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Economic Commission for Africa Fourth African Science, Technology and Innovation Forum

Kigali (hybrid), 1 and 2 March 2022

Strengthening institutional arrangements for science, technology and innovation to advance full implementation of the 2030 Agenda for Sustainable Development in Africa

I. Background and mandate

1. The collaborative multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals was established pursuant to the 2030 Agenda for Sustainable Development as part of the Technology Facilitation Mechanism. The Mechanism was established under the Addis Ababa Action Agenda and was launched by the 2030 Agenda to support the implementation of the Sustainable Development Goals. The global forum is organized by the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals, with the support of a 10-member group appointed by the Secretary-General drawn from the private sector, the scientific community and civil society.
2. The global multi-stakeholder forum is convened once a year, as indicated in paragraph 70 of the 2030 Agenda, “to discuss science, technology and innovation cooperation around thematic areas for the implementation of the Sustainable Development Goals, congregating all relevant stakeholders to actively contribute in their area of expertise”, and to “provide a venue for facilitating interaction, matchmaking and the establishment of networks between relevant stakeholders and multi-stakeholder partnerships in order to identify and examine technology needs and gaps, including on scientific cooperation, innovation and capacity-building”. All these measures are expected to facilitate the development, transfer and dissemination of relevant technologies for the Sustainable Development Goals.
3. The African Science, Technology and Innovation Forum was established by the Conference of Ministers, in its resolution 961 (LI) of 15 May 2018, calling on the Economic Commission for Africa (ECA), in collaboration with the African Union Commission and other partners, to take all steps necessary to organize on a regular basis a multi-stakeholder forum on science, technology and innovation as an input into the work of the Africa Regional Forum on Sustainable Development.
4. The first African Science, Technology and Innovation Forum was held in Marrakech, Morocco, on 16 April 2019; the second on 24 February 2020 in Victoria Falls, Zimbabwe; and the third Forum was hosted by the Congo in Brazzaville on 25 and 26 February 2021. The forums are co-organized with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Department of Science and Innovation of South Africa, together with the host country.



5. The Forum has grown into the preeminent continental platform for the exploration of complex and innovative issues of science and technology, showcasing emerging developments in that area, instilling technical and entrepreneurial skills in young people and forging long-lasting partnerships and alliances. In 2020, over 800 delegates representing African member States, United Nations agencies, the academic sector, civil society, youth, marginalized groups, the private sector and people living with disabilities were in attendance. In 2021, the Forum was organized in a hybrid format and brought together over 600 registered participants.

6. Since 2020, a youth innovation bootcamp has been organized as part of the Forum. The bootcamp attracts young people from across the continent and beyond to collaborate in the design and development of innovative solutions and learn new technologies, such as rapid prototyping using 3D printing, genomics, robotics, artificial intelligence, and nanotechnology, and also introduces them to entrepreneurship concepts and competencies.

II. Progress in fulfilling the 2021 key messages

7. The third African Science, Technology and Innovation Forum made nine specific recommendations to the regional economic communities, organizing partners and member States. The recommendations are outlined below, together with a summary of the actions taken:

(a) *Recommendation:* The organizing partners should work with the regional economic communities and member States to develop action plans, mobilize adequate resources for implementation, and also for monitoring and evaluation of the recommendations of science, technology and innovation forums during the intersessional period.

Action: This recommendation has not been fully realized, even though some regional economic communities, such as the Southern African Development Community, have worked with the organizers of the Forum;

(b) *Recommendation:* The United Nations system and other development partners are called upon for support in enhancing national capacity to design, implement, monitor and evaluate science, technology and innovation policies and strategies.

Action: ECA and its partners have completed the design of the science, technology and innovation policy formulation and implementation guide, and have supported the work of the inter-agency task team on science, technology and innovation in implementation of the science, technology and innovation road maps for the Sustainable Development Goals;

(c) *Recommendation:* Member States and partners are urged to develop databases and platforms for the collection of quality, accessible and open data, including scientific information, to promote research, innovation and product development (goods and services), especially for the digital economy.

Action: A survey was carried out in 2021 of progress made by African universities towards becoming entrepreneurial in nature. The first round of the survey covered some 20 universities, in Algeria, Ethiopia, Ghana and South Africa, and, in the second round, further universities in Egypt, Kenya and Rwanda, enabling the gathering of valuable data to support national efforts in ensuring that universities serve as engines of economic, social and environmental sustainable development.

