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Contribution by Brazil

to the CSTD 2024-2025 priority theme on "Diversifying economies in a world of accelerated digitalization"

PRIORITY THEME 1: Diversifying economies in a world of accelerated digitalization

United Nations Commission on Science and Technology for Development (CSTD)

Dear CSTD Member

The 27th CSTD annual session selected "Diversifying economies in a world of accelerated digitalization" as one of the priority themes for its 28th session (2024-25 period). This theme directly addresses SDG 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation" at the 2030 Agenda.

Although the contribution of science, technology and innovation (STI) to the achievement of other sustainable development goals (SDGs) is discussed in every session of the CSTD, its role in upgrading and diversifying industrial capabilities and the linkages with industrial policies have not been specifically addressed for several years in the Commission. Economic diversification, including through the upgrading of industrial capabilities, is an essential component of economic development and a key area of SDG 9, which aims at enhancing scientific research and accelerating technological upgrade of industries through innovation, particularly in developing countries.

Under this priority theme the Commission could discuss challenges and opportunities brought about the rise of new digital technologies, as Artificial Intelligence, for industrial and innovation policies aiming at increasing productive capacities and diversifying the industrial structure toward higher value productions to benefit all while preserving cultural identity, including indigenous knowledge. The accelerating pace at which frontier technologies emerge and develop makes policymakers struggle to navigate and design responsive policies. Under this theme, the Commission can examine the challenges and opportunities specific to countries at different level of development, and what can least developed countries do to face the disproportionate challenges they face; work to identify best practices and inform inclusive policies for innovation and economic diversification; discuss how to leverage international cooperation to guarantee that uneven technological capabilities will not worsen inequality.

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting to be held in the second half of October 2024 in Geneva. In this context, we would like to solicit inputs from CSTD member States on this theme. We would be grateful if you could kindly answer the following questions based on your experience in your country.

1. What are the specific challenges your economy is facing to develop or adapt frontier technologies and AI?

   As one of the largest economies in the Global South and the world, Brazil has a relatively diversified economy with a network of advanced research centers. The country is also well-positioned in rankings pertaining to digital government and readiness to AI adoption.

   However, the country faces some challenges in developing and adapting frontier digital technologies, including AI. Investment rates in infrastructure and RD&I are still relatively low. Interest rates and the high tax burden (especially for the industrial sector) still inhibit private investment and the generation of spillovers/productive chains, also posing some difficulties to make an innovation culture flourish properly. Furthermore, according to the "ICT companies" survey, the main obstacles reported by companies that make them to not use artificial intelligence are high costs, lack of trained people, lack of knowledge about the technology, incompatible equipment and lack of data necessary for the use of technology (https://cetic.br/pt/tics/pesquisa/2023/empresas/H13/). This situation also has the effect to push frontier technologies and AI to small economic groups and small use cases. The need to create conditions to develop AI is paramount to really democratise its possibilities, to the extent that this technology is resource intensive to run and uses only state of the art computing, and

   In a recent G20 Side-event, organized by the Ministry of Science, Technology and Innovation, with support from the Brazilian National Data Protection Authority - ANPD, some of the challenges in developing or adapting frontier technologies and AI, particularly to the Global South, were addressed:

Inequality in AI Infrastructure: Brazil, like many other developing countries, faces significant disparities in AI infrastructure compared to developed nations. The concentration of AI assets in a few global regions, particularly in developed countries, exacerbates these inequalities. This gap is evident in the availability of high-performance computing resources and data centers, with 80% of data centers being based in developed countries. Domestic inequalities pertaining to AI infrastructure, especially between rural and urban areas, in a continental-wide country as Brazil, add to this challenge;
Dependency on Big Tech: There is a heavy dependency on Big Tech companies for AI development, which can lead to developing countries, including Brazil, becoming mere data exporters. This dynamic risks perpetuating existing inequalities and places developing nations at a further disadvantage by potentially widening disparities within and between nations;
Digital Sovereignty and Strategic Autonomy: Brazil is facing challenges related to digital sovereignty and the need to govern AI development and deployment effectively. This includes concerns about the governance and control of digital infrastructure by large technology companies, which challenges the country's ability to maintain autonomy over its digital territories;
Skilled Human Resources: There is a critical need for skilled human resources in AI – and AI applied to sectors such as health. Challenges include brain drain, limited access to quality education and training programs, and the need for collaborative research initiatives. These factors hinder the development of a robust local AI ecosystem in Brazil;
Need of Investment in AI Infrastructure: To address the digital divide, there is an urgent need for Brazil to prioritize investments in AI infrastructure. This includes developing the country's AI computing power, enhancing capacity, effectiveness, resilience, and sustainability;
Need to Foster International Cooperation: Cooperation between countries is crucial for sharing knowledge, assets, and best practices. Expanding Brazil's computing infrastructure is a topic of debate, with international cooperation being part of the discussion. This cooperation is seen as essential for ensuring that all countries, regardless of their current capabilities, can participate in and benefit from AI development.

Still regarding infrastructure, the National Telecommunications Agency in Brazil highlights the challenges resulting from the development of AI for the use of telecommunications, in which the scenario focused on integrated communication and AI stands out. It is assessed that there will be a series of new applications with the integration of AI technologies implemented in the network infrastructure itself, as opposed to the current model in which intelligence is restricted to the cloud, that is, outside the boundaries of network equipment and the telecommunications service operator. While on the one hand, those developments will generate revenue for operators and innovations in the services provided to end users, on the other hand it will result in a new range of regulatory challenges in the management of these services. AI integrated into the network will raise, for example, questions in the following areas: Cybersecurity; Network neutrality; Privacy of user and company information; Competition/market aspects; Spectrum use management; Energy efficiency of networks; Promotion of public connectivity policies; and Protection of user rights.

Finally, there are also challenges pertaining to the adoption of legal frameworks that incentivize innovation while safeguarding the responsible, ethical, trustworthy and inclusive development and deployment of AI and other frontier technologies.

2. Can you provide successful examples of AI and other frontier technologies uptake in your country?

Since the release of the Brazilian Artificial Intelligence Strategy (EBIA), in 2021, notable advancements have been made in AI adoption. Brazil has established up to eight applied AI centers (CPAs) focusing on smart cities, agriculture, Industry 4.0, health, cybersecurity, among others. These centers complement existing AI-focused institutions such as the Center for Artificial Intelligence (C4AI) (based at the University of Sao Paulo in partnerhsip with IBM) and the Brazilian Association of Research and Industrial Innovation’s Network of Digital Technologies and Innovation (Embrapii’s Network).

Additionally, Brazil has initiated several important programs to support AI development. Grants have been provided to startups, and education programs such as “The Future of Work, Work of the Future” (supervised by the Ministry of Science and Technology) aimed to equip the current workforce with

skills in data science, cybersecurity, the Internet of Things (IoT), cloud computing, and robotics. This program targets all educational levels, from elementary to postgraduate studies, ensuring comprehensive skill development across the nation.

In the field of health, the Ministry of Health of Brazil has carried out projects involving automation and assistance in the manifestation of judicialized health demands, detection of anomalies in hospital and outpatient production data, support for government drug purchasing decisions, among others. The Ministry of Health is also working to incorporate automated machine learning and artificial intelligence techniques into other tools that are already in production, such the Ministry of Health's Open Data Portal, which could enhance objective analyses of the health situation and preparation of strategic responses to epidemics.

Still pertaining to the health sector, Brazil has several successful examples of the adoption of AI and other cutting-edge technologies. AI systems assist in the analysis of X-rays, mammograms, and other exams, making diagnosis more accurate and agile. Some hospitals use chatbots for initial care and patient triage, relieving system overload. During the COVID-19 pandemic, remote consultations via videoconference expanded access to specialists, especially in remote regions.

