



Research and Innovation

Working Group

Issue Note



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A. Context: Research and Innovation themes at the G20

The Covid-19 pandemic and major geopolitical conflicts highlighted the fragility of global production and supply chains and intensified the dispute for technological preponderance and competition based on national interests. Meanwhile, there are pressing global challenges, such as extreme weather events, water scarcity, rising sea levels and health emergencies, which recognize no borders and may only be resolved through active international cooperation in science, technology and innovation (S, T & I)

The theme of the first G20 Research and Innovation Initiative Meeting (G20 RIIG), held in 2022 in Indonesia, was “Using Biodiversity to Support the Green and Blue Economy”. Moving the agenda of this Initiative forward, India identified “Research and Innovation for an Equitable Society” as the main theme of the RIIG during its Presidency in 2023. The priority topics of the last two editions of the RIIG addressed sustainability, specifically addressing research and innovation related to biodiversity, eco-innovations for the energy transition, circular bioeconomy, sustainable blue economy and materials for sustainable energy. Several technical meetings were held, culminating in meetings of Research Ministers, in which the central role of science, technology and innovation in national, regional and global development processes was highlighted.

Brazil proposes to continue the RIIG discussions started in the Indonesian and Indian presidencies, now in the form of the Research and Innovation Working Group (RIWG).

B. RIWG Objectives

Considering that this will be the first meeting of the RIWG, it is advisable to draw up terms of reference for the new Working Group that defines minimum procedures, common principles, scope of actions and general objectives. The previous two chair summaries from RIIG’s ministerial meetings will serve as guidelines for the new working group.

According to the document resulting from the G20 Research Ministers' Meeting held in Mumbai on 5 July 2023, the meetings should provide a platform for stakeholders to share ideas and create new partnerships, while recognizing the role of research and innovation as a key factor in achieving socioeconomic and technological progress. The document further mentions working towards common principles that underpin open, transparent, reciprocal and accountable international research cooperation through dedicated multilateral dialogues. Therefore, countries should carry out research and innovation that has the potential to positively impact global sustainable development and promote better understanding between nations through scientific diplomacy.



In this sense, the RIWG shall continue to work to transform research and innovation ecosystems in order to respond responsibly and effectively to social and environmental challenges, including natural hazards, disasters and extreme weather events, and support joint efforts for this purpose, when necessary. This work must take place in an open and transparent way to build more sustainable, accessible, inclusive, resilient and adaptive systems.

It is also clear the group should encourage the mobility of students, academics, researchers and scientists between research and higher education institutions through mobility programs; striving to reduce barriers to inter-institutional collaborations to achieve inclusive and sustainable development and to create vibrant and sustainable economies and societies.

The Chair's summary resulting from the G20 Research and Innovation Ministers' Meeting held in Jakarta, on October 28, 2022, pointed out, in turn, the need to support the sharing of best practices related to training and capacity building of researchers in early career and those in less developed institutions and regions. He also listed potential areas of research and innovation cooperation between G20 countries:

- (i) protection, conservation, restoration and sustainable use of biodiversity and related ecosystem services;
- (ii) invention, testing, adoption and safe implementation of new technologies and innovations for sustainable development in general and the green and blue economy in particular, including bio-based products and services;
- (iii) sustainability of all sectors relevant to the development of biotechnology; and
- (iv) new and renewable energy to ensure access for all to low-cost, reliable, sustainable and modern clean energy.

Both documents agree on the relevance of open science, the sharing of research infrastructures and academic mobility to solve contemporary global challenges, achieve the Sustainable Development Goals and ensure evidence-based policies.

C. Theme and priority topics

As stated, the first meeting of the G20 Research and Innovation Working Group will continue the discussions of the two previous RIIG meetings, in Indonesia and India. It will also seek to maintain part of the priority topics of the Chief Scientific Advisors



Roundtable (CSAR), organized by India in 2023, which will not have its own meeting during the Brazilian presidency. Furthermore, it is worth noting that in 2023 we reached exactly the middle of the envisaged period of implementation of the United Nations Sustainable Development Goals (from 2016 to 2030). It is therefore essential to evaluate and, mainly, accelerate the implementation of “SDG 17 – Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development”, in particular the goals related to the topic of Technology.

Through the 2030 Agenda, countries committed to:

“17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism;

17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed;

17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology”.

