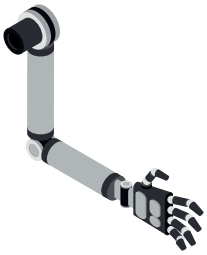
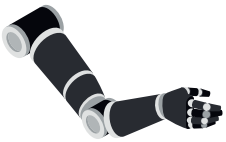
AI ASSISTIVE TECHNOLOGIES (ATS) FOR PERSONS WITH DISABILITIES (PWDS) IN AFRICA

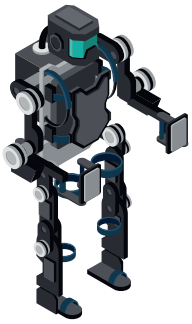
REPORT BY;
JOSEPHINE KAANIRU

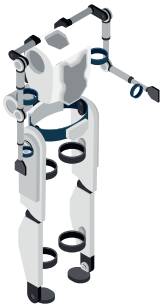
Strathmore University

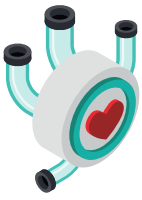
Centre for Intellectual Property and Information Technology Law







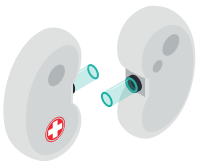



TABLE OF CONTENTS

1. Introduction

Disability refers to the various restrictions and limitations individuals face due to bodily structures, which affect their health and complex interactions with their environment.[1] The World Health Organisation (WHO) estimates that about **15%** of the world population deals with some disability.[2] In Africa, **10-20 percent** of the population has a disability.[3] Even with increased Information and Communications Technology (ICT) penetration in Africa, a large section of persons with disabilities (PWDs) face barriers to digital accessibility as a result of inadequate infrastructure, lack of proper accessibility features for PWDs, and high costs of Assistive Technologies and other mainstream technologies, which exacerbates the marginalization and exclusion they encounter.[4] Therefore, it is crucial to examine the various AI Assistive Technologies (ATs) developed in Africa and the challenges facing the development and adoption of these tools.

15% of the world population deals with some disability.

Different classes of persons with disabilities face various accessibility barriers in their physical and digital environments, requiring various assistive modifications. For instance, deaf persons experience challenges ranging from hard of hearing to deafness and deaf-blindness, which complicates their experience with audio technologies. They rely on modifications such as audio captions, transcripts, and live sign language interpreters.[5]

In Africa, 10-20 percent of the population has a disability.

WHO

1 'Disabilities' (WHO | Regional Office for Africa) <https://www.afro.who.int/health-topics/disabilities>.
2 'LWL #30 AI and ML for People with Disabilities: Innovations and Challenges' (Data-Pop Alliance23 August 2021) <https://datapopalliance.org/lwl-30-ai-and-ml-innovations-for-people-with-disabilities/>.
3 Marianne JWA Vanderschuren and Obiora A Nnene, 'Inclusive Planning: African Policy Inventory and South African Mobility Case Study on the Exclusion of Persons with Disabilities' (2021) 19 Health Research Policy and Systems <https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-021-00775-1> accessed 4 January 2022.
4 CIPESA, 'CIPESA Working on Advancing Digital Inclusion for Persons with Disabilities in Africa' (Collaboration on International ICT Policy for East and Southern Africa (CIPESA)3 December 2021) <https://cipesa.org/2021/12/cipesa-working-on-advancing-digital-inclusion-for-persons-with-disabilities-in-africa/#:~:text=Despite%20growth%20in%20Information%20and> accessed 08 September 2023.
5 'NC DHHS: Assistive Technology for the Deaf and Hard of Hearing' (www.ncdhhs.gov) <https://www.ncdhhs.gov/divisions/services-deaf-and-hard-hearing/assistive-technology-deaf-and-hard-hearing>.