Another successful example in frontier technologies is the use of Biometrics in Brazil, which delivered the possibility of more than 120 million citizens to use more than 4400 digital public services with security and without attrition. That attrition can be expensive and excluding to a lot of people in our country. Today, Gov.br is the largest government platform in the world by number of services and number of users, at the same time delivering real value to those who use it. In this sense, biometrics provides the real opportunity to provide high-risk services with confidence to the government and to all citizens.

National agencies see value in the importance of considering mechanisms for using Artificial Intelligence (AI), with trust, to modulate data from government systems and records, in order to support the development of consistent and group-oriented public policies. Envisioning the use of AI as a tool for automating processes, allowing the serial analysis of naturalization requests, thus accelerating the elimination of backlogs and increasing administrative efficiency. AI can also guide the preparation of standard opinions, thus harmonizing decisions of the Public Administration.

3. Has your country put in place inclusive policies for innovation and economic diversification specifically tailored to diffusion of digital technologies and AI?

Yes. Brazil has enacted (2018) and updated (2022) its Strategy for the Digital Transformation (e-digital), whose guidelines aim at harnessing the potential of digital technologies to foster development. In 2021, as previously mentioned, Brazil also enacted its National AI Strategy, which is under process of revision. More recently, in 2024, Brazil announced its National AI Plan, « AI for the Good of All », a people-centred, development-oriented plan aimed at addressing challenges in health, hunger prevention, food security with the use of AI, as well as improve massively in termos of technology infrastructure, high-performance computing, AI sovereignty and position Brazil as an AI leader in the Global South through strategic international cooperation. The Plan is structured in 5 axes, among them AI infrastructure and Development, AI for the improvement of the Public Service and Business Innovation.

Brazil has also implemented other initiatives, such as:
Regulatory Agenda for AI: AI is a significant component of National Data Protection Authority (ANPD)'s regulatory agenda. The goal is to regulate the provisions of the LGPD (General Data Protection Law), especially Article 20, which pertains to the holder's right to request a review of automated decisions. The National Data Authority aims to address this issue through the creation of guiding documents, such as guides and technical studies, to support individuals who may not have advanced knowledge of the topic. These guidelines will serve as the foundation for the development of further necessary rules for AI system regulation. For more information, please check: ANPD Regulatory Agenda
Regulatory Sandbox for AI and Data Protection: ANPD has launched a call for contributions to establish a regulatory sandbox focused on AI and Data Protection. This initiative aims to foster

responsible AI innovation that complies with the Brazilian LGPD, and intends to tackle issues related to algorithmic transparency. Since data protection is a cross-cutting topic, the sandbox will allow for the testing of AI innovations across various sectors, including finance, health, and public administration. For more information please check ANPD's Regulatory Sandbox Call for Contributions

Drafting of the AI Bill: ANPD is actively contributing to the drafting of the AI Bill in Brazil, advocating for the protection of individual rights and the implementation of governance mechanisms to enhance transparency, fairness, and accountability in AI systems. Examples of ANPD's involvement include several key documents: Preliminary Analysis, in July, 2023, a Technical Note, in October, 2023, and Proposals for Amendment of the Bill's version, in May, 2024.

Regarding the regulatory framework, discussions on an AI bill have advanced. The main draft bill in discussion adopts a human-rights-oriented approach, including risk classification for AI systems, AI governance, and a risk-based approach. It also proposes the establishment of an AI supervisory authority. Recent stakeholder contributions, such as ANPD, to the bill have reinforced privacy rights protection in AI systems and guidelines for a sustainable economy in AI development. Further discussions and proposals on how the supervisory authority should operate and coordinate the various agencies pertaining to AI are still going through national debates. One proposal recently raised, in this regard, yet still under discussion, envisions the creation of a national system of regulation and governance in AI, whose main purpose is to promote and ensure cooperation and harmonization among regulatory bodies, without hierarchical subordination, and coordinated by a competent authority.

