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Paradigm Initiative
Artificial Intelligence Project, Nigeria

STAKEHOLDER MAPPING
OF
**ARTIFICIAL
INTELLIGENCE
ACTORS**
IN NIGERIA

By **Jake Okechukwu Effoduh**
For Paradigm Initiative, Nigeria
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LIST OF ABBREVIATIONS

3D	Three-dimensional
5G	Fifth generation of cellular networks
AAIRC	African Artificial Intelligence Research Centre
AI	Artificial Intelligence
AU	African Union
DAG	Directed Acyclic Graph
DIA	Discovery, Incubation, and Acceleration
ECA	Economic Commission for Africa
ECOWAS	Economic Community of West African States
EU	European Union
FPI	Federal Public Institution
GDP	Gross Domestic Product
IBM	International Business Machines Corporation
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineering
IT	Information Technology
ITU	International Telecommunications Union
IoT	Internet of Things
MIT	Massachusetts Institute of Technology
NART	NITDA Academy for Research and Training
NCAIR	National Centre for Artificial Intelligence and Robotics
NCC	Nigerian Communications Commission
NDIC	Nigeria Deposit Insurance Corporation
NDPR	Nigerian Data Protection Regulation 2019
NEDPS	National Digital Economy Policy and Strategy 2020 – 2030
NIICTE	Nigerian Institute of Information and Communication Technology Engineers
NIIT	National Institute of Information Technology
NITDA	National Information Technology Development Agency
NLP	Natural Language Processing
NOTAP	National Office for Technology Acquisition and Promotion
NOUN	National Open University of Nigeria
NSE	Nigerian Society of Engineers
PLWDs	People Living with Disabilities
PPP	Public-Private Partnership
R&D	Research and Development
REAP	Regional Entrepreneurship Acceleration Programme
SEC	Securities and Exchange Commission
UN	United Nations
UNIDO	UN Industrial Development Organisation
UTME	Unified Tertiary Matriculation Examination



Stakeholder Mapping of Artificial Intelligence Actors in Nigeria

I. EXECUTIVE SUMMARY

This paper provides a stakeholder mapping of Artificial Intelligence (AI) actors in Nigeria. By “AI actors” this work refers to institutions and organizations in Nigeria that regulate, deploy, or create Artificial Intelligence systems. AI is used, in different forms, by both private and public entities in Nigeria. The Nigerian federal government has through different ministries, set up agencies and learning centres whose work revolves around the use of AI. State governments such as Cross River and Lagos states are also progressive actors in the Nigerian AI space. Several ministries and hubs dedicated to the development and use of AI in Nigeria have also sprung up across respective states. Nigeria can be considered as one of the leading African countries with institutions committed to the deployment, development, and the use of AI systems.¹ Some private institutions in Nigeria, ranging from transportation companies, to finance corporations, and even pharmaceutical chains are actors in the Nigerian AI space. There are also private institutions in Nigeria that offer training courses on AI. Divided into six (6) parts (with this Executive Summary being the first, and the Research Method section being the second), this work highlights the Nigerian AI actors in three (3) broad clusters: Public AI actors in Nigeria; Private AI actors in Nigeria; and the regional AI actors impacting on Nigeria. The sixth and final part concludes.

II. RESEARCH METHOD

This research is desk-based, and it involved qualitative analysis and interpretation of documentary material, both primary and secondary. Textual and discourse analysis was used for some of the sources of information. Data was derived from texts, publications, reports, news articles, and websites (with relevant existing data published on web pages across the internet). Information collected for this work was studied and analysed to create a comprehensive map of all stakeholders in Artificial Intelligence space in Nigeria.

¹ “Nigeria is becoming Africa’s unofficial tech capital”, online: TechCrunch <<https://social.techcrunch.com/2020/02/02/nigeria-is-becoming-africas-unofficial-tech-capital/>>; Open AIR, “7 Ways that African States are Legitimizing Artificial Intelligence | Open AIR”, online: <<https://openair.africa/7-ways-that-african-states-are-legitimizing-artificial-intelligence/>>; Innocent Odoh, “Africa: Nigeria Will Lead Africa in Artificial Intelligence, Block Chain - NITDA Boss”, (25 June 2021), online: allAfrica.com <<https://allafrica.com/stories/202106250005.html>>; Aleksandra Gadzala “Coming to Life: Artificial Intelligence in Africa” Atlantic Council Africa Center (Issue Brief, November 2018) <<https://www.atlanticcouncil.org/wp-content/uploads/2019/09/Coming-to-Life-Artificial-Intelligence-in-Africa.pdf>>

PART 1: PUBLIC AI ACTORS IN NIGERIA



A. Ministry of Communications and Digital Economy

The Ministry of Communications and Digital Economy was created to foster a knowledge-based economy and information society in Nigeria.² Since the rebranding of the Ministry in late 2019 to expand its scope to cover the digital economy in Nigeria, the Ministry, and the agencies under its supervision, have taken steps towards fostering the AI ecosystem in Nigeria.³ The Ministry published its National Digital Economy Policy and Strategy 2020 – 2030 (NDEPS),⁴ which is based on eight pillars for the acceleration of the Nigerian digital economy, namely:

1. Developmental regulation
2. Digital literacy and skills
3. Solid infrastructure
4. Service infrastructure
5. Digital services development and promotion
6. Soft infrastructure
7. Digital society and emerging technologies
8. Indigenous content development and adoption.

Artificial Intelligence is referred to under Pillar 7: Digital Society and Emerging Technologies, as one of the emerging technologies that the ministry will act on.⁵ The focus under this pillar is to tie the development of the digital economy using AI with indices of well-being in the lives of ordinary citizens.⁶ In this respect, the strategy document outlines policy objectives and implementation strategies. The policy objectives are as follows:

- Enabling a progressive increment in the contribution of digital technologies to the economy
- Promoting research in emerging technologies to improve the livelihood of Nigerians
- Actively focusing on skills rather than degrees
- Accelerating digital inclusion in the country by taking advantage of the spread of existing infrastructure across the country.

To achieve the above, the implementation strategy to be adopted by the government takes the following forms:

- Supporting the emergence of new services and industries that are enabled by emerging technologies

- Facilitating services and workforce transformation in the public service using emerging technologies starting with some pilot Ministries, Departments and Agencies
- Fostering digital inclusion for People Living with Disabilities (PLWDs) and other digitally excluded people
- Supporting the emergence of e-services in leading sectors of the economy
- Prioritising financial inclusion to reduce the current percentage of unbanked adults by 50 per cent within the next four years
- Collaborating with the private sector, academia, and development partners to create Centres of Excellence in Emerging Technologies
- Including topics on emerging technologies across the broad spectrum of formal and vocational education in the country
- Encouraging tertiary institutions to introduce/enhance courses on emerging technologies through the relevant regulatory institutions
- Supporting Awards of Excellence in Emerging Technologies to celebrate innovations and innovators
- Creating an enabling environment for National Youth Corps members to acquire digital entrepreneurship skills
- Promoting sector-specific emerging technology centres through relevant Federal Public Institutions (FPIs) such as NITDA and NCC
- Converting campuses of the Digital Bridge Institute around the country to emerging technology, digital literacy, and digital skills centres
- Enlisting the support of Nigerian ICT professionals in the diaspora
- Establishing viable digital technology institutions to promote the deployment of digital services across the country's key sectors.⁷

In January 2020, the ministry partnered with IBM to provide Nigerians with over 280 hours of free learning and over 85 courses on key emerging technologies including the use of AI and Blockchain technology.⁸

² The Ministry was created to facilitate ICT as a key tool in the transformation agenda for Nigeria in the areas of job creation, economic growth, and transparency of governance. <<https://www.commtech.gov.ng/>>

³ Premium Times Nigeria, "Buhari renames communications ministry", online: <<https://www.premiumtimesng.com/news/top-news/359229-buhari-renames-communications-ministry.html>>.

⁴ Federal Ministry of Communications and Digital Economy, 'National Digital Economy Policy and Strategy (2020 – 2030)' pp 1 – 41. <<https://www.ncc.gov.ng/docman-main/industry-statistics/policies-reports/883-national-digital-economy-policy-and-strategy/file>>

⁵ Ibid at 35.

⁶ Ibid.

⁷ Ibid at 37.