Regarding SDG 9, which deals, among other topics, with promoting innovation, the countries committed to:

“9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending;

9.6 b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.”

Former UN Secretary-General Kofi Annan urged scientists years ago to act against technical-scientific inequality. In 2003, he pointed out that *“This unbalanced distribution of scientific activity generates serious problems not only for the scientific community in the developing countries, but for development itself. It accelerates the disparity between*



advanced and developing countries, creating social and economic difficulties at both national and international levels. The idea of two worlds of science is anathema to the scientific spirit. It will require the commitment of scientists and scientific institutions throughout the world to change that portrait to bring the benefits of science to all.” This statement holds true for Governments and remains valid 20 years later.

UNCTAD's 2023 technology and innovation report points out that countries in Latin America, the Caribbean and sub-Saharan Africa are the least prepared to use, adopt or adapt cutting-edge technologies and are at risk of losing current technological opportunities for a low-carbon world, such as Artificial Intelligence, Sustainable Hydrogen and the Internet of Things.

If on one hand, the scenario seems challenging; on the other, it opens a window of opportunity for economies that are already low carbon to embark on a green and technological revolution that is still on its initial phase. The same UNCTAD report points to the need for the international community to make trade rules more favorable to emerging green industries in developing economies and to reform intellectual property rights that facilitate technology transfers to these countries.

The members of the G20 are well positioned to make a deep reflection on whether we are in the right direction and speed to reverse the scenario outlined in 2003 by the Secretary-General of the United Nations and achieve the goals of the 2030 Agenda, as well as to propose and implement effective actions for this purpose. Signs are that we are still far from achieving our commitments, as technological advances in recent years have not led to a reduction in inequalities between nations.

Thus, Brazil proposes to place issues related to global asymmetries in access to science, technology and innovation at the center of its presidency. For the Brazilian presidency, the RIWG will have the theme **“Open Innovation for a Just and Sustainable Development”**. The intention is to strengthen actions for real advances, in a balanced and equitable way, in the science, technology and innovation agenda.

Special focus will be given to reducing scientific, technological and innovation inequalities and to inclusive, socially fair and environmentally responsible economic development.

This will be addressed through five highly convergent and complementary priority topics:

- 1) Open innovation for strengthening international north-south cooperation in S,T&I;



- 2) Open innovation for the decarbonization of the economy, including energy transitions and the bioeconomy;
- 3) Open innovation to guarantee the right, access and information about health;
- 4) Research and open innovation for a sustainable Amazon;
- 5) Inclusion, diversity and combating inequalities in science, technology and innovation.

These topics will be addressed in an integrated manner, in order to facilitate discussions over the coming months, thus ensuring a better systematization of the desired deliveries.

Priority topics:

1) Open innovation to strengthen international North-South cooperation in S,T&I

For most of the last century, the predominant paradigm in technological development was that of closed innovation, in which skills, techniques and product creation processes required direct control of relevant companies and governments, with little involvement of broader communities and modalities. Technical advances that allowed, especially in recent decades, greater availability and mobility of information, knowledge and qualified workers, as well as the maturation of global supply chains and capital markets, have paved the way for a change in this model. Entities can no longer afford to rely entirely on their own research and development infrastructures to keep up with productivity needs and economic volatility.

Furthermore, this traditional model based on national interests and dependent on secrecy and the dispute for technological preponderance has been proven insufficient to face serious challenges on a global scale, such as climate change, pandemics and health emergencies, food and water insecurity, etc. Similarly, doing everything as usual will not reduce, but rather increase inequalities, making it more difficult for nations that arrived late in the development process (latecomers) to advance.

Open innovation processes allow us to embrace external cooperation and explore the vast sources of internal and external knowledge through the management of knowledge flows from academia, companies and governments, as well as focused access to their respective economic resources and capabilities, in order to develop innovative opportunities. Brazil



endorses the idea that the open innovation paradigm can serve as a basis to reinforce efforts within the G20 community to achieve and accelerate sustainable development, as well as to more effectively integrate the S,T&I priorities of the developing world. By shifting science, technology, research and innovation policies from the national to the multinational/multilateral level, and making the results available to international knowledge communities, we can contribute to alleviating poverty and hunger, preserving the environment and improving quality livelihoods of populations around the world, especially the most vulnerable.