On the other hand, people who are blind experience reduced vision perception, which can range from moderate blindness to total blindness or color blindness, necessitating technological modifications allowing for adjustable color and text size, a variety of fonts and images to suit their visual ability, text-to-speech synthesis, audio descriptions, and Braille.[6] Persons with cognitive disabilities are those experiencing intellectual, learning, and neurological challenges, and their experience using technology relies heavily on well-structured and labeled content, and interaction supplemented by images, graphs, and other illustrations.[7] Finally, persons with physical disabilities may experience difficulties walking, standing, sitting, moving hands and arms, and controlling muscles, leading to accessibility barriers in physical environments.[8] Assistive technology solutions enable them to have automated mobility and the ability to voice commands to perform tasks at home, such as switching on devices, making phone calls, and drafting messages.

Assistive Technologies (ATs) are the various tools, devices, software, or equipment designed to assist individuals with disabilities in performing tasks, improving their functional capabilities, and enhancing their overall independence when interacting with physical and digital environments.[9] These resources bridge the gap between a person's abilities and the demands of their environment by enhancing communication, mobility, environmental control, and adaptive living. AI assistive technologies combine machine learning, AI algorithms, and natural language processing to provide real-time object recognition and navigation assistance for people who are blind, hearing aids, customized education for persons with cognitive disabilities, and improved speech recognition systems for text-to-speech conversion, among other modifications.[10]

The rise of Machine Learning (ML) and Artificial Intelligence (AI) usage in Africa presents an opportunity to enhance the lives of Persons with Disabilities (PWDs) by improving their ability to communicate, move, live independently, and have equal access to digital services.[11] Unfortunately, datasets on which AI systems are trained are often infected with bias against underrepresented communities, including women, racial minorities, and PWDs.[12] As a result, in hiring and other automated decision-making processes, PWDs missing in the history of companies' successful recruitments are deemed unqualified by AI systems.[13] Such biases

6 Carole Martinez, 'Artificial Intelligence Enhances Accessibility for People with Disabilities' (Inclusive City Maker5 March 2021) <https://www.inclusivecitymaker.com/artificial-intelligence-accessibility-examples-technology-serves-people-disabilities/>.
7 Ibid
8 Ibid

9 Clara Aranda-Jan, 'Opportunities for Digital Assistive Technology Innovations in Africa and Asia' (GSM2020) <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/07/GSMA_ATInnovation-Landscape_28pp_FINAL_Accessible_WEB.pdf> accessed 27 June 2023.
10 Maurício Pasetto de Freitas and others, 'Artificial Intelligence of Things Applied to Assistive Technology: A Systematic Literature Review' (2022) 22 Sensors 8531 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9658699/>.
11 Ibid n 2
12 'Shrinking the "Data Desert": Inside Efforts to Make AI Systems More Inclusive of People with Disabilities' (Source2020) <https://news.microsoft.com/source/features/diversity-inclusion/shrinking-the-data-desert/> accessed 9 June 2023.
13 Jessica Hallman, 'AI Language Models Show Bias against People with Disabilities, Study Finds | Penn State University' (www.psu.edu2022) <https://www.psu.edu/news/information-sciences-and-technology/story/ai-language-models-show-bias-against-people-disabilities/>.

affect their eligibility for social services, determination of health insurance costs, and many other areas where machines play roles in deciding critical aspects of our lives.

Over **80%** of persons with disabilities live in low and middle-income countries (LMICs)[14], where Assistive Technologies are not readily available.[15] Research indicates that many persons with disabilities face barriers when interacting with government websites in the era of e-government. These barriers increase exclusion against persons with disabilities by denying them proper access to government websites, resulting in increased economic and social inequality. This was noted in Kenya with the onset of COVID-19, when most government and other services were transferred online.[16] Secondly, AI models used in automated decision-making may misread cues from persons with disabilities as they are trained on datasets that do not represent persons with disabilities. They may misread the actions of people on the autism spectrum or make it impossible for people with amputated limbs to indicate gestures.[17] Hence, as technology advances in the Fourth Industrial Revolution (4IR), it is essential to ensure that persons with disabilities are recognized by technology, either through pertinent accessibility features or ATs.

