssa.gov.za/?p=15407</u>).

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

Educational Achievement: % Above (+) or Below (-) International Average	Algeria	Argentina	Colombia	Peru	Thailand	Vietnam	S. Africa	
Reading 2015/2016 <sup>1</sup>	-29%	-3%	-14%	-19%	-17%	-1%	-36%	
Math 2015/2016 <sup>1</sup>	-26%	-7%	-21%	-21%	-15%	+1%	-29%	
Science 2015/2016 <sup>1</sup>	-23%	-4%	-16%	-20%	-15%	+6%	-28%	
Update from PIRLS 2021, PISA 2018, and	TIMSS Math	n and Science	2019					
G4 Math: TIMSS 2019 or PISA 2018 <sup>3</sup>	N/A	-24%	-22%	-20%	-16%	-1%	-25%	
G4 Science: TIMSS 2019 or PISA 2018 <sup>3</sup>	N/A	-19.2%	-17.4%	-19.2%	-14.8%	+9%	-35%	
G4 Reading: PIRLS 2021 or PISA 2018 <sup>3</sup>	N/A	-20%	-18%	-20%	-21%	+1%	<mark>-42.4%</mark>	
Graduation Rates <sup>5</sup> : 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%	

#### Updated to include PIRLS 2021 and PISA 2018 Results:

#### **Sources and Notes**

- 1. PIRLS and TIMSS 2016: <u>https://timssandpirls.bc.edu/pirls2016/international-results/wp-</u> content/uploads/structure/PIRLS/1.-student-achievement/1 1 pirls-achievement-results.xlsx
- 2. PIRLS 2021 data published 16 May 2023: <u>https://pirls2021.org/results/download/</u>
- TIMSS 2019 International Results in Mathematics and Science: <u>https://timss2019.org/reports/download-center/</u>, For close equivalents, PISA 2018 in Math, Science and Reading: <u>https://factsmaps.com/pisa-2018-worldwide-ranking-average-score-of-mathematics-science-reading/</u>
- 4. Vietnam Data PISA 2018: <u>https://en.vietnamplus.vn/vietnam-gets-high-scores-but-not-named-in-pisa-2018-ranking/164931.vnp</u>
- Graduation Rates: <u>https://genderdata.worldbank.org/indicators/se-ter-cmpl-zs?gender=total</u> AND in the absence of data (e.g., Peru), results published for the STEM subjects have been used: <u>http://api.worldbank.org/v2/en/indicator/UIS.FOSGP.5T8.F500600700?downloadformat=excel&source=12</u>
- 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 Comments on PIRLS 2021 Results

Statement by MEC David Maynier on Progress in International Reading and Literacy Study 2021 results: 16 May 2023: <u>https://www.gov.za/speeches/mec-david-maynier-progress-international-reading-and-literacy-study-2021-results-16-may</u> 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): <u>https://link.springer.com/book/10.1007/978-3-030-18811-5</u>

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 <sup>1</sup>		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 <sup>3</sup>			
10-year CAGR (% per annum)	13%	8%	10%	11%	13%	15%	4%			
Estimated Internet Households <sup>4</sup>	31%	76%	55%	33%	59%	62%	8% <sup>2</sup>			
Update Jan 2025 <sup>5</sup>	56%	79%	53%	35%	48%	79%	12%			

#### Source and Notes

- 1. <u>https://data.worldbank.org/indicator/IT.NET.BBND.P2</u> Derived from ITU Database
- 2. S. African connected household data from: <u>https://www.nab.org.za/uploads/files/State-of-ICT-Sector-Report-March-2022.pdf</u> (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 <a href="https://www.icasa.org.za/legislation-and-regulations/state-of-ict-sector-report-2023-report">https://www.icasa.org.za/legislation-and-regulations/state-of-ict-sector-report-2023-report</a>.
- 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.
- 4. In the absence of specific household survey data, an approximation of broadband household penetration can be derived from the published data of Fixed Broadband subscriptions per 100; population; number of households; household family size. The validity of this approach has been verified, with caveats, by ChatGPT and Gemini. Using this approach with all caveats, ChatGPT estimated the South African Household Broadband Penetration at 7.3% in 2020, using ITU and STATS SA published statistics.
- 5. Derived from World Bank Statistical Update of 16 December 2024: <u>https://databank.worldbank.org/metadataglossary/world-development-indicators/series/IT.NET.BBND.P2</u>

# 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: <u>DBE-NEIMS-REPORT-2020.docx.pdf Equal Education</u>)
  - 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 the available internet connection in these schools is/was not available for teaching or learning;
  - 11,575 (50%) schools had no internet connections of any kind.

#### Comparison Notes, Vietnam, and China:

- Significantly poorer Vietnam connected 96% of all schools using high speed fibre optical networks by 2013 (Source: <u>Viettel Aug 17, 2021</u>).
- 2. <u>China reported on 8 April 2021</u> 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 <u>African Talking Drums</u>, date of invention unknown, probably stretching back more than 100,000 years, through Aeneas Tacticus' invention of the "<u>Hydraulic Telegraph</u>" about 100,000 years later in circa 350 BCE, to today's Artificial Intelligence (AI), have all served humanity very well. The exceptions are 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 or regional 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 <u>Time Machine – the origins of innovation</u> <u>100,000 years ago</u>"), 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 technological advances as they arise, e.g., the everincreasing "G's," or "new generations" of mobile ICTs, from 1G to 5G, today 6G, with 7G around the corner. The so-called "Industrial Revolutions", 1IR to 4IR, now progressing to 5IR (for academics, "Industry 5.0"), human-machine interaction, and the 6<sup>Th</sup> Industrial Revolution – "by the year 2050, technology will have progressed to the point of complete autonomy" (IET on Industry 6.0 - 07 October 2021), finally succeeding in rendering humans irrelevant?

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 the knowledge that technology enables. 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%; with Argentina leading 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 <u>Generative AI</u> (GAI), a potentially powerful knowledge access and learning platform, which can result in disastrous outcomes if ignored or abused. GAI will soon be followed by <u>Artificial general intelligence (AGI)</u> - AI systems which surpass human intelligence, able to reason like humans, able to improve their own software instructions and therefore their functionalities. AGI will be followed soon after by "<u>Sentient</u>" AI systems which can think, feel, and develop human-like emotions and self-awareness, but at much greater capacities and speeds than humans and older AIs. <u>A Google AI Engineer was fired recently</u> for suggesting that Google's AI was becoming sentient!

And South Africa wants to introduce a compulsory AI curriculum in all schools? Of course, AI is urgently needed in all the nation's school systems, but the nation cannot rely on schools only. With just 20% of the nation's schools connected to a working internet service for education and learning in 2021, and 8% of homes similarly connected for online home and continuous lifelong learning in 2020, much more than school curricula are required. The high cost of ubiquitous national mobile broadband services needed to access AI services presents yet another barrier which demands corrective action. Given these challenges, the best South Africa can do is to innovate around the models used by progressive countries like Finland: eschew the ideals of AI curriculums in South Africa's marginalised schools, and focus on integrating progressive elements of AI in all subjects, and setting up complimentary public access facilities. South Africa needs a new vision and commitment to action to improve ICT/AI connectivity and user literacy, both prioritizing the poorest homes first, in their schools and in complementary public access facilities which can be extended to early childhood education (ECD) of the technological kind, and the <u>17.1 million-strong army of NEETS</u> (Not in Education, Employment or Training).

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 "<u>Al4Good</u>" whilst avoiding the numerous doomsday scenarios that dominate much of the current Al 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 Gauteng (e.g., Silverton), Eastern Cape (e.g., Gqeberha), KZN, and other manufacturing centres in 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 explaining his research findings in e.g., "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, so that we can collectively chart a safe path into a "human-centred" future. Al can be a powerful tool for that purpose.

An exceptionally gifted young palaeobiologist, Sottish-born Thomas Halliday, writes in "<u>Otherlands – A World</u> <u>in the Making</u>", 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.

The statement made by historian Professor Yuval Noah Harari in the summary of his discussion that follows, that "<u>A.I. is 'seizing the master key of civilization, and we cannot afford to lose</u>", is consistent with Dr Halliday's historical scientific research which reminds us that nature may have recognised, repeatedly, that "the master key of civilization" has been hacked many times over, 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 Al world, the technological leaders who design the Al systems and operate them for good or for bad; the philosophers who seek to understand Al's impacts on humanity and the environment it survives on; whole multidisciplinary communities 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 Al at any cost.

#### AI Views of Expert Thinkers:

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, research reports, 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 interdependencies, 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 <u>AI Chatbots</u>, either as accurate representations of the opinions themselves, or as <u>AI "hallucinatory"</u> 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," influencing whole electorates to elect anti-democratic leaders to govern them: <u>https://www.youtube.com/watch?v=yIu8QAiw5Yw</u>.

# 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., <u>the artificial neural networks</u> 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 "<u>remained in a cognitive rut</u>" in their African evolutionary homelands, 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 <u>Smithsonian June 2012</u>). 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*" (<u>Science, 9 April 2021</u>). 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 was 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 Sterkfonteinborn 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 <i>"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 in the minds of our Homo erectus ancestors? What we do know is that humans have been thinking along those lines for a very long time. We know about the visions of <u>Dædalus</u> in Greek mythology circa 3,500 years ago. We also know about the tragic British computer genius <u>Alan Turin (1912 to 1954</u>), who was murdered by his own government because of his sexual preferences. And of course, the more recent work of <u>Stanford Professor John McCarthy in 1955</u> who coined the term "artificial intelligence". Al 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 Al. The need for layperson levels of understanding of Al 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 Al, 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 childfriendly 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:

"OpenAl'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 are presented to trigger further action-focussed thinking by academics, politicians, techno-economic practitioners, and commercially-focussed marketeers, all of whom must direct their research and thoughts 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 pubic 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 <u>Code Conference in May 2018</u>"

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 <u>sixth mass extinction</u>.

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 Geffrey 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 <u>Scott Pelley</u>, seasoned journalist and author: *"The AI revolution: Google's developers on the future of artificial intelligence"*: <u>https://www.youtube.com/watch?v=880TBXMuzmk</u>
- 9 May 2023: Geoffrey Hinton, former Google VP, also known as "The Godfather of Al": Interviewer Hari Sreenivasan, American Broadcast Journalist: "Godfather of Al' Geoffrey Hinton Warns of the 'Existential Threat' of Al": <u>https://www.youtube.com/watch?v=Y6Sgp7y178k</u>

3. **1 June 2023**: **Mohammad "Mo" Gawdat**, former chief business officer for Google X: Interviewer <u>Steven</u> <u>Cliff Bartlett</u>, Botswana-born British-Nigerian entrepreneur and podcaster: *"Al is Worse than Climate Change"*: <u>https://www.youtube.com/watch?v=bk-nQ7HF6k4</u>

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

- All is changing society similarly to how fire, agriculture, electricity changed society. All 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 translates 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 Al":

- 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 Al'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."
- Al 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 "<u>1984</u>". 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 <u>CNBC 6</u> 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 <a href="https://www.bbc.com/news/technology-30290540">https://www.bbc.com/news/technology-30290540</a>, 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," <u>The Guardian, 24 May 2017</u>.

Professor Yuval Noah Harari is a popular, widely read historian, philosopher, and author of the best-selling books "<u>Sapiens: A Brief History of Humankind</u>", "<u>Homo Deus: A Brief History of Tomorrow</u>", and "<u>21 Lessons for the 21st Century</u>" 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?": <u>#ai #aiforgood #ituaisummit</u>: "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 Al include:

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

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

3 Jun 2023: <u>https://www.youtube.com/watch?v=Bpy6X7kF7-s</u>: "The Oppenheimer Moment of AI" 20 Jun 2023: <u>https://www.youtube.com/watch?v=tvR0qUIPN1o</u>: "Oppressive AI, WWIII & Genetic Engineering"

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

17 Jul 2023: <u>https://www.youtube.com/watch?v=Mde2q7GFCrw</u>: "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, <u>https://www.youtube.com/watch?v=ukhmq5on-IA</u>; (b): "*AI and Deep Space Exploration, 27 Apr 2023*" <u>https://www.youtube.com/watch?v=iJQdny3-T2Q</u>: and (c): 6 May 2023, Neil DeGrasse Tyson warned:

"AI could be 'nail in the coffin' for the internet," <u>https://www.youtube.com/watch?v=4cWh1tZta2s</u>.

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 <u>Business Insider, 3 Jul 2018</u>; and in <u>2019, Vinton Cerf</u> 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." <u>Carnegie Endowment for International Peace: 6 October</u> 2022

<u>MIT Technology Review of 13 September 2019</u> 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:

<u>"generative AI", see IBM definition</u>, 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 (<u>Bradshaw Foundation, 13 September 2018</u>); through the artistic creations of wandering descendants of those ancient South African artists in South East Asia (<u>Borneo, Smithsonian November 2018</u>); <u>France's Lascaux cave</u> discovered in 1940; the amazing rock art of <u>Brazil's Serra da Capivara described elegantly by the Bradshaw Foundation</u>; through to the re-discovery of original African works of rock art that survived the vagaries of the African climate (<u>AI helping to date ancient paintings from Southern Africa, Smithsonian 2017</u>).

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 <u>Barbara Ehrenreich</u> in <u>"The Humanoid Stain" published by The Baffler in November 2019</u>, and reprinted in <u>The Guardian on 12</u> <u>December 2019</u>. 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.'" – <u>Smithsonian Magazine 25</u> 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 <u>Beethoven</u> and <u>Coltrane</u>; <u>Shakespear</u>, <u>Wole Soyinka</u>, and <u>Ngũgĩ wa Thiong'o</u>; <u>Picasso</u>, <u>William Kentridge</u> and <u>Jackson Hlungwani</u>, 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) "<u>sentient AI</u>": 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, <u>Blake Lemoine</u>, for suggesting that its LaMDA chatbot, a precursor of Google's popular BARD chatbot, was sentient. The full story is told in <u>The Guardian of June 2022</u>: "*1 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.

# Al for Good and Al 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 <u>The Conversation July 2023</u>):

Effective use of Al'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 <u>Otherlands – A World in the Making</u> discussed on page 9). 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 <a href="https://eandt.theiet.org/content/articles/2023/06/rethinking-human-evolution-through-technology/">https://eandt.theiet.org/content/articles/2023/06/rethinking-human-evolution-through-technology/</a>.

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 <u>Higgs</u> <u>Bosson, https://www.nature.com/articles/528018a</u>, and how it contributed to the formation of our universe and our world. The AI assisted <u>James Webb Telescope</u> 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 "<u>Big Bang singularity</u>", the nature of <u>Black Holes</u>, 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 <u>Square Kilometre Array (SKA)</u> 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, like those unleashed by misguided but powerful self-aggrandizing politicians scattered around the world. Many researchers believe that it is 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 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:

Al 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 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 – *"Stanford historian uncovers a grim correlation between violence and inequality over the millennia,"* Stanford 2017) - are their modern messengers, warning of the consequences of humanity getting it wrong, again.

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., <u>AI is coming to schools, and if we're not careful, so will its biases: Brookings 2019</u>. This informative report also covers an 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, the "Black Schools", 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 in the introduction of this document, suggest the urgency for such inclusion.

Al in home loan approvals. Can Al 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 of humankind based on identity, status, or wealth; 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. Al can exacerbate the practice, or ameliorate it, the choice is very human. Starting references include <a href="https://www.technologyreview.com/2020/10/20/1009452/ai-has-exacerbated-racial-bias-in-housing-could-it-help-eliminate-it-instead/">https://www.technologyreview.com/2020/10/20/1009452/ai-has-exacerbated-racial-bias-in-housing-could-it-help-eliminate-it-instead/</a>, and Al 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.

Al in military weapon targeting systems. The weaponization of Al is a reality. Al 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). Al, 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 Technology (IET) "Will robots steal jobs?" Engineering and in our 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 <u>https://www.axios.com/2023/05/22/medical-ai-weaponization-artificial-intelligence-healthcare</u>.

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 "<u>Nature 8 August 2023</u>": "*Rules to keep AI in check: nations carve different paths for tech regulation*" (Note: article is 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?

<u>The NIH March 2023 article</u> "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 6), 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 <u>Bloomberg August 08, 2023</u>), 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 <u>StatsSA GHS, 2021</u>.

Stability AI and its principal product <u>Stable Diffusion</u>, 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 a potential 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 <u>failure rate of 83% in mid-2023</u>, 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 <u>70% and 80%</u>. Other statistical analyses, like those of <u>Statista 2023</u>, 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 <u>"'F'-Night"</u> 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 <u>2017 Sweden established a very popular</u> <u>"Museum of Failure"</u>, so popular that the home of Silicon Valey, 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. <u>AI4ALL "AI Will Change the World.</u> <u>Who Will Change AI?"</u> 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 can be positioned as a potent tool for national sustainable growth, instead of a tool that expands and sustains inequality, or a weapon of mass destruction of South Africa 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 interdependent and interlinked sustainable development challenges which must be met to achieve South Africa's development goals. 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 or mitigating each of the triple threats has been extremely disappointing. Similarly disappointing has been the progress in developing, accessing, and using the principal tools available for such amelioration or mitigation. Education supported by ICT are key amongst these tools, the ICTs support the development and dissemination of the information and knowledge needed to deal with all the nation's 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. Can a "human-focussed" AI regulatory regime in South Africa help ameliorate these disappointing trends?

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 <u>GINI</u> 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.

Numerous philosophers, historians, and development thinkers, ranging from Aristoteles and Plato in ancient Greece, to contemporary academics and thinkers like <u>Frances Stewart</u> in "<u>Root causes of violent</u> <u>conflict in developing countries</u>" and Walter Scheidel's classic "<u>The Great Leveler: Violence and the History</u> <u>of Inequality from the Stone Age to the Twenty-First Century</u>" have traced a direct link between inequality, civil society decay, revolution, and wars.

The philosophies of Plato (429?–347 B.C.E.), and his student Aristotle (384–322 B.C.E.) rank amongst the most quoted philosophies on governance, equality and inequality, and poverty, but even they have been subjected to significant deliberate or unintended misinterpretation and misrepresentation in this post-Neolithic epoch, some 5-million years after our species and its immediate pre-human predecessors emerged. One of the most disingenuous interpretations of Aristoteles' philosophy on inequality is the often-repeated quotation: "The worst form of inequality is to try to make unequal things equal"; it is an outright falsehood created by neoliberal free-marketeers to promote their self-interests. To expose this falsehood, Google's GEMINI AI was prompted to research the global database of knowledge for a global consensus:

**Summary of the AI prompt:** (a) Report on the validity of the quotation; (b) relate AI's response to a similar misinterpretation of Adam Smith's opinion in his actual quotation "*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*" (read opinion by Noam Chomsky); (c) provide a global consensus on the potential of AI to correct these falsehoods.

# Summary of Gemini's responses:

- There's strong evidence the quote "*The worst form of inequality is to try to make unequal things equal*" isn't from Aristotle. Scholars haven't found it in his works. This misattribution highlights a deeper issue: using historical figures to justify modern ideologies.
- Aristoteles, Plato, and Smith all advocate for a society with balanced wealth distribution, fearing both poverty and extreme wealth. Adam Smith, often seen as a champion of the free market, also recognized the dangers of unchecked inequality, e.g., his famous quote about "the vile maxim" criticizes selfishness at the expense of others.
- AI has the potential to be a powerful tool in understanding and potentially mitigating inequality, by interrogating the world's database of knowledge on the subject, and reporting the most statistically probable global consensus opinions. AI can be a vital tool in education, in policy formulation, and in statistical evaluation systems for corrective programme monitoring and control.
- Al also poses immense risks: it can be "trained" on biased, fake, and maliciously-intended data to
  promote great harm to whole communities, nations, and the whole world, to worsen inequality,

unleashing all four apocalyptical horsemen of inequality described in Walter Scheidel's "The Great Leveler" "*The only conquerors of inequality are the Four Horsemen of the Apocalypse*.

- Gemini Conclusion: "The misrepresentation of Aristotle is a reminder to be sceptical of simplistic takes on complex issues like inequality. Al can be a valuable tool in understanding and addressing social issues, but its effectiveness hinges on responsible development and deployment. Ultimately, true progress requires a combination of technology, critical thinking, and a commitment to fairness and truth."
- **Poverty:** Poverty levels in South Africa are exceptionally high for an upper-middle-income economy. According to the latest World Bank database, in 2014, 61.6% of the nation's population lived under the international poverty line for nations in this economic grouping; 40% of the population lived under the poverty line set for countries in the lower-middle-income group of countries; 20.5% of the population lived in extreme poverty, at or below the lowest international poverty line of US\$ 2.15 PPP per day, approximately R 15.4 per day or R 462 per month. This international poverty line is roughly equivalent to the nation's Food Poverty Line (FPL) of R 633 per person per month in year 2022.

The South African Poverty Lines for 2022 published by Statistics South Africa (STATS SA) at <u>https://www.statssa.gov.za/publications/P03101/P031012022.pdf</u> 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 4 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 measure or to have any practical significance.

• **Unemployment:** South Africa ranked 235<sup>th</sup> 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: According to the most widely used international tools for educational performance assessments, namely <u>PIRLS</u> - *Progress in International Reading Literacy Study;* <u>PISA</u> - *Programme for International Student Assessment* which is preferred by OECD nations; <u>TIMSS</u> - *Trends in International Mathematics and Science Study,* South Africa's ranked amongst the lowest amongst all countries participating in the tests. South Africa's learners scored 42.4% below the world average in the critical PIRLS 2021 reading literacy assessment; 35% below the world average for science (TIMSS 2019); and 25% below world average in the critical mathematics discipline (TIMSS 2019). The statistics relevant to South Africa's educational performance are presented in Table 4 on page 6 of this document, with discussions throughout the rest of the document.