(d) *Recommendation:* Member States and their partners are urged to reform national education systems and provide incentives to research institutions to promote entrepreneurship in their communities and society at large.

Action: The work on advancing entrepreneurial universities includes a special focus on two dimensions: entrepreneurial pathways and partnership with the

private sector and the community;

(e) *Recommendation:* Member States and development partners are encouraged to put into place strategies for accelerating the uptake and diffusion of emerging technologies, in particular nanotechnology, biotechnology, artificial intelligence and robotics.

Action: In this regard, three generic bachelor of science and master of science curricula were finalized in 2021, in the fields of artificial intelligence; materials science and nanotechnology; and pharmaceutical chemistry and manufacturing;

(f) *Recommendation:* Member States are encouraged to put into place infrastructure, standards and regulatory frameworks, and also to strengthen their supply chain for the pharmaceutical industry to accelerate the innovation, manufacturing and marketing of pharmaceutical products and medical devices, especially to build resilience of the health sector response to pandemics.

Action: To support this effort, the ECA secretariat has completed the generic curriculum that universities can easily adapt to design bachelor's and master's programmes in pharmaceutical chemistry and manufacturing. It has also developed the African Medical Supplies Platform¹ to reduce costs and enhance the transparent procurement of pharmaceuticals, medical devices and related products;

(g) *Recommendation:* To transform Africa into a global research hub, member States are encouraged to build accessible and reliable key science, technology and innovation infrastructure, in particular renewable energy and digital communication, and to empower their young people and women, especially in the fields of science, technology, engineering and mathematics.

Action: In response to this imperative, ECA and the Government of the Congo have launched the Regional Centre on Artificial Intelligence; the Democratic Republic of the Congo launched a plant to build electric battery precursors; and a number of countries (Egypt, Ghana, Kenya, Mauritania, Morocco, Namibia and South Africa) launched hydrogen energy and solar plants;

(h) *Recommendation:* Member States are urged to meet their commitment to increase expenditure on research and development to at least 1 per cent of their gross domestic product (GDP).

Action: This recommendation remains unfulfilled;

(i) *Recommendation:* ECA, UNESCO, the Government of South Africa and partners are called upon to work with member States to scale up and organize regular youth innovation bootcamps that accelerate the acquisition of technical and entrepreneurial skills among young people, especially in new and emerging technologies.

Action: To this end, the partners have organized seven bootcamps that have benefited more than 80,000 participants, more than 80 per cent of whom are female;

8. In addition, the inter-agency task team on science, technology and innovation, comprising all United Nations entities with science, technology and innovation programmes, organized several events during the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals and on the margins of the high-level political forum. These included briefings on the science, technology and innovation road maps for the Goals, which formed part of the team's pilot programme, and on the approach and methodology followed. Five of the countries included in the global pilot programme (Ethiopia, Ghana, India, Japan, Kenya, Serbia and Ukraine) shared their experiences. Ghana, Japan and Serbia have since published their science, technology and innovation road maps for the Goals.

¹ <https://amsp.africa/>

III. Fourth African Science, Technology and Innovation Forum

9. The fourth African Science, Technology and Innovation Forum will be held from 28 February to 1 March 2022, in a hybrid format, in Kigali. The Forum is co-organized with UNESCO, the African Union Commission and the Department of Science and Innovation of South Africa. Other key partners include the Technology Bank for the Least Developed Countries, the International Atomic Energy Agency, the African Materials Research Society and the African Biomedical Engineering Consortium. The Forum is designed to fulfil both global and continental mandates.

10. To meet its mandate to provide inputs to the eighth session of the Africa Regional Forum on Sustainable Development, the African Science, Technology and Innovation Forum will consider how science, technology and innovation could help the continent in its efforts to respond and contribute to the realization of the theme of the Africa Regional Forum on Sustainable Development: “Building forward better: a green, inclusive and resilient Africa poised to achieve the 2030 Agenda and Agenda 2063” and will undertake an extensive review of Goals 4 (Education), 5 (Gender equality), 14 (Life below water), 15 (Life on land) and 17 (Partnership) and the corresponding goals of Agenda 2063: The Africa We Want, of the African Union.

