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Leveraging frontier technologies and innovation to advance regional integration for sustainable and inclusive growth

I. Background

1. While there is no single, agreed-upon definition of what constitutes a frontier technology, most technologies addressed in the present report are considered to fall into that category because they have some or all of the following attributes:

(a) Radical novelty;

(b) Relatively fast growth;

(c) Distinctness from the original discipline or technology;

(d) Significant effect on several fields, industries or communities;

(e) Uncertainty and ambiguity about their full effect on development.[1]

2. Frontier technologies present numerous challenges for both developed and developing countries. The first challenge is path dependence, since the use of one or more existing technologies is a prerequisite for the application of most frontier technologies. For instance, artificial intelligence can only be employed through the use of existing digital technologies, such as chips, data centres, software and public infrastructure. The availability of services and infrastructure varies widely both between and within countries and, thus, the ability to drive innovation, regional integration and sustainable development also varies.

3. The second challenge is that frontier technologies are generally the result of many years of research and development, demonstrations and testing. States and other entities that have been involved in or contributed to such work have accumulated more of the knowledge, including intellectual property and expertise, needed to deploy frontier technologies and incorporate them into their existing business models than those that have not. Many developing countries find themselves relegated to the periphery of emerging frontier

* E/ECA/CPRTIIT/4/1

[1] Daniele Rotolo, Diana Hicks and Ben Martin, "What is an emerging technology?" *Research Policy*, vol. 44, No. 10 (December 2015).

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technology markets, owing to limited absorptive capacity, technology readiness or both.

4. New technological advances open up new opportunities for States with limited resources to exploit emerging technological and market niches, however, potentially enabling them to develop very quickly. As technologies mature and competition increases, the costs rapidly fall and the number of potential sources of technology swiftly increases. Since Africa has a low average population age, the continent is likelier than other regions with older populations to have people prepared to take greater risks, be more open to new trends and be early adopters of new technologies. The rapid uptake of cellular phones and mobile money in Africa could be seen as evidence that the continent's young people are eager to embrace new technologies to overcome existing challenges.

5. The present report explores the chief trends in frontier technologies that are particularly relevant to Africa. It includes an assessment of the measures required to unlock the continent's market potential and an examination of how these innovations can both benefit from and drive regional integration and sustainable development.

II. Frontier technologies as drivers of innovation

6. Innovation may be defined as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)".[2] It can involve new and improved goods, services and production methods, along with new markets, inputs and organizational methods;[3] thus, it excludes inventions.

7. Frontier technologies are major drivers of innovation because they often consist of new or significantly improved tools, materials or business models that enable firms to bring to market innovations that may have previously been costly, inefficient or unrealistic. For example, improvements in gene sequencing technologies have dramatically reduced the cost of completely decoding the human genome: in 2001, it cost about $100 million; in 2023, thanks to high-throughput sequencing, it cost just over $500. As a result of the cost savings due to the introduction of high-throughput sequencing, genome sequencing is transforming drug development, disease diagnosis, disease tracking and personalized medicine.[4]

8. It is estimated that the global genome sequencing market will grow from $22.6 billion in 2024 to $101.9 billion in 2030.[5] The African genomic medicine market is projected to grow significantly, from an estimated $15.2 billion in 2025 to $36.8 billion in 2031,[6] driven by technological advancements in genome sequencing, among other factors. Since the coronavirus disease (COVID-19) pandemic, the number of African countries with functional high-throughput sequencing capacity in public health laboratories has grown from 7 in 2019 to 30 in 2023, in addition to 9 centres of excellence;[7] in the same period,

[2] OECD and Eurostat, *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition* (Paris; Luxembourg; 2018).

[3] Joseph Schumpeter, *The Theory of Economic Development: an Inquiry into Profits, Capital, Credit, Interest and the Business Cycle* (Piscataway, New Jersey, United States of America; Transaction Publishers; 1983).

[4] World Intellectual Property Organization (WIPO), "Measuring genome sequencing costs and its health impact", 19 March 2025.

[5] Towards Healthcare, "Genome sequencing market size, trends, competitive strategies and opportunities", 20 March 2025.

[6] Towards Healthcare, "Africa genomic medicine market size and forecasts 2031", 11 August 2025.