What are the most likely causes for South Africa's dismal educational achievements? 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 reputable international development partners like <u>UNICEF (Policy Brief 07 July 2020)</u>, show that the levels of South African children living in poverty is stark: 62.1% of the nation's children were multidimensionally poor (<u>https://www.statssa.gov.za/?p=13438</u>). The remaining 38% of the nation's children are spread between the lower-middle income economic classes who get better but still mediocre education, to the children from wealthy families who generally attend the most expensive educational institutions, and 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 countries and communities. Solutions can be found, but they need intensive action-oriented research and full apolitical support across all societal hierarches.

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 <u>BBC on 10 February 2023</u>; "*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, access 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 7 of this document, and the discussions associated with the data, are self-explanatory illustrations of how South Africa has used, or failed to use the modern technology-based tools for all its people. The comparisons against the nations' most similar developing country peers are most informative, and must drive national recognition that the complex challenges can be resolved, given the experience of the nation's peers.

Using South Africa's politically popular clichés "empowering" and "transformative," South Africa has let its people and its children down - starved most of them of the vital empowering and transformative technological tools needed for survival and growth in these turbulent technologically-driven times.

# Additional comments on the relationship between development statistics and AI regulation:

What can South Africa do about the alarming multisectoral 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 <u>Report No. 03-10-06 "Poverty Trends in South Africa</u>". These already alarming 2015 indicators were exacerbated further by the Coronavirus Pandemic, which, according to the National Income Dynamics Study (<u>NIDS 2019/2</u>) 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 propoor 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 "<u>democratic socialist</u>": 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. China and Vietnam prefer "<u>socialist-oriented market economies</u>", 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.

# 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"*: <u>https://escholarship.org/uc/item/4wx7g61j</u>, 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 – apartheid was extremely costly to reverse, and its reversal remains a work in progress.

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. These very human divides are not "digital divides" as they are popularly known - "digital divides" can be equated to technocentric "straw men" throwing "digits" – not the finger and toes variety as defined in most dictionaries - the "Zeroes and Ones" that represent the binary numbering system that digital technology uses. South Africa's comparatively low STEM literacy levels (Table 4 on page 6) exacerbate the misunderstanding of these "digital" metaphors. The result of throwing "digits" at the very human "triple threat" 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 techno policies and regulations. 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 "<u>Submission to the Competition Commission South Africa Data Services Market Inquiry, June 2019</u>." 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, from page 110 in the document <u>ICT4SDG8</u> - *"The search for Affordable ICTs in South Africa: Public Access Systems."* 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 <u>159-year-old International Telecommunication Union (ITU)</u>'s popularization of "digits" as the primary means of resolving human development challenges in e.g., the most recent celebrations of its establishment in 1865: 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, in partnership with all the numerous multilateral and state agencies active in human (i.e., people) development, re-orient their objectives and strategies from developing digits to developing people?

# 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 GEMINI**: "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. The trillions of microscopic digital switches and trillions of lines of software code that drive AI, could be positioned to do good for humanity, instead of threatening to harm humanity through lack of access for those that need these digital switches and software codes most, or worse still, through abuse of "digits" in AI and its algorithms to cause immense harm to humanity.

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,*" suggests that the great "Out Of Africa" trek most likely began in Southern Africa. With such a rich human history, why then are most South Africans being left behind in the global stakes of human development in this so-called age of enlightenment and civilization? Perhaps the nation's leadership have focussed too much attention on the tools for development – the economy, technology, profits, and wealth, and not enough focus on the people for whom these tools were intended. Fortunately, a growing number of influential entities are beginning to think deeper about the links between people and the available people-development tools, rethinking e.g., the concept of "Human Capital (HCI)," a financial value assigned to people based on the profits that their labour and skills can raise for their employers. South Africa's "Human Capital" value of 0.425 in year 2020 ranks the country 135<sup>th</sup> out of 217 countries, with Singapore leading the world with an HCI of 0.879.

The Human Capital concept is, or should be, generating a growing level of discomfort through its historical and conceptual dehumanization as demonstrated by the statistical comparison of the value of humans in the World Bank's data at <u>https://api.worldbank.org/v2/en/indicator/HD.HCI.OVRL?downloadformat=excel</u>).

The clear implication that an average South African is worth half an average Singaporean must sit uncomfortably in all rational-thinking human beings.

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 in pursuance of a common good, before it became toil in the service of a socioeconomically superior class of human being, the class of *Homo economicus* who follow the unbridled selfishness and greed described by Adam Smith as *"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, published nearly 250-years ago in 1776.

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 Gemini 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: "<u>A Human-Centred Approach to the AI Revolution</u>". 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 Gemini and OpenAl's ChatGPT were prompted to explain the link between Human Capital and Slavery. Key extracts from each were:

**Gemini:** "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 and unemployed (Table 2) must endure, as they live to work so that they can work to 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, that they too will have to work to live so that they can live to work some more?

# 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. Children so empowered by technology 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 that destines humans to "work to live so that they can live to work," i.e., Human Capital. Perhaps the AI machines will come to the assistance of their human creators to change this vicious loop to a virtuous loop.

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.

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 7 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 <u>Telecommunication Act No. 103 of 1996</u> 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 who 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: <u>https://www.gov.za/sites/default/files/gcis\_document/201409/37119gon953.pdf</u>.

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 <u>Government Gazette No. 36332 of 3 April 2013</u>.
- 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 8 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 <u>Artificial general intelligence (AGI)</u> 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*" | <u>https://www.ellipsis.co.za/national-broadband-policy/</u>
- 2. <u>Review of SA Connect</u> in connection with South Africa's <u>National Infrastructure Plan 2050 (NIP 2050)</u>
- 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. <u>https://www.sakan.org.za/SakanDocs.html</u>, e.g., the informative presentation by Dr Tim Kelly of the World Bank: "<u>Global Perspectives on Broadband Policy And their implications for South Africa</u>".

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 below the relevant international poverty line, 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 4 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.

The results of Census 2022 conducted by Statistics South Africa are expected to provide the latest authentic income and expenditure statistics which will enable updates of all poverty statistics, will be published by STATS SA during the period 2024 to 2026 (<u>https://www.statssa.gov.za/?p=15858</u>). There may be further delays in compiling and publishing these critical statistics - <u>STATS SA reported on 21 August 2024</u> that "*The Census 2022 data quality evaluation showed reporting-related biases due to the high occurrence of unspecified responses, and the income variable has thus been excluded. Income estimates will be availed from the Income and Expenditure Survey 2022/23, the results of which will be released in November 2024.*"

While South Africa wrestles with the complex task of producing accurate data for inequality and poverty assessments, the United Nation's family criticises the World Bank approach to poverty alleviation:

1. **Report to the United Nation's General Assembly** by Philip Alston, Special Rapporteur on extreme poverty and human rights, 19 November 2020: <u>https://digitallibrary.un.org/record/3904295/files/A\_HRC\_44\_40-EN.pdf?ln=en</u>: "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 (<u>NIDS 2019/2</u>), 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 21<sup>st</sup> 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 lowincome 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://estatements.unmeetings.org/estatements/11.0030/20211020/ldjSC8gmm4BF/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 <u>US\$15,590 per annum</u>, 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 <u>https://www.statssa.gov.za/?p=15858</u>.

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 totally 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 Al 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 <u>A4AI</u>, and the newer <u>A14ALL</u> 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, a slow strangulation of innovation by costly never-ending pilot projects (read <u>7 Ways We Can Scale ICT4D Pilot-itis</u>) and <u>silo-itis</u>; working in silos on integrated and interdependent programs is exceptionally costly, and nearly always leads 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 engineering masterpieces of human creativity that make up the tools originally intended for such people development, must be returned to their original function of

serving humanity first, all humanity, not just the politically and economically empowered segments of humanity. Modern trends indicate that humanity is progressively being relegated to the service of the politically and economically powerful segments of humanity who own the technology and its applications and evolution.

- In South Africa, the top priority of development must be the nation's poor; that is, if the country wishes to avoid a situation that "would be too ghastly to contemplate" as predicted by historians and philosophers throughout human history. The highest locally-estimated poverty headcount in this post-Covid-19 world is 76%; 55% as estimated by STATS SA for year 2015 in <u>Report No. 03-10-06</u> "Poverty Trends in South <u>Africa</u>", and an additional 21% estimated by the National Income Dynamics Study (<u>NIDS 2019/2</u>) 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 compared to 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 reshown in Table 4 on page 6 of this document. Finland's learning achievements in grade 4 were ±10%, ±6%, and ±11% above average in reading, mathematics, and science respectively, while Vietnam recorded ±1%; -1%; ±9%. South Africa achieved below the global average rates of -42%; -25%; and -35% respectively for the same indicators in the international assessments for 2019 and 2021.

Perhaps South Africa will need the full 180 years predicted by <u>Olivier De Schutter</u>, 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 Reconnected?

Connecting South Africa's poor is getting more attention in 2023, as suggested by new pronouncements by the Minster of Communications and Digital Technologies (DCDT)<sup>2</sup>. 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: <u>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</u>:

<sup>&</sup>lt;sup>2</sup> Following <u>South Africa's General Elections of 29 May 2024</u>, the re-inauguration of <u>Matamela Cyril Ramaphosa</u> as State President on 19 June 2024, and the formation of the second Government of National Unity (GNU), President Ramaphosa appointed <u>Mmoba</u> <u>Solomon Malatsi</u> – "Solly Malatsi" – as the 16<sup>th</sup> Minister of Communications and Digital Technologies (DCDT), with former minister Mondli Gungubele serving as Deputy Minister (Note: 16 ministers responsible for this portfolio since the dawn of the nation's democracy on 27 April 1994.)

**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, and especially their children, who must be developed, who need to maximise the use of the "digits" as vital tools for people development? Digits must not be the target of national development; people using digits to development themselves, their communities, their country, their region, and their world, must be the primary objective of national development.

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 analogue interconnecting networks on land, beneath the oceans, and in space.

The primary targets for South Africa's development must change to refocus directly and unambiguously on the children of the nation, the <u>62.1% of the nation's children born into multidimensional poverty</u>, children 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 who are deprived of most opportunities to use the tools.

**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. The "one size fits all" traditional form of ICT regulation, introduced into the country with the first electronic ICT more than 160 years ago, has failed the whole nation of South Africa. Its failure has fuelled multidimensional inequalities to the dangerous levels measured by our own statistical institutions today. That "one size fits all" has been confused by the metaphorical "digital economy a.k.a. digital worlds" (Author's attempt to demystify these concepts here), and "Cloud Services", a.k.a. Cloudification using Dark Clouds of Confusion – read "Mistification: the Dreadful Side of Cloud Computing". South Africa must find a way of redefining and reinterpreting the "one size fits all" idiom so that "one size" refers to the whole nation; young and old; rich and poor; black, white, and all other; socially and politically powerful or marginalized groups of South Africans. This "one size" must encompass the full range of information and knowledge delivering technologies, including the still evolving Als, so that ALL South Africans are able to acquire user-competency to all the information and knowledge they need to make wise decisions for themselves, their communities, and their country.

South Africa faces a mammoth challenge in regulating AI so that AI and its ICT anchors, digital or otherwise (the physical infrastructure that enables digital communications is all analogue!), 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 and knowledge 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, using different words, 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: <u>https://www.itweb.co.za/content/G98YdqLG3YWMX2PD</u>: *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 large margins. The vital school connectivity targets of 100% at 10 Mbps by 2020 have similarly been missed, Table 5 on page 7 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: <u>https://www.engineeringnews.co.za/article/dcdt-to-mandate-r6bn-broadband-project-led-by-sita-2023-05-18</u>: "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 5 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 <u>ICT4SDG4</u>, 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 <u>ICT4SDG8</u>.

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.

• <u>MyBroadband 7 July 2023</u>: "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.

Acknowledging 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 "<u>The State of the</u> <u>ICT Sector Report in South Africa, March 2023</u>," 10.4% of South Africa's 18.5 million homes had 24/7 fixed internet connections in 2021. 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 number of connected homes to 3.6 million, approximately 20% of the household population in the country. Most of South Africa's developing nation peers are closing in, or have already reached, the 100% household connectivity target that drives human and national development.

Welcome as the Minister's statement may be, Table 5 shows that even this new target is significantly lower than the next lowest in the group – Algeria achieved 31% in 2020. Vietnam, economically poorer than South Africa, achieved 62% household broadband connectivity by 2020. 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 already achieved this target. South Africa's National Broadband Policy sets 2030 as the target year to achieve this 100% 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 targets. A new action-oriented vision for South Africa's ICT4ALL is needed.

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, 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 <u>6 GHz spectrum band</u> 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 high quality 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:

- <u>Tshwane free Wi-Fi tested, with mixed results: MyBroadband: 3 June 2022, MyBroadband 30 April 2022</u>: 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.
- <u>MyBroadband 14 September 2023</u>: Stellenbosch's decade-old free Wi-Fi tested.
- <u>MyBroadband 15 June 2022</u>: Free Think Wi-Fi tested with surprisingly good results.
- <u>MyBroadband 13 February 2022</u>: Free Wi-Fi at South African coffee shops tested, generally good results.
- <u>Reuters 25 July 2023</u>: South Africa to ink deal with state-owned firm for internet access:

"In February, President Cyril Ramaphosa had said he aims to <u>provide</u> affordable, high-speed internet to all, without giving a time frame. Months later, Gungubele said he aimed to <u>connect</u> 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 <u>provide</u> affordable, high-speed internet to all", and the aim of connecting 80% of South Africans to the internet by 2024. According to the ICASA "<u>State of the ICT Sector</u> <u>Report of 2023</u>,<sup>3</sup>" 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

<sup>&</sup>lt;sup>3</sup> An updated version of the nation's <u>State of the ICT Sector</u>, published on 31 March 2024, reports a 2022 internet household penetration of 13%, a 25% increase over the 2018 level. The equivalent household penetration level in Colombia, a demographically similar developing country as South Africa, was nearer 60% according to the <u>World Bank Database</u>.

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 18 million South African households accommodating 60 million South Africans, i.e., ≈6 million people, 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" <u>Statistics South Africa 16 May 2023</u>;
- 69.4% household members, or 41 million South Africans were able to access the internet, instantly, anywhere, via the national mobile network, 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 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, <u>ranking third highest in the global Crime Index for 2023</u>.

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 an "Internet User" 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 effectively been closed! In 2021, South Africans enjoyed 99.9% national coverage at 3G, and 97.7% at 4G/LTE (<u>Statista 2023</u>). 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 <u>Vodacom Internet daily bundle</u> 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 <a href="https://www.statssa.gov.za/publications/P03101/P031012023.pdf">https://www.statssa.gov.za/publications/P03101/P031012023.pdf</a>:
  - Food poverty line (FPL): R760 per month: Monthly cost for 20MB per day ≈ R152 or 20% of total income or expenditure per month;
  - Lower bound poverty Line (LBPL): R1,058 per month; Monthly cost for 20MB per day ≈ 14%;
  - Upper-bound poverty Line (UBPL): R1,558 per month. Monthly cost for 20MB per day ≈ 10%.
- New recommended affordability level by A4AI is "<u>2 for 5": 2% of monthly income for 5GB of data (A4AI 2021</u>). 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 <u>Telkom SA</u> <u>SOC Ltd</u>, 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: <u>https://ewn.co.za/2023/08/03/expanding-the-digital-economy-must-benefit-the-whole-of-society-gungubele</u>: "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 these will threaten the long-term viability of the nation. The key question is: "How can this objective be achieved?"

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: <u>World Bank September 2030</u>); 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: <u>STATISTA September 14<sup>th</sup> 2023</u>. 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 digital 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.

• <u>News 24; 12 September 2023</u>: "*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 doubleedged 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 <u>NITRD 2019 Workshop Report</u> – "Artificial Intelligence & Wireless Spectrum: Opportunities and Challenges 2020," and by the ITU in "<u>AI will make radiocommunications smarter</u>," must be part of the solution, not the challenge. All these high-tech innovations will depend on <u>AI4Good</u> 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: <u>http://wirelessafrica.meraka.org.za/wiki/index.php/Wireless Africa Home Page</u>. 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, with local innovations when suitable components like antennae ran out a jam tin on a broom stick antenna enabling several Mbps throughput.
  - <u>Energy Efficient Wireless Mesh Networks</u>: <u>Dr Ntsibane Ntlatlapa</u> 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 nations immense information and knowledge divides. Why were their effectiveness and therefore mass applications so

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: <u>https://1worldconnected.org/project/africa\_communitynetwork\_jawugsouthafrica/</u>. 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: <u>https://1worldconnected.org/project/africa\_communitynetwork\_sowetowirelesssouthafrica/</u>. 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 22 of this document.

 Wi-Fi at a walking distance: Project Isizwe: 1 September 2020: <u>https://lworldconnected.org/post/africa\_communitynetwork\_projectisizwesouthafrica/.</u> 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 31 and 32 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 Al-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 human and 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. The Brazilian LAN House strategy is introduced on page 125 of <u>ICT4SDG8</u>.

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

# Al 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: <u>Argentina: a public sector focus embedded in a broader AI strategy</u>: "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: <u>The Colombian case: adopting collaborative governance as a path for</u> <u>implementing ethical artificial intelligence</u>: "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:** <u>Law promoting the use of artificial intelligence</u>: 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: <u>MIC requests comments on draft AI and big data standard</u>: "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."</u>
- South Africa: At the time of preparation of this document, there were no known plans for regulating Al in South Africa. This is verified by Google searches, which return responses like "Currently, there is no specific legislation in South Africa regarding Al; 17 Aug 2023." There are however, a few opinions and studies proffered by concerned citizens, like those expressed by the <u>Daily Maverick</u>, <u>Kieti Law LLP, Kenya</u>; <u>The</u> <u>Conversation</u>; 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.

## 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 control its use, for both pleasantly altruistic or for dangerously selfish or ends.

The above references provide useful beginning summaries 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: <u>The EU Artificial Intelligence Act</u>
- Nature: 8 August 2023: <u>Rules to keep AI in check: nations carve different paths for tech regulation</u> (Note: invaluable knowledge imprisoned behind a poverty-excluding impenetrable paywall)
- The Conversation: 3 April, 2023: <u>Regulating AI: 3 experts explain why it's difficult to do and important to get right</u>
- 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: <u>Regulation essential to curb AI for surveillance</u>, <u>disinformation: rights experts</u>
- New York Times: 3 March, 2023: <u>As A.I. Booms, Lawmakers Struggle to Understand the Technology</u>
- 19 May, 2023: Harvard Business Review (HBR): <u>Who Is Going to Regulate AI? Harvard 2023</u>
- 9 May 2023: Taylor Wessing: <u>AI regulation around the world</u>

## Random Issues Needing AI Regulatory Attention in South Africa

Al, NDP, and SDGs: The estimated global <u>value of the AI industry was US\$ 208 billion in 2023</u>, expected to grow nearly ten-fold to US\$ 1.85 trillion by 2030. With such high market values and therefore profits, it is difficulty 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., <u>Oxfam International on 17th January 2022</u>, and <u>Brookings</u>, <u>21 April 2022</u> (*"Profits and the pandemic: As shareholder wealth soared, workers were left behind"*), concerning the obscene profits made from the Coronavirus Pandemic by the key supply chain shareholders. These shareholders 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 <u>WEF 4 February 2021</u>.

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.

Will the above apply to AI as well?

## South Africa's Progress in NDP and SDGs: STATS SA Baseline Report 2017<sup>4</sup>

## http://www.statssa.gov.za/MDG/SDG\_Baseline\_Report\_2017.pdf:

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 <u>DBE-NEIMS-REPORT-2020.docx.pdf</u> - <u>Equal Education</u>: Just 0.3% additional schools connected to the internet for teaching and learning in the 5-years between 2016 and 2021?

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

<sup>&</sup>lt;sup>4</sup> All references to the Sustainable Development Goals (SDG) apply equally to South Africa's National Development Plan (NDP) – they are the same – read "<u>The SDG targets and NDP objectives align</u>". For this discussion document, the SDGs were preferred for their broader data coverage, enabling invaluable performance comparisons between South Africa and the nation's developed and developing country peers.

"household" use the internet from any location besides the household itself? This indicator needs urgent review and refinement for relevance.

- Reality Check: <u>ICASA State of the ICT Sector Report 2023</u>: 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:
  - <u>World Bank</u> references ITU definition: "*individuals who have used the Internet (from any location) in the last 3 months.*"
  - <u>United Nations</u>: 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."
  - <u>Google's BARD</u>, 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."
  - <u>ChatGPT</u>, 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" type VoIP or OTT voice calls, 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 are to support the profitability of the technology providers, the supply side of the equations, and the wealthy users who provide that profitability. The bulk of the demand side of the equation, especially in South Africa, are users living at the minimum subsistence levels as discussed by the two UN Special Rapporteur on extreme poverty and human rights starting on page 29 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 <u>SDG Report of 2019</u>: "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 <u>the Sustainable Development Goals</u> – the promise of a better world for all – may fuel greater political instability, upend economies and lead to irreversible damage to the natural environment."

The Sustainable Development Goals (SDGs) Reports of 2023 and 2024 underscore significant challenges in achieving the 2030 Agenda. In the <u>2023 Special Edition</u>, UN Secretary-General António Guterres warned, "*Unless we act now, the 2030 Agenda could become an epitaph for a world that might have been*." Just one year later, by June 28, 2024, at the launch of the subsequent SDG Report, he emphasized, "*This report is known as the annual SDG report card – and it shows the world is getting a failing grade… Our failure to secure peace, to confront climate change, and to boost international finance is undermining development. We must accelerate action for the Sustainable Development Goals – and we don't have a moment to lose*" - <u>UN Secretary-General António Guterres, 28 June 2024</u>.

These statements highlight a critical issue: the global approach to sustainable development often addresses symptoms rather than root causes. The prevalent technocentric and siloed strategies may overlook the intricate, interconnected nature of SDG challenges. A paradigm shift towards holistic, people-centred solutions is imperative, where technological interventions serve as means to human-centric ends, not as objectives in themselves.