11. Education – as both a sector and an enabler – has been the focus of the Africa Regional Science, Technology and Innovation Forum. Education is a key input into the national systems of innovation, a powerful tool for enabling individuals to determine their own future and one of the largest sectors of any country. Education consumes a large proportion (some 10 per cent) of national budgets and employs thousands of teachers, technicians, managers, politicians and other support staff (such as cleaners, guards and others). In a continent that is relatively young and whose population is growing rapidly, schools and their support facilities (such as libraries, laboratories, sports and staff housing) need to be built and maintained.

12. Technology and innovation play an important role in enhancing the learning experience of students and enabling teachers to stay in touch with learners from anywhere in the world. It is now possible for a student in Africa to be enrolled in Asia and have a tutor in Europe for as little as \$20 per month. Similarly, the education technology industry has been growing rapidly. Estimates suggest that the African market for education technology attained a value of \$1.5 billion in 2020 and is expected to grow by some 36.5 per cent a year, reaching \$10.9 billion by 2026.²

13. This progress should, however, be viewed against the bigger picture: while primary school enrolment is about 80 per cent, dropout rates remain high (up to 42 per cent of primary school children in Africa fail to complete primary school)³ and very few are likely to complete secondary or tertiary education. One estimate suggests that only 17 million of the 500 million children in primary schools in Africa ever enter higher education.⁴ Accordingly, technology should help to close gaps in access to, equality and the quality of education by generating alternative business models and options to bring quality and inclusive education to all.

² Figures from Expert Market Research, *Africa E-Learning Market*, Sheridan, WY, 2021. Available at www.expertmarketresearch.com/reports/africa-e-learning-market.

³ See United Nations Educational, Scientific and Cultural Organization, “42% of African school children will drop out before the end of primary education”, post of 28 November 2012. Available at www.unesco.org/new/en/member-states/single-view/news/42_of_african_school_children_will_drop_out_before_the_end/.

⁴ See Kenza Bouhaj, “EdTech in Africa: a landscape”, post of 9 August 2021, GSV Ventures, Chicago, San Francisco, New York. Available at <https://kenza-bouhaj.medium.com/edtech-in-africa-a-landscape-6bb03c299b33>.

14. Gender equality has always been a major component of the African Science, Technology and Innovation Forum. Thus, the Forum's first youth innovation bootcamp brought together over 200 young people, the majority of whom were female. Since then, ECA has organized three all-female bootcamps focused on digital skills and digital opportunities, including careers and business opportunities. It is now important to design and advance mechanisms that boost not only the numbers of females involved but also the quality of opportunities, participation and leadership accorded to female participants. Currently, as few as one in five researchers in Africa are women – a disquieting statistic that must change if science, technology and innovation are to advance gender equality in other sectors.

15. Life under water and life on land remain main areas of interest to science, technology and innovation, in terms of both scientific exploration and sustainable exploitation of resources. While the greater interest is in sustainable exploitation of the green and blue economy, scientific understanding on the impact of pollution, climate change and the various human activities on the ability of land and aquatic bodies is also needed.

16. In terms of economic and social contributions, estimates suggest that the global ocean economy is worth about \$1.5 trillion. In Africa, some 275 million people depend on fish for food security, with the small-scale sector accounting for more than 60 per cent of total fisheries production and employing some 12 million people, with women playing a key role in processing and marketing.⁵ There is general agreement that overfishing, illegal fishing and warming of water bodies and contamination have led to a decline in fish population in water bodies, putting lives and livelihoods at risk.⁶

17. According to the International Union for Conservation of Nature (IUCN), 68 per cent of known plant species, 12 per cent of bird species and 90 per cent of primates are disappearing or threatened with extinction, while half of the world's mammals are declining in numbers largely as a consequence of human activity, climate change and natural disasters. For instance, deforestation in Africa will alter rainfall patterns, with negative impacts on rain-fed agriculture.⁷ With 281.6 million Africans undernourished in 2020, pressure on land to produce food is likely to remain high. Forests are also a major source of energy for the 650 million people without access to electricity on the continent.

18. New and emerging technologies promise to improve the monitoring and management of forests, increase the productivity of farms, expand access to renewable and clean energy sources and alter both production and consumption. The Forum will explore some of the emerging technologies and business models, and their potential to make a meaningful impact on fulfilling the 2030 Agenda for Sustainable Development.

19. In addition, the Forum will also provide a platform to identify and examine technology needs and institutional voids that should be addressed to enable African countries to fully harness and deploy science, technology and innovation to accelerate attainment of the Sustainable Development Goals and the corresponding goals of Agenda 2063.