[7] Adepoju, P. "The next chapter for Africa's genomic initiatives", *The Lancet Infectious Diseases*, vol. 24, No. 3 (March 2024).

the number of countries with capacity for genomic surveillance increased from 7 to 53.[8] Genome sequencing was critical for tracking COVID-19 variants and their transmission patterns; designing testing and treatment strategies; informing policy decisions; and facilitating vaccine development.

9. In a similar vein, advances in generative artificial intelligence are helping individuals and institutions to design innovative solutions to problems in such fields as education, agriculture, entertainment and transport. Examples include: the swift designing of healthy, cheap and creative recipes; the acceleration of drug discovery, streamlining of clinical trials and increased efficiency of pharmaceutical manufacturing; the automation of complex processes; the improvement of customer experience; the increased security of financial institutions; and time and cost reductions in chip design.

10. It is estimated that, given its rapid adoption and use, the global market for generative artificial intelligence will increase from $25.9 billion to $1.0 trillion between 2024 and 2034.[9] It is also estimated that, in Africa, generative artificial intelligence could unlock between $61 billion and $103 billion of additional productivity, if deployed at scale. More than half of the economic potential of generative artificial intelligence in Africa is thought to be in such sectors as retail, telecommunication, energy and extractive industries, and finance.[10]

11. Advances in nanotechnology are enabling the design of stronger, cheaper, smarter and more sustainable materials for use in such sectors as energy, health, agriculture, water, transport and space. For instance, nanoparticles have been used for the delivery of COVID-19 vaccines based on messenger RNA; the manufacture of smaller but more powerful semiconductors; and the development of antibacterial packaging materials. As a result, the global market for nanomaterials is likely to grow from $36.73 billion in 2024 to $136.47 billion in 2033.[11]

12. In the United Republic of Tanzania, one company has developed nanomaterial-based filters for water purification systems of various sizes for use in rural communities. Each system costs about $130 and the filter needs to be replaced every three months, at a cost of $5 every time.[12] The nanofilters are serving about 400,000 people in rural areas of Kenya, the United Republic of Tanzania and Zambia, as of December 2023.[13] Nanotechnology holds significant potential as a low-cost resource to help with African development.[14]

13. As a result of the emergence of frontier technologies that meet the needs of different social groups in various countries, numerous market niches have opened up. For instance, the falling price of domestic and commercial solar photovoltaic energy technologies combined with demand for electricity in Africa have led to numerous opportunities for energy providers operating under various business models – such as pay-as-you-go and prepaid arrangements – and for small-scale solar installers and service providers. As a result, it is expected that the number of new solar installations in Africa will increase by

[8] Ochola, R. “The case for genomic surveillance in Africa”. *Tropical Medicine and Infectious* (*Disease*, *10* (5), 129. 2025.

[9] Precedence Research, “Generative AI market size, share, and trends 2025 to 2034”, 22 May 2025.

[10] Mayowa Kuyoro and others, “Leading, not lagging: Africa’s gen AI opportunity”, McKinsey, 12 May 2025.

[11] Imarc, “Nanomaterials market size, share, trends and forecast by product type, structure type, end use industry and region, 2025–2033”, 2025.

[12] Catherine Jewell, “Tanzanian entrepreneur develops innovative water filter”, WIPO Magazine, 21 August 2015.

[13] Julie Carballo, “The Tanzanian engineer bringing clean water to the Maasai”, Newsendip, 6 December 2023.

[14] Economic Commission for Africa, *Towards an African Nanotechnology Future: Trends, Impacts and Opportunities* (Addis Ababa, 2020).

42 per cent in 2025 and total installed capacity will increase by between 30 and 50 per cent by 2028.[15]

14. Despite the progress outlined above, Africa is on the periphery of the rapidly growing markets for frontier technologies. For instance, almost all electric cars, solar energy products, generative artificial intelligence models, biotechnology and nanotechnology equipment and materials on the continent are imported and most African data are stored in data centres located outside the region. Efforts must be made to develop the knowledge and talent needed to design and manufacture frontier technologies, to manage them and to apply them to addressing development challenges.