⁸ Franklin Uzor, "Government, IBM Launch Digital Skills Training Program", (4 April 2020), online: Nigerian Investment Promotion Commission <<https://www.nipic.gov.ng/2020/04/04/government-ibm-launch-digi->

B. National Information Technology Development Agency (NITDA)

NITDA is the IT sector regulator in Nigeria and has committed itself to implement the NDEPS and its pillars.⁹ In line with this, NITDA set up the NITDA Academy for Research and Training (NART), which is expected to serve as a centre of excellence for research and development in emerging technologies, covering AI.¹⁰ Related to AI, it offers courses such as Cloud Computing, Programming Essentials for Python, Introduction to the Internet of Things, Introduction to Game Development, Data Science: Productivity Tools, Data Science: R-Basics, Data Science: Machine Learning, Huawei AI, and Microsoft Data Analyst. It claims to have over 58,000 active students and over 55,000 active training sessions.¹¹

In a related development, NITDA has established its position as the de facto data protection regulator in Nigeria without a substantive agency for that purpose. Through the Nigerian Data Protection Regulation 2019 (NDPR)¹² and the Guidelines for the Management of Personal Data by Public Institutions in Nigeria,¹³ NITDA introduced Nigeria's data protection laws. These regulations have provisions that impliedly extend to several aspects of the use of AI in Nigeria. For instance, Rule 2.1a of the Guidelines cited above provides for the processing of personal data. It generally provides that, public institutions are under a duty to protect personal data in the event of processing, whether by automated means or not. By implication, a public institution employing AI-enabled automation to process personal data in its care may be held liable for any harm occasioned.¹⁴ Rule 2.3f introduces the requirement of consent before a data controller can make a decision that affects a data subject significantly, based on an

automated decision system.¹⁵ Rule 2.9d provides that the privacy policy of public institutions should describe technical methods used to collect and store information.¹⁶ Finally, Rule 3.1b provides that no person shall be subject to automated decision making without a law of the National Assembly or the person's consent.^{17, 18}

C. National Centre for Artificial Intelligence & Robotics (NCAIR)

This NCAIR was birthed as a response to the directive for all agencies under the Ministry of Communications and Digital Economy to formulate practical strategies for enhanced implementation of the Digital Economy. It is serving as the digital laboratory for advancing skills development and innovation in AI and Internet of Things (IoT), to fully exploit the power of Discovery, Incubation, and Acceleration (DIA). The NCAIR is a special purpose vehicle under NITDA to accelerate AI development in Nigeria. It is equipped with a digital innovation laboratory, 3D printing facilities, and workspace. It also doubles as the Abuja Office of the Massachusetts Institute of Technology Regional Entrepreneurship Acceleration Programme (MIT-REAP). It also houses the Office of ICT Innovation and Entrepreneurship, another subsidiary of NITDA. NITDA is expected to play a supervisory role over NCAIR by providing monthly reports on its programmes to the Minister. At the end of 2021, it is projected that NITDA will be granted autonomy in managing the Centre.¹⁹ The establishment of the Centre represents an implementation of the seventh pillar of the NDEPS which deals with the use of AI in Nigeria. The Director of the Centre has called on the Nigerian Institute of Information and Communication Technology Engineers (NIICTE), a division of the Nigerian Society of Engineers (NSE), to provide support to interns,

tal-skills-training-program/>.

9 National Information Technology Development Agency (NITDA) was created in April 2001 to implement the Nigerian Information Technology Policy and co-ordinate general IT development in the country. The Act (National Information Technology Development Act (2007) mandates NITDA to create a framework for the planning, research, development, standardization, application, coordination, monitoring, evaluation and regulation of Information Technology practices, activities, and systems in Nigeria. Their role therefore is to develop, regulate and advise on Information technology in the country through regulatory standards, guidelines, and policies. Additionally, NITDA is the clearing house for all IT projects and infrastructural development in the country. It is the prime Agency for e-government implementation, Internet governance and general IT development in Nigeria. NITDA states that it is poised to actualise its mammoth mandate through strategic and inclusive stakeholder management, local and international partnership, and efficient utilisation of resources in the interest of Nigeria. <<https://nitda.gov.ng/>>

10 In line with its capacity building programmes, NITDA conceived the idea of setting-up an Academy that will serve as the Foremost Centre of Excellence for Research and Development (R&D) in Emerging Technologies in Information and Communication Technology (ICT) and related entrepreneurial skills. The NITDA Academy for Research and Training (NART), is envisioned to strengthen National technological capabilities of Nigerians to bridge the professional skills gap between industry and academia, while also promoting and inclusive ICT driven society. The objectives of the NITDA Academy are to: a. Build capacity and develop skills of participants in the knowledge and register of emerging IT programs and systems. b. Complement the efforts of tertiary institutions in IT education by focusing on developing marketable skills and knowledge. c. Bridge industry-academia research gap that focuses on addressing prioritized national challenges (security, digital services promotion, innovation, and entrepreneurship). d. To employ a hybrid training using pedagogical and andragogy techniques. <<https://academy.nitda.gov.ng/public/>>

11 Ibid.

12 Nigeria Data Protection Regulation, 2019. NITDA developed the NDPR to provide a legal framework for the use and exchange of electronic data. The NDPR was created pursuant to Section 32 of the NITDA Act, 2007. The Regulation seeks to capture international best practices regarding "Safeguarding the rights of natural persons to data privacy; Fostering safe conduct of transactions involving the exchange of personal data; Preventing manipulation of personal data; Ensuring that Nigerian businesses remain competitive in international trade through the safeguards afforded by a just and equitable legal regulatory framework on data protection; and, Ensuring that the Nigerian Data protection framework is consistent with global best practices." The Regulation applies to all transactions which require the processing of personal data irrespective of how the data is processed or intended to be processed in respect of natural persons in Nigeria; and natural persons residing in Nigeria or residing outside Nigeria but of Nigerian descent.

13 NITDA, Guidelines for the Management of Personal Data by Public Institutions in Nigeria, 2000: Issued as a Guideline for the Implementation of the Nigeria Data Protection Regulation (NDPR), 2019, within Public Institutions in Nigeria (May 2020). <<https://nitda.gov.ng/regulations/>>

14 Ibid. Akintunde Agunbiade, "How the Guidelines for the Management of Personal Data by Public Institutions in Nigeria can apply for regulating Artificial Intelligence in Nigeria", (Digilaw, July 15, 2020) <www.digilaw.com.ng/2020/07/15/how-the-guidelines-for-the-management-of-personal-data-by-public-institutions-in-nigeria-can-apply-for-regulating-artificial-intelligence-in-nigeria>

15 NITDA, Guidelines for the Management of Personal Data by Public Institutions in Nigeria, 2000: Issued as a Guideline for the Implementation of the Nigeria Data Protection Regulation (NDPR), 2019, within Public Institutions in Nigeria (May 2020). <<https://nitda.gov.ng/regulations/>>

16 Ibid.

17 Ibid.

18 Currently, there is a proposed amendment to the establishing law of NITDA, the NITDA Act of 2007, which, if enacted, will give NITDA an expanded scope of responsibility that covers the digital economy and the use of AI. For instance, section 5(1) of the proposed NITDA Amendment Bill provides that the agency shall "regulate the use, development, standardisation, research, and application of... emerging technologies... in Nigeria" (Section 5(1), NITDA Amendment Bill).

19 Inyene Ibang, "That National Centre for Artificial Intelligence and Robotics in Nigeria — Economic Confidential", (November 2020) online: <<https://economicconfidential.com/2020/11/national-centre-artificial-intelligence-robotics>>.

start-ups and innovators working at the Centre.²⁰

D. Nigerian Communications Commission (NCC)

The NCC is the national telecommunications regulator in Nigeria.²¹ In 2020, they published a document on AI's ethical and societal impact, the first of its kind by a government agency in Nigeria.²² It is the outcome of a study they commissioned to lay the foundation for future studies in AI and provide the NCC with informed recommendations on the safe and ethical deployment and regulation of AI in Nigeria.²³ The study distinguishes between ethical and societal issues relating to the use of AI. Ethical issues according to them, consist of problems caused by individuals (e.g., algorithmic bias, negligence, etc) resulting negatively on individuals and society. On the other hand, social issues are those that affect the community which are complex, difficult to control, and cannot be solved with sanctions or incentives.²⁴ They also refer to work by international agencies concerning regulating AI, such as the EU, the Institute of Electrical and Electronics Engineering (IEEE), and the International Telecommunications Union (ITU).²⁵

Conclusively, nine recommendations were proffered to the NCC as follows:²⁶

- There is a need for a set of requirements to ensure only authorised businesses or service providers offer AI-enabled services to the public by a licensing department to formulate a class of licenses for AI providers.
- Collaboration with relevant stakeholders such as the Ministry of Communications and Digital Economy, NOTAP, and NITDA
- Consider the plans to establish an agency for robotics and AI and establish a partnership to license.²⁷
- NCC should study international best practices by other nations and seek to localise them.
- NCC should continuously engage with the ITU on AI standardisation efforts.
- The NCC should render support and collaboration with the agency for robotics and

AI (the NCAIR) to carry out a holistic review of needs and challenges towards the creation of a White Paper on robotics and AI for Nigeria.

