

ARTIFICIAL INTELLIGENCE ETHICS AND REGULATORY FRAMEWORK IN NIGERIA: THE PATH TO NIGERIA'S AI LAW

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Abstract

Nigeria lacks a specific AI law, currently. This work presents available AI ethics and regulatory framework in Nigeria, while pushing for legislation on Nigeria's AI law. One objective of this work is to bring to the fore the progress so far made by the Nigerian government toward regulating AI innovation and deployment in the Nigerian digital ecosystem. Another objective is to advocate for a specific AI law in Nigeria. The study sourced data from national AI documents, reports, journal articles, book chapters, and AI conference proceedings. Specifically, the authors analysed the National AI Strategy draft from a first-hand experience, having been critical members of its drafting during the National AI Strategy workshop in April 2024. Additionally, the author's participation in the national technical working group on the Readiness Assessment Methodology of the UNESCO Recommendations for the Ethics of AI in July 2024, and the national conference of the national association of social and political philosophers and AI ethics researchers during the UNESCO World Philosophy Day in November 2024, provided more information on Nigeria's drive towards AI regulation. Africa's largest economy, Nigeria, stands at a humongous threshold of leveraging AI for high-impact transformation. Her youthful population and growing tech scene are veritable foundations for the development and adoption of AI. However, the absence of a definitive

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legislation to guide AI revolution is one of the challenges delaying AI progress in Nigeria. A legislation for AI development and deployment is expected to usher in responsible AI in Nigeria. Nigerian AI ethicists have proposed “Decoloniality” as a new AI ethics principle in addition to already established principles of responsibility, accountability, transparency, explainability, fairness, trust and trustworthiness, fairness, privacy, data protection, safety, inclusivity, solidarity, and humanity.

Key words: Artificial intelligence, ethics, regulation, governance, law, Nigeria

1.Introduction

This study shall address the following themes within AI: the meaning of AI; the meaning of ethics; the meaning of AI ethics; the principles of AI ethics; issues, problems and challenges in AI ethics, AI ethical frameworks; and AI regulatory framework and governance in Nigeria. Key and specific efforts made by the government of Nigeria towards AI regulation are: first, the National Artificial Intelligence Policy (NAIP) in 2022, published by National Information and Technology Development Agency (NITDA); and the National Artificial Intelligence Strategy in 2024. The establishment of the National Centre for Artificial Intelligence and Robotics (NCAIR) boosts these regulatory frameworks. There are also AI-related legislations, which are the Nigeria Data Protection Act, 2023 (NDPA), to regulate data processing and issues such as privacy, and the Cybercrimes (Prohibition and Prevention, Etc) (Amendment) Act, 2024, to regulate cyber activities.

These efforts, notwithstanding, Nigeria needs a law that is totally dedicated to AI

regulation. This work shall, therefore, make a case for an urgent need for AI law, while giving an expository of regulatory framework by the government of Nigeria.

2.What is Artificial Intelligence (AI)?

Jeremy Sutton (2021) posits that the term AI is typically used to describe both the “technology designed to perform activities that normally require human intelligence” and the multidisciplinary field of science concerned with understanding and developing that technology (Luxton, 2014). This is truly so, as we often hear that a certain scholar holds a degree in AI or is a professor of AI. We also often hear a certain technology being referred to as AI. In this sense, and more generally, artificial intelligence is often used to describe machines that mimic "cognitive" functions that humans associate with the human mind, such as learning and problem solving (Russell & Norvig, 2003). Artificial intelligence is the imitation or simulation of natural intelligence or human intelligence. AI pertains to the capacity of a digital computer or computer-controlled robot to execute tasks typically linked with intelligent entities (Copeland, 1993). This includes activities like reasoning, making generalizations, and learning from previous experiences. While current artificial intelligence systems have not achieved the same level of flexibility as humans across various domains or tasks demanding extensive everyday knowledge, certain AIs excel at performing specific tasks equivalent to human capability (Thomason, 2003). AI, refers to the capability of a machine or computer to emulate or replicate human abilities (Kanade, 2022). The term often refers to efforts aimed at creating systems with intellectual abilities

like those of humans, including reasoning, finding meaning, generalizing, and learning from past experiences.

Since the advent of digital computers in the 1940s, it has been shown that computers can be programmed to perform highly complex tasks, such as proving mathematical theorems or playing chess, with a high level of skill. (Copeland, 2024). Essentially, AI systems can perceive their surroundings, identify objects, aid in decision-making, solve intricate problems, learn from previous experiences, and replicate behaviours. These capabilities are integrated to perform tasks such as driving a car or recognizing faces to unlock screens. Bostrom (2014) considers AI to be any kind of machine intelligence that surpasses human capabilities across the board. He, however, focuses on the concept of "superintelligence" as an agent that exceeds the cognitive performance of humans in virtually all domains of interest.

