

The EU strategy for international cooperation in research and innovation

SUMMARY

The Treaty on the Functioning of the European Union stresses the need to promote cooperation with third countries and international organisations in the field of EU research, technological development and demonstration (Article 180 (b)).

In September 2012, the European Commission announced the EU's strategic approach to enhancing EU international cooperation in research and innovation, underlining the significance of international cooperation and the role for the EU that derives from being a global leader in research and innovation. The current Horizon 2020 programme (2014-2020) and science diplomacy were pinpointed as the main tools for implementing the strategy. The future Horizon Europe (2021-2027) should continue in the same vein.

A global leader in research, development and innovation

The EU is a global leader in research, development and innovation, accounting for 20 % of world expenditure on research, 32 % of high impact publications and 25 % of patent applications, while representing only 7 % of the world's population, according to a Commission [publication](#). The EU's Member States are among the most innovative countries in the world and the EU is the world's third biggest investor in research and development (R&D).

According to the [Global Innovation Index 2019](#) there are nine EU Member States among the twenty most innovative economies in the world: 1) Switzerland; 2) *Sweden*; 3) United States of America (US); 4) *the Netherlands*; 5) *United Kingdom*; 6) *Finland*; 7) *Denmark*; 8) Singapore; 9) *Germany*, 10) Israel, 11) Republic of Korea, 12) *Ireland*, 13) Hong Kong (China), 14) China, 15) Japan, 16) *France*, 17) Canada, 18) *Luxembourg*, 19) Norway, and 20) Iceland.

According to the [Unesco Institute for Statistics](#) (UIS), global expenditure on R&D recently reached a record high of almost US\$1.7 trillion; and about 80 % of that spending was made by 10 countries (in decreasing order: US, China, Japan, Germany, South Korea, France, India, United Kingdom, Brazil and Russia) (see also Box 1). The UIS also points out that countries have committed to increase their R&D expenditure (both public and private) and the number of researchers by 2030 as part of the sustainable development goals.

In 2016, global expenditure on R&D reached the level of 2.228 % of global gross domestic product (GDP), the highest so far, according to the [World Bank](#).

Box 1 – R&D expenditure by global leaders (2017)

Country	R&D expenditure (at PPP*, in US\$ billion)	Share of global R&D expenditure	Share of R&D business expenditure
United States	\$476.5	26.4 %	71.5 %
China	\$370.6	20.6 %	77.3 %
Japan	\$170.5	9.5 %	77.8 %
Germany	\$109.8	6.1 %	67.7 %
South Korea	\$73.2	4.1 %	78.2 %
France	\$60.8	3.4 %	63.6 %
India	\$48.1	2.7 %	35.5 %
United Kingdom	\$44.2	2.5 %	65.1 %
Brazil	\$42.1	2.3 %	n/a
Russia	\$39.8	2.2 %	59.6 %
Italy	\$29.6	1.6 %	56.7 %
Canada	\$27.6	1.5 %	53.2 %
Australia	\$23.1	1.3 %	56.3 %
Spain	\$19.3	1.1 %	52.9 %
Netherlands	\$16.5	0.9 %	56 %

Source: EPRS, based on [Unesco Institute for Statistics](#) and [World Economic Forum](#) data.

* PPP - purchasing power parity

The EU is the third biggest [R&D](#) and innovation investor in the world, after the US and China. In 2017, R&D expenditure in the EU totalled €318.1 billion (2.07 % of EU GDP), according to [Eurostat](#).

Under the Europe 2020 strategy, R&D expenditure is supposed to reach at least 3 % of EU GDP by 2020. So far growth has been quite slow (2.04 % in 2016 compared to 1.77 % in 2007) and [Eurostat](#) predicts that 'R&D intensity in the EU is growing too slowly to meet the Europe 2020 target'.

In 2017, the 3 % of GDP target had been reached only by Sweden (3.33 %), Austria (3.16 %), Denmark (3.06 %) and Germany (3.02 %).

The share of R&D private business expenditure was quite high; in 2017, 66 % of total R&D disbursed. The remaining R&D expenditure was made by the higher education sector (22 %), the government sector (11 %) and the private non-profit sector (1 %).

[The 2018 EU Industrial R&D Investment Scoreboard](#) ranked the top 2 500 global companies, with investments in R&D of over €25 million per company. With total investments of €736.4 billion in R&D in 2017/18, they account for around

90 % of the world's business-funded R&D. The major investors were 778 US companies – €274.2 billion, representing 37 % of the top 2 500 global R&D companies, followed by 577 EU companies – €201 billion, representing 27 %.