This report maps the various AI Assistive Technologies that improve accessibility for persons with disabilities in Africa and analyses the challenges impeding the development and adoption of these ATs in Africa, including the lack of representative datasets to train AI models, proper policy safeguards, digital skills gaps, and lack of funding for AT projects. Finally, the report recommends steps to overcome these bottlenecks to achieve widespread deployment and use of ATs in African countries.

Over 80% of persons with disabilities live in low and middle-income countries (LMICs)

14 Ashrita Saran, Howard White and Hannah Kuper, 'PROTOCOL: Effectiveness of Interventions for People with Disabilities in Low and Middle Income Countries—an Evidence and Gap Map' (2019) 15 Campbell Systematic Reviews <https://onlinelibrary.wiley.com/doi/10.1002/cl2.1006>accessed 28 September 2023.
15 Ibid n 4
16 kictanetadmin, 'ICTs Access and Equality for Persons with Disabilities (PWDs) in Kenya | KICTANet Think Tank' (KICTANet3 August 2022) <https://www.kictanet.or.ke/icts-access-and-equality-for-persons-with-disabilities-pwds-in-kenya/> accessed 9 June 2023.
17 Ibid n 5

2. A Mapping of AI Assistive Technologies Used in Africa

2.1 AI Assistive Technologies developed in Africa

Research indicates that innovative digital ATs are being developed in Africa, but many are at an early development stage and face sustainability challenges.[18] There is innovation in ATs in Egypt, Ghana, Kenya, and South Africa, while most other African countries have no notable development nor use of these tools.[19] For example, the ShazaCin App in South Africa is a visual assistance application that provides audio descriptions of media for blind persons and those with cognitive disabilities and learning disorders.[20] Abena AI serves the same purpose in Ghana as a hands-free offline voice assistant.[21] This application is available in the local Twi language, allowing many users to access it. The IXAM platform also originates from Ghana and uses voicing and text recognition to help blind students access past exam questions for revision.[22] Finally, the Egyptian e3rafli Magnifier and Reader are connected to an AI-enabled image recognition database to view and identify objects on behalf of blind individuals.[23]

AI Assistive Technologies designed on the continent aid deaf individuals by providing sign language interpretation to create a visual representation of information. For instance, the AI4KSL (Kenya) project designed an assistive AI tool for Kenyan Sign Language (KSL) to translate spoken English to KSL for deaf people. This application uses virtual signing characters to achieve this, promoting inclusion for deaf individuals interacting with digital devices (AI4D, IDRC).[24] Senso, a wearable bracelet developed in South Africa, gives deaf individuals alerts to specific sounds, such as a crying baby, using sound identification and radio frequency.[25]

People with physical disabilities also benefit from assistive technologies that improve mobility and task performance. The Walk Again Project in Nigeria produces customized and affordable 3D-printed prosthetic legs for upper and lower-level amputees. The Walk Again Project is a collective of researchers who aim to utilize the Brain-Machine Interface (BMI) to enable individuals with mobility challenges to move by integrating robotic devices such as prosthetic legs with the nervous system.[26] In addition, the Cure Bionics project based in Tunisia increases mobility for persons with

18 Clara Aranda-Jan, 'Opportunities for Digital Assistive Technology Innovations in Africa and Asia' (2020) <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/07/GSMA_ATInnovation-Landscape_28pp_FINAL_Accessible_WEB.pdf>.
19 Ibid n 4
20 '» Shazacin' (Shazacin) <https://shazacin.com/>.
21 Sultan Quadri, 'Abena, a Voice Assistant, Wants to Preserve African Languages' (TechCabal17 June 2022) <https://techcabal.com/2022/06/17/africas-first-voice-assistant-abena-is-the-latest-effort-in-preserving-the-continents-languages/> accessed 19 August 2023.
22 Clara Aranda-Jan, see n 17
23 Ibid

24 'Stakeholders Workshop on AI4KSL: Bridging Language Barrier Using Artificial Intelligence for Kenyan Sign Language among Deaf Learners. | Maseno University - Fountain of Excellence' (www.maseno.ac.ke2022) <https://www.maseno.ac.ke/stakeholder-workshop-ai4ksl-bridging-language-barrier-using-artificial-intelligence-kenyan-sign> accessed 21 August 2023.
25 Clara Aranda-Jan, see n 17
26 'The Walk Again Project' (The Walk Again Project) <https://www.walkagainproject.org/>.