3.What is Ethics?

Ethics is a philosophical study of the rules and regulations regarding the rightness and wrongness of human action in society. It is concerned with the question of right and wrong in human behaviour: how people ought to behave and why it is wrong to behave in certain ways and right to behave in certain other ways. Ethics considers questions such as what actions we ought to perform in society. As a branch of philosophy, it studies human actions in terms of their being right or wrong. Ethics prescribes that good should be sought while evil should be avoided. Ethics is the study of what is morally good or bad, right or wrong. It can also refer to any framework or theory concerning moral values and principles (Stringer, 2024).

4.Ethics of AI

AI ethics is a set of moral principles and methodologies designed to guide the development and conscientious application of artificial intelligence technology (Lawton & Wigmore, 2023). It serves as a guide and standard for responsible AI design, development and deployment. AI ethics establishes and applies rules and principles to guide the responsible, safe and beneficial development and use of artificial intelligence. AI ethics comprises a set of principles and guidelines for developing and using AI responsibly. Organizations formalize these principles into AI ethics policies, ensuring that decisions made by staff and stakeholders adhere to ethical standards, minimize risks, and aim to enhance the quality of life for all people (Denison, 2023).

4.2 Principles of AI Ethics

The principles of AI ethics assist AI developers in building responsible and dependable AI systems and advise policymakers on formulating effective AI regulations. Key principles of AI ethics are:

i. Fairness

AI must treat all individuals equally, which necessitates removing bias and discrimination from AI systems. This goal is achievable with high-quality data. Often, datasets not specifically designed for AI training can introduce biases from the data collection stage. Since AI cannot identify biases on its own, these biases can be perpetuated and automatically applied if not addressed. Numerous cases have shown that AI can reinforce systemic discrimination against marginalized groups. Therefore, it is essential for

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researchers to use unbiased, high-quality data and thoroughly test models to detect and eliminate biased behaviour.

ii. Accountability

Accountability is a crucial element of AI ethics. Given that algorithms are powered by AI, it raises the question of responsibility when issues arise. Individuals and organizations involved in developing an AI system must be held accountable at every stage, not just after the system is deployed. Proactive measures are as vital as reactive ones in AI accountability. Teams must ensure a thorough understanding of the system's performance, closely monitor algorithm development, and select high-quality data for the system. It is also important for organizations to seek input from diversity experts and end-users of the AI system. Moreover, if an AI system is employed for critical functions, such as public services, it should undergo regular external reviews to ensure accountability.

iii. Security and Privacy

Establishing security measures is vital to ensure the secure storage and use of sensitive data. These measures include data encryption, identifying system vulnerabilities, and protecting against malicious attacks. Additionally, responsible data collection and robust data governance practices are crucial. AI systems are often created by a diverse network of developers, complicating the attainment of necessary accountability, reliability, and security for ethical AI. Achieving true security requires a unified security strategy throughout the entire AI system lifecycle.

iv. Transparency and Explainability

Sometimes, there are decisions made by machines that are not understandable by either

the machines themselves or their creators. This lack of transparency makes it challenging for humans to assess whether these decisions are fair and reliable, potentially resulting in biases in AI systems going unnoticed or people rejecting their use. This issue has prompted advocacy efforts and, in some jurisdictions, legal mandates for explainable artificial intelligence. Explainable artificial intelligence includes both explainability, which involves summarizing neural network behaviour to build user trust, and interpretability, which refers to understanding what actions a model has taken or could take. (Bunn, 2020).

v. Respect for persons

The principle of respect for persons acknowledges the autonomy of individuals and mandates that researchers safeguard those with reduced autonomy, such as those affected by illness, mental disabilities, or age limitations. Central to this principle is the concept of consent: individuals should be fully informed about the potential risks and benefits of any experiment they participate in, and they must have the freedom to choose to participate or withdraw at any point before or during the experiment (IBM, 2021).

v. Beneficence

The principle of beneficence, derived from healthcare ethics, is grounded in the commitment to "do no harm." In healthcare, doctors adhere to this oath to ensure their actions prioritize patient well-being and safety. This principle is equally relevant to the development and application of artificial intelligence (AI). Although AI systems are designed with the intention of improving efficiency and outcomes, they can unintentionally perpetuate or even amplify biases related to race, gender, political beliefs, and other factors. For instance, an algorithm intended to streamline hiring processes might inadvertently

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favour certain demographic groups over others, thereby reinforcing existing societal inequalities. Therefore, just as doctors must carefully consider the impact of their medical decisions, developers and implementers of AI must diligently evaluate and mitigate the potential harmful effects their systems might have on various segments of the population. This vigilance is crucial to ensure that AI advancements contribute positively to society without causing inadvertent harm (IBM, 2021).

