Responsibly Scaling AI in Africa

CEIMIA's Strategic Framework for Increasing Impact

White Paper

September 2024

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About CEIMIA

In an era of rapid development in artificial intelligence (AI) technologies, including the arrival of generative AI, governments are faced with the crucial task of effectively navigating the complexities surrounding deployment of AI and its impact on society. It is in this context that the International Centre of Expertise in Montreal on Artificial Intelligence (CEIMIA) supports the work of the Global Partnership on Artificial Intelligence (GPAI)[1], a multi-stakeholder initiative aiming to bridge the gap between theory and practice on delivering responsible AI. The GPAI does this by supporting cutting-edge research and applied activities on AI-related priorities. Built around a shared commitment to the OECD Recommendation on AI[2], the GPAI brings together engaged minds and expertise from science, industry, civil society, governments, international organizations, and academia to foster international cooperation.

With its unique position supporting the GPAI, CEIMIA mobilises international experts and resources (from the academic, private, and civil society sectors) to promote the responsible development and use of AI for the benefit of humanity. CEIMIA therefore acts as a key player in the responsible development of AI based on human rights, inclusion, diversity, innovation, economic growth, and the well-being of society, while seeking to achieve the United Nations' Sustainable Development Goals[3].

In this shared effort to develop responsible AI, CEIMIA, with the support of the International Development Research Centre (IDRC)[4], has launched a Researcher-in-Residence Program to facilitate the development of links with AI ecosystems Sub-Saharan in Africa, and to identify opportunities for collaboration with GPAI's Expert groups and the Canadian AI ecosystem. Such a mission would not be possible without knowing the priority areas based on the needs of Africa and Africans when it comes to developing responsible AI; it is within this context that we offer this White Paper.

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[1] Global Partnership on Artificial Intelligence - GPAI
[2] Recommendation of the Council on Artificial Intelligence
[3] THE 17 GOALS | Sustainable Development
[4] IDRC - International Development Research Centre

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Citation

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Acronyms

ACCF	Africa Climate Change Fund
ACTS	African Centre for Technology Studies
AFD	Agence Française de Développement
AfDB	African Development Bank
AI	Artificial Intelligence
AI4D	Artificial Intelligence for Development in Africa
AU	African Union
BMGF	Bill and Melinda Gates Foundation
CEIMIA	International Center of Expertise in Montreal on Artificial Intelligence
EMR	Electronic Medical Record
ERC	European Research Council
ESSTIC	Ecole Supérieure des Sciences et Techniques de l'Information et de la Communication
EWARS	Early Warning, Alert and Response System
FAO	Food and Agriculture Organisation
FCDO	Foreign, Commonwealth and Development Office
GCF	Green Climate Fund
GLAM	Galleries, Libraries, Archives, and Museums
GPAI	Global Partnership on Artificial Intelligence
IDRC	International Development Research Centre of Canada
IoT	Internet of Things
ML	Machine Learning
RAN	Resilient Africa Network
RECs	Regional Economic Communities
MOOC	Massive Open Online Course
MRI	Magnetic Resonance Imaging
NGO	Non-Governmental Organisation
POPIA	South Africa's Protection of Personal Information Act
SRAIS	Scaling Responsible AI Solutions
TAAT	Technologies for African Agricultural Transformation
TDIF	Trustworthy Data Institutions Framework
ToT	Training of Trainers
UAVs	Unmanned Aerial Vehicles
UNDP	United Nations Development Programme
UQAM	Université du Québec à Montréal
USAID	United States Agency for International Development

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Executive Summary

As Artificial Intelligence (AI) continues to transform industries and societies around the world, Africa stands at a pivotal moment. These technologies can either be harnessed to solve key challenges or can risk deepening existing inequalities. This White Paper, "Responsibly Scaling AI in Africa: CEIMIA's Strategic Framework for Increasing Impact," provides a comprehensive analysis of the current AI landscape in Africa and outlines a practical path for building an inclusive, responsible, and impactful AI ecosystem across the continent.

AI is already making progress in sectors such as healthcare, agriculture, and climate action, offering new opportunities for growth and development. AI technologies are helping improve diagnostics and disease prevention, enhancing agricultural productivity through precision farming, and supporting climate resilience with early warning systems and energy management. However, the full potential of AI in Africa remains untapped due to several challenges. These include regional inequalities, limited infrastructure, data shortages, and a lack of skilled professionals. Moreover, external donors often set priorities, which may not always align with Africa's local needs.

At the heart of overcoming these challenges is the central role of African governments. They must take the lead in shaping national AI policies, investing in critical infrastructure, and ensuring that AI development is inclusive and addresses the continent's socio-economic priorities. Governments are best positioned to foster an environment where AI can thrive responsibly, with national strategies that reflect Africa's unique challenges and opportunities. Without this leadership, the continent risks falling further behind in the AI revolution, leaving underserved communities at an even greater disadvantage.

This White Paper proposes a strategic framework built around, and upheld by, three key pillars to guide governments and stakeholders in Africa:

- **Ethical AI Principles** – Ensuring AI systems are fair, transparent, and accountable to the people they serve.
- **Human-Centered Design** – Focusing on AI solutions that address the real needs of African communities and that respect local values.
- **Continuous Risk Assessment** – Regularly identifying and mitigating potential harms throughout the AI lifecycle to ensure long-term sustainability.

Governments must also take decisive action by following four essential steps to create a thriving AI ecosystem:

- **Step 1: Develop national AI policies and foster cooperation** by establishing governance structures, encouraging adoption in key sectors, and promoting collaboration both locally and internationally.
- **Step 2: Accelerate the creation of national trustworthy data institutions to** ensure secure, interoperable data exchange, protect data rights, and foster inclusiveness.
- **Step 3: Create public-private partnerships that incentivize local AI innovation,** attract investments, and ensure AI solutions align with local needs and contexts.
- **Step 4: Facilitate participation in AI-driven projects** by engaging local communities, promoting collaborative research, and ensuring inclusivity throughout AI development.

While governments drive these essential steps, they cannot act alone. Collaboration with private sector actors, AI developers, and international organizations is necessary to bring AI's full benefits to all African communities. However, it is the governments that must establish the necessary policies, frameworks, and infrastructure to make AI work for the people.

This White Paper is not only a resource for policymakers; it also serves as an inspirational tool for other organizations seeking to develop their own strategies for AI in Africa. The White Paper provides a roadmap for businesses, research institutions, non-governmental organizations (NGOs), and international partners to align their efforts with Africa's development goals and promote responsible AI adoption.

The role of CEIMIA, later highlighted in this White Paper, offers an example of how an organization can contribute to Africa's AI development in alignment with the African Union's Continental AI Strategy. Over the next five years, CEIMIA will be mentoring blossoming AI teams, assisting governments in policy formulation, and building the capacities of local experts. This contribution is based on four main work packages:

- **Work Package 1:** Mentoring blossoming AI teams to Responsibly Scale their AI Projects;
- **Work Package 2:** Support AU's Member States in Developing their National AI Policies;
- **Work Package 3:** Strengthen Capacity-Building and Upskilling of Local Experts and Communities in Responsible AI;
- **Work Package 4:** Actionable Research Projects to Explore New Areas of AI Applications;

These efforts are aimed at empowering African nations to harness AI for inclusive growth and social progress. Our example for CEIMIA is just one model, from which we invite other organizations to draw inspiration as they seek to contribute to Africa's AI future, adapting the lessons and strategies outlined in this White Paper to their own context and objectives.

Introduction

Introduction

Artificial Intelligence (AI) is quickly changing industries and societies worldwide, offering innovative solutions to complex challenges. In Africa, AI presents a unique opportunity to address critical issues such as enhancing healthcare, improving agricultural systems, and combating climate change. These technologies can help the continent overcome traditional development barriers, fostering innovation, economic growth, and sustainable development. However, realizing AI's full potential requires more than just technology — it calls for the creation of an enabling environment that supports responsible and ethical AI adoption.

African governments must take the lead in this transformation. They are in a unique position to shape national AI policies, invest in necessary infrastructure, and ensure that AI development aligns with the continent's socio-economic goals. While AI can drive progress, its success depends on clear national strategies, strong governance, and inclusive participation from local communities. This White Paper aims to explore the current state of AI in Africa, identify the key challenges and opportunities, and provide actionable recommendations for governments, developers, and stakeholders to ensure AI benefits all Africans, meets Africa's specific needs and promotes inclusive growth for all.

Part A

An Overview of the African
AI Ecosystem

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An Overview of the African AI Ecosystem

In a shared effort to develop responsible AI, CEIMIA, with the support of IDRC, has produced a series of reports[5] on the current state of AI in Africa, enabling us to target priority areas based on the needs of Africa and Africans when it comes to adopting, developing, and implementing responsible AI. Building on the findings of this report series, Part A of this White Paper provides an overview of the African AI ecosystem, focusing on three main aspects:

- **Prominent applications.** AI is making significant progress in healthcare, agriculture, and climate action, helping address key developmental challenges.

- **Challenges.** Responsible AI adoption faces barriers such as regional disparities, a shortage of local data, a lack of skilled professionals, and external priority-setting by international donors, which may not align with Africa's needs.

- **Opportunities.** There are substantial opportunities to strengthen local AI capacity, improve infrastructure, and align AI development with Africa's socio-economic goals, particularly through the African Union's Continental AI Strategy.

Before we dive in these three main aspects, let us share the methodology we used in this report series.