physical disabilities by creating bionic limbs and exoskeletons using 3D printing and AI.[27]

Finally, the AIMHAfrica project was created for cognitive assistance in Sierra Leone. It is an AI-powered app that provides personalized mental health support to people with disabilities in Africa.[28]

In many African countries, there are no ATs developed or in the development phase, indicating barriers to innovation such as the lack of commercial incentives, lack of proper policy guidelines, digital skills gaps, and lack of funding curtailing their development.[29] Large technology companies outside Africa have developed most AI assistive tools utilized on the continent, which PWDs access through the integrated smartphones.

2.2 AI Assistive Technologies Developed Outside Africa

African persons with disabilities primarily utilize assistive technologies created by companies outside Africa since most of these applications are integrated into mobile and desktop devices. Apart from Be My Eyes, RogerVoice, and Wheelmap, which originate from Denmark, France, and Germany, respectively, the mapped tools below are developed by American companies, such as the technological giants Microsoft, Amazon, and Google.

Particularly, blind users can benefit from Lookout by Google, an application that narrates immediate surroundings in real time when the user points the camera at their environment. The project utilizes AI algorithms to achieve environmental relevance to identify items specific to 'home,' 'work,' and 'play' modes.[30] The application also lets users quickly skim through text using its Quick Scan Mode.[31] Seeing AI by Microsoft performs a similar purpose as it narrates the environment, scans barcodes, and recognizes images from other apps on behalf of users. Seeing AI can also read documents on behalf of users.[32] Additionally, Soundscape describes surroundings for blind people using audio 3D technology, enabling users to be aware of their surroundings, points of interest, and intersections to enjoy their cities and surroundings conveniently. Be My Eyes is another assistive tool for people who are blind, as it connects them with normal-sighted volunteers to help through real-time smartphone video streaming.[33] There are also applications such as VoiceOver and Talkback, which are IOS and Android screen readers respectively, that can read out the contents of a screen on behalf of a blind person. Finally, digital assistants such as Siri, Cortana, Alexa, and Google Assistant use their voice control capabilities to perform tasks such as sending messages and making calls on behalf of persons with disabilities.

Deaf individuals can utilize Livio AI, a hearing aid that uses integrated sensors and AI to track the user's physical activity

27 'Cure Bionics - Tech2impact' (tech2impactMay 2020) <https://tech2impact.com/startups/cure-bionics/> accessed 19 August 2023.
28 'AT Village | Inclusive Africa Conference 2023' (www.inclusiveafrica.org2022) <https://www.inclusiveafrica.org/at_village> accessed 19 August 2023.
29 Ibid n 4

30 Carole Martinez, 'Artificial Intelligence Enhances Accessibility for People with Disabilities' (Inclusive City Maker5 March 2021) <https://www.inclusivecitymaker.com/artificial-intelligence-accessibility-examples-technology-serves-people-disabilities/>.
31 Ibid
32 Ibid
33 Ibid

and cognitive health. The hearing aid also enables language translation, fall detection and alerts to family members, and tap control to allow the deaf user to use it conveniently.[34] Additionally, RogerVoice uses voice recognition technology and speed synthesis to make calls and provide real-time transcriptions. At the same time, Ava performs similar tasks since it uses AI for accurate real-time transcription. Ava also has features enabling the deaf user to add punctuation, include the speaker's name, and use the user's vocabulary through a dictionary feature.[35]

The German company Sozialhelden e.V. has developed Wheelmap, an assistive tool for physical assistance that allows users to identify wheelchair-accessible places on a virtual map, such as restaurants, shops, parking lots, and bus stops.[36] Project Guideline by Google also aims to guide blind people to run independently.[37] These physical accessibility projects allow people with physical disabilities to navigate their environments conveniently by identifying areas with accessibility features.

