

Roadmap for EU - Brazil STI cooperation

1. BRAZIL as a partner of the EU

Brazil and the EU share a long-standing relationship based on strong cultural and historical ties. In fact, Brazil was one of the first countries to establish diplomatic relations with the EU. Today, Brazil is one of the EU's main partners and interlocutors in Latin America.

Brazil is an emerging global player, one of the leaders among developing countries, playing a moderating role within the BRICS and LAC. It has great influence on the G77 is member of the G20 and different international bodies and organisations. Brazil is presently candidate to access the OECD and is actively engaged in the reform of the U.N. Security Council.

Brazil is Latin America's largest country and the world's eighth-largest economy. Its trade with the EU accounts for 30.8% of the EU's total trade with the Latin American region. The EU is Brazil's first trading partner, accounting for 19.6% of its total trade and Brazil is the EU's 11th trading partner (1.7% of total EU trade - 2017). As regards foreign direct investments (FDI), the EU is the largest foreign investor in Brazil.

The EU and Brazil hold regular summits at the highest political level, focusing on key global challenges. The last EU – Brazil Summit, held in 2014, reiterated the importance of cooperation on research and innovation in addressing the shared economic, environmental and societal challenges within the context of the overall EU-Brazil relations.

The relationship between Brazil and the EU is governed by the EU-Brazil framework cooperation agreement (1992). This relation was upgraded to a strategic partnership in 2007. This has led to a significant widening of the scope of the cooperation, with several ongoing sectorial dialogues ranging from agriculture, intellectual property rights, environment, climate change, to air and maritime transport, education, drugs, non-proliferation, financial services, science and technology, energy, space cooperation, etc.

Brazil is a founding member of Mercosur with which the EU signed a Framework Cooperation Agreement in 1995 and is currently negotiating a free trade agreement.

Cooperation between the European Union and Brazil on research and innovation is governed by the [Agreement for Scientific and Technological \(S&T\) Cooperation](#) (signed in 2004, entered into force in 2007 and renewed until 2022). The S&T Agreement is intended to encourage, develop and facilitate cooperative activities in areas of common interest and is based on the principles of mutual benefit, timely exchange of information, reciprocal access to activities undertaken by each Party and appropriate protection of intellectual property rights.

¹ http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_122530.04.2018.pdf

In the area of Fusion Energy Research, a [bilateral Cooperation Agreement](#) under the Euratom Treaty, was signed in 2009, entered into force in 2013 and has been renewed until 2023. Brazil is one of the first non-ITER parties with which Euratom has signed a bilateral fusion cooperation agreement. Brazil is an emerging global player in nuclear fusion, determined to play this role with an ambitious fusion national programme to be supported by the planned National Fusion Laboratory in Sorocaba, São Paulo.

A [Cooperation Arrangement](#) was signed in January 2013 between the Joint Research Centre (JRC) and the Brazilian Ministry of Science, Technology and Innovation (MCTI). The agreement was renewed in March 2018 and it intends to strengthen cooperative activities in the areas of disaster prevention and crisis management; climate change and sustainable management of natural resources and ecosystem services; energy, including bioenergy and smart grids; food security; bio-economy; information and communication technologies (ICT), as well as nanotechnologies.

In October 2016, the European Commission and the Brazilian National Council of State Funding Agencies (CONFAP) signed an [Implementing Arrangement \(IA\)](#), intended to allow for enhanced cooperation between Brazilian Researchers and teams funded by the European Research Council (ERC). The Implementing Arrangement allows Brazilian researchers to undertake multiple short or one long term research visit to ERC funded teams in Europe.

In July 2017, the EU, Brazil and South Africa signed the [Belem Statement on Atlantic Research and Innovation Cooperation](#). It aims to improve the scientific knowledge of marine ecosystems and the links between oceans and climate change, food and energy systems, as well as the dynamics of the Atlantic Ocean and its interconnected circulation systems from Antarctica to the Arctic. The first Belem Statement Implementation meeting took place in July 2018, in Salvador, Bahia.

The Directorate General for Research and Innovation of the European Commission, the National Council for Scientific and Technological Development (CNPq), the Funding Agency for Studies and Projects (FINEP) and Brazilian National Council of State Funding Agencies (CONFAP) signed in May 2018, an administrative arrangement on the mechanisms to support EU – Brazil cooperation in research and innovation activities. The arrangement established the operation steps necessary to support collaborative activities, including co-funding of Horizon 2020 projects, twinning of projects and the launch of coordinated calls, as well as actions aimed at enhancement of mutual knowledge and awareness.

R&I landscape in BRAZIL

At the federal government level, the coordination of the research policy is under the responsibility of Ministry for Science, Technology, Innovations and Communications (MCTIC), the main body of the federal Science, Technology and Innovation (STI) system. In terms of definition and execution of the research budget, other ministries are also involved, like education, agriculture, health, energy, planning and development, industry and foreign trade.

The federal government is the main source of funding for universities and other research organizations. This means that most of the spending on science and technology is done by the public sector (around 53%). Over the past decade, state level research foundations have increased their funding of research. In general, funding comes majorly from the three main federal agencies: National Council for Scientific and Technological Development (CNPq), Coordination of Higher Education (CAPES) and Funding Agency for Studies and Projects (FINEP) and the 26 Brazilian State's Foundations (commonly known as FAPs).