The UN Secretary-General isolates three out of numerous examples to emphasise his points:

- Our failure to secure peace: Securing lasting peace requires a deep understanding of conflict dynamics, including economic disparities, political tensions, cultural, ethnic, and racial divisions, and other fragmentations within humanity. Without addressing these underlying issues, calls to "silence the guns" and "invest in people and peace" risk being short-term fixes. Educational initiatives that emphasize our shared humanity are essential to bridge these divides and counteract millennia of fragmentation stemming from individualism, materialism, patriarchy, and religious dogma.
- **Confront climate change:** On climate change, many view nature as a resource to exploit, a mindset contributing to environmental degradation and the looming sixth mass extinction. The profit-driven denial of climate change by influential leaders exacerbates this crisis. Reversing current trends appears increasingly challenging; thus, educating the younger generation on sustainable practices becomes vital to equip them against potential existential threats.
- **Boost international finance:** While international finance is essential for development, its current form often exacerbates inequality. Developing nations grapple with debt crises and economic dependency, while global capitalism prioritizes profit over people. <u>As Adam Smith observed in 1776</u>, "*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.*" To truly boost development, we must reform financial systems to prioritize equity and sustainability.

Addressing multidimensional NDP and SDG Challenges: Addressing the multifaceted challenges of sustainable development demands exceptional collaboration, coordination, communication, and cooperation—the four Cs of effective management of complex challenges. Implementing a holistic, virtuous cycle model can break the silo mentality hindering SDG progress. Developmentally oriented Artificial Intelligence (AI) systems can provide vital support for the vital four Cs, and especially for the holistic virtuous cycle control processes. Integrating AI-assisted systems thinking can further enhance this approach by mapping, predicting, and optimizing interdependencies among SDGs beyond human cognitive capacities.

In summary, achieving the Sustainable Development Goals necessitates a comprehensive, human-centred strategy that transcends technocratic solutions and addresses the foundational causes of global challenges. All countries, developed and developing alike, require, perhaps demand, such human-centred development strategies.

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

- Nature Communications: 13 January 2020: <u>The role of artificial intelligence in achieving the</u> <u>Sustainable Development Goals</u>
- 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: <u>AI in Context and the</u> <u>Sustainable Development Goals: Factoring in the Unsustainability of the Sociotechnical System</u>
- World Economic Forum: 11 May 2022: <u>Why artificial intelligence is vital in the race to meet the SDGs</u>

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.



The State of SDGs in South Africa 2024: <u>https://dashboards.sdgindex.org/</u>: World Ranking: 115/166.

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<sup>5</sup>

Two concise definitions of "politics" are provided by: <u>Collins Dictionary</u>; "Politics are the actions or activities concerned with achieving and using power in a country or society"; and <u>Oxford Dictionary</u>; "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 to political power, for good and for bad.

Al 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

<sup>&</sup>lt;sup>5</sup> This section of the discussion document was written prior to the conclusion of South Africa's May 2024 general election. Those elections have been concluded with relative peace. A Government of National Unity was the most welcome outcome, but this is merely the beginning of a complex sociopolitical process that continues to promise growth through human development and peace, or disaster, depending on how all South Africans build their body politic – the choice of building wisdom into political power as recommended by <u>Plato some 2,400 years ago</u>.

work, employment, and economies:" <u>OECD The Forum Network, 29 August 2023:</u> "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. EWN reported on 18 January 2024 that there were more than 350 aggressively competitive political parties in South Africa, all competing for political power and the lucrative benefits that comes with such power. Does this make the country especially vulnerable to this AI usage threat?

As this document was being written, South Africa was preparing for its 29 May 2024 general election. The spectre of AI influencing the outcome of the democratic process was raised by government and several media outlets:

- <u>TechCentral 2 November 2023</u>: "Worries are growing that Russia and other nations could use technology in an effort to sway the outcome of the 2024 election. Should South Africans worry about foreign interference in South Africa's pivotal general election next year? While some academics and political commentators believe this is a real concern, others say Russia will not be the only country trying to influence the outcome of the poll."
- <u>TechCentral 30 January 2024</u>: "The growth of misinformation tools, including AI-generated deepfakes, is forcing the Electoral Commission of South Africa (IEC), the Information Regulator and other organisations to cooperate with one another to assure the integrity of the upcoming election, regarded by many as the most important poll since 1994."
- <u>The Conversation February 22, 2024</u>: "It is worrying, then, that South Africa's government hasn't yet taken any legislative steps to combat deepfakes especially with the country's national elections scheduled for later this year."

Will AI misinformation and disinformation influence this "most important poll since 1994"? Will AI reverse any socioeconomic gains made since the demise of apartheid, rekindling another round of deadly societal disruptions that may lead to a failed state of the 5<sup>th</sup> largest economy in Africa by GNI per capita PPP?

While South Africa agonizes over its numerous socioeconomic growth threats and sustainability, the foremost economic and military power on earth, the United States, agonizes just as much over the impact of generative AI on its presidential elections scheduled for 5<sup>th</sup> November 2024. The outcome in the US could have immense existential-level impact on the whole world. The whole global media is dominated by this concern as this document is being written.

Can South Africa survive this onslaught on its democratic health without the support of an all-embracing AI/ICT regulatory system to protect the country and its inhabitants?

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

- <u>European Parliament, 19 September 2023</u>: Briefing: Artificial intelligence, democracy, and elections: "AI has a potential for bias, manipulation and spreading of disinformation, which risks weakening societies."
- <u>MDPI Applied Sciences, 16 November 2021</u>: An Explainable Artificial Intelligence Model for Detecting Xenophobic Tweets:
- <u>MIT Technology Review, 28 July 2023</u>: 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."
- <u>Swissinfo.ch. 25 June 2022</u>: 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."
- <u>The Interpreter, 19 May 2023</u>: The View from Australia: AI vs democracy: the battle is already here: "The race for Artificial Intelligence dominance <u>is now on</u>. 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** <u>Plato, circa 375 BCE</u>: "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?" How can AI help South Africa's search for such wisdom?

# Al 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" (Quote used by Wired in 2012): 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." (Author's own opinion)

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. Humankind 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 <u>Wits 2020 article "Numbers can Kill</u>"), 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 all warning messages delivered by numbers.

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, <u>describes these language models</u> 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 statistics to derive logical, and sometimes illogical political conclusions, presenting them in humanlike formats, enabling humans to use the results for good, and for bad.

Al machines 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 Al 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:

- <u>The Guardian, Sat 31 Oct 2020</u>: 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."
- <u>William Davies</u> in the <u>Guardian, 19 Jan 2017</u>: 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."

- <u>Taylor & Francis Group, published online: 25 May 2020</u>: *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.
- <u>Taylor & Francis Group, published online: 23 Mar 2021</u>: 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."
- <u>University of California, Berkeley, 10 January 2018</u>: 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?

## Al 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 a submissive populace unable to 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 <u>World Report 2023</u>; seven coups d'état in West Africa alone in the last three years listed by <u>Africa News 2023</u>; the tragic dehumanizing conflicts in the "<u>Horn of Africa</u>" (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 <u>Getachew Fentahun, August 2023</u>)?
- 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: <u>Saudi Arabia, Oman</u>, the <u>UAE</u>, <u>Qatar</u>, <u>Brunei</u>, <u>Afghanistan</u>, and the <u>Vatican</u>. The world's "democracies" thus include countries like the <u>Democratic People's Republic of Korea</u> and <u>The Republic of Korea</u>; <u>The Democratic Republic of Congo</u> and <u>The Republic of Congo</u>. 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: "<u>Israel hasn't been a democracy for a long time. Now, Israelis need to face this fact</u>" discusses this matter well, especially considering the horrendous dehumanizing outbreaks of violence by both Israel and its 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 – <u>Sir Winston Churchill on 11 November 1947</u>:

"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 <u>81.4% of the national population</u>, 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" – <u>Britannica 16 October 2023: "Where was democracy first practiced?</u>"

Table 4 on page 6 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. Al is a potent corrective tool for this specific challenge, but it must be positioned for that purpose through effective regulation and informed 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:

- <u>The Washington Post, 26 April 2023</u> (blocked by paywall): also available in <u>American Academy of Arts &</u> <u>Sciences: Opinion by Danielle Allen</u>: **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."*
- <u>The Guardian, 28 July 2023</u>: 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: <u>https://www.swissinfo.ch/eng/sci-tech/can-artificial-intelligence-and-democracy-co-exist-/47672584</u>. 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 targeted at positioning AI as an aid to democracy, not an enemy of democracy.
- The Interpreter, 19 May 2023 <u>Australia Technology</u>. "<u>AI vs democracy: the battle is already here</u>": "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: <u>How AI could take over elections and undermine democracy</u>: "Could organizations use artificial intelligence language models such as ChatGPT to induce voters to behave in specific ways?" Examples of this from USA include:
- **Brookings Institution, 21 March, 2023**: <u>How generative AI impacts democratic engagement</u>: "In 2017, the Federal Communications Commission (FCC) <u>invited</u> public commentary regarding its proposed changes to

net neutrality regulations. An orchestrated <u>astroturf</u> 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 <u>only</u> 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." If AI already undermines the FCC, what can it do to ICASA?

# Al 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 scientific 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 <u>Thomas Carlyle</u>, 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 <u>The Atlantic, 17 December 2013</u>:

'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.

This "Dismal Science" went on to spawn yet another distasteful economic phrase: "<u>Human Capital</u>," 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 "<u>Accounting for Slavery: Masters and Management</u>, <u>published 15 October</u>, 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" (HCI) 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, <u>https://api.worldbank.org/v2/en/indicator/HD.HCI.OVRL?downloadformat=excel</u>, ranks South Africa 135th out of 217 countries, all led by top ranked Singapore.

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

Economics is the de facto measure of success in this <u>post-Neolithic Anthropocene epoch</u> 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 <u>https://www.ibiblio.org/ml/libri/s/SmithA\_WealthNations\_p.pdf</u>:
  - "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 in which South Africa finds itself 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 <u>Adam Smith</u> published <u>An Inquiry into the Nature</u> <u>and Causes of the Wealth of Nations</u>. Prior to that, throughout the 6-to-7-million years or so of Hominin existence (our common ancestors, <u>Nature 2012</u>), and the estimated of 550,000 to 750,000 years of Homo sapiens existence, us, <u>Smithsonian 2 February 2021</u>, 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:

- <u>The Original Affluent Society, Marshall Sahlins, 1972</u>: "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": "<u>Rescuing Adam Smith from Myth and Misrepresentation</u>". This highly informative article, and its original "<u>An Authentic Account of Adam Smith, 2017</u>" by <u>Gavin Kennedy</u>, 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.

• <u>Against Economics, David Graeber, December 5, 2019</u>: "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 <u>Bloomberg, 19 November 2019</u>: "Slamming ideas the profession has largely discarded doesn't help figure out what to do in the future." <u>Time Magazine on 24 March 2023</u> 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:

## AI, Capitalism and Democracy:

• The Crisis of Democratic Capitalism, Martin Wolf; 16 February 2023: <u>https://www.lse.ac.uk/lse-player?id=ffdc72f5-6d9d-467c-8b30-f0f2838ac008</u>;

- 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": <u>https://hbr.org/2020/03/do-democracy-and-capitalism-really-need-each-other</u>; 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."* <u>https://www.youtube.com/watch?v=3xQgVc3IYRY.</u>
- Capitalism is killing the planet it's time to stop buying into our own destruction: The Guadian 30 October 2021: <u>https://www.theguardian.com/environment/2021/oct/30/capitalism-is-killing-the-planet-its-time-to-stop-buying-into-our-own-destruction</u>.
- 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 : <u>https://stonecenter.gc.cuny.edu/panel-capitalism-and-democracy-can-they-coexist/</u>.
- 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 <u>dismal science</u>". Adam Smith's economic philosophies are claimed by nearly all schools of economic thought, often with imprecise interpretations. On 26 July 2018, <u>The Economist Magazine</u> joined Paul Krugman's criticism of the "myths and misrepresentations" of modern economics in its article "<u>Rescuing Adam Smith from Myth</u> <u>and Misrepresentation</u>". Krugman's essay strongly suggests some of the economics thinking that must be built into AI regulation must aim at serving people first, with economics also serving people first, instead of the perception that economic growth is the main objective, and people are the subservient tools for achieving that objective.

Al 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: <u>https://www.science.org/doi/abs/10.1126/science.aaa8403</u>
- Economic patterns in a world with artificial intelligence: Springer Link, January 2020 (already old at just 3-years): <u>https://link.springer.com/article/10.1007/s40844-019-00157-x</u>
- **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.": <u>https://www.bbc.com/news/av/world-us-canada-65627027</u>

South Africa's modern history has left a legacy of complicated highly competitive political structures: <u>AI4Good</u> 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 <u>Futurism, 04 April 2023</u>. If South Africa's AI regulation leans towards "making tons of money"

which is then 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 apocalyptical horsemen of Walter Scheidel's "The Great Leveler" "<u>The</u> 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 <u>AI4Good (the ITU link</u>), 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 apocalyptical horseman, state collapse; the third horseman, mass mobilization warfare; and the fourth horseman, ideological revolution. The four apocalyptical horsemen are discussed further on <u>page 112 of ICT4SDG8</u>.

## AI and Xenophobia:

There are numerous highly informative definitions of Xenophobia by nearly all credible dictionaries and encyclopaedias. One definition selected for this discussion is that of the <u>European Commission (Framework</u> <u>Decision 2008/913/JHA)</u>: "Attitudes, prejudices and behaviour that reject, exclude and often vilify persons, based on the perception that they are outsiders or foreigners to the community, society or national identity."

The selection of the European Commission's definition of Xenophobia has been influenced by its concise coverage of the broad spectrum of probable causes and implied effects of xenophobic behaviour.

The complexity of South Africa's AI regulatory challenges demands that the country considers all possible threats to the country's sustainable development and sociopolitical security and stability. Xenophobia is such a threat; all South Africans should understand its roots, socioeconomic impacts, and the range of solutions to reduce and ultimately eliminate it. All these critical elements are deeply rooted in human knowledge about itself and its life-giving environment; the sharing of such knowledge and information is vital for human survival and sustainability. The whole technology sector, particularly its information and knowledge techno industry, which includes AI, its most recent evolutionary innovation, are the most effective tools for such sharing.

**Brief Background:** Xenophobia is a well-known threat to South Africa's sociopolitical stability; the human behavioural phenomenon has been in existence well before the violent xenophobic outbreaks of 2008 and 2015, and continues into this third decade of the 21<sup>st</sup> century. The world of Dudula (<u>BBC September 2023</u> <u>description here</u>) and related harmful human behavioural phenomena continues to unfold. Xenophobia was the fuel of the apartheid system; the <u>Afrikaner Weerstandsbeweging (AWB)</u> was merely a continuation of the <u>xenophobic practice of Nazism</u> (UNHRC 2022). Historians and scientists, with the assistance of Al4Good, 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.

The following short list of key references presents a useful starting point for any policy/regulatory research needed for an appropriate national programme for the elimination of xenophobia:

- 18 September 2023; BBC article and video documentary: "Inside South Africa's Operation Dudula: 'Why we hate foreigners'", video discussion at <u>https://www.youtube.com/watch?v=rogZ8BYg-kM</u>. 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; <u>Kevin Ritchie</u> of The Diamond Fields Advertiser (DFA) responds in "<u>Operation Dudula</u> <u>documentary a sobering reminder of very real time tomb that is ticking</u>". 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)**: "<u>*Can AI be used to tackle racism?*</u>" "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**: "<u>As AI Act vote nears, the EU needs to draw a red line on racist surveillance</u>". "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."
- **19 April, 2022: Massachusetts Institute of Technology (MIT):** "<u>South Africa's private surveillance machine</u> is fuelling a digital apartheid". .... "South Africa is in the process of building out a <u>national biometric</u> identification database called <u>ABIS</u> 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."

As indicated in the opening paragraph of this section, xenophobia is a complex relatively recent human frailty, thought to have gathered momentum during the Neolithic period, ca. 7000–1700 BCE, read e.g., <u>Smithsonian</u> <u>article updated 3 September 2020</u>.

It is necessary to recognise that xenophobia has very strong socio-religious-political-economical-ideological bases: the identification of "<u>the other</u>" often transcends ethnicity, nationality, and religious identifying characteristics of modern Homo sapiens. The religious biases and identification of "the other" will be discussed briefly in the next paragraphs on Religion:

Just one of the many informative South African reference documents discussing religion and xenophobia is Jerry Pillay's article "*Racism and xenophobia - The role of the Church in South Africa*" (University of Pretoria, 2017), summarised by the author as:

"Racism and xenophobia have become a worldwide issue and challenge. The recent flood of immigrants and refugees into Europe and America has put this matter on the world map. In South Africa racism and xenophobia have, in recent times, reached explosive proportions and have greatly intensified the need for the Church to get more deeply involved in the creation of racial harmony and peace as it works towards the fullness of life for all people. This chapter explored the challenges of racism and xenophobia in South Africa and concluded by discussing the role of the Church in combating these realities."

Al can, perhaps must, help eliminate xenophobia in South Africa. If this process is not built into the national Al regulatory framework, Al could, perhaps will, be used to promote the self-interests of the purveyors of xenophobia. Researchers in South Africa have already concluded that the South African media, and therefore the unfolding Al which targets the media, has, perhaps inadvertently, promoted the occurrence of xenophobia in South Africa; Reference "<u>The Media's Coverage of Xenophobia and the Xenophobic Violence prior to and including May 2008</u>"

# AI and Religion

**Introduction:** Religion, and the competing belief systems that define it, ranks amongst the most complex highly emotive topics for any discussion concerning human behaviour and human cognitive processes. Most attempts to discuss religion in this modern post-Neolithic era, under any debating or discussion platform, is likely to generate significant argument which may, and has in many cases, turned to violent confrontation, or worse – societal collapse is considered by many philosophers as a direct result of violence in the form of revolutions and wars. It is a slow-action poison that eats away at the soul of a nation.

And yet, such discussions are mandatory in this age of conflict between cultures, nations, races, ethnic identities, religious belief systems, and the abuse of religion for selfish or nefarious purposes, e.g., abuse of girls and women in the name of religion.

#### **Religion versus Science**

All religions and their competing belief systems have, or intended to have, served humanity well throughout their respective evolutionary histories. The first formal religion, considered by many researchers to be Hinduism, was founded circa 2,000 BCE as an early polytheistic religion which promoted love, peace, non-violence, and maximum freedom of choice, e.g., individual freedom to worship even a monotheist region of personal choice while remaining a Hindu. A useful introduction is provided by <u>History, Hinduism, updated 16</u> <u>November 2023</u>. Hinduism was followed soon after by Judaism, said to be the first monotheistic religion, also originating circa 2,000: source <u>Britannica 15 December 2022</u>.

All formalized religions were founded long after the evolutionary emergence of early bipedal hominins, the oldest known to date is <u>Sahelanthropus tchadensis</u>, ancient hominin ancestors that lived approximately 6 million years ago in Africa. It took Sahelanthropus another 5-million years or more to evolve into us – Homo sapiens - said to have originated between 550,000 and 750,000 years ago – <u>Science | February 2, 2021 | An Evolutionary Timeline of Homo Sapiens</u>.

Statistical data of global religiosity today has been provided by <u>Pewresearch.org (2015)</u>, which projects for the year 2050 religious shares of the world population to be (1) Christian, 31.4%; (2) Muslims 29.7%; (3) Hindus 14.9%; (4) Buddhists 5.2%; (5) Folk Religions (mainly non-theist spirituality believers) 4.8%; (6) Other Religions 0.7%; (7) Jews 0.2%; (8) Unaffiliated (no religion) 13.2%.

The most recent South African population surveys by religion, as reported by <u>Statistics South Africa Census</u> 2022, were (a) Christianity 85.3%; (b) Traditional African (forms of spirituality) 7.8%; (c) No religious affiliation, including Agnosticism and Atheism – 3.1%; (d) Islam 1.6%; Hinduism 1.1%; (e) Other (unspecified) 1.0%; (f) Judaism 0.1%. Within the dominant Christian faith, overlaps with Traditional African belief systems can be observed through a variety of cultural practices and other extreme forms of Charismatic Christian practices leading to e.g., gender and child abuse, and financial crimes, many of which are regularly reported officially and in the public media.

## Religion and Violence:

Virtually all religions practiced today are portrayed as powerful forces for peace amongst humans, and respect for nature, but even within that framework, most religious groupings have been plagued by varying degrees of violence in their recent histories, i.e., since the <u>Neolithic Revolution</u> which began approximately 12,000 years ago. This stands in stark contrast to the egalitarian lifestyles of hunter-gatherers, which archaeological and paleoanthropological research suggests fostered cooperation and minimized violence. The advent of agriculture and sedentary lifestyles during the Neolithic Revolution led to societal changes, a.k.a. "civilization", with new societal structures emerging to accommodate growing populations and the onset of <u>materialism</u> (Oxford reference). As Desmond Morris describes in "<u>The Human Zoo</u>," these changes led to the rise of "Tribes and Super-Tribes, Status and Super-Status" hierarchies, which may have contributed to rapid population growth, social fragmentation, and the rise of socioeconomic inequalities. Desmond Morris' classic is interpreted by this author as:

"The 'civilization<sup>6</sup>' of humanity began approximately 12,000 years ago with the dawn of the Neolithic Revolution, resulting in a population explosion and the subsequent development of crowded urban dwelling. This significant shift occurred after the species separated from its ancestral hominid kith and kin, some six to nine million years earlier"

<sup>&</sup>lt;sup>6</sup> Modern interpretations of "Civilization": (a) National Geographic 23 Oct 2023: "Most historians, anthropologists, and archaeologists working today feel that the word is problematic because of the way the label has been used to set up harmful oppositions among world societies, with "civilized" societies being seen as superior to "non-civilized" societies." (b) ChatGPT: "Research suggests that early agricultural settlements, while foundational to what we historically call civilization, introduced new forms of social inequality, environmental degradation, and conflict." (c) DeepSeek: "Civilization is not a value judgment: It should not imply moral, intellectual, or cultural superiority. Societies labelled as 'uncivilized' often had sophisticated social structures, sustainable lifestyles, and rich cultural traditions." (d) Gemini: "Ultimately, the way we use the term "civilization" reflects our values and priorities. By moving away from a hierarchical and Eurocentric understanding of the term, we can create a more inclusive and nuanced understanding of human history and social development. This understanding should recognize the diversity of human experience and the value of all cultures, regardless of whether they conform to a particular model of "civilization."

