AI in Africa: The state and needs of the ecosystem

Diagnostic and solution set for skills

March 2024

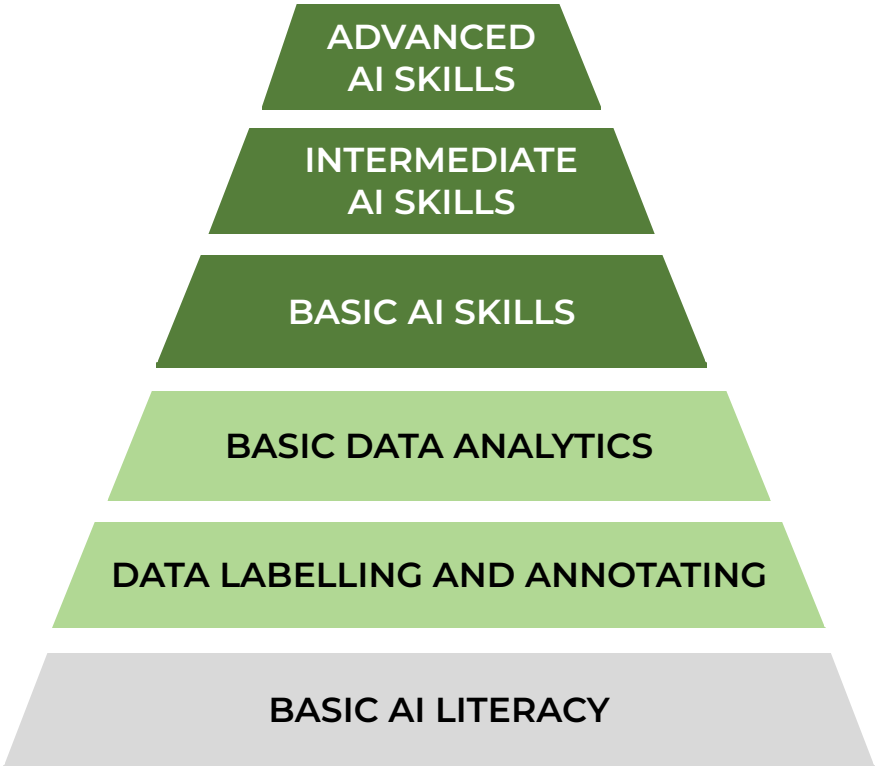
Sida IDRC · CRDI AI4D AFRICA G:ENESIS 25 YEARS OF UNLOCKING VALUE

SKILLS

WHAT IS COVERED IN THIS PACK

1. Defining an ‘AI skill sets’ within a hierarchy of technical capabilities
2. The current AI skills landscape across the continent
3. Forecasting demand for AI skills across African markets and the associated upskilling investments required
4. Suggested areas for intervention

AI skills encompass a range of capabilities, best understood in a hierarchy



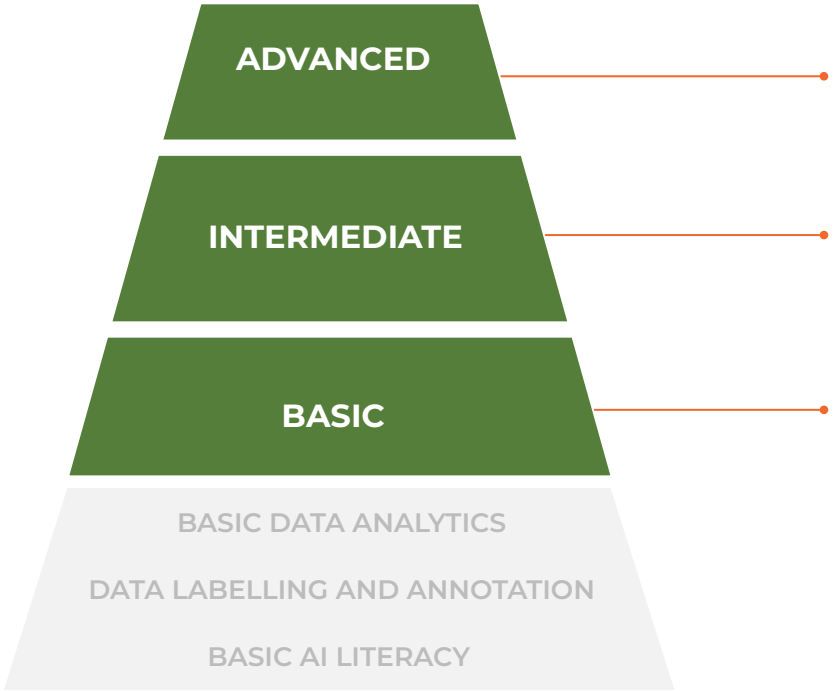
Technical skills enable individuals to actively engage in the development and application of AI e.g. theoretical understanding and ability to code

Foundational skills either support the development of AI or provide baseline technical capabilities e.g. data analytics, software development

Enabling skills allow individuals to safely use AI products e.g. knowledge of key risks *(not included in our assessment)*

Each skill level has a role to play in the overall growth of the ecosystem

Advanced AI skill are critical for deep AI innovation while intermediate skills are important for design and implementation of the technology. We think basic AI skill sets will increase demand for AI practitioners by identifying and building towards use cases where AI could be applied and then hiring intermediate and advanced skills.