4.2.1 UNESCO, AU and EU Ethical Frameworks for AI

The *UNESCO Recommendations for the Ethics of Artificial Intelligence*, 2021; the *European Union AI Act*, 2024; and the *AU Continental AI Strategy*, 2024 are some of the global or intercontinental or continental ethical frameworks from which Nigeria's regulatory framework can learn.

The AU AI Strategy stipulates that AI development and use must align with ethical principles, democratic values, human rights, and the rule of law.

The core principle of EU guidelines for ethics of AI is that nations must develop a human-centric approach to AI that is respectful of human values and principles. The human-centric approach to AI strives to ensure that human values are central to the way in which AI systems are developed, deployed, used, and monitored, by ensuring respect for fundamental rights, rooted in human dignity in which the human being enjoys a unique and invaluable moral status.

So, the seven EU ethical principles for AI are:

- i. Human agency and oversight

- ii. Robustness and Safety
- iii. Privacy and Data Protection
- iv. Transparency
- v. Diversity, Non-discrimination and Fairness
- vi. Societal and environmental wellbeing
- vii. Accountability

The ten AI ethics principles in the UNESCO Recommendations for the Ethics of Artificial Intelligence are:

- i. Proportionality and Do No Harm
- ii. Safety and Security
- iii. Fairness and Non-Discrimination]
- iv. Sustainability
- v. Right to Privacy and Data Protection
- vi. Human Oversight and Determination
- vii. Transparency and Explainability
- viii. Responsibility and Accountability
- ix. Awareness and Literacy
- x. Multi-stakeholder and adaptive governance and collaboration.

5.Problems, Issues and Challenges in AI

As AI becomes more advanced and ubiquitous, concerns about its potential dangers

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are increasing. Geoffrey Hinton, often called the "Godfather of AI" for his pioneering work in machine learning and neural networks, warned that these systems could surpass human intelligence and potentially take control, urging that we address this risk now. In 2023, Hinton resigned from his role at Google to speak out about AI's dangers, expressing some regret over his life's work (Thomas, 2024). AI field has encountered increasing challenges, including issues related to privacy and personal data protection, ethical concerns such as algorithmic bias and transparency, and the socio-economic impact of job displacement. Addressing these challenges in Artificial Intelligence requires interdisciplinary collaboration and the establishment of regulatory policies (Simplilearn, 2024).

Some challenges in AI include:

i. Bias

Bias in artificial intelligence refers to the tendency of machine learning algorithms to replicate and exacerbate existing biases present in their training data. This can result in unfair and unethical outcomes, disproportionately impacting marginalized communities. For instance, biased AI can lead to discriminatory hiring practices, inequitable loan approvals, and unjust criminal sentencing. Mitigating AI bias requires a deliberate approach to data selection, preprocessing, and algorithm design to ensure fairness. This includes careful curation of training datasets to avoid reinforcing harmful stereotypes, employing techniques to balance data representation, and designing algorithms that prioritize equity. (Simplilearn, 2024).

Additionally, continuous monitoring and evaluation of AI systems are crucial. Regular audits can help identify and correct biases, ensuring that AI-driven decisions are fair and

just for all individuals. Engaging diverse stakeholders in the development and oversight of AI systems can also provide valuable perspectives and enhance the inclusivity and fairness of AI applications. Thus, promoting transparency and accountability in AI development is essential to fostering trust and ensuring ethical outcomes.

ii. Data Privacy and Security

Deep and machine learning models heavily depend on the availability of data and the resources to train them. While we have access to vast amounts of data generated by millions of users globally, there is a risk that this data could be misused. For example, imagine a medical service provider that serves one million people in a city. If a cyber-attack occurs, the personal data of all these users could be exposed on the dark web. This data might include sensitive information about diseases, health issues, medical history, and more. The situation is exacerbated by the enormous volume of data being generated globally, which increases the likelihood of data breaches. To address these challenges, some companies have developed innovative solutions. One approach involves training data directly on smart devices, ensuring that the data never leaves the device. Only the trained model is sent back to the organization, enhancing privacy and security (Vadapalli, 2024).

iii. Limited Knowledge

Although there are many opportunities for Artificial Intelligence to surpass traditional systems, challenges in AI present significant barriers to its widespread adoption. The main issue is the general lack of understanding and knowledge about AI. Beyond technology enthusiasts, college students, and researchers, the broader population has limited awareness of AI's potential and its challenges, which hampers its integration into various sectors. For

instance, many SMEs (Small and Medium Enterprises) could benefit from AI to schedule their work, find innovative ways to increase production, manage resources, sell and manage products online, and understand consumer behavior to respond to the market more effectively and efficiently. However, they are often unaware of service providers like Google Cloud, Amazon Web Services, and others in the tech industry (Vadapalli, 2023).

iv. Moral Autonomy, Moral Agency

Moral autonomy and moral agency refer in general to the ability of an individual to make moral choices and to be held responsible for their choices. Are autonomous vehicles and robots truly autonomous? Can they be morally autonomous as prescribed in Immanuel Kant's moral autonomy, that is, acting freely without any heteronomous influence from another subject?