Societal chaos and disorder accompanied this "civilization" process as the scramble for material resources, economic, and political power, triggering major lifestyle changes. The tools developed by humankind to restore order from that chaos included religion in two major formats:

- The eastern philosophies and religions "which embody many virtues that are alluring: introspection, gentleness, sensitivity, fortitude and connection with mind and body" quoted from a study course offered by the <u>University of Cape Town</u>.
- The middle-eastern and western religious philosophies and cultures which developed competing "Theistic" philosophies based on all-powerful God or Gods, creators of the universe and all that it contains, and demanding absolute loyalty, adherence, and compliance with commandments and rules prescribed by the deities, and enforced by the deities' chosen human leaders.

Religiosity can be detected in virtually all major global conflicts today and throughout history. Examples of faith-based conflicts include:

- Africa, e.g., the biblical justification of apartheid and the American slave trade; the expanding Boko Haram movements that plague the continent today, (read <u>Taylor & Francis 2024 discussion here</u>).
- Asia, read e.g., *Postcolonial Religious Conflict in Southeast Asia*, and the current <u>Myanma Genocide against</u> <u>Muslim Rohingyas</u>.
- Modern European history is awash with faith-based violent conflicts, e.g., from the <u>12<sup>th</sup> century anti-Muslim Crusades</u>; the <u>anti-Semitism of Nazi Europe</u>; the long <u>"Christian" conflicts featuring Ireland</u>; <u>Europe's "thirty year's wars" (1618 to 1648)</u> that led to fragmentation of Christianity; and the immense brutality perpetrated by many European colonizers against indigenous populations in Africa, Asia, the Americas, and even in the pacific island groups and Australasia. A related document published in 2016, "Imperialism, Conquest, and Mass Murder, documents the Namibian genocide, also referred to as "the first Holocaust."
- **Apartheid** in South Africa, and **Slavery** in the Americas: These dehumanizing brutalities were justified by deliberately misinterpreted religious dogmas, e.g., "*The 'Curse of Ham': how people of faith used a story in Genesis to justify slavery,*" <u>The Conversation, 12 March 2024</u>. The consequences are still unfolding, and even resurfacing as nationalism and racism raise their heads once more, e.g., "*Are the elites driving nationalism in post-Brexit Britain?*" <u>LSE 12 Jan 2021</u>, with video.
- **The Middle-East Crises:** The millennia-old Middle East conflicts which began with the birth of formalized religions circa 2,000 BCE continue unabated more than 4,000 years later.

# The Existential Threats Posed by the Middle East Conflicts.

Sometime during the 13<sup>th</sup> century BCE, more than 3,000 years ago, an ancient nomadic Arab tribe known as the Amalekites ambushed newly arrived Israeli migrants during their (historical) flight from slavery in Egypt. This "transgression" against "<u>God's Chosen People</u>" led to extreme retribution – God instructed Saul, then king of the Israelites, to "attack the Amalekites and totally destroy everything that belongs to them. Do not spare them; put to death men and women, children and infants, cattle and sheep, camels and donkeys." (<u>Bible Gateway 1 Samuel 15: NIV - MIT</u>).

That ancient conflict has been reenacted many times throughout modern history, and it includes the current turmoil in "<u>the land between the river and the sea</u>" – the much-maligned description of the geographic territory between the River Jordan and the Mediterranean Sea, historically and currently occupied by both Israelis and Palestinians.

The Israelites and the Palestinians share a common ancestry, the Canaanites. This relationship extends to other historical tribes and cultures that lived in the <u>Levant</u>. The Israelites are genetically related to the Amalekites whom they reportedly destroyed in a biblical "genocide." The respective scriptures of both Israelis and Palestinians verify their shared ancestry as descendants of Abraham, who lived in the 2nd millennium BCE and is credited with establishing the religious traditions of Judaism, Christianity, and Islam.

Modern genetic evidence supports the recent common origins and biological relationships of Arabs, Jews and Palestinians, as reported in numerous media and scientific papers such as <u>Haaretz 31 May 2015</u> – "Blood

Brothers: Palestinians and Jews Share Genetic Roots"; updated in <u>Haaretz 31 May 2020</u> – "Jews and Arabs Share Genetic Link to Ancient Canaanites, Study Finds"; <u>Science 20 Oct. 2000</u> – "Jews and Arabs Share Recent Ancestry"; and <u>JNS.org June 18, 2024</u> – "Genetics can bring Jews and Arabs together."

Given that Arabs, Jews, and Palestinians are so closely related—biblical and genetic "cousins"—why does violence persist between them? Why does the world continue to tolerate such conflicts, which border on existential threats, particularly given the potential for triggering a nuclear holocaust? Could the problem be religious misinformation and disinformation, exacerbated by advanced technology such as AI, which is being used to fuel conflicts through misinformation and disinformation, and its use in e.g., surveillance technique used to fuel all forms of violent conflicts?

**South Africa** has a secular constitution since the advent of democracy in 1994, one which is generally accepted by the population. There is little evidence of direct interfaith conflict in the country, besides the brutality of apartheid, which was created and defended through extreme misinterpretations of biblical scriptures, as reported in numerous biblical texts and recent research publications like <u>The Conversation, 12 March 2024</u>, and <u>https://www.thegospelcoalition.org/article/damn-curse-ham/</u>. The role of religion in the establishment, justification, enforcement, and ultimately elimination of the apartheid system of governance has been studied and recorded extensively in articles such as <u>The church and state in apartheid South Africa 1998</u>; <u>African Traditional Religion in the face of Secularism in South Africa, 6 September 2011</u>; and <u>Learning From Mistakes of the Past: Christianity and Apartheid, 2016</u>. These documents provide excellent entry-level research material for further studies of the relationships between religion and society, and enable the realignment of these relationships as forces for good, in service of all who live in the country.

The lack of direct interfaith conflict in South Africa's recent history has not and does not render the nation immune from its impacts:

- <u>WEF 12 March 2024</u>: "In today's complex global landscape, geopolitical tensions have far-reaching implications across a variety of sectors. The ripple effects of these tensions are felt across politics, economics, society, and the environment. These interconnected challenges don't just impact governance structures but also affect the delicate equilibrium of our ecosystems in unexpected ways."
- Many of these conflicts and global tensions have evoked religion to justify them, e.g., "President Vladimir Putin on Saturday said Ukraine "glorifies" Adolf Hitler's SS killing squads and vowed to "eradicate Nazism." – <u>The Moscow Times 27 January 2024</u>
- Even the Sudanese conflict has deep religious roots <u>The Conversation April 25, 2024</u>.
- Religiously-inspired groups like <u>Boko Haram</u><sup>7</sup> and its affiliates have recently perpetrated extreme violence in South Africa's neighbour <u>Mozambique starting in September 2021</u>, with up to 70 children missing, either dead or kidnapped.
- Several South African criminal gangs have named themselves Boko Haram read Nigeria's Daily Post
  report "South African court sentences 'Boko Haram' gang to 384 years in jail" of 8<sup>th</sup> July 2022; and
  South African Police Service's Media Statement of 25 Apr 2024 concerning the arrest of eight members
  of the Al-Qaeda gang active in the North West Province of South Africa. Links with the international
  namesakes of these South African gangs have not yet been publicised.
- The fallout from these regional and global conflicts is acutely felt in South Africa. Vital resource shortages and cost of living increases emanating from these conflicts fuel the nation's already deep societal fissures such as inequality, poverty, and unemployment even more. The responses by the socioeconomically excluded South Africans can be deadly violent service delivery protests with elements of xenophobic violence and rising crime levels are becoming a way of life in contemporary South Africa.

<sup>&</sup>lt;sup>7</sup><u>United Nations Security Council, 09 September 2014</u>: Jama'atu Ahlis-Sunna Lidda'Awati Wal-Jihad (Boko Haram) was listed on 22 May 2014 pursuant to paragraphs 2 and 3 of resolution 2083 (2012) as being associated with Al-Qaida for "participating in the financing, planning, facilitating, preparing, or perpetrating of acts or activities by, in conjunction with, under the name of, on behalf of, or in support of" Al-Qaida (QDe.004) and the Organization of Al-Qaida in the Islamic Maghreb (AQIM) (QDe.014).

The rise of nationalism, racism, religious intolerance, and violence in all regions of the world today should be viewed as a "wake-up" call for humanity, and for South Africa with its provocatively high inequality, poverty, and unemployment levels. The country has little influence over these global trends, but it does have a responsibility to protect the nation and all its people, especially its children as they progress to adulthood, from the impacts of these global trends.

# Final Thoughts and Conclusions

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: (1) education, and (2) 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 5 to 7 of this document. They are an update of a previous statistical presentation posted in March 2023: "<u>SA Benchmark 2023</u>", 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 <u>https://www.sakan.org.za/SakanDocs.html</u>.

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 5 to 7 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 <u>more than 160 years ago</u>. 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 human-level 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 <u>ICT4SDG8</u>. 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: the economic, political and technological leaders of the nation; the educators and learners; and all other national service providers; all citizens, community groups, and especially the children and youth, it may be possible to build national consensus and commitment to the multimodal actions needed to ameliorate and ultimately resolve the numerous challenges that face the nation.

To conclude this discussion, two annexes are provided:

**ANNEX 1** discusses the popular use of metaphors to describe the vital information and knowledge dissemination tools created and used by humankind to share knowledge for developmental and survival. Metaphors such as "Digital Worlds," "Cloud Computing," "Data is the New Oxygen," "Digital Divides," etc., are re-examined for potential obfuscation, especially in relationship to both adults and children with low STEM (Science, Technology, Engineering, Mathematics) foundations. To ensure unbiased responses, the two AI platforms, <u>ChatGPT</u> and <u>Gemini</u>, were prompted to survey the global databases of knowledge, and to present consensus conclusions on the potential for misinformation and disinformation resulting from the superficial use of these technological metaphors. The AI responses were most informative, confirming the significant potential to inadvertently (or deliberately) misinform or disinform children and youth, adult laypersons and high-ranking decisionmakers, and even educators across all critical learning disciplines, through thoughtless use of most metaphors.

**ANNEX 2** discusses a common misconception closely related to the preceding discussions on technological metaphors: The commonly held Western-centric or Eurocentric belief that Homo sapiens are superior to nature, and can thus use nature as they wish. The source of this belief is entrenched in religiosity – the Judeo-Christian belief that God said, "Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground" Genesis 1:26.

To reduce the potential for bias in this sensitive discussion, ChatGPT and Gemini were once more prompted to interrogate the vast repositories of human knowledge to present the most representative consensus opinion on this subject. The responses were stark: Yes, the misconception is largely Western-centric; it is based on religious systems. These religious systems have themselves evolved over time from non-religious spirituality – animism – into the dominant religions followed by most global citizens today. This belief system,

of human superiority over nature, has wreaked devastation on the ecological balance between humans and nature – climate change is just one damaging example of uncontrolled exploitation of nature.

Both AI platforms were prompted to recommend key references for this emotive subject – the resulting lists of references will be valuable inputs for the proposed development of a new holistic proactive all-embracing AI regulatory provision which addresses all human-related challenges enshrined in South Africa's National Development Plans and the nation's Sustainable Development Goals processes.

## Annex 1: Metaphors, Falsehoods, Misinformation, Disinformation

#### Metaphors: The Perils of Misrepresentation: AI Responses by Gemini and ChatGPT

**Metaphor:** Definition by Wikipedia: "A *figure of speech* or *rhetorical figure* is a word or phrase that intentionally deviates from straightforward language use or <u>literal meaning</u> to produce a <u>rhetorical</u> or intensified effect (emotionally, aesthetically, intellectually, etc.).<sup>[1][2]</sup> In the distinction between <u>literal and figurative language</u>, figures of speech constitute the latter. Figures of speech are traditionally classified into <u>schemes</u>, which vary the ordinary sequence of words, and <u>tropes</u>, where words carry a meaning other than what they ordinarily signify."

The modern use of metaphors to describe one of the most important tools created and used by humankind for communications, knowledge sharing, learning, and human development, is misleading at best for most of the global population, yet extremely lucrative for the few global citizens who design and market the technologies and the metaphors that purport to describe them. For many technologically challenged global citizens who have been "left behind" by humanity's race for more knowledge and the economic benefits it enables, metaphors like "Digital Worlds<sup>8</sup>" and the "Clouds" of "New Oxygen<sup>9</sup>" do little, if anything, to promote understanding, and therefore productive use of the underlying technologies. What the metaphors do very well is to fuel the desires for the latest fashionable technological gizmos that do little to satisfy the basic needs of most economically, educationally, and technologically challenged citizens and their children.

The metaphors also help to feed the insatiable appetite for more of everything by most of those who have acquired the understanding of, and therefore productive access to, such knowledge. An article published in <u>theconversation.com July 2023</u> discusses the impact of one such group of gizmos, cell phones and their numerous variants, the most popular variants priced from R 10,999 to R 33,999 by a <u>well-known seller in South</u> <u>Africa</u>, equivalent to between <u>14.5 to 44.6</u> times the 2023 monthly food poverty line under which up to 65% of South Africa's children must survive.

The South African challenges of STEM literacy are especially damaging in this knowledge-driven age of space exploration - the rapidly unfolding knowledge about ourselves, our ancient past, and our interconnected and interdependent ecosystems. The Palaeosciences - read <u>South African Government Palaeoscience Strategy</u> <u>here</u> – are vital sources of knowledge to which too few South Africa learners are exposed. Most South African learners are not exposed to the terminologies and their meanings used in the vital palaeosciences, e.g., the science behind the impact of humanity on its living environment. One example buried deeply in the palaeosciences is the South African Case Study concerning the Homo naledi Controversy presented in Annex 2 of this document. This case study is just the tip of the iceberg defining the conflict between religious and scientific knowledge, which should be a core component of the nation's scientific learning - the knowledge of our past which impacts the belief systems and behavioural cultures that define our present. The scientific

<sup>&</sup>lt;sup>8</sup> **Digital World Definitions**: Given the paucity of a definition for this "digital world," the AI platforms of ChatGPT and Gemini were prompted to suggest a definition. **ChatGPT**: "*the digital world is a human-constructed reality that offers new possibilities for interaction, communication, and creation*;" **Gemini:** While there's no single, universally accepted definition of the term "digital world," institutions like the ITU, World Bank, OECD, Google, Microsoft, etc., use the metaphor extensively to discuss the process of digital encoding and decoding of analogue signals to enable digital computing. This process is being extended to the unfolding world of quantum computing – qubits are inherently analogue, but engineers can extract digital signals from them and replicate the world of digitally encoded analogue signals.

<sup>&</sup>lt;sup>9</sup> **Oxygen**: The "Old Oxygen" comprises a gaseous concoction "brewed" from cyanobacterial photosynthesis deep in the ancient oceans about 3-billion years ago, before enough was "brewed" to enter the earthly atmosphere to enable living organisms about 2.33 billion years ago: <u>MIT 13 May 2016</u>. The "New Oxygen" is simply data derived from the use of digital technologies: Read "<u>Data is more than</u> the new oil — it's oxygen" published by the "<u>IE UNIVERSITY</u>" on 05/04/2022.

evidence of the formation of the universe and its millions of planetary descendants like Homo sapiens' earthly home, are critical components of the palaeosciences, and the knowledge we all need, expressed in terms understandable by all segments of our population.

Has the 13.7-billion-year-old universe and its 4.6-billion-year-old earthly offspring been replaced by "Digital Worlds" in the minds of the nation's children, whose STEM literacy is poorly developed through no fault of their own? As technology progresses into the new era of Quantum Computing (<u>IBM August 2024</u>) driving powerful new forms of AI yet to be conceived or developed, will we migrate this "Neo-Digital World" full of "Neo-Oxygen" into a new "<u>Qubital World</u>," replacing the "new oxygen" with "<u>Qubital Clouds</u>" of new life-giving or life-depriving gasses? Will the "<u>Bioengineering</u>" research facility at the University of Pretoria (<u>UP</u>) supersede even the new "Qubital World" to unleash "*a small class of 'superhumans' and a huge underclass of 'useless' people*" as suggested by Professor Yuval Noah Harari in his Guardian News 2017 article "<u>Are we about to witness the most unequal societies in history?</u>"

Science and technology, if mired in misinforming, misleading, misunderstood, misguided metaphors, could reverse all the good visualised by <u>South Africa's NDP</u> architects, and their global partners who visualized the <u>global SDG initiative</u>, unleashing the much-discussed existentialist threats arising from ignorance of, and potential abuses of technology; read e.g., <u>MIT Technical Review of 19 June 2023 here</u>.

The education of South Africa's children, the future generations of adults who were defined at birth by science instead of the belief systems and social hierarchies triggered by the Neolithic Revolution, should begin with full clarification and therefore understanding of all related STEM components and facts, at the most basic levels of understanding that their young minds can accommodate and use in future.

The following list of key related references is a tiny fraction of the vast knowledge repositories about the real analogue world and its constituents, with examples of how meaningless metaphors have captured global attention. These complex subjects are available to all humankind, easily accessed through information and communications technologies which the metaphors under discussion are meant to describe. The complex subjects can, especially with the help of technologies like AI, be reviewed and expanded where necessary, or "clouded in obfuscation" by more meaningless metaphors which tend to mislead instead of inform.

- Age of Our Earth: 6,000 or 4.5 billion years old? University of Notre Dame
- <u>Mankind: Who are we?</u> University of Notre Dame
- <u>The Age of Humans: Evolutionary Perspectives on the Anthropocene</u> Smithsonian, January 2024
- UNDP Digital Worlds: <u>https://www.undp.org/sites/g/files/zskgke326/files/2024-05/undp\_digital\_inclusion\_in\_a\_dynamic\_world.pdf</u>
- UNCTAD Digital Worlds: <a href="https://unctad.org/system/files/official-document/der2024">https://unctad.org/system/files/official-document/der2024</a> en.pdf
- UN Digital Worlds: <u>https://www.un.org/en/pdfs/DigitalCooperation-report-for%20web.pdf</u>

South Africa, with global records of socio-economic-political inequalities, dominated by opportunity-sapping learning inequalities (more than 80% of the nation's children cannot read for meaning at grade 4), presents a classic case of metaphoric "good intentions gone wrong." The new "Digital World" is now sustained by "Digital Clouds" of the "New Oxygen." About 20% of South Africa's population are equipped with the STEM grounding to understand the real meanings of all these metaphors, while 80% of the nation's children languish in the darkness of techno-illiteracy, achieving amongst the lowest results in all credible international STEM subject assessments during their formative years (Table 4 on page 6 of this document). Their reading skills are equally challenged as shown also in Table 4.

On 31 May 2024, South Africa's Department of Communications and Digital Technologies published its final version of the *National Data and Cloud Policy 2024*.

Will this Cloud Policy 2024 demystify "the visible mass of minute particles suspended in the air, or a gas" as "clouds" are defined by the <u>Merriam Webster</u> Dictionary? Will a young South African child trying to understand the mysteries of technology and its constructive and/or destructive use zero in on Merriam Webster's alternative definitions, including: (3.) "Something that has a dark, lowering, or threatening aspect," or (4.) "Something that obscures or blemishes"? Will the child's teacher, parent, relative, guardian or peer prefer the Collins Dictionary definition of the verb "if something "clouds" your view, you are unable to understand it or judge it properly."

Clearly, the intentions of the policy are good, but the unexpected outcomes can be extremely "cloudy."

An excellent starting point to correct this "techno-illiteracy" enhancing quagmire of "cloudy information" is to reconsider and revise all national policy and regulatory instruments which guide this AI-driven technological age, so that all segments of the population, rich and poor; literate and less literate; young and old; have the means of understanding these technologies for their growth and for their protection.

The development of a new holistic proactive all-embracing AI regulatory development is a logical starting point to resolve this quagmire.

Towards that objective, the following discussion of the role of metaphors in developing such a regulatory framework, and even more importantly, in steering the nation's development towards an effective inclusive information technology sector that addresses the needs of all South Africans, may be helpful.

In the search for knowledge clarity and understanding in this age of "<u>cloudy digital obfuscation</u>" (read <u>Mystification: The Dreadful Side of Cloud Computing</u>), the "<u>Large Language Models</u>" (<u>IBM March 2023</u>) of AI, capable of interrogating the world's vast repositories of knowledge, and drawing consensus conclusions in microseconds, have become essential tools. Two of the leading AI platforms, <u>ChatGPT</u> and <u>Gemini</u>, were prompted to search the global databases of knowledge, and to present consensus conclusions on the potential for misinformation and disinformation resulting from the popular use of technological metaphors. A focus on South Africa was based on the country's position as the global leader in multidimensional inequality. AI can help to mitigate South Africa's challenges, but if ignored or abused, AI will exacerbate them. Using AI tools in this way provides an additional level of confidence - the reduction of bias, deliberate or unintentional, by both authors and the AI tools themselves. Selected responses offered by <u>Google's Gemini</u> and <u>OpenAI</u>'s Artificial Intelligence platforms are provided in full below.