'Build from scratch'
Deep expertise in AI R&D supported by advanced technical capabilities to design and deploy solutions

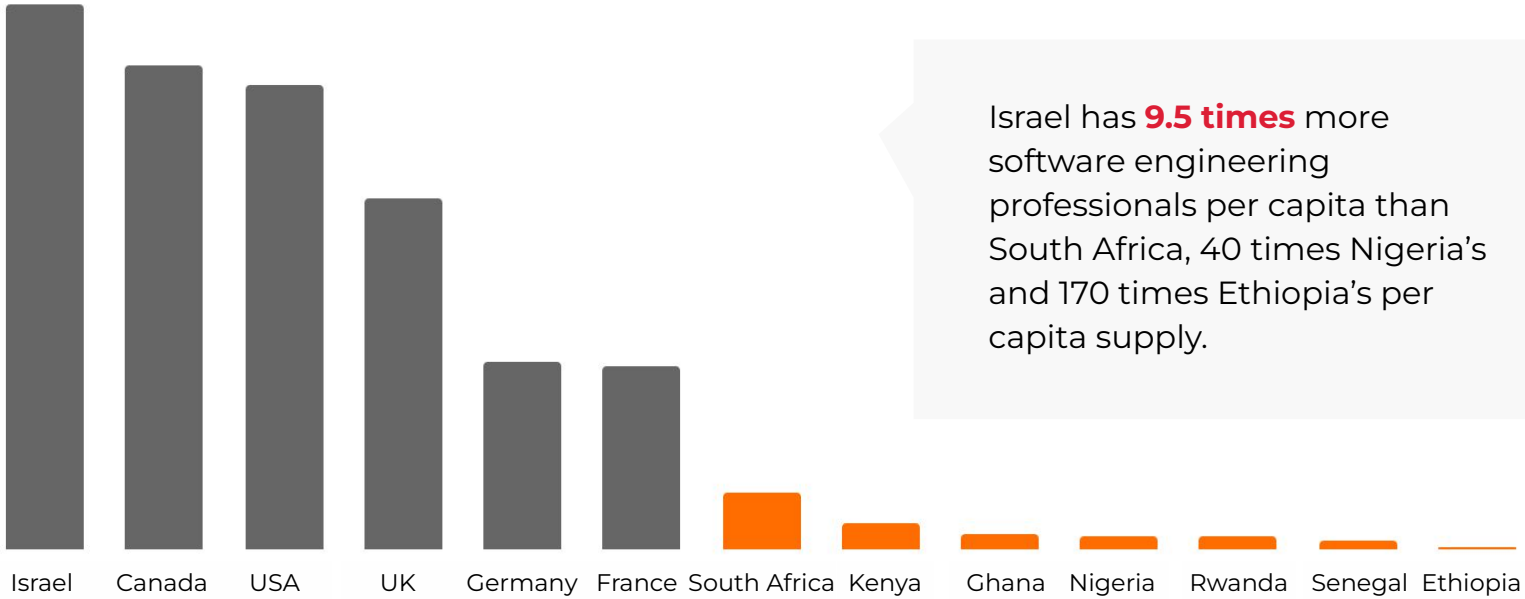
'Deploy from GitHub'
Conceptual knowledge is balanced with the technical capabilities to implement and build AI applications

'AI could work here...'
A theoretical understanding of AI product applications and design processes with basic technical abilities

African countries lag in the number of people with ICT expertise and foundational AI skills

Software engineering is a gateway skillset to machine learning and AI development. Software engineers have been used as a proxy measure for the supply of AI talent.