15. Such efforts could include work with partners on developing selected frontier technologies of interest; building national intersectoral centres of excellence in chosen sectors; encouraging and supporting open innovation platforms; and establishing supportive policy frameworks. For States with limited fiscal space, selecting a well-funded, well-respected national institution to lead the development and adoption of frontier technologies could help. Examples include State-owned power companies; national security agencies; national telecommunication regulators; central banks; national development agencies; ministries of health and education; revenue authorities; and special economic zones.

III. Frontier technologies and regional integration

A. Agreement Establishing the African Continental Free Trade Area as a catalyst for the development and adoption of frontier technologies

16. The Agreement Establishing the African Continental Free Trade Area holds significant potential for advancing regional cooperation on science, technology and innovation, while also creating a continental market for frontier technologies. At the same time, frontier technologies themselves can facilitate the realization of aspirations in relation to the African Continental Free Trade Area, by enabling more efficient trade and investment and greater connectivity across the continent.

17. The Agreement presents a unique opportunity, not only to establish a large, unitary market, but also to accelerate investment in research into frontier technologies and in the development, adoption and transfer of such technologies. Under the Agreement and its protocols, legal and regulatory requirements, standards and practices pertaining to trade in goods and services, competition policy, investment, digital trade and intellectual property rights are all being harmonized. This harmonization can facilitate technology transfer, foster shared investment in frontier technologies and expand markets for innovative products, including those rooted in African traditional knowledge systems.

18. For instance, efforts to establish a single African market for pharmaceuticals through harmonized regulations and standards could stimulate greater investment in biopharmaceutical research and in the manufacturing and distribution of biopharmaceutical products. Similarly, the Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade, which is aimed at creating a unified and functional digital market, is expected to enhance cross-border data flows, stimulate the creation of online content and encourage investment in digital infrastructure, ultimately

[15] Global Solar Council, *Africa Market Outlook for Solar PV, 2025–2028* (London, 2025).

accelerating the uptake of such technologies as artificial intelligence, blockchain and the Internet of things.

19. Moreover, initiatives implemented under the Agreement can directly support the adoption of frontier technologies. For example, the development of trade corridors offers opportunities to deploy advanced digital solutions to streamline customs procedures, to improve transparency and to enhance the security and safety of cross-border trade. In addition, African research institutions and firms, including technology start-ups, can play a role by working with partners – both on the continent and outside it – to jointly develop solutions to practical challenges facing both traders and Governments.

20. Lastly, the Agreement can serve as a platform for pan-African collaboration on the inclusive and equitable regulation and deployment of frontier technologies. Existing initiatives and institutions can make a valuable contribution to research, innovation and problem-solving aimed at removing barriers to regional integration. Examples include the Alliance for Entrepreneurial Universities in Africa, which is led by the Economic Commission for Africa (ECA) and has some 50 member universities; the Pan-African University of the African Union, which has five specialized institutes; the African Centres of Excellence, which is a World Bank initiative; and the origin research and innovation labs, which are also led by ECA.

B. Frontier technologies as drivers of regional integration

21. Reliable digital infrastructure is the backbone of regional integration. Expanding broadband access, 5G networks and satellite Internet can provide Internet connections for remote parts of Africa, enabling seamless cross-border trade and communication. Projects like the African Digital Transformation Strategy of the African Union, along with Internet connections provided via satellite Internet constellation or high-altitude balloon, demonstrate how improved connectivity can facilitate real-time data-sharing, e-commerce and financial inclusion. If Africa is digitally connected, the region is less dependent on physical borders, which fosters a more integrated continental market.

22. Blockchain technology can revolutionize intra-African trade by reducing fraud, lowering transaction costs and enhancing transparency. One example is that, under the blockchain-based Pan-African Payment and Settlement System, a project of the African Continental Free Trade Area secretariat and the African Export-Import Bank, digital financial solutions are used to enable instant cross-border payments in local currencies, reducing reliance on foreign currencies. Likewise, smart contracts and decentralized ledgers – both blockchain-based technologies – can also streamline customs processes, reducing delays at borders and boosting trade efficiency.

