AI NATIONAL GOVERNMENT SUMMIT

# DISCUSSION DOCUMENT
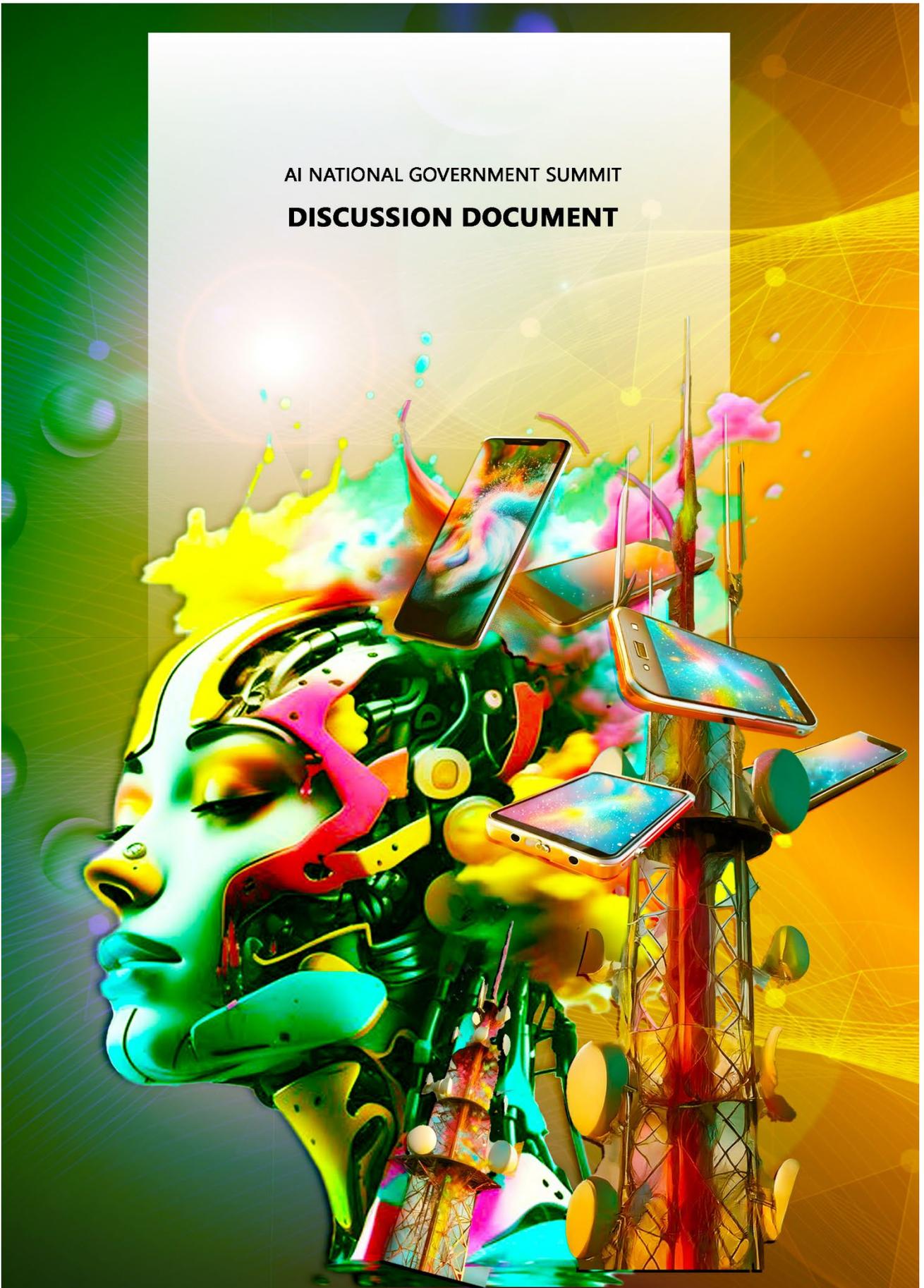
# SOUTH AFRICA'S ARTIFICIAL INTELLIGENCE (AI) PLANNING





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Department of Communications and Digital Technologies (DCDT)

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# FOREWORD BY MINISTER OF COMMUNICATIONS AND DIGITAL TECHNOLOGIES

There are strong indications that AI has the potential to deliver more benefits to humanity as compared to any technology introduced in the last century. As with any technology, these benefits are always matched by the ills or harms they carry. The harms requires that they be mitigated and managed through a sustainable planning process at all levels of society.

Since the invention of computers or computation machines, their growth has been exponential both in terms of capability and task performance. Our understanding is that this was because of humans' ability to have developed the power of computer systems with diverse working domains, speed increase, and size reduction and time adjustment.

The global assessment on how countries are addressing AI as a general-purpose technology differs in terms of continental, regional and national circumstances. Various permutations range from seeing AI as a tool that will bring goodness to humans as outlined by the International Telecommunications Union (ITU), or AI being able to bring prosperity for humans' rights according to the United Nations AI Task Force, or AI challenging human ethical foundations. Ours as South Africa is guided by the Presidential Commission on the 4th Industrial Revolution (PC4IR) report which looks at AI as a technology tool that will advance our social and economic prosperity.

We have witnessed several AI I initiatives around the country emanating from the government, private sector, academia, and civil society and decided that the best approach is to devise a plan that would encompass all. The plan purpose is to ensure that all the AI key role players can agree on the national priorities and objectives that will ensure our prosperity and growth through the adoption of AI.

From the government perspective, two (2) major initiatives are already taken and have been widely accepted. The Department of Communications and Digital Technologies (DCDT) has established an AI Institute of South Africa (AIISA) in 2022 and the Department of Science and Innovation (DSI) has established the Centre for Artificial Intelligence Research (CAIR) in past years.

South African government is now outlining key government AI priorities and putting up some deadlines that would ensure that we are not left behind on the AI global race. We understand that this phase of AI will grow in leaps and bounds and we will always be guarding against the negative aspects and harness the positive one and make the African continent a success story.

Mr Mondli Gungubele, MP

Minister of Communications and Digital Technologies

# EXECUTIVE SUMMARY

The advancement in Artificial Intelligence (AI) as a technology has created a breeding storm and necessitates that each sovereign country to have a deep look at its propensity, impact and pitfalls towards its citizens and needed governance systems. The AI National Plan approaches the computing system in a logical flow that would provide impetus for adoption and provision of direction to all stakeholders.

The plan begins with the provision of an overview of AI landscape and how is viewed from the perspective of South Africa's landscape. Section A outlines the global AI discussion as influenced by trends and drivers. Global discourse is influenced by political, economic and militarization of AI. It further points out that this discourse brings out global concerns and requires tools and applications. The regional and national approaches are assessed and aligned with the South African conceptual framework.

Section B looked at how the South Africa's landscape has been impacted by the pitfalls and opportunities brought by both versions of Applied and Generative AI. It unpacks the PC4IR approach and indicate how AI is impacting South Africa through law, governance, and regulatory approaches. It further elaborates by sharing localization of the AI approach that will drive South Africa's aspirations.

Section C outlines South Africa's AI plan priorities and key enablers. It further provides how the AI governance and institutional mechanisms could be guided by the ethical and regulatory approaches. The governance structures to manage AI in South Africa is proposed with the incorporation of AI, Big Data and IOT (automated services). This is directed by the AI framework which was developed in the aftermath of PC4IR report approval. It then points out the key priorities to be adopted and the timelines that are within the outlined AI opportunities.

# CONTENTS

# SECTION A:
# MODELLING ARTIFICIAL INTELLIGENCE (AI) WITHIN THE SOUTH AFRICAN LANDSCAPE

AI        The International Landscape: AI Global Discourse, Trends and Drivers

AI "is a software that is developed with one or more of the techniques and approaches (…) and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environment they interact with"

-European Commission definition

## A1.1    INTRODUCTION AND PURPOSE

Countries have historically and continuously navigated a global technological phenomenon because of its impact on the social and economic attributes as part of advancement in technological revolution.  When such navigation signals, it is expected that national governments must direct and plan for adoption of such an emergence.  AI technology is now such a phenomenon.

The advancement in AI as a technology has created a breeding storm and necessitates that each sovereign country to have a deep look at its propensity, impact and pitfalls towards its citizens and needed governance systems.

There are various definitions and descriptions of AI from the main global bodies and industries which require synergizing and alignment. AI is described *as systems that exhibit intelligent behavior which quickly analyse various activities and specific environments, then make independent decisions with the aim to achieve specific [socio-economic goals] {own emphasis}*" (OECD, 2018).

 McKinsey and Company (2023, April 24) define AI as a "machine's ability to perform the cognitive functions usually associated with human minds, such as perceiving, reasoning, learning, interacting with an environment, problem solving, and even exercising creativity".

Boston Consulting Group (BCG) also defines AI as "a field of computer science that aims to create machines or systems able to perform tasks that normally require human intelligence – tasks involving reasoning, learning, decision-making, or creativity".

Assessing the various definitions of AI at the global level, the key result from all these definitions is directed by the effort to seek a neutral global understanding which will permit for growth for AI for all humanity. Blumberg even remarked that *"humans and machines are a match made in productivity heaven"* (*Blumberg, et al, 2023*).

Historically, the human species has witnessed machine impact since the invention of the wheel that revolutionized agriculture, it can be concluded that machines have made the life as it is, possible. It is also attributed that the 20th century theoreticians such as Alan Turing, a computer scientist and mathematician to envision a future where machines could perform functions faster than humans, but machines would not replace humans in any stage of the future.

The overall purpose and objective of this document is to craft a South African National AI Plan. This plan will inform the creation of the certainty on the AI legal and governance environment and AI regulatory landscape that would be solicited from stakeholder inputs at a collaborative level. It will also contribute towards the various African continent coordinated AI activities.

This plan envisages to create a better AI future use through the following:

• Creation of policy and regulatory experiments

• A set of positive goals for what South African society requires from AI.

• Management of negative AI impacts on society and industry.

• Building an understanding of the AI technological possibilities.

• Proving certainty to society on this rapidly evolving AI technology through flexibility and accommodation of skills, software, innovations, and applications.

## A1:2    GLOBAL DISCOURSE: POLITICS OF AI; ECONOMICS OF AI; AND MILITARIZATION OF AI

According to Brynjolfsson and Unger (Oct 2023) "the collective decisions we make today will determine how AI affects productivity growth, income inequality, and industrial concentration." They further state that there are good reasons to take seriously the growing potential of AI systems because they exhibit intelligent behavior and abilities on learning, reasoning, and problem solving with view to transform the economy as opposed to technical advances of the past years.

The advancements on AI globally have created a global discourse for countries who are looking towards AI as a tool to advance their global positions aspirations. The AI advancements provides and ability for countries to traverse terrains that were previously difficult to navigate.

Agreements are being completed at the global levels to address strategic matters such as Sustainable Development Goals (SDGs), COP-17 obligations, and maintenance of the leadership on the global Gross Domestic Product (GDP) by the largest economies.

AI may affect society as a whole and the economy and other areas such as national security, politics, and culture, however the effect on the macroeconomic terrain is on:

- Productivity growth

- Labour market, and

- Industrial concentration

According to updated data on 04 December 2023, the current global GDP is indicated that it has grown towards the positive side of $125 trillion. The United States is leading with more than $26, 945 trillion; followed by China at more than $17, 786 trillion; Germany by more than $4, 430 trillion; Japan by more than $4,231 trillion; India by more than $3.730 trillion and United Kingdom (UK) by $3. 332 trillion (Forbes India, 2023). South Africa global GDP position in 2023 is $380, 91 billion which puts it second to Nigeria in the African continent at $477, 38 billion.

It is indicated that AI has the potential to impact global productivity growth increase positively, the impact on labour market through creation of creation, substitution and complementary situation between humans and machines.

Several various debates on AI at a global level touch on the realm of politics related to AI, weaponization of AI capabilities and economics emanating from AI. Thomson Reuters Foundation AI Governance toolkit (www.trust.org) measured the complexity of AI governance and found that there are several global concerns at a country level which are at a different phase and need to be resolved through governance instruments.