Software Engineers per Capita across select countries



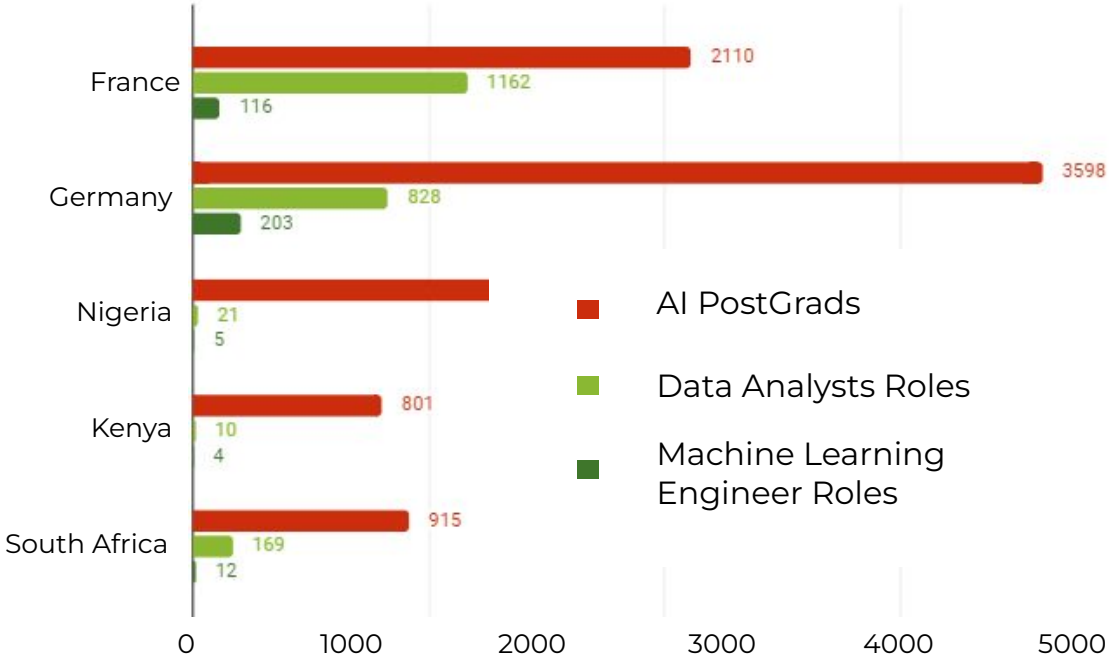
Israel has **9.5 times** more software engineering professionals per capita than South Africa, 40 times Nigeria's and 170 times Ethiopia's per capita supply.

Source: 1) Tony Blair Institute (2023) State of Compute Access; 2) World Bank Open Data (2022); Genesis own calculations

But the demand for these skills is suppressed

Comparing the number of job posts on Linkedin for entry level AI roles against the number of AI postgrads highlights the lack of demand in African markets compared to European markets.

Number of AI PostGrads compared to Data Analyst and ML Engineering roles available on Linkedin



For every:

1 Data Analyst Position

There are:

20 European AI PostGrads

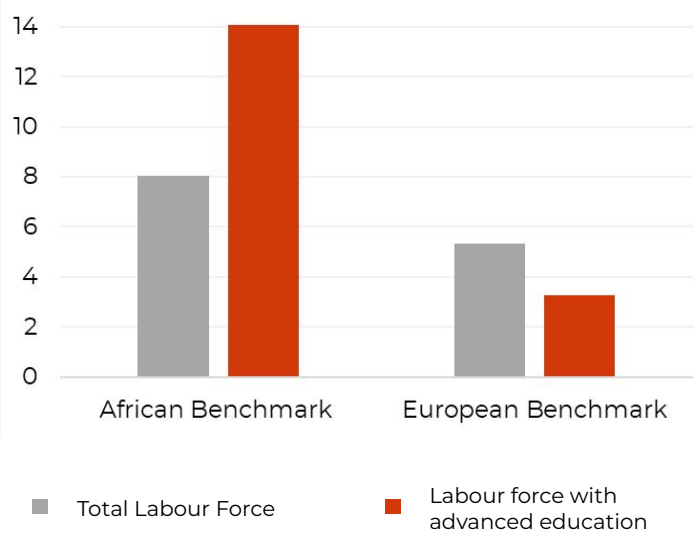
200 African AI PostGrads

Source: Genesis Analytics team analysis supported with LinkedIn Data

Suppressed demand for advanced skills drives the brain drain

Local talent is pushed overseas to seek employment opportunities, given the suppressed levels of local demand

% of labour force who are unemployed, available for and seeking employment



People with advanced education are 4x more likely to be unemployed in Africa than in Europe

70,000 Africans are lost to brain drain annually and African countries make up 50% of the top 25 countries with the highest emigration rates of tertiary graduates.