Navigating Data Protection in the G20 Digital Economy Agenda: ANPD organized a side-event titled "Navigating Data Protection in the G20 Digital Economy Agenda" during the 3rd G20 Digital Economy Working Group (DEWG) meeting in June 2024. This event aimed to explore the challenges and opportunities related to data protection within the digital economy. It emphasized the role of data protection in fostering digital inclusion, building trustworthy digital public infrastructure, ensuring information integrity, and supporting responsible AI use. ANPD facilitated multistakeholder discussions, including representatives from four G20 engagement groups (B20, C20, T20, and W20), G20 Members, UNESCO, and invited keynote speakers. The sessions focused on Media and Information Literacy (MIL) & Data Protection and Experimental Regulation & Data Governance. This side-event fostered discussions on best practices and collaborative approaches for promoting a secure, inclusive, and prosperous digital economy. Highlights of the speeches and discussions will be shared in a future report, to be shared in the following months.

Other relevant side-events in the context of the G20 presidency were: "Harnessing AI for Social Equity and Sustainable Development" in April; "Promoting Information Integrity: Combating Disinformation, Hate Speech, and Threats to Public Institutions Online," held on the margins of NetMundial+10 with participation of the OECD; Government and Inclusion within the Digital Government track (June). Further information of these side-events are available on G20 Brasil's official page.

In another context, the Unified Heath System Digital Program (SUS Digital Program) of the Ministry of Health focuses on digital health, with a multidisciplinary approach, integrating technology, information and health, incorporating software, hardware and services, as part of the digital transformation process. For the purposes of the Program, digital health encompasses, among others, interoperable information systems, electronic health data records, application of data science, artificial intelligence, telehealth, mobile health applications, wearable devices, applied robotics, personalized medicine, and the Internet of Things, among others, aimed at the health sector. The SUS Digital Program is composed of three axes Axis 1: digital health culture, training and continuing education in health; Axis 2: technological solutions and digital health services within the scope of the SUS; Axis 3: interoperability, analysis and dissemination of health data and information.

Apart from this Program, the Ministry of Health has recently established the Inova SUS Digital Laboratory, an interinstitutional environment dedicated to innovation and digital transformation in the Unified Health System (SUS). The Laboratory aims to promote, foster and develop innovative solutions to strengthen the Brazilian health ecosystem through innovation and digital transformation, focusing on improving services provided to the population. The Inova SUS Digital Laboratory will be

responsible for proposing themes, methodologies and criteria for selecting innovative practices and disseminating experiences relevant to digital innovation.

In addition, the National Health Data Network (RNDS) is the main information architecture for processing health data for the SUS, and is the national platform for interoperability (data exchange) in health. The RNDS supports the digital transformation of health in Brazil and aims to promote the exchange of information between points of the Health Care Network, enabling the transition and continuity of care in the public and private sectors. Still pertaining to the health sector, the "Meu SUS Digital" (My Digital SUS) is the official app of the Ministry of Health and the gateway to access the services of the Unified Health System (SUS) in digital format. It allows citizens to monitor their clinical history. The app displays general information about the citizen, such as the National Vaccination Card, National Covid-19 Certificate, International Certificate of Vaccination or Prophylaxis (CIVP), National Health Card, results of Covid-19 laboratory tests, as well as blood donation records and monitoring of the position on the transplant list. In addition, it allows citizens to identify health facilities near their location, according to the type of service desired.

Both RNDS and Meu SUS Digital are examples of technological policies that guarantee inclusion and direct benefits to citizens.