### AI Studies on its Impact on the African Continent

According to the report titled "AI in Africa: Unlocking Potential, Igniting Progress, A Working Paper" produced by Access Partnership (September 2023), it is elaborated that *one of the foremost challenges in Africa's AI adoption is the potential to exacerbate the current social and digital divides.* However, the report further states that *AI is already being used to address a wide range of African and global humanitarian challenges, from predicting floods and earthquakes and improving maternal health outcomes, to protecting endangered species and safeguarding food security.*

There is an understanding in the African continent, AI can assist in improving productivity and jobs creation outcomes across sectors like manufacturing, agriculture, financial services, and natural resources that are key to African economic growth. There is a challenge which remains which is the availability of detailed research which practically demonstrates how AI can impact Africa on these sectors.

The impact of AI on society research within the African continent is limited research especially when needed to focus on several key AI-related topics as **depicted on table below**, thus necessitating a need of deeper research to understand local impact and inform decision-making.

**Table 1:** Overview of existing research to date

| Country/region | Impact on employment | Impact on productivity | Societal impact | Risks (including privacy) |
|---|---|---|---|---|
| Broader Africa | Limited research | Existence of headline reports such as *How is AI being utilized in Africa?* by Strathmore University | Existence of headline reports such as *State of AI in Africa* by AI Media Group | Limited research |
| Ghana | Limited research | Limited research | Limited research | Limited research |
| Kenya | Limited research | Existence of headline reports such as *AI in Kenya* by Paradigm Initiative. | Limited research | Existence of headline reports such as *AI in Kenya* by Paradigm Initiative. |
| Nigeria | Limited research | Existence of headline reports such as *AI for Economic Development in Nigeria* by Citris Policy Labs | Limited research | Existence of headline reports such as *AI for Economic Development in Nigeria* by Citris Policy Labs |
| South Africa | Reports such as *The Future of Work in South Africa* by McKinsey & Co (2019) | Limited research | Limited research | Limited research |

Legend: *No color – Limited coverage, Amber – Some coverage, Green – Extensive coverage*

## AI Governance

The Africa continent is witnessing increasing positive advocacy approaches on the future of AI governance which outlines various governance instruments.  Some of the AI governance instruments considered are as follows:

- AI Guidelines and Standards – these are frameworks to guide AI developers, users and policy makers on what AI software development and applications comply with the existing AI paradigm.

- AI Government Strategy – as a high-level plan or approach that outlines goals, priorities, and actions that the government intends to achieve with AI.

- AI Policy and Law – a detailed and specific set of guidelines, rules, principles that will guide decision making and actions in the AI area.  This will be road mapping exercises linked to domestic and international AI prescripts.

- In terms of the AI Law, there is a codified approach which will be enforceable through rules that discourage non-compliance as it will be accompanied by penalties as evidenced by EU-AI Act.

- AI Ethical Foundations – this relates to a set of ethical and principles conditions linked to human rights, harmful actions and protection of personal information and data.

At a continental level, particularly in Africa, there is a strong emphasis on AI supporting sustainable development goals (SDGs).  At the country level evidence is emerging where various domestic actions are undertaken by countries such as Mauritius, Egypt, and Rwanda amongst others.

In a bigger picture approach, there has been location of relevant national government departments such as communications, science and technology that are playing a role of AI in the areas such as healthcare, mining, manufacturing, and agriculture.

The awareness of the pitfalls and benefits of AI is looked at the risks and biases that would sustain digital divides, digital inequalities, and data disparity due to lack of adequate digital infrastructure currently experienced.

AI is a serious policy concern for the African continent and the African Union (AU) has encouraged the need to determine countries AI governance measures.  There has been many activities and guiding instruments for African countries such as the Smart Africa AI Blueprint, Sharm El Sheikh Declaration, Malabo Convention, AU Digital Transformation Strategy, and some reports such as "AI for Africa: AI for Socio-Economic Development amongst others.

The are still main questions around AI impact such as "How many jobs are going to be lost because of AI? What is the best estimate? What fraction of labour force is exposed due to AI adoption, especially Generative AI?

IMF studies report indicates that it varies country to country.  The examples demonstrated is in the United States and United Kingdom where 60-70% of labour force is exposed to AI.

In India where the large portion of workforce is in Agriculture exposure is around 30% and in Brazil and South Africa exposure will be 40%.  What can be synthesizes is that in South Africa where the total labour force is estimated to be 24 267 566, then 40% means almost 9 707 026 job opportunities will be exposed to AI.

AI has the potential to add and create value in the private and public sectors more efficiently. On the gender exposure, it is remarked that women who tends to be in retail sector or services industries there will be a greater exposure to AI.

Countries where agriculture drives economies and women largely employed at such sectors, AI will not do much damage. The agriculture sector in South Africa is slightly less than 2,5% but Industry and Services are 25% and 62, 61% respectively.

Role of Government in AI

Since the Dartmouth Summer Research Project on Artificial Intelligence in 1956, where the term AI was coined by Professor John McCarty, data and AI have mainly been fields of specialists in academic institutions, government, and private research organizations. However, recent years have been characterized by a shift of interest towards the public sphere to include political actors, the public, and private companies in nearly all major sectors.

AI has the potential to deliver more benefits to humanity than any new technology in the last century. This AI benefit is also matched by great global and human potential harms.

BCG indicates that "governments need to start looking to learning from the AI leaders when it comes to AI implementation. Many governments have begun to implement AI across various small-scale pilots. But they are still limited to experimentation, and few have achieved true AI at scale."

The BCG report further advises that for AI "to implemented effectively and generate benefits for public-sector organizations in three ways: smarter policymaking, reimagined service delivery, and more efficient operations. Thus, the technology can help governments better meet the needs of their citizens while making better use of taxpayer" revenue for growth.

Governments around the world are facing complex challenges ranging from youth bulge, ageing population, climate change etc.  What comes across clearly is that the public sector in conjunction with the other stakeholders such as the academic institutions and the private sector must continually evolve to meet the demanding needs of the citizens.

McKinsey study conducted recently, found that almost 80% of public sector transformation initiatives tend to fail or faulter.  It is however, noted that South Africa is working to buck this trend.

In harnessing AI, governments must build levers that are key to driving the phenomenal absorption of AI in the whole of society which are as follows:

- Expanding connectivity to the Internet and Digital Infrastructure

- Fostering the plans to investing in people through talent and skills development

- Enhance an ecosystem that promotes competitive and open markets

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- Accelerating technological innovation and supporting the growth of next-generation technologies, mainly AI and Cloud Computing

## A1:3    INVESTMENT IN AI TECHNOLOGIES AND APPLICATIONS

According to *AI Media report (2022)*, AI in Africa is a cross cutting technology that has the potential to impact many industry sectors, society, and the future of work in Africa.  The global AI market was valued at $328 billion in 2021 and is projected to have grown from $387 billion in 2022 and projected to $1,394 billion by 2029.

This economic growth is exhibiting a Compounded Average Growth Rate (CAGR) of 20.1% with some estimates suggesting it will create a $15.7 trillion contribution to the global economy by 2030. With the projection that South Africa's economy will be impacted on a positive economic growth of +1% to national GDP increase.  A figure below demonstrates a state of play of AI in the African continent.

Also, a figure below demonstrates the funding raised by AI Strat-ups in the African continent since 2019 – April 2022.



**Top 10 Findings**

**2400+**
African based organizations list "artificial intelligence" as a specialty

4 countries account for
**66%**
namely; South Africa, Nigeria Egypt & Kenya

African Deep Tech companies leveraging AI have attracted
**>$0.5Bn USD**
investment

**34%**
of companies are SMEs with less than 100 staff

**41%**
of companies are Micro-SMEs with less than 10 staff

**74%**
are privately held

**40%**
were founded in the last 5 years

Growth in number of companies founded was exponential over the last
**10 years**[a]

**120+**
different industry sectors are assigned to organizations in this sector

**65%**
of all companies analyzed were found in 6 key industry sectors

1. Information Technology & Services
2. Computer Software
3. Internet
4. Financial Services
5. Management Consulting
6. Telecommunications

[a] This has slowed in last 2 years perhaps due in part to the impacts of COVID19
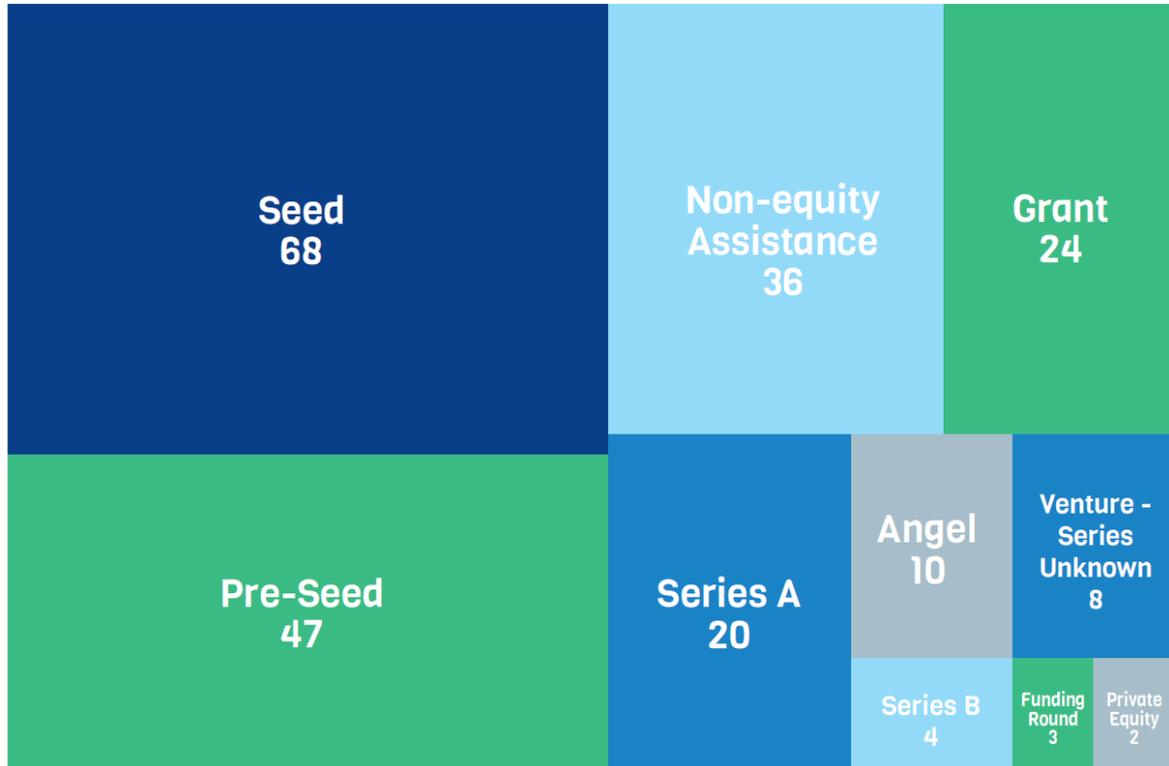
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## Total funding raised by start-ups since 2019

For more, visit **thebigdeal.substack.com** by Max Cuvellier & Maxime Bayen

### As of end of April 2022

**#8 Tunisia**
~$150m
7 $1m+ deals

**#4 EGYPT**
**$1.1bn+ (12%)**
raised since 2019
121 deals over $1m

**#6 Senegal**
$240m+
11 $1m+ deals

**#1 NIGERIA**
**$3.5bn+ (36%)**
raised since 2019
192 deals over $1m

**#5 Ghana**
$250m+
27 $1m+ deals

**#9 Uganda**
$125m+
18 $1m+ deals

**#2 KENYA**
**$1.9bn+ (19%)**
raised since 2019
140 deals over $1m

**#7 Tanzania**
$150m+
10 $1m+ deals

**Total funding raised by start-ups in the country since 2019**

- 'Big Four'
- $100m and over
- $10m to $100m
- $10m and less
- No recorded activity

**#3 SOUTH AFRICA**
**$1.6bn+ (16%)**
raised since 2019
145 deals over $1m

As of May 1st, 2022| Deals $1m+ (2019-2020) and $100k+ (2021-)| Full database : thebigdeal.gumroad.com
Based on deals both publicly disclosed & shared confidentially by selected investors
*Some deals (inc. Chipper Cash's rounds ($250m)) were not attributed to a specific country (~5% of total value)*

The figure below demonstrates the type of AI Investments taking place in the African continent in terms of numbers and categories. These AI investments are enabled by a need for a conducive Technology Foreign Direct Investments (TFDIs) and the enabling Visa Regime and related environments.