Research Approach

As indicated, this section of the White Paper is the result of an analysis of data gathered from health, agriculture, and climate action sectors through four main platforms: Google Scholar, Lens.org, Google search, and LinkedIn. The research was conducted in French and English, using:

- **Keywords** such as 'Africa', domain-associated words (ex: 'health', 'agriculture' and 'climate action'), 'artificial intelligence', 'machine learning', and 'deep
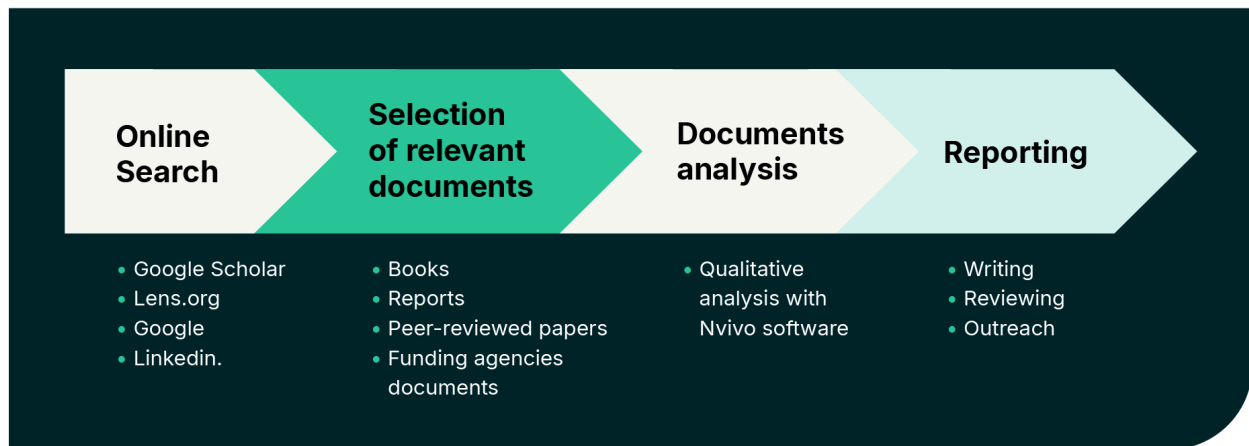
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[5] État des lieux de l'IA en Afrique - CEIMIA

learning'. Among the results obtained, the selection was further restricted to a date range of 2018 to 2024.

- **Relevant documents** including books, reports, peer-reviewed papers, and documents from funding agencies were selected. The bibliographic references are available in the CEIMIA's Zotero groups: CEIMIA - AI in Health in Africa; CEIMIA - AI in Agriculture in Africa, and CEIMIA - AI in Climate Change in Africa[6].

- **A sample of active AI initiatives** in healthcare, agriculture, and climate action in Africa. We are aware that our research did not cover all existing initiatives of AI in these domains in Africa[7].

These resources were then processed and analyzed using Nvivo, a qualitative analysis software programme.

Figure 1: Summary of Research Approach

Online Search	Selection of relevant documents	Documents analysis	Reporting
• Google Scholar • Lens.org • Google • Linkedin.	• Books • Reports • Peer-reviewed papers • Funding agencies documents	• Qualitative analysis with Nvivo software	• Writing • Reviewing • Outreach

We wish to acknowledge certain limitations of our research approach:

- **The lack of linguistic diversity** in the various sources of information used to write this report is a limitation. In sub-Saharan Africa, there are French, English, Portuguese, and Spanish-speaking countries, however, only French and English materials were used to gather information for these reports.

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[6] Please feel free to join the group and contribute.

[7] We encourage the reader to complete this form so we can collectively uphold a dynamic repository of AI initiatives in various African sectors.

- **The focus on local initiatives.** The information gathered mainly comes from Western countries that work in Africa as a research field, either through African diasporas or collaborations with local researchers. In this White Paper, we are highlighting initiatives originating from the continent. Therefore, some globally-recognised initiatives may not be included.

- **Figures are indicative**. The representation and breakdown of initiatives shown in this report only reflect an assessment based on the numbers of initiatives we found.

Prominent AI Application Sectors in Sub-Saharan Africa

The rapid advancement of AI has been enabled by large amounts of data being collected via technologies like the Internet, cloud computing, the Internet of Things (IoT), remote sensing technologies, smartphones and mobile applications, as well as unmanned aerial vehicles (UAVs) such as drones. The analysis of these data is enabled by advanced AI techniques such as machine learning (ML) and computer vision systems: facilitating identification of patterns, making predictions, and assisting in decision-making. While these advancements have contributed to transforming various sectors in sub-Saharan Africa, we focus particularly on implications to the domains of healthcare, agriculture, and climate action.

Healthcare

In healthcare, AI is being used to enhance clinical decision-making, improve patient care, and increase access to quality healthcare services. Common AI applications include: telemedicine and remote patient monitoring; sexual, reproductive, maternal, and child health; healthcare operations and management; medical imaging; diagnostics; data-driven surveillance and pandemic resilience; and drug discovery.

- Telemedicine and remote patient monitoring: AI-powered telemedicine platforms leverage technologies such as video conferencing, instant messaging, and virtual consultation to remotely connect patients with healthcare providers. Moreover, patient monitoring can be done in real-time, collecting and collating patient data inexpensively via smartphones or

chatbots. Health-E-Net in Botswana is an example of a local company operating in this field.

- Sexual, reproductive, maternal and child health: AI technologies support sexual, reproductive, maternal and child health by monitoring pregnancy, predicting complications, and offering guidance on family planning. By providing virtual self-care health coaching to people at risk of, or living with, chronic disease(s), these tools enhance the quality of care for women and children, particularly in regions with limited access to healthcare professionals. Wekebere in Uganda is an example of a local company operating in this field.

- Healthcare operations and management: AI is revolutionizing Africa's medical supply chains for a sustainable future. With AI-based Electronic Medical Record (EMR) management, hospitals can forecast demand for medical services based on historical data, plan staffing levels and deliver those services appropriately. It integrates cutting-edge technology, sustainable transport and digital solutions for affordable and accessible healthcare. LifeBank in Nigeria is an example of a local start up operating in this field.

- Medical imaging: Current medical imaging techniques such as x-rays, scans, and MRIs make extensive use of AI to analyze images and accurately detect anomalies, fractures, tumors, and other signs of disease. Deep Learning and Computer Vision are used to identify diseases in real-time. Neural Labs in Kenya is an example of a local company operating in this field.

- Diagnostics: AI provides healthcare professionals with opportunities for optimizing clinical diagnostics, remote review, and audit of clinical decision-making. These AI systems help doctors to make accurate diagnoses, improving the quality of healthcare in limited-resource settings. AI-powered diagnostics are also facilitated with the growth of rapid point-of-care diagnostic technology. Saratani AI in Tanzania is an example of a local company operating in this field.

- Data-driven surveillance and pandemic resilience: AI models analyze a multitude of data in real time, including climate data, population movements,

health data, and surveillance data, to identify risk factors and anticipate possible epidemic outbreaks. This constant monitoring enables the early warning signs of a possible epidemic to be detected quickly and trigger automatic alerts as soon as an anomaly is detected. This is called the Early Warning, Alert and Response System - EWARS, widely used in epidemiological surveillance. IntelSurv in Malawi is an example of a local company operating in this field.

- Drug discovery: AI is gradually emerging as a valuable tool for drug discovery in sub-Saharan Africa, albeit at an early stage. Various research institutions and start-ups are beginning to explore AI technologies to discover new therapies for diseases that primarily affect Africans and are based on naturally occurring compounds from African medicinal plants and other African sources. The University of Buea - Center for Drug Discovery in Cameroon is an example of a local research organisation operating in this field.

An analysis of our various non-exhaustive lists of AI initiatives in sub-Saharan Africa has enabled us to provide an indicative breakdown of the adoption of AI in different fields of healthcare (Figure 2). This figure shows an indicative rate of the adoption of AI solutions in the field of telemedicine (31.67%), sexual and reproductive health (20.00%), healthcare operation (16.67%), medical imaging (15.00%), data surveillance (8.33%), diagnostics (6.67%) and drug discovery (1.67%).

Figure 2: AI Applications in Healthcare in Sub-Saharan Africa (CEIMIA, 2024a)
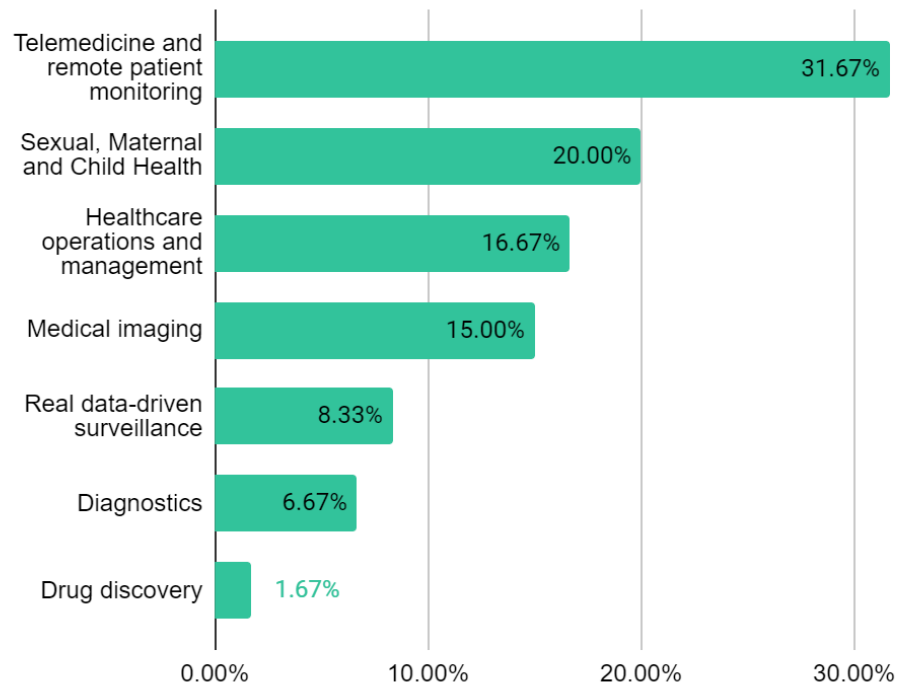
Agricultural Systems

AI is revolutionizing the way food is grown and agricultural systems are managed. The most well-known uses of AI technology in agriculture are through automation and precision agriculture, which are data-driven systems devoted to fintech, crop monitoring, disease management, digital farming advisory services, prediction of crop yield, resource management, and supply chains and logistics.