4. Do you have examples of policy instruments in place to favour the diffusion of frontier technologies in the economy and targeting specific sectors?

a. Industry 4.0
i. Brasil Mais Produtivo ("A more productive Brazil") Programme: This program aims to increase productivity and competitiveness in small and medium-sized enterprises (SMEs) by implementing advanced manufacturing technologies and practices.
ii. Embrapii (Brazilian Research Company and Business Innovation): Embrapii is a non-profit organization that supports research and development in industrial innovation. It facilitates collaboration between companies and research institutions to develop frontier technologies in sectors such as automotive, aerospace, and energy.
b. Internet of Things (IoT) Plan
i. Programa Internet das Coisas (IoT): Launched in 2017, this national strategy aims to stimulate the development and adoption of IoT technologies. The program targets specific sectors such as healthcare, agriculture, industry, and smart cities. It includes initiatives for research and development, regulatory adjustments, and support for startups and innovation.
c. Agricultural Technology
i. Plano ABC (Low Carbon Agriculture Plan): This plan promotes sustainable agricultural practices and the adoption of technologies that reduce greenhouse gas emissions. It includes financial incentives, technical assistance, and research support for precision agriculture, integrated crop-livestock-forest systems, and renewable energy use in agriculture.
ii. Agricultural produce tracking (to be launched): A system to track all agricultural goods produced in Brazil to guarantee safe, green and certified supply chain to buyers around the world.

In the field of health, Brazil has several policy instruments to promote the dissemination of cutting-edge technologies. Programs such as Startup Saúde ("Startup Health") encourage the development of innovative digital solutions for health. The Ministry of Health encourages partnerships with private companies to implement AI solutions.

The "Lei do Bem" (Brazilian Social Welfare Act) offers tax incentives to companies that invest in R&D, and the National Fund for Scientific and Technological Development (FNDCT) finances research and innovation projects in several areas.

5. Has your country put in place mechanisms to strengthen industrial capabilities through partnerships among different stakeholders (e.g., university-industry, or private-public)?

Brazil has several mechanisms to support the development of industrial capabilities through partnerships between different stakeholders. Among them, one of the most relevant is the ICT Law, which encourages investment in R&D in the country and accredits science and technology institutions to develop projects in cooperation with companies benefiting from the law. In addition to this initiative, the Ministry of Science, Technology and Innovation (MCTI), together with the Ministries of Education (MEC), Health (MS) and Development, Industry, Commerce and Services signed a management contract with a Brazilian Research Company and Business Innovation (EMBRAPII) for this institution to accredit research units with specific technological skills to develop R&D projects in partnership with companies, in a subsidized manner. In this way, by sharing project risks with companies, the aim is to encourage the industrial sector to innovate more and with greater technological intensity, thus enhancing the competitive strength of companies both in the domestic and international markets.

Furthermore, it is important to mention that the de-contingency of the National Fund for Scientific and Technological Development has allowed the strengthening and development of programs and actions in this regard, such as the Finep Mais Inovaçao line, which aims to support Strategic Innovation Plans (PEIs) aligned with the missions and structuring axes established within the scope of the National Industrial Development Council (https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/noticias/2024/04/plano-de-investimento-de-r-12-7-bilhoes-do-fndct-para-2024-e-aprovado) and the line More Innovation Brazil – Digital Technologies, which grants economic subsidy resources for innovative and technological risk projects (http://www.finep.gov.br/chamadas-publicas/chamadapublica/733).

In the field of health, for example, we observe the partnership between Google and the Ministry of Health, specifically in the context of the My SUS Digital application (Meu SUS Digital), mentioned in the previous paragraphs.

In the field of digital qualification, the Ministry of Labour of Brazil hightlights the initiative « School of Worker 4.0 », a partnership between the Ministry of Labour and Microsoft aiming at promiting the professional education/qualification and insertion in the labour market. This initiative encompasses free courses in topics such as technology, productivity, ranging from digital literacy to high-level programming and artificial intelligence.