# Investment Type



| Seed<br>68 | Non-equity<br>Assistance<br>36 | Grant<br>24 |
|---|---|---|
| Pre-Seed<br>47 | Series A<br>20 | Angel 10 / Venture - Series Unknown 8 / Series B 4 / Funding Round 3 / Private Equity 2 |

## A1: 4    GLOBAL CONCERNS ON AI

Globally it is believed and understood that AI has potential to drive significant advances in so many social and economic fields thus making connectivity more meaningful and accessible to everyone.

It is also observed that new business models and many industries are quickly shifting towards the implementation and maturity of AI-driven products and services. These product and services are taken up at an amazing speed by humanity and have the potential to change the world as we know it.

There are several matters globally, however that need to be addressed substantively when confronting the emergence of AI which amongst others are:

-    Data as a meaningful developmental tool.

-    Digital skills and Job Impacts (Employment)

-    Global Bodies Formation and Approaches on AI

- Ethical use of AI

- Funding and Investments – Protection of Intellectual Property and Patents

- AI Start-ups and New Emerging Business (Tax and VISA Regime and Maturity Assessment Models)

## A1:5 MAIN TYPES OF AI DISCOURSE

Many people in the world currently have knowingly or unknowingly interacted with AI through various tools such as voice assistants like Siri and Alexa that are founded on AI technology and applications. Also, in the customer service environment there are chatbots that sprung out to help navigate some URLs and websites.

Mainly there are two types of AI making rounds in the global discourse, Applied AI (AAI) and Generative AI (GAI).

AAI is model or a system where artificial intelligence is used or applied to real world problems or global wicked problems and has a serious implication for governments and industries. This type of AI can help or assist governments to grow economic and social sectors value-chains through bringing efficiency and elimination of human inconveniences. In the industry and business levels, this AI has the potential to make them more profitable and introducing new business models.

GAI is an AI model that generates or creates content in a response to prompt. These are AI tools such as ChatGPT (Chat Generative Pre-trained Transformer) and DALL-E (art generated tool) amongst others (McKinsey, 2023).

Boston Consulting Group (BCG) defines GAI as "a set of algorithms, capable of generating seemingly new, realistic content – such as text, images, or audio – from training data.

GAI tools can produce a wide variety of credible writing in seconds, then respond to a user's critiques to make the writing more fit for purpose. This has implications for a broad range of industries, from IT and software organizations that can benefit from the instantaneous code generated by AI models to organizations in need of marketing copy. Use generative AI resolution versions of medical images, as an example with the time and resources saved, government can pursue new business opportunities and the chance to create more value.

## A1:6  COMPONENTS OF AI - AI SYSTEM; MACHINE LEARNING; NEURAL NETWORKS; DEEP LEARNING

AI has largely a common definition available from most of the global recognized organizations and a layered approach in terms of the components.  It is, however, not to be complacent that everyone in the national psychic has the same understanding.  The diagram below demonstrates how the understanding of AI and related components could be viewed.
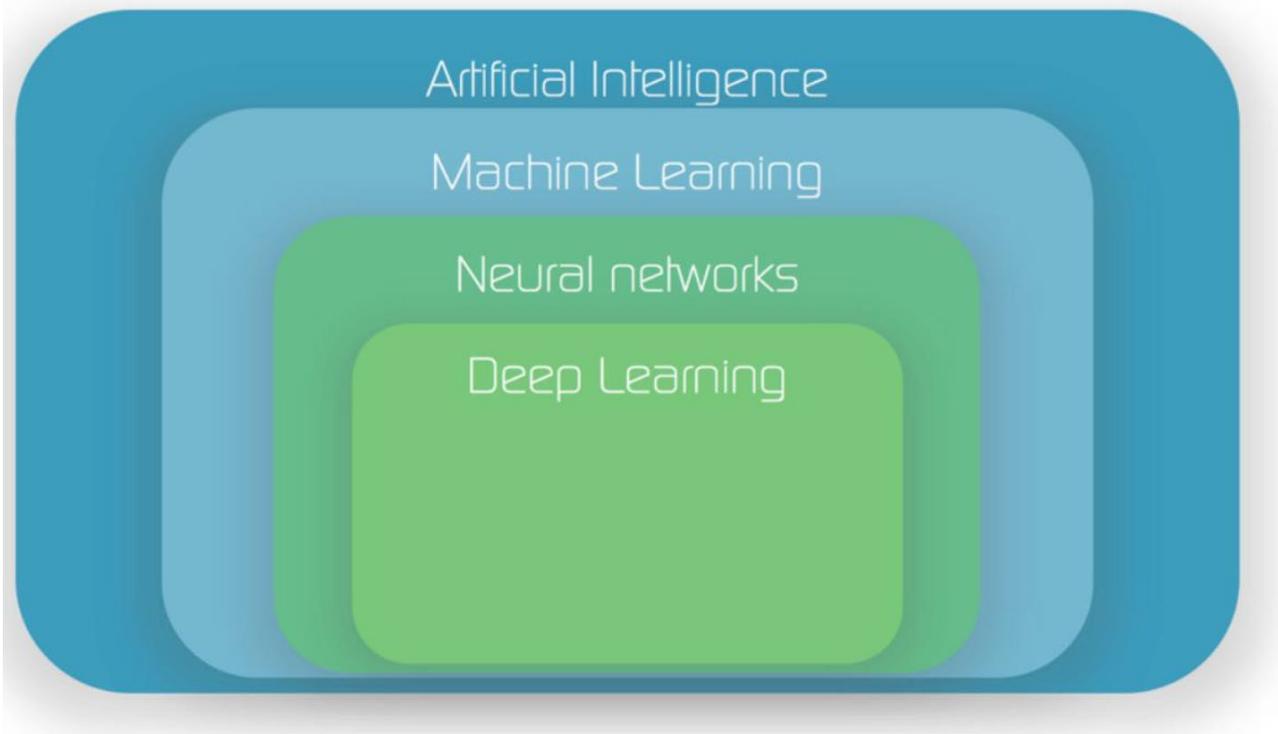


Diagram 1: Components of AI Ecosystem

AI is a machine's ability to perform the cognitive functions we associate with human minds, such as perceiving, reasoning, learning, interacting with an environment, problem solving, and even exercising creativity.

AI techniques are increasingly using massive amounts of alternative data sources and data analytics referred to as 'big data'. The image below states that Big Data has four (4) variations, volume, variety, velocity, and veracity.  The image below demonstrates how the four elements of Big Data are considered.

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**Infographic 1.1. The four Vs of Big data**



Source: (IBM, 2020[11]).

AI is a machine's ability to perform the cognitive functions we associate with human minds, such as perceiving, reasoning, learning, interacting with an environment, problem solving, and even exercising creativity. AI techniques are increasingly using massive amounts of alternative data sources and data analytics referred to as 'big data'. The image below states that Big Data has four (4) variations, volume, variety, velocity, and veracity. The image below demonstrates how the four elements of Big Data are considered.

Machine learning is a form of AI based on algorithms that are trained on data. These algorithms can detect patterns and learn how to make predictions and recommendations by processing data and experiences, rather than by receiving explicit programming instructions. The algorithms also adapt in response to new data and experiences to improve their efficacy over time.

The volume and complexity of data that is now being generated, too vast for humans to reasonably reckon with, has increased the potential of machine learning, as well as the need for it. In the years since its widespread deployment, which began in the 1970s, machine learning has had an impact in several industries, including achievements in medical-imaging analysis and high-resolution weather forecasting.

Such data feed machine learning (ML) models which use such data to learn and improve predictability and performance automatically through experience and data, without being programmed to do so by humans.

Some computers have now crossed the exascale threshold, meaning that they can perform as many calculations in a single second as an individual could in 31,688,765,000 years.

But it's not just about computation. Computers and other devices are now acquiring skills and perception that have previously been our sole purview.

Many people have probably interacted with AI even if you didn't realize it with voice assistants like Siri and Alexa are founded on AI technology, as are some customer service chatbots that pop up to help you navigate websites.

The neural network can then make determinations about the data, learn whether a determination is correct, and use what it has learned to make determinations about new data. For example, once it "learns" what an object looks like, it can recognize the object in a new image.  Three types of artificial neural networks used in machine learning as defined by McKinsey study:

- Feed-forward neural networks (FfNNs) are simple neural networks first proposed in 1958, information moves in only one direction.  Meaning you can feed, or input, data into the model, then "train" the model to predict something about different data sets.  They are used in banking, among other industries, to detect fraudulent financial transactions.

- Convolutional neural networks (CNNs) are type of feed-forward neural network modeled on the makeup of the animal visual cortex, the part of the brain that processes images well suited to perceptual tasks, such as identify bird or plant species based on photographs.  It is suited diagnosing diseases from medical scans or detecting a company logo in social media to manage a brand's reputation or to identify potential joint marketing opportunities.

- Recurrent neural networks (RNNs) are a neural network whose connections include loops, meaning the model both moves data forward and loops it backward to run again through previous layers helpful for predicting a sentiment or an ending of a sequence, like a large sample of text, speech, or images.

Deep learning is a type of machine learning that can process a wider range of data resources (images, for instance, in addition to text), requires even less human intervention, and can often produce more accurate results than traditional machine learning.  Deep learning uses neural networks based on the ways neurons interact in the human brain to ingest data and process it through multiple iterations that learn increasingly complex features of the data.

The COVID-19 crisis has accelerated and intensified the digitalization trend that was already observed prior to the pandemic, including around the use of AI. Global spending on AI is forecast to double over the period 2020-24, growing from USD50 bn in 2020 to more than USD110 bn in 2024 (IDC, 2020).

It is remarked that humans and machines are a match made in productivity heaven. The human species wouldn't have gotten very far without our mechanized workhorses. From the wheel that revolutionized agriculture to the screw that held together increasingly complex construction projects to the robot-enabled assembly lines of today, machines have made life as we know it possible.

Despite their seemingly endless utility, humans have long feared machines on the possibility that machines might someday acquire human intelligence and strike out on their own.

## A1.7    REGIONAL VS NATIONAL AI APPROACHES AND FRAMEWORKS

There is 70% plus global internet adoption in 2022 and more than 60% online mobile usage across major markets *(AI Media Group, 2022)*. Generative AI and ChatGPT in particular, swept into the world's collective consciousness and made us all sit up and take notice The application reached 100 million monthly active users just two months after launch and swiftly earned the honour of being the fastest-growing consumer application in history *(Ekow Duker, co-Founder of Zindi Africa)*.

According to McKinsey research the real value for the Middle East's Gulf Cooperation Council (GCC) countries could be $150 billion or equivalent to 9 percent or more of those countries combined Gross Domestic Product (GDP).
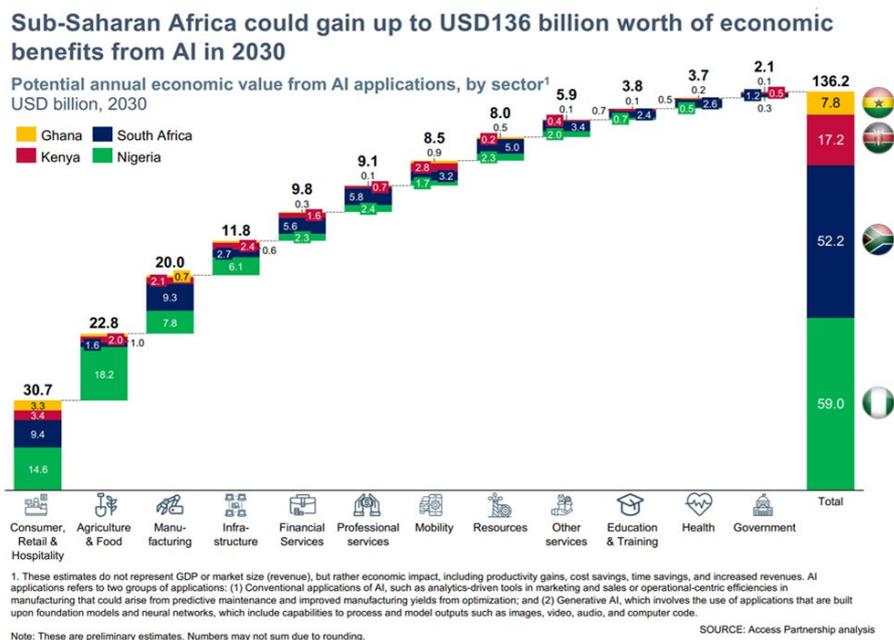
The figure above as researched by Access Partnership shows that the Sub-Saharan Africa could gain up to $136 billion worth of economic benefits by comparing the AI sector AI impact in South Africa, Ghana, Kenya and Nigeria. As previously reported that depending on each country key economic sector contributor, AI will determine the value derivative. For example, Nigeria key sectors stands to benefit from AI at a greater scale compared to South Africa which its key sectors will be somehow negatively impact to a greater extent. However, all these countries will enjoy greater benefits from the adoption of AI.