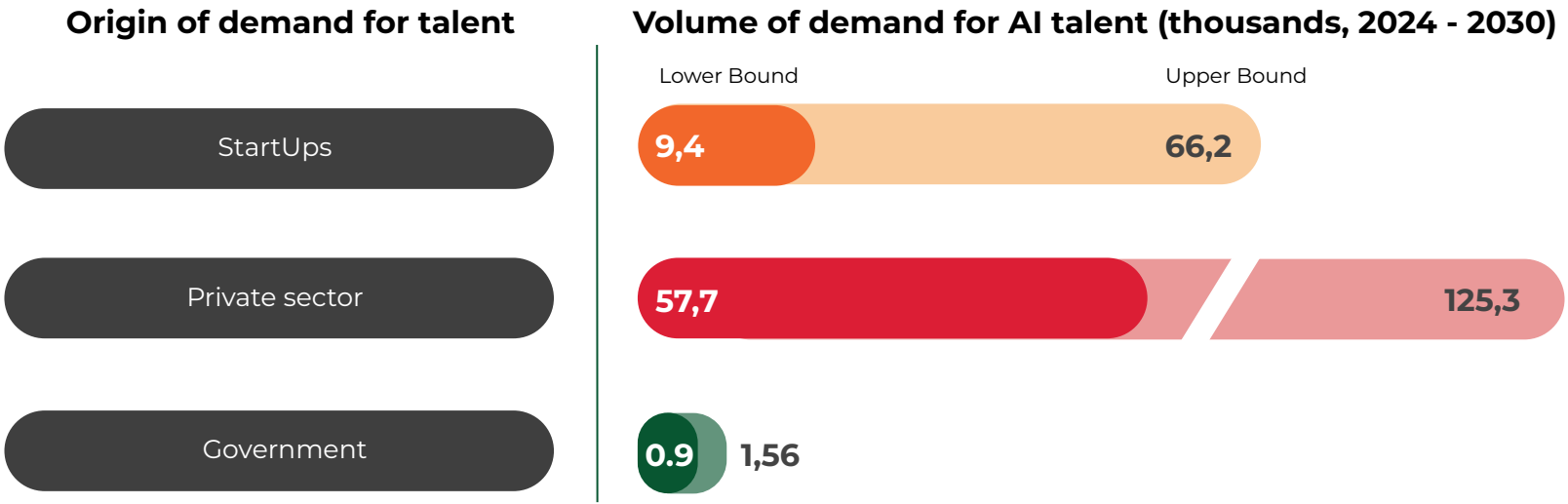
In all African countries examined, bar South Africa, the unemployment rates for university graduates is higher than total unemployment rates.

Local demand must be stimulated for African countries to benefit from the investments in advanced level education.

Source: 1. World Bank Open Data, 'European Benchmark' is average from UK, France and Germany, 2. OECD Migration Data Brief . 2019. Latest Data from DIOC (2015/2016).

Demand for AI talent is expected to be driven by the private sector

Total demand for AI talent is expected to increase by 50% to 75% by 2030, driven by the private sector. While the AI market is rapidly taking off globally, we anticipate that the large employers in Africa, SMEs and the public sector, will be slower to adopt that peers in the Global North.

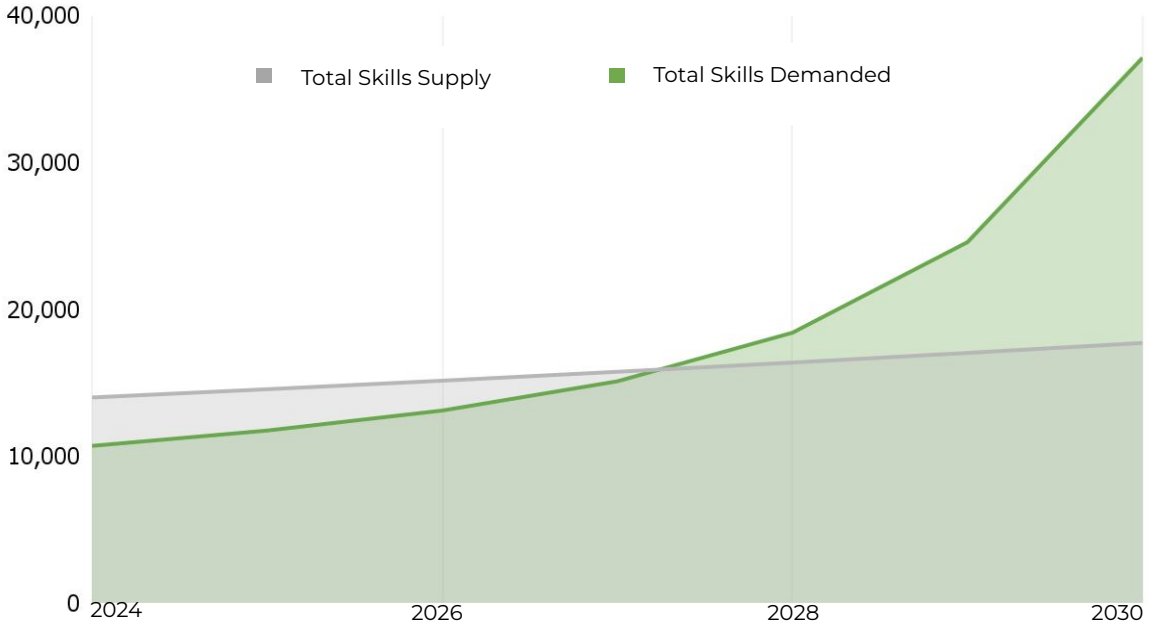


See Methodology here

Employability considerations are important when investing in skills

Estimates suggest that without demand-side intervention, the oversupply of advanced skills is likely to continue.