⁵ See African Development Bank, “Blue Economy Flagship: a briefing note for partnership”, briefing note for dialogue at the Blue Economy Conference in Nairobi, Kenya, 26–28 November 2018. Available at www.riob.org/sites/default/files/documents/AfDB%20Blue%20Economy%20Flagship%20%20Briefing%20Note_November%202018.pdf.

⁶ See Chin Yee Chan and others, “Prospects and challenges of fish for food security in Africa”, *Global Food Security*, vol. 20, March 2019, pp. 17–25.

⁷ For further details, see Confidence Duku and Lars Hein, “The impact of deforestation on rainfall in Africa: a data-driven assessment”, *Environmental Research Letters*, vol. 16, No. 6, June 2021, 064044.

IV. Theme of the fourth African Science, Technology and Innovation Forum

20. As noted above, the theme of the eighth session of the Africa Regional Forum on Sustainable Development is “Building forward better: a green, inclusive and resilient Africa poised to achieve the 2030 Agenda and Agenda 2063” with a focus on Goals 4, 5, 13, 14 and 17. To ensure an effective contribution by science, technology and innovation, efforts are needed to strengthen the appropriate institutional arrangements. Such institutional arrangements may include, among others, those relating to the governance, policy formulation and implementation of science, technology and innovation; technology development and deployment; the funding of research and development; and promoting or facilitating partnership between all the key players in science, technology and innovation.

21. The fourth Forum will focus on strengthening institutional arrangements for science, technology and innovation to advance full implementation of the 2030 Agenda for Sustainable Development in Africa. To achieve this goal, as called for in paragraph 70 of the 2030 Agenda, the Forum will see the launch of a number of initiatives aimed at helping member States to strengthen their institutional arrangements and to meet the goals of facilitating interaction, matchmaking and the establishment of networks. To this end, the fourth Forum will provide opportunities for matchmaking, networking and partnerships to advance sustainable development.

A. Science, technology and innovation policy formulation and implementation guide

22. The Addis Ababa Action Agenda called on member States to design science, technology and innovation policies to drive development. Since then, the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals and the 10-member group appointed by the Secretary-General have developed the science, technology and innovation road maps for the Sustainable Development Goals. This is a major step towards helping member States to identify needs and develop plans that can be implemented. Other notable efforts include those of UNESCO, the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Industrial Development Organization (UNIDO) supporting countries to undertake reviews or formulate policies on science, technology and innovation.

23. These efforts will include the formal launch of the ECA-led science, technology and innovation policy formulation and implementation guide, designed to support all the above efforts and furnish member States with the necessary information to design, draft, adopt, implement, monitor and evaluate science, technology and innovation policies independently or with partners. It is also a living document that will be continuously reviewed and supplemented by national, regional and international experiences. The guide has already undergone three review processes conducted by experts and policymakers.

B. Network of entrepreneurial universities in Africa

24. The second and third Forums, held in 2020 and 2021, respectively, called for efforts to encourage universities to become providers of goods and services and also agents of change. In response to this call, ECA, Algeria, Ethiopia, Ghana and South Africa spearheaded national surveys of universities and held joint consultative meetings on the current state of play of efforts by selected universities to become entrepreneurial in nature. Since then, the work has been extended to include Egypt, Kenya and Rwanda, which will be joining the aforementioned countries in this endeavour. This session will share both the

lessons learned from their experience and forge ways of extending this line of work to other interested African countries and universities. The main aim is to launch a community of practice or alliance of entrepreneurial universities in Africa.

C. Technology development and transfer network

25. Technology plays an important role in national development and newer technologies are widening the technology gap between leading countries in this field, such as the Republic of Korea and the United States of America, and African countries even further. Access to technology developed by other countries could narrow the development gap if countries have institutions that can drive technological learning and development. The case of the COVID-19 vaccines clearly demonstrates this knowledge gap: most technology owners prefer to form partnerships with existing vaccine producers rather than with African countries. Furthermore, of the hundreds of vaccines under development and in clinical trials, almost none are led by African teams or countries.

26. To meet the above aim, this effort will bring together leading figures in research and development, industry and technology transfer and policymakers who can exchange information, share technologies and technology development platforms and help broker technology deals from both domestic and international partners. This component will also support universities and research institutions in understanding the current and future technology needs of industry and other communities that they serve and, in turn, will improve the formulation of research and development agendas and the relevance of outputs of work in that area.