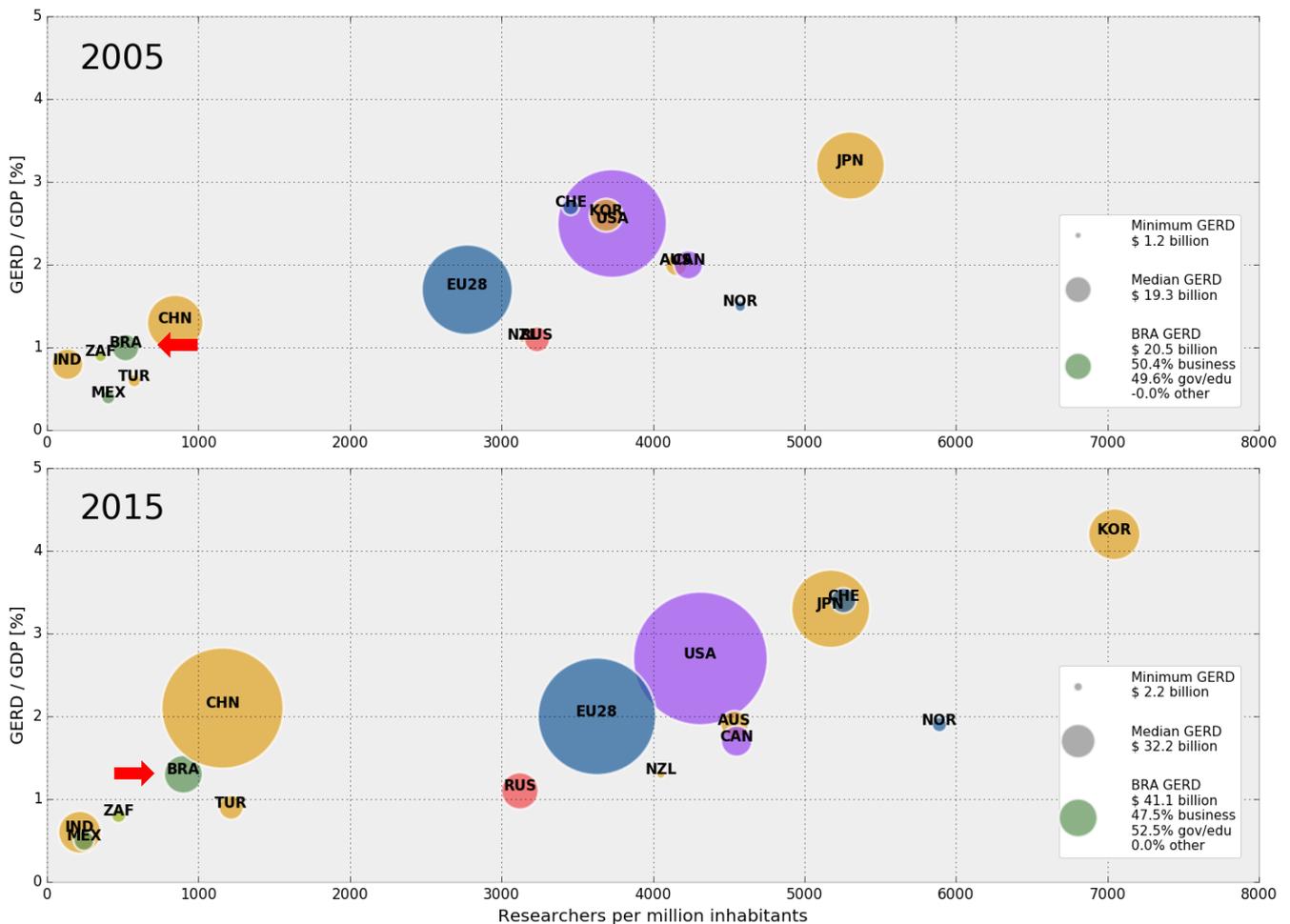
According to MCTIC, the total expenditure in research reached in 2016 (last data available) 1.27% of the GDP, being 0.67 % of public expenditure - 0.43% coming from the Federal government and 0.24% at state level. Private expenditure in R&D reached 0.6% of the GDP for the same year. Top Brazilian R&D spending enterprises spend more on R&D than EU enterprises, the result of relatively large companies in Oil, Mining and Aerospace (see European Innovation Scoreboard 2017).

A new "Legal Framework for STI" (Law 13.243/2016) known as "Marco Legal" was enacted in 2016, together with its regulation through the Presidential Decree 9.283/2018 enacted in 2018. Some main principles of the new law concern: the promotion of S&T activities as strategy for social and economic developments; the promotion of collaborations and interactions between public entities, between public and private sectors, and among enterprises; incentives for creating suitable environments for innovation and technological transfers; incentives to innovation activities in S&T entities and enterprises, including creation of R&D and innovation centres and technological parks; and the simplification of procedures for management of STI projects and adoption of evaluation and control of results.

The referred Decree 9.283/2018 creates specific mechanisms to integrate S&T institutions with enterprises and to encourage investments in research. It should (i) stimulate the industry's engagement in STI activities through contributions from private resources into research activities through federal agencies, like FINEP also supported by the BNDES (National Development Bank); (ii) facilitate the transfer of technology and the increase in cooperative projects between research institutions and entrepreneurs; (iii) simplify the signing of agreements and the internationalization of S&T institutions; and (iv) reduce the bureaucracy to stimulate the STI capacities of Brazil.

In this regard, EMBRAPII (Brazilian Enterprise for Research and Industrial Innovation) created in 2013 and managed by MCTIC is recognized as the most successful initiative to foster innovation in Brazil. Companies need to develop their projects with one of the 42 research units accredited to EMBRAPII in all regions of Brazil. EMBRAPII can invest up to 1/3 of the expenditures of the RD&I projects, and the rest between the company and the accredited unit as in-kind. The current numbers are around almost 160 million Euros of investment in almost 500 projects from around 350 companies.

Figure 1: Expenditures in Research & Development and researchers per million inhabitants



Note: GERD in current PPP; Top chart: Data for CHE from 2004. Bottom chart: Data on researchers per million inhabitants for BRA from 2014, for CAN from 2014, for MEX from 2013 and for AUS from 2010.
 Source: DG RTD - International Cooperation
 Data: UIS, OECD, EUROSTAT; extraction date: 11/10/2018

Despite the improvement over the past decade, Brazil’s expenditure on research is still very low when compared to industrialised countries or even other BRIC countries, like China. The National Strategy for Science, Technology and Innovation (ENCTI) 2016-2022, sets the goal on 2% of GDP to be reached by 2022 and identify key challenges to be tackled:

- Closing the technological gap with developed economies;
- Strengthening institutional capabilities to increase productivity through innovation;
- Reducing social and regional inequalities in access to the countries' national innovation system;
- Developing innovative solutions for productive and social inclusion;
- Promoting sustainable development.