Total skills in demand and supply across Africa, (2024-2030)



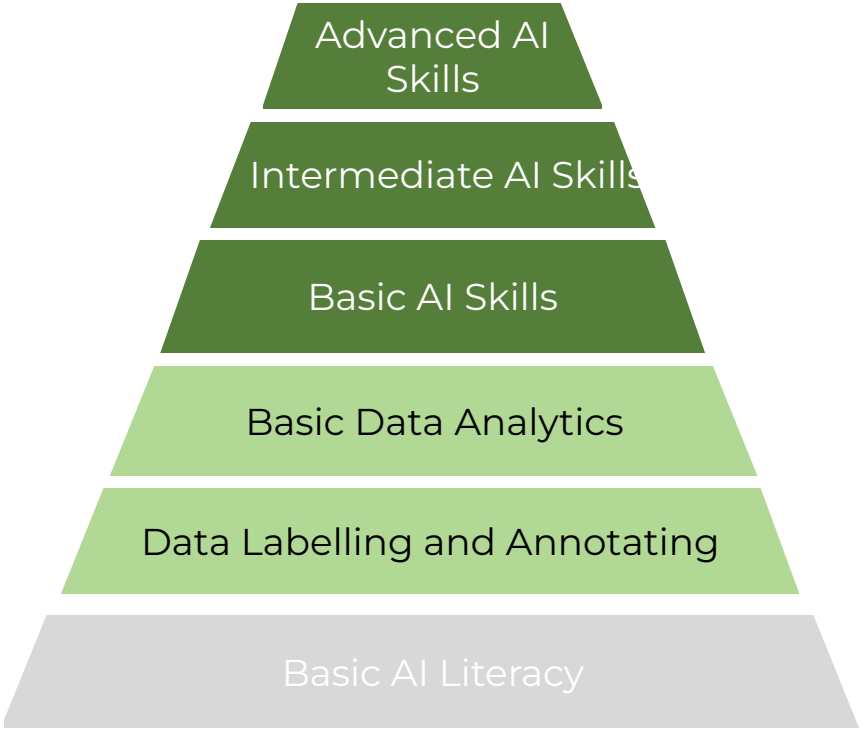
Using an average of the lower bound and upper bound scenarios for demand, and keeping the growth of AI skills supply consistent, there will be a **shortage of AI talent from 2027.**

Closing the gap, is estimated to cost **$580 million.** Under accelerated demand conditions, the gap nears $1.2 billion.

See Methodology here

Growth in the ecosystem will not be driven by advanced AI skills alone

The major gap lies in suppressed local demand for AI skills. To grow the ecosystem, the focus needs to be on cultivating talent that can identify and pursue use cases for AI applications in their businesses or government departments. Investments only in advanced skill sets are likely to add to the pools of unemployed talent.



Large investments here should be carefully considered due to the existing **brain drain.** Moreover, some evidence points to the **automation** of intermediate skills, with AI improving the productivity of 'coding' practitioners up to 70%.

These are people who can **identify use cases and applications** for AI but are unlikely to have the technical knowledge to design and implement. They will need to **employ intermediate and advanced AI talent.**

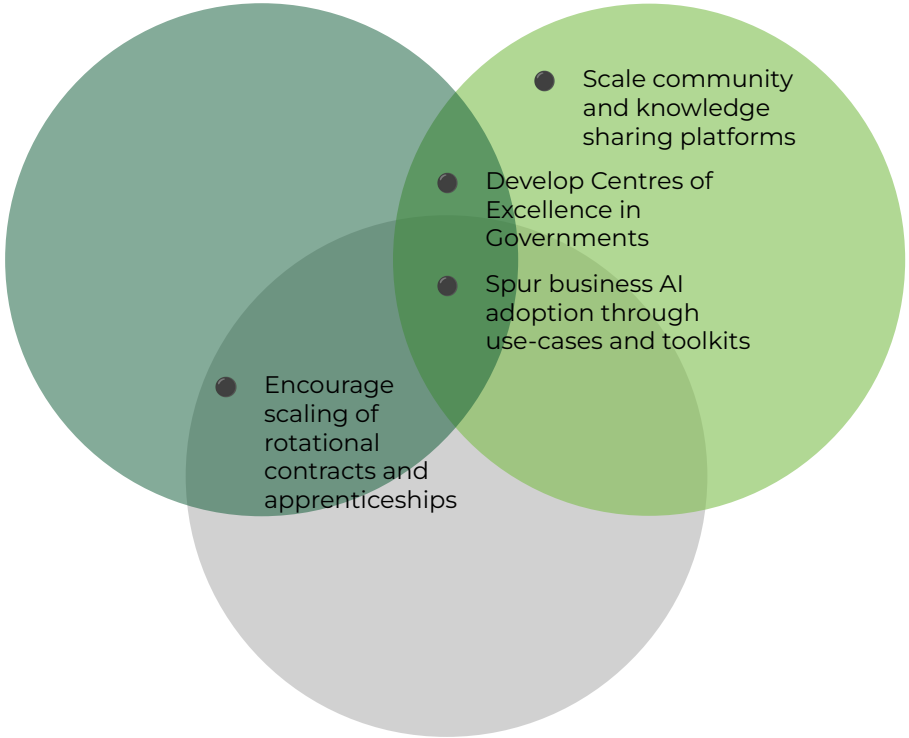
African countries have large and growing pools of young talent. However, the majority of this talent pool is **un- or low-skilled.** Investments here can lead to **job creation at scale.**