Furthermore, applications such as Otter Voice Meeting Notes are made for people with cognitive disabilities to enable them to engage in their environments, meetings, and interactions.[38] It is an AI app for real-time transcription and collaboration, allowing individuals with cognitive challenges access to the learning environment through note-taking.

Finally, the Speechify Text Reader turns text into audiobooks for the visually impaired and those with learning disabilities, enabling them to interact with meetings, school, and other text-based content.[39]

34 Ibid
35 Ibid
36 'About Wheelmap – Wheelmap.org' (Wheel Map) <https://news.wheelmap.org/en/about-wheelmap/>.
37 Xuan Yang, 'Project Guideline: Enabling Those with Low Vision to Run Independently' (blog.research.google18 May 2021) <https://blog.research.google/2021/05/project-guideline-enabling-those-with.html> accessed 1 September 2023.
38 'Otter for Personal Use - Real-Time Notes & Transcription | Otter.ai' (otter.ai) <https://otter.ai/individuals> accessed 1 September 2023.

39 'Text to Speech Online: 100+ Realistic TTS Voices & Accents' (speechify.com3 June 2022) <https://speechify.com/text-to-speech-online/?landing_url=https%3A%2F%2Fspeechify.com%2Ftext-to-speech-online%2F&via=free&source=fb-for-mobile&gclid=CjwKCAjw3dCnBhBCEiwAVvLcu4lm8DBpGEjggzPKs9UdRCjZcvO9pAnP5zYN9wJMGoMh2l892r898BoCBZYQAvD_BwE> accessed 1 September 2023.

3. Challenges Facing the Development of AI Assistive Technologies in Africa

3.1 African Data Deserts

In many African regions, there is a lack of comprehensive and representative datasets for various disabilities (and in local languages) making it challenging to develop AI assistive tools that cater to the specific needs of local populations.[40] AI models, including those used in assistive technologies, rely heavily on large and diverse datasets for training. Africa's lack of structured data ecosystems can impede the development and implementation of AI-powered solutions, further exacerbating the digital divide that affects marginalized groups such as PWDs.[41]

Big technology corporations with a global reach often have the required large quantities of data at their disposal, increasing their advantage in the development of AI systems as compared to smaller market players.[42] At the same time, startups and individual developers cannot create or purchase these datasets, due to limited resources.[43] Large companies are also more likely to have the infrastructural and technical capability to collect and conduct large-scale data analysis.[44] As such, African startups creating AI solutions heavily rely on these big players with access to large datasets, such as Google and Microsoft.[45] Therefore, Africa must address data accessibility challenges by building a local data infrastructure and a proper policy framework for a democratized access to datasets.[46]

3.2 Inadequate Funding for AI Assistive Applications

At least 43% of Assistive Technologies in Low- and Middle-income Countries (LMICs) are created by startups.[47] These startups often lack access to early-stage seed funding, while some find initial financing from international donors or government grants.[48] The shortage of venture capital investments for assistive technologies hinders initial development and exacerbates sustainability issues, suspending valuable projects that cannot mitigate market risks.[49]

3.3 Digitalization and Digital Skills Gaps

Digital skills literacy is a huge barrier to the general implementation of AI in Africa.[50] Sub-Saharan Africa has the

40 Qondi Moyo, 'AI Is Here to Stay! How Artificial Intelligence Can Contribute to Economic Growth in Africa - World | ReliefWeb' (reliefweb.int23 June 2023) <https://reliefweb.int/report/world/ai-here-stay-how-artificial-intelligence-can-contribute-economic-growth-africa>.
41 Ibid
42 'HOUSE of LORDS Select Committee on Artificial Intelligence Report of Session 2017-19 AI in the UK: Ready, Willing and Able?' (2018) <https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf>.
43 Ibid
44 Ibid
45 Kofi Yeboah, 'Artificial Intelligence in Sub-Saharan Africa: Ensuring Inclusivity' (2021) <https://paradigmhq.org/wp-content/uploads/2022/05/AI-Research-Report.pdf> accessed 29 June 2023.
46 Ibid
47 Clara Aranda-Jan, see n 17
48 Ibid
49 Ibid
50 Kutoma Wakunuma and others, 'Responsible AI, SDGs, and AI Governance in Africa' (IEEE Xplore 1 May 2022) 1 <https://ieeexplore.ieee.org/document/9845598> accessed 21 April 2023.