The strategy also identified as priority areas, among others, defence, water, food, biomes and bio-economy, climate change, ICT, energy and health. All of which are of particular interest to the EU. International cooperation is seen as cross cutting in support of all thematic priorities.

The past decade also saw an improvement in number and qualification of human resources as well as in R&D infrastructure. The number of researchers more than double in the same period passing from 90320 in 2006 to 199566 in 2016. The number of universities grew from 403 in 2006 to 531 in 2016². Brazil has 6 universities among the world's top 500 and hosts the top Universities in Latin America³.

Despite fiscal austerity and low economic growth, the Federal Government continues to support key research infrastructures, like the Synchrotron Light Laboratory (LNLS) and the National Centre for Monitoring and Warnings of Natural Disasters (CEMADEN). The LNLS is currently building Sirius, a fourth-generation synchrotron light source, planned to be one of the most advanced in the world. Sirius will be the biggest and the most complex scientific infrastructure ever built in the country.

Research output measured in number of scientific publications has also increased significantly but at a slower pace than other emerging economies, like China or India. Brazil has a weak level of international collaboration, as seen by the low share of international co-authored articles and co-patents⁴.

According to the European Innovation Scoreboard of 2018, the performance of Brazil is below that of the EU, and the country is a Moderate Innovator. Performance has increased since 2010 and it has been highest in Marketing and organisational innovators, in which Brazil performs better than the EU. Also in trademark applications and knowledge-intensive services export, Brazil performs better than the EU. The Global Competitiveness Report for 2017-2018 places Brazil in the 80th position, thanks to the improvements in several indicators, like the institutions pillar and the macroeconomic situation. According to the World Economic Forum "Brazil's largest progress comes in the innovation pillar, with upturns in many of the indicators, indicating an enhanced capacity for innovation, more industry-university-business collaboration, a higher quality of research, and better-trained scientists and engineers"⁵.

Brazil remains at the forefront of research in the field of agriculture, mainly due to the excellence of EMBRAPA research centres, as well as in tropical and infectious diseases. It is also a world-class player in the fields of Information and Communication Technologies, Nanotechnologies and Energy, notably biofuels (second world producer of liquid biofuels, after the United States of America).

² According to indicators published by MCTIC and available here: <http://www.mctic.gov.br/mctic/opencms/indicadores/index.html>

³ According to the Shanghai ranking for 2016, the top 5 universities in Latin America are (by order): the University of São Paulo, National Autonomous University of Mexico, University of Buenos Aires (Argentina), Federal University of Minas Gerais and Federal University of Rio de Janeiro.

⁴ For all, see OECD Science, Technology and Innovation Outlook 2016.

⁵ See Global Competitiveness Report 2017-2018 by the World Economic Forum

2. STATE OF PLAY OF EU-BRAZIL S&T COOPERATION

2.1. On-going FP7 and Horizon 2020 cooperation

The Seventh Framework Programme (FP7) has promoted research and innovation initiatives during the timeframe 2007-2013, with a total budget of EUR 53 billion. The programme was very open to international collaboration and strongly encouraged it.

Under FP7, Brazil was still automatically eligible for EU funding. In fact, Brazilian entities participated 441 times in 291 FP7 signed grant agreements, receiving a total EU contribution of €42.9 million for such participants, and an overall EU Contribution of €565 million in total, for the respective projects. Among all third countries in all FP7 signed agreements Brazil ranked 6th in number of participations and in budget share (according to final statistics of FP7). Overall, the success rate for Brazil was approximately 23% very similar to the average success rate of all Third countries (22%).

The majority of Brazilian institutions participating in FP7 signed agreements were located in the South and Southeast of the country and the majority was Higher Education institutions. The States with the highest number of financed projects were São Paulo, Rio de Janeiro and Minas Gerais, whereas the Northern States managed to attain less funded projects. The Midwest presented an expressive participation, due to the concentration of the public institutions located in Brasília, Distrito Federal.

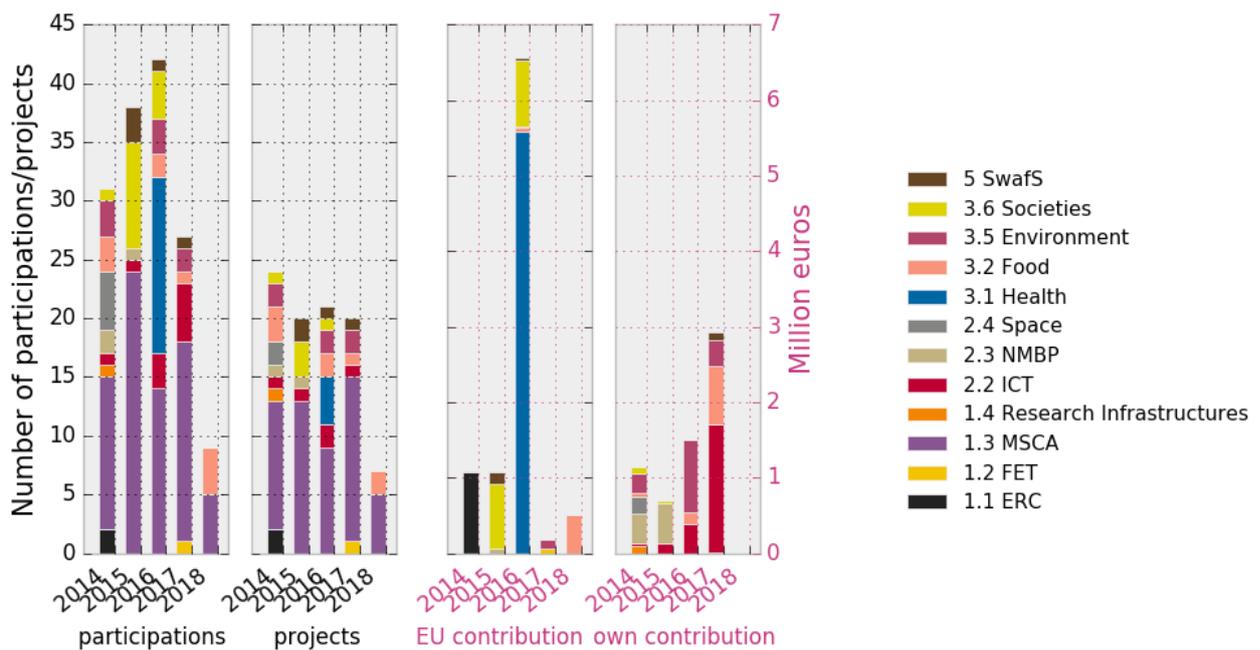
In FP7 159 Brazilian Researchers and 187 Brazilian organisations participated in Marie Skłodowska-Curie actions (MSCA) and 1470 Brazilians participated in the International Research Staff Exchange Scheme (RISE). On the other hand, Brazilian organisations hosted 6 European researchers MSCA and 1228 Europeans that took part in the RISE scheme. In addition, 5 Brazilian researchers obtained ERC grants.