In adopting AI at a national stage is by creating and understanding and acknowledging of the global digital transformation changes happening at the United Nations (UN) levels and many global platforms. Secretary-General (SG) of the UN report on the preparation for the Summit of the Future in September 2024, indicated that a Digital Global Compact (DGC) must be developed encapsulating AI is an embedded technology. The DGC will be driven by focus on Digital Transformation and Climate Change as key drivers for global changes with AI as the center of gravity.

## A1: 8 SOUTH AFRICA'S AI CONCEPTUAL FRAMEWORK AND APPROACH

South Africa (during its African Union Presidency) was instrumental in contributing to a pan-African "AI for Africa Blueprint" part of the SMART AFRICA initiative supported by the German Development Cooperation (GIZ) and the Smart Africa Secretariat. The AI for Africa Blueprint helps member-states towards developing policies, strategies and plans that ensure growth and prosperity within the context of 4IR digital revolution.

In November 202, the Department of Communications and Digital Technologies (DCDT) launched an Artificial Intelligence Institute of South Africa (AIISA) [www.aii-sa.co.za] to encourage the take-up of AI and localised AI solution.

In addition, the Department of Higher Education, Training, and Innovation (DHET&I) established the WEF Affiliated AI Centre which focuses on AI Ethics and the Centre for Artificial Intelligence Research (CAIR) which focuses on AI Research.

These current approaches were informed and directed by the several prescripts but mainly from the Presidential Commission on the 4th Industrial Revolution (PC4IR) report. It was adopted at Cabinet meeting on August 26, 2021. The establishment of the institute sums up the actions that South Africa's government will take to advance the take-up of AI in both private and public sector, to increase the relevant skills and research.

The envisaged South African National AI plan will rely on the following pillars:

- Boosting AI in the government, economy, digital skills through research and development. and the legal environment.

- Government-as-Platform approach to boost uptake of AI in both public sector and wider economy.

- AI public skilling courses and raising AI awareness.

- Creation of AI sandboxes for testing AI localised applications.

- Collaboration with the private sector, academia, and civil society to identify AI opportunities to advance society.

- Develop designated AI local innovation and development of Start-up grants for developing machine learning based solutions.

- There is a need for a separate legislation regime that will demonstrate the importance of AI as a field of technology that is becoming increasingly popular.

- AI has the potential to deliver real value in South Africa.

# SECTION B: AI – SOUTH AFRICAN LANDSCAPE, OPPORTUNITIES AND PITFALLS

## B1. AI UNDERSTANDING WITHIN SOUTH AFRICA'S CONTEXT

The greatest attention currently on AI is because it is now able to perform the functions that were exclusively human brain function. AI is a machine's ability to perform the cognitive functions we usually associate with human minds. AI systems are machine-based systems with varying levels of autonomy that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions.

The image below demonstrates how the AI system through data accumulation and interpretation can perform brain functions as used by many others.
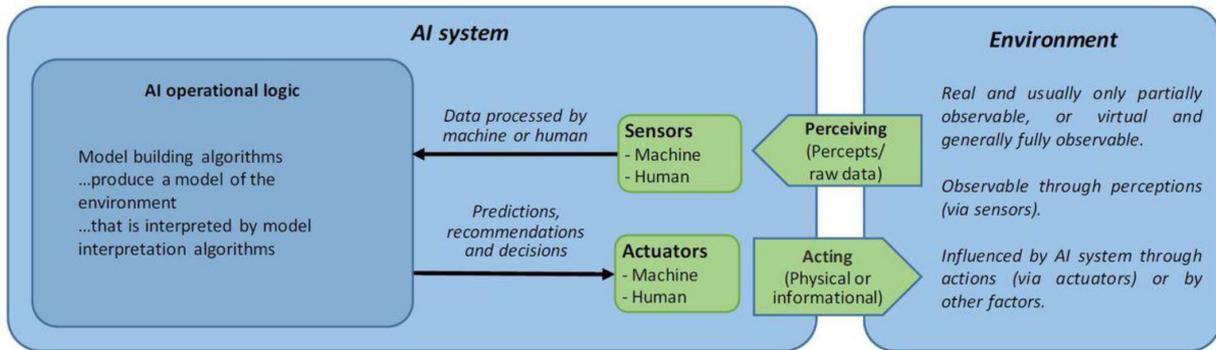
In the context of South Africa where there is a challenge with job security and high unemployment, the use of AI should be dovetailed with the need to improve such situations. It is remarked that a mere adoption of AI within the administration work phase could save South Africa $9 billion an annum through improvement of absenteeism.

One of the significant aspects about AI as a general-purpose technology is that is not a standardized blanket approach technology. It offers the user or adopter the opportunity to tailor make it to address the specific challenges at that moment and in future. For example, there are countries that looked at AI to help solve their national problem by addressing the national question which was based on solving the aging population crisis.

This was applied with the understanding that AI can provide the ability to analyze, diagnose, predict, and automate a problematic situation at a faster speed.

AI is revolutionizing human life and unlocking a whole new world of innovation. Its prevalence will affect nearly every society aspect. The AI Industry and developers are required to demonstrate responsible behavior and ethical use.

AI solutions and applications must consider that they are designed to ensure safety, reliability, and ethical practices. There will be a need to create trustworthy regulatory principles and governance systems that will guarantee levels of accountability, inclusivity, and transparency that will promote human life and prevent harm.

## B1.1    ADOPTION OF AI: SA AI APPROACH PC4IR

In South Africa's situation, the PC4IR report has outlined 10 national features   that need to be understood before deciding on AI approach. These features include but not limited to youth bulge, gender inequality, internal migration, income disparities, human development index, skewed economic structure, regression in energy and water supply, domestic workers dominance, weak economic growth, high corruption, reduced global competitiveness, amongst others.

The PC4IR also outlines 8 key dimensions that should guide the development of an AI national plan approach which are:

- service delivery,

- preparation through experimentation,

- private sector capabilities,

- technological clarity and commitment,

- government as an organizing player,

- human capital development, and

- regulation and ethics.

There is also un understanding provided by the PC4IR report when it comes to policy development and formulation that outlines required approach: policy must be inclusive in its process, integrated infrastructure framework, financial incentives, adaptiveness, and socio-economic impact assessment.

Companies and organizations in South Africa have started with the implementation of both the applied and generative AI technologies in areas such as chatbots, job seeking tools, quantum analysis and data traffic management.

## B1.2 APPLIED AND GENERATIVE AI: IMPACT IN SOUTH AFRICA

There is a need to understand the various forms of AI especially in two (2) formats, Applied AI, and Generative AI. Applied AI simply, artificial intelligence applied to real-world problems has serious implications for the business world. In this aspect, the value of AI is not in the systems themselves but in how companies use those systems to assist humans and their ability to explain to shareholders and the public what those systems do in a way that builds and earns trust.

The PC4IR has placed emphasis on the adoption of applied AI in advancing the economic growth prospects of South Africa. The key economic sectors such as manufacturing, transportation or network industries require an applied AI to function optimally.

Generative AI is an AI model that generates content in response to a prompt. AI tools like ChatGPT and DALL-E (a tool for making AI-generated art) have the potential to change how a range of jobs are performed.

The full scope of that impact, though, is still unknown, as are the risks. Questions that can be answered are, how generative-AI models are built, what kinds of problems they are best suited to solve, and how they fit into the broader category of AI and machine learning.

Generative-AI tools can produce a wide variety of credible writing in seconds, then respond to a user's critiques to make the writing more fit for purpose. This has implications for a broad range of industries, from IT and software organizations that can benefit from the instantaneous code generated by AI models to organizations in need of marketing copy. Use generative AI resolution versions of medical images, as an example with the time and resources saved, government can pursue new business opportunities and the chance to create more value.

Generative AI will have heavy impact on the educational, art and culture, and research and development areas. There is a need to shape up and build defensive all the address possibility of fake and misleading facts through proper AI regulation mechanisms.

## B1:3 STATE CONSIDERATIONS IN TERMS OF LAW, GOVERNANCE AND REGULATION

The deployment of AI in major sectors is expected to increasingly drive competitive advantages through two main avenues:

- Cost reduction, and

- Productivity enhancement.

Policy makers and regulators have a role in ensuring that the use of AI is consistent with regulatory aims of promoting stability, protecting consumers, promoting integrity and competition. Policy makers should consider supporting AI innovation in the different sectors.

Emerging risks from the deployment of AI techniques need to be identified and mitigated to support and promote the use of responsible AI. Existing regulatory and supervisory requirements may need to be clarified and sometimes adjusted, as appropriate, to address some of the perceived incompatibilities of existing arrangements with AI applications.

The application of regulatory and supervisory requirements on AI techniques could be looked at under a contextual and proportional framework encouraging the use of AI without unnecessarily stifling innovation.

Policy makers should consider sharpening their focus on better data governance. Policy makers should consider disclosure requirements around the use of AI techniques in the provision services and that it may impact outcome.

Regulators should consider how to overcome the perceived incompatibility of the lack of explainable in AI with existing laws and regulations.

Policy makers should consider requiring clear AI model governance frameworks and attribution of accountability to help build trust in AI-driven systems. Explicit governance frameworks that designate clear lines of responsibility for the development and overseeing of AI-based systems throughout their lifecycle, from development to deployment, could be put in place. Internal model governance frameworks could be adjusted to better capture risks emerging from the use of AI.

### What is needed to be in place to Achieve with adoption of AI in South Africa?

The era of Digital Transformation provides states and nations options to navigate. These options are related to achieving phenomenal economic and social growth which will yield returns that are realizable. The options that are readily applied within the digital transformation are:

- Digital Economy

- Gig Economy

- Circular Economy

A choice or combination of these options have the requirements and yields for when a country or nation decides on a particular choice within the digital transformation can provide a springboard. The table below shows a snapshot of what each choice has enabling requirements and outcomes that will be realized. It should be borne in mind that should a specific option be made further unpacking will become a driving policy and strategies that would be compounded by needed regulatory framework.

| Choices/Options | Enabling Requirements | Outcome |
|---|---|---|
| Digital Economy | Robust 80- 100% Internet Connectivity Access by society | Disruptive Development: Remodeled Systems that will provide Global Leader and Enhanced Competitiveness |
| Innovation/Gig Economy | 80-100% Funding on Invention and Local Innovation. | Game Changer Development: Innovation with global reach |

| Choices/Options | Enabling Requirements | Outcome |
|---|---|---|
| | Large segment of society must be of young age with government having a lost risk appetite. | |
| Circular Economy | 80-100% consumption based on net importer of goods | Sustainable Development: Recyclable and Greening Systems |

In explaining the table above, will be guided by the understanding of how each option is defined within the context of a particular nation. Defining the Digital Economy, a unified definition is that *"is a worldwide network of economic activities, commercial transactions and professional interactions that are enabled by information and communications technologies (ICT), meaning an economy based on digital technologies"* ([www.techtarget.com](www.techtarget.com)).

Digital Economy require that a nation or society must have 80-100% must be connected to the Internet, meaning that government, industry, academia, and civil society must use Internet in most it's their activities. The outcome is that the current systems must be remodeled, and change must be deep.

Innovation/gig economy is defined as *"a field of economic theory and applied/experimental economics that emphasizes innovation and entrepreneurship"* ([www.valuer.ai](www.valuer.ai)). The choice of Gig Economy requires that the society must be driven by youth bulge where at least 75% of the population is younger than 40 years old. In this option, the government must be willing to fund local inventions and innovations with the intention to have a game changing innovation that will be globally adopted.