- **Fintech:** AI-powered fintech solutions bridge the gap between traditional financial services and the unique needs of the agricultural industry, leading to increased productivity, sustainability, and financial inclusion. These platforms connect farmers directly with buyers, eliminating the need for intermediaries, ensuring farmers receive fair prices for their produce. AgroCenta in Ghana is an example of a local company operating in this field.

- **Crop monitoring:** Often includes sensors for monitoring crop health and field conditions. By analyzing data collected from sensors, AI systems are able to provide predictive insights for improving crop yields; and can recommend personalized fertilizer and nutrient management plans. AI techniques are used

to track and assess crop health, including recognizing sick trees, pest tracking, disease prevention, and yield management analyses. Aerobotics in South Africa is an example of a local company operating in this field.

- Disease management: Poor soil quality, insect pests, and plant diseases are significant threats to global agriculture and are a major problem for African farmers. AI and ML techniques can help maintain soil health, and identify and diagnose plant diseases and pests, giving farmers an opportunity to take appropriate measures to control them in advance. Tolbi from Senegal is an example of a local company operating in this field.

- Digital farming advisory services: Digital farming advisory services are revolutionizing agriculture by providing farmers with the information they need to make better decisions and improve their yields. These services, tailored to specific regions and crops, utilize digital channels and AI to deliver timely and relevant advice, ultimately supporting sustainable agricultural practices and enhancing food security in Africa and beyond. M-shamba from Kenya is an example of a local company operating in this field.

- Prediction of crop yield: The use of predictive analytics, powered by AI and machine learning, is effective in predicting crop yield at different scales such as at local, regional, and country levels. The ability to predict crop yield before harvesting may also assist farmers in making favorable financial and management decisions. In addition, policy makers rely on these accurate predictions to make import and export decisions to strengthen national food security. AgriPredict from Zambia is an example of a local company operating in this field.

- Resource management: AI supports sustainable agriculture by optimizing the use of resources like water, fertilizer, and energy. For example, automated irrigation systems leverage AI, sensors, and IoT devices to optimize water usage, ensuring that crops receive the right amount of water at the right time. These insights help in precision farming, enabling farmers to make informed decisions about irrigation, fertilization, and pest control, ultimately increasing crop yield and promoting sustainable agriculture. Agrix Tech from Cameroon is an example of a local company operating in this field.

● **Supply chains and logistics:** AI and automation solutions for supply chain and ecosystem management facilitate seamless value chain linkages. These technologies enhance the efficiency and transparency of agricultural supply chains, ensuring that products move smoothly from farm to market. Key applications include traceability solutions, demand-supply matching, and optimized logistics. Hello Tractor from Nigeria is an example of a local company operating in this field.

An analysis of our various non-exhaustive lists of AI initiatives in sub-Saharan Africa has enabled us to provide an indicative breakdown of the adoption of AI in different fields of agriculture (Figure 3). This figure shows an indicative rate of the adoption of AI solutions in the field of FinTech (26.47%), crop monitoring (20.59%), disease management (17.65%), digital farming advisory services (11.76%), prediction of crop yields (11.76%), resource management (8.82%) and supply chains and logistics (2.94%).

Figure 3: AI Applications in Agriculture in Sub-Saharan Africa (CEIMIA, 2024b)
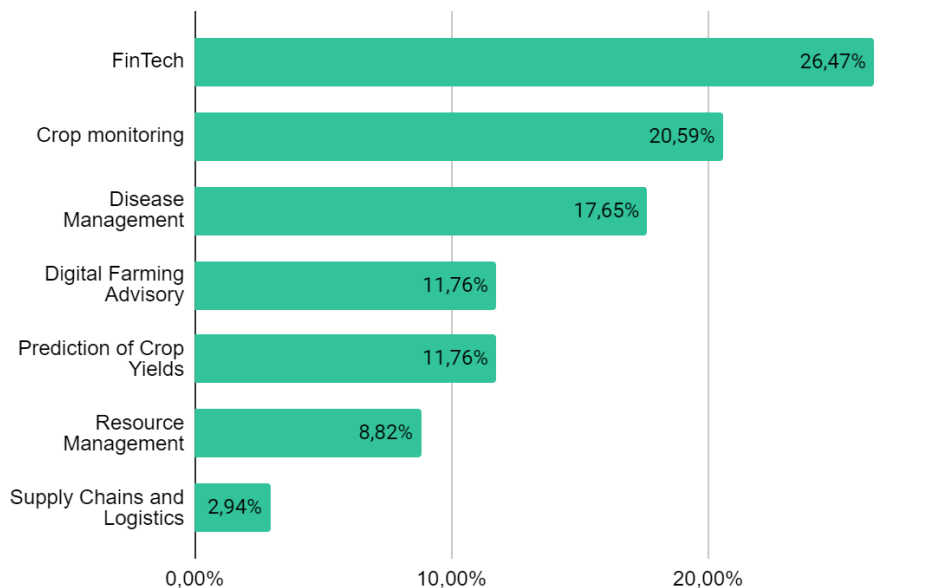
Climate Action

Climate change poses complex challenges that require innovative strategies for effective mitigation, in order to protect communities, infrastructure, and businesses from its effects. In this sense, AI offers powerful capabilities for processing large datasets, identifying patterns, and making predictions, which are essential for effective climate modeling, disaster preparedness, and resource management (GPAI, 2021). Across Africa, a growing number of initiatives and start-ups are harnessing AI to address climate-related challenges. Common AI applications include climate adaptation and early warning systems, biodiversity, modelling and forecasting, energy optimization, and forest monitoring and carbon footprint tracking.

- **Climate Adaptation and Early Warning Systems:** AI has emerged as a viable tool for climate change adaptation. By analyzing large amounts of data, such as climate models, satellite images, and weather patterns, AI can assist in planning climate change adaptation actions. Moreover, given that indigenous knowledge is based on relative and local experience, integrating them into AI applications may upscale climate engagement of the public and strengthen AI-powered early warning systems. Weather Net is a governmental initiative operating in this field.

- **Biodiversity monitoring:** Biodiversity plays an important role in sustenance and the life cycle of organisms on the planet; it is also an essential part of the solution to climate change, economic growth, and cultural identity of nations (GPAI, 2022). Despite the challenges biodiversity monitoring is facing, AI technologies are offering hope for the continued protection and thriving of Africa's unique biodiversity. In practice, AI-driven algorithms analyze data from GPS collars and other tracking devices to monitor the movements and health of wildlife, supporting conservation strategies. Smart initiative in Mozambique is a Civil Society Organisation (CSO) operating in this field.

- **Modelling and forecasting:** AI-enabled climate modeling is a data-driven approach done by analyzing large amounts of data from various sources, including satellite imagery and weather patterns to predict future climatic conditions and to identify patterns and trends that may not be apparent

through more traditional methods. This can help policy makers, African Governments, and other stakeholders anticipate the impacts of climate change and design effective mitigation and adaptation strategies. Ignitia Smart in South Africa is a CSO operating in this field.

- Energy optimization: AI, with its capacity to process vast amounts of data and learn from patterns, has revolutionized energy management practices in buildings, industries, and transportation systems. AI has the potential to cut energy waste, lower energy costs, and accelerate the use of clean renewable energy sources in power grids worldwide. Moreover, AI-driven analytics help in predicting energy consumption patterns, optimizing battery storage, and ensuring efficient energy distribution in off-grid areas. SunCulture in Kenya is an example of a local company operating in this field.

- Forest monitoring and carbon footprint tracking. In climate change mitigation, innovations and technological developments play a pivotal role in supporting sustainable practices. AI-powered technology is used in forestry and carbon emission tracking, to tackle a wide range of climate problems. AI can be used to track and manage carbon emissions in forestry and provide accurate reporting on carbon credits generated from forest conservation projects. Geoterra Image in South Africa is an example of a local company operating in this field.

An analysis of our various non-exhaustive lists of AI initiatives in sub-Saharan Africa has enabled us to provide an indicative breakdown of the adoption of AI in different fields of climate action (Figure 4). This figure shows an indicative rate of the adoption of AI solutions in the field of climate adaptation and early warning systems (31.82%), biodiversity (22.73%), modelling and forecasting (22.73%), energy optimization (13.64%) and forest monitoring and carbon tracking (9.09%).