23. Analytics driven by artificial intelligence can help policymakers to identify trade bottlenecks, predict market trends and optimize supply chains. For instance, a Kenya-based company is already operating a logistics platform powered by artificial intelligence that is improving freight movement across East Africa, while data-driven agricultural systems can help farmers to gain access to regional markets. By pooling data among countries, African innovators can develop artificial intelligence solutions that are tailored to the continent's unique challenges, from healthcare to climate resilience.

24. Energy poverty remains a major barrier to industrialization and integration in Africa. However, decentralized renewable energy solutions, such as solar microgrids and battery storage, can power remote communities and industrial hubs that lack extensive grid infrastructure. Smart grids at the level of the regional economic community, supported by sensors connected to the Internet of things, can optimize energy distribution across borders, ensuring a stable electricity supply.

25. Despite their potential, frontier technologies face adoption barriers, including regulatory fragmentation, inadequate digital literacy and funding gaps. To make full use of these innovations, African States and institutions should:

(a) Harmonize national policies, laws and regulations on data governance, cybersecurity and digital trade, in order to remove from the continent all barriers to Internet-based frontier technologies;

(b) Invest in expanded education on science, technology, engineering and mathematics and in skills development for young people, in order to encourage the development of frontier technologies in Africa;

(c) Foster public-private partnerships by encouraging Governments, technological start-ups and investors to work together, in order to scale up frontier technologies developed in Africa.

IV. Frontier technologies for the timely attainment of the Sustainable Development Goals

26. While frontier technologies have the potential to accelerate progress in the attainment of numerous Sustainable Development Goals, their effects and availability are likely to vary widely from one Goal to another and from one part of the continent to another. Accurately identifying the Goals in relation to which the benefits are most likely to be felt remains difficult, since the effects of a given technology may change as it matures and as it becomes more or less accessible. For example, Internet cafes and community information centres were once celebrated as innovations that expanded Internet access, but have now largely disappeared.

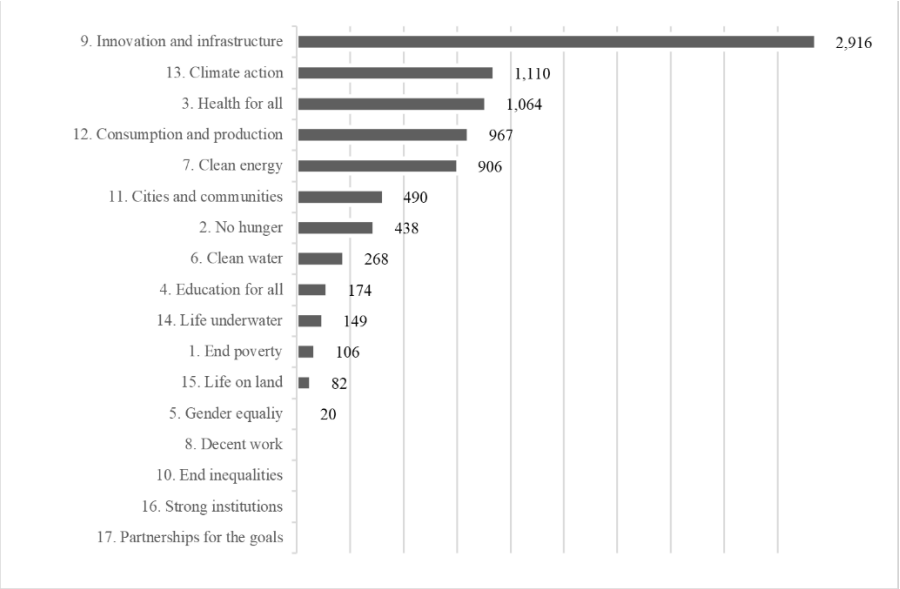
27. Despite these uncertainties, trends in research, patenting and deployment can provide valuable insights into sectors that are attracting significant investment and policy attention and into those most likely to benefit from future technological developments.

A. Mapping of innovations to the Sustainable Development Goals

28. Although patents are not a perfect proxy for innovation, they remain a useful indicator of areas that are attracting sustained investment in research and development. Patents often signal long-term strategic commitments and changes in innovation pathways. According to the World Intellectual Property Organization (WIPO), approximately 31.4 per cent of active patent families worldwide are linked to the Sustainable Development Goals.[16] As can be seen in the figure, 34 per cent of these are associated with Goal 9 (build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation), followed by Goal 13 (take urgent action to combat climate change and its impacts), Goal 3 (ensure healthy lives and promote well-being for all at all ages) and Goal 12 (ensure sustainable consumption and production patterns). Together, those four account for nearly 70 per cent of all Goal-related patents, reflecting their strong alignment with commercial and industrial interests.