In December 2013, the new programme Horizon 2020 was launched. Running from 2014 to 2020 with a € 80 billion budget, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe. It stands in three main pillars: excellent science, industrial leadership and societal challenges.

Under Horizon 2020 due to the "non-automatic funding" principle which applies to emerging economies, Brazilian entities are no longer automatically eligible for EU funding⁶. Such limitation has decreased significantly Brazilian participation in the calls launched in Horizon 2020.

⁶ For collaborative research projects. Individual Brazilian researchers are always eligible for EU funding under the Marie Skłodowska-Curie Actions – Individual Fellowships and under the European Research Council programme

Figure 2: Participation of Brazil in Horizon 2020



Note: Participations of beneficiaries, third-parties and partner-organisations.
 Source: DG Research and Innovation - International Cooperation
 Data: CORDA (JRC, EIT and art.185 not included); extraction date: 15/10/2018

Up to October 2018, Brazilian entities have participated 147 times to 92 signed grants of collaborative, MSCA and ERC actions of Horizon 2020, receiving €9.7 million of direct EU contribution while €6.3 million is the non-EU budget of Brazilian beneficiaries.

Regarding collaborative actions⁷ of Horizon 2020, Brazilian applicants are involved 497 times in eligible proposals, with a success rate of 20.6% (as compared to 15.8% overall).

Regarding the Marie Skłodowska-Curie Actions (MSCA), Brazilian entities have participated 73 times in MSCA (3 in Individual Fellowships (IF), 63 in the RISE, 4 in the ITN and 3 in the COFUND action). A total of 206 researchers and staff members of BR nationality have participated in MSCA. At the same time, 152 MSCA researchers and staff members of different nationalities have been hosted in Brazil.

Regarding support to frontier research, 54 applications by researchers of Brazilian nationality have been, so far, presented under H2020 (against 55 of all FP7) and 5 principal investigators of Brazilian nationality obtained an ERC grant. An extrapolation of the figures to some 7,000 ERC projects would indicate that there are currently altogether an estimated 270 team members with Brazilian nationality engaged in ERC projects.

⁷ i.e. excluding projects under ERC, MSCA, SME Instrument and Access to Risk Finance.

In addition, 12 Brazilian scientists were selected, in 2017, to undertake research visits in ERC funded teams in Europe, under the Implementing Agreement between EC and CONFAP. The destination countries are France, Denmark, Belgium, Italy, Germany, United Kingdom, Netherlands, Portugal and Sweden.

In the field of fusion energy research, there are presently about 15 on-going collaborative activities, involving 17 European research institutions and 14 Brazilian entities, and in particular, two specific JET (Joint European Torus) related projects.

2.2. Current framework conditions for EU-BRAZIL S&T cooperation

Framework conditions for cooperation have been improving over the last years, notably with the recently signed Administrative Arrangement on mechanisms to support EU – Brazil cooperation in research and innovation activities. Still, more can be done, mainly to ensure mutual opening of funding programmes and proper dissemination of cooperation opportunities.

Some funding agencies, like CAPES, CNPq, FAPESP⁸ and FAPERJ⁹ have calls open to international cooperation (i.e., open to the participation of foreign researchers/entities with own funding) mainly supporting mobility and exchange programmes. FINEP and several State Funding Agencies (FAPs) have bilateral agreements with different European Funding Agencies and launch regular coordinated calls.

The EU's framework programmes for research and innovation have been the main vehicle for cooperation. Under Horizon 2020, as mentioned, Brazilian entities are no longer automatically eligible for EU funding. To overcome the "non-automatic" funding rule for Brazilian participation in Horizon 2020, the EU Delegation in Brazil and the Brazilian National Council of State Funding Agencies (CONFAP) signed a Letter of Intent in December 2014, that works as the overall umbrella under which single State Foundations (commonly known as FAPs) are encouraged to implement mechanisms for co-funding the participation of Brazilian entities in collaborative Horizon 2020 projects¹⁰.

In March 2015, the first co-funding mechanism was set-up by FAPESP. So far, co-funding mechanisms for Brazilian participants in Horizon 2020 are available in the following states:

- Fundação de Amparo à Pesquisa do Estado de São Paulo - [FAPESP](#)
- Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina- [FAPESC](#)
- Fundação de Amparo à Pesquisa do Estado de Goiás - [FAPEG](#)

⁸ Research Foundation of São Paulo

⁹ Research Foundation of Rio de Janeiro

¹⁰ Detailed information on the co-funding mechanisms can be found at <http://confap.org.br/news/horizonte-2020/>

- Fundação de Amparo à Pesquisa do Estado de Minas Gerais - [FAPEMIG](#)
- Fundação Araucária de Apoio ao Desenvolvimento Científico e Tecnológico do Estado do Paraná - [FAPPR](#)
- Fundação de Amparo à Pesquisa e Inovação de Espírito Santo - [FAPES](#)
- Fundação de Amparo à Pesquisa do Estado de Distrito Federal - [FAPDF](#)
- Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão - [FAPEMA](#)
- Fundação de Apoio ao desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul - [FUNDECT](#)

This co-funding mechanism is now being extended with mechanisms in support of cooperation agreed at the Administrative Arrangement signed in May 2018 (see above: “Brazil as a partner of the EU”).