By promoting an open innovation strategy that advances global collaboration and integrates knowledge networks, G20 members can not only potentially benefit their own S,T&I systems, but also contribute to a more robust development of such systems in developing countries. An open innovation strategy can improve productivity on a local, regional and global scale, reduce the costs of research and development and improve digital transformation across multiple domains. Given that it also helps increase the availability of existing technologies and access to critical information for local communities, open innovation can be critical to combating global poverty, preventing and reversing environmental degradation, and improving access to education and services across the world.

Brazil supports the broad discussion, by the G20 RIWG, of best models and practices that lead to the creation of a Global Open Innovation Strategy, which may include (i) the use of appropriate open source technologies; (ii) the promotion of knowledge transfer partnerships;(iii) multilateral R,D&I financing platforms; (iv) common understandings on international trade agreements that allow nascent technological industries to flourish in, for example, new green sectors of developing countries; (v) multilateral platforms of technology foresight systems; (vi) international alignment on the need for more flexible intellectual property rules for less technologically advanced countries; (vii) international competitions of ideas aimed at sustainable development actions (hackathons, crowdsourcing initiatives, etc.) and, ultimately; (viii) the creation of an entire innovation network among member countries.

Proposed deliverables:

- Establishment of the G20 Initiative to promote open innovation.
- Formulation of the G20 Plan to accelerate the implementation of the SDGs related to the development, transfer, dissemination and diffusion of technologies (SDGs 9.5, 9b and 17.6 to 17.8)

2) Open innovation for the decarbonization of the economy, including energy transitions and bioeconomy

The decarbonization of the economy represents the only alternative to face the climate crisis and its effects, putting the world on a trajectory that limits global warming to 1.5 °C. This will require profound transformation in energy generation, industry, transport, civil construction, agriculture and land use, in which research and innovation play a central role. It will also involve radical strategies for initiatives that use biodiversity in a sustainable way, such as the circular bioeconomy, as an alternative to economic activities that increase deforestation and the emission of greenhouse gases.

In the case of Brazil, for example, the potential for decarbonization in productive activities applies mainly to projects involving bioeconomy, energy transitions and agribusiness.

In the bioeconomy, this can occur through innovative businesses developed from resources originating from vast biodiversity, which result in pharmaceuticals, vaccines, industrial enzymes, bioplastics, biofuels, bio-based chemicals, cosmetics, foods and fibers. The bioeconomy still has special relevance, both due to the revenue potential and the environmental and social benefits involved - mitigating the effects of climate change, forest conservation and restoration, job creation, access to new markets and improving the quality of life of local populations.

In energy, opportunities involve energy storage, energy efficiency, the use of solar energy (photovoltaic, thermal and heliothermal), wind energy (onshore and offshore) and the replacement of fossil fuels with biomass, producing biofuels from waste of animal, vegetable, industrial or urban origin, and the development of the sustainable hydrogen chain.

Changing the energy matrix from fossil resources to renewable and clean resources is the main aspect of the decarbonization of the economy. Energy transitions to a carbon-neutral world require a change in behavior and heavy investments in research and innovation to accelerate the process.

Brazil is a example of the energy transition, 48% of our energy matrix is based on renewable sources compared to a world average of 15%. Renewable sources comprise 82% of electricity generation in Brazil, the majority from hydroelectric generation, but with an increased share of photovoltaic solar energy and onshore and offshore wind energy, compared to a world average of 28%. Even so, Brazil has been working to make



its matrix even cleaner, with investments in research and innovation in second-generation ethanol, the use of biomass and the production of green hydrogen.

G20 countries at the RIIG meeting in Mumbai in July 2023 recognized that, in the pursuit of sustainable development, they need to expand the production and use of clean energy in line with the conclusions of the Intergovernmental Panel on Climate Change (IPCC), and promote affordable, reliable, modern and sustainable energy for all. Members supported progress towards a prosperous, inclusive, resilient, safe and sustainable society that leaves no one behind, and to accelerate the implementation of Nationally Determined Contributions (NDC) and just transition towards net-zero greenhouse gas (GHG) emissions carbon neutrality by mid-century. For this purpose, G20 countries encouraged research partnerships in areas of sustainable, clean and renewable energy generation, conversion and storage, including wind and solar energy and clean hydrogen and its derivatives; end-to-end production of energy storage devices; resilient supply chain management; and end-of-life management of technological waste.