[16] WIPO, *Mapping Innovations: Patents and the Sustainable Development Goals* (Geneva, 2024).

Mapping of patents to specific Sustainable Development Goals, worldwide
(Thousands)



Source: WIPO, *Mapping Innovations: Patents and the Sustainable Development Goals* (Geneva, 2024).

29. At the lower end of the scale, Goal 5 (achieve gender equality and empower all women and girls), Goal 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss), Goal 1 (end poverty in all its forms everywhere) and Goal 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development) collectively represent only 4.1 per cent of patents worldwide.

30. When conducting its study, WIPO did not map Goal 8 (promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), Goal 10 (reduce inequality within and among countries), Goal 16 (promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels) or Goal 17 (strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development) to any patents, in view of the difficulty of finding technological solutions to such socioeconomic issues as anaemic economic growth, inequality, violence and institutional weakness. For Africa, this imbalance is significant, as those very areas are some of the continent's most critical development priorities. Given that finding markets for any technological solutions to these problems is difficult, private companies give little attention to developing such solutions. Filling these gaps will require deliberate interventions from Governments, through research and development funding, targeted incentives and supportive policy frameworks.

B. Mapping of business opportunities to the Sustainable Development Goals

31. Investment in frontier technologies also tends to follow identifiable business opportunities. The Business and Sustainable Development Commission estimated that attaining the Sustainable Development Goals by 2030 could generate at least $12 trillion per year and create up to 380 million

jobs, predominantly in developing countries.[17] In fact, the total economic benefits are likely to be even larger: for example, it has been estimated that the achievement of gender parity in the workplace could add between $12.0 trillion and $28.0 trillion in global gross domestic product[18] and that a significant increase in students' collaborative problem-solving skills could add over $2.5 trillion to the global economy.[19] Therefore, the potential economic benefits of achieving the Goals are enormous.

32. As shown in the table, the Goals that present the most business opportunities are also likely to be linked to a large number of high-impact technologies. Together, Goals 2, 3 and 7 account for business opportunities worth a total of $6 trillion and for 60 high-impact technologies. By contrast, Goals 1, 5, 10 and 16 are mapped to negligible business opportunities and only four technologies. As with the granting of patents, therefore, business opportunities and high-impact technologies are unevenly distributed among the Goals.

Mapping of high-impact technologies and business opportunities to Sustainable Development Goals

Sustainable Development Goals	*No. high-impact technologies*	*Business opportunities (trillions of United States dollars)*
2 (Zero hunger) **3 (Good health and well-being)** **7 (Affordable and clean energy)**	60	6.0
4 (Quality education) **8 (Decent work and economic growth)** **9 (Industry, innovation and infrastructure)** **11 (Sustainable cities and communities)**	15	5.0
6 (Clean water and sanitation) **13 (Climate action)** **14 (Life below water)** **15 (Life on land)**	7	0.5
1 (No poverty) **5 (Gender equality)** **10 (Reduced inequalities)** **16 (Peace, justice and strong institutions)**	4	0.0

Source: United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals, "Landscape of science, technology and innovation initiatives for the SDGs" (New York, United Nations, 2017).

C. Reducing costs and accelerating timelines

33. Frontier technologies can substantially reduce both the cost of and time required for achieving the Sustainable Development Goals. For example, the cost of solar batteries has fallen dramatically since the mid-2000s and advances

[17] Business and Sustainable Development Commission, *Better Business, Better World* (London, 2017).

[18] McKinsey, *The Power of Parity: how Advancing Women's Equality Can Add $12 Trillion to Global Growth*, McKinsey Global Institute (New York, 2015).