V. Objective of the African Science, Technology and Innovation Forum

27. The overall objective of the fourth African Science, Technology and Innovation Forum is to conduct the regional follow-up and review of progress made, in order to identify potential mechanisms and measures that countries can deploy to scale up actions, facilitate peer learning and advance transformative solutions to accelerate achievement of the Sustainable Development Goals and the goals of Agenda 2063. These include:

(a) Conducting a regional follow-up to, and review of, the implementation of the key messages and measures recommended at the previous Forum;

(b) Providing a platform for peer learning and sharing experiences, approaches, good practices and lessons learned, in order to accelerate the realization of the aspirations of the 2030 Agenda and Agenda 2063;

(c) Identifying the technological opportunities, gaps and challenges, and also the institutional voids, with a view to driving innovation and development;

(d) Identifying realistic mechanisms for collaboration and matchmaking, to strengthen regional and international partnerships and investments in science, technology and innovation, to accelerate implementation of the two agendas over the decade 2020–2030.

VI. Format of the fourth African Science, Technology and Innovation Forum

28. The fourth African Science, Technology and Innovation Forum will comprise the following activities, high-level policy dialogues, panel discussions and showcasing events:

(a) High-level policy dialogues: At least four high-level policy dialogues will be organized, comprising senior government officials, ministers, heads of United Nations agencies and chief executive officers of firms, along with vice-chancellors of universities and heads of research and technology organizations. The interactive high-level policy dialogues will focus on broad and cross-cutting issues and strategic direction, including opportunities and transformative levers, partnerships, commitments, actions and other measures to accelerate implementation;

(b) Panel sessions to assess progress on the 2030 Agenda and Agenda 2063: At least five sessions (on the themes of education, gender, life under water and life on land) will be held to assess the contribution of science, technology and innovation in the progress registered to date, and the actions needed to amplify the impact of science, technology and innovation in efforts to achieve the Sustainable Development Goals. All panel sessions may include key presentations and discussion in a town-hall format, to encourage free interactions;

(c) Special sessions: There will be several special sessions and events organized by partners and ECA, with the aim of informing the Forum. These shall include the youth bootcamp on technologies and innovations of the future;

(d) Review and adoption of key messages of the Forum: During this part of the Forum, all stakeholders will review, propose amendments to and adopt the key messages of the Forum. These are aimed at accelerating implementation and are to be submitted to the Africa Regional Forum on Sustainable Development at its 2022 session and to inform the inter-agency task team on science, technology and innovation for the Sustainable Development Goals and the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals.

VII. Expected outputs

29. The fourth Forum is expected to generate the following key outputs:

(a) Report of the fourth African Science, Technology and Innovation Forum, which will inform the Africa Regional Forum on Sustainable Development and the multi-stakeholder forum on science, technology and innovation;

(b) Outcome documents of special sessions and events, such as the youth bootcamp;

(c) General guide for implementing regional networks and platforms facilitating technology transfer, collaboration and the formulation and implementation of policy on science, technology and innovation.

VIII. Expected outcomes

30. The fourth African Science, Technology and Innovation Forum is specifically designed to foster collaboration, the diffusion of technology and innovation, and scaling up of policy and operational efforts needed to accelerate the contribution of science, technology and innovation to fulfil the 2030 Agenda for Sustainable Development. In particular, the following will be the key tangible and intangible outcomes of the Forum:

(a) Report of key outcomes that could guide member States, the private sector and non-State stakeholders in improving their science, technology and innovation policies and amplify the impact of science, technology and innovation on measures to accelerate fulfilment of the two agendas;

(b) Strategies to strengthen science, technology and innovation institutional arrangements that can drive policy implementation, improve

funding mechanisms for research and development, innovation and entrepreneurship identified and documented to help member States to build a sound scientific, technological and innovation foundation;

(c) Regional networks and platform for exchanging information on funding, innovations and institutions launched to accelerate technology transfer, collaboration and co-creation among key science, technology and innovation partners in Africa.

IX. Participants

31. The meeting will be attended by representatives of all African member States of the United Nations, the African Union Commission, the African Development Bank, the regional economic communities, civil society, business and industry organizations, academic and research institutions, agencies and organizations of the United Nations system, and other international agencies and organizations, together with all development partners.

X. Working languages

32. The meeting will be conducted in English and French, with simultaneous interpretation in both languages.

XI. Dates and venue

33. The fourth African Science, Technology and Innovation Forum will be held in Kigali, in a hybrid format, on 1 and 2 March 2022.

XII. Contacts

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