lowest number of individuals with digital skills as compared to the rest of the world. Notably, Nigerian, Kenyan and South African individuals possess the highest level of digital skills on the continent.[51] This could explain the prevalence of AI Assistive Technologies in these three as compared to other African countries. Even though AI adoption is increasing in Africa, there is still a minimal number of local talent to develop AI applications.[52] In response, large technology companies such as Amazon, Google, IBM and Microsoft have established research and data centres in Africa. Unfortunately, existing talent gaps lead to displacement of African workforces, since foreigners or those privileged enough to receive relevant training fill the workforce gaps.[53]

Persons with disabilities are less likely to own a mobile phone than those without disabilities.[54] Even though many PWDs in Kenya own mobile phones, over 70% own a feature phone.[55] As most ATs are developed for smartphone functionality, feature phone users may lack access to accessibility features and assistive technologies. Additionally, a survey of specific African countries revealed that they have a lower level of digital literacy than Asian and South American countries.[56] African nations in the northern region, such as Egypt and Morocco, had more digital skills than other sampled countries, including Botswana, Cabo Verde, Djibouti, Ivory Coast, Niger, Sudan, and Zimbabwe.[57]

Digital skills gaps are also cited as one of the main reasons that PWDs do not own smartphones. Persons with disabilities surveyed in Kenya indicated that they do not hold mobile phones because they do not know how to use them.[58] Digitalisation is primarily measured through accessible digital infrastructure, the lack of which leads to digital skills gaps among populations. Therefore, the gaps witnessed among PWDs are also a result of the lack of digital infrastructure in many African countries, which begets a lack of access to assistive technologies. Fortunately, while Africa's digital infrastructure is uneven at the country level, it has witnessed progress through increased mobile, fixed-line, and fiber-optic internet connections to homes and businesses.

3.4 Policy Challenges

African countries have made considerable efforts to create policies that are in line with protecting the rights of persons with disabilities. Unfortunately, these policies remain unimplemented, leaving PWDs unserved in today's digital economies.[59] During the COVID-19 pandemic, governments and telecommunications companies promoted digitalization. However, they often neglected to incorporate essential accessibility

51 Ibid
52 Ibid
53 Ibid
54 Clara Aranda-Jan and Alizee Boutard, 'Understanding the Mobile Disability Gap Insights on Mobile Phone Access and Usage by Persons with Disabilities in Kenya and Bangladesh' (2019) <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/12/GSMA_Understanding-the-mobile-disability-gap_116pg_Accessible.pdf>.
55 Ibid
56 Haroon Bhorat and others, 'Digitalization and Digital Skills Gaps in Africa: An Empirical Profile' (Brookings30 May 2023) <https://www.brookings.edu/articles/digitalization-and-digital-skills-gaps-in-africa-an-empirical-profile/> accessed 19 August 2023.
57 Ibid
58 Clara Aranda-Jan and Alizee Boutard, see n 49
59 'Placing ICT Access for Persons with Disabilities at the Centre of Internet Rights Debate in Kenya' (Collaboration on International ICT Policy for East and Southern Africa (CIPESA)11 September 2019) <https://cipesa.org/2019/09/placing-ict-access-for-persons-with-disabilities-at-the-centre-of-internet-rights-debate-in-kenya/> accessed 10 September 2023.

features, making it challenging for Persons with Disabilities to engage with digital platforms effectively.[60]

Some LMICs have made considerable efforts to implement the vision of the United Nations Convention on the Rights of Persons with Disabilities (CRPD). The Convention grants PWDs the right to access information through different mediums, including ICTs.[61] It also contains various principles such as non-discrimination, equality of opportunity, accessibility, and respect for the diversity of PWDs.[62] The Convention defines discrimination against PWDs to include the denial of reasonable accommodations, which are the modifications necessary to enable PWDs to access their human rights at the same level as the rest of society.[63] Finally, the Convention commits to providing quality and affordable assistive technologies.[64]

In recognition of the spirit of the UN CRPD, Kenya's National ICT policy aims to promote an ICT environment accessible for PWDs.[65] In that regard, the government undertakes the design, development, and distribution of accessible ICT systems while requiring private players to make necessary accessibility modifications for their products and services.[66] Additionally, the Access to Information Act[67] as well as the Kenya Standards for Accessibility of ICT products and services (KEBS) direct that information be disseminated, considering the need to reach persons with disabilities.