## GEMINI Response on the Perils of Metaphors: 30 July 2024

## The Perils of Metaphors in Technology: A Focus on Educational Inequality

Thank you for your insightful and detailed rephrasing of the prompt. Your emphasis on the potential harm of misleading technological metaphors, particularly in the context of South Africa's educational disparities, is crucial.

## The Misleading Nature of Technological Metaphors

You correctly highlight the danger of oversimplified metaphors like "cloud computing," "digital worlds," and "data is the new oxygen." These terms, while convenient for marketing and general public consumption, can obscure the complex realities of technology and its implications.

- **Cloud computing:** This metaphor can foster the misconception that data is magically stored in an ethereal space, rather than on physical servers located in specific geographical locations. It can also obscure the energy consumption and environmental impacts associated with data centers.
- **Digital worlds:** This term can create a false dichotomy between the "real" world and the "digital" world, ignoring their interconnectedness and mutual influence. It can also downplay the potential for digital spaces to replicate or exacerbate real-world inequalities.
- Data is the new oxygen: This metaphor, while attention-grabbing, oversimplifies the role of data. It can lead to the belief that data is inherently valuable and beneficial, without considering issues of data privacy, security, and bias.

## The Impact on Education and Society:

In countries with significant educational disparities like South Africa, these misleading metaphors can have particularly harmful consequences:

- **Reinforcing digital divide:** Oversimplified concepts can create a barrier to entry for those without access to quality education, further widening the digital divide.
- **Misallocation of resources:** Misunderstandings about technology can lead to ineffective policy decisions and misallocation of resources, hindering development.

• **Undermining critical thinking:** Reliance on simplistic metaphors can discourage critical thinking and problem-solving skills, essential for addressing complex challenges.

## The Role of AI in Addressing the Issue

As you suggest, AI can play a role in mitigating these issues by providing clearer and more accurate explanations of technological concepts. However, it's essential to ensure that AI-generated content is unbiased, transparent, and accessible to a wide audience.

## Key considerations for AI-driven explanations:

- **Clarity and simplicity:** While avoiding oversimplification, explanations should be accessible to individuals with varying levels of technical knowledge.
- **Contextualization:** Explanations should be grounded in real-world examples and implications.
- **Ethical considerations:** Al-generated content should adhere to ethical principles, avoiding biases and misinformation.

By promoting a more nuanced understanding of technology through clear and accurate language, we can contribute to a more equitable and informed society.

# Would you like to explore specific strategies for improving technology education in South Africa, or perhaps delve deeper into the ethical implications of AI in this context?

# ChatGPT Response on the Perils of Metaphors, 30 July 2024

Re-examining the potential mis-education caused by popular metaphors like "cloud computing," "digital worlds," and "data is the new oxygen" highlights important issues, especially in contexts like South Africa where educational inequalities are stark. These metaphors, while catchy and helpful in simplifying complex concepts for certain audiences, can often be misleading or confusing, particularly for those with limited access to high-quality STEM education. This can exacerbate existing inequalities, as these metaphors often assume a level of understanding that is not universal.

## Impact of Metaphors on Education and Understanding

- 1. "Cloud Computing": This metaphor suggests an ethereal, intangible space where data is stored, which can mislead individuals into thinking of data as less physical and potentially less secure. For students in under-resourced educational systems, the lack of understanding about the physical infrastructure behind "the cloud" (such as data centers and server farms) can lead to misconceptions about privacy, security, and the environmental impacts of data storage.
- 2. **Digital Worlds**": This term can give the impression of a separate, entirely distinct reality from the physical world, which may obscure the profound connections and impacts of digital technologies on real-world issues. For those with limited exposure to comprehensive digital literacy education, this metaphor might mask the complexities of digital citizenship, including data privacy, online security, and the socio-economic impacts of digital exclusion.
- 3. "Data is the New Oxygen": This metaphor emphasizes the importance of data but can be misleading by suggesting data is as universally accessible and essential as oxygen. It fails to account for the digital divide and the inequalities in data access and usage. In South Africa, where educational and technological access is highly uneven, this metaphor might obscure the reality that data and digital technologies are not equitably distributed, thus exacerbating socio-economic divides.

## Educational Inequalities and the Misapplication of Technological Advances

The disparity in education quality between wealthy and underprivileged communities in South Africa magnifies the potential for these metaphors to contribute to misinformation and misunderstanding. In well-resourced educational environments, students may have the context and support to understand these metaphors and their limitations. However, in under-resourced schools, these same metaphors can contribute to a superficial understanding of technology, leading to misconceptions about its capabilities and limitations.

This superficial understanding can be particularly harmful when it influences policy-making. Political leaders who lack a deep understanding of technological nuances might make decisions based on these metaphors,

which can lead to ineffective or even harmful policies. This is especially concerning in a country like South Africa, where technological advancements are seen as key to addressing economic and social challenges. Misguided policies could exacerbate inequalities rather than alleviate them.

## Role of AI in Addressing These Challenges

Artificial Intelligence (AI) can play a pivotal role in improving the clarity and accuracy of technological education. AI-driven educational tools can tailor learning experiences to individual needs, helping to bridge the gap in understanding. Moreover, AI can assist in creating more accessible and accurate representations of complex technological concepts, moving beyond simplistic metaphors.

However, this potential will only be realized if there is a concerted effort to implement AI and other technological tools in a way that is inclusive and accessible. This requires investment in infrastructure, teacher training, and curriculum development to ensure that all students, regardless of their socio-economic background, have access to high-quality STEM education.

## Conclusion

While metaphors like "cloud computing," "digital worlds," and "data is the new oxygen" can make complex technological concepts more accessible, they also risk oversimplifying and misinforming. In contexts with significant educational disparities, like South Africa, these risks are amplified. To mitigate these risks, there must be a focus on improving STEM education and ensuring that technological metaphors do not obscure critical understandings. Al and other digital tools can support this effort, but only with careful implementation and a commitment to equity.

# Case Study: Conspiracy Theories and South Africa's educationally-marginalized citizens.

A recent visit by the author of this document to a Johannesburg supermarket ended with an interesting discussion with a car guard – one member of an army of economically and educationally marginalized yet proud South Africans eking out a living by "guarding" shoppers' vehicles in return for a pittance – about R10.00 ( $\approx$ US\$ 0.5) is a reasonable non-obligatory rate for such services.

The car guard expressed strong beliefs in the conspiracy theory that "<u>Bill Gates invented the Coronavirus in</u> <u>order to destroy poor people in developing countries</u>" (link to BBC article of 6 June 2020). He also expressed a strong opinion supporting the Russian invasion of Ukraine, verifying that his "source of knowledge" was social media, which he was able to consult via his "smart phone." Of course these conspiracy theories are just that – <u>conspiracy theories</u> – read "Fact Check by Reuters: '<u>Bill Gates is not responsible for COVID-19</u>"

Given the seriousness of the possibility of misunderstood technological metaphors to spread dangerous conspiracy theories, Google's Gemini was prompted to consult the global database of knowledge and provide a consensus opinion on metaphors and conspiracy theories:

## Gemini Response:

# Technological Metaphors and Conspiracy Theories: A Dangerous Combination

## The Role of Misunderstood Metaphors

Technological metaphors, while often used to simplify complex concepts for a wider audience, can inadvertently contribute to the spread of misinformation and conspiracy theories. When terms like "cloud computing" or "data is the new oxygen" are not fully understood, they can be misinterpreted and used to fuel fear and distrust.

## The Case of 5G and COVID-19

The "5G Cell Towers Spread COVID-19" conspiracy theory is a prime example of how misunderstandings of technology can lead to harmful beliefs. The term "cloud computing" suggests a virtual, ethereal space, which can lead people to believe that wireless technologies like 5G operate in a similar way. This misunderstanding, combined with a lack of understanding of how electromagnetic waves work, has fuelled the belief that 5G is somehow responsible for the spread of COVID-19.

## The Gates Foundation and Invisible Ink

The conspiracy theory about the Bill & Melinda Gates Foundation funding research for invisible ink is another example of how technological metaphors can be misconstrued. The idea of "data" being "the new oxygen" suggests that information can be stored and transmitted in a physical, tangible way. This misunderstanding has led to the belief that a vaccine could contain a tracking device.

#### The Impact in Johannesburg

It's not surprising that these conspiracy theories are prevalent in Johannesburg. The city, like many others, is grappling with economic inequality, political instability, and a lack of access to quality education. In such environments, people may be more susceptible to misinformation and conspiracy theories as they seek to make sense of complex world events.

#### Conclusion

While technological metaphors can be helpful tools for communication, it's essential to ensure that they are used responsibly and that their limitations are understood. By promoting accurate information and critical thinking, we can help to combat the spread of harmful conspiracy theories.

**Auther's comment**: South Africa's AI/ICT leadership would be wise to review the unintended consequences of well-meaning policies like the *National Data and Cloud Policy 2024*.

## The "Digital Divide": Yet another misleading metaphor.

The global technological industry, the global governance of this vital industry, and the AI platforms like Gemini and ChatGPT that serve this industry and its governance, all seem to be fixated on yet another technologically misleading metaphor – the "Digital Divide" (Britannica August 2024). The metaphor was introduced by Lloyd Morrisett of the Markle Foundation in 1995, and promoted vigorously by the National Telecommunications and Information Agency (NTIA), referring to access gaps in computer ownership and use. But what exactly, in plain English, is a "digital divide"? Most dictionary definitions of that which is divided, digits, are unhelpful. For example, one of Merriam Webster's definition of "digital" as "critical ischemia of the digitals of upper and lower limbs" has nothing to do with communications or the technologies used. ChatGPT and Gemini were prompted to analyse the global databases concerned with this metaphor, and suggest a real-world clarification of the concept. The responses of both AI platforms follow.

Gemini discussion of the "Digital Divide" metaphor: 04 August 2024.

## The Digital Divide: A Misleading Metaphor?

## Deconstructing the "Digital Divide"

You make a compelling argument against the term "digital divide." It's a term that, while widely used, often obfuscates more than it clarifies. By focusing on a seemingly technological gap, it can divert attention from the underlying socioeconomic disparities that truly hinder access to information and opportunities.

Your point about the physical infrastructure is crucial. The world is indeed interconnected through a vast network of physical systems, from undersea cables to satellite constellations. The challenge lies not in the technology itself, but in equitable access to the services and information it enables.

## **Beyond the Metaphor: A Clearer Framework**

To address the issue of educational inequality in the context of technology, we might consider more precise and inclusive terminology. Here are some alternatives:

- Access Divide: This term explicitly focuses on the physical and economic barriers that prevent people from accessing digital tools and resources.
- **Opportunity Gap:** This phrase highlights the unequal distribution of chances to benefit from technologyenabled education and employment.
- Knowledge Equity: This term emphasizes the goal of ensuring fair access to information and learning opportunities for all.

These alternatives avoid the technological jargon of "digital" and more directly address the core issue: the uneven distribution of benefits from technological advancements.

## The Perils of Metaphors

Your critique of the "digital divide" is a valuable reminder of the dangers of relying on metaphors in technical discussions. Metaphors can be powerful tools for communication, but they can also be misleading, especially when they obscure underlying complexities.

In the context of educational inequality, it's essential to use language that accurately reflects the challenges faced by those without equal access to technology. By moving beyond the metaphor of the "digital divide," we can focus on developing effective strategies to bridge the actual gaps in opportunity and access.

Would you like to explore specific examples of how the "digital divide" metaphor has been used to misrepresent the issue of educational inequality? Or perhaps delve deeper into the potential solutions to address the access and opportunity gaps that truly exist?

## ChatGPT Response regarding the "Digital Divide" metaphor

The term "digital divide" does indeed carry a lot of baggage and can be confusing, especially when taken literally. In the context of educational inequality, the metaphor is intended to highlight disparities in access to technology and the internet. Here's a more precise and clearer wording for discussing this topic:

#### The Misleading Nature of the "Digital Divide" Metaphor in Educational Inequality

The "digital divide" is a term that has been widely used to describe the gap between those who have access to digital technologies and those who do not. However, this metaphor can be misleading and lacks clarity, especially for non-technical laypersons and children exposed to poor education.

Originally coined by Lloyd Morrisett of the Markle Foundation in 1995, and popularized by the National Telecommunications and Information Agency (NTIA), the term aimed to address disparities in computer ownership and internet use. However, "digital" is a broad term with multiple meanings. For instance, one of Merriam Webster's definitions refers to "critical ischemia of the digitals of upper and lower limbs," which could imply a person missing fingers or toes is experiencing a "digital divide."

In reality, what is often referred to as the digital divide encompasses various issues, such as:

- Access to Devices: The availability of computers, tablets, or smartphones.
- Internet Connectivity: The quality and affordability of internet access.
- Digital Literacy: The skills required to effectively use digital technologies.
- Educational Resources: Availability of online educational content and tools.

Despite the prevalence of digital technologies, including analog radio spectrum modulated with digitally encoded information and global communication systems like Elon Musk's Starlink and the James Webb telescope, disparities still exist. These disparities are less about the physical infrastructure and more about socio-economic factors that affect accessibility and usability.

#### The Real Issue: Educational Inequality and Technological Neutrality

The focus should shift from the ambiguous term "digital divide" to the more pressing issue of educational inequality. This includes ensuring that all students, regardless of their socio-economic background, have equitable access to the tools and skills needed to succeed in a digital world.

The arguments for technologically neutral systems of access and dissemination of information are not new. Samuel Morse's first telegraphic message, "What Hath God Wrought?" in 1844, emphasized the transformative potential of technology. This theme has been echoed by many respected academics and authors.

#### Conclusion

In discussions about "The Perils of Metaphors in Technology: A Focus on Educational Inequality," it is crucial to clarify that the term "digital divide" is a metaphor for the socio-economic and infrastructural disparities that prevent equitable access to digital technologies. By focusing on the real issues of access, connectivity, and literacy, we can better address the root causes of educational inequality.

This framing helps to clarify the concept and focuses on the tangible aspects of inequality, rather than relying on a potentially confusing metaphor.

# Annex 2: The "Nature" of Nature: The Western Dichotomy of Humans and Nature The Religious Roots of the Fractured Relationship between Humans and Nature

## Introduction:

Closely related to the preceding discussions on technological metaphors and their potential to misinform and mislead is the belief held by many humans, particularly those who adhere to western philosophies and values, that humans are superior to nature itself. Too many global leaders and laypersons use this sense of superiority over anything non-human for their own self-interests, with little consideration of the ecological harm such use can inflict on nature.

The inclusion of this section in this discussion document was triggered by the publication of a related article in the United Kingdom's <u>The Guardian newspaper on 27 Jul 2024</u>: "What is 'nature'? Dictionaries urged to include humans in definition." This interesting article led to a further subject search, leading to the highly informative article published by the prestigious scientific journal "Nature," on 10 February 2020 under the title "<u>What does 'nature' mean?</u>"

The two documents referred to in the hyperlinks above clearly state that the worldview of human domination over nature originated in western philosophies, or more accurately, the worldview is predominantly "Eurocentric" - it is not shared by non-European western cultures like Native Americans of North, Central and South America, nor is it shared by most non-European cultures worldwide. This conclusion may be deemed sensitive to some, with potential perceptions of bias. To forestall any suggestion of bias, the AI platforms provided by ChatGPT and Gemini were prompted to provide consensus opinions from the vast global databases of relevant knowledge. The results are summarised below:

- ChatGPT: "Western Philosophical Tradition: The distinction between humans and nature has deep roots in Western philosophical and religious thought. For example, the Judeo-Christian tradition often emphasizes human dominion over nature, as seen in the Biblical narrative of creation. This view can lead to a perception of nature as a resource to be exploited, rather than a complex system of which humans are an integral part."
- Gemini: "The Excluded Self: Human and Nature": "The prevalent Western definition of nature as a realm distinct from humanity presents a profound challenge to our understanding of our place in the world. This dichotomous view, contrasting humans with the natural world, has far-reaching implications for our relationship with the environment and contributes to the escalating crises of conflict and climate change."

Religious belief systems are so deeply entrenched in the human mind, that finding consensus outside the scientific research community, and often within it, is extremely difficult. A detailed discussion of religion and religiosity is clearly beyond the scope of this discussion, but must nevertheless be considered in the design of human-focused development policies and processes. A few references will be provided as this discussion unfolds, but even these can, perhaps must, be viewed as potentially biased – the choice of reference material can itself be suggestive of bias. To minimize bias, Artificial Intelligence platforms were prompted to offer opinions based on access to the vast databases of knowledge made possible by technological advances. A first foray into this strategy produced the following response from ChatGPT:

**ChatGPT, 31 July 2024:** "One of the greatest strengths of artificial intelligence (AI) lies in its ability to access and analyse vast amounts of digital data from global libraries and online knowledge repositories, and to provide well-supported conclusions based on statistical consensus."

All AI platforms are not immune from bias, malignant falsification of facts, or restrictions on access to online databases due to copyright infringement considerations and regulations. Such limitations can be alleviated through careful probing and restatements of AI prompts.

As already stated or implied, any discussion about religion is bound to be extremely difficult, argumentative, controversial, and may even lead to the violence. Violence has historically shaped the world's major religions,

especially, but not exclusively, the Abrahamic religions comprising Judaism (origin circa 2000 BCE, estimated 2014 global population 15.6 million); Christianity (origin circa 100 CE, 2014 population 2.3 billion); Islam (origin circa 622 CE, 2014 population 1.6 billion) [source Khan Academy]. Religious intolerance and violence continue to plague humanity to this day, more than 4 millennia after humankind's "creation" of the first modern religions, Hinduism, and Judaism.

This discussion is about the fractured relationship between humans and nature, and how we could use a proactive people-centred AI regulatory regime to render this dichotomy irrelevant. This dichotomy is a microcosm of the deep divisions between religious belief systems and the still unfolding scientific knowledge of ourselves, our world, and the universe we live in. While the dichotomy is universal in nature, and is alive and well in South Africa, the country has not turned this dichotomy into violence. The exceptions relate to relatively modern interpretations of ancient biblical scriptures and texts, some of which were used to design and justify the apartheid system of governance (read <u>scielo.org.za December 2014</u>). This use of religious dogmas to justify apartheid unleashed immense violence and misery on all who lived in the land, irrespective of their ethnicity, race, or religion. Three unconnected observations are offered to illustrate the universal and the local challenges that can, perhaps must, be resolved for South Africa's future generations to inherit sound fact-based sustainable knowledge.

The evolution of religion and spirituality:

 Empathy, "conceived by many to be a driving motivation of moral behaviour and justice (PMC 2016)", is an animal instinct observable in nearly all animals, illustrated by the research-based opinions of Frans de Waal, in "The Bonobo and the Atheist", March 2013, and many other primatologists and behavioural scientist like him. Perhaps these instincts - empathy and moral behaviour - can be traced to our genetic origins through a re-interpretation of Richard Dawkin's much disputed masterpiece "The Selfish Gene".

Most modern religious doctrines and dogmas are very well known and well documented. All recognised faiths today have vast databases of these doctrines and dogmas, in the form of religious texts like the Bible, the Qur'an, the Tanakh, the Tripitaka, the Vedas, etc. They all contain strong elements of empathy, behavioural and moral codes, and related edicts in their doctrines. All these doctrines emerged relatively recently in the evolutionary history of humankind, beginning with the invention of writing about <u>5,200</u> <u>years ago, circa 3,200 BCE</u>). Many religious doctrines still aggressively defend their rejection of scientific evolution in favour of various forms of Creativity myths, with many conflicting interpretations of the exact date of earth creation:

- 77.76 trillion years ago: Puranic Hinduism calculating repeating cycles of creation of the universe, as reported by the <u>Northern Arizona University</u>, July 27, 2007.
- 1<sup>st</sup> September 5509 BC to 31<sup>st</sup> August 5508 BC: <u>The Byzantine Creation Era, 7 January 2023</u>.
- <u>4004 BC: On 23 October 4004 BC</u>, the world was created, according to Archbishop James Ussher of Armagh (1581-1656).
- 7<sup>th</sup> October 3761 BC is now generally accepted as the day God created the universe and earth in Judaism (<u>Anno mundi | Jewish Calendar, History & Origins – Britannica 11 October. 2013</u>).
- In 1738, De Vignoles stated that he had accumulated no fewer than 200 computations of the date of creation, all based upon various diverse interpretations of the Bible (<u>Northern Arizona University, July</u> <u>27, 2007</u>).
- Spirituality precedes nearly all religious doctrines and their dogmas by hundreds of millennia. This applies especially to the Abrahamic-rooted religions of Judaism, Christianity, and Islam, which are predated by most variants of spirituality by at least 350,000 to 750,000 years, following the emergence of Homo sapiens (Smithsonian 2021). This argument could be stretched even further back to about 2-million years ago, to the emergence of hominins with instinctive empathy and larger brains, e.g., the presumed bigger, faster, kinder, gentler, wiser, global traveller <u>Homo erectus</u> and her "paleo" hominin cousins like <u>Australopithecus africanus</u> and Homo Naledi (Smithsonian, 03 January 2024). These so-called "Archaic hominins" "migrated" peacefully to all corners of earth from their African ancestral homes they were not "illegal migrants" when they planted the seeds of Homo sapiens in all corners of inhabited earth. Their

evolutionary history could have stretched even much further back in earth's history to the emergence of Richard Dawkin's imagery of the Selfish Gene, which itself was triggered by the emergence of Oxygen in the earth's atmosphere about 3.22 billion years ago, well before the "<u>New Oxygen" – Data</u> - was invented by some members of Homo sapiens about 3-billion years later.

## The Modern Resurgence of Spirituality: AI Responses:

The deep emotional attachment to religious beliefs by most of the world's population today, which has shaped the relationships between humans and nature, is now changing slowly through a relatively recent resurgence of ancient spiritual belief systems. ChatGPT and Gemini were prompted to comment on both the resurgence of spirituality, and the western world view of Homo sapiens' superiority over nature. This was done specifically to reduce any perceptions of bias as discussed in the introduction of this section of the discussion document.