Figure 4: AI Applications in Climate Action in Sub-Saharan Africa (CEIMIA, 2024c)
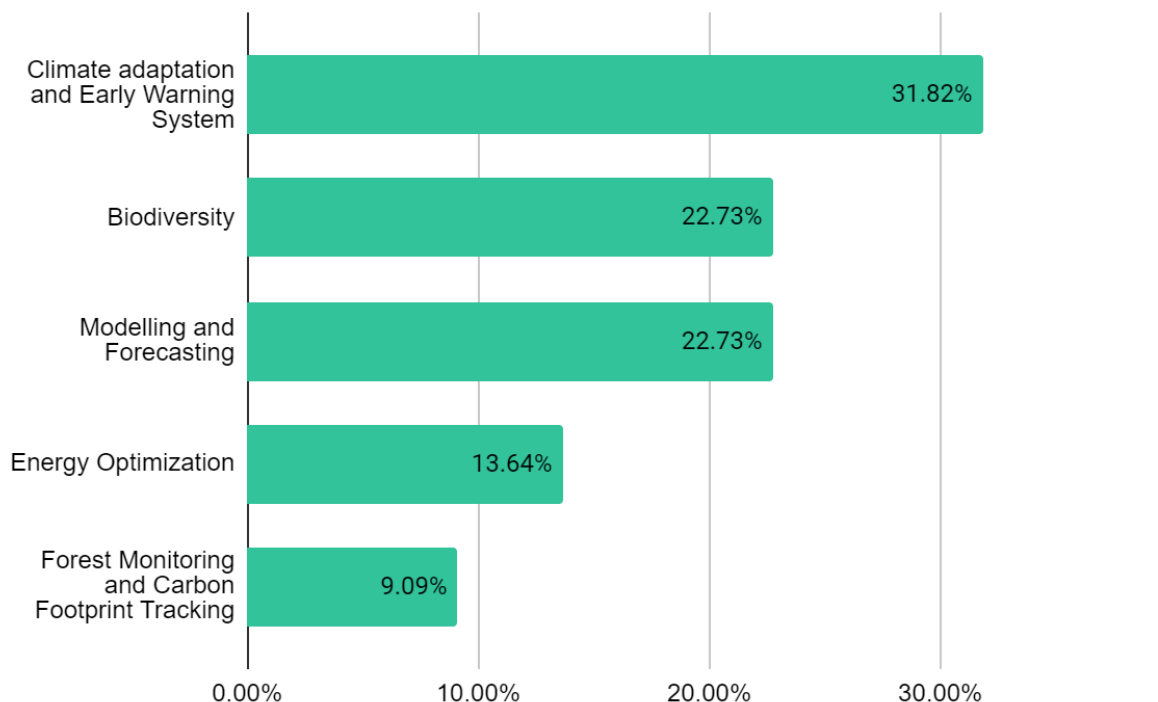
The wide range of AI initiatives and applications identified in our state of AI report series demonstrates that AI presents a powerful opportunity for transforming several sectors in Africa. However, this potential is not yet fully realised or leveraged due to the existing challenges that deployment of artificial intelligence in Africa faces.

Challenges to the Adoption of AI in Sub-Saharan Africa

Transversal Challenges

AI is a game-changing innovation with the potential to improve all sectors of the African social system. However, the adoption and use of AI applications in African society can raise issues that manifest as ethical and social challenges, legal and regulatory challenges, economic challenges, and technical challenges.

Technical Challenges

- **Digital divide:** The digital divide in Africa significantly hampers the widespread adoption of AI technologies. A major factor is the insufficient infrastructure and network connectivity across the continent. Adequate access to wireless

networks and affordable internet services is essential for AI to function effectively, but many regions in Africa face severe limitations in this regard. This lack of infrastructure creates significant barriers to AI development and implementation, particularly in remote or underserved areas. Additionally, there is a pronounced urban-rural divide, where urban centers benefit from better infrastructure, a higher concentration of skilled labor, and more investments in AI initiatives. In contrast, rural areas often lack even basic digital infrastructure such as reliable electricity and internet connectivity, making AI adoption far more challenging. This disparity deepens the socio-economic gap, leaving rural populations disconnected from the benefits of AI and the broader digital economy.

- **Data shortage:** AI initiatives rely on high-quality, diverse data to function effectively, but there is a notable shortage of appropriate data in Africa. This shortage affects the ability of AI systems to provide accurate and contextually relevant responses for the continent's diverse populations. The scarcity of locally-generated data is due to several factors, including limited infrastructure for data collection, weak data governance frameworks, and insufficient financial and technical resources. As a result, many AI systems deployed in Africa are trained on data from other regions, which may not adequately reflect the demographic and socio-economic variables of the African population. This mismatch can lead to biased or ineffective AI solutions that fail to meet local needs.

- **Dependence on foreign solutions:** The majority of AI solutions and technologies are developed outside of Africa, creating dependencies on foreign technologies and platforms. This can limit the development of local AI ecosystems and the tailoring of AI solutions to address local challenges. This is especially true in Africa, where AI developers are more likely to import machine learning algorithms built and trained abroad using data that may not recognize or may be biased against substantial parts of the African population.

Legal and Regulatory Challenges

- **Lack of AI national policies:** There is a general lack of relevant policies that can prioritize the design and implementation of AI as well as address its potential impacts on society. Mauritius, Egypt, Zambia, Tunisia, and Botswana have recognized the potential of AI to boost their GDPs and have developed national AI strategies over the past few years. For example, Mauritius launched its National Artificial Intelligence Strategy in 2018, positioning it as one of the earliest adopters on the continent. However, these policies are still relatively nascent, and most have not yet had time to take full operational form or produce measurable impacts on AI development or economic growth. South Africa, Nigeria, and Kenya have passed data protection laws, which are foundational to AI governance. South Africa's Protection of Personal Information Act (POPIA), introduced in 2013 and enforced in 2020, was among the earliest steps toward regulating AI-related data practices. However, these frameworks are still evolving, and while they lay the groundwork for responsible AI use, they do not yet constitute comprehensive AI strategies. In general, these policies and regulations are in their infancy in that they have not yet been fully operationalized or scaled to significantly influence national AI ecosystems (African Union, 2024). Their early stage means they are primarily focused on laying foundational legal and ethical structures, and it will take more time for them to fully address the broader challenges of AI governance, innovation, and widespread adoption across key sectors.

Ethical and Social Challenges

- **Ethics:** While AI has enormous potential, it is implicated in several ethical issues including accountability, biases, transparency, and socio-economic risks. For example, the majority of acquired data does not correctly reflect the African experience, implying that many algorithms may not be appropriately adapted to the features of local populations. Using biased data can create socioeconomic inequality by compromising algorithms' trust and transparency.

- **Shortage of skills:** Theoretical and practical skills are required for the development, implementation, and use of AI applications in different sectors across Africa. Regardless of whether African IT professionals (such as software developers and engineers) are doing their best to design and develop AI applications, the scarcity of AI-ready workers presents a major issue for the adoption of AI.

- **User attitudes:** Africans are skeptical in adopting and using new technology due to culture and social influences. African societies are deeply rooted in traditions and communal ways of life, where trust and human relationships are central to decision-making processes. Many people place high value on face-to-face interactions, personal relationships, and oral traditions, which AI systems may not replicate or respect. AI, as a data-driven technology, may be perceived as impersonal and disconnected from these traditional, human-centered approaches. This can lead to resistance in adopting AI-driven processes that replace or automate tasks that were traditionally carried out by individuals in communities.

Economic Challenges

- **Uncertainty about the future of work:** The fear of the unknown poses a great challenge to the adoption and use of AI in Africa. While some African stakeholders believe and trust in AI, others are afraid that its implementation may disrupt their traditional ways of working.

- **Lack of funding:** AI projects, especially those that are large in scale, require significant investment. Limited access to funding and venture capital in many African countries makes it difficult for start-ups and innovators to develop AI-based solutions.

Regional Disparities

Based on the results we found in our report series on the State of AI in Africa, Kenya, South Africa, Nigeria, Ghana, Uganda, and Rwanda are at the forefront of AI innovation in sub-Saharan Africa. This distribution seems to reflect African regional disparities which are shaped by economic, infrastructural, educational and political factors.

Linguistic-Related Disparities

Inside Africa, disparities are exacerbated by linguistic factors. Anglophone African countries have a notable advantage in AI adoption, partly due to their linguistic ties with global AI hubs in the United States of America and in the United Kingdom, where most research papers, conferences, and online courses are available in English. This provides easier access to educational resources, international collaborations and great exposure to funding sources. Francophone African countries have less access to AI-related resources in French; and regional institutions often rely on foreign partnerships, primarily with France or other European countries, to develop AI capacity.

Disparities Related to Under-Exploited Areas of AI Applications

In sub-Saharan Africa, AI development activities are primarily funded by foreign donors, creating a natural dependence that can determine the priorities on which Africans will work. It is therefore not surprising to see that the areas considered important by donors are the most promising in sub-Saharan Africa. These include health, agriculture, climate change, and education. As a result, some areas that could be relevant for Africa have been left out. These neglected areas, amongst others, might include:

- Galleries, Libraries, Archives, and Museums (GLAM)
- The discoverability of African scientific content
- Multilingualism and the role of open LLMs
- The integration of traditional knowledge in the development of AI solutions

Opportunities

Main Funding Agencies

Several key funding agencies are actively supporting AI initiatives across sub-Saharan Africa. These agencies play a crucial role in advancing technological innovations and AI adoption.

- IDRC. In 2020, IDRC and Sweden's government agency for development cooperation (Sida) launched the Artificial Intelligence for Development in

Africa (AI4D Africa) program[8]. The AI4D program has now grown with combined investments from the United Kingdom's Foreign, Commonwealth and Development Office (FCDO), the Bill and Melinda Gates Foundation (BMGF), United States Agency for International Development (USAID), and IDRC[9].

- **The Bill and Melinda Gates Foundation (BMGF).** The Bill and Melinda Gates Foundation (BMGF) supports the development of AI in Africa through the Grand Challenges[10]. While primarily focused on health and development, the Gates Foundation funds projects that use AI to address climate-related challenges in agriculture and food security in Africa. Its agricultural innovation program integrates AI for climate-smart agriculture and resilience building.

- The African Development Bank (AfDB). The African Development Bank (AfDB) funds a variety of climate action projects across Africa. The Africa Climate Change Fund (ACCF or Fund) and the Technologies for African Agricultural Transformation (TAAT) are among the programs through which initiatives that integrate AI for improved outcomes in areas such as climate resilience, renewable energy, and sustainable agriculture are funded. The Africa Climate Change Fund (ACCF) is a multi-donor trust fund well positioned to contribute to the achievement of the African Development Bank (AfDB)'s goal to triple its climate financing efforts and foster its drive for a climate-resilient Africa.