Circular economy is defined as *"a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible"* (ww.europarl.europa.eu). The choice of a Circular economy relies on the society which does not actually produce goods at a large scale but relies on importing goods from other nations. This means that whatever is imported must be made longer term longer and recyclable for longer-term.

South Africa is in the middle strata of these economic models because they possess snippets of elements of each and not through the determined thresholds. The acquisition of AI technology determines the choice of an economic model pursuant to social and economic growth. South Africa has made a choice to pursue a digital economy model as the digital transformation agenda, thus its use and adoption of AI will be demonstrated as such.

Frameworks for appropriate training, retraining and rigorous testing of AI models could be introduced and/or reinforced to ensure that ML model-based decision-making is operating as intended and in compliance with applicable rules and regulations.

Regulators should consider promoting the ongoing monitoring and validation of AI models, which are fundamental for their risk, as one of the most effective ways to reinforce model resilience, prevent, and address model drifts.

Appropriate emphasis could be placed on human primacy in decision making when it comes to higher-value use-cases. Policy makers could consider the increased technical complexity of AI, and whether resources will need to be deployed to keep pace with advances in technology. The role of policy makers is important in supporting innovation in the AI sector and protecting the citizens from consuming AI products that are harmful to their privacy, security, and dignity.

## B1: 4   SOUTH AFRICA'S ASPIRATIONS: GLOBAL AND CONTINENTAL

South Africa's global AI Aspirations are guided by the following objectives:

- To promote national character as a global shaper in the domain of AI.

- AI Skills Aspiration - South Africa aims to enhance SA human capital with a steady local supply of AI-empowered talents to cope up with the disruption that will be caused by this technology.

- AI Policy And Regulation Aspiration – South Africa will be part of legislative national transformation of the African continent in enacting the most welcoming legislation AI businesses and talents.

- AI Investment Aspiration – South African government will support increase assets and enable the economy by attracting local and foreign investors to identify and fund AI investment opportunities in SA.

- Research and innovation initiatives will target top human capital talents to nurture their skills through state-of-the-art R&I environment in new/smart cities to spearhead innovation and impact creation.

- Ecosystem Initiatives aim to stimulate Data & AI adoption across giga projects and across major cities, improving productivity, quality of services and wellbeing

# SECTION C: SOUTH AFRICAN AI PLAN

## C1    PRIORITY FOCUS AREAS AND ENABLERS

**A national AI Plan Mapping Steps**
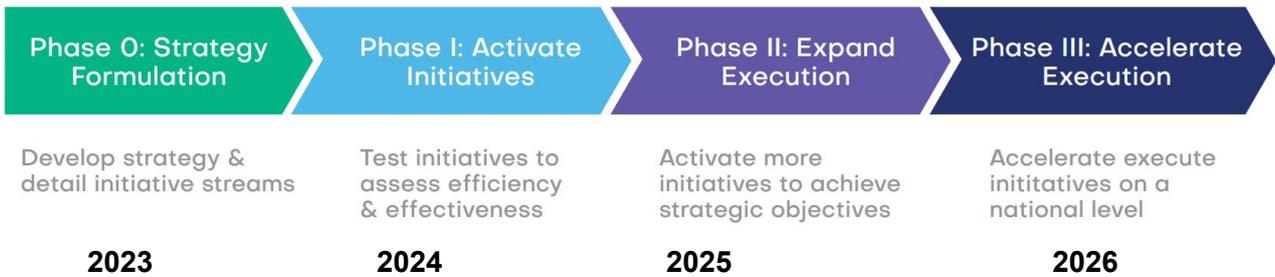
| Phase 0: Strategy Formulation | Phase I: Activate Initiatives | Phase II: Expand Execution | Phase III: Accelerate Execution |
|---|---|---|---|
| Develop strategy & detail initiative streams | Test initiatives to assess efficiency & effectiveness | Activate more initiatives to achieve strategic objectives | Accelerate execute inititatives on a national level |
| **2023** | **2024** | **2025** | **2026** |

With foresight and a commitment to act, South Africa can capture the opportunity offered by technology, manage the AI risks, and ensure that the gains are broadly shared. There are **four core priorities** for a bold AI national plan of action that is co-owned by government, business, labour and educational leaders. Provide the state with predictive maintenance, diagnostic ability, analytical models for policy and regulatory systems, and automated service delivery channels.

In terms of AI as a technology tool of choice and the impact it must have on the social and economic sectors is to achieve the following outcomes:

- AI Predictive maintenance abilities.

- AI Logistics optimization and Automated services

- AI Diagnostic abilities

- AI Analytical abilities

AI National Major Initiatives Required to Scale-UP

- Launching and events → AI Insititions

- Operationalisation and     Activiting     POLICY & REGULATIONS

- Building AI Data Achitecture

- **INVESTMENT** **AI delibarate investment channels**

**First**, South Africa can shape a smart approach to embrace AI for the benefit of all citizens. The plan can help define the country's AI agenda, including prioritizing AI industries where South Africa has or can develop a competitive edge in technology-driven solutions, such as mining and manufacturing. The envisaged national plan AI of action can also scope and size the risks that AI adoption poses to jobs and the economy; it can also assist develop the necessary AI national plan.

**Second**, South Africa can take decisive steps to invest in AI skills generation plan. The plan could help rethink the country's education and learning ecosystem to foster broad participation in the AI opportunities of the future. It can create transparency on the AI skills that the economy will need in future, and help educational institutions plan to meet that need. It can trigger a review of South Africa's basic education system, to strengthen the focus on teaching quality, literacy, and STEM subjects - science, technology, engineering, and mathematics. It can promote a stronger technical and vocational education and training (TVET) system to ramp up the development of AI technical skills. And it can help drive improvement in the graduate conversion rate of South Africa's education system.

**Third**, the AI national plan can set out a national strategy to mitigate the AI impact of adoption. That would include identifying jobs that will not be portable and identifying ways to reintegrate displaced workers into the AI workforce. For example, South Africa can increase investment in AI to boost employment opportunities. That can include providing focused support to AI start-ups that are producing AI products for export or import substitution in sectors such as advanced manufacturing and agro-processing, and which have prospects for rapid growth. South Africa can also develop support for individuals moving from formal employment into the 'gig' or "digital" or "circular" economy. Finally, the plan can propose ways to rebalance AI social-support funds and mechanisms to support those who cannot be AI integrated into the workforce.

**Fourth**, the AI plan can help foster a step-up scenario, where AI job creation increases over and above a trendline scenario because of societal and policy choices enabled by increased productivity and economic growth. Closing the AI infrastructure and needed gap will require an increased levels of investment in the South African AI sector economy and could be a major as this could be a source of labour demand in years to come.

A further opportunity is embracing the transition to clean energy through AI, including increasing the share of renewables and making buildings, transportation, and technologies more energy efficient.

| AI Dimensions | AI Components | AI Activities |
|---|---|---|
| Skills | Data and Literacy<br><br>Data and AI Specialists<br><br>Data and AI Experts | • Instil basic data and AI skills for the national workforce and students.<br><br>• Build sustainable pool of national specialization in data and AI.<br><br>• Nurture data and AI scientists through local and international partnerships at an academic and professional levels. |
| Policy and Regulations | Activate policy and regulatory frameworks.<br><br>Companies' incentives programmes.<br><br>Talent's incentives programmes | • Data generation AI generative and applications.<br><br>• Attract local and foreign companies to AI sectors through incentives programmes.<br><br>• Attract foreign talents data and AI sector. |
| AI Investment | AI Investment Funds<br><br>Investor support programme<br><br>Administrative services | • Stimulate data and AI investments through targeted investment funds.<br><br>• Activate specialised programme to support investors. |

| | | |
|---|---|---|
| Research and Innovation | R&D innovation excellence.<br><br>National innovation test beds. | • Elevate data and AI R&D innovation capabilities in universities and research centers.<br><br>• Create an attractive data and AI test bed environment in mega-projects and smart cities. |
| AI Ecosystem | Data and AI Sector strategies<br><br>Data and AI Platforms<br><br>Smart cities<br><br>Government Systems | • Develop data and AI domain in sectors identified as priority strategies.<br><br>• Accelerate data and AI technology adoption through accessible digital platforms.<br><br>• Drive the smart city agenda in towns and cities.<br><br>• Adopt data management practices and use of AI in government organisations |

## C1.1   DISCUSSION ON ENABLING ENVIRONMENT

South Africa is observing three (3) trends in which the adoption of AI is possible:

• Firstly, technologically, the data from machine learning is tied to the wide availability of large amounts of data that could be used through cheap computing power.

• Secondly, economically, progress on adopting AI is based on significant investment input and advancement of venture capital in technological companies and start-ups.

• Thirdly, culturally, the digital content generation drives the digital transformation global agenda as it enables AI platform generation.

Which South African Economic Sectors can benefit from machine learning machine and deep learning?

The image above demonstrates the plethora of sectors that have been advanced in terms of structure and size in terms of maturity, semi-maturity, and least maturity.
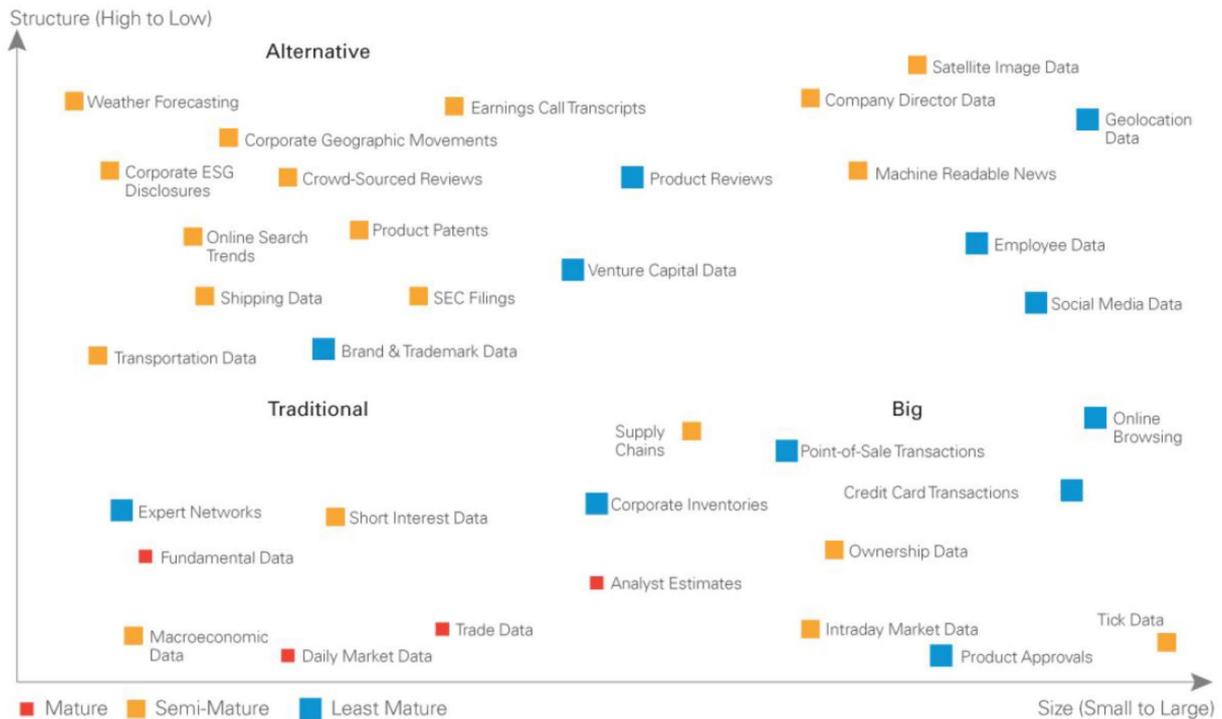


Source: Dell Technologies.

The McKinsey study collated more than 400 use cases of machine and deep learning across 19 industries and nine business functions. Nearly all industries can benefit from machines and deep learning.

The identification of key economic sectors that could benefit from application or adoption of Applied and Generative AI should be harnessed and supported through the lens of acknowledging the changing business models.