Other mechanisms of policy support:

To support the STI cooperation, the BILAT project INCOBRA (2016-2019, funded under Horizon 2020) has the overall objective to focus, increase and enhance Research & Innovation Cooperation Activities between Brazil and EU R&I actors.

Specifically aiming at supporting European innovative entrepreneurs and companies, a European Research and Innovation Centre - ENRICH-Brazil - was set up under a Horizon 2020 funded project (CEBRABIC – Centre for Europe Brazil Business and Innovation Cooperation running from 2017 until 2021), and named.

Also the EU-Brazil Sector Dialogues Support Facility is intended to contribute to the advancement and enhancement of the strategic partnership and bilateral relations between Brazil and the EU, by fostering greater exchanges of technical know-how. The project is coordinated jointly by the Brazilian Ministry of Planning and the Delegation of the European Union to Brazil, with financing from the Foreign Partnership Instrument.

The 10th call of the Sector Dialogue was published in 2018. Final selected projects are expected to start in November 2018.

3. Priorities for the future in S&T cooperation

3.1. Areas of future S&T cooperation agreed at latest Joint Committee

At the VIII Brazil – EU Joint Steering Committee meeting (November 2017) it was agreed to step up bilateral engagement in the following areas:

- **Marine Research:** was selected as one of the most relevant priority areas for cooperation. In July 2017, the "[Belém Statement on Atlantic Research and Innovation Cooperation](#)" was co-signed, between the EU, Brazil and South Africa. It aims to improve the scientific knowledge of marine ecosystems and the links between oceans and climate change, food and energy systems, as well as the dynamics of the Atlantic Ocean and its interconnected circulation systems from Antarctica to the Arctic. The statement is building on previous bilateral Declarations of Intent on Marine Research and Innovation Cooperation signed by the European Commission with [Brazil](#) and [South Africa](#), and the development of the [South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern Ocean](#). It will also help to closely link research activities in the South Atlantic and Southern Ocean with those in the North Atlantic, and explore synergies with other initiatives.

On the EU side, the "*Belém Statement*" will be implemented through the call included in the Blue Growth part of Societal Challenge 2 published under the Horizon 2020 Work Programme for 2018-2020, with a total budget of €60 million. Considering the importance of this partnership, participation of researchers from South Africa and from Brazil in the future projects is mandatory and Brazilian partners will be exceptionally eligible for EU funding. Other calls are also open to Brazilian participation.

- **Health:** most health-related issues have a global nature and therefore, cooperation is essential and better accomplished at multilateral level. In this sense, the recent ZIKA virus outbreak has shown that a network such as the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R) can be crucial in quickly gathering resources, in this case, from the EU and CELAC (Community of Latin American and Caribbean States). A dedicated Horizon 2020 call on ZIKA was launched in March 2016 to set up a research network across the Latin America region to facilitate, coordinate and implement urgent research against the ZIKA outbreak, and laid the foundation for a preparedness research network against any future emerging severe infectious threats. Given the seriousness of the outbreak in Brazil and the risks associated to its spreading in the region and globally, on an exceptional basis, Brazilian partners were eligible for EU funding. The response from the Brazilian research community was extremely positive and the three projects funded under this call count with 13 Brazilian participations.

For the future, cooperation will continue to focus on the multilateral initiatives led/supported by the European Commission and that count with Brazilian partners, like the [Global Research Collaboration for Infectious Disease Preparedness \(GloPID-R\)](#) or the [Global Alliance for Chronic Diseases \(GACD\)](#). In addition, under the EU – CELAC Common Research Area, future topics for cooperation are chronic diseases, infectious diseases and anti-microbial resistance. It was also launched under H2020 Work Programme 2018-2020 one call on translational collaborative cancer research, as cancer is becoming one of the most important health problems world-wide. A total of five proposals with participation of eight Brazilian institutions were approved and the Brazilian federal agencies are analysing the possibilities to fund Brazilian entities under the Administrative Arrangement.

- **Transport and aviation:** The Brazilian aerospace industry is one of the most competitive industries in Brazil and Brazilian Embraer is one of the four major civil aircraft manufacturers in the world. Embraer

Brazil and Embraer Portugal participate in EU funded projects, like ITAKA (an FP7 project on alternative fuels for aviation) and Future-Sky-Safety (a Horizon 2020 project in the field of aviation safety). "Safer and Greener Aviation in a smaller world" is an international cooperation flagship that includes initiatives related to Brazil's capacities, such as use of biofuels, atmospheric research, aviation icing safety research and disruptive technologies for future higher-speed aviation. The topic "Innovative technologies for improving aviation safety and certification in icing conditions" explicitly targets Brazil and other countries in a multilateral approach. In addition, the topic "Human Factors in Transport Safety" also encourages international cooperation, including aviation.

For transport, cooperation is being considered as part of the EU – CELAC dialogue. Three initiatives are planned for the H2020 WP 2018-2020:

1) In the "INCO Flagship on reduction of transport impact on air quality" international cooperation is encouraged in both the areas of 'Low-emission oriented driving, management and assistance' (in particular with China and other Asian and/or CELAC countries) and of "Measurement of airborne pollutants emissions from aircraft (in particular with Asia, CELAC and the US);

2) The aim of the "INCO Flagship on "Urban mobility and sustainable electrification in large urban areas in developing and emerging economies" is to bring together European, Asian (e.g. China), CELAC and African research partners, government agencies and urban authorities, private sector and civil society and to foster participatory engagement in urban electrification in order to reduce air pollution and CO2 emissions;

3) Finally, the INCO flagship on "Integrated multimodal, low-emission freight transport systems and logistics" targets international cooperation with projects or partners from the US, Japan, Canada, China, Latin America.