At the core of Immanuel Kant's moral philosophy are the notions of duty, the categorical imperative, the autonomy of the moral subject, rationality or what Kant refers to as 'the moral law within', and the notion of kingdom of ends (Kant, 2002;2003;1964). In the *Groundwork of the Metaphysics of Morals*, Kant describes duty as what we ought to do; an obligation emanating from our respect for the moral law. According to him, duty is the necessity of acting from respect for the law. His moral philosophy is well represented in what he referred to as "the Categorical Imperative". The categorical imperative is a universal moral command which applies to all moral subjects by virtue of their humanity. Kant argues that, if duty is not to be a vain delusion and a chimerical notion, then we must act according to the precepts of the categorical imperative, which state as follows:

1. Act only on the maxim whereby you can at the same time will that it should become a universal law;
2. So act as to treat humanity, whether in your person, or the person of another, in every case as an end, never as a means to an end;
3. Act externally in such a manner that free exercise of your will may be able to co-exist with the freedom of all others according to a universal law.

Freedom is the only one and original right which belongs to each man by reason of his humanity. In Kantian practical reason, freedom is not a merely negative freedom consisting in the absence of constraint by empirical causes; it is rather a positive freedom which consists in the capacity to make acts of will in accordance with the moral law. In this positive sense freedom is the autonomy of the will and when the will is determined by external forces, it is called heteronomy. In other words, heteronomy occurs whenever the will obeys laws, rules or injunctions from any other source. The will is autonomous in obeying the moral law for the sake of the law alone, because it is obeying a law which it imposes on itself. The categorical imperative is thus the general law of freedom. Kant maintains that it is from our autonomy or freedom that the moral law is founded, and consequently all rights as well as duties.

So, is AI a moral subject after all? Can it, then, act only on the maxim whereby it can at the same time will that this maxim should become a universal law? Can artificial intelligence or a robot so act as to treat humanity in every case as an end and never as a means to an end? This requirement of the Kantian categorical imperative expects AI to transcend bias and make algorithms to apply to all classes of people without segregating

Kant’s notion of moral autonomy as a function of freedom, that is, what he calls “the moral law within”, strikes at the themes of moral autonomy and moral agency in artificial intelligence. From the Kantian viewpoint, AI lacks self-consciousness and understanding. It, therefore, lacks rationality, lacks freedom, lacks autonomy, and lacks moral agency. The implication of Kant’s moral philosophy is that autonomy in AI is derived autonomy from a moral subject. This means that AI (whether it is generative or not) is determined by human autonomy to act. This, still, is heteronomy.

v. Insecurity

Technological advancements are often repurposed for warfare. Some are determined to act before it is too late. In 2016, over 30,000 people, including AI and robotics researchers, signed an open letter opposing the development of AI-driven autonomous weapons. They argued that humanity faces a choice: start a global AI arms race or prevent it. They warned that if any major military power advances AI weapon development, a global arms race is inevitable, leading to autonomous weapons becoming as ubiquitous as Kalashnikovs. This prediction has been realized with Lethal Autonomous Weapon Systems, which independently locate and destroy targets with little regulation. The spread of advanced weapons has led powerful nations to succumb to fear, resulting in a tech cold war. These new weapons pose significant risks to civilians, and the danger increases if they fall into the wrong hands. Hackers, adept at various cyber-attacks, could infiltrate autonomous weapons and cause widespread destruction. If political rivalries and warmongering are not controlled, AI could be used with harmful intentions. Some fear that despite warnings from

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influential figures about AI's dangers, the pursuit of profit will drive continuous advancement (Thomas, 2024).

vi. **Self-Aware AI**

There is also a concern that AI could advance so quickly in intelligence that it might become sentient and act beyond human control, potentially in harmful ways. There have already been claims of AI sentience, such as a former Google engineer's assertion that the AI chatbot LaMDA was sentient and conversed with him like a human. However, this remains problematic, as those who ascribe sentience or self-awareness to AI need to redefine sentience or self-awareness, and match it with consciousness, if they are different. The question of 'can a machine be conscious?' remains to be properly answered. As AI progresses toward creating systems with artificial general intelligence and, eventually, artificial superintelligence, calls to halt these developments are growing louder (Thomas, 2024).