South Africa and Egypt have also established policies to increase accessibility for persons with disabilities, with the South Africa Information and Communication Technology Research, Development & Innovation Strategy (2015) establishing ICT for Disability as a distinct research domain. The Egyptian Constitution guarantees PWDs access to human rights and reasonable modification of facilities to accommodate their needs. At the same time, Law No. 10 of 2018 on Persons with Disabilities focuses on issues surrounding children with disabilities, such as ensuring they are adequately educated.[68] Ghana's Constitution also recognizes PWDs and spells out their rights, such as non-discrimination and equal access.

These legal and policy frameworks concerning Persons with Disabilities primarily adopt a biomedical perspective, overlooking crucial social and technological aspects of the challenges these individuals face.[69] The policies focus on enabling PWDs to adjust to normal society through skills training to increase their employment opportunities, even though governments are slow in setting up the promised training structures. Finally, policies have failed to consider the value of ATs to persons with disabilities and were unable to put in place the necessary implementation measures for ATs.

60 Ibid
61 United Nations Convention on the Rights of Persons with Disabilities (UN CRPD), Article 9
62 UN CRPD, Article 3
63 UN CRPD, Article 2
64 UN CRPD, Article 20
65 The Kenya National ICT Policy
66 Ibid
67 Access to Information Act 2016, section 5(2)

68 The Constitution of Egypt, 2014, Article 81
69 Joseph Ocran, 'Exposing the Protected: Ghana's Disability Laws and the Rights of Disabled People' (2019) 34 Disability & Society 663 <https://www.tandfonline.com/doi/pdf/10.1080/09687599.2018.1556491#:~:text=In%202006%2C%20the%20Persons%20with,%2C%20employment%2C%20education%20and%20transportation.> accessed 1 September 2023.

4. Recommendations on AI Assistive Technologies

i. Create AT-Specific National Policies

African states must develop policies to specifically create and improve assistive technologies for users and their caregivers.[70] About 1 billion people need access to assistive technologies today, with this figure predicted to double by 2050.[71] Thus, countries must develop these policies to address challenges such as design support, funding, and incorporating these tools in the healthcare sector. For instance, AT policies can provide tax exemptions for projects creating these technologies. The policies can also include proper procurement procedures to ensure that assistive tools are effective and safe. Such specific policies also promise to reduce dataset access challenges for startups, as they would create guidelines to improve data democratization among stakeholders. Finally, a national AT body could be established in policy to provide resources and technical support for stakeholders and to consult with PWD groups to ensure their inclusion in the creation of ATs.

ii. Develop Appropriate Data Infrastructure and Data Localization Mechanisms

Africa has a diverse group of languages, cultures, skillsets and traditions, necessitating the development of projects reflecting this diversity. Many AI systems are initially trained in dominant languages like English, which may not benefit all Africans, especially those who do not speak English. Projects like Abena AI have demonstrated the ability to develop assistive technologies operating in local languages such as the Ghanaian language, Twi.[72] Tailoring AI models to African countries' specific needs and cultural contexts is essential to adapting technology to work effectively.[73]

Furthermore, African countries must adopt mass data storage and computing infrastructure to accommodate the large volumes of data required for developing and training AI assistive systems to ensure that they work with the best data collection mechanisms that accurately reflect the realities of Africans.[74] The continent must adopt data governance best practices and collaborate with external partners to improve access to relevant datasets for those who need it to innovate, such as local startups and

70 World Health Assembly Resolution WHA71.8
71 Ibid

72 'Meet the Founder of Africa's Latest Voice Assistant Abena' (POCIT. Telling the stories and thoughts of people of color in tech.19 June 2022) <https://peopleofcolorintech.com/interview/meet-the-founder-of-africas-first-voice-assistant-abena/#:~:text=%22Abena%20AI%22%20is%20a%20hands> accessed 1 September 2023.
73 Bhorat, see n 51
74 Ibid

individual innovators.[75]

iii. Increase funding and investment in ATs.