- **Nanotechnology:** significant progress was achieved in the past years in the field of nanosafety, namely with the participation of Brazil, since 2015, to the NANoREG project, a European initiative that deals with international regulation for nanotechnology.

In the H2020 Work Programme 2018-2020, cooperation with Brazil is sought under the call "Governance, science-based risk assessment and regulatory aspects" with 3 topics related to risk governance of nanotechnology, nanoinformatics and safe by design. Other topics of interest are planned for 2020.

- **Sustainable urbanisation:** Sustainable cities and nature-based solutions (NBS) are the subject of projects under the EU – Brazil Sector Dialogue aiming to facilitate mutual learning and knowledge sharing in this field. The first sector dialogue in 2015-16 was an opportunity to promote European nature-based solutions worldwide.

A second sector dialogue 'The EU- Brazil Sector Dialogue on 'Nature-based Solutions for resilient cities: from R&I to implementation' was approved under the 9th call. The project started in 2017 and will end in the second half of 2018. The purpose is to deepen mutual learning on NBS, with a bigger emphasis on the Brazilian challenges, priorities and existing best practices. Exchange activities include a visit of Brazilian representatives to EU cities participating in Horizon 2020 NBS demonstration projects (October 2017) and Brazilian participation to the Estonian Presidency conference on NBS in Tallinn October 2017, as well as an international seminar and a workshop in Brazil (July 2018).

Under the Horizon 2020 Work Programme 2018-2020, there will be a dedicated action on NBS for urban ecosystem regeneration, specifically targeting the Latin American and Caribbean region.

Brazil is also participating to the EU-LAC Working Group on Sustainable Urbanisation (WG-SU). The group has been proposed after the EU-LAC Senior Officials Meeting in Research and Innovation (March 2017) confirmed research cooperation in sustainable urbanisation as a strategic priority of common interest. The objective is to develop a common Strategic R&I Agenda (SRIA) for sustainable urbanization, in line with Societal Development Goal (SDG) 11, and to explore modalities for its joint implementation. Currently, LAC countries are nominating their representatives.

- **Renewable Energy:** has been a top priority for EU – Brazil cooperation for the past years. Two coordinated calls on biofuels have been launched, the last one in 2016. This call funded by Horizon 2020 and on the Brazilian side by FAPESP, CONFAP and MCTIC exploits mutual synergies on the development of advanced biofuels. One project was financed on each side and the European one started its works in May 2017.

Brazil, like the European Commission, is a member of the global initiative Mission Innovation ^[1]. Brazil is co-leading the Innovation Challenge (IC) on Sustainable Biofuels, and is also participating in the following ICs: Smart Grids; Off-Grid Access to Electricity; Converting Sunlight (co-led by the EC); and Affordable Heating and Cooling of Buildings (also co-led by the EC). Brazil is the second world producer of liquid biofuel, also as a result of a successful R&D program on ethanol conducted in the 1970s.

- **ICT:** The EU – Brazil ICT dialogues take place on an annual basis since 2007 to discuss the Policies for the Information Society and Digital Transformation. Research and Innovation is an important chapter. Four joint calls have been implemented so far with the MCTI (through CNPq and Brazilian National Research and Education Network (RNP) which act as funding agencies for the Brazilian partners). The 4th call was part of H2020 ICT work-programme 2017 and addressed 5G, Cloud Computing and pilots for Internet of Things (IoT) with 6 new projects worth 16 MEUR planned to start in November 2017.

^[1] <http://mission-innovation.net/joint-statement/>

In the upcoming H2020 work-programme a joint call is included under FET-HPC addressing High Performance Computer applications for health and energy. Other topics, such as 5G collaboration, are expected to be included possibly by 2020.

- **Cooperation with the European Commission's Joint Research Centre (JRC):** The JRC and MCTIC have been progressing with the implementation of a collaboration agreement following a work programme and ensuring regular exchange on its execution via annual Steering Group meetings. The work programme includes joint activities related to climate change, disaster prevention, water resources management, smart grids, sustainable agriculture and food security, bioeconomy, nanotechnologies, human mapping and forest resources monitoring. In 2017, for the fourth consecutive year, several common projects were selected for funding under the EU-Brazil Sector Dialogue Support Facility on circular economy and life cycle assessment, smart specialisation and collaboration on natural disasters, among others.
- **Fusion energy research:** at the first meeting of the Brazil-Euratom Coordinating Committee (September 2015), under the bilateral Fusion Cooperation Agreement, both sides adopted the "Brazil-Euratom Fusion Work Programme" based on the following main lines of activities: enhancing the alignment and convergence of the respective programmes; updating the mapping of the on-going collaborative activities; organizing technical missions of Brazilian scientists to Joint European Torus in the UK for the installation, commissioning and operation of the TAE¹¹ diagnostic system; and a visit of European experts to Brazil in relation to the Brazilian Laboratory of Fusion. Good progress has been achieved in many of the agreed actions, notably cooperation on JET.

Awareness-raising about Euratom Research and Training Programme and about the possibilities of Brazilian entities to apply under the Euratom Fission Calls is of mutual benefit.

3.2. Other areas of future S&T cooperation proposed at latest Joint Committee, through SFIC, or by thematic services

- **Climate action:** As one of the leading nations on climate negotiations, Brazil committed to reduce its greenhouse gas emissions by 43% at the Paris Climate Conference in 2016 and is therefore an important player in this area.

In addition, FAPESP is a member and current co-chair of the Belmont Forum, a partnership of the world's major and emerging funders of global environmental research. As one of its major activities, the Belmont Forum launches Collaborative Research Actions (CRAs) on specific themes, like freshwater security, biodiversity and ecosystem or global urbanisation.

¹¹ "Toroidal Alfvén Eigenmode" antenna.