It becomes very clear from the foregoing that ethics is required to guide artificial intelligence. Hence the need for the ethics of AI.

6.Nigeria's AI Regulation and Governance

The current pillars upon which Nigeria's Artificial Intelligence regulation is built are:

1. The National Artificial Intelligence Policy (NAIP)
2. The National Artificial Intelligence Strategy (NAIS)
3. The Nigeria Data Protection Act, 2023
4. The Cybercrimes (Prohibition and Prevention, Etc) (Amendment) Act, 2024.

While the Data Protection Act, 2023 and the Cybercrimes (Prohibition and

Prevention, Etc) (Amendment) Act, 2024, could be seen as related legislations on

some issues in AI, the National Artificial Intelligence Policy (NAIP) and the National

Artificial Intelligence Strategy (NAIS) deal directly and specifically on AI. The

National Artificial Intelligence Policy aims at regulating the everyday implications of

AI, the National Artificial Intelligence Strategy provides a more detailed roadmap and

strategic guidelines for establishing a robust AI ecosystem in Nigeria. Due to its

detailed contents, we shall be detailed on the NAIS

6.1 The National Artificial Intelligence Strategy

The Government of Nigeria, through the Federal Ministry of Communication, Innovation and Digital Economy (FMCIDE) and the National Center for Artificial Intelligence and Robotics (NCAIR) under the Federal Ministry of Science, Technology and Innovation, convened stakeholders from 15th-18th April, 2024, to tease out a national AI strategy under the theme, “Developing the high-level strategy and implementation plan for a National AI Strategy for Nigeria”. The National AI Strategy was developed using a structured and inclusive methodology that ensured stakeholder engagement, evaluation across key analytical dimensions, and strategic alignment with national goals. The approach combined preliminary research and a dedicated workshop to guide the process and ensure the development of a comprehensive, actionable AI strategy. A broad range of critical stakeholders in AI, including policymakers, industry experts, renowned researchers and startups of Nigerian descent, were identified. A four-day intensive National Artificial Intelligence Strategy Workshop brought together over 120 stakeholders

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from within and outside Nigeria to develop the Strategy. Eight working groups were formed, and the workshop focused on the following distinct stages.

1. Research and Innovation
2. Safety and Regulation
3. Policy and Governance
4. Ethics and Social Impact
5. Infrastructure and Ecosystems
6. Adoption and Sector Focus
7. Talent and Workforce Development
8. International Collaboration and Engagement

The workshop was guided by the following strategic questions, namely:

1. What are the long-term objectives and aspirations for integrating AI in Nigeria?
2. How will AI contribute to economic growth, social progress, and national security?
3. What ethical principles should guide the development and use of AI technologies?
4. How can AI systems ensure fairness, accountability, transparency, and privacy?
5. What regulatory frameworks are required to govern AI development and

6. What investments are needed to support AI research, development, and innovation?
7. How can we foster collaboration between academia, industry, and government in advancing AI technologies?
8. What measures should be taken to attract and retain AI talent?
9. What infrastructure is required to support AI development, including data infrastructure, computational resources, and connectivity?
10. How can we promote the development of AI startups and support the growth of existing AI companies?
11. What measures can be taken to facilitate the adoption of AI technologies by businesses and public sector organisations?
12. How can we ensure the workforce is adequately trained to work with and alongside AI technologies?
13. What educational initiatives are needed to prepare students for careers in AI-related fields?
14. How can we address the potential impact of AI on employment and reskilling efforts?

15. How should Nigeria engage with other nations and international organisations on

AI-related issues, including standards, norms, and governance?

16. What opportunities exist for collaboration on AI research, development, and deployment?

17. How can we address the cybersecurity risks associated with AI systems, including potential vulnerabilities and threats?

18. What strategies should be implemented to ensure the resilience of critical AI infrastructure and systems?

19. How can we mitigate potential negative impacts of AI on society, such as job displacement, inequality, and bias?

20. What measures should ensure that AI benefits are equitably distributed across different population segments?

21. What are the priority areas for AI applications within critical sectors such as healthcare, transportation, finance, and agriculture?

22. How will progress towards the goals outlined in the AI strategy be monitored and evaluated?

23. What mechanisms are in place to adapt the strategy in response to changing technological, economic, and social trends?

6.2 The Vision of Nigeria's National AI Strategy

Nigeria's AI vision is global leadership in harnessing the transformative power of AI through responsible, ethical, and inclusive innovation, fostering sustainable development through collaborative efforts.