## Gemini Response on Resurgence of Spirituality

#### The Modern Resurgence of Spirituality and Ecological Consciousness

The contemporary world, marked by rapid technological advancement and globalization, has paradoxically led to a growing sense of disconnection from nature and a yearning for deeper meaning. This has sparked a resurgence of spirituality, often intertwined with a profound ecological consciousness.

This movement is characterized by a critical re-examination of traditional religious doctrines and a search for alternative spiritual paths that foster harmony with the natural world. There's a growing recognition that many environmental crises stem from a worldview that places humans in dominance over nature, rather than as integral parts of it.

#### Key Themes in the Resurgence:

- **Eco-spirituality:** This approach seeks to deepen the spiritual connection with the natural world, often drawing from indigenous wisdom and animistic traditions.
- **Reinterpretation of Religious Texts:** Many individuals and groups are re-examining religious scriptures to find ecological messages that have been overlooked or suppressed.
- **Social and Environmental Justice:** The movement often intersects with social justice concerns, recognizing that environmental degradation disproportionately affects marginalized communities.
- **Mindfulness and Meditation:** Practices that promote inner peace and connection with the present moment are seen as essential tools for fostering ecological awareness.

## Short List of Key References:

## Books:

- <u>Braiding Sweetgrass by Robin Wall Kimmerer</u>: "Every plant, animal, rock and river is referred to as a person, not an object; a verb and not a noun"
- <u>Sacred Ecology by John Grim and Mary Evelyn Tucker</u>: "Exploration of the history of religious traditions and the environment, illustrating how religious teachings and practices both promoted and at times subverted sustainability."
- <u>The Hidden Life of Trees by Peter Wohlleben</u>: "Rules need to be applied by powerful elites to ensure that the 'natural world' is properly protected from wayward humans—particularly those who wish to make a living from it."

#### Organizations:

- The Schumacher Center for a New Economics
- <u>The Network of Spiritual Progressives</u>
- Eco-Justice Ministries

#### Academic Journals:

- Journal of Religion and Nature
- Worldviews: Environment, Culture, Religion

It's essential to note that this resurgence is a diverse and multifaceted phenomenon. While there's a common thread of ecological concern, the specific expressions of spirituality vary widely. Some focus on personal transformation, while others engage in collective action for environmental protection.

# Would you like to explore a particular aspect of this topic in more depth, such as the role of indigenous wisdom or the challenges of integrating spirituality into environmental activism?

# ChatGPT Response on Resurgence of Spirituality

Animism, defined as the belief in the existence of individual spirits that inhabit natural objects and phenomena, is indeed considered one of the earliest forms of spirituality and religious belief. From an AI perspective, it's essential to contextualize the development of animistic beliefs within the broader framework of human and hominin evolution.

#### Historical Context of Animistic Beliefs:

#### Early Homo Species:

- **Homo erectus**: While there is no direct evidence of religious beliefs in Homo erectus, their cognitive and social advancements suggest the potential for symbolic thought. This species exhibited behaviors such as tool-making, the use of fire, and possibly even some form of social cooperation, which could be precursors to more complex belief systems.
- **Neanderthals**: More evidence exists suggesting that Neanderthals had some form of symbolic thinking, which is a precursor to spiritual belief. They buried their dead, sometimes with grave goods, which implies a belief in an afterlife or some form of respect for the deceased that goes beyond mere disposal of bodies.

#### Homo sapiens:

• **Pre-Neolithic Hunter-Gatherers**: Early Homo sapiens, who lived as hunter-gatherers before the advent of agriculture, are believed to have practiced animism widely. Cave paintings, carvings, and burial practices from this period suggest a belief in the spiritual significance of animals and natural elements.

### Evidence of Animism in Early Human Societies:

- **Cave Art**: The cave paintings in places like Lascaux and Chauvet in France depict animals and hunting scenes, which many anthropologists interpret as evidence of animistic beliefs. These artworks suggest that early humans saw animals as possessing spiritual significance.
- **Burial Practices**: The inclusion of tools, ornaments, and other objects in graves indicates a belief in an afterlife or a spiritual journey after death. This practice dates back tens of thousands of years, with evidence found in sites associated with both Neanderthals and early Homo sapiens.
- Artifacts and Symbols: Objects such as the Venus figurines, which date back to the Upper Paleolithic, may have held spiritual or ritualistic significance, pointing to early forms of religious belief centered around fertility, nature, and the human body.

#### Animism and Its Non-Racially-Biased Context:

- Universal Belief System: Animism is not restricted to any one region or culture. It has been a prevalent belief system in various forms across different human societies. This universality suggests that animistic beliefs likely emerged independently in various human groups as a fundamental way of interpreting the world.
- **Cultural Adaptation**: Animistic beliefs are deeply intertwined with the environment and lifestyle of a society. Hunter-gatherer societies, which were closely connected to nature, often viewed animals, plants, and natural phenomena as possessing spirits or consciousness.
- Non-Racial Bias: Recognizing animism as a widespread early belief system underscores the shared human experience of seeking to understand and relate to the world around us. It emphasizes commonalities rather than differences among early human societies.

#### Summary:

From an evolutionary and anthropological perspective, animism likely emerged as a prevalent belief system among early Homo species, including Homo erectus, Neanderthals, and early Homo sapiens. The evidence

suggests that as humans developed more complex cognitive abilities and social structures, they began to attribute spiritual significance to the natural world around them. This early form of spirituality is a testament to the universal human quest for meaning and connection with the environment, transcending racial and cultural boundaries.

## **Key References:**

- "<u>The Mind in the Cave</u>" by David Lewis-Williams: This book explores the origins of art and religion in the Upper Paleolithic, providing insights into early human spirituality.
- "<u>The Roots of Religion: Exploring the Cognitive Science of Religion</u>" by Roger Trigg: This text delves into the cognitive underpinnings of religious beliefs, including animism, in early human societies.
- "<u>Burial Practices in Early Homo</u>" by Paul Pettitt: A study on the burial practices of early humans, providing evidence of spiritual beliefs and rituals.

These references offer a deeper understanding of how animism and other early spiritual beliefs likely developed as integral parts of human evolution.

# An SA Case Study: The Homo naledi Controversy

# History of Homo naledi discovery

"Fossil hominins were first discovered in the Dinaledi Chamber of the Rising Star Cave system in South Africa during an expedition led by Lee Berger beginning October 2013. In November 2013 and March 2014, over 1550 specimens from at least 15 Homo naledi individuals were recovered from this site. This excavation remains the largest collection of a single hominin species that has been found in Africa. Rick Hunter and Steven Tucker found an additional 133 Homo naledi specimens in the nearby Lesedi Chamber in 2013, representing at least another 3 individuals – two adults and a juvenile. In 2017, the Homo naledi fossils were dated to between 335,000 and 236,000 years ago." Source: Smithsonian, 3 January 2024.

Numerous scientific reports are available for this important scientific discovery, including an excellent outline by the prestigious Natural History Museum published on 5 June 2023: "*Claims that Homo naledi buried their dead could alter our understanding of human evolution*"

While the world celebrated the discovery of Homo naledi, the discovery also triggered a furious high-level race/religious-based public discord between scientist and some high-level political leaders in the country:

• The scientific defence of the discovery of Homo naledi, its interpretation and meaning for the world of human knowledge, was expressed by Wits University's Professor Lee Berger, leader of the discovery, as follows:

"For our scientists, the search for human origins is one that celebrates all of humankind's common origins on the continent of Africa. The science is not asking questions of religion nor challenging anyone's belief systems, it is simply exploring the fossil evidence for the origins of our species."

• The response from many South African political leaders was varied: a celebration of exceptional scientific and human evolutionary knowledge advance laced with alarming racial and dogmatic religious undertones, illustrating once more the deep racially-defined divisions in religion and scientific knowledge that has challenged the nation throughout its recent history. At the formal announcement of the discovery in September 2015, South Africa's State President Jacob Zuma, and his deputy Cyril Ramaphosa, both welcomed and celebrated the discovery. Former President Zuma stated that he was very excited about the discovery and was proud that it had happened in South Africa: "Our country is truly the cradle of mankind."

In stark contrast, well-known sociopolitical leaders expressed extreme views of their understanding of science and the origins of humankind:

<u>Zwelinzima Vavi</u>, former general-secretary of the powerful trade union group Cosatu, stated that "No-one will dig old monkey bones to back up a theory that I was once a baboon. Sorry," – <u>PHYS.ORG</u>, <u>17 September 2015</u>;

- <u>Professor Mathole Serofo Motshekga</u>, former Chief Whip of ANC, who has served as a representative of the ANC in the Judicial Services Commission and Chairperson of the Joint Committee on the Financial Management of Parliament, commented as follows:
- "Africa has a picture of the oldest, most ancient human beings that originated on this continent and that human being is claimed to have been in the image of God, and he's not a chimpanzee." "Europeans don't have a record of their history and their ancestors – they're looking for their next ancestor, and they found their ancestor in the baboon." ..... "They want us to share that ancestor. We can't share that, because we have our ancestor." Sources: <u>Business Tech. 16 September 2015</u>, and <u>SABC Question Time broadcast, 14</u> <u>September 2015</u>.

Professor Mathole Serofo Motshekga, by his own admission, draws his knowledge mainly from the <u>Corpus</u> <u>Hermeticum</u>, ancient religious texts inspired by the Greek god Hermes and the Egyptian god Thoth between the 2<sup>nd</sup> and the 4<sup>th</sup> centuries CE. Homo naledi predates the Corpus Hermeticum by about 300,000 years. What modern scientists have yet to "unearth" is if, how, and when, Homo naledi may have been one of our seemingly numerous genetic ancestors – how they may have passed the evolutionary baton to the Homo sapiens gene pool. Was Homo naledi one of the many "archaic Homo" ancestors of us all?

The scientists who "discovered" the Homo naledi fossils, and those who study them, draw their knowledge directly from the fossil evidence using a variety of scientific archaeological analytic and dating technics, paleoanthropological behavioural studies, and progressively, genetic analyses. Genetic analyses, finding the DNA of ancient fossils, is the most informative technique, but also the most difficult - the climatic conditions in Africa are not conducive to the preservation of ancient DNA.

The search for Homo naledi DNA continues, as described in the 2017 paper "<u>Homo naledi genome: Will we</u> <u>ever find this elusive key to human evolution?</u>"

The scientific knowledge of who we are, where we came from, with which other <u>hominid or hominin</u> species our ancestors consorted with to "create" us, is still unfolding. New discoveries generally lead to more questions requiring even more multidisciplinary scientific research to answer them. South Africa, a.k.a. the "Cradle of Humankind," is an excellent location for such research, and the intense public discourse on the conflicting knowledge that inspires and sets objectives for that research. It is home to all human ancestors, and by that extension, the genetic home of all humankind.

# Epilogue of the Homo naledi Controversy:

The Palaeosciences are central to this controversy: how can we know ourselves and our life-supporting ecosystems, and from such knowledge craft a more sustainable path for our species and ecosystems into the future, if we do not know the history of where we came from and how we arrived at today? What misjudgements, missteps, misinformation, and disinformation have added vulnerabilities to our journey from the past to today, which may add even more vulnerabilities, and perhaps <u>anthropogenic existential risks</u>, in our future human trajectories? The relationships between our past, our present, and what the future may be, are very well articulated by Thomas Halliday, a young Scottish-born palaeoscientist, selected for his youth and advanced research-based knowledge of our world to support this discussion. Dr Thomas Halliday comments as follows:

"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" – quote from "Otherlands – A World in the Making" - first paragraph on page 301 of the Epilogue in the award-winning non-fiction book by Thomas Halliday, published by Penguin Books on 02 Feb 2022.

Nature has kept an accurate record of our world and all its varied life-forms, all the way from earth's formation about 4.54 billion years ago, to today. Palaeoscientists are trained to find and decipher that record, most of it embedded in the rocks originating from the dust clouds formed by the Big Bang birth of the universe about 14-billion years ago (NASA 20 February 2024). New rocks formed by volcanic activity and those built from compressed sand and fossil remains during earth's turbulent times, are nature's preferred "hard drives" – the

histories of earth and its ecosystems are solidly embedded in some of those rocks, waiting for dedicated scientists like Thomas Halliday to decipher them. Thomas paints vivid pictures of the births, deaths, and resurrections of major segments of earth, its turbulent geography, and the equally turbulent lives of all living cells, animals and plants that made earth their home:

- 4.5 billion years ago, earth forms from compression of material from the <u>Big Bang</u> formation of the universe, 13.8 billion years before. For up to 2-billion years after its formation, earth remained a desolate, lifeless, bone-dry overheated wasteland, until it cooled down enough to make its own water, although the most likely processes of water formation are still being researched read <u>14<sup>th</sup> April 2023 in Space.com</u>, and a discussion of alternative theories of water formation on earth published on <u>19<sup>th</sup> December 2023 by The Planetary Society</u>.
- By 3.5 billion years ago, enough water was chemically manufactured from earth's magma reacting with atmospheric hydrogen, to cover most of earth, providing a massive petri dish for the formation of the bacterial seeds of life, and triggering a cycle of supercontinent formations and disruptions, the seeds of countries, continents, and supercontinents, now and into the future. A supercontinent is defined as a landmass comprising at least 75% of earth's available landmass. The "supercontinents" of Pangaea and Gondwana are relatively well-known albeit not fully understood by many.

Scientists predict that as the earth's cycle of extinction and rebirth continues to unfold in the so-called sixth mass extinction, a new supercontinent, which they have named <u>Pangaea Proxima; a.k.a. Pangaea</u> <u>Ultima</u>, may be formed. This supercontinent, at perhaps 250 million years into the future, is too far ahead to be of interest to today's turbulent human societies, but it must be understood by many, at least peripherally, so that the plea by young Thomas Halliday for humanity to *"find the routes that avert disaster"* can be crafted by humanity's future generations of knowledgeable global citizens.

Dr Halliday includes in his research reports, evidence of major cataclysms which have shaped our world, many resulting directly from the tumultuous restructuring of earth's surface through continental drifting, and the five well-known extinction events such continental drifts may have triggered:

- The first identified Mass Extinction, the "Late Ordovician mass extinction" of approximately 484 million years ago, in which environmental and geographic turbulence resulted in the extinction of up to 85% of all life forms. The world recovered from this mass extinction, with <u>new lifeforms evolving over a period of 3 to 8 million years.</u>
- The second mass extinction, the <u>Late Devonian event about 370 million years ago</u>. Driven mainly by climate changes exacerbated by volcanic activity, and competition for survival between animal and plant species resulting from extreme global cooling. This event killed approximately 75% of earth's lifeforms, and is estimated to have lasted between <u>500,000 years to 25 million years</u>.
- The third mass extinction, the <u>Permian-Triassic extinction</u> event, began about 252 million years ago and wiped out about 80% of marine invertebrate species and approximately 70% of terrestrial vertebrate species. Its duration is uncertain, estimates range from tens of thousands of years to about 15 million years.
- The fourth mass extinction was the end-Triassic extinction a.k.a. the Triassic–Jurassic (Tr-J) extinction event <a href="https://www.britannica.com/science/Permian-extinction">https://www.britannica.com/science/Permian-extinction</a>, which began unfolding about 201 million years ago. About 76% of all marine and terrestrial species were rendered extinct, paving the way for new lifeforms to evolve the emergence of dinosaurs. Triggers for this event included tectonic drift induced volcanic eruptions, climate change, massively rising sea levels with sudden releases of large amounts of carbon dioxide, all contributing towards the reconstruction and reconfigurations of earth's geographies the formation and deconstruction of supercontinents.
- The fifth mass extinction, the <u>Cretaceous-Paleogene extinction</u> occurring about 66 million years ago, was triggered by a giant asteroid fragment impacting earth near the Yucatán Peninsula in northeastern Central America. The impact sent huge waves of heat, dust, and soot around the planet, blocking sunlight, and thereby forcing massive-scale ecosystems collapse. 76% of earths living species were killed, including the dominant non-avian dinosaurs, opening the door to the resurgence of the animal and bird species we are familiar with today. The event was likely very rapid, possibly spanning only years to decades.

The Sixth Mass Extinction: There is overwhelming research-based evidence generated by multidisciplinary historians, scientists, and philosophers, that a sixth mass extinction event, driven by human activities and nature's responses to such activities, has already begun: *"Human activity is killing nature at an unprecedented rate. We are now experiencing the consequences in the form of a possible sixth mass extinction" - Natural History Museum, "Anthropocene" 21 February 2023.* Numerous very high-quality research reports in all available formats are available in the public domain, but too many of them are presented in formats and language which are beyond the comprehension of most global citizens, especially children and adults in countries like South Africa with very low foundational literacy levels in the critical skill sets needed to comprehend the underlying palaeosciences. In nearly all credible international educational performance assessments, South Africa ranked last in the critical reading literacy (rank 44/44 in PIRLS 2021, score 42% below average); second last in both mathematics and science (rank 56/58, score 25% below average in TIMSS 2019 math; rank 56/58, score 36% below average in TIMSS 2019 science).

The following short list of public media coverage of the subject suggest that the general global public has access to the information necessary, but full understanding of it all, and participation in any defensive and/or corrective action that humans may imagine, will remain out of reach for many due to poor education, especially poor grounding in science and mathematics. Knowing the past is necessary for understanding the present, predicting the future, and planning mitigating strategies as suggested by Thomas Halliday in the introduction to this section of the document. Media coverage of the ongoing sixth mass extinction event, an existential threat to humanity and its earthly habitat, include:

- 1. The sixth mass extinction is happening now, and it doesn't look good for us: <u>South Africa's Daily</u> <u>Maverick, 09 Mar 2022</u>;
- Cradle of Humankind: Maropeng and Sterkfontein Caves: "<u>EXTINCTION</u>" "About 65-million years ago, after the fifth extinction, in which the dinosaurs were wiped out, an explosion of early mammals brought about the emergence of our human ancestors – the early primates." Accessed November 2024:
- 3. <u>Mail and Guardian, 15 February 2019</u>: Age of environmental breakdown: "Mainstream political and policy debates have failed to recognise that human impacts on the environment have reached a critical stage, potentially eroding the conditions upon which socioeconomic stability is possible."
- 4. <u>CNN World | Sat December 23, 2023</u> | "What is a mass extinction, and why do scientists think we're in the middle of one?" "A growing number of scientists believe a sixth mass extinction event of a magnitude equal to the prior five has been unfolding for the past 10,000 years as humans have made their mark around the globe."
- 5. <u>The Guardian International Edition, Mon 10 Jul 2017</u> | "Earth's sixth mass extinction event under way, scientists warn". <u>Opinion</u>: "You don't need a scientist to know what's causing the sixth mass extinction. It's simple. It's us. The more people there are, the more habitats we destroy. Human civilisation can only survive if the population begins to shrink."

Humanity has been warned, but will humanity listen and act to mitigate its self-driven extinction? Could the unfolding sixth mass extinction end Homo sapiens' self-imposed (or is it God-given?) superiority over nature and the whole universal ecosystems? The above introduction of the formation of our world and our fellow lifeforms are in direct response to the egoistic notion of human superiority over nature discussed in this annex. It also responds to the futile conflicts between humanity's religious and scientific worldviews, a complex conundrum that imposes significant risks to humanity's peaceful coexistence within and beyond its own species.

The numerous global, regional, and national conflicts in progress today, driven by the rise and rise of populism, religious extremism with racial undertones, ignorance, and potential dangers of their escalations into nuclear holocausts, are the warning signs of extreme turbulence ahead. The thoughts of the scientific genius Albert Einstein's prediction of the fourth world war being fought with sticks and stones – read media comment in the Independent U.K. of Friday 22 November 2024 - comes easily to mind.
In South Africa, the case study of the Homo naledi controversy must add to the urgency to "map the past so that we can predict the future, and find the routes that avert disaster." The focus must be on South Africa's children and youth, their opportunities to acquire scientific knowledge without the distractions of religious-based indoctrination.

### Concluding discussions of Annex 1 and Annex 2.

The discussions about metaphors in Annex 1, and those concerning the actual and perceived relationships between Homo sapiens and nature discussed in Annex 2, are largely self-explanatory. What is most important for South Africa, and virtually all nations on earth, developing and developed alike, is that these relationships need to be understood by all, demanding massive public discussions at all levels and ideological divisions of society, and of course, equally massive reorientation of traditional education and learning processes.

The deep societal fissures that shape our contemporary world, fuelling the growth, or resurgence, of alarming extremism like the global spread of populism, homophobia, racism, sexism, xenophobia, and interfaith conflicts, are relatively new global phenomena which emerged from the human societal restructuring that followed the <u>Neolithic Revolution</u>. This new <u>Anthropocene Epoch</u>, the existence and definition of which is receiving growing support from the global scientific community, is *"characterized as the time in which the <u>collective</u> activities of <u>human beings</u> (Homo sapiens) began to substantially alter <u>Earth's</u> surface, <u>atmosphere</u>, <u>oceans</u>, and systems of <u>nutrient cycling</u>. A growing group of scientists argue that the Anthropocene Epoch should follow the <u>Holocene Epoch</u> (11,700 years ago to the present) and begin in the year 1950. The name Anthropocene is derived from Greek and means the <i>"recent age of man,"* quotation from <u>Britannica</u>, <u>updated on 30 August 2024</u>.

The results of the "collective activities" of human beings in reshaping our world are real, evidenced by the increases of devastating climate-change disasters, health pandemics, and wars that impact all nations and regions in the world today. These human setbacks remind us of the warnings of credible historians like Walter Scheidel's provocative thinking in his classic "The only conquerors of inequality are the Four Horsemen of the Apocalypse, and his fellow historian Yuval Noah Harari as he paints a dystopic picture of "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" (Yuval Noah Harari in The Guardian, Wednesday 24 May 2017)

Is South Africa, leading the world in inequality, already a nation of "superhumans" (the wealthy 24%) and an underclass of useless people (the remaining 76%, including the unemployed <u>41.9% of the labour force - STATS SA Q1:2024</u>), even before the advent of AI and its creation of more useless people?