- **Earth Observation:** Brazil and the European Commission were founding members of the Group on Earth Observations (GEO) which now numbers 105 member governments and 115 participating organisations. The initiative, which is Co-Chaired by the European Commission, aims to ensure Earth observation data and the information and knowledge derived from those observations allow solutions to global challenges to be identified and implemented. As a direct contribution to the Global Earth Observation System of Systems, Instituto Oceanográfico da Universidad de Sao Paulo (IOUSP) is a partner in the H2020 project Atlantos (an Integrated Atlantic Ocean Observing System). Brazil plays an active role together with many European organisations in the GEO Flagship Forest Observations Initiative (GFOI) , in the GEO Global Network for Observation and Information in Mountain Environments initiative (GEO-GNOME), the GEO Human Planet Initiative (Spatial Modelling of Impact, Exposure and Access to Resources), the GEO Global Drought Information System (GDIS), the GEO Global Urban Observation and Information initiative as well leading capacity building activities and participating in the development and dissemination of sustained and cost-effective satellite-based dissemination systems (GEONETCAST). The GEO Blue Planet initiative, presents further opportunities for collaboration between the EU and Brazil as it aims to ensure the sustained development and use of ocean and coastal observations for the benefit of society.
- **Space:** space research has its main objective and challenge to foster a cost-effective competitive and innovative space industry (including SMEs) and research community to develop and exploit space infrastructure to meet future Union policy and societal needs. It is also a key topic identified in Brazil's National STI Strategy 2016-2019, in line with the National Programme of Space Activities for 2012-2021. Brazil has two launching bases and current efforts are mainly devoted to the development of satellites for earth observation, weather monitoring and communication and research activities. Brazilian space industry is mainly composed of SME's located in the southeast region of the country.
- **Research infrastructures:** Under Research Infrastructures (RI), Brazilian and European Research Infrastructures are already collaborating around a limited number of activities (there were 11 projects under FP7 under the theme of RI, including e-infrastructures and 1 project in H2020, so far).

A relevant initiative which could positively impact cooperation is the Trans-Atlantic submarine cable for connectivity to Latin America aimed at ensuring very high capacity, cost benefit, short route and stimulating diversity over the trans-Atlantic segment.

Research infrastructures is one of the three strategic pillars of the EU – CELAC Common Research Area (CRA) and a bi-regional Working Group on Research Infrastructures (WG RI) has been recently set up. Brazil's involvement in this WG is welcome.

There are currently two calls under Horizon 2020 where Brazilian entities are eligible for funding. The first, [INFRA supp-01-2019](#), is a Coordination and Support Action (CSA) that aims to support one project to concretely build on the outputs of the EU-CELAC Research Infrastructure Working Group, and by means of dedicated workshops and meetings between involved communities (research infrastructures,

ministries, funding agencies support the identification of priorities, exchange of best practices etc. The second, [INFRAIA-01-2018-2019](#), is a Research and Innovation Action (RIA) that aims to support 11 projects of €10 million each, among 20 areas addressed for the 2019 deadline. i.e.: Biological and medical sciences; Energy; Environmental and earth sciences; Mathematics and ICT; Materials sciences and analytical facilities; Physical sciences; and Social sciences and humanities.

- **Bioeconomy:** Bioeconomy is a strategic priority in Research and Innovation for Brazil and for the EU. In the Bioeconomy area, the EU is launching the International Bioeconomy Forum (IBF). The aim of IBF is to provide a flexible multilateral instrument for international cooperation, specific to the bioeconomy, capable of adapting to emerging global needs. IBF will align research funding programmes and focus the global effort on specific research areas of global interest; identify emerging needs, issues and future research trends; create a knowledge exchange on critical areas (e.g. outbreak of plant diseases affecting several regions and new areas due to climate change) and develop a policy dialogue, especially on bioeconomy indicators and on availability of biomass, essential for measuring progress of the bioeconomy at international level.

IBF is open to the involvement of Brazil and its funding agencies and could support EU-Brazil cooperation on a number of key R&I and horizontal activities in the Bioeconomy area.

The Work Programme 2018-2020 of Horizon 2020 will include a coordination and support action supporting microbiome coordination and of the IBF that is particularly suitable for Brazilian funding agencies considering the microbiome-related research and programmes existing in the country.

3.3. Improvements in framework conditions agreed at latest Joint Committee/High Level Dialogue and additional framework conditions to be addressed at future policy dialogue meetings

The last EU-Brazil Joint Steering Committee Meeting - JSCM (November 2017) stressed the need to continuously improve framework conditions for cooperation, mainly focusing on co-funding of common activities and dissemination of cooperation opportunities.

Regarding co-funding, the JSCM considered the need to improve and complement the current co-funding mechanism set in place with the support of CONFAP and being implemented by eight FAPs. The JSCM endorsed the negotiation and conclusion of an administrative arrangement aiming to establish mechanisms to support cooperation and including all relevant actors, namely the Federal Funding agencies. Following this mandate, the Directorate General for Research and Innovation of the European Commission, on the European side and CNPq, FINEP and CONFAP on the Brazilian side, signed an administrative arrangement on mechanisms for cooperation in research and innovation. The arrangement describes three mechanisms: co-funding of Brazilian participation in Horizon 2020 projects, twinning of projects and the launch of coordinated calls. The arrangement is valid

through the entire duration of Horizon 2020 and could set a new model of co-funding activities for EU – Brazil cooperation in R&I.

Regarding dissemination and communication of cooperation opportunities, Brazil has been expanding its network of National Contacts Points (NCPs). Currently, there are various experts from seven institutions acting as NCPs: CNPq on JRC cooperation, CONFAP on MSCA, FGV on Social Sciences and Humanities, and energy, FIOCRUZ on health, MCTIC/SEPED on marine research and energy; RNP in ICTs, and USP as general coordinator, ERC and ICTs.

The EU-Brazil cooperation would also be strengthened by further supporting two-way mobility of researchers and academic staff. In this sense, an Implementing Arrangement between the European Commission and CONFAP was signed in 2016 encouraging Brazilian researchers to temporarily join teams funded by the European Research Council (ERC). The first call (2017) resulted in 12 research visits from Brazilian researchers to ERC funded teams, working in Europe.