- Collaboration with academia and research institutions for intensive research into emerging technologies such as AI
- NCC should use the ITU regulatory tracker to identify, monitor, and resolve gaps in existing regulations as regards emerging technologies
- NCC should push a Public-Private Partnership (PPP) with leaders in emerging technologies to share information and foster inclusive collaboration for policy formulation.

E. Securities and Exchange Commission (SEC)

The SEC is the government agency mandated to regulate and develop the Nigerian capital market.²⁸ In its capacity as the regulator for the investment space in Nigeria, the SEC has issued a regulation that covers aspects of AI that is related to the business of investment management: the Rule on Robo-Advisory Services, published in May 2021.²⁹ The rules define a "Robo adviser" to be a person who provides digital advisory services.³⁰ "Digital advisory services" under the proposed regulations narrowly refer to automated, algorithm-based tools which are client-facing, with little or no human adviser in the advisory process.³¹ It further provides that a Robo-adviser will be considered fully automated when there is no human adviser in the entire advisory process, that is, where there is no human in the loop.³² The rules provide registration requirements for corporate and individual Robo-advisers. It stipulates the procedure for offering Robo-advisory services as follows:³³

A risk warning statement should be provided to clients at the point of account opening and when offering foreign investment products

The client should be made to answer a series of questions to ascertain factors like level of risk tolerance, investment objectives, investment time horizon, and the amount they are willing to invest periodically.

Algorithms should analyse the responses given to deliver a suitable investment portfolio, backed by a reasonable basis for the recommendation.³⁴

²⁰ "NITDA Urges NIITE to Provide Support for Interns, Start-up Innovators – NITDA", online: <<https://nitda.gov.ng/nitda-urges-niite-to-provide-support-for-interns-start-up-innovators/>>.

²¹ The Nigerian Communications Commission is the independent National Regulatory Authority for the telecommunications industry in Nigeria. The Commission is responsible for creating an enabling environment for competition among operators in the industry as well as ensuring the provision of qualitative and efficient telecommunications services throughout the country. The Powers of the Nigerian Communications Commission is derived from Section 3 of the Nigerian Communications Acts of 2003 <<https://www.ncc.gov.ng>>

²² Nigerian Communications Commission, 'Ethical and Societal Impact of Artificial Intelligence' (November 2020) <<https://www.ncc.gov.ng/technical-regulation/research/919-ethical-societal-impact-of-artificial-intelligence-ai>>

²³ Ibid at 3.

²⁴ Ibid at 10.

²⁵ Ibid at 15 – 16.

²⁶ Ibid at 30 – 31.

²⁷ Note that the study was published before the launch of the NCAIR; as such, the NCC will likely seek to form a partnership with the Centre. In addition, Section 21 of the NITDA Amendment Bill introduces a new class of licences. If passed, some of these licenses may be applicable to the use of robotics and AI.

²⁸ SEC activities are currently governed by the Investments and Securities Act 29 of 2007. <<https://sec.gov.ng>>

²⁹ Securities and Exchange Commission Nigeria, 'New Rules, Major and Sundry Amendments to the Rule and Regulations of the commission: Rule on Robo Advisory Services' <<https://sec.gov.ng/regulation/rules-codes/>>

³⁰ Ibid, Rule 1(1).

³¹ Ibid.

³² Human-in-the-loop is a branch of artificial intelligence that leverages both human and machine intelligence to create machine learning models. In a traditional human-in-the-loop approach, people are involved in a virtuous circle where they train, tune, and test a particular algorithm

³³ Rule 4, Rules on Robo Advisory Services.

³⁴ Ibid, Rule 14b.

If the client accepts the recommendation, the buy order will be executed

If the client rejects the recommendation, the Robo-adviser will obtain the express consent of the client, which will be documented and used to revise the client's portfolio

Suppose the client changes their mind and decides to revert to the previous recommendation, known as rebalancing. In that case, the Robo-adviser will ensure that the rebalancing is only carried out in respect of the portfolio chosen by the client, disclose the scope of rebalancing, and obtain a one-time prior written authorisation from the client for rebalancing.

It is noteworthy that Robo-advisory services are already available in the Nigerian investment marketplace via several fintech companies. The proposed rules only seek to introduce higher standards by requiring additional data to train algorithmic models that deliver recommendations.

F. Ministry of Robotics and Artificial Intelligence, Cross River State

In 2019, the Governor of Cross-River state announced the creation of the Cross River State Ministry of Robotics and Artificial Intelligence to "enable the country to empower and fully equip the youths to be players at the emerging Fourth Industrial Revolution... to create a new intellectual platform that will drive the future of Cross River."³⁵

G. Federal Airports Authority of Nigeria, Federal Ministry of Aviation

The Federal Ministry of Aviation is responsible for the regulation and management of air travel and aviation services in Nigeria. The Nnamdi Azikiwe International Airport in Abuja, under the control of the Federal Airports Authority of Nigeria, and in adapting to the Covid-19 pandemic, acquired two robots with Artificial Intelligence features to improve passenger safety. The robots are responsible for the identification and screening of passengers amongst other duties.³⁶

H. Fintech and Innovations Unit, Nigeria Deposit Insurance Corporation

The Nigeria Deposit Insurance Corporation (NDIC) is an independent agency of the Federal Government of Nigeria. The purpose of the deposit insurance system is to protect depositors and guarantee

the settlement of insured funds when a deposit-taking financial institution can no longer repay their deposits, thereby helping to maintain financial system stability. The "Fintech and Innovations Unit" proposes to use blockchain, artificial intelligence, and other emerging technologies in its financial services.³⁷

I. Digital Case Management System, Supreme Court of Nigeria

The Supreme Court of Nigeria is set to introduce the use of Artificial Intelligence for the service of court processes and other legal documents through its digital case management system which will enable all lawyers registered on the database to serve documents via electronic means as opposed to the current manual service of documents. Through a proposed international court software, this system will automate processes pertaining to case filing, case assignments, delivery of judgements and generation of statistics and reports. This system will be advanced by using AI to fully deploy automated case flow management in the courts.³⁸

J. University of Lagos Library

The University of Lagos is said to have acquired artificially intelligent robots which have been placed in strategic locations to improve the productivity of the university. To improve teaching, learning and safety in the face of the COVID-19 pandemic, the University took delivery of three robots for temperature and blood pressure checks and provision of other data. The robot placed in the library assists in the headcount of visitors, categorisation of books, and performs reference services.³⁹

³⁵ "Cross River's embrace of robotics and artificial intelligence – The Sun Nigeria", online: <<https://www.sunnewsonline.com/cross-rivers-embrace-of-robotics-and-artificial-intelligence/>>; "Governor Ayade creates foreign affairs ministry for Cross River", online: <<https://www.premiumtimesng.com/regional/south-south-regional/369967-governor-ayade-creates-foreign-affairs-ministry-for-cross-river.html>>.

³⁶ "Abuja Airport Deploys AI Robots To Scan Passengers, Take Body Temperature", (28 June 2020), online: HumAngle <<https://humangle.ng/abuja-airport-deploys-ai-robots-to-scan-passengers-take-body-temperature/>>; Kess Ewubare, "FG acquires robots to stop the spread of COVID-19 at airports", (29 June 2020), online: Legit.ng - Nigeria news <<https://www.legit.ng/1342659-covid-19-fg-acquires-robots-screen-passengers-airports.html>>.

³⁷ The new Unit, which is domiciled in the Insurance & Surveillance Department of the Corporation, is expected to engage, and collaborate with innovators in the financial and non-financial sectors of the economy to identify, develop and promote technology-driven solutions that would protect depositors and improve the safety and soundness of Insured Financial Institutions. "NDIC Establishes New Unit On Fintech And Innovation", online: NDIC <<https://ndic.gov.ng/ndic-establishes-new-unit-on-fintech-and-innovation/>>; "NDIC Establishes Fintech, Innovation Unit", (29 January 2020), online: Financial Technology <<https://www.financialtechnologyafrica.com/2020/01/29/ndic-establishes-fintech-innovation-unit/>>.