WHERE TO INTERVENE

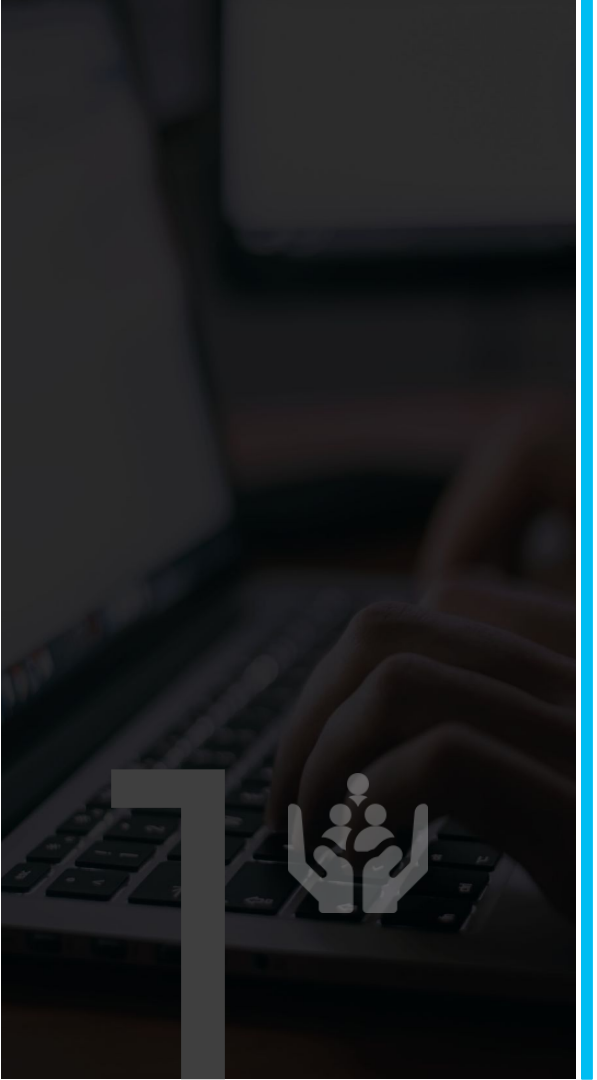
Skilling Quick Wins

Scale up: generating demand for advanced AI skills

Scale out: increasing the supply of basic and intermediate level skills



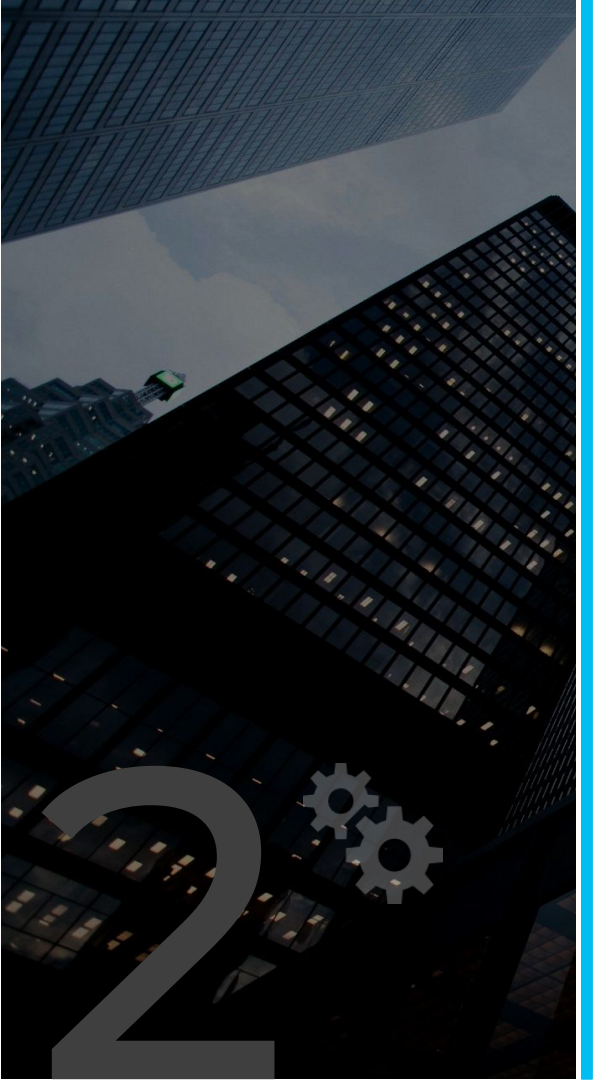
Empower: scaling the local opportunities for AI talent and more effectively matching supply and demand