**EDUCATION**: Integrating Data and AI in education to align the education system with labor market needs and improve the student's journey

**GOVERNMENT**: Assimilating Data and AI in Government to create a smarter and more efficient public sector

**HEALTHCARE**: Integrating Data and AI into healthcare to increase access, enhance preventative care, and accommodate growing demand

**ENERGY**: Integrating Data and AI into Energy in increase capacity, enhance efficiency, and develop adjacent industries

**MOBILITY**: Incorporating Data and AI in Mobility to build a regional hub, create smart city Mobility technology, and enhance traffic safety in cities

**APPLYING AI in terms of Process Steps**
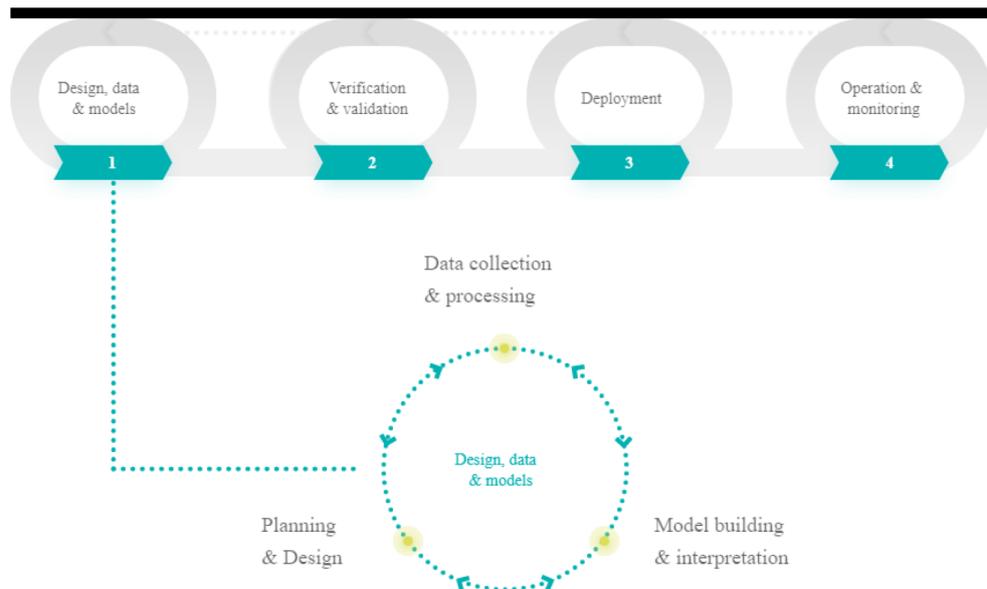


Note: As defined and approved by the OECD AI Experts Group (AIGO) in February 2019.
Source: (OECD, 2019[4]).

The steps that are outlined in the above image demonstrates the number of inputs and planning required to adopt by the various sectors in creating a value-based design that would guide the narration of AI in SA planning process.

The number of AI Institutes and Centres within SA must endeavor to share a national design data and models that would facilitate the quick adoption of AI within the SA national economic and social footprint.

AI National Targets in Catapulting and Dovetailing NDP 2030

•  30% of the total workforce trained on basic AI data management and AI literacy skills.

•  20 000 local AI specialists in workforce.

•  5 000 AI experts

•  Top 20 of countries in Applied index

- Exemplary AI legislative aspects and regulation

- 100 - 300 AI startups

- 70 Bn Government, local and Foreign Direct investment AI

- Top 20 countries in peer reviewed SA AI research and development publications

## Why AI Adoption matters in SA?

South Africa's position regarding the stack choices mentioned above seems to sit in the middle of the choices. The ambition to make the South Africa to be at the place where AI is made reality goes in parallel with the national priorities under NDP 2030.

The country is going through an unprecedented transformation, and we are aiming to maximize the benefits provided by AI to support and accelerate this transition. South Africa needs to ensure the continuity of this endeavour throughout the design and implementation of the different phases of the policy and strategy by focusing on six broad dimensions. The dimensions are policy and regulations imperatives, generative skills, needed investment, research and innovation and the data and AI ecosystem.

These dimensions will support the proposed four (4) phases related to planning for – strategy formulation, activate initiatives, expand execution, and accelerate execution.

Under the 2030 National Development Plan (NDP) vision of the Republic of South Africa (RSA), the Presidential Commission on the 4th Industrial Revolution (PC4IR) report and strategic framework developed in 2021, Artificial Intelligence (AI) became a key topic to be developed and integrated in the new digital transformation agenda

and adoption of 4IR technologies. South Africa vision on AI is defined by the intention to establish a national AI Institute that will drive the economic and social policies designed to advance national interest and global competitiveness.

An AI Framework was developed through the formulation of a Strategic Implementation Programme for the PC4IR report. Below image is the depiction of the components of the AI framework.
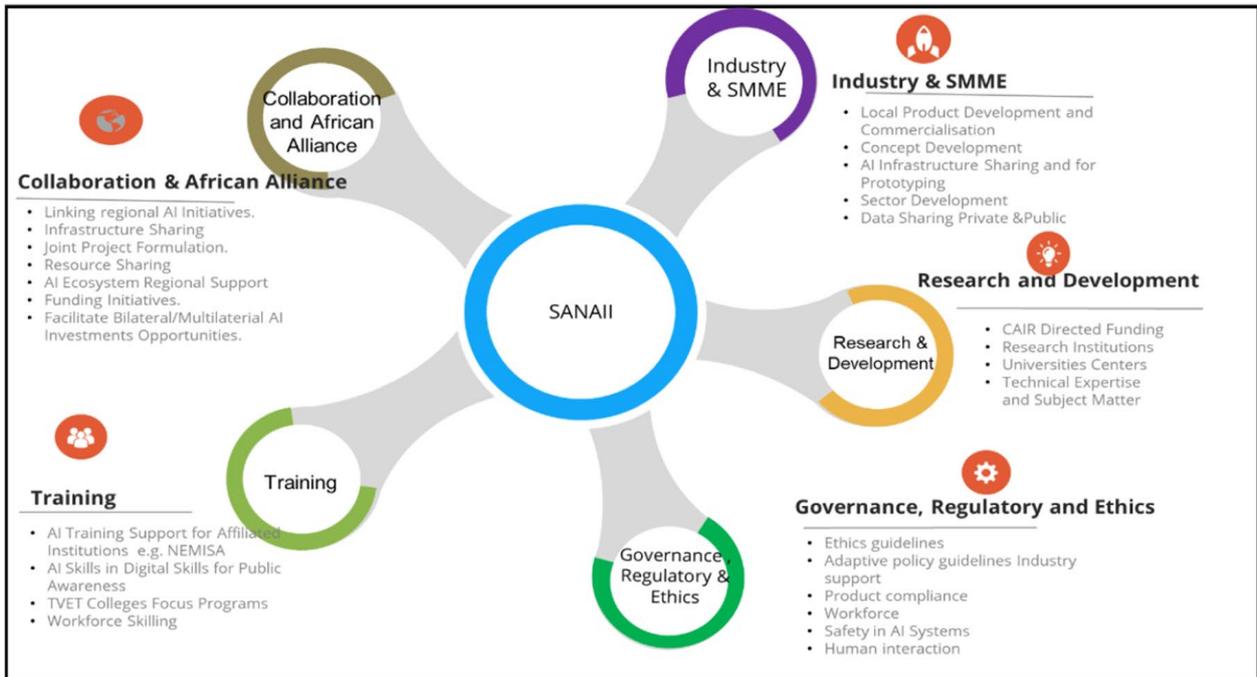
As announced on 30 November 2022, the South African government through the Department of Communications and Digital Technologies (DCDT) has been actively driving digital innovation by establishing an Artificial Intelligence (AI) Institute in partnership with the academic institutions which will be the Centers of Excellence and Hubs for the application of AI within the sector economies.

The DCDT in partnership with University of Johannesburg (UJ) and Tshwane University of Technology (TUT) embarked on the establishment of an AI Institute was the catalysts for ushering South Africa into the digital frontier. There are keyways that must be crafted and driven to ensure the practical success of this initiative through ensuring programme approach, championing, funding, and sustainability activities.

Since the past years, the situation across the world economy and society has slowed down due to the current pandemic, AI in its applied and generative format provides a key opportunity for South Africa and the globe to test its potential.

From South Africa's perspective, AI has the potential to close the growing digital gap that exists between developed and developing nations, which has been made more prominent during this unprecedented period.

This vision was part of the discussion about the launch and establishment of AIISA. This requires all of us to think and work hard to take advantage of artificial intelligence and unleash its full potential to advance our societies and economies.

With foresight and a commitment to act, South Africa can capture the opportunity offered by technology, manage the risks, and ensure that the gains are broadly shared.

Four core priorities are suggested for a bold national plan of action that is co-owned by government, business, labour and educational leaders.

**First**, South Africa can shape a smart approach to embrace digitisation for the benefit of all citizens. The plan can help define the country's digital agenda, including prioritising industries where South Africa has or can develop a competitive edge in technology-driven solutions, such as mining and manufacturing. The national plan of action can also scope and size the risks that digital automation poses to jobs and the economy; as we discuss below, it can also help develop the necessary mitigation plans.

**Second**, South Africa can take decisive steps to invest in human capital. The plan we suggest could help rethink the country's education and learning ecosystem to foster broad participation in the work opportunities of the future. It can create transparency on the skills that the economy will need in future, and help educational institutions plan to meet that need. It can trigger a review of South Africa's basic education system, to strengthen the focus on teaching quality, literacy, and STEM subjects - science, technology, engineering, and mathematics. It can promote a stronger technical and vocational education and training (TVET) system to ramp up the development of technical skills. And it can help drive improvement in the graduate conversion rate of South Africa's education system.

Just as important in strengthening South Africa's human capital, the plan can help guide both public and private-sector organisations to create 'retraining engines' to enable lifelong learning. That will entail several fundamental shifts in the country's current approach to education and training. For example, we might need to shift from a focus on once-off degrees to discrete certifications in specific skills.

We might develop a new taxonomy of certified skills to enable workers to 'brand' themselves for specific capabilities. And, to help training providers rise to the challenge of large-scale reskilling, the plan could define a clear accreditation framework and recommend new quality-assurance processes that focus on application of skills rather than theoretical understanding.

**Third**, the plan can set out a national strategy to mitigate the jobs impact of automation. That would include identifying jobs that will not be portable, and identifying ways to reintegrate displaced workers into the workforce. For example, South Africa can increase investment in SMEs to boost employment opportunities. That can include providing focused support to SMEs that are producing products for export or import substitution in sectors such as advanced manufacturing and agro-processing, and which have prospects for rapid growth. South Africa can also develop support for individuals moving from formal employment

into the 'gig' economy. Finally, the plan can propose ways to rebalance social-support funds and mechanisms to support displaced workers who cannot be reintegrated into the workforce.

**Fourth**, the plan can help foster a step-up scenario, where job creation increases over and above a trendline scenario because of societal and policy choices enabled by increased productivity and economic growth. For example, infrastructure systems have not kept up with demand and housing shortages persist in many countries – including South Africa. Closing this infrastructure and housing need gap will need increased levels of investment in the South African economy and could be a major source of labour demand in years to come. A further opportunity is embracing the transition to clean energy, including increasing the share of renewables and making buildings, transportation, a

The established AIISA will be addressing several critical AI-related four main areas for consideration and direction and themes.

- Shaping a New Normal through AI

- AI and Government role

- AI Governance and Regulation, and

- The Future of AI.

## C1.2 FOCUS AREAS: WHAT MUST BE IN PLACE FOR AIISA TO BE EFFECTIVE AND REALISTIC

### Right Data Architecture

The journey towards digital transformation is the most pressing challenge within the public sphere is whether the infrastructure that exists is ready for innovation of tomorrow. In simple terms, the public-sector and its partners need to ask the question: Can their existing technology architecture and systems effectively store and manage the amount of data volumes that require the effective application of AI systems?

Management and ownership of Data in particular, has become an essential developmental resource for many countries. It is even remarked that is now "the new oil,". This illustrates the possibility of immense opportunities it can create in terms of efficiency, development of AI solutions, and public services. Major ccountries are learning to maximize data collection opportunities, processing, and integration into developmental agenda to provide valuable solutions. It is expected that it will gain significance, in the short and long term. SA, therefore, has a critical role in developing the Data and AI agenda to position the country in the league of data-driven economies.