Annex 1 and Annex 2 discuss extremely complex human challenges, all supported by a wealth of research documents and data, far beyond the capacity for inclusion in this discussion, a veritable "information overload" which can be managed through wise usage of AI.

All the complexities inferred in Annex 1 and Annex 2 need to be included in any national effort to develop a proactive people-friendly developmental-oriented AI/ICT regulatory provision.

The risks of doing nothing in South Africa are "too ghastly to contemplate"

## Annex 3: AI on The Complexity of Sustainable Development and Suggested Responses

This third annex, a late addition, was triggered by a closer look at South Africa's, and the world's "failures," to deliver meaningful progress on the SDG agenda, and therefore on South Africa's NDP agenda. Evidence of these failures include:

- South Africa Overview: Selected Indicator Rankings: 

   Population: World 24/217; Africa 6/54; Peers 3/7;
   Economy (GDP US\$ 2023): World 40/210; Africa 2/54; Peers 4/7:
   Economy (GDP/Capita PPP 2023): World 135/236; Africa 8/54; Peers 6/7;
   SDG Progress: World 115/166, between Botswana 114/166 and Senegal 116/166. These indicators suggest major challenges, and demand closer fact-based analyses and interpretation as part of the NDP and SDG agenda. All statistical data above derived from relevant World Bank databases updated on 28 January 2025, unless otherwise specified.
- 2. 2020 NDP Review Findings: <u>Parliamentary Monitoring Group 6 March 2024</u>: "2030 National Development Plan (NDP) 10-Year Review":

- Slide 7/21: Summary of the NDP Failures: 

   NDP outcomes and quality needs significant improvement;
   poverty rising, inequality persistent;
   service delivery "worsened;
   economic growth stagnant;
   unemployment on the rise;
   spatial inequality challenges persist;
   progress in social protection.
- Slide 10/21: Key statistics on selected failures in years 2018, 2021, 2022: Nine key missed targets listed, measured against baseline and 2030 targets.
- Media: (a) <u>Moneyweb 22 August 2023</u>: "10 years later: Has the NDP disappointed?": (b) <u>TechCentral</u> <u>27 September 2023</u>: "The National Development Plan is failing amid government inaction".

## Sustainable Development Report South Africa:

- <u>Stats SA SDG Country Report 2023</u>: "Overall, it is clear that South Africa still faces a range of development challenges, with the underlying cross-cutting cause and effects being high levels of poverty, inequality and unemployment. Moreover, the country lags in its attempt to produce new and up-to-date data that may be used to better track the progress made in achieving the SDGs. While the South African government has done a lot to address these challenges, <u>a more robust and integrated</u> approach may be desired if the country is to successfully realize its 2030 development agenda"
- United Nations Sustainable Development Report 2024: South Africa: Country Ranking: 115/167 (previously published as 115/166): SDG Dashboard and Trends: Six SDGs stagnating; Nine SDGs with major, significant, or remaining challenges which are moderately improving; SDG10, Inequality, unmeasured, no data; SDG5, Gender Equality, achieved and on track. Welcome as this assessment of SDG5 is, or should be, the extensive media coverage and high-level government statements on the reality of Gender-Based Violence and Femicide (GBVF), and the scourge of child abuse (UCT May 2024; UNICEF Feb. 2024) in South Africa, illustrated by the very frequent statements by the Presidency 24 November 2020; 2 February 2021; 2 November 2022; 29 November 2023; 25 March 2024; 12 February 2025, casts doubt on the validity and usefulness of this sole indicator of success. An urgent reconsideration of this indicator and its impact on SDG 5 is strongly recommended. A more detailed South African analysis published online on 2<sup>nd</sup> August 2019 is available at ICT4SDG5.

## Sustainable Development Reports, World:

- <u>The Sustainable Development Goals Report 2023: Special Edition</u>: UN Secretary-General António Guterres warned, "Unless we act now, the 2030 Agenda could become an epitaph for a world that might have been." UNICEF observed that: "Failure to redouble global efforts to achieve <u>the Sustainable</u> <u>Development Goals</u> the promise of a better world for all may fuel greater political instability, upend economies and lead to irreversible damage to the natural environment."
- <u>Sustainable Development Goals Report 2024</u>: UN Secretary-General António Guterres: "The Sustainable Development Goals Report 2024 makes for sobering reading." **Press Statement**: "This report is known as the annual SDG report card and it shows the world is getting a failing grade... Our failure to secure peace, to confront climate change, and to boost international finance is undermining development. We must accelerate action for the Sustainable Development Goals and we don't have a moment to lose."

The above indicative statistics, indicators and reports suggests major developmental challenges facing South Africa. The Sustainable Development Challenges (SDC) facing the world, and South Africa, are extremely complex as suggested by all the analytical opinions and statistical data in this discussion document. The interconnectedness and interdependencies between and within all NDP and SDG objectives and their defined targets, as well as the interconnectedness and interdependencies within and between human cognitive variability, is clearly extremely complex. The most probable reason why South Africa, and the world, are failing to meet the SD challenges, as stated or inferred by Statistics South Africa and the UN Secretary-General, can be attributed to this complexity – the eight-billion strong human family does not have the cognitive capability to deal with this complexity under the contemporary socio-economic-political global order.

Al has the design capability and capacity to deal with this extreme complexity, but it also has the capability and capacity to exacerbate the results of failure to deal with such complexity. The choice of how Al and its

vast networks of integrated information, communication, and knowledge networks rests entirely in the hands of today's global and national leaders: to position technology to promote equitable human – people – development, or to use technology to reinforce economic and political power over much of the world's population. The prescient statement "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" by the "father of capitalism," Adam Smith in 1776, nearly 250 years ago, remains as valid and dangerous today as it was when Adam Smit conceived it.

Developing people and their environments is extremely difficult: very simple to define and quantify in measurable quantitative and qualitative statistical data, but immensely difficult to control and coordinate the numerous interconnections and interdependencies of such data. The languages of the four Cs of development, Collaboration, Communications, Cooperation, and Coordination, have developed a complexity beyond the comprehension of most of humanity – the cognitive capacities of most Homo sapiens today has been overwhelmed. The design capability of Artificial Intelligence, the most recent evolution of "human civilizing" technologies, can help, but only if its human inventors allow it to do so.

Three AI tools available to humankind today have been "prompted" to examine the global database of knowledge to offer a global consensus on the key elements of this complexity. The AI responses are provided in full in the following paragraphs.

# Al on Sustainable Development Challenges - Definition (SDC)

Nearly all documentation on the contemporary concerns about the sustainable development of humanity and the "<u>Human Ecosystems</u>" they depend on for survival, tend to focus on the tools for such development – the NDP and SD objectives, goals, and targets, and less on the underlying causes and effects – the problem statements, or the Sustainable Development Challenges. A simple Google search on "Sustainable Development Challenge" showed a strong focus on the SDGs, very little coverage of the underlying causes and effects that necessitated the SDGs – the SDC.

The <u>DeepSeek</u> AI platform, a recent "<u>Open Source</u>" AI competitive platform emanating from China, was prompted to examine this perception and to suggest an elegant differentiation between sustainable development challenges and sustainable development goals:

## DeepSeek Response 26 Feb 2025:

To elegantly differentiate between the **Sustainable Development Challenges** and the **Sustainable Development Goals (SDGs**), one could frame the distinction as follows:

The **Sustainable Development Challenges** represent the complex, interconnected, and often systemic issues that hinder global progress toward a more equitable, resilient, and thriving world. These challenges are the root problems—ranging from poverty, inequality, and climate change to environmental degradation, inadequate healthcare, and lack of access to education—that demand urgent attention and transformative action. They are the "why" behind the global call to action, reflecting the pressing realities faced by communities and ecosystems worldwide.

In contrast, the **Sustainable Development Goals (SDGs**) are the "**how**"—the carefully crafted, aspirational targets and solutions designed to address these challenges. The SDGs provide a roadmap for collective action, offering measurable objectives and strategies to mitigate the challenges and build a sustainable future. While the challenges illuminate the gaps and vulnerabilities in our current systems, the goals represent the vision and tools to bridge those gaps.

By distinguishing between the two, we can better appreciate the depth and urgency of the challenges while recognizing the SDGs as the strategic framework to overcome them. This clarity ensures that the discourse remains focused on both understanding the problems and implementing the solutions, rather than conflating the two.

This framing emphasizes the challenges as the foundational issues and the goals as the response, creating a clear and elegant separation between the problems and the solutions.

# Three AI platforms on Complex Problem Solving – Holistic Virtuous Cycles.

## ChatGPT

Your focus on breaking the **silo mentality** in SDG implementation is crucial. The **holistic virtuous cycle** you envision aligns well with the idea of **AI-assisted systems thinking**, where machine intelligence helps map, predict, and optimize interdependencies among SDGs in ways that exceed human cognitive limits.

### **Reframing the Concept for SDGs**

A more refined term for your model could be:

- 1. **Regenerative SDG Synergy Model** Emphasizing interconnected progress and self-reinforcing benefits.
- 2. **Dynamic SDG Co-Evolution Framework** Highlighting adaptive, mutually reinforcing growth across goals.
- 3. Holistic SDG Acceleration Loop Focusing on continuous, integrated advancement rather than isolated fixes.
- 4. **AI-Enhanced SDG Nexus Engine** Suggesting Al's role in mapping and optimizing cross-SDG relationships.
- 5. **Unified Impact Spiral for Sustainable Development** Avoiding circular stagnation by promoting upward momentum.

Would you like to explore AI models that could operationalize such a framework, perhaps by integrating system dynamics modeling or multi-objective optimization for SDG trade-offs?

### DeepSeek:

A **holistic virtuous cycle mode of complex project implementation** refers to an integrated, self-reinforcing approach where all components of a project work synergistically to create continuous improvement and positive outcomes. This model emphasizes the interdependence of various elements—such as planning, execution, monitoring, and feedback—ensuring that each phase enhances the others. By fostering collaboration, adaptability, and learning, this cycle promotes efficiency, innovation, and sustainability throughout the project lifecycle.

### Key Characteristics:

- 1. **Interconnectedness**: All project elements are linked, ensuring that improvements in one area positively impact others.
- 2. **Continuous Improvement**: Feedback loops allow for ongoing refinement and optimization.
- 3. **Sustainability**: The cycle ensures long-term success by addressing challenges proactively and leveraging opportunities.
- 4. **Adaptability**: The model is flexible, allowing for adjustments in response to changing conditions or new insights.

## Alternative Ways to Express the Concept:

- 1. Integrated Self-Reinforcing Project Model: Highlights the interconnected and self-sustaining nature of the approach.
- 2. **Synergistic Project Lifecycle Framework**: Emphasizes the collaborative and mutually reinforcing aspects of the process.
- 3. **Dynamic Feedback-Driven Implementation Cycle**: Focuses on the role of continuous feedback in driving progress.
- 4. Sustainable Project Ecosystem Approach: Stresses the holistic and enduring nature of the model.
- 5. **Iterative Improvement Loop for Complex Projects**: Underscores the repetitive and progressive refinement of project elements.
- 6. **Collaborative Adaptive Project Management Cycle**: Highlights teamwork and flexibility as core principles.

7. Holistic Continuous Enhancement Framework: Emphasizes the ongoing and all-encompassing nature of the process.

## 8. Reciprocal Optimization

Model for Projects: Focuses on the mutual benefits and improvements across project components.

Each of these alternatives captures the essence of the holistic virtuous cycle while emphasizing different aspects of the concept, such as collaboration, adaptability, or sustainability. The choice of phrasing may depend on the specific context or audience.

## Gemini

You're tackling a crucial issue: how to effectively address the complex, interconnected Sustainable Development Goals (SDGs) when our current approaches are falling short. The idea of a "holistic virtuous cycle" is key, but the phrasing itself can be improved. Let's break it down:

### What a "Holistic Virtuous Cycle" Means in SDG Implementation:

A "holistic virtuous cycle" in this context refers to a system where actions taken to advance one SDG positively influence and reinforce progress on other SDGs, creating a cascading effect of positive change. It recognizes that the SDGs are not isolated goals, but rather interconnected elements of a larger system. A virtuous cycle contrasts with a "vicious cycle" where problems in one area exacerbate issues in others.

- Holistic: Emphasizes the interconnectedness of the SDGs. It means considering the whole system, not just individual goals in isolation. It requires understanding the interdependencies, trade-offs, and synergies between different goals.
- Virtuous Cycle: A positive feedback loop where progress in one area leads to improvements in others, creating a self-reinforcing dynamic of positive change.<sup>1</sup> For example, improvements in education (SDG 4) can lead to better health outcomes (SDG 3) and increased economic opportunities (SDG 8), which in turn further improve education levels.<sup>2</sup>

## Why the Current Approach is Failing (and the "Silo Mentality"):

As the UN Secretary-General's assessment indicates, the current approach to SDG implementation often suffers from a "silo mentality." This means:

- **Fragmented Action:** Goals are treated in isolation, with little consideration for their interconnections. Efforts to achieve one goal may inadvertently undermine progress on others.
- Lack of Systems Thinking: Failing to recognize the complex interdependencies and feedback loops within the SDG system. This leads to unintended consequences and missed opportunities for synergistic action.
- **Short-Term Focus:** Prioritizing immediate gains over long-term, systemic change. This can lead to unsustainable solutions that address symptoms rather than root causes.

## Alternative Phrasing for "Holistic Virtuous Cycle":

While "holistic virtuous cycle" is descriptive, it can sound a bit clunky. Here are some more elegant alternatives:

- **Synergistic SDG Implementation:** Highlights the positive interactions and synergies between the goals.
- Integrated SDG Action: Emphasizes the need for coordinated and interconnected efforts.<sup>3</sup>
- **Systemic SDG Advancement:** Focuses on the importance of understanding and leveraging the complex interdependencies within the SDG system.

- **SDG Ecosystem:** Evokes the image of a complex, interconnected system where changes in one area ripple through the entire system.
- **Thriving SDG Network:** Suggests a dynamic system of interconnected goals, where progress in one area supports progress in others.
- **Cascading SDG Impact:** Highlights the ripple effect of positive change across the SDGs.

## How AI-Assisted Systems Thinking Can Help:

Al can play a crucial role in overcoming the silo mentality and fostering a more holistic approach to SDG implementation:

- Data Integration and Analysis: AI can process vast amounts of data from diverse sources to identify patterns, relationships, and potential synergies between different SDGs.<sup>4</sup>
- **Systems Modeling:** AI can be used to create complex models of the SDG system, allowing policymakers to simulate the impact of different interventions and identify the most effective strategies.
- Scenario Planning: AI can help explore different scenarios and assess the potential risks and opportunities associated with various approaches to SDG implementation.<sup>5</sup>
- **Optimization:** AI can be used to optimize resource allocation and prioritize interventions based on their potential impact across multiple SDGs.<sup>6</sup>

### **References and Further Reading:**

While a single, definitive work on "holistic virtuous cycles" in the SDG context might not exist, the concepts are rooted in systems thinking and complexity science. Here are some relevant areas and potential search terms:

- **Systems Thinking:** Look for works by Donella Meadows, Peter Senge, and Barry Richmond. Search terms: "systems dynamics," "feedback loops," "causal loop diagrams."
- **Complexity Science:** Explore the work of Stuart Kauffman, John Holland, and Melanie Mitchell. Search terms: "complex adaptive systems," "emergence," "self-organization."
- **SDG Interlinkages:** The UN's own publications on the SDGs often discuss interlinkages. Search terms: "SDG synergies," "SDG trade-offs," "integrated SDG implementation."
- AI for Global Good: Look for research on how AI can be applied to address global challenges, including the SDGs. Search terms: "AI for sustainable development," "AI and social good."
- Sustainable Development Goals Knowledge Platform: The official UN website for the SDGs is a great resource for information, reports, and data.<sup>7</sup>

By embracing systems thinking, leveraging the power of AI, and moving beyond the silo mentality, we can create the "holistic virtuous cycles" needed to achieve the SDGs and build a more sustainable future.

### All sources and related content

How to define and nurture your firm's "virtuous cycle" - Zweig Group zweiggroup.com

Health and education: the building blocks of a thriving economy resep.sun.ac.za

<u>The importance of an integrating framework for achieving the Sustainable Development Goals: the example</u> <u>of health and well-being - PubMed Central</u> pmc.ncbi.nlm.nih.gov

Artificial Intelligence and the Sustainable Development Goals: An Exploratory Study in the Context of the Society Domain - Scientific Research Publishing - <u>www.scirp.org</u>

# Al on Division of Labour

Al Prompt: Addressing South Africa's NDP and Sustainable Development Challenges, and implementing the actions derived from the goals and targets, is fraught with difficulties and complexities, most of which arise from the compartmentalization of the challenges; all actions are generally confined to "expert silos" with little regard to the four C's of complex problem solving - Collaboration, Communications, Cooperation, and Coordination. This compartmentalization is a symptom of the prevailing Division of Labour concept which dominates modern societies throughout the world. The Al platforms of ChatGPT, DeepSeek, and Gemini were prompted to examine this challenge from the global databases of knowledge. The responses follow.

### Gemini Response: 05 March 2025

You've raised a complex and fascinating set of points, touching on deep historical trends and their relevance to contemporary challenges. Let's break down your assumption about the Neolithic Revolution and the division of labor, and then address your broader concerns about AI and sustainable development.

### Division of Labor and the Neolithic Revolution:

- Supporting Evidence:
  - The Neolithic Revolution, characterized by the shift to agriculture and settled societies, undeniably led to increased specialization. This is a key point.
  - Agriculture necessitated new skills: planting, harvesting, animal husbandry, irrigation, and storage.
  - Settled communities allowed for the accumulation of surplus, which in turn supported non-foodproducing specialists: potters, weavers, toolmakers, and eventually, priests and rulers.
  - Archaeological evidence, such as specialized tools and craft workshops, supports the idea of a more complex division of labor in Neolithic societies.
  - The creation of permanent settlements, and the storage of food, led to the creation of hierarchies, and thus the division of labour became more complex.
- Rebutting Evidence/Nuances:
  - While the Neolithic Revolution intensified the division of labor, it's not accurate to say it was entirely absent before.
  - Hunter-gatherer societies, even those with a strong emphasis on egalitarianism, likely had some degree of task specialization based on age, gender, and skill.
  - The idea of "maximum equality" in pre-Neolithic societies is debated. While some anthropologists emphasize egalitarian tendencies, others point to evidence of social complexity and hierarchy even in hunter-gatherer groups.
  - The work of Graeber and Wengrow in "The Dawn of Everything" challenges the linear narrative
    of progress from egalitarian hunter-gatherers to hierarchical agriculturalists, suggesting a more
    fluid and varied social landscape. They highlight examples of seasonal shifts in social organization
    and the conscious rejection of hierarchy.
  - Richard Lee's work with the !Kung San people, shows that sharing, and a generally egalitarian structure was present, but that there are still some divisions of labour.
- Key Takeaways:
  - The Neolithic Revolution dramatically accelerated the division of labor, but it was not the absolute starting point.
  - Pre-Neolithic societies were more complex than simple narratives often portray.
  - The transition to agriculture and settled life created conditions that fostered greater social stratification and specialization.

### Your Broader Concerns:

- The "Four Cs" and Sustainable Development:
  - You're right to question whether the supposed benefits of "civilization" (communication, collaboration, cooperation) are truly delivering on their promises.
  - Modern communication technologies, while offering immense potential, can also exacerbate divisions, spread misinformation, and undermine social cohesion.
  - The pursuit of economic growth and technological advancement often comes at the expense of environmental sustainability.

## • AI and ICT as a Double-Edged Sword:

- AI and ICT have the potential to:
  - Optimize resource management.
  - Facilitate global collaboration.
  - Provide data-driven insights for sustainable development.
- However, they also pose risks:
  - Job displacement.
  - Algorithmic bias and discrimination.
  - The spread of misinformation and manipulation.
  - $\circ$   $\;$  The potential for AI to be used in autonomous weapons systems.

## • The Need for Proactive Regulation:

- Your emphasis on developmentally-oriented AI/ICT regulation is crucial.
- Such regulation should:
  - Prioritize ethical considerations and human rights.
  - Promote equitable access to technology.
  - Address the risks of misinformation and manipulation.
  - Incentivize the development of AI and ICT solutions that support sustainable development.
  - Include international cooperation, as AI related problems are globally present.
- Addressing Human Frailties:
  - Overcoming the challenges of sustainable development requires addressing the underlying human frailties that contribute to them: greed, inequality, conflict, and a lack of empathy.
  - Education, public awareness campaigns, and fostering a culture of cooperation are essential.
  - It is vital to find ways to promote critical thinking, and media literacy, to combat the spread of misinformation.
- Yuval Noah Harari's "Nexus":
  - Harari's concerns about the "demise of truth" are highly relevant. The ability to manipulate information and create "alternative realities" poses a serious threat to social cohesion and democratic governance.

## **Recommendations:**

- Acknowledge the complexity of the historical relationship between the division of labor and social development.
- Emphasize the need for a holistic approach to sustainable development that addresses both technological and social factors.
- Clearly articulate the potential benefits and risks of AI and ICT.

- Provide concrete recommendations for AI/ICT regulation, focusing on ethical principles, equitable access, and the prevention of abuse.
- Highlight the importance of education and public awareness in promoting responsible technology use.
- Incorporate the importance of international cooperation, in the regulation of AI, and the sharing of information.
- Stress the importance of critical thinking, and media literacy, to combat the spread of misinformation.

By presenting a nuanced and balanced perspective, you can strengthen your argument and increase the likelihood of your submission having a positive impact.