Encourage rotational contracts and apprenticeships

The current lack of AI-related job opportunities is pushing African graduates to seek career prospects abroad. There were 17x less ML Engineering positions advertised on Linkedin in profiled African countries than in European markets.

Encouraging contracts which rotate candidates around international offices can create more opportunities for African talent while also bringing international exposure and capacity to African institutions. These programmes should have conditions around returning home and need to be scaled through cross-firm collaboration to generate a pool of available positions for African talent. An alternative is for African talent to be better matched with existing, international sources of demand. Tapping into Western demand for intermediate and advanced AI talent often requires overcoming Western misconceptions about the standard of African talent.

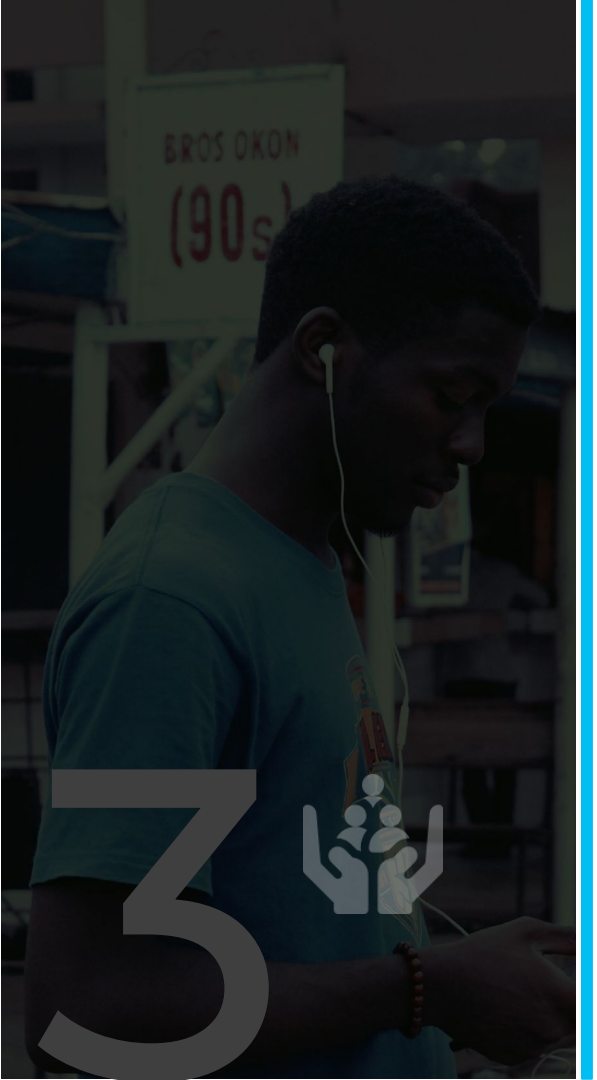


Generate the pursuit of AI business use cases

Awareness of AI's potential and the availability of basic AI skills are limited, leading to poor adoption of these technologies across African businesses; a crucial source of demand for AI products and practitioners.

To bridge this gap, sector specific AI use cases can be identified and promoted, particularly for key industries such as financial services, telecommunications, manufacturing, and mining. Use cases can be disseminated through roadshows in business forums, key events such as hackathons and sector associations.

Additionally, advocating for the inclusion of basic AI training modules within mandatory learning courses across professional bodies (e.g. accounting, auditing, and actuarial sciences) can ensure a broader base of professionals equip themselves with the AI competencies.



Scale platforms that connect local talent communities

As more businesses become sensitised to the potential of AI, the demand for skilled professionals to create and deploy these technologies grows. However, without proper awareness and links to local talent pools, there is a serious risk that this demand is outsourced to established international markets.