³⁸ Mahmud Adamu, "The Application of Information Technology in the Effective Dispensation of Justice in Area/Sharia/Customary Courts" (National Judicial Institute, March 2019).

³⁹ "COVID-19: Unilag gets robots for temperature, blood pressure checks, others", (29 June 2020), online: Vanguard News <<https://www.vanguardngr.com/2020/06/covid-19-unilag-gets-robots-for-temperature-blood-pressure-checks-others/>>.

PART 2: PRIVATE AI ACTORS IN NIGERIA



Several private organizations, start-ups, and companies in Nigeria have posited to be using, creating, or adopting Artificial Intelligence systems in their work. This second part of the stakeholder mapping exercise, therefore, will highlight these private actors by listing out who they are, a brief description of what they do, and then provide a link to their organization website. These private AI actors are categorized into eight (8) categories viz: Agricultural Sector; Education Sector; Financial Services, Banking, E-commerce, and Business; Health Sector; Legal Services; Social Services; Telecommunications Sector; and Transportation Sector with a total of seventy-five (75) organizations listed. Whilst the list is extensive, it does not claim to be exhaustive of all the private actors in Nigeria that deploy the use of AI. As to what qualifies them as AI actors, reliance is made on the information mostly provided on their websites, without necessarily verifying the authenticity of every claim to be using or creating AI systems for their work.

K. Agricultural Sector

1. AgriEdge: AgriEdge is a platform of services in precision agriculture that offers user-friendly solutions to farmers, especially the smallholder ones, to improve their profitability. They rely on the use of data collected via sensors, satellite images, or drone images that they value using algorithmic models and agronomic knowledge to give recommendations to farmers, via a mobile application, to rationalize costs of the agricultural inputs.⁴⁰

2. FarmSpeak Technology: Farmspeak Technology focuses on manufacturing IoT-powered hardware devices that work with a web and mobile application using Artificial Intelligence to diagnose poultry diseases, monitor and regulate the poultry environment to help smallholder poultry farmers in Nigeria improve their farm management, reduce wastage and mortality, thereby increasing profitability in poultry farming.⁴¹

3. Farmz2u: Farmz2U is a food and agriculture technology start-up that provides technology solutions to farmers and end-consumers. They

employ artificial intelligence (AI), machine learning, and enterprise databases in providing functionality that achieves two primary objectives: reducing food waste and enhancing nutritional management.⁴²

4. Foodlocker: Foodlocker is a Nigerian foodstuff and grocery aggregator for large buyers, it uses deep learning (a sub-branch of AI) for forecasting demand for farm produce and consumer goods. It was launched in 2017.⁴³

5. Hello Tractor: Launched in 2014, Hello Tractor is focused on improving smallholder farmers' access to timely and affordable tractor services, along with other farm inputs. Its mobile app aggregates tractor service requests and then pairs them with recommended tractors and operators while tracking how many hours each piece of equipment is in the field and area serviced.⁴⁴

6. Plantheus: Launched in 2018, Plantheus is an application that uses Artificial Intelligence to diagnose plant diseases and suggest solutions to farmers and agricultural extension workers.⁴⁵

7. ShareQube: ShareQube makes use of deep learning, machine learning, and chatbots. They are focused on advancing the Research and Development of Artificial Intelligence algorithms and deploying Artificial Intelligence applications that create sustainable economic and environmental value. By collecting real-time data on weather, soil and air quality, crop maturity, and even equipment and labour costs and availability, ShareQube use predictive analytics to make smarter decisions for farmers. It was launched in 2016.⁴⁶

8. VetsArk: Launched in 2018, VetsArk makes use of predictive analysis to predict, prevent and manage disease outbreaks, for the benefit of livestock farmers, veterinarians, etc.⁴⁷

9. Zenvus: Zenvus is an intelligent solution for farms that uses proprietary electronics sensors to collect soil data like moisture, nutrients, pH and send them to a cloud server via GSM, satellite, or Wifi. Algorithms in the server analyse the data and advice farmers

⁴⁰ Website: <https://agriad.um6p.ma/agriedge/>

⁴¹ Website: <https://www.farmspeak.net/>

⁴² Website: <https://www.farmz2u.com/>

⁴³ Website: <https://www.foodlocker.com.ng/>

⁴⁴ Website: <https://hellotractor.com/>

⁴⁵ Website: <https://plantheus.com.ng/>

⁴⁶ Website: <https://shareqube.com/>

⁴⁷ Website: <https://vetsark.com/>

on what to do in their farms to maximize their yield.⁴⁸

L. Education Sector

10. Bizmarrow Technologies: They offer courses in artificial Intelligence. They offer an in-depth overview of Machine Learning topics including working with real-time data, developing algorithms using supervised & unsupervised learning, regression, classification, and time series modeling.⁴⁹

11. Data Science Nigeria: Data Science Nigeria is a non-profit organisation in Nigeria that provides free education and training on Artificial Intelligence. It runs the AI Hub as part of its strategy to build an inclusive ecosystem for sustainable capacity building in AI knowledge and application. The AI Hub offers free AI classes, and a library, a mini-research lab, and community meet-up.⁵⁰ They have a vision to build a world-class AI ecosystem in Nigeria and raising one million AI talents in 10 years, thus positioning Nigeria as a top talent destination with a 20 percent GDP multiplier impact.⁵¹ On their website, they list some of their initiatives which includes Intercampus Machine Learning Competition, Artificial Intelligence Bootcamp, Artificial Intelligence Summer School for Grades 5–9 students, AI+ Clubs in secondary schools and universities, AI Classes for post-secondary schools/pre-university students etc.⁵² From their records, their Artificial Intelligence for Starters eBook has recorded over 1 million direct downloads.⁵³ In addition, over 10,000 learners participated in the 1st Intercampus Machine Learning Competition; over 12,000 online participants in data science courses; over 1,500 hours of free classes on data science and machine learning in 30 states of Nigeria; 205 direct job placement, project participation and internships.⁵⁴

12. Gradely: Launched in 2017, Gradely provides personalized learning for kids by making use of image and language AI to study students' learning patterns and optimize their best learning patterns.⁵⁵

13. National Open University of Nigeria (NOUN): NOUN, under its faculty of science and technology, through course CIT478 offers a course on Artificial Intelligence. The course examines different ways of approaching AI. It starts with the basics of AI, and then moves on to the more advanced concepts. The Search in artificial Intelligence - State Space Search, uninformed Search, informed Search

Strategies, and tree Search are also treated. Finally, students are introduced to Artificial Intelligence and its applications– Expert System and Robotics; Knowledge; Representation and programming languages for AI.

14. NIIT Nigeria: They offer an Artificial Intelligence program to help people learn about various algorithms that can be used to build Artificial Intelligence applications.⁵⁶

15. Port-Harcourt City School of Artificial Intelligence: Port Harcourt School of AI is a non-profit organization that focuses on democratizing AI and making World-Class Machine Learning and Data Science education accessible to underrepresented groups in Nigeria free through collaborative learning using study groups.⁵⁷

16. Rise Networks: Rise Networks is a data science and AI-powered learning, research, and work readiness centre working to improve the skill set of people for industry fitness in the evolving digital world of work.⁵⁸ Their goal is to empower 5 million data science and analytics professionals with technology education and skills over the next five years. To this end, they organise ideathons, hackathons, and events towards teaching and creating courses relevant for the future of work. In addition, they built Ise, the Job Bot, a chatbot that provides career coaching, helps with job search and work readiness. Ise was built, leveraging on natural language processing, deep learning, trained on queries fed by human users.⁵⁹ Rise Networks owns Rise Labs, a talent pipeline and work readiness centre that leverages AI and big data analytics to improve the skillset of job seekers for industry fitness before placing them in jobs in organisations. In 2019, they organised the Artificial Intelligence Ideathon, where innovators pitched ideas leveraging AI; and #TheWorkPlan2019 on the future of work and the fourth industrial revolution. Through the year, they offer training on different aspects of data science and analytics such as: Data Science and Artificial Intelligence for banking, fintech and insurance; Robotic Process/Automation Control; 6-month Graduate Program in Data Science, Analytics and Artificial Intelligence etc.⁶⁰

17. Robotics and Artificial Intelligence Nigeria: This is a privately funded educational facility that provides 12 weeks to 9 months courses and certifications