The Brazilian G20 presidency expects to discuss further how to strengthen mechanisms that ensure all countries, especially developing countries, have the scientific, technological and innovation conditions to achieve the energy transition.

To expand the use of open technologies in decarbonization processes, it would be important for countries in the G20 group to identify the importance of expanding financing for this type of technological development and support the development of a monitoring platform for these initiatives.

Although the effects of climate change are global, developing and relatively less developed countries are even more vulnerable, even though they have historically been less responsible for the emission of greenhouse gases that triggered the process of global warming. It is these countries that need greater support from developed nations to strengthen their national S, T&I systems that respond to the challenges of mitigating and adapting to climate change and decarbonizing the economy.

Proposed deliverables:

- Preparation of a list of priority green technologies to be targets for the development, transfer, dissemination and diffusion of knowledge and technologies to developing countries, with the aim of achieving the global ecological transition and the decarbonization of the economy
- Preparation of a comparative study between national policies, strategies and research and innovation programs for the decarbonization of the economy, with a focus on bioeconomy.



· Preparation of a compendium of policies, strategies and national research and innovation programs for the energy transition.

3) Open innovation to guarantee the right, access and information to health

The Covid-19 pandemic demonstrated the vulnerability of national health systems to guarantee access for their respective populations. In addition to the overload on medical teams and hospital beds, we experienced an unprecedented rush for health products and equipment, from simple items such as disposable masks, gloves and other PPE to the more complex ones such as ventilators and vaccines.

This situation further highlighted the inequalities between rich countries, holders of technologies, and poor countries, dependent on donations that did not serve their populations at the necessary speed. This disparity also neglects the problems that afflict the majority of the world's population as they do not even have research, innovation and production of medicines or vaccines for diseases present mainly in the global south. It is urgent, in this context, to create and improve existing mechanisms that deal with the transfer of technology to the most vulnerable countries, such as the new Treaty on Pandemics, currently being negotiated within the scope of the World Health Organization – WHO.

A new context of search for reindustrialization on an innovative basis that could minimally respond to internal demands and future pandemics followed this global health crisis. Brazil is the only country with a population of more than 100 million inhabitants to have a universal health system and is making efforts to strengthen its local production of diagnostics, vaccines, medicines, equipment and software, as a way of guaranteeing its sovereignty in health. Most governments, including those in the G20, are following this same trend.



At the same time, these diverse national efforts, ideally intensive in research, development and innovation, to combat the next pandemics will not have a definitive solution without international cooperation in S, T&I. G20 countries can play a decisive role in discussing scientific, technological and innovation advances necessary to guarantee access and the right to health for all. In this debate, neglected diseases are of particular relevance to developing and relatively less developed countries, which urgently need a global increase in investment in research, development and innovation, the production of vaccines, treatments and diagnostics, and their control.

The threat of a new pandemic is real and is associated with both climatic elements and population expansion. This topic needs to be debated collectively through a One Health system. In this sense, it is important to create a virtual environment for collaboration between countries with the sharing of disease control tools, models, identification of environments and ecosystems suitable for the development of pathogens that are monitored collectively. This virtual environment needs to connect, for example, the different One Health institutions to have effective collaboration.

Proposed deliverables:

- RIWG support for the Pandemic Treaty, within the WHO, with a focus on ensuring technology transfer for equitable access to vaccines, treatments and diagnostics, as well as developing local capacities.
- Support for global mechanisms that encourage the establishment and development of infrastructures and centers for research, innovation and production in health in the global south, which enable such countries to be more prepared for future pandemics and neglected diseases.
- Support for the creation of a virtual environment for collaboration between countries with the sharing of disease control tools, models, identification of environments and ecosystems suitable for the development of pathogens that are collectively monitored.



4) Open innovation for a sustainable Amazon

The Amazon Forest is the largest tropical forest in the world. This forest has an estimated area of 6,700,000 km², distributed in nine of the eleven countries on South America: Brazil (60%), Peru (13%), Colombia (8%), Venezuela (6%), Bolivia (6%), Guyana (3%), Ecuador (2%), Suriname (2%) and French Guiana (1%).