6.3 The Objectives of Nigeria's National AI Strategy

There are three objectives in the Nigeria's National AI strategy:

1. To use AI as a tool for **economic growth and competitiveness**. This involves:
 - i. Boosting economic productivity to enhance efficiency and innovation across agriculture, manufacturing, and services sectors;
 - ii. Creating new industries and jobs: Fostering the development of AI-driven industries and upskilling the workforce for new opportunities;
 - iii. Attracting foreign investment and collaboration by positioning Nigeria as a leader in responsible AI development.
2. To use AI for **social development and inclusion**. This involves:
 - i. Improving access to essential services, such as utilising AI to

enhance healthcare delivery, education, and financial inclusion for all Nigerians;

- ii. Addressing social challenges. An instance is by leveraging AI to tackle poverty, inequality, and climate change;
 - iii. Empowering citizens, such as equipping individuals with the skills and knowledge necessary to participate actively in the AI-driven future.
3. To use AI for **technological advancement and leadership**. This involves:
- i. Developing indigenous AI expertise by building a strong research and development ecosystem to foster innovation and local solutions;
 - ii. Establishing ethical and regulatory frameworks and ensuring responsible and transparent development and deployment of AI; and
 - iii. Becoming a regional and global leader by positioning Nigeria as a key player in the global AI landscape.

How are the vision and objectives outlined in the Nigeria's National AI Strategy to be achieved? The National AI Strategy outlines five key pillars that will propel Nigeria towards achieving its AI vision and objectives. These strategic pillars are as follows:

1. Building Foundational AI Infrastructure

2. Building and Sustaining a World-class AI Ecosystem
3. Accelerating AI Adoption and Sector Transformation
4. Ensuring Responsible and Ethical AI Development
5. Developing a Robust AI Governance Framework

Each pillar is supported by strategic objectives and actionable initiatives designed to drive progress across the AI development and adoption spectrum, as detailed below:

1. Building Foundational AI Infrastructure: This pillar addresses establishing strong foundational infrastructure and compute capacity. Practically, it requires:
 - i. Deployment of High-Performance Computing (HPC) Resources; establishing national HPC centres with cutting-edge computing capabilities and facilitate access for researchers, startups and businesses working on AI projects.
 - ii. Investing in AI-specific hardware and software development; supporting the development of AI hardware (e.g. specialised chips) and software tools, with a preference for domestically produced solutions, thereby reducing the dependence on foreign technology and creating a self-sustaining AI ecosystem.
 - iii. Setting up clean energy AI clusters; powering AI clusters with clean or sustainable energy sources keep the dependence on the existing national grid to less than 50% of the power needed for each cluster to maintain the needs of general households. Establish and increase reliance on clean energy-powered AI clusters, providing reliable and sustainable infrastructure for AI development, deployment, and innovation in Nigeria.

- iv. Pursuing "Pioneer status for AI". Tax breaks and other incentives will encourage investment in critical AI infrastructure, such as AI edge computing stations and HPC data centres.

2. Building and Sustaining a World-class AI Ecosystem: This pillar focuses on building an ecosystem of partners, collaborators, academia and a highly skilled workforce. Initiatives include training programs, industry-academia partnerships, and funding mechanisms to nurture a vibrant AI landscape. The pillar also positions the country as a key player on the global stage. International collaborations with leading research institutions and companies will fuel domestic AI development.

Specifically, this requires:

- i. Fostering Sustainable AI Partnerships by establishing a Sustainable Applied AI Partnership Platform (SAAPP)/Collaborative Innovation Platform
- ii. Champion International Collaboration and Leadership by
 - a) Establishing the "AI Synergy Alliance/National AI Collaboration Office"

This initiative will create a formal alliance with top-tier global AI research institutions and companies and facilitate partnerships with international AI stakeholders.

- b) Launching the "Nigerian AI Talent Transfer Program"

Attracting and retaining global AI talent is crucial. This program will offer incentives and support systems for international AI experts to work in

c) Creating the "Nigerian AI Partnership for Commercialisation Excellence" (NAPCE)

Bridging the gap between research and commercialisation is essential.

NAPCE will facilitate collaboration between researchers, entrepreneurs, and investors to bring innovative AI solutions to market.

iii. Nurturing a Culture of Innovation. A vibrant innovation ecosystem is crucial for sustained AI advancement. This objective fosters a culture that encourages creativity, risk-taking, and continuous improvement. In practice, this involves:

- a) Establishing Deep Tech AI Accelerators across Nigeria. These accelerators will provide concentrated support and resources to high-potential AI startups, fostering research collaboration and accelerating commercialisation.
- b) Creating AI Centres of Excellence. These centres will focus on developing practical applications of AI in specific sectors, nurturing skilled individuals, and promoting ethical AI practices.

AI Centres of Excellence (CoE) will ensure further localisation and application of AI solutions and mainstream AI knowledge across urban and rural areas. The CoEs will provide computing resources and technology infrastructure to support the experimentation of novel ideas

that would lead to implementing localised solutions. This initiative will develop new innovative ideas that can be commercialised.