- The Agence Française de Développement (AFD). AFD is a public international financial institution founded in 1941. The mandate of AFD is to contribute to social and economic development through sustainable and inclusive growth, enhancing livelihoods and natural resource management. AFD sought accreditation with the Green Climate Fund (GCF) to utilize its experience in project delivery by offering support to national priorities in climate resilient development pathways, leveraging AI for climate action, sustainable development, and environmental protection.

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[8] AI4D Africa
[9] Combining forces for a new phase of AI for development: Africa and beyond | IDRC
[10] Global Grand Challenges

- The United States Agency for International Development (USAID). USAID funds projects that address climate change in Africa, with a focus on integrating AI to improve resilience, food security, and disaster response. This is the case of the Resilient Africa Network (RAN), which integrates AI into climate adaptation and resilience-building efforts, and the Feed the Future initiative which funds agricultural research and development projects that incorporate AI technologies.

- UN Organisations provide funding and technical assistance for projects in Africa, including those like the UNDP Accelerator Labs which leverage AI applications for climate resilience and adaptation in Africa. The Food and Agriculture Organisation (FAO), FAO E-Agriculture funds and implements AI-driven projects that focus on data collection, precision farming, and sustainable resource management.

- The European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program provides significant funding for projects in Africa, many of which incorporate AI to enhance their impact.

- The Rockefeller Foundation is a pioneering philanthropy built on collaborative partnerships at the frontiers of science, technology, and innovation to enable individuals, families, and communities to flourish. The Foundation funds AI-driven initiatives aimed at building resilience to climate change, particularly in vulnerable communities in Africa.

- The Pierre Fabre Foundation aims to provide access to quality healthcare for people in low and middle income countries. Its five areas of intervention are: (1) the training of healthcare professionals, (2) the fight against sickle cell disease, (3) access to healthcare for vulnerable populations, (4) e-health and (5) dermatology.

- Big Tech Companies. Big tech companies such as Twitter, Google, Facebook, Alibaba Group, Huawei, Amazon, and Microsoft have significantly increased the development and deployment of AI systems in Africa. They have realized the importance of training local workforces in digital skills, leading to the establishment of AI research labs on the continent such as: the Google African

AI research Centre in Ghana and the IBM laboratory in Nairobi which support the emergence of local AI practitioners and research groups that have formed to address local problems in health.

The Continental Artificial Intelligence Strategy

In a context where the main funders of activities related to the development of AI solutions are international organisations, the continental AI strategy guarantees a framework for action for funders, enabling them to contribute to the development of AI solutions at the service of African populations.

The AU Strategy on Artificial Intelligence (AI) was adopted by the AU Executive Council during its 45th Ordinary Session held on 18th – 19th July 2024, in Accra, the Republic of Ghana. The Continental AI Strategy proposes a people-centric, development-oriented and inclusive approach around five focus areas and fifteen actions areas.

Table 1: The Five Focus Areas and Fifteen Strategic Actions of the Continental AI Strategy (African Union, 2024)

Focus Areas	Strategic Actions
Maximising AI Benefits Harnessing AI's benefits for African people, institutions, the private sector and countries, in line with Agenda 2063 (with a focus on AI applications in agriculture, education, healthcare, public service delivery, climate change, and peace and security) and promoting the competitiveness of the African private sector.	AI Adoption by the public sector
	AI in priority sectors
	Adoption of AI by the private sector
	Building Vibrant AI startup ecosystem
Building Capabilities for AI Accelerating AU Member States' capabilities in infrastructure (energy, broadband, computing capabilities, data centres, cloud, IoT), AI talent and skills, datasets, innovation and research that underpin AI development.	Datasets and computing platforms
	AI skills and talents
	Information integrity, media and Information literacy
	Research and innovation

Focus Areas	Strategic Actions
Minimising AI Risks Addressing the risks associated with the increasing use of AI, with attention to governance, inclusion and diversity, human rights, gender equality, dignity, safety, peace and security, information integrity, and sustainable environment and ecosystem, considering African contexts, cultures, and values.	Gender, equality, inclusion and diversity in AI
	AI safety and security
African Public and Private Investment in AI Stimulating public and private investment in AI at national and regional levels.	African public sector investment in AI
	African private sector investment in AI
Regional and International Cooperation and Partnerships Fostering regional & international cooperation and partnerships to develop national and regional AI capabilities and advance Africa's position on a global stage.	Intra-African coordination and cooperation
	African participation in global AI governance
	AI-related cooperation and partnership between Africa and the rest of the world

This first part of the White Paper highlights the fact that a number of successful AI applications across sectors like healthcare, agriculture, and climate action, are already growing in Africa, showcasing the continent's potential to leverage AI for meaningful change, and supporting inclusive and prosperous African societies. However, two major challenges hinder responsible AI (RAI) uptake:

● General Challenges: Regional disparities, inadequate infrastructure, data gaps, and a lack of skilled professionals. These issues limit access to AI technologies, particularly in underdeveloped regions, thereby exacerbating inequalities;

● External Setting of Priorities: Much of the funding and decision-making is driven by external donors and organizations. While well-intentioned, this can result in a mismatch between the local needs and the focus areas prioritized by these external actors, neglecting important areas such as the integration of traditional knowledge and local languages.

We strongly believe in a two-pronged strategy to address these challenges and ensure an impactful uptake of RAI in Africa:

- **Establishing an enabling environment for Responsible AI development and adoption**, led by national governments. This includes creating policies that support AI innovation, ensuring data governance, and building infrastructure to sustain growth.

- **Aligning with the African Union's Continental AI Strategy,** which provides a framework for prioritizing AI applications that are aligned with Africa's development goals and needs. By focusing on this strategy, governments and stakeholders can ensure that AI serves local communities and addresses their unique challenges.

Part B

Pathways to an Impactful Uptake of Responsible AI in Africa

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Pathways to an Impactful Uptake of Responsible AI in Africa

In an era where AI plays an increasingly pivotal role in shaping various aspects of communities and societies, the intersection of technology, ethics, and human rights has become a critical focal point (GIZ Fair Forward, 2024). As AI technologies become more and more widespread around the world, it is imperative to ensure that their development, use, deployment and governance are carried out responsibly, aligned with human rights principles and avoid causing harm or perpetuating social inequalities. Hence the necessity to embed our approach in responsible AI:

> *"Responsible AI refers to the design, development, deployment and governance of AI in a way that respects and protects all human rights and upholds the principles of AI ethics through every stage of the AI lifecycle and value chain. It requires all actors involved in the national AI ecosystem to take responsibility for the human, social and environmental impacts of their decisions"*.
> - **Global Index on Responsible AI (2024)**[11]

Responsible AI in the African Context

Building on CEIMIA's field work research, GPAI's practical work in Africa[12], and IDRC's findings through the AI4D programme and GIZ Fair forward initiative, our approach to responsible AI in the African context is upheld by three pillars: ethical AI principles, human-centered design, and continuous AI risk assessment.

Pillar 1: Ethical AI principles

Several AI ethical guidelines have been developed by organizations such as the OECD, IEEE, UNESCO, etc. The following principles are common for responsible AI (GPAI, 2021, 2022a, 2022b, 2023a, 2023b):

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[11] https://girai-report-2024-corrected-edition.tiiny.site/

[12] Specifically the Scaling Responsible AI Solutions, Data Justice, and Data Institutions projects.

- **Fairness:** addresses the possible disparate outcomes end users may experience as related to sensitive characteristics such as race. It ensures that AI systems do not perpetuate or exacerbate biases and are equitable across different groups.

- **Security and Privacy:** Safety includes a set of design and operational techniques to follow to avoid and contain actions that can cause harm, intentionally or unintentionally. This ensures AI systems operate reliably and are secure from malicious attacks. Privacy involves protecting personal data and ensuring AI systems comply with data protection regulations.

- **Accountability:** means being held responsible for the effects of an AI system. This involves transparency or sharing information about system behavior and organizational process. This holds developers and organizations responsible for the outcomes and impacts of AI systems.

- **Explainability and Transparency:** Develop AI systems that provide clear and understandable explanations of their decision-making processes. Use interpretable models where possible, maintain comprehensive documentation of the AI model, including data sources, algorithms used, and the rationale for design decisions. Transparency makes AI processes and decision-making understandable and accessible to users and stakeholders.

- **Sustainability:** Considering the environmental impact of AI technologies and striving for sustainable practices

- **Trustworthy AI:** Developed by OECD, principles for trustworthy AI provide policymakers with tools to shape policies and create AI risk frameworks.

These principles are not rigid; they can be adjusted according to the type of organization or project for which they are defined.

**Pillar 2: Human-Centric Approach**

A human-centric approach in AI focuses on designing, developing, and deploying AI systems that prioritize human values, needs, and well-being. This approach ensures that AI technologies enhance human capabilities, respect human rights, and align with societal goals. In the African context, human-centered design can help enhance

African AI capabilities and align AI designs with African needs and values (Design Principles for Afro Feminist AI).

Pillar 3: Continuous AI Risks Assessment

AI risk and ethics assessments are done throughout the AI life cycle[13] to identify, assess, and mitigate potential harms and biases in AI. Here, we recommend the qualitative responsible assessment tools developed by GIZ Forward (2024), to guide AI stakeholders in critically analyzing AI resources, emphasizing human rights and ethical considerations throughout the AI life cycle.