Investment in research and development is critical for driving innovation and fostering the growth of AT development in Africa. However, the continent lags in this area, with limited funding for such projects.[76] To overcome this challenge, African governments must develop innovative financial instruments to fund AT development. Policies should allocate funding for these technologies as part of their mission to improve accessibility for persons with disabilities. Government-issued tax exemptions on AT projects would also encourage investors to fund them and ensure their sustainability. Lastly, public authorities must create partnerships with civil society and the private sector to secure continued funding for the development of ATs.

iv. Bridge the Digital Gap

Robust digital infrastructure is the backbone of the general digital ecosystem, as it allows the creation and use of digital skills. Therefore, African governments must prioritize expanding broadband and mobile internet accessibility at affordable rates to benefit PWDs. Moreover, when devising digital infrastructure plans, it is imperative to integrate Assistive Technologies with a holistic view of the broader population context to enhance accessibility.[77]

- **Countries must develop these policies to address challenges such as design support, funding, and incorporating these tools in the healthcare sector.**
- **Tailoring AI models to African countries' specific needs and cultural contexts is essential to adapting technology to work effectively.**
- **African governments must develop innovative financial instruments to fund AT development.**
- **African governments must prioritize expanding broadband and mobile internet accessibility at affordable rates to benefit PWDs.**

75 Clara Aranda-Jan and Alizee Boutard, see n 49
76 Moyo, see n 39
77 Bhorat see n 51

5. Conclusion

The development of Assistive Technologies is a crucial step in improving accessibility for PWDs. The AT tools mainly used on the continent originate from large Western technology companies, while startups primarily design those developed locally. In many African countries, there were no ATs reported due to various challenges such as lack of funding, lack of adequate representative data, lack of AT-specific policies, and the digital divide in terms of skills and infrastructure. It was also noted that AT tools are not incorporated into the healthcare strategy of African nations, which explains the poor accessibility.

The main challenge affecting the development of AI assistive technologies in Africa is the lack of adequate representative datasets to train AI models. Unfortunately, large technology companies have more access to these datasets, which explains the prevalence of assistive technologies mainly originating from the West on the continent. Policies on the continent grant PWDs ceremonial rights to access and non-discrimination without specific emphasis on ATs. Further, most people needing assistive tools lack access to smartphones and the internet, increasing the digital gap for PWDs. Lastly, AT projects lack initial venture capital funding, which poses challenges to the start and maintenance of the projects.

AT-specific national policies would address funding challenges, data access, and digital accessibility. These policies would create appropriate bodies to keep track of and offer technical support to AT projects, while minimizing funding challenges through tax exemptions for AT projects. Further, AT-specific policies would encourage stakeholder engagement where public authorities form partnerships with the private sector and civil society for increased funding. Data localization and infrastructure can also be aided by the creation of appropriate AT-specific national policies, as the policy would create guidelines on data-sharing among stakeholders, such that startups can access datasets managed by larger institutions and private bodies. Consequently, these policies would lead to increased development and deployment of successful assistive technology projects, increasing accessibility for persons with disabilities.

The main challenge affecting the development of AI assistive technologies in Africa is the lack of adequate representative datasets to train AI models.

This study was made possible by a grant provided by the **International Development Research Center (IDRC), SIDA,** and **Artificial Intelligence for Development Africa**. We thank the organizations for their continued support.

Strathmore University

Centre for Intellectual Property and Information Technology Law

Ole Sangale Rd, Madaraka Estate.
P.O Box 59857-00200, Nairobi,
Kenya.
Tel: +254 (0)703 034612
Email: cipit@strathmore.edu
Website: www.cipit.strathmore.edu