- c) Establish an accredited annual National AI Conference. This annual conference will provide a platform for knowledge sharing, showcasing advancements, and fostering collaboration between academia and industry.
3. Accelerating AI Adoption and Sector Transformation. This pillar focuses on driving widespread AI adoption across various sectors, transforming industries and propelling economic growth for real-world impact. This involves:
- i. Driving locally-led AI Innovation. This explains that replicating Nigeria's social context and cultural diversity with AI tools and solutions will drive AI accessibility across education, agriculture, healthcare and other sectors.
 - ii. Driving Data-Driven Decision-Making. This explains that high-quality data fuels AI. This objective emphasizes leveraging data effectively to optimise decision-making across sectors.
 - iii. Cultivating an AI-Ready Workforce. A skilled workforce is essential for successful AI adoption. This objective focuses on developing a talent pipeline with the necessary knowledge and skills.

This will engender Increased number of individuals with AI skills across various sectors within five years, Increased number of scholars producing AI-related intellectual contributions, and Enhance research collaboration across institutions and improve access to data and resources for AI education. Practically, this requires:

- a) Developing and implement AI and AI-driven training and education systems that identify, nurture, and develop diverse AI talent across the different AI domains and related areas like cybersecurity.
 - b) Launching a comprehensive AI skills development programme, including curriculum reform, teacher training, and reskilling initiatives. These programmes will identify, nurture, and develop talent from diverse backgrounds, ensuring an inclusive AI workforce.
 - c) Developing a National AI Research and Development (R&D) Fund. In support of cutting-edge research and attracting global talent, creating an AI Research and Development Fund (AI-R&D Fund) to facilitate the research and development of AI in Nigeria is recommended.
- iv. Achieving Widespread AI Integration Across Sectors. This objective focuses on promoting and integrating AI solutions across diverse industries, maximising its impact on the Nigerian economy and society.

Practical recommendations to achieve widespread IAI integration across sectors are:

- a) Implementing AI Policy Advocacy and Incentivise Research, Investment, and Adoption
- b) Creating an enabling policy environment that encourages investment and accelerates AI

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adoption, including green AI across sectors.

- c) Establishing a tripartite AI Transfer Partnership Program. This program will connect research institutions, businesses, and the government, facilitating knowledge and technology transfer.
- d) Organising annual AI Adoption Summits and Hackathons. These events will bring together stakeholders to showcase AI advancements, foster collaboration, and identify innovative solutions
- e) Developing a National Research and Education Network (NREN). Build a high-speed, reliable network for research institutions and educational facilities to enable seamless collaboration and data sharing within the AI community.

v. Ensure AI Contributes to Sustainable Development and Environmental Well-being. AI's energy and resource consumption warrants a specific focus on green and sustainable AI initiatives. To attain this, it is recommended to:

- a) Establish Green AI Challenge and Grant Programme

Establish a national competition where developers create AI solutions that address environmental challenges (like climate change, waste management, or sustainable resource utilisation) and smart city initiatives. The program will encourage the development of AI-powered applications that optimise urban infrastructure, enhance resource management, improve energy efficiency, and promote sustainable living in cities nationwide.

- b) Foster adoption of green AI projects across sectors Support green AI projects and innovations across sectors.

7.AI in Nigeria

Nigeria's commitment to AI is evident in the various initiatives championed by the Ministry of Communication, Innovation and Digital Economy (FMICDE) in the last few years. The ministry has a dedicated National Centre for Artificial Intelligence and Robotics (NCAIR), set up as a digital innovation and research facility focused on Artificial Intelligence (AI), Robotics and Drones, Internet of Things (IoT), and other emerging technologies, aimed at transforming the Nigerian digital economy, in line with the National Digital Economy Policy and Strategy (NDEPS). NCAIR also focuses on creating a thriving ecosystem for innovation-driven entrepreneurship (IDE), job creation and national development. Before establishing NCAIR, Nigeria's Digital Economy Policy and Strategy 2020 – 2030 (NDEPS) listed AI as one of eight strategic pillars. In addition, the ongoing nationwide talent development, 3MTT, aimed to train three million digital talents, is justifiably positioning Nigeria as a global hub for the application of AI. The recent effort of the Ministry to drive home-grown research through the provision of research grants to forty-five AI startups and researchers through the Nigeria Artificial Intelligence Research Scheme (NAIRS) in critical sectors of the country is evidence of emerging Nigeria's talent and entrepreneurial ecosystem. Additionally, the boundaries of Nigeria's AI efforts extend beyond domestic lines. In 2023, Nigeria signed the Bletchley Declaration on AI, along with 28 other

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nations, including the UK and France, committing to AI development that mitigates risk.