48 Website: <https://zenvus.com/>

49 Website: <https://www.bizmarrow.com/artificial-intelligence-training-in-abuja-nigeria/>

50 Website: <https://www.datasciencenigeria.org/>

51 Ibid. 'Our Vision'.

52 Ibid. 'Our Platforms'.

53 Ibid. 'Our Achievements'.

54 Ibid.

55 Website: <http://gradely.ng/>

56 Website: <https://www.niit.com/nigeria/>

57 Website: <https://phcschoolofai.org/>

58 Website: <https://risenetworks.org>

59 Ibid.

60 '2021 Data Science/Analytics & Artificial Intelligence Training Calendar', Rise Networks <https://risenetworks.org/rise-networks-2021-data-science-analytics-training-calendar/>

in Artificial Intelligence, Machine Learning, Robot Development, and Automation.⁶¹

18. SimbiBot: Launched in 2018, SimbiBot proposes to use AI to solve the problem of poor education in Africa. It is an interactive learning assistant on the journey to prepare students for the Unified Tertiary Matriculation Examination (UTME) and Post UTME. The bot also assists students in making career choices.⁶²

19. Spell Africa: Spell Africa has developed an AI-based chatbot also called Sabi for English learning purposes. The chatbot has been embedded with a mobile pedagogy that covers four areas of language learning viz reading, writing, speaking, and listening. It also comes with the ability to assign homework and test the user's learning capability and progress.⁶³

20. Tatafo: Tatafo is described as an AI chatbot that provides instant access to resources and information needed by Campus students to succeed while on campus and support after-school plans. It was launched in 2018.⁶⁴

21. University of Lagos: In 2018, the University of Lagos launched the first-ever artificial intelligence hub in Nigeria. The artificial intelligence hub, located inside the Human Resources Development Centre of the University of Lagos, serves as an avenue to develop the Artificial Intelligence cycle in the country by focusing on deep learning and encouraging young talent discovery within the innovation and data analytics space. This was done in partnership with Data Science Nigeria profiled above.⁶⁵

22. Xigma: Xigma is a high technological research company with focus areas in Space Science, Nanotechnology, Robotics and AI, for Commercialisation.⁶⁶

M. Financial Services, Banking, E-commerce, and Business

23. Access Bank: Access Bank deployed chatbot Tamada which offers customers online banking services in real-time. Its services include investment advice, request for instant loans, and even sports updates. In March 2020, it was revealed that the bank had concluded plans to unveil a new technology payment solution tagged FacePay that leverages

facial recognition and artificial intelligence to provide a secure, seamless, and convenient way of making payments.⁶⁷

24. Airmat: Airmat provides AirSmat Artificial Intelligence (AAI) enabled software to operate, gather data, and collaborate to help farmers to see growth trends, count and size plants, generate prescription maps, identify early indicators of plant stress, and measure the zonal efficiency of farmers' plantation. The software platform provided by the company makes drones safe, reliable, and connected. Artificial intelligence-enabled software helps to provide valuable intelligence from the sky to the user and with this information; they can take proactive steps to solve real problems.⁶⁸

25. Chekkit: Chekkit is a DAG blockchain-powered anti-counterfeiting solution for food and drug supply chain tracking. They provide supply chain tracking and customer intelligence software. Its supply chain tracking software includes features like asset tracking, inventory and order request management, real-time stock viewing, fleet management, and market analytics. The customer intelligence software includes anti-counterfeiting, brand protection, and product authentication using scanned QR codes. It was founded in 2018.⁶⁹

26. Chiniki Guards: AI-based theft prevention solutions for retailers and brands. Chiniki Guard is a monitoring, analysis, and reporting software for security cameras. Chiniki uses AI to estimate human poses and detect suspicions like shoplifting and theft in retail stores. It makes use of Image recognition. It was launched in 2018.⁷⁰

27. Cruitera: AI-based recruitment management software, Cruitera is an AI-based recruitment management software. The features of the product include talent screening, cloud-based solutions, recruitment marketing, candidate sourcing, job posting, employee branding, etc. The product is offered for recruitment agencies and corporations. It was founded in 2019.⁷¹

28. Curacel: Curacel uses Neuro-linguistic programming and other algorithms to detect fraud and errors in customer data. They help Health Insurers realize massive time and cost savings during claims processing.⁷²

61 Website: <https://rainigeria.com/>

62 Website: <https://simbibot.com/>

63 Website: <http://spell-africa-international.business.site/>

64 Website: <http://tatafo.tech4africa.com>

65 "This Is Nigeria's First Ever Artificial Intelligence Hub • Techpoint Africa", online: <<https://techpoint.africa/2018/06/11/nigerias-first-ever-artificial-intelligence-hub/>>.

66 Website: <https://www.xigma.org/>

67 Website: <https://www.accessbankplc.com/>

68 Website: <https://www.airsmat.com/>

69 Website: <https://chekkitapp.com/>

70 Website: <https://chinikiguard.com/>

71 Website: <https://www.cruitera.com/>

72 Website: <https://curacel.co/>

29. Custodian Investment Plc: Custodian Investment Plc is a leading insurance company in Nigeria. It launched, in 2018, an AI Chatbot to leverage technology and deploy enhanced personalized services to its customers. The Chatbot named Max interacts with customers in a conversational mode and provides services such as getting a quote/purchasing majority of Custodian products and services, responding to enquiries about Custodian products and services, making claims, and checking claim status.⁷³

30. DeepQuest AI: DeepQuest AI is a suite of "dockerized" Artificial Intelligence server software that enables developers to easily build, deploy and manage AI-powered applications on their private servers and edge IoT gateways.⁷⁴

31. EnterFive: Enterfive is a solutions agency that launches and scales businesses through innovative digital solutions. They make use of NLP, sentiment analysis to understand online and offline data that will provide clients better insights. It was launched in 2018 and has over 20 employees.⁷⁵

32. FBN Insurance: FBN Insurance is a life insurance company in Nigeria that primarily focuses on retail-based insurance. They have built artificial intelligence into their financial advisor app so that they can recommend cross-selling opportunities based on data they already have on the customer. They also make use of artificial intelligence in their customer service with AI they can identify a customer before the customer identifies themselves.⁷⁶

33. Fidelity Bank: Fidelity Bank Plc's IVY can efficiently open bank accounts for prospective customers. The chatbot which imitates human life allows customers to pay bills, log complaints, and perform traditional banking activities through WhatsApp.⁷⁷

34. Indicina: Indicina is a credit risk manager provider that makes use of predictive analysis and machine learning to identify and reject bad loans during the application and underwriting process. It was launched in 2017.⁷⁸

35. Insyt: Insyt is a strategic sentiment analysis software that provides businesses with a means to improve customer satisfaction via opinion mining in local languages. It makes use of an autonomous

Artificial Intelligence text interpretation engine to detect and analyse all relevant references to a business.⁷⁹

36. Jumia: Jumia launched the Jumia Bot in 2017. Jumia Bot is a shopping assistant backed up by artificial intelligence and machine learning. It works by asking customers what they are looking for, then use their answers to uncover the best offers that are relevant, like search results after typing in a search query on e-commerce websites.⁸⁰

37. Karatoo: Founded in 2000. They are a Natural Language Processing company where they intersect technology with language. They develop language tools, learning resources, and software that processes texts and words using Machine Learning in the Hausa Language.⁸¹

38. Keystone Bank: Keystone Bank adopted the Chatbot functionality, named Oxygen both on Facebook and Telegram. The AI technology allows us to improve customer experience by turning several transaction steps on internet Banking and the Mobile App to simple conversations in a chat environment, achieving huge timesaving and convenience for busy customers who are already frequent users of social media.⁸²

39. Kiakia: Having raised over 50,000USD is a platform that matches users who want to lend money with users looking to borrow money, and in some cases will provide direct loans. A virtual AI agent called "Mr. K" also does credit scoring based on borrowers' activity on the platform, financial behaviour, and social media information. It was launched in 2016.⁸³

40. Kudi.ai: Launched in 2016, Kudi uses Artificial Intelligence to facilitate financial transactions and payment on chat platforms like Facebook, Slack, and Telegram using chatbots.⁸⁴

41. Migos: Migos is a Nigerian fintech start-up that creates data-based credit products using artificial intelligence algorithms to determine what fits consumers best. They offer these products to banks or other financial services providers like mobile operators. Earning percentages on each transaction justifies the unique value offered.⁸⁵