It is reported that by 2025, about 463 exabytes of data would need to be generated globally each day and managing this paradigm is a challenge that must be addressed imminently. The MIT Technology Review report indicated that despite the great enthusiasm for Artificial Intelligence (AI), it was found that 77% of organizations in the

Asia-Pacific and Japan find it difficult to digest, analyze and interpret data. This is the major task the Artificial Intelligence Institute of South Africa (AIISA) must face head on and address as the first task.

Effective data analytics first requires a scalable and reliable infrastructure of which the sector government departments must understand through the need to lay out public data architecture systems. It is estimated that at least R70 billion at minimum should

be dedicated towards 5G innovation and more than R100 billion would need to be set aside to develop AI systems and meet national cyber security needs. The public sector will have to upgrade and rebuild legacy IT systems to support the seamless storage, retrieval, and analysis of data.

## AI Adoption Programme Approach

The management and operations of the AI Institute would require that it be implemented at a programme level within the DCDT structure and systems. This would allow for robust business continuity capabilities which are able to reach the higher echelons of government and executive suites of the private sector.

South Africa citizens are incrementally and increasingly adopting a digital lifestyle, which means government services are expected to be always online. The speed and agility would not sustain the long downtime as siloed and legacy IT systems and mundane maintenance and backup processes may be catastrophic consequences. What is not to be forgotten is the constant cyber-attacks that always threaten the delivery of e-services.

The rationale for the programme level can be elucidated by an example where an essential service such as a national water distribution system which requires constant monitoring of water pressure and quality distribution is key. The AI Institute would require advice and intervene by identifying leaks and possible contaminations as an early warning through real-time data through reduction of human intervention. Operating at the programme level is thus critical to the smooth operations of government services, thereby increasing timely and trustworthy interventions.

The AI Hubs must be independent on their operations and project management guided by the policy and strategy programme of the DCDT.

The AI Hubs will develop a report mechanism will will be provided to the DCDT at quarterly intervals to allow for proper reporting within government structures.

## AI Engagement Strategy and Approach

The purpose of an AI Institute is to assist sector departments at various government levels to effectively use AI as digital tools that will advance the value-chains and mandates. Various national, provincial, and local governments have indicated the need for accessing and using digital technologies such as AI towards solving their challenges.

The AI Hubs have identified catalytical projects related to the sector solutions such as transport, mining, farming amongst others. These projects require an ability to provide proof of solution and the ability to hit the ground running to those sector clients.

There is a need to develop a planned engagement strategy towards the identified stakeholders through the AI Institute. The AI Institute should be the first point of call and set up the required engagement with government departments. Once the groundwork has been laid, then the Hubs will take over the projects on both the operational and technical elements.

The approach must be based on a solid foundation wherein a sound proposal by the AI Hub on the identified solution must be developed as an engagement tool.

## AI Advisory Council or AI Panel of Experts

There was a discussion about the need to establish an AI Expert Advisory Council which was facilitated by DCDT. The processing of the establishment has faced some constraints internally that would have to be resolved soon.

The AI Hubs must also determine how they will have advisory council linked to their areas of focus.

## Funding, Investment and Sustainability

The adoption of AI is a general – purpose technology (GPT) will require funding related to aspects such setting data architecture, equipment, lab tools etc. There are various

ways for funding the AI Institute and its Hubs. There is a need to ensure that a seed fund plus the launch costs must be budgeted to ensure awareness and visibility.

The AI Institute sustainability is paramount to its impact and sustainability because it will have the whole of society participation. Investments must be sourced or accepted from various sources which are

government, academia, private sector, and international donors.  These investments would come from the influential quarters depending on what area of AI their focus will be based.

The AI Institute and the Hubs must establish a framework to address such investments and a vehicle mechanism to manage such investments.  The key issue is that for any

sort of investments to flow, there is a need for seed funds that would propel the initial work that must be undertaken by the AI Institute.

## Structuring and Resources (Governance)

The setting-up of an AI approach by the DCDT is based on having a programme approach wherein to avoid a brick-and-mortar physical structure outside the mandate department because AI is a national imperative.  The AI Institute role is to be the coordinator, facilitator, and policy setting organization rather than direct operational implementation.  The AI Institute would be made up of a network of AI Centers of Excellence or Hubs with a focus on different but interlocutory areas of execution.  A decision matrix must be put in place which will allow for consistent use of resources.

The structure of the AI Institute must be modelled around the role of the networked AI Hubs or Centers of Excellence.  It is envisaged that the governance structure must be codified and agreed by all to allow for plugging of other initiatives.

The role of the private sector involvement must also be incorporated within the government structure.  The decision-making matrix must also deal with the distinction between the management, operational and technical aspects.

The last governance structure agreed to is demonstrated below:

## Governance Structure Model for AI Hubs

```
                    ┌──────────────────────────┐
                    │           DCDT           │
                    │        Node 1 (UJ)       │
                    │        Node 2 (TUT       │
                    └──────────────────────────┘
                                 │
                                 ▼
        ┌──────────────────────────────────────────┐         ┌──────────────┐
        │          Management Committee            │────────▶│   Oversight  │
        │ DCDT Official, UJ and TUT Representative  │         │      and     │
        └──────────────────────────────────────────┘         │   Direction  │
                                 │                            └──────────────┘
                                 ▼
        ┌──────────────────────────────────────────┐
        │      Operational Experts Committee       │         ┌──────────────────────┐
        │     (AI Hub Nodes Heads, DCDT            │────────▶│ Technical Advisory and│
        │    Officials, Chairperson of AI          │         │ Operational Execution │
        │        Experts Advisory                  │         └──────────────────────┘
        └──────────────────────────────────────────┘
              │             ▲│▼            │
              ▼                            ▼
    ┌─────────────────┐           ┌─────────────────┐
    │ Technical Working│          │ Technical Working│
    │ Committee (Node 1)│         │ Committee (Node 2)│
    └─────────────────┘           └─────────────────┘
```

During the preparation of the AI Institute establishment and launch of the UJ Hub there were various working committees that were created which can be reviewed to ensure proper governance and required resources.  The highest decision structure was the

AIISA Launch Preparation Committee which includes the DVCs and the Acting Director-General of the DCDT.

## Focus Areas of AI Hubs

The UJ and TUT AI Hubs presented catalytical projects aligned with the focus areas which are distinct and overlapping.  There will be other AI Centers that would be added within the network already created and their focus areas would have to be decided upon regarding how they get infused within the existing focus areas.

There might be a need for the AI Hubs to have a workshop to align the areas of focus and build the required engagement plans to the identified sector departments.

### Benchmarking and Fact-finding Missions

The exponential rise and global focus on AI as a technology has witnessed a plethora of establishing AI Institute or centers by countries and global organisations. There are also various private sector developments and AI platforms being established around the world that have shown interest in the work of the AIISA.

The AI initiatives that have approached DCDT are:

• Saudi Data and Artificial Intelligence Authority (SDAAI) – United Kingdom of Saudi Arabia

• The AI Institute of the Netherlands – Republic of Netherlands

• National institute for Transforming India (NITI Aayog) – Republic of India

• UNESCO AI Ethics Centre

• AI- Sweden

• Artificial Intelligence Technology Centre – Republic of Egypt

There is a need to conduct fact-finding missions and benchmarking studies by the AIISA to build global cooperation and develop best practice system which will allow AIISA to be competitive and in line with current affairs.

## C1.3   DATA, AI AND IOT

CORE MANDATE: DCDT's key role is to Drive and Own the National Data and AI agenda, through the following objectives.

1) Set the overall strategic direction of AI and Data - Define the nation- wide strategic direction of AI and Data

2) Guide the execution of the AI strategy with government and Entities - Support and guide different entities in strategy execution, without hindering their current Data and AI plans. Address the VISA Regime and Global Investments access path.

3) Execute AIISA led initiative - Achieve and fulfil AIISA initiatives such as AI data consolidation and regulation

4) Fund AI Local Initiatives, communication, and public awareness – Strategic Funding for Local AI Innovations



**Provide**
government cloud services

**Integrate**
government data

**Foresight**
national priorities

**Develop and Operate**
national platforms

**Orchestrate**
AI research

**Foster**
AI entrepreneurship

**Develop**
AI solutions

**Build**
AI expertise
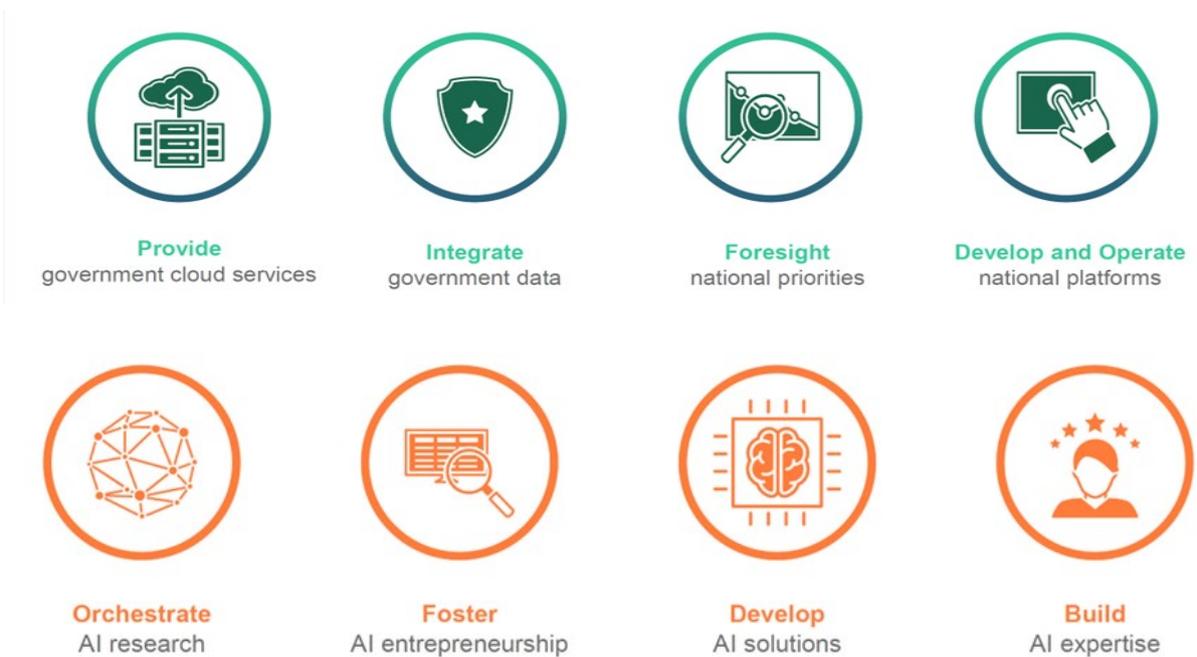
## C2 AI GOVERNANCE AND INSTITUTIONAL MECHANISMS
## C2:1 SOUTH AFRICA'S AI ETHICAL CONSIDERATIONS

There are future potential AI harms will require the adoption of a set of human and ethical considerations that have been postulated but where it is less clear what the optimal form of regulation is, such as:

• Anti-competitive behavior should the provision of key AI models, or other enablers, be concentrated in a small number of players.

• Risks in robotic or autonomous devices that use AI to decide on actions, such as AI-enabled autonomous cars.

• Aggressive loss of employment leads to social risks.

• Criminal behavior or other highly dangerous outcomes.

• Existential risks should AI "get out of control" and pursue goals detrimental to humanity.