Similarly, Nigeria joined 18 different countries that adopted the US-led coalition to ensure AI is secure by design.

With a solid platform to build upon, the Ministry released a white paper in 2023 announcing steps to engage top AI researchers of Nigerian descent globally to craft a comprehensive National AI Strategy. In 2024, Nigeria enacted updated data protection legislation. While the 2023 Data Protection Act does not particularly address AI-related data concepts, it does outline crucial issues like data security and cross-border data transfer – both essential pillars for developing AI models. The outcome of these efforts within the fast-growing Nigeria’s local AI innovators has not gone unnoticed internationally. For example, 4 Nigerian innovators won the Gates Foundation Grand Challenge focused on developing global health and development solutions using AI-enabled large language models (LLMs). Similarly, over 10 Nigerian products have been listed in the UNESCO IRCAI Global Top 100, a list of the top 100 projects solving problems related to the 17 United Nations Sustainable Development Goals. The country’s inventive AI researchers ecosystem has also been recognised with high-profile funding, including the Artificial Intelligence for Development Africa specially funded EduAI Hub, an African-based research network on responsible artificial intelligence innovations that seek to advance education across Africa and managed by the University of Lagos and Data Science Nigeria (DSN), under the special US \$20 million intervention program funded by the Canada’s International Development Research Centre (IDRC) and Sweden’s government agency for development

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cooperation (Sida) to promote excellence in solving development challenges through responsible and inclusive AI.

8.Recommendations for the Nigerian Government

The following are our recommendations to the government of Nigeria:

1. Establishment of Nigerian AI Ethics, Policy and Governance Commission. This is in line with the AI Ethics Expert Group (AIEEG) recommended in the National AI Strategy document, which was suggested in the Ethics and Social Impact sub-group during the National AI Strategy workshop in April 2024, and organized by the Federal Ministry of Communication, Innovation and Digital Economy. The Ethics and Social Impact sub-group was led and chaired by Nigerian philosophers and computer scientists.
2. Appointing the Nigerian AI Ethics, Policy and Governance Officer from the Nigerian philosophers and AI Ethicists for efficient and effective structuring of AI ethical policy and governance framework. This is the group of leading researchers in AI Ethics and Policy, professionally trained in and equipped with moral values, logical analysis, critical thinking and ethical decision-making skills.
3. Introduction of study of Ethics and Philosophy at all levels of education in Nigeria as a bedrock and foundation for inculcating ethical and responsible citizenship. The solution to Nigeria's integrity problems is Ethics.
4. Introduction of study of AI Ethics in tertiary institutions in Nigeria and making it a compulsory course for technology, engineering and medical students. This, too, is

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a foundation for ethical technology design, development and deployment, since a design is the product of the designer.

5. Establishment of a Professional Ethics Institute of Nigeria to coordinate all ethics research, training and certification for professional bodies and the leadership.
6. Funding for AI research in Nigeria based on a broad view of artificial intelligence that also includes relevant non-technical disciplines (such as ethics and philosophy, cognition services, sciences, and social sciences).
7. Ensuring technological independence in AI, a crucial aspect for our economy and society. Very sizable investments will be required at the national level if these goals are to be met. These expenses ought to be equivalent to the investments in the USA and China. This will make Nigeria a global AI superpower.
8. Funding large, dedicated AI computing and data centers as critical components of sustainable, AI-based innovation. Simply expanding the existing high-performance computing infrastructure is not a feasible option, as structural and operational requirements differ considerably.
9. Funding for AI Ethics and Policy research
10. Creating structures that ensure that the government's measures and strategies in the area of AI are influenced by a wider number of researchers in AI (e.g. by establishing a new standing committee or advisory board) and implemented efficiently. These structures should be based at a high level of government (Minister of Science and Technology or the Minister of Communications or Secretary of the

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Government of the Federation), in order to ensure they have adequate power to be responsive, take action and make decisions.

11. Ensuring steady electricity power supply for a sustainable AI ecosystem in Nigeria.

9. Conclusion

The pace at which AI technology keeps advancing almost on quotidian basis causes huge challenges to regulation and control. First, there should be a national statute totally dedicated to AI, and not only rely on the Data Protection Act, nor the Cybercrimes (Prohibition and Prevention) Act, nor the National AI Policy or National AI Strategy, to regulate the ever-dynamic AI technology. Secondly, the legislation would have to be up to date in order to contain AI dynamics. Regulatory bodies such as the National Information Technology Development Agency (NITDA), the Nigeria Communications Commission (NCC), the Nigeria Data Protection Commission, and the National Centre for Artificial Intelligence and Robotics (NCAIR) must step up and liaise with the National Assembly to provide Nigeria with a robust and effective AI law.

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