This biome contains approximately one third of the world's biodiversity, including fauna and flora species, and incalculable microbial biodiversity. Furthermore, it plays a fundamental role in the global carbon stock (the equivalent of a decade of global carbon emissions) and fresh water, providing an invaluable service in controlling greenhouse gas emissions and regional water cycles.

This megabiodiversity has genetic potential for products with high economic value and constitutes a great possibility of generating wealth without destroying the forest and of social inclusion, involving the communities that inhabit it. Brazil recently made a commitment to achieve zero deforestation in the Amazon by 2030.

Sustainability actions for the Amazon must include the generation of knowledge and the definition of tools for the dissemination of technologies for the productive sector and society, strengthening the technical-scientific base to achieve a true regional and global productive structure.

G20 may promote the development of the science necessary to understand the potential of biodiversity and climate resources to solve technological bottlenecks. The bioeconomy can boost reindustrialization on a greener basis, that is, offering low-carbon alternatives that take advantage of biodiversity resources, adding value to the entire production chain.

G20 is a privileged multilateral space to discuss and propose scientific and technological improvement actions in the Amazon region capable of combating the loss of global biodiversity and the increase in GHG emissions, in addition to bringing the desired improvement in the quality of life of its population, the generation of income and wealth and inclusive and sustainable local economic development. A sustainable development model for the Amazon aligned with policies to combat deforestation, mitigate and adapt to climate change and protect local communities and indigenous peoples, including their traditional knowledge, is a global challenge that requires international collaboration in research and innovation.



In line with the intentions already expressed in previous RIIG meetings on joint actions on open science themes, the group of G20 countries should make efforts to support the cataloging of biodiversity. This would mean, for example, support for expanding the information base of the Global Biodiversity Information Facility (GBIF).

Proposed deliverables:

- Establishment of the G20 Initiative for Research and Innovation in the Amazon and Tropical Forests, to support research projects, academic mobility and the construction, use and sharing of research infrastructures.
- G20 support for species cataloging initiatives, such as GBIF, and support for the expansion of open biodiversity databases.
- Organization of an international seminar on challenges and opportunities for research and innovation in the Amazon Forest.

5) Inclusion, diversity and combating inequalities in science

The themes of inclusion, diversity and inequality in science, technology and innovation, while having transversal characteristics, have not played a central role in discussions on the advancement of these fields. They involve gender, race, ethnic, economic-social, regional and geopolitical dimensions.

The Brazilian presidency will seek to address the themes of inclusion, diversity and combating inequalities across all previous priorities, and addressing, for example, the need to increase the participation of women and girls in STEM careers and break down gender barriers, especially in the more advanced stages of scientific careers and innovation and entrepreneurship.

Especially in relation to entrepreneurship, it is fueled and the result of innovation, which arises mainly in academic environments. However, the connection between this environment and companies is not always natural and needs to be encouraged for it to occur efficiently.

Likewise, it will address the importance of traditional knowledge, the conservation of biodiversity, the protection of genetic heritage and the appreciation of culture for sustainable and inclusive development. The effective participation of people and communities in the management of natural resources and genetic heritage associated with their traditional knowledge can be addressed in detail, ensuring their prior informed consent and the fair sharing of benefits and the strengthening of the capabilities of people and communities to document, value, transmit and defend their traditional knowledge, respecting their customary norms and collective interests.



It is essential that countries have disaggregated data for gender, race and other forms of diversity so that we can build a global base that monitors advances in different countries and due to different policies. The creation of this collective database is fundamental to creating evidence-based policies.

Proposed deliverables:

- Preparation of G20 recommendations on inclusion, diversity and combating inequalities in science, technology and innovation.
- Support for the creation of a platform for monitoring equity policies, with data disaggregated into gender, race and other forms of diversity so that we can build a global base that monitors advances in different countries and due to different policies.



D. Proposed Agenda:

Brazil proposes to organize a series of activities throughout its presidency of the RIWG, with the following agenda:

Date	Activity	Location
February 7th and 8th	First RIWG Meeting (Inception)	virtual
March 11th and 12th	Second RIWG Meeting	Brasília, DF
April 29th	Delivery of the zero version of the Ministerial Declaration	
May 22th to 24th	Third RIWG Meeting	TBC
September 16th and 17th	Fourth RIWG Meeting	Manaus, Amazonas
September 19th	G20 Research and Innovation Ministers Meeting	Manaus, Amazonas