Figure 5: AI Life Cycle (GIZ Fair Forward, 2024)
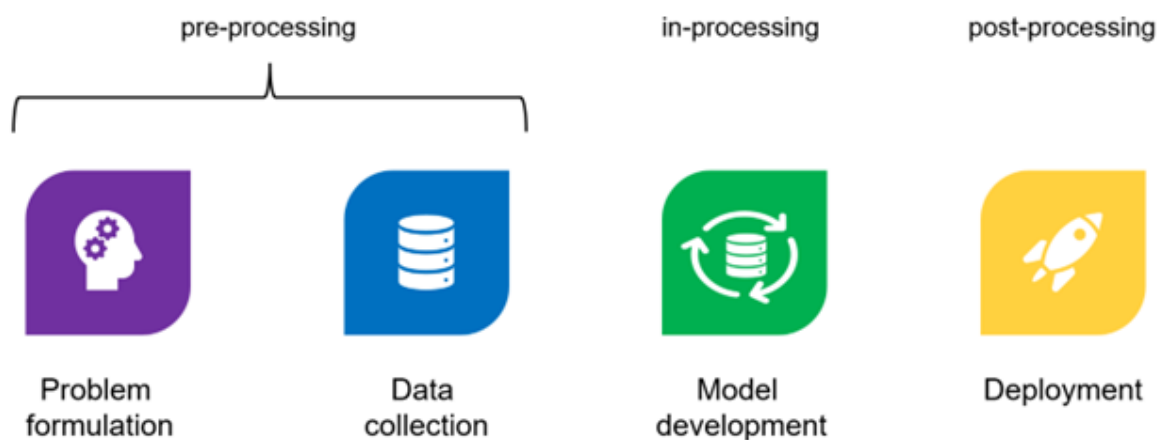
Pre-Processing: Problem Formulation & Data Collection

The pre-processing stage covers concrete steps from problem formulation to data collection and processing, influencing the later performance of an AI system. Assessing the pre-processing stage serves two primary objectives:

- Attain a precise definition of the problem. The AI system should align with real-world scenarios, considering various variables around the main problem and evaluating the problem-solving approach.
- Ensure the data used for training the AI system is of high quality, aiming for the most accurate representation of reality and its complexity.

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[13] We use the notion of AI lifecycle as defined by GIZ Fair Forward in the Responsible AI Assessments. The AI life cycle, understood here to range from pre-processing (encompassing problem formulation and data collection), in-processing (model selection and development), and post-processing stage (deployment).

This is important, because the first moment in which bias can enter the AI lifecycle is when you formulate the problem that an AI system should solve. The problem formulation stage requires making assumptions about the problem and the data required to solve it.

The second pre-processing moment in which bias can enter the AI lifecycle is when reality is translated into data. That way, social inequalities, historical imbalances and discriminatory patterns may feed into the data collection process and create harmful downstream patterns.

In-Processing: Model Selection, Training, and Evaluation

The in-processing stage involves selecting, training, and adapting the model to tailor it to a specific use case and context. This process also includes evaluating the AI system performance and fairness from a statistical standpoint. The main goal of assessing the in-processing stage is to pinpoint and minimize the influence of various biases—such as technical, statistical, or cognitive biases—on the AI model.

Post-Processing: Deployment and Monitoring

The post-processing stage consists of ensuring that the AI model works as intended in the real world. Several factors need to be reconsidered when the AI system runs on integrated production data, software and hardware: once deployed, algorithms may perform very differently on data subgroups. Assessing the deployment stage is done for two main goals:

- Continuous evaluation of the performance of the AI model in the real-word scenario;
- Identify biases or harms caused during implementation and tackle them.

Each moment of the AI lifecycle is subject to different sources of bias, which are not mutually exclusive nor relevant in all cases. Annex 1 and 2 summarize the type of biases found in the AI life cycle and techniques to mitigate them.

While numerous responsible AI guidelines exist, translating them into actionable policies for responsible development of AI remains a challenge; particularly in Africa. It requires a comprehensive approach that integrates multiple stakeholders across

the entire AI life cycle. To achieve this, it is important for African Governments to establish an enabling environment for responsible AI development and adoption.

Essential Steps to Establish an Enabling Environment for Responsible AI

For impactful uptake of responsible AI in Africa, a multi-stakeholder approach which involves African governments, international organizations, donors, development partners and developers is required. This collaborative approach allows participation by engaging diverse perspectives and stakeholders in the development and deployment of AI to ensure that it is taking into account the local context, specific needs, and cultural norms. While each stakeholder plays distinct roles which influence how responsible AI principles can and should apply, African governments must take a leadership role in establishing the enabling environment.

- **African Governments** are uniquely positioned to establish the necessary regulatory frameworks, policies, and infrastructure that ensure AI serves the public interest. Indeed, governments can drive the development of national AI strategies that prioritize local needs, promote ethical AI principles, and protect citizens from potential risks such as privacy violations and algorithmic biases. Their leadership is critical in ensuring that AI adoption aligns with the continent's socio-economic goals, is inclusive of marginalized communities, and respects cultural norms. Without strong government involvement, the AI landscape risks being shaped predominantly by external actors, which may not fully reflect Africa's unique challenges and opportunities.

- **AI developers,** including companies and research institutions, are at the forefront of creating AI technologies and have a direct influence on how these technologies are designed and deployed. So, developers should develop context-specific AI solutions to ensure that these solutions are tailored to the local context, considering cultural, legal, and social factors, and that they do not exacerbate existing inequalities.

- **International organisations and development partners**, such as international development agencies, play a critical role in setting global standards and facilitating cooperation across borders.

- **Donors,** including philanthropic organizations and international aid agencies, provide crucial funding for AI projects and initiatives, often in developing countries.

Here are the four essential steps for African governments and supporting stakeholders to develop an enabling environment for responsible AI.

Step 1: Develop National AI Policies and Foster Cooperation

Governments should establish comprehensive AI policies and regulations that enforce ethical standards, data protection, and accountability. This includes developing national AI strategies and setting up regulatory bodies to oversee AI deployment, ensuring that rights of end users are respected and to address the potential impacts of AI on society. To achieve this, there is a need to:

- Create and implement policies that encourage the adoption of appropriate technology within national priority sectors;
- Establish governance structures to oversee the deployment and use of AI solutions, ensuring they are beneficial, rights-respecting, and aligned with national interests;
- Foster collaboration between National African institutions and international partners to share knowledge, resources, and best practices in AI and climate action; and
- Engage in pan-African AI initiatives, like the continental AI strategy, and pan-African peer-learning on AI policies, allowing for the exchange of insights and best practices that can immensely benefit policy makers, AI practitioners, entrepreneurs, and investors looking for scalable solutions.

Step 2: Accelerate the Creation of National Trustworthy Data Institutions

African Governments should ensure their data sovereignty by creating a standardized data infrastructure that allows for the secure, efficient, and interoperable exchange of data. They should also address emerging challenges

regarding data protection, data ownership, and governance to ensure that AI solutions developed are both effective and ethical. This can be achieved through:

- Shared access to digital resources amongst stakeholders;
- Clear guidelines for collecting, storing, and using data, to ensure data privacy and security;
- Improving inclusiveness and ownership within data steward organizations in order to foster greater representation of marginalized groups; and
- Adopting the trustworthy data institutions framework (TDIF) developed by CEIMIA and GPAI[14]. The TDIF presents our ideal vision of trustworthiness that enables the development of safe, fair, and equitable sharing of data while empowering individuals and communities to assert their data rights.

Figure 6: Ideal Vision of Trustworthiness in Data Institutions – the TDIF

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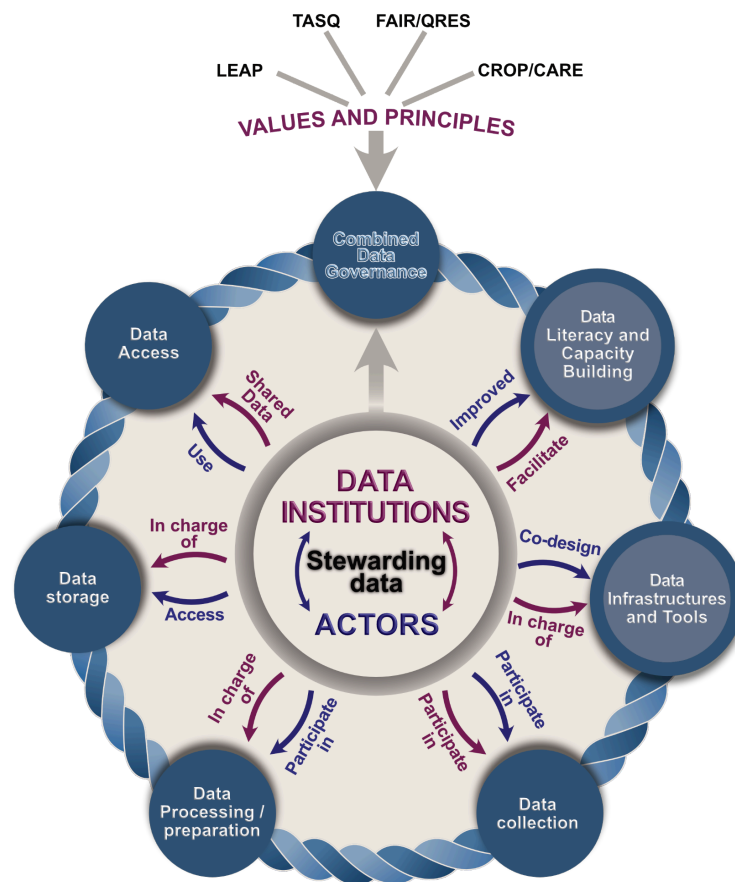
[14] The TDIF and additional information on how to interpret and use it can be found here.