ANNEXES:**HORIZON 2020 WORK PROGRAMME 2018-20 TOPICS ENCOURAGING COOPERATION WITH BRAZIL**

Topic id	Topic Title
2019	
INFRAIA-01-2018-2019	Integrating Activities for Advanced Communities
INFRASUPP-01-2018-2019	Policy and international cooperation measures for research infrastructures*
NMBP-15-2019	Safe by design, from science to regulation: metrics and main sectors
BG-08-2018-2019	All Atlantic Ocean Research Alliance Flagship *
NMBP-15-2019	Safe by design, from science to regulation: metrics and main sectors
CE-RUR-08-2018-2019-2020	CE-RUR-08-2018-2019-2020: Closing nutrient cycles (topics b and c)
DT-SPACE-06-EO-2019	International Cooperation Copernicus – Designing EO downstream applications with international partners
LC-GV-05-2019	Urban mobility and sustainable electrification in large urban areas in developing and emerging economies
LC-CLA-06-2019	Inter-relationships between climate change, biodiversity and ecosystem services
MG-2-9-2019	Integrated multimodal, low-emission freight transport systems and logistics
SC5-13-2019	Strengthening international cooperation on sustainable urbanisation: nature-based solutions for restoration and rehabilitation of urban ecosystems
MIGRATION-07-2019	International protection of refugees in a comparative perspective
2020	
ICT-43-2020	EU-Brazil 5G collaboration

* Brazilian entities under this call are exceptionally eligible for EU Funding.

Figure 3: Brazil – Top scientific areas compared to EU28 in terms of citation impact of publications

	Scientific Area	Share in world output	Share of international co-publications	Citation Impact	
				Difference with EU28	8-year trend
High publication output	Physics and Astronomy: Nuclear and High Energy Physics	2,9%	65%	+0.42	↑
	Chemistry: Analytical Chemistry	2,8%	24%	-0.05	–
	Chemical Engineering: General Chemical Engineering	1,9%	24%	-0.1	↑
	Chemistry: Organic Chemistry	2,0%	23%	-0.17	–
	Physics and Astronomy: Atomic and Molecular Physics, and Optics	1,3%	37%	-0.18	↑
	Medicine: Psychiatry and Mental Health	2,2%	31%	-0.18	↑
	Biochemistry, Genetics and Molecular Biology: Endocrinology	2,9%	28%	-0.19	–
	Medicine: Dermatology	3,8%	18%	-0.21	↑
	Medicine: General Medicine	1,9%	27%	-0.22	–
	Medicine: Obstetrics and Gynecology	2,8%	21%	-0.22	↑
Low publication output	Veterinary: Small Animals	3,5%	33%	+0.66	–
	Medicine: Critical Care and Intensive Care Medicine	1,9%	33%	+0.56	↓
	Medicine: Emergency Medicine	0,4%	31%	+0.55	–
	Nursing: Gerontology	1,7%	17%	+0.48	–
	Earth and Planetary Sciences: Stratigraphy	1,5%	70%	+0.34	–
	Materials Science: Materials Science (miscellaneous)	2,8%	7%	+0.34	↑
	Veterinary: Equine	6,9%	36%	+0.22	–
	Medicine: Embryology	1,5%	53%	+0.2	–
	Social Sciences: Social Sciences (miscellaneous)	0,4%	39%	+0.12	↑
	Engineering: Engineering (miscellaneous)	2,3%	63%	+0.12	↑

Source: DG Research and Innovation – International Cooperation

Data: Elsevier SciVal; extraction date: 6/8/2017; publications' window: 2011-2013; citations' window: 3 years

Note: These tables show scientific areas in which the country's academic publications have a higher citation impact than EU28, and whether this difference has decreased, increased or remained the same in the past 8 years. They are grouped in two tables. The top table focuses on areas with high share of publications in the country's total output of publications and the bottom table on those with low share of publications. Scientific areas are based on Elsevier 'All Science Journal Classification'. For each area, the country's share in the world output of publications and the share of international co-publications are also shown.

Figure 4: Brazil – Specialisation compared to EU28 in selected technologies based on PCT patents

Technology		2014 PCT patents	2014 PCT patents of EU28	2014 Specialisation compared to EU28	8-year trend
OECD classification	Nanotechnology	5	137	3,1	↑
	Medical technology	59	3.879	1,18	↓
	Biotechnology	40	2.745	1,14	–
	Pharmaceuticals	35	2.524	1,09	–
	Selected environment-related technologies	49	3.663	1,05	↓
	ICT	121	14.579	0,64	↑
WIPO classification	Micro-structural and nano-technology	5	86	5,00	–
	Food chemistry	13	484	2,31	↓
	Furniture, games	25	952	2,26	↑
	Thermal processes and apparatus	20	791	2,17	↓
	Civil engineering	36	1.632	1,90	↑
	Handling	28	1.447	1,66	↓
	Materials, metallurgy	16	939	1,46	↓
	Other consumer goods	21	1.238	1,46	↓
	IT methods for management	7	425	1,42	↓
	Engines, pumps, turbines	32	1.975	1,39	↓
	Environmental technology	11	716	1,32	↓
	Other special machines	22	1.692	1,12	↑
	Pharmaceuticals	20	1.581	1,09	↓

Source: DG Research and Innovation – International Cooperation

Data: OECD (top table) WIPO (bottom table); extraction date: 6/8/2017

Note: The top table shows the relative specialisation of the 2014 PCT patent output of the country with respect to EU28, calculated as (# of patents of country in technology X / # of patents of country in all technologies) / (# of patents of EU28 in technology X / # of patents of EU28 in all technologies). It also shows whether the relative specialisation has increased, decreased or remained the same in the past 8 years. The selected technologies are classified based on the OECD database. The bottom table shows the same information for the top-13 technologies with the highest specialisation index with respect to EU28 - this time the technology classification is based on the WIPO database. Both tables also show the country's and EU28 total number of PCT patents under each technology in 2014.