42. OneFi: Launched in 2012 and with over 40

⁷³ Website: <https://custodianplc.com.ng/>

⁷⁴ Website: <https://deepquestai.com/>

⁷⁵ Website: <https://www.enterfive.com/>

⁷⁶ Website: <https://www.fbninsurance.com/>

⁷⁷ Website: <https://www.fidelitybank.ng/>

⁷⁸ Website: <https://www.indicina.co/>

⁷⁹ Website: <https://www.insytai.com/>

⁸⁰ Website: <https://www.jumia.com.ng/>

⁸¹ Website: <http://www.karatoo.com/>

⁸² Website: <https://www.keystonebankng.com/>

⁸³ Website: <https://kiakia.co/>

⁸⁴ Website: <https://kudi.com/>

⁸⁵ Website: <https://www.migo.money/en-ng/>

employees, OneFi's payment application leverages data analytics through machine learning and deep learning algorithms to build credit scores for individuals and companies who have had difficulties accessing credit before that time. Their lending process is done through their Carbon Mobile App.⁸⁶

43. OuterDesk: Launched in 2017, OuterDesk is a multi-channel chatbot that uses machine learning to provide customer support for enterprise businesses. It is powered by Natural Language processing.⁸⁷

44. Peexoo Technologies: Peexoo is an AI-enabled photographer booking platform. The platform allows users photographers to upload their portfolios, accept booking requests of clients, proceed with photoshoots, and get paid. It offers various features such as zero editing downtime, calendar updates, cloud storage to share work with clients, etc.⁸⁸

45. PrimeAlert: PrimeAlert provides an emergency SOS alert application. The product offers location and movement tracking, dependants management, geofencing. The features of the product include automatic alerts, emergency messages, AI-based voice recognition, etc.⁸⁹

46. QuickHelp Nigeria: QuickHelp is a mobile contact service that operates as an accredited source for accessing contact information of much-needed help on demand. It was also enabled to provide on-demand filtered and smart information, as against the use of cumbersome directory services or search engines. QuickHelp is being created to champion the future of search, airtime recharge, eCommerce, and AI-enabled e-Education in Nigeria, and subsequently all over Africa, by adopting proven AI technologies.⁹⁰

47. RelianceHMO Insurance: Formerly known as KangPe, RelianceHMO platform leverages artificial intelligence and data science to prepare customized preventative medical insurance programs eliminating hospital admissions costs by providing access to doctor's consultation online, enabling families and individuals to avail themselves of telemedicine services in a hassle-free manner.⁹¹

48. Samora: Samora provides an AI-based chatbot solution. It enables virtual conversation with a human. It includes interacting with a robot for bulk

SMS, language translation, offline Bible/Qur'an, shorten URL, website content to PDF, IP information, storybooks, and an inventory control system.⁹²

49. Sela: Sela is a platform that enables transparent execution and measurement of sustainable development projects, eliminating traditional barriers of entry for capital into the emerging world. Sela uses blockchain and artificial intelligence to track all transactions and impact-driven measurements, fostering trust among project stakeholders.⁹³

50. Slatecube: Slatecube is a technology company that develops AI-powered SaaS (Software-as-a-service) solutions for learning and workforce development. Governments, social impact organizations, businesses, and individuals leverage their cutting-edge digital platforms to run their learning and workforce management programs.⁹⁴

51. Stanbic IBTC: Stanbic IBTC in 2018, deployed Robots called Bluebots to some of its branches to manage middle and back-office activities. Bluebots facilitate Account Origination and Servicing for Anti-Money Laundering transactions and Processing and Clearing for inward cheque confirmation. It also handles Personal Banking Credit assessments and manages T-Bills processing at various branches. They also make use of an AI-powered Chatbot christened Sami which renders banking services to customers.⁹⁵

52. Talo: AI-enabled conversational banking solutions for financial institutions. It enables financial institutions to put a chatting widget on the website for automated answers. It offers services such as checking the status of account opening, balance checks, loan requests, payments, and more. It was founded in 2018.⁹⁶

53. Touchabl: This Start-Up uses Artificial Intelligence to enable people to stop and search for items in a picture by simply touching them. Launched in Port Harcourt in 2017, Touchabl has been described as the "Shazam for pictures", a reference to the start-ups' AI-based image recognition product.⁹⁷

54. Union Bank: Union Bank uses AI to upgrade its existing strategy and accelerate further innovation in its banking services and solutions. AI is also being leveraged by the bank to predict future volume of inbound calls that can reduce some of the

86 Website: <https://onefi.co/>

87 Website: <https://www.outerdesk.com/>

88 Website: <https://www.peexoo.ai/>

89 Website: <https://primealert.com.ng/>

90 Website: <https://quickhelp.com.ng/>

91 Website: <https://www.reliancehmo.com/>

92 Website: <https://samarobot.com/>

93 Website: <https://sela-labs.co/>

94 Website: <https://www.slatecube.com/>

95 Website: <https://www.stanbicibtcbank.com/>

96 Website: <https://www.taloplatform.com/>

97 Website: <https://touchabl.com/>

volatility in call management. Through AI, the cash management solutions team is provided with data-driven relevant recommendations and proposals for customers.⁹⁸ Union Bank's education platform-Edu360- and Awarri, a pan-African technology company, organized a Robotics competition. Successful candidates were trained in robotics and artificial intelligence.

55. United Bank for Africa: The United Bank for Africa introduced Leo, an AI-powered digital assistant. It is a mobile banking chatting platform that is used for financial transactions such as paying bills, checking account balance, football updates, and other services in different languages on the social media platforms such as WhatsApp and Facebook.⁹⁹

56. Youverify: Youverify helps businesses and individuals confirm identity and physical addresses. Using AI, they confirm a user's identity document and compares it with their facial biometrics. This information can be cross-checked against more than 300 databases locally and globally.¹⁰⁰

N. Health sector

57. Aajoh: Aajoh makes use of Artificial Intelligence by the way of predictive analytics to improve the quality of and access to healthcare in Africa. With a mobile phone, one can receive medical diagnosis and treatment thereby eliminating queues in hospitals and saving money.¹⁰¹

58. Arone: Arone is an online platform and app to order medicines. Arone was founded in 2017. The platform uses smart aerial logistics technology empowered with AI and autonomous flight navigation software to run drones for delivering medical supplies to and from clinics, hospitals, labs, and health facilities.¹⁰²

59. Doktorconnect: Provider of a cloud and AI-based doctor consultation platform. The company has developed an app-based platform that allows users to book appointments from doctors and clinics for online consultation. Users can access the medical history, access pharmacies and medical laboratories, track vital signs using a fitness tracker, and access the fitness videos. It was founded in 2020.¹⁰³

60. Ubenwa: Ubenwa uses Artificial Intelligence to

analyse a baby's crying to give a warning of baby asphyxia. According to the founder Charles, the solution has achieved 95% accuracy in its predictions in trial with 1,400 pre-recorded baby cries.¹⁰⁴

O. Legal services

61. Judy: Founded in 2018, Judy provides an AI-based database for Nigerian case laws. It allows users to collect and manage case judgment records, manage citation format using artificial intelligence technologies. It enables information related to tax law, criminal law, or maritime law.¹⁰⁵

62. Law Pavilion Business Solutions: Law Pavilion is an information technology provider in the Legal Industry in Nigeria. They launched Timi, an AI-powered virtual assistant that assists lawyers to walk through the Civil Procedure Rules of courts in Nigeria.¹⁰⁶

63. Law Repository: Law repository uses a powerful artificial intelligence algorithm, natural language processing, and machine learning to process pre-filled information into a legal document. It was created to solve some of the basic problems associated with legal delivery in Nigeria.¹⁰⁷

P. Social Services

64. Azuri: Azuri is a leading commercial provider of PayGo Solar Home Systems for rural off-grid homes. Azuri's solar system's Homesmart uses artificial intelligence to monitor both climatic conditions and historical customer usage patterns to ensure a full night of light, even following cloudy days.¹⁰⁸

65. Renewable Africa 365: Nigerian non-profit Renewable Africa 365 (RA365) is a non-profit that believes in the use of research to solve the energy problem. RA365 is working with local governments to install mini solar power substations, known as renewable energy microgrids. Each microgrid can deliver electricity to serve small communities of 4,000 people. In this way, RA365 aims to address Nigerian energy poverty community-by-community with solar installations. They collaborated with Omdena to successfully complete the project. Omdena is a global platform where AI experts and data scientists from diverse backgrounds collaborate to build AI-based solutions to real-world problems.¹⁰⁹