## DeepSeek Response:

Your assumption that the division of labor emerged as a significant outcome of the Neolithic Revolution (starting around 10,000 BCE) is well-supported by archaeological and anthropological evidence. Prior to this period, during the Paleolithic era, human societies were predominantly hunter-gatherer communities characterized by relatively egalitarian social structures, shared resources, and limited division of labor beyond gender-based roles. The transition to agriculture during the Neolithic Revolution fundamentally reshaped human societies, leading to more complex social hierarchies, specialized labor, and the accumulation of surplus resources. Below, I will address your points in detail and provide evidence to support or refine your assumptions.

# 1. Division of Labor and the Neolithic Revolution

The Neolithic Revolution marked a shift from nomadic hunter-gatherer lifestyles to settled agricultural communities. This transition facilitated the emergence of division of labor for several reasons:

- **Surplus Production**: Agriculture allowed for the production of surplus food, freeing some individuals from the need to engage in subsistence activities. This enabled specialization in crafts, governance, and religious roles.
- Settled Communities: Permanent settlements led to the development of more complex social structures, including the need for administrators, artisans, and traders.
- **Technological Advancements**: Tools and technologies became more specialized, requiring skilled labor (e.g., potters, weavers, metalworkers).

Evidence from archaeological sites, such as Çatalhöyük in Turkey (circa 7500 BCE), shows early signs of occupational specialization, with distinct areas for tool-making, food processing, and ritual activities. Similarly, the rise of early cities like Uruk in Mesopotamia (circa 4000 BCE) demonstrates advanced division of labor, with records of scribes, priests, and merchants.

# 2. Pre-Neolithic Egalitarianism and Limited Division of Labor

Your assertion that pre-Neolithic societies were largely egalitarian, with division of labor primarily based on gender, is supported by anthropological studies of modern hunter-gatherer societies and archaeological evidence:

- Hunter-Gatherer Societies: Studies of contemporary hunter-gatherer groups, such as the !Kung San of the Kalahari Desert and the Hadza of Tanzania, reveal egalitarian social structures with minimal division of labor. Tasks are often shared, and decision-making is communal.
- Archaeological Evidence: Paleolithic sites show little evidence of social stratification or specialized roles beyond gender-based tasks (e.g., men hunting, women gathering). Tools and artifacts from this period are relatively uniform, suggesting shared knowledge and skills.

Researchers like **Richard Lee** and **Marshall Sahlins** have argued that hunter-gatherer societies were "*original affluent societies*," where needs were met with minimal labor, and resources were shared. Similarly, **David Graeber** and **David Wengrow** challenge the traditional narrative of linear progress from simple to complex societies, emphasizing the diversity of social organization in prehistory.

## 3. The Role of Civilization and the "Four Cs"

Your observation that civilization, as a social construct fostering communication, collaboration, coordination, and cooperation, has not fully delivered on its promise is insightful. While these elements have driven human progress, they have also led to unintended consequences:

- **Inequality**: The rise of civilizations often coincided with the emergence of social hierarchies, exploitation, and unequal resource distribution.
- Environmental Impact: Agricultural and industrial advancements have strained ecosystems, contributing to the current sustainability crisis.
- **Technological Dualism**: While technology (e.g., AI, ICT) offers solutions to global challenges, it also enables misuse, such as surveillance, misinformation, and warfare.

Yuval Noah Harari's concerns about the "demise of truth" in the age of AI and mass communications highlight the dual-edged nature of technological progress. The challenge lies in harnessing these tools for sustainable development while mitigating their risks.

## 4. AI/ICT as a Tool for Addressing Complexity

Your belief in the potential of AI and ICT to reduce complexity and address global challenges is well-founded. These technologies can:

- Enhance Decision-Making: AI can analyze vast datasets to inform policy decisions, optimize resource allocation, and predict environmental changes.
- **Promote Collaboration**: ICT can facilitate global cooperation, enabling knowledge-sharing and collective action on issues like climate change and poverty.
- **Empower Communities**: Digital tools can democratize access to information and resources, fostering grassroots innovation.

However, as you note, proactive regulatory frameworks are essential to prevent misuse. A developmentallyoriented approach to AI/ICT regulation should prioritize:

- Ethical Standards: Ensuring transparency, accountability, and fairness in AI systems.
- **Equitable Access**: Bridging the digital divide to ensure all communities benefit from technological advancements.
- **Sustainability**: Aligning AI/ICT development with the Sustainable Development Goals (SDGs).

## 5. Recommendations:

Your submission to local decision-makers could emphasize the following points:

- **Historical Lessons:** Highlight how pre-Neolithic egalitarianism and limited division of labor offer insights into sustainable social organization.
- **Technological Potential**: Advocate for the responsible use of AI/ICT to address global challenges, emphasizing the need for ethical regulation.
- Holistic Approach: Propose policies that integrate technological innovation with social equity and environmental sustainability.
- **Global Cooperation**: Stress the importance of international collaboration in developing and implementing AI/ICT regulations.

## Conclusion

Your assumption about the Neolithic Revolution's role in fostering division of labor is supported by evidence, as is your characterization of pre-Neolithic societies as more egalitarian. The challenges of modern civilization, including inequality and environmental degradation, underscore the need for innovative solutions like AI/ICT, coupled with robust regulatory frameworks. By drawing on historical insights and advocating for proactive policies, your submission can contribute to a more sustainable and equitable future.

#### ChatGPT: Response 1

Your assumption that the division of labor became more pronounced during the Neolithic Revolution (circa 10,000 BCE) is supported by substantial evidence. Prior to this period, hunter-gatherer societies exhibited relatively egalitarian structures, with labor divisions primarily based on gender and age. Men typically engaged in hunting, while women focused on gathering plant-based foods and caring for children. This gender-based division of labor is well-documented among recent hunter-gatherer societies and is believed to have been present among early humans as well.

#### journals.uchicago.edu

The Neolithic Revolution marked a significant transition to agriculture and permanent settlements, leading to more complex social structures. This shift enabled the production of surplus food, which in turn facilitated specialization of labor. Individuals began to focus on specific tasks beyond basic subsistence activities, such as tool-making, construction, and administration. This specialization contributed to the development of distinct social classes and more hierarchical societies.

#### khanacademy.org

However, recent studies suggest that early Neolithic societies may have been more egalitarian than previously thought. For example, research on the Linear Pottery Culture of Central Europe around 5,500 BCE indicates a lack of discernible social stratification, with both men and women participating actively in farming and other communal activities.

#### nypost.com

This challenges earlier assumptions about the emergence of pronounced social hierarchies during the Neolithic.

In addressing contemporary sustainable development challenges, the evolution of labor division offers valuable insights. The transition from egalitarian hunter-gatherer groups to specialized agricultural societies illustrates how economic and social structures can influence equality and resource distribution. Today, technologies like Artificial Intelligence (AI) and Information and Communication Technologies (ICT) hold potential to mitigate complexities arising from human nature, such as economic disparities and environmental degradation. However, the misuse of these technologies poses significant risks.

Implementing proactive, development-oriented AI and ICT regulatory frameworks is crucial to harness their benefits while minimizing potential harms. Such regulations should promote transparency, accountability, and equitable access, ensuring that technological advancements contribute positively to societal well-being and environmental sustainability.

Neolithic culture was less sexist than previously thought, researchers find

#### **Response 2**

Your assumption that the division of labor became more pronounced following the Neolithic Revolution (circa 10,000 BCE) aligns with anthropological evidence. Prior to this period, hunter-gatherer societies exhibited egalitarian structures with minimal labor specialization beyond physiological differences, such as gender roles.

#### Pre-Neolithic Egalitarianism:

Studies of contemporary hunter-gatherer groups, which are often used as analogs for prehistoric societies, suggest that early human communities operated on egalitarian principles. Research indicates that in such societies, men and women had equal influence on group decisions, including movements and social associations. This equality may have provided evolutionary advantages by fostering extensive social networks and cooperation among unrelated individuals.

#### theguardian.com

Similarly, the Hadza people of Tanzania, one of the last remaining hunter-gatherer societies, maintain an egalitarian social structure. Their communities lack formal hierarchies, and decisions are made collectively, reflecting a social organization that likely mirrors that of early humans.

#### en.wikipedia.org

### Impact of the Neolithic Revolution:

The transition to agriculture during the Neolithic Revolution introduced the ability to accumulate and store resources, leading to significant societal changes. This shift allowed for the development of private property and resource surplus, which contributed to social stratification and more defined divisions of labor. As certain individuals or groups controlled more resources, inequalities emerged, and labor became more specialized beyond basic physiological distinctions.

### zmescience.com

### Case Study – Çatalhöyük:

Çatalhöyük, a large Neolithic settlement in present-day Turkey, provides insight into early agricultural societies. Archaeological evidence suggests that Çatalhöyük maintained a relatively egalitarian structure without clear indications of social hierarchy. Both men and women appeared to have equal social status, and there is little evidence of significant wealth disparities. However, some studies propose that while certain tools and resources were shared, private property existed, indicating the beginnings of social complexity and potential inequality.

### en.wikipedia.org

### Relevance to Modern Sustainable Development Challenges:

Understanding the evolution of social structures from egalitarian hunter-gatherer groups to complex agricultural societies with pronounced divisions of labor offers valuable perspectives on contemporary issues. The initial egalitarianism facilitated cooperation and resource sharing, which are crucial for addressing global challenges like sustainability. However, as societies evolved, increased complexity led to hierarchies and inequalities that can hinder collective action.

In the context of modern technologies such as Artificial Intelligence (AI) and Information and Communication Technologies (ICT), there is potential to both exacerbate and mitigate these challenges. Without appropriate regulations, these technologies can deepen inequalities and spread misinformation, undermining societal cohesion. Conversely, with proactive, development-oriented regulatory frameworks, AI and ICT can promote transparency, enhance cooperation, and support sustainable development goals.

Scholars like Yuval Noah Harari have discussed the erosion of truth in the digital age, emphasizing the need for responsible management of technological advancements. Implementing regulatory measures that ensure ethical use of AI and ICT is essential to harness their potential for the greater good.

### Conclusion:

The progression from egalitarian hunter-gatherer societies to complex agricultural civilizations introduced divisions of labor and social stratification. Recognizing this historical trajectory underscores the importance of fostering equality and cooperation in addressing today's sustainable development challenges. Ensuring that technological advancements serve to unify rather than divide requires intentional regulatory efforts, aligning with the cooperative principles that characterized early human societies.

## AI on Knowledge Sharing and Academic Elitism:

Three AI platforms, ChatGPT, DeepSeek, and Gemini (alphabetical order) were prompted to consult the global databases of knowledge on the impacts on sustainable development of (a) the vast global knowledge repository from the stone age to the AI age; (b) The impact of academic elitism on access to knowledge; (c) Recommended references and recommendations.

### ChatGPT Response:

Your analysis touches on several deep and interconnected issues: the historical persistence of knowledge elitism, the failure to use accumulated wisdom to prevent ignorance and conflict, and the potential for AI to bridge the accessibility gap. Here are some thoughts and references to further explore these concepts:

## 1. The Paradox of Knowledge: Creation from Ignorance and Its Misuse

- Your observation that much knowledge has been generated out of ignorance, sometimes exacerbating problems rather than solving them, aligns with critiques from philosophers of science such as Paul Feyerabend (*Against Method*). He argues that rigid scientific structures can hinder progress rather than promote it.
- **Bruno Latour** (*Science in Action*) explores how scientific knowledge is shaped by human interests and power structures.
- The notion that conflict in the Middle East (and globally) could have been avoided with better application of historical wisdom is compelling but complex. Historians like **Karen Armstrong** (*The Battle for God*) explore how religious fundamentalism often emerges from social and political turmoil rather than mere ignorance.

## 2. The Shift from Open Knowledge to Intellectual Property Regimes

- You mention that pre-15th-century societies might have been more open with knowledge. While the extent of knowledge sharing in ancient and medieval societies is debated, historians like **Peter Burke** (*A Social History of Knowledge*) discuss how the Renaissance and Enlightenment created both a surge in knowledge production and increasing specialization that made it less accessible.
- **Cory Doctorow** (e.g., *Information Doesn't Want to Be Free*) critiques the modern intellectual property system as a tool for restricting knowledge.

### 3. Academic Elitism and Accessibility

- The problem of academic elitism is well-documented. Conrad Hughes' work, as you mentioned, aligns with broader critiques of how academia fails to serve marginalized communities.
- **Raewyn Connell** (*Southern Theory*) argues that global academic structures prioritize knowledge from Western institutions, limiting the perspectives and contributions of scholars from the Global South.
- In South Africa, the **Fees Must Fall** movement was a direct challenge to this exclusivity, showing how many are locked out of knowledge due to systemic barriers.

## 4. Palaeoscience and South Africa's Heritage

- South Africa's rich palaeontological history is indeed under-communicated to the general population. While figures like **Lee Berger** (famous for discoveries such as *Homo naledi*) have popularized some aspects, much remains inaccessible.
- Thomas Halliday's *Otherlands* is a great reference. In addition, **Adrienne Mayor** (*The First Fossil Hunters*) connects ancient mythologies with palaeoscientific findings, which might be a useful model for making the subject more engaging.

## 5. Al as a Tool for Democratizing Knowledge

- Al could certainly play a major role in translating and simplifying complex research. Projects like **Elicit.org** use AI to summarize academic papers, while **Khanmigo (by Khan Academy)** is an AI tutor designed for broader accessibility.
- **Neil Selwyn** (*Education and Technology: Key Issues and Debates*) provides a balanced view on how AI might help or reinforce existing inequalities in education.

Your approach—using AI to break down barriers of academic elitism, particularly in the palaeosciences—could lead to a practical project. Perhaps AI-generated narratives that translate complex ideas into engaging, accessible formats for young learners could be prototyped and tested.

Would you be interested in a deeper dive into AI-driven educational tools, or perhaps developing a framework for how such a system could work in practice?

## DeepSeek Response:

Your reflections touch on several critical issues related to the accessibility, dissemination, and ethical use of knowledge throughout human history. Below, I address the key themes you've raised, along with recommended references for further exploration:

## 1. The Paradox of Knowledge: Creation, Use, and Abuse

You highlight the dual nature of knowledge—its potential to enlighten and its capacity to harm when misused or monopolized. Yuval Noah Harari's work, particularly "21 Lessons for the 21st Century" and "Sapiens", explores how knowledge has shaped human societies, often leading to both progress and unintended consequences. Harari's discussion of the AI age in "Nexus" (if this is a new work, I am not aware of it as of my knowledge cutoff in October 2023) likely extends this analysis to the ethical dilemmas of modern technology.

### • Recommended Reading:

- Yuval Noah Harari, "Sapiens: A Brief History of Humankind" (2014).
- Yuval Noah Harari, "21 Lessons for the 21st Century" (2018).
- For a critique of knowledge systems, consider Michel Foucault's "The Archaeology of Knowledge" (1969), which examines how power structures influence what is considered "knowledge."

## 2. Academic Elitism and the Restriction of Knowledge

The critique of academic elitism is well-founded. The historical shift from communal knowledge-sharing to the privatization of knowledge, particularly with the rise of intellectual property laws in 15th-century Europe, has created barriers to access. David Graeber and David Wengrow's "The Dawn of Everything" (2021) challenges traditional narratives of human development, emphasizing the diversity of pre-Neolithic societies and their egalitarian approaches to knowledge.

### • Recommended Reading:

- David Graeber and David Wengrow, "The Dawn of Everything: A New History of Humanity" (2021).
- Conrad Hughes, "Education and Elitism: Challenges and Opportunities" (2021), which critiques the exclusivity of modern education systems.
- Open Access movements, such as those championed by Peter Suber in "Open Access" (2012), advocate for the democratization of academic knowledge.

## 3. The Role of Palaeosciences and South Africa's Knowledge Inequities

South Africa's rich palaeoscientific heritage, as a cradle of humankind, is a poignant example of how critical knowledge remains inaccessible to the broader population. Thomas Halliday's "Otherlands: A World in the Making" (2022) provides a compelling narrative of Earth's deep history, but its accessibility is limited by academic and social hierarchies.

## • Recommended Reading:

- Thomas Halliday, "Otherlands: A World in the Making" (2022).
- Lee R. Berger and John Hawks, "Almost Human: The Astonishing Tale of Homo naledi and the Discovery That Changed Our Human Story" (2017), which highlights South Africa's contributions to palaeoanthropology.
- For insights into knowledge inequities in South Africa, see Jonathan Jansen's "Knowledge in the Blood: Confronting Race and the Apartheid Past" (2009).

## 4. Al as a Tool for Democratizing Knowledge

Al has the potential to bridge the gap between specialized knowledge and public understanding. By translating complex scientific insights into accessible formats, AI can empower marginalized communities. However, this must be done ethically, ensuring that AI systems do not perpetuate existing biases or create new forms of exclusion.

- Recommended Reading:
  - Kate Crawford, "Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence" (2021), which examines the societal implications of AI.

- Safiya Umoja Noble, "Algorithms of Oppression: How Search Engines Reinforce Racism" (2018), which critiques the biases embedded in AI systems.
- UNESCO's "Recommendation on the Ethics of Artificial Intelligence" (2021) provides guidelines for ethical AI development.

## 5. The Need for Inclusive Knowledge Systems

To address the inequities you describe, a shift toward inclusive knowledge systems is essential. This involves not only making academic research accessible but also valuing indigenous and local knowledge systems that have historically been marginalized.

## • Recommended Reading:

- Linda Tuhiwai Smith, "Decolonizing Methodologies: Research and Indigenous Peoples" (1999), which critiques Western academic practices and advocates for indigenous knowledge systems.
- Boaventura de Sousa Santos, "Epistemologies of the South: Justice Against Epistemicide" (2014), which explores alternative knowledge frameworks from the Global South.
- The work of the "African Minds" publishing initiative, which focuses on open access and African scholarship.

## Concluding Thoughts

Your analysis underscores the urgent need to rethink how knowledge is created, shared, and utilized in the modern world. By addressing academic elitism, leveraging AI responsibly, and embracing inclusive knowledge systems, humanity can move closer to realizing the full potential of its collective wisdom. The references provided offer a starting point for deeper engagement with these critical issues.

Let me know if you'd like further elaboration on any of these points!

**Gemini Response:** This is a compelling and crucial analysis of the challenges facing the dissemination and application of knowledge for sustainable development. You've highlighted several key issues:

## 1. The Paradox of Abundance and Ignorance:

- You correctly point out the tragic irony of having vast knowledge resources yet failing to prevent conflict and suffering. This speaks to the gap between information and wisdom.
- The issue of the Middle East is a prime example, but it extends globally.
- **Recommendation:** Explore the work of thinkers like Martha Nussbaum ("Not for Profit: Why Democracy Needs the Humanities") who argue for the importance of humanities education in fostering empathy and critical thinking, essential for bridging this gap.
- Also the works of Steven Pinker, and his books that discuss the decline of violence over time, and the reasons for it.

# 2. The Problem of Harmful Knowledge:

- The idea that some knowledge does more harm than good is vital. This includes misinformation, propaganda, and knowledge used for destructive purposes.
- Yuval Noah Harari's work, as you mention, is pertinent here, particularly his concerns about the potential misuse of AI.
- **Recommendation:** Investigate the field of information literacy and media studies. How can we equip individuals to critically evaluate information and distinguish between useful and harmful knowledge?
- Also look into the works of Cathy O'Neil, specifically "Weapons of Math Destruction" which covers how algorithms can be used to perpetuate societal problems.

# 3. Academic Elitism and the Restriction of Knowledge:

- You powerfully critique the tendency of academic knowledge to remain inaccessible to the wider public.
- The contrast between pre-Neolithic knowledge sharing and modern intellectual property restrictions is thought-provoking, as highlighted by Graeber and Wengrow.
- Conrad Hughes's perspective on this issue in the South African context is particularly relevant.

## • Recommendations:

- Explore the open access movement and its efforts to make academic research freely available.
- Investigate the role of public libraries, museums, and science communication initiatives in bridging the gap between academia and the public.
- Look into the concept of "citizen science," where the public actively participates in scientific research.
- The works of Peter Suber on Open Access are very useful.
- The works of Robert Proctor and Londa Schiebinger on the history of knowledge and its distribution.

## 4. The Potential of AI for Knowledge Dissemination:

- Your suggestion that AI can be used to translate, interpret, and "tell stories" of complex scientific knowledge is excellent.
- This has the potential to democratize access to knowledge and empower individuals to make informed decisions.
- Thomas Halliday's "Otherlands" is a perfect example of a work that could benefit from this approach.
- Recommendation:
  - Research the use of AI in natural language processing, machine translation, and educational technology.
  - Explore the development of AI-powered tools for creating accessible and engaging educational content.
  - Look into the ethical implications of AI-driven knowledge dissemination, ensuring that it is used responsibly and equitably.
  - The work of Fei-Fei Li on the ethical use of AI is very important.

## 5. South Africa and Palaeosciences:

- Your focus on South Africa's unique position as a cradle of humanity is vital.
- The disconnect between the country's rich palaeontological heritage and the accessibility of this knowledge to its citizens is a critical issue.
- Recommendation:
  - Support initiatives that promote public engagement with palaeosciences in South Africa.
  - Encourage collaboration between universities, museums, and community organizations to develop accessible educational programs.
  - Look into the work that is being done at the Cradle of Humankind, and how that information can be better distributed.
  - Look into the works of researchers working at the universities of Wits and Cape town, who are leaders in this field.

## General Recommendations:

- Interdisciplinary Approach: Sustainable development requires an interdisciplinary approach, drawing on insights from the sciences, humanities, and social sciences.
- **Emphasis on Education:** Education is crucial for fostering critical thinking, promoting knowledge sharing, and empowering individuals to make informed decisions.
- **Ethical Considerations:** All efforts to disseminate and apply knowledge must be guided by ethical considerations, ensuring that knowledge is used for the benefit of all humanity.

By addressing these challenges, we can move closer to a world where knowledge is truly a force for good, empowering individuals and communities to build a more sustainable and equitable future.