- Risks that AI designed for military purposes "escapes" into the wider world and leads to enhanced criminal behavior or other highly dangerous outcomes. (Access Partnership, 2023)

South Africa is witnessing global numerous calls on the AI ethical dimensions such as

- OECD – AI Trustworthy and Reliable use

- UNESCO – AI Ethical use

- ITU – AI for Good

- UN – AI for Development

South Africa has to navigate within these global proposals and find a solution that is aligned with the developmental state aspirations. The cornerstone of South Africa human rights is located within the Chapter 2 of the Constitution and the preamble. Below images demonstrate some of the approaches that would guide the consideration of on aspects that should be considered when addressing the AI impact and pitfalls.
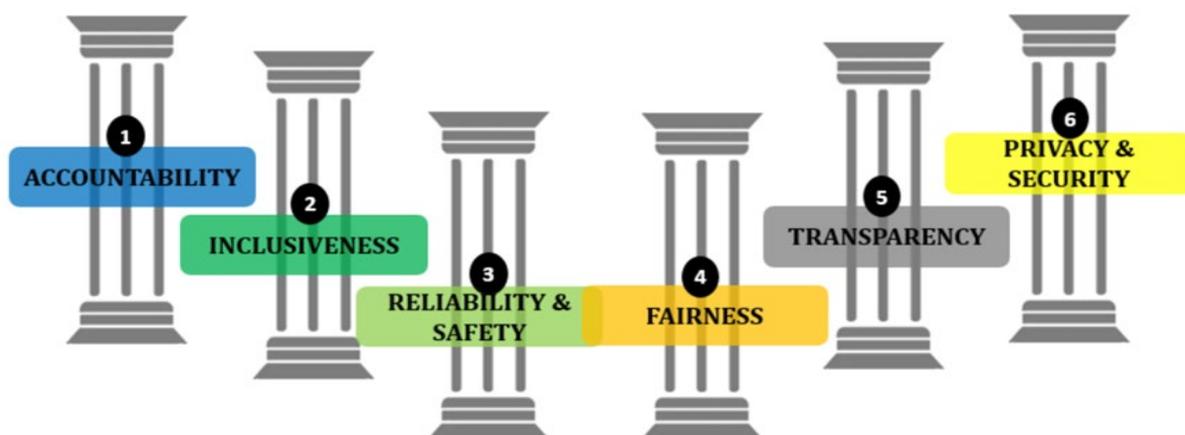


**RESPONSIBLE & TRUSTED AI**
is the *foundational keystone* in enabling the universal confidence, inclusivity, trusted adoption, ethical advancement and technological prosperity in humanity's journey as a "digital species".

**RESPONSIBLE & TRUSTED AI**
can lend itself to *re-establishing industry and sector trust* on a level that defends credibility and output.

## C2:2 SOUTH AFRICA AI REGULATION APPROACH

According to Access Partnership AI Policy Lab (2023) [www.accesspartnership.com], *"regulators, policy bodies, and companies have responded to this clear need with a flurry of proposals to either regulate AI or build the evidence base to do so. However, the quality of these proposals varies considerably. Others, meanwhile, are considering alternative approaches, such as voluntary ethical frameworks."*

Recently the most concrete regulatory prescript was from the European Commission through a EU's AI Act. (see below image) This has been through many years in development and is now approved by the EU structures which is detailed over 100 pages document and includes enforcement mechanisms and more. It is regarded as the first comprehensive piece of legislation in the global AI space and became the de facto global AI regulation.

The observation is that other countries have varying degrees of regulation and frameworks, while it is not clear that whether South Africa and others will follow the same approach or would come up with anything materially better based on the environmental conditions.

Any regulatory approach to AI, in terms of South Africa, it should be guided by the following outlined factors as per Access Partnership AI Lab:

- Global practices since AI by its nature cannot be constrained to any country.

- Responsive to Economic and Social Aspirations because of the need to ensure an all-inclusive approach to ensure that the whole society benefit as the AI harms become apparent in many instances.

- Built on principles, or ethics, and human rights protection that provide guidance for those working on AI and enable even some degree of self-regulation.

There are other regulatory concerns that should be borne in mind are as follows:

- Disinformation and fake news generated through Generative AI applications and software.

- Bias and discrimination that could be exhibited by AI developers and users.

- Copyright abuse in alignment with World Intellectual Property Organisation (WIPO)

- Privacy to protect personal, private, and public data.

## C2.3  SA AI AND DATA GOVERNANCE STRUCTURE

AI is still quite a novel technology which may not have an immediate economic impact within organisations, as it is still being developed. However, the risk of waiting for the technology to mature means lagging cannot be tolerated.  The support required from government is for the application of governance of AI and mitigation of the risks associated with its implementation towards significant economic impact in the future.

The implementation of AI governance on applications is a high priority on discussion topics in continental and global cooperation groups of the African Union (AU), SADC, BRICS+ and G20 member-states.

The relationship between Data and Cloud, IOT and AI should inform the required governance structure at the programme and executive level.  The governance structural depiction is informed by the tripartite relations of data, IOT and AI as demonstrated below:
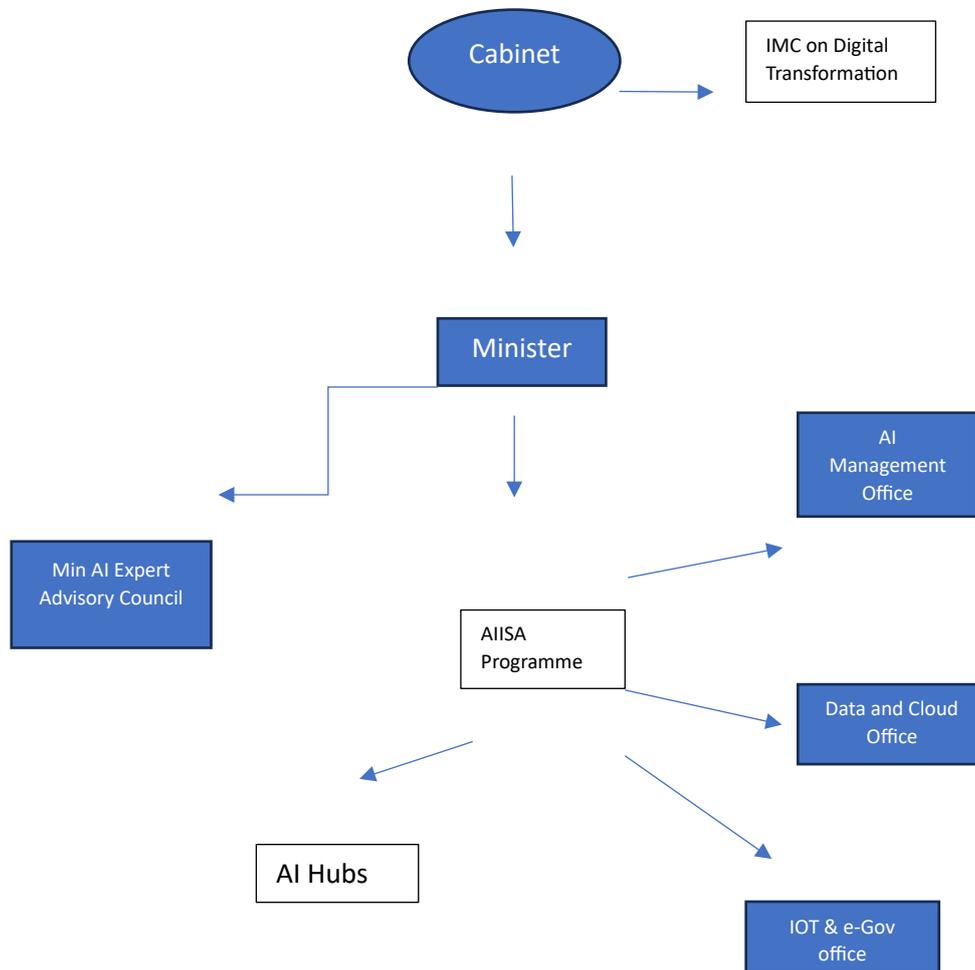
The governance structure and model of AI from the global perspective is guided by relationship cultivated the role of government, private sector and civil society.

**Cabinet Role** – Approve and guide the execution of the National AI Plan with government entities.

**Minister and AI Expert Advisory Council Role** - Set the overall strategic direction of Data and AI and define the nation-wide strategic direction.

**AIISA Programme** - Facilitate the execution of plan and strategic initiatives. Achieve and fulfil AIISA initiatives such as data consolidation and regulation

**AI Hubs** – Support and guide different entities in strategy execution by generating AI localised solutions, applications, skills, and software development, without hindering their current Data and AI plans.

**AI Management Office** – exists to motivate AI innovation and build capabilities.

**Data and Cloud Office** – regulate national data and drive compliance.

IOT and e-Government Office - manage national data and draw insights through data processing.

# C3    AI PLAN ADOPTION AND TIMELINES PROCESSING

South Africa's Action Roadmap and Plan for the implementation of AI

The main presume is that a shift from analogue thinking towards digital thinking requires a redesign of the systems and mindsets from the population at large.

The area and the application of AI in South Africa is still in development in phase, as per the global developments and like the rest of the world.

A few AI solutions based on machine learning and other technologies have been established and applied within South Africa's public and private sector; however, the scope and usefulness of such technologies is currently limited.  There are **principles that guide the need SA Action Plan as follows**:

- AI should be part of the long-term wider National plan or strategy.

- Balancing act between enabling environment and required governance.

- The plan must be informed by a process to be undertaken.

- AI plan must be focused on Actions.

- AI is created by people for the development of humanity.

- AI can be used as a tool for communication and public awareness.

The following areas of focus will guide the adoption of the AI National Plan in SA:

| Area of Focus | Activities | Timelines |
|---|---|---|
| Human Capital Development | Basic Education (coding, robotics, critical thinking etc) | Immediately |
| | Incentivizing AI skills initiatives | Immediately |

| | | |
|---|---|---|
| | Skills knowledge and transfer (global partnership) | Immediately |
| Localized AI solutions | AI Innovation Market Access | 2025 |
| | AI venture investments and start-up supports | 2025 |
| | Supporting AI start-ups | Immediately |
| Reinforce Collaboration with Academia and Industry | Innovation pipeline | Immediately |
| | Centralised Computing Power | 2027 |
| | Distributed AI through Non-traditional data and Open Data Regime | 2025 |
| | AI Hyper-scale Data and Large Language Model Centre | 2028 |
| Capacitating Artificial Intelligence Institute of SA (AIISA) | 11 AI Hubs/Centers of Excellence | 2025 |
| | AI Data Markets and Revenue collection system | 2026 |
| AI Regulation on | AI Applications | 2026 |
| | Data Computing | 2025 |
| | AI industries | 2027 |

| | | |
|---|---|---|
| | AI copyrights/patents | 2025 |
| | Protection Intellectual Property | 2025 |
| | Unfair Competition | 2025 |
| | AI Standards regulation | 2025 |
| Data Architecture Systems in Key Sectors | EDUCATION: Integrating Data and AI in education to align the education system with labor market needs and improve the student's journey | Immediately |
| | GOVERNMENT: Assimilating Data and AI in Government to create a smarter | |
| | and more efficient public sector | |
| | HEALTHCARE: Integrating Data and AI into healthcare to increase access, enhance preventative care and accommodate growing demand. | |
| | ENERGY: Integrating Data and AI into Energy in increase capacity, enhance | |
| | efficiency, and develop adjacent industries. | |
| | MOBILITY: Incorporating Data and AI in Mobility to build a regional hub, create smart city Mobility | |

| | | |
|---|---|---|
| | technology, and enhance traffic safety in cities | |
| Create Data collaborative Space in Africa | FDI and domestic investment, both from the government and the private sector, would be essential to support the development of the AI support in the AfCFT | 2025 |
| | Global hub for AI skills creation centre | |
| AI Policy and Legislation Process | AI Ethics and Governance | 2025 |
| | | |
| AI Maturity Assessment Framework for SA | Tool which can be used to measure the level of maturity South Africa is at, in term of AI | 2025 |
| | | |
| Set-up AI Ministerial Advisory Council or AI Panel of Experts | Deliberate Targeted National Departments Network Industries and Frontline services | 2024 |

## CONSULATED SOURCES AND ACKNOWLEDGEMENT

Many publication sources on AI are widely available on the websites and published articles. Benchmarking and best practice approaches would serve as a guidance towards the development of this draft document which will be for discussion purposes solemnly.

South Africa belongs to several international bodies that outline the basic tenants of how AI can be approached towards the fulfilment of national priorities such as the United Nations, International

Telecommunications Union, UNESCO, and OECD which would have been researched to ensure that proper flow of South Africa's approach is within the global prescripts.

It is important that the contents of the draft document are to guide the SA approach in relations to the discourses taking place around the world in order to ensure that as a country we are not gravitating far away from the global norm and standards.

Lastly, the SA national policy formulation process is based on extensive consultation as a basic tenant of priority setting and this draft document is a measure to ensure that such outcome is always maintained.