66. SayPeace: SayPeace makes use of Deep Learning Algorithm to monitor hate speech on

⁹⁸ Website: <https://www.unionbankng.com/>

⁹⁹ Website: <https://www.ubagroup.com/leo/>

¹⁰⁰ Website: <https://www.youverify.co/>

¹⁰¹ Website: <http://aajoh.com/>

¹⁰² Website: <https://aronedelivery.com/>

¹⁰³ Website: <https://www.doktorconnect.com/>

¹⁰⁴ Website: <https://ubenwa.ai/>

¹⁰⁵ Website: <https://www.judy.legal/>

¹⁰⁶ Website: <https://lawpavilion.com/>

¹⁰⁷ Website: <https://www.lawrepository.com/>

¹⁰⁸ Website: <http://www.azuri-group.com/>

¹⁰⁹ Website: <https://www.ra365.net/>

social media in real-time to predict the possible occurrence of violence. It was founded in 2018.¹¹⁰

67. Triangle Africa: Triangle Africa is using Artificial Intelligence to help young people in Africa make reliable career decisions. Triangle Africa is a not-for-profit Edutech organization committed to building technological solutions, programs, and initiatives that directly address the problems of unemployability of youths across Africa. Their system uses Artificial Intelligence to help young people find credible career information, calculate their employability ratings, discover skills relevant to upskill for their chosen career, and ultimately find suitable jobs.¹¹¹

68. Tringoo: Tringoo an on-demand photography booking platform leveraging artificial intelligence is changing the photography industry by making it easy and affordable for celebrants and event organisers in Africa to connect with pre-vetted professional photographers in a quick and easy way. It was founded in 2018.¹¹²

Q. Telecommunications sector

69. 9Mobile: In January 2020, 9Mobile launched Enin, an Artificial Intelligence-enabled chatbot that would help customers do various things on the 9mobile network such as airtime purchase, subscription to data plans, presents customers with offers, bonuses, sales, reminders, notifications, recommendations, subscriptions, and customer service information.¹¹³

70. Globacom: In 2019, Globacom unveiled plans to introduce Glo Titi, an Artificial Intelligence platform that would assist customers to get facts and/or information about urgent issues. It would also help customers to project issues and ask questions 24/7 without any human interface and permit customers to choose the most convenient plan. The platform would also be able to have conversations in English, Yoruba, Hausa, Igbo, and Pidgin through voice and text.¹¹⁴

71. MTN Group: In 2019, MTN deployed an artificial intelligence mobile money "assistant" to enable customers to engage with MTN's MoMo services, including payments, on various social media platforms such as WhatsApp and Facebook Messenger, and via SMS.¹¹⁵

72. Spectranet: The Spectranet Mobile app offers customers seamless connectivity. It comes with a unique artificial intelligence, EVA, who provides

instant responses to questions raised by customers on Spectranet offers and services.¹¹⁶

R. Transportation Sector

73. Aero Contractors: Aero Contractors is a state-controlled Airline in Nigeria, they make use of Ramco's Systems Aviation SuiteV5.8 for their MRO operations, thereby automating manual work execution processes and enabling organization-wide visibility.¹¹⁷

74. Lara.ng: Created by Road Preppers Technologies, Lara.ng is a WhatsApp Chatbot that uses artificial intelligence to offer conversation style directions and fare estimates for public transportation in Lagos. It was launched in 2017.¹¹⁸

75. Uber: Uber is a platform where those who drive and deliver can connect with riders and people in need of their services. Uber makes use of AI for fraud detection, risk assessment, safety processes, marketing spend and allocation, matching drivers and riders, route optimization, driver onboarding, and just about everywhere else it is possible to apply.¹¹⁹

110 Website: <https://www.saypeace.ng/>

111 Website: <https://triangle.africa>

112 Website: <https://tringoo.com/>¹¹²

113 Website: <https://9mobile.com.ng/enin/>

114 Website: <https://www.gloworld.com/ng/>¹¹⁴

115 Website: <https://www.mtn.com/>

116 Website: <https://spectranet.com.ng/>

117 Website: <http://www.flyaero.com/>

118 Website: <https://lara.ng/>

119 Website: <https://www.uber.com/ng/en/>

PART 3: REGIONAL AND SUB-REGIONAL AI ACTORS IN NIGERIA



S. African Artificial Intelligence Research Centre

The UN Economic Commission for Africa (ECA), in collaboration with the UN Industrial Development Organisation (UNIDO), and the International Telecommunications Union (ITU) in March 2021, commenced setting up the AAIRC in Congo Brazzaville. Although situated in the Congo, the Centre is expected to serve Africa through collaboration between the Congo and other African countries. It is also likely to pursue partnerships with other AI research centres around the world. In addition, the Centre is expected to develop research for AI in Africa. The ECA is also reportedly working on a work program and research areas for the Centre to focus on.¹²⁰ Earlier, it was stated that one of the recommendations to the NCC was to follow the work of the ITU towards localising international best practices. Furthermore, considering the ITU's involvement in the AAIRC project, the NCC may serve as an exchange point between local government efforts in AI and the continental organisation.

T. African Union/African Commission on Human and Peoples Rights

African Union Digital Strategy Information for Africa (2020 – 2030) has proposed an African Peer Review Mechanism as part of a continent-wide digital governance on the use of AI within Member States.¹²¹ The AU has prescribed AI rules on the grounds of solidarity and cooperation to ensure that Africa's forthcoming digital infrastructure with AI is cooperative, transformative, inclusive, homegrown, safe and is able to allow Member States to have varied levels of what they call 'Digital Maturity.'¹²² This prescription for an African solidarity in the use of AI is also required for the equitable sharing of responsibility of the technology and its impact on the continent. Progressively, in February 2021, the African Commission on Human and Peoples' Rights adopted a resolution on human rights and AI.¹²³ The resolution emphasizes the need for sufficient consideration of African norms, ethics, values,

and communitarian ethos, in the development of AI structures, and it also emphasizes the need for freedom from domination of one people by another in framing of global AI governance frameworks.¹²⁴

U. Economic Community of West African States

The Telecommunications and Information Technology department of the ECOWAS, under the directorate for Digital Economy and Post exists a specific role for conducting policy and program dialogues with Member States on issues relating to Internet development and ICT emerging issues such as 5G and Artificial Intelligence among others.¹²⁵ The ECOWAS is a regional group of 15 Member States¹²⁶ and was established in 1975.¹²⁷ It aims to promote economic integration in the region. On the African continent, ECOWAS appears to be one of the most active regional organisations in cyber security. In 2010, the Community adopted the Supplementary Act on Personal Data Protection within ECOWAS.¹²⁸ This legally binding act, seen as being strongly influenced by the EU Data Protection Directive, specifies the required content of data privacy laws, and obligates member states to establish a data protection authority. ECOWAS has also adopted a Directive on Fighting Cyber Crime, highlighting the growing need to harmonise or create regional legislation in the face of the increasing level of cybercrime in the region.¹²⁹

120 Communications Section – ECA, 'ECA to help establish an artificial intelligence centre in Congo' (ECA, March 1, 2021) www.uneca.org/stories/eca-to-help-establish-an-artificial-intelligence-centre-in-congo

121 The Digital Transformation Strategy for Africa (2020-2030) | African Union, online: <<https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>>.

122 Ibid. This Digital Maturity Model is where Member States can identify their current digital state (as is), and where they want to go (to be) along a development continuum; a set of flexible 'pathways to prosperity' that bring together the various foundational pillars in different configurations. This is to provide Member States with a range of options and alternatives to consider in pursuing digital transformation, in a way that is best suited to their needs.

123 African Commission on Human and Peoples' Rights, "473 Resolution on the need to undertake a Study on human and peoples' rights and artificial intelligence (AI), robotics and other new and emerging technologies in Africa - ACHPR/Res. 473 (EXT.OS/ XXXI) 2021" Available at: <<https://www.achpr.org/sessions/resolutions?id=504>>

124 Ibid.

125 ECOWAS, "Director, Digital Economy & Post" <<https://www.ecowas.int/careersall/2019-2/director-digital-economy-post/>>

126 ECOWAS members are Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

127 ECOWAS, About the Economic Community of West African States <<https://www.ecowas.int>>

128 ECOWAS, Supplementary Act A/SA.1/01/10 on Personal Data Protection within ECOWAS (37th session on the authority of Heads of State and Government, 16th February 2010).