Scaling platforms, like Zindi, to build a pool of local talent can provide organisations with a direct pipeline to scout and recruit professionals. Sponsoring challenges on Zindi offers the opportunity to assess candidates' practical skills while also fostering innovation and participation in the broader ecosystem. By aligning challenges to industry needs, participants can develop skills which are directly aligned to market needs. Zindi can partner with organisations such as multidisciplinary labs to further nurture local expertise.

Develop centres of excellence in government

The public sector has immense potential to apply AI across a myriad of functions, including healthcare, social services, taxation, which can help to drive innovation across the economy. This potential, however, remains largely untapped due to lack of internal capacity and expertise within government bodies.

AI Centres of Excellence (CoE) in government can serve as a catalyst for innovation and capacity building within the public sector, while also generating career opportunities for professionals with advanced skills. Centres can operate as central nodes for AI expertise with government, providing tailored training programs to empower and upskill government officials.

CoEs can leverage local expertise, by fostering partnerships with academic institutions and existing AI research labs.

APPENDIX

Estimating the number of AI Graduates and Post Graduates method

Slide 7: Estimating the number of AI postgraduate students for LinkedIn Analysis

- Using UIS UNESCO data on the number of tertiary graduates across programmes and the percentage of students graduating in STEM subjects, the number of African STEM graduates was calculated for South Africa, Nigeria and Kenya.
- AI publications as a share of total STEM publications was then used as a proxy for the share of AI in STEM (3%). This percentage was used against the number of STEM graduates to estimate the number of AI graduates for the chosen countries.
- Using university published data on the ratio of post-graduates to undergraduates. The number of AI postgraduates was estimated as a quarter of total AI graduates which was used to calculate the number of AI postgraduates.

Sizing method

Slide 9: Sizing and forecasting demand for AI practitioners across Sub-Saharan Africa

1. **Start-ups**

Assumed 1 AI practitioner per AI start-up. To estimate the current number of AI startups, we used data on the number of active tech startups in South Africa, Nigeria and Kenya and multiplied by share of AI VC investment from total tech VC investment (~9%) which gave 120 AI startups across the three countries.

Lower Bound: For the lower bound demand, we grew the current number of AI startups (120) by the average growth rate of AI VC investment from 2018 to 2023 in South Africa, Kenya and Nigeria (~55%).

Upper Bound: For the lower bound demand, we grew the current number of AI startups (120) by the average growth rate of AI VC investment from 2018 to 2023 in Kenya (~130%).

The total demand was then divided by the combined share of GDP across Kenya, Nigeria and South Africa (~48%) to get a continental view of demand. (EG. LB Total 4400/0.48) = 9143).

Sizing method

Slide 9: Sizing and forecasting demand for AI practitioners across Sub-Saharan Africa

SMEs and Large Corporates

Assumed 1 AI practitioner for every 50 million USD in gross revenue in the Upper Bound Scenario and 1 for every 100 million in the Lower Bound scenario. The growth rate was assumed to be 5.8% in the Lower Bound (the AfDB's upper estimate for economic growth) and 8.5% in the Upper Bound scenario (average ICT sector growth rate in South Africa).

Lower Bound:

- 1360 practitioners are needed in South Africa if assume 1 practitioner for every 100 million USD in gross revenue.
- Grown by 5.8% annually gives a total demand by 2030 of 11,352.
- 11,352 was divided by South Africa's share of continental GDP to get a total demand of 57,703 by 2030.

Upper Bound:

- 2721 practitioners are needed in South Africa if assume 1 practitioner for every 50 million USD in gross revenue.
- Grown by 8.5% annually gives a total demand by 2030 of 24,657.
- 11,352 was divided by South Africa's share of continental GDP to get a total demand of 125,333 by 2030.

Sizing method

Slide 9: Sizing and forecasting demand for AI practitioners across Sub-Saharan Africa

Public Sector

Lower Bound:

- Assumed that, on average a quarter of government departments have an AI practitioner as a baseline and by 2030 this would increase to one per department.

Upper Bound:

- Assumed that, on average a quarter of government departments have an AI practitioner as a baseline and by 2030 this would increase to two per department.

Costing method

Slide 10: Costing the gap in demand for AI practitioners and AI Graduates

- Looking at research on average costs for computer science degrees, the estimate cost is $14,500 per degree. This was used as a proxy for AI degrees.
- **Under the lower bound scenario**
  - There is a skills surplus of ~42,000 graduates over the period and therefore wasn't costed.
- **Under the upper bound scenario**
  - There is a skills shortage of 82,743 graduates over the period.
  - Multiplying by the average cost of a degree at $14,500, the total investment required is $1,188,000,000
- **Taking an average** of the lower and upper bound scenarios (what is presented on the slide)
  - There is a skills shortage of 40,370 graduates over the period
  - Multiplying out gives a required investment of $579,986,000