Step 3: Create Public-Private Partnerships that Incentivize Local AI Innovation and Attract Investments

A holistic and collaborative approach must be adopted, involving all stakeholders, with the aim to align AI development with the local context, taking into account specific needs, available resources, existing infrastructures and cultural norms. This is facilitated through collaboration between governments, academia, industry (including tech companies), local experts, and communities through public-private partnerships. To do so, African governments should:

- Create dedicated spaces for multi-stakeholder discussions (forums, public consultations, public debates, think-tank, incubators, etc.), around scaling AI responsibly and data governance, with the aim to align AI development with the local context, taking into account specific needs from populations, different sectors, and industries. Such spaces of discussion are crucial in facilitating the integration of AI tools and can result in AI-powered solutions that are more appropriately tailored to local challenges and needs.

- Promote a favorable business environment that attracts and retains tech companies interested in AI, by developing regulations that encourage private sector investments through tax incentives and other financial benefits. This can guarantee fundings for local AI research and development activities; accessible through national grants and contributions to international funding schemes. This will ensure that local interests are prioritized and help prevent an "AI brain drain"[15].

- Encourage and promote the adoption of locally-made AI solutions by the governments itself via various sectors such as industry, health care, agriculture, transport, public services, industry, etc.

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[15] Brain drain is the departure of educated or professional people from one country, economic sector, or field for another usually for better pay or living conditions (Merriam-Webster Dictionary).

Step 4: Facilitate Participation in AI-Driven Projects

Participatory approaches encourage citizen engagement by involving local communities, indigenous groups, and stakeholders in the design, implementation, and monitoring of AI-driven projects, ensuring they address real needs and take native languages into consideration. While the three first steps mentioned above are led by the governments, the fourth step is under the leadership of AI developers, including companies and research institutions. Taking advantage of the conditions put in place by the governments, AI developers can facilitate participation by:

- Supporting collaborative research between academia and Industry with the aim to align AI development with the local context, taking into account specific needs. By the way, solutions developed are relevant and directly usable for local purposes;
- Working as a multidisciplinary research teams to develop context-specific AI applications and ensuring that AI models are designed to be inclusive at all stages of the AI lifecycle;
- Including and empowering end-user communities and women with AI skills to ensure that their voices and knowledge are considered in the development of AI solutions;
- Implementing e-literacy programs targeting local communities to train them on how to use AI tools and interpret data.

These four essential steps remind us that it is the local partners, i.e. the African governments and the AI developers, who are primarily responsible for setting up the enabling environment. Donors and development partners can only assist African governments in achieving the vision they have set themselves.

Part C

CEIMIA's Strategic Vision
in Africa

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CEIMIA's Strategic Vision in Africa

As a key player in the development of responsible artificial intelligence, based on principles of ethics, human rights, inclusion, diversity, and innovation, CEIMIA is committed to playing a central role in supporting the impactful uptake of responsible AI in Africa. To do so, it is important for CEIMIA to strategically align its priorities and their shared areas with the African Union's continental AI strategy.

Strategic Alignment with the African Union

The African Union's Continental AI Strategy provides a framework for prioritizing AI applications that are aligned with Africa's development goals and needs. By focusing on this strategy, governments and stakeholders can ensure that AI serves local communities and addresses their unique challenges. To achieve its vision of AI, the AU needs the support and contribution of all stakeholders including governments, developers, donors, and international organisations, specifically to:

> *"Support Africa's effort to accelerate AI use for solving its development challenges in alignment with Agenda 2063, especially in addressing challenges related to agriculture food and security, health, education, climate change adaptation"; and*
> *"Support AU Member States effort to build their datasets, compute capabilities, skills and research and innovation capabilities that underpin AI development and adoption for sustainable development and reduction of its risks to the society"*
> **- Continental AI Strategy, (African Union, 2024)**

Responding to this call to action, CEIMIA wishes to support the AU's Continental AI Strategy and contribute to the socio-economic goals set out by the AU Agenda 2063. This commitment can be operationalized through some of the CEIMIA's strategic objectives as outlined in its 2024-2025 Operational Plan. Table 2 shows a summary of CEIMIA's relevant strategic objectives and how they map to the AU's Continental AI Strategy's focus areas, as well as the common actions between both strategies.

Table 2: CEIMIA's Strategic Alignment with the Continental AI Strategy

CEIMIA Objectives	AU's Focus Areas	Strategic Actions
Objective 1: Implement innovative, high-impact and socially responsible AI projects	**Maximising AI Benefits**	• AI in priority sectors • AI adoption by the public sector
	Building Capabilities for AI	• AI skills and talents • Research and innovation
	Minimising AI Risks	• Gender, equality, inclusion and diversity in AI
Objective 2: Develop innovative models of collaboration and funding in the field of responsible AI	**African Public and Private Investment in AI**	• African private sector investment in AI • African public sector investment in AI
Objective 3: Promote the inclusion of low middle income countries in the responsible AI ecosystem	**Regional and International Cooperation and Partnerships**	• African participation in global AI governance
Objective 4: Showcase Quebec and Canadian AI ecosystems in the field of responsible AI		• AI-related cooperation and partnership between Africa and the rest of the world

CEIMIA's Action Plan

Over the next five years, CEIMIA plans to contribute to establishing an enabling environment for responsible AI development and adoption in Africa, based on four main work packages:

- Work Package 1: Mentoring AI Teams to Responsibly Scale their AI Projects (towards CEIMIA objectives 1, 2, and 4)
- Work Package 2: Support AU's Member States in Developing their National AI Policies (towards CEIMIA objectives 1, 2, 3, and 4)
- Work Package 3: Strengthen Capacity-Building and Upskilling of Local Experts and Communities in Responsible AI (towards CEIMIA objectives 1, 3, and 4)
- Work Package 4: Actionable Research Projects to Explore New Areas of AI

Applications (towards CEIMIA objectives 1, 2, 3, and 4)

Work Package 1: Mentoring AI Teams to Responsibly Scale their AI Projects

This work package is built on the existing Scaling Responsible AI Solutions (SRAIS) Project developed by GPAI. The objective of the SRAIS project is to select and mentor promising AI projects (teams) through the guidance of GPAI experts and external specialists, in order to identify challenges teams are facing with both responsibility and scaling, and assist in tackling these challenges (GPAI, 2023).

Since the beginning of 2024, CEIMIA, in collaboration with the African Centre for Technology Studies (ACTS), are mentoring African teams with their existing AI solutions, to scale their initiatives responsibly. CEIMIA plans to continue offering this program, and targets **mentorship of 100 teams across Africa**.

Work Package 2: Support AU's Member States in Developing their National AI Policies

CEIMIA will seek to engage with governments and policymakers across Africa, to shape public policy around trustworthy data governance and National AI strategies. In 5 years, we hope to **support 12 countries from sub-Saharan Africa in developing their National AI policies** (5 Anglophone, 5 Francophone, 2 Lusophone). To date six countries - Algeria, Benin, Egypt, Mauritius, Rwanda and Senegal - have developed stand-alone AI strategies. CEIMIA will seek to support the development of national AI strategies that align with the AU's Continental AI Strategy, emphasizing digital sovereignty, data governance, and the ethical use of AI.

Work Package 3: Strengthen Capacity-Building and Upskilling of Local Experts and Communities in Responsible AI

By working closely with local universities and research institutions, CEIMIA will focus on strengthening AI literacy and building the capacities of local experts and communities. This includes training programs, upskilling initiatives, and fostering responsible AI research across the continent, promoting open education and collaborative approaches. This work package contributes to all of CEIMIA's objectives. By the end of the programme, CEIMIA aims to have **developed a Training of Trainers (ToT) programme and a Massive Open Online Course (MOOC) on responsible AI**,

and have **established an exchange program between Africa and Canada** (both directions), with a target of 10 exchanges per year.

Work Package 4: Actionable Research Projects to Explore New Areas of AI Applications

Areas in which there are prominent AI applications are primarily those areas currently prioritised by donors, thereby leaving certain areas that are relevant to Africa unexplored. To this end, CEIMIA plans to conduct at least one action-oriented research project in the following areas:

- **Discoverability of African scientific contents.** AI can play a transformative role in improving the discoverability and accessibility of African scientific contributions, ensuring that local research is recognized and utilized both within and outside the continent.
- **Integration of traditional knowledge in AI models.** Integrating traditional knowledge into AI models can lead to more contextually relevant and culturally sensitive solutions, ensuring that AI serves Africa's unique needs and preserves its cultural heritage.
- **Explore the risks and opportunities associated with open LLMs.** In the African context, open LLMs may be seen as a tool for the democratisation of AI, that empowers local developers, educators, and innovators to create AI applications that address specific linguistic, cultural, and societal needs.

Whether you are a government body developing AI policy, a business driving technological innovation, a university building AI capacity, or an international partner eager to support Africa's growth—your role is essential. Let's work together to ensure that AI becomes a force for good, empowering African nations and fostering innovation that is ethical, inclusive, and impactful. By collaborating with CEIMIA through one or more work packages, you can contribute to responsible AI development that serves local communities, bridges the digital divide, and supports Africa's long-term socio-economic goals. Support CEIMIA's action plan and be part of a transformative movement that will shape the future of AI on the continent for generations to come.

Conclusion

Conclusion

Artificial Intelligence (AI) offers tremendous opportunities to solve critical challenges in healthcare, agriculture, and climate action across Africa. However, several obstacles must be addressed to fully unlock this potential. These include regional inequalities, a lack of high-quality local data, and a shortage of skilled professionals. In addition, many AI projects are shaped by external organizations whose priorities may not always match Africa's specific needs. To overcome these challenges, Africa must establish an enabling environment for responsible AI. This can be achieved by focusing on three key pillars: ethical AI principles, a human-centered approach, and continuous risk assessment. Governments can play a critical role by taking four essential steps: developing clear AI policies, building trustworthy data institutions, encouraging public-private partnerships, and involving local communities in AI projects. Together, these actions will help create a foundation for AI that is both fair and effective, addressing the continent's unique development goals.