[19] World Economic Forum, "Catalysing education 4.0: investing in the future of learning for a human-centric recovery" (Cologny, Switzerland; 2022).

in electronics have simplified installation. It now takes between 8 and 18 months to build a 100 MW solar farm, compared with between three and six years for a coal-fired power plant. Solar energy also offers scalability and flexibility, from powering household appliances to supplying national grids, and is especially well-suited to Africa, with its abundant solar resources. Decentralized solar systems can reduce rural electrification costs by up to 70 per cent compared with conventional transmission expansion.[20]

D. Digital finance and remittances

34. The International Fund for Agricultural Development highlights that achieving Sustainable Development Goal target 10.c of reducing to less than 3 per cent the transaction costs of migrant remittances worldwide could save migrants and their families over $20 billion per year.[21] Frontier technologies in digital payments play a crucial role in reducing remittance costs worldwide. It has been estimated that, owing to the use of digital platforms, the global average cost of sending remittances declined from 7.30 per cent in 2016 to 6.35 per cent in 2024, while the African average decreased from 10.00 to 7.73 per cent during the same period.[2223] By enabling faster transaction times, digital remittances also save costs compared with bank wire transfers, which can take several days, and reduce indirect costs, such as those incurred by travel to physical bank branches.

E. Smart grids and energy efficiency

35. By 2027, the cost savings from smart grids are expected to reach approximately $125 billion worldwide, compared with $33 billion in 2022.[24] This 279 per cent increase in savings is being driven by reduced operational costs, mainly due to optimized demand-side management. It has been calculated that a mere 1 per cent reduction in peak demand could result in 4 per cent cost savings, translating to billions of dollars in savings at the system level.[25] In South Africa, a power company's installation of 3,500 advanced meters reduced electricity distribution losses from 26 to 6 per cent, significantly increasing its revenue.[26]

F. Enhancing efficiency, productivity and safety

36. Beyond cost savings, frontier technologies improve efficiency and productivity. For instance, the e-voucher model can free up resources that could be reallocated to rural infrastructure – such as roads and storage facilities – at no additional cost to the taxpayer, thereby amplifying broader benefits with regard to attainment of the Sustainable Development Goals. In Nigeria, between 2011 and 2013, replacing paper vouchers for a fertilizer subsidy with e-wallet mobile vouchers reduced the cost per smallholder from between $225 and $300 to $22, while expanding the reach of the subsidies in question from

[20] International Energy Agency, *Africa Energy Outlook* (Paris, 2022).

[21] "Remittances and the Sustainable Development Goals" (Rome, 2025).

[22] Alisha Chhangani and Ananya Kumar, "Advancing a twenty-first century approach to remittances", Atlantic Council, 15 October 2024.

[23] ECA calculations on the basis of World Bank, Remittance Prices Worldwide Quarterly, No. 49, March (Washington, D.C., 2024).

[24] Juniper Research, "Smart grid cost savings to exceed $125 billion by 2027", 28 November 2022.

[25] Morgan Bazilian and others, "Smart and just grids: opportunities for sub-Saharan Africa" (London, Imperial College London, 2013).

[26] Minnesh Bipath, acting Chief Information Officer and Programme Manager for Smart Grids, Data and Knowledge Management of the South African National Energy Development Institute, presentation to the twelfth National Municipal Managers Forum, White River, South Africa, 20 February 2018.

between 600,000 and 800,000 farmers to 4.3 million.[27] While these successes are promising, the incorporation of such technologies remains uneven.

G. Obstacles to the use of frontier technologies to achieve the Sustainable Development Goals

37. Despite their promise, frontier technologies are largely developed and owned by entities located in advanced economies, where they are viewed as strategic assets. Consequently, they are often protected by strong intellectual property regimes or subject to export restrictions,[28] which limits access to them in developing countries.

38. In addition, African States and institutions face significant structural challenges, including limited infrastructure, high acquisition costs and shortages of the skilled staff required for deployment. Without addressing these constraints, African States and institutions risk being left behind in the global technological transformation, undermining their ability to harness frontier technologies for sustainable development.

V. Initiatives of the Economic Commission for Africa

A. Alliance for Entrepreneurial Universities in Africa

39. In 2022, ECA worked with several of its members to launch the Alliance for Entrepreneurial Universities in Africa, with the objective of fostering the emergence of at least 1million start-ups by 2032. The initiative's central purposes are threefold: bringing research to market, promoting entrepreneurship, and scaling up start-ups and small and medium-sized enterprises. As of mid-2025, approximately 50 universities have formally joined the Alliance, collectively leading to the involvement of more than 1 million students and of 60,000 researchers and lecturers.