129 CCDCOE, "Economic Community of West African States" <<https://ccdcoe.org/organisations/ecowas/>>

CONCLUSION

Artificial Intelligence is an emerging technology that is fast being adapted around the world. It is simply put, the simulation of human intelligence by computer processes. Nigeria, as a country, has not been left behind in the deployment, utilization, or even experimentation with the use of AI systems by both private and public entities. While the government generally deals with regulation and proposing the use of AI within its institutional infrastructures, private Institutions and Non-Profit organisations deploy the use of AI to automate processes and provide solutions to challenges. This stakeholder map highlights the various bodies and organizations who employ the use of Artificial Intelligence in Nigeria.

IV. About Paradigm Initiative

Paradigm Initiative works to connect underserved young Africans with digital opportunities and ensures protection of their rights. Across regional offices in Cameroon, Kenya, Nigeria, Senegal, Zambia, Zimbabwe and beyond, Paradigm Initiative works to connect under-served African youth with improved livelihoods through digital inclusion and digital rights programs.¹³⁰

¹³⁰ See more information here: <https://paradigmhq.org>

BIBLIOGRAPHY

- "Abuja Airport Deploys AI Robots To Scan Passengers, Take Body Temperature", (28 June 2020), online: HumAngle Media Limited <<https://humanglemedia.com/abuja-airport-deploys-ai-robots-to-scan-passengers-take-body-temperature/>>.
- "Buhari renames communications ministry", online: <<https://www.premiumtimesng.com/news/top-news/359229-buhari-renames-communications-ministry.html>>.
- "COVID-19: Unilag gets robots for temperature, blood pressure checks, others", (29 June 2020), online: Vanguard News <<https://www.vanguardngr.com/2020/06/covid-19-unilag-gets-robots-for-temperature-blood-pressure-checks-others/>>.
- "Cross River's embrace of robotics and artificial intelligence – The Sun Nigeria", online: <<https://www.sunnewsonline.com/cross-rivers-embrace-of-robotics-and-artificial-intelligence/>>.
- "Governor Ayade creates foreign affairs ministry for Cross River", online: <<https://www.premiumtimesng.com/regional/south-south-regional/369967-governor-ayade-creates-foreign-affairs-ministry-for-cross-river.html>>.
- "NDIC Establishes Fintech, Innovation Unit", (29 January 2020), online: Financial Technology <<https://www.financialtechnologyafrica.com/2020/01/29/ndic-establishes-fintech-innovation-unit/>>.
- "NDIC Establishes New Unit On Fintech And Innovation", online: NDIC <<https://ndic.gov.ng/ndic-establishes-new-unit-on-fintech-and-innovation/>>.
- "Nigeria is becoming Africa's unofficial tech capital", online: TechCrunch <<https://social.techcrunch.com/2020/02/02/nigeria-is-becoming-africas-unofficial-tech-capital/>>.
- "NITDA Urges NIICTE to Provide Support for Interns, Start-up Innovators – NITDA", online: <<https://nitda.gov.ng/nitda-urges-niicte-to-provide-support-for-interns-start-up-innovators/>>.
- "That National Centre for Artificial Intelligence and Robotics in Nigeria — Economic Confidential", online: <<https://economicconfidential.com/2020/11/national-centre-artificial-intelligence-robotics>>.
- "This Is Nigeria's First Ever Artificial Intelligence Hub • Techpoint Africa", online: <<https://techpoint.africa/2018/06/11/nigerias-first-ever-artificial-intelligence-hub/>>.
- "Why I created Ministries of robotic and artificial intelligence, foreign affairs - Ayade", (27 December 2019), online: Ben Ayade <<http://www.senatorbenayade.org/created-ministries-robotic-artificial-intelligence-foreign-affairs-ayade/>>.
- African Commission on Human and Peoples' Rights, "473 Resolution on the need to undertake a Study on human and peoples' rights and artificial intelligence (AI), robotics and other new and emerging technologies in Africa - ACHPR/Res. 473 (EXT.OS/ XXXI) 2021" Available at: <<https://www.achpr.org/sessions/resolutions?id=504>>
- CCDCOE, "Economic Community of West African States" <<https://ccdcocoe.org/organisations/ecowas/>>
- Commtech, "Home", online: <<https://www.commtech.gov.ng/>>.
- ECA, 'ECA to help establish an artificial intelligence centre in Congo' (ECA, March 1, 2021) www.uneca.org/stories/eca-to-help-establish-an-artificial-intelligence-centre-in-congo
- ECOWAS, Supplementary Act A/SA.1/01/10 on Personal Data Protection within ECOWAS (37th session on the authority of Heads of State and Government, 16th February 2010).
- Effoduh, Jake Okechukwu, "7 Ways that African States are Legitimizing Artificial Intelligence | Open AIR", online: <<https://openair.africa/7-ways-that-african-states-are-legitimizing-artificial-intelligence/>>.
- Ewubare, Kess, "FG acquires robots to stop the spread of COVID-19 at airports", (29 June 2020), online: Legit.ng - Nigeria news <<https://www.legit.ng/1342659-covid-19-fg-acquires-robots-screen-passengers-airports.html>>.
- Mahmud Adamu, "The Application of Information Technology in the Effective Dispensation of Justice in Area/Sharia/ Customary Courts" (National Judicial Institute, March 2019).
- Odoh, Innocent, "Africa: Nigeria Will Lead Africa in Artificial Intelligence, Block Chain - NITDA Boss", (25 June 2021), online: allAfrica.com <<https://allafrica.com/stories/202106250005.html>>.
- Rise Networks '2021 Data Science/Analytics & Artificial Intelligence Training Calendar', <https://risenetworks.org/rise-networks-2021-data-science-analytics-training-calendar/>
- The Digital Transformation Strategy for Africa (2020-2030) | African Union, online: <<https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>>
- Uzor, Franklin, "Government, IBM Launch Digital Skills Training Program", (4 April 2020), online: Nigerian Investment Promotion Commission <<https://www.nipc.gov.ng/2020/04/04/government-ibm-launch-digital-skills-training-program/>>.
- <http://aqjoh.com/>
- <http://gradely.ng/>
- <http://spell-africa-international.business.site/>
- <http://tatafo.tech4herafrica.com>
- <http://www.azuri-group.com/>
- <http://www.flyaero.com/>
- <http://www.karatoo.com/>
- <https://9mobile.com.ng/enin/>
- <https://agriad.um6p.ma/agriedge/>
- <https://aronedelivery.com/>
- <https://chekkitapp.com/>
- <https://chinikiguard.com/>
- <https://curacel.co/>
- <https://custodianplc.com.ng/>
- <https://deepquestai.com/>
- <https://hellotractor.com/>

<https://kiakia.co/>
<https://kudi.com/>
<https://lara.ng/>
<https://lawpavilion.com/>
<https://onefi.co/>
<https://phcschoolofai.org/>
<https://plantheus.com.ng/>
<https://primealert.com.ng/>
<https://quickhelp.com.ng/>
<https://rainigeria.com/>
<https://risenetworks.org>
<https://samorabot.com/>
<https://sela-labs.co/>
<https://shareqube.com/>
<https://simbibot.com/>
<https://spectranet.com.ng/>
<https://touchabl.com/>
<https://triangle.africa>
<https://tringoo.com/>
<https://ubenwa.ai/>
<https://vetsark.com/>
<https://www.accessbankplc.com/>
<https://www.airsmat.com/>
<https://www.bizmarrow.com/artificial-intelligence-training-in-abuja-nigeria/>
<https://www.cruitera.com/>
<https://www.datasciencenigeria.org/>
<https://www.doktorconnect.com/>
<https://www.enterfive.com/>
<https://www.farmspeak.net/>
<https://www.farmz2u.com/>
<https://www.fbninsurance.com/>
<https://www.fidelitybank.ng/>
<https://www.foodlocker.com.ng/>
<https://www.gloworld.com/ng/>
<https://www.indicina.co/>
<https://www.insytai.com/>
<https://www.judy.legal/>
<https://www.jumia.com.ng/>
<https://www.keystonebankng.com/>
<https://www.lawrepository.com/>
<https://www.migo.money/en-ng/>
<https://www.mtn.com/>
<https://www.niit.com/nigeria/>
<https://www.outerdesk.com/>
<https://www.peexoo.ai/>
<https://www.ra365.net/>
<https://www.reliancehmo.com/>
<https://www.saypeace.ng/>
<https://www.slatecube.com/>
<https://www.stanbicibtcbank.com/>
<https://www.taloplatfrom.com/>
<https://www.ubagroup.com/leo/>
<https://www.uber.com/ng/en/>
<https://www.unionbankng.com/>
<https://www.xigma.org/>
<https://www.youverify.co/>
<https://zenvus.com/>