Other examples involving multistakeholder partnerships are :
i. SIBRATEC (Brazilian Technology System): SIBRATEC is a program that promotes technological innovation by facilitating cooperation between research institutions, universities, and industries. It aims to improve the competitiveness of Brazilian companies by supporting the development and adoption of new technologies through collaborative projects.
ii. RHAE (Capacity-building Program for Human Resources aimed at Strategic Activities): The RHAE program encourages partnerships between universities, research institutions, and industries to develop human resources with the skills needed for strategic activities. It provides funding for training programs, internships, and research projects that involve collaboration between academia and industry.
iii. CAPES-Industry Cooperation Programs: The Coordination for the Improvement of Higher Education Personnel (CAPES) has established programs that promote cooperation between universities and industries. These programs provide funding for joint research projects, internships, and training programs to enhance industrial capabilities and innovation.
iv. FINEP (Finance Institution for Studies and Projects): FINEP offers various funding programs to support innovation and research projects that involve collaboration between public institutions, universities, and private companies. It provides grants, loans, and venture capital to stimulate technological development and strengthen industrial capabilities.

6. How can international cooperation support the uptake of new technologies and the development of technological capabilities in your country and ensure that industrial policies will benefit all and do not worsen inequality?

Given the high market concentration in frontier digital sectors and the high investments required to enable digital infrastructures and develop know-how in frontier technologies, international cooperation

can be an essential instrument for developing capabilities and adopting new technologies. In addition to strategic alliances between countries with similar geopolitical and commercial interests, international cooperation can contribute to the exchange of specialized information, the training of researchers and professionals, the development of cooperative R&D projects, the sharing of large research infrastructures, the access to sources of financing to make projects viable, etc.

In this regard, the Ministry of Health of Brazil recalls that its international collaboration with the World Health Organization and the Pan-American Health Organization bear fruits, such as transfer of knowledge and technology, training, in addition to establishing standards to enable equal access to benefits, whether solutions or services. In reference to question #3, Brazil has a vast experience, with the potential to be shared globally, in the field of health, notably through the Unified Health System Digital Programme. This federal funding was designed considering essential social and equitable criteria, precisely in line with what CSTD defends in terms of policies that can improve the quality of decision-making, making them more informed, more evidence-based and inclusive, promoting inclusive debate and identifying strategic priorities for the areas of Science, Technology and Innovation at the national level.

Finally, Brazil takes the opportunity as the rotative G20 presidency to foster discussions and international collaboration to address challenges such as digital inequality, digital inclusion and AI regulation. Those discussions can help create the framework aimed at promoting and supporting the democratization of those technologies.

7. What can do the UN CSTD to support an economic transformation that enhances your country productive capabilities and foster an inclusive digital transformation?

Given the excessive concentration of assets necessary for the adoption and development of frontier technologies, it is essential that the UN CSTD seeks ways to mobilize member countries and international organizations for the development of shared infrastructure and structuring projects. Furthermore, given that the development of frontier digital technologies is increasingly driven by large companies and not by universities and research centers, it is interesting that the UN CSTD develops mechanisms to support the development of technology companies in developing countries.

The CSTD can investigate how countries can contribute to the most viable solution in distribution of base knowledge of frontier technologies, especially to provide opportunities for countries to develop their own solutions without the usual gap that comes with development and research of new technologies. With open source and other policies, the digital gap and digital inequality can be reduced, especially in long term.

CSTD can lead discussions, for example, on the ethical and responsible development of AI to the health sector as well as provide platform to exchange best practices, as well as foster financing for R&D, training and capacity building in the area of digital health in developing countries.

The work in this forum should focus on access to the resources and capabilities needed for the local development of these technologies. Only in this way can these technologies truly benefit everyone and consider, from their conception, cultural issues and specific interests of different communities. The purpose is to take measures now so that AI does not end up becoming another layer of the digital divide that is reflected in barriers to fair economic competitiveness between countries but also in difficulties in the social inclusion of different populations within the same nation.

Brazil is ready to continue engaging in the work of CSTD and sharing its best practices in the digital transformation, contributing to make the nations of the Global South also technology powers, and not technology consumers.

Please indicate contact person(s) responsible for projects/policies and international collaboration in this context in case we need clarification on the inputs.
Please send your responses and any further inputs on the theme to the CSTD secretariat (stdev@unctad.org) by **24 July 2024**. We look forward to receiving your valuable inputs.

Sincere regards,

CSTD secretariat