B. Origin research and innovation labs

40. ECA established the origin research and innovation labs as a continental platform for collaborative problem-solving, design and innovation. The first origin research and innovation lab, located in Kenya, is developing artificial intelligence tools with rural primary and secondary school students and teachers to enhance the teaching and learning of science, technology, engineering and mathematics subjects. It is also working with a wide variety of partners – including farmers, highways authorities and small businesses – to help them to address the challenges that they face; in some cases, it has successfully surmounted the challenges and, in others, it is continuing to provide help. One notable achievement of the origin research and innovation labs has been the establishment of the continent's first facility for the design and fabrication of semiconductors.

[27] Jeremiah Grossman and Michael Tarazi, "Serving smallholder farmers: recent developments in digital finance", GCAP Focus Note No. 94 (Washington, D.C., Consultative Group to Assist the Poor, 2014).

[28] See, by way of example, the "Export control guidance (A–Z)" provided for researchers at the University of Nebraska-Lincoln, United States, available here: https://research.unl.edu/researchcompliance/activities-subject-to-export-controls/.

C. Centres of excellence in digital technologies and in science, technology, engineering and mathematics

41. ECA has partnerships with several of its members to strengthen capacity in frontier technologies through the establishment of centres of excellence. These include the African Centre for Coordination and Research on Cybersecurity in Togo, the African Research Centre for Artificial Intelligence in the Congo and the future African centre of excellence for teaching on science, technology, engineering, the arts and mathematics in Rwanda. The overarching objective of these centres is to build the necessary human and institutional capacity in frontier technologies to advance sustainable economic development. In addition, ECA is implementing capacity-building programmes on artificial intelligence, the Internet of things and financial technology to equip African entrepreneurs and small and medium-sized enterprises with the skills required to effectively participate in the digital economy, in particular digital trade.

D. Advocacy and consensus-building on frontier technologies

42. In 2023 and 2024, during the negotiation of the Global Digital Compact, a United Nations initiative aimed at ensuring an open, secure and equitable digital future, ECA actively advocated for an African perspective to be incorporated into the final text of the Compact. In doing so, the Commission sought to facilitate African access to international support for digital infrastructure financing, the development of data governance frameworks and enhanced cybersecurity cooperation.

43. Furthermore, ECA organizes the Africa Regional Review of the World Summit on the Information Society, the outcome documents of which feed into the World Summit on the Information Society. It also convenes the African Science, Technology and Innovation Forum every year to assess the role of science, technology and innovation in advancing sustainable development on the continent. The outcome documents of the African Science, Technology and Innovation Forum are presented annually at the African Regional Forum on Sustainable Development and at the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals in New York. The overarching aim of these efforts is to unify and amplify the voice of Africa in global digital and innovation governance.

VI. Conclusion and issues for consideration

44. Frontier technologies hold considerable promise for advancing economic transformation, fostering social development and expediting the attainment of the Sustainable Development Goals. For African States and institutions, frontier technologies provide an opportunity to foster innovation, accelerate regional integration and achieve the Sustainable Development Goals in a more cost-effective and timely manner. The magnitude of their impact, however, will depend on the ability of African States and institutions to ensure access to these technologies, create an enabling environment for business innovation and secure sustained public investment in skills development and infrastructure to support their development, adoption and deployment.

45. In this regard, the Committee may wish to deliberate on the following issues:

(a) What measures should African States take to gain access to new and emerging technologies in a rapidly evolving global environment, characterized by stringent intellectual property regimes, security considerations and export restrictions?

(b) How can African States and institutions stimulate the development and deployment of technologies in priority sectors, despite a limited supply of those technologies?

(c) What approaches are required to comprehensively assess the potential cost savings from the deployment of frontier technologies, and in which sectors?[29]

(d) In what ways can the Agreement Establishing the African Continental Free Trade Area be used to promote continental collaboration on research, development and the deployment of frontier technologies across the region?

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[29] Although some preliminary efforts were made between 2015 and 2017, the guidance in this area remains limited.