CEIMIA is committed to playing a vital role in supporting Africa's AI journey. By aligning with the African Union's Continental AI Strategy, CEIMIA will help ensure that AI is used responsibly and effectively across the continent. Through mentoring AI teams, assisting governments in developing AI policies, strengthening local expertise, and exploring new AI applications, CEIMIA aims to empower African communities and drive sustainable innovation. This collaborative approach, guided by ethical and human-centered principles, will ensure that AI serves the needs of African people and contributes to a more inclusive and prosperous future for the continent.

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Annexes

Annexes

Annex 1: Gender Biases Identification and Mitigation Techniques

AI Life Cycle	What happens when GEI is not considered	Strategies for integrating GEI
Design	• Ignoring GEI in problem formulation leads to AI solutions that fail to address the unique needs and challenges faced by different genders, resulting in less effective and inclusive products • Lack of gender diversity in design teams can limit perspectives and lead to biased problem definitions and solutions.	• Engage diverse stakeholders, including underrepresented groups, in problem formulation and defining project objectives. • Establish clear GEI criteria and metrics to guide the AI system's design and development. • Conduct gender impact assessments to identify potential biases and disparities • Ensure diversity in the AI development teams to incorporate multiple perspectives
Data collection and preparation	• Gender biases in datasets lead to AI systems that perpetuate discrimination and perform poorly for underrepresented genders, eroding trust and limiting the system's reliability and fairness. The gender data gap is both about data sets that are missing women and poor quality data that reproduces harmful stereotypes about women and girls.	• Use inclusive, diverse and representative data collection methods, considering factors such as gender, race, age, and socioeconomic status. • Implement gender-sensitive data labeling and annotation practices to prevent the introduction of stereotypes and biases. • Implement data preprocessing techniques to identify and mitigate biases in the training data.
Development	• Failing to address gender biases during model development results in AI systems that make unfair decisions, reinforce stereotypes, and limit opportunities	• Employ bias detection and mitigation techniques to identify and address gender biases in algorithms • Use fairness-aware machine learning approaches to mitigate biases during model training.

AI Life Cycle	What happens when GEI is not considered	Strategies for integrating GEI
	for underrepresented genders, also exposing the organization to legal and reputational risks;	• Conduct regular fairness audits and assessments to identify and address any emerging biases.
Testing and Evaluation	• Neglecting to test for gender biases can allow discriminatory AI systems to be deployed, harming underrepresented genders and undermining development goals. • Lack of gender-disaggregated evaluation metrics can mask performance disparities across different gender groups. • Failing to engage diverse gender groups in testing and evaluation can result in AI systems that do not meet the needs of all users.	• Develop comprehensive testing frameworks that include GEI-specific metrics and evaluation criteria to assess performance across different groups. • Engage diverse user groups, including underrepresented communities, in the testing and feedback process. • Conduct fairness evaluations across different demographic groups to ensure equitable performance.
Deployment	• Deploying AI systems without considering gender inequalities in access and impact can exacerbate existing disparities, leading to unequal distribution of benefits and harms, and undermining the system's social responsibility and ethical standing; • Lack of gender-responsive deployment strategies can limit the adoption and effectiveness of AI systems for underrepresented gender groups.	• Implement transparent and explainable AI techniques to enable users to understand and trust the system's decisions. • Provide clear information on the AI system's limitations, potential biases, and intended use cases. • Establish accessible feedback channels for users to report any GEI-related concerns or issues.
Maintenance, Monitoring and updating	• Failing to address evolving gender biases in AI systems over time can perpetuate and amplify discrimination, hindering progress towards gender equality. • Lack of inclusive feedback mechanisms can prevent the identification of emerging gender-related issues and concerns.	• Regularly audit the AI system's performance and outcomes for any emerging biases or disparate impacts. • Implement inclusive feedback loops to gather insights from diverse users and communities for system improvements. • Continuously update and retrain the AI models and datasets to reflect evolving gender dynamics and mitigate biases

AI Life Cycle	What happens when GEI is not considered	Strategies for integrating GEI
	• Infrequent or inconsistent updates to AI models and datasets can allow gender biases to become entrenched and more difficult to mitigate over time.	

Annex 2: Biases in the AI Lifecycle and Mitigation Techniques

AI Life Cycle	Bias type	Mitigation Techniques
Formulation	**Techno-solutionist bias** Over-reliance on high-tech solutions without considering simpler alternatives or potential social and environmental impacts.	● Analyze alternatives. ● Assess expectations of developers vs. performance in other relevant use cases; ● Check desirability and compliance ● Evaluate environmental impact. ● Study social impacts.
	Data availability/ scarcity The selected datasets are not relevant to the problem, or there is insufficient data to represent (crucial parts of) the real-world problem.	● Check available datasets for relevance. ● Assess labels and features. ● Ensure data minimization compliance. ● Consider and analyze statistical differences between groups.
	Historical bias The data used for training the AI system reflects existing social and societal biases, leading to potentially harmful outcomes.	● Perform contextual analysis and identify protected groups; ● For Natural Language Processing (NLP): validate word embeddings; ● Analyze statistical differences between groups
	Population bias	● Identify affected stakeholders and protected groups ● Check distribution differences of groups.

AI Life Cycle	Bias type	Mitigation Techniques
	The **target population** during the design phase does not represent the actual user population, leading to non-representative results.	• Perform randomization testing
Data collection	**Labeling bias** Inaccurate data labeling due to subjective perceptions.	• Use/ create labeling guidelines. • Have multiple and diverse experts label data and reach consensus. • Use a majority vote for labeling if many experts are available. • Check how labels (categories) are distributed in your data. • Review and correct labeling errors. • Consider using open-source datasets and labels that allow for crowd-verification of labelling. • Publish your own datasets & labels under open-source licenses to allow for third-party checks, corrections, and crowdsourcing of improvements.
	Sampling/ generalization bias Non-random or uneven sampling leading to unrepresentative data.	• Address issues in data collection method, e.g. for questions where people are hesitant. • Compare and contrast data from different sources. • Use probabilistic matching and individual reference identifiers for dataset harmonization. • Minimize likelihood for recall bias through survey design. • Distribute surveys evenly, account for under-sampled groups.
	Survey bias	• Address issues in data collection method, e.g. for questions where people are hesitant.

AI Life Cycle	Bias type	Mitigation Techniques
	Inaccurate, incomplete, or inconsistent data from surveys or interviews.	- Compare and contrast data from different sources. - Use probabilistic matching and individual reference identifiers for dataset harmonization. - Minimize likelihood for recall bias through survey design. - Distribute surveys evenly, account for under-sampled groups
	Survivorship bias Only considers data that 'survived' or remained till the end, ignoring the ones that did not. This could lead to overestimating the 'survived' data.	- Collect and record all relevant information. - Work with confidence intervals in your data analysis. - Check how labels (categories) are distributed in your data. - Consider open-source datasets, see above.
In-Processing	**Over- and underfitting** Overfitting (or high variance): occurs when an AI model is excessively complex. It fits the training data too well but performs poorly on new data. Underfitting (or high bias): occurs when an AI model is overly simplistic. It can neither model the training data nor generalize to new data.	- Introduce penalties for complex models to prevent overfitting. - Obtain more diverse data or reduce reliance on insufficient data. - Adjust model complexity based on data patterns. - Optimize model constraints during training to balance bias and variance.
	Measurement bias	Ensure that testing conditions align with real-world scenarios, including the resolution of measurement tools.

AI Life Cycle	Bias type	Mitigation Techniques
	Arises from a mismatch between training data types/tools and actual target data.	• Capture data more frequently to account for variations. Avoid relying on infrequent measurements. • Test in lab and real settings before launch
	Hot hand / Gambler's fallacy Arises when assuming a model will continue to perform well based solely on past success, without proper re-evaluation or testing.	• Reassess ground truth, variables and measurements before launch of major system updates. • Check for recent event/dynamics that may impact model performance and impacts.
	Aggregation bias Occurs when a model is suboptimal or biased toward a specific (e.g. dominant) subgroup in the data. This leads to incorrect conclusions about the group more generally.	• Check for differential performance across groups. • Calculate results/rates for each protected group identified in pre-processing. • Calculate and document impact ratio per group (results for protected vs results for most salient group) and individuals (results for individuals of a protected group vs. results for individuals in the most salient group). • Define/validate fairness definitions and metrics.
In-Processing	**Deployment bias** Occurs when organizational, budgetary, technical, or training issues impact outputs of the AI system, potentially influencing those affected by the decisions.	• Assess model performance in the real-world context. • Incorporate human oversight and ethical considerations throughout the deployment process. • Update AI system based on feedback from continuous auditing.

AI Life Cycle	Bias type	Mitigation Techniques
	Benchmark test bias This bias occurs when a model's quality is judged solely on its performance on specific benchmark datasets.	• Consider alternative metrics and evaluation criteria beyond accuracy. • Validate model performance across diverse datasets and conditions to ensure generalizability beyond specific benchmarks.
	Automation bias Human tendency to favor suggestions from automated (or popular) systems, possibly ignoring correct but contradictory non-automated information.	• Staff and user training and easy-to-find information on possible limitations of the system. • Clear attribution of roles and responsibilities for humans and AI systems. • Establish documented procedures that justify and validate any human intervention, ensuring equal accountability for accepting or rejecting algorithmic decisions.
	Visualization bias This bias is introduced through the Framing Effect, where the way options are presented can influence decisions. Related biases include dark patterns or marketing, availability bias, anchoring bias, and signal error, which may result from how data is visualized and interpreted.	• Awareness and education: Ensure that individuals who oversee data are aware of visualization biases and cognitive effects. • At a more technical level: causal methods (like directed acyclic graphs) may provide a more nuanced understanding of data.