The top 10 companies accounted for 15 % of R&D investments made by the 2 500 companies. The first on the list, Samsung (South Korea), invested €13.44 billion (1.8 % of the global total). The top 50 companies generated 40 % of investments; and among them 22 US-based and 18 EU-based firms invested €147.3 billion. As for the country distribution of the EU-based investments, German and UK-based companies invested €135 billion each, followed by French companies at €75 billion, Dutch at €40 billion, Swedish at €36 billion and Danish at €30 billion.

The EU international cooperation strategy in short

In September 2012, the Commission adopted the EU strategic approach to enhancing and focusing EU international cooperation in research and innovation ([COM\(2012\) 497](#) and [SWD\(2012\) 258](#)). The key idea of the strategy is to open up EU research and innovation to the world.

The strategy's adoption stemmed from EU commitments made under the Europe 2020 flagship initiative *Innovation Union*, the [European research area](#) (ERA) framework and the current Horizon

2020 (H2020) programme. The ERA was established in 2000 and reinforced in 2012 on the basis of the communication [A Reinforced European Research Area Partnership for Excellence and Growth](#) (COM(2012) 392). International cooperation is an ERA priority, the aim being to ensure that the EU as a whole is able to take maximum advantage of the best R&D and innovation opportunities in a global setting.

By opening up EU R&D and innovation to the world, the 2012 strategy contributes to broader EU policies by helping to strengthen EU excellence and attractiveness in R&D and innovation and EU economic and industrial competitiveness, tackling global societal challenges, and backing up the EU's external policies.

The Horizon 2020 programme is the main vehicle for implementation of the strategy. The programme is open 'to participation from all over the world'. The European Research Council (ERC) and Marie Skłodowska-Curie actions (MSCA) are open to researchers from third countries and research infrastructure activities have a specific focus on international cooperation. More detailed information on ERC grants can be found on page 8, below.

In addition, the [COST](#) and [Eureka](#) networks encourage cooperation between European research networks and their third-country equivalents.

Under the strategic approach, the idea is that science diplomacy will use 'international cooperation in research and innovation as an instrument of soft power and a mechanism for improving relations with key countries and regions. Good international relations may, in turn, facilitate effective cooperation in research and innovation'. A more detailed description of science diplomacy is provided on page 10, below.

Box 2 – International cooperation strategy: main activities

- 1 Opening up Horizon 2020 to researchers and innovators from across the world and supporting targeted activities on the basis of priority areas for cooperation with international partner countries and regions
- 2 Improving the framework conditions that underpin international cooperation
- 3 Playing a leading role in multilateral fora and working with international organisations
- 4 Reinforcing the partnership with Member States
- 5 Intensifying synergies with the EU's external policies
- 6 Widening communication and strengthening monitoring

Source: [2016 report](#) on the implementation of the strategy.

EU strategic approach to third countries and regions

To maximise the impact of international cooperation in research and innovation, the EU strategy provides for differing approaches to different third countries and regions under the Horizon 2020 programme, in accordance with the countries' and regions' research and innovation strengths. The most advanced approach is granted to European Economic Area (EEA), European Free Trade Association (EFTA) and EU enlargement countries, and the least advanced approach applies to developing countries (see Box 3).

So far, the EU has signed:

- 20 bilateral scientific and technical (S&T) cooperation agreements with third countries under the Treaty on the Functioning of the European Union (TFEU), and
- 25 with third countries, plus one with an international organisation, under the Euratom Treaty.

Scientific and technical cooperation agreements under the TFEU

The EU has signed 20 [bilateral agreements on science and technology](#) (S&T) with third countries (as of March 2019). These are, in alphabetical order: Algeria, Argentina, Australia, Brazil, Canada, Chile,

China, Egypt, India, Japan, Jordan, Korea, Mexico, Morocco, New Zealand, Russia, South Africa, Tunisia, Ukraine and the US. Some of the agreements are signed for an indefinite period (Algeria, Australia, Canada, Egypt, Jordan, Morocco and Tunisia) whereas others require periodic renewals.

Box 3 – The EU's strategic approach to different partners within the Horizon 2020 programme

International partners	Strategic approach
EEA, EFTA and EU enlargement countries	<ul style="list-style-type: none"> fostering integration into (or alignment with) the European research area (ERA)
European Neighbourhood policy countries	<ul style="list-style-type: none"> supporting a 'common knowledge and innovation space' bringing together research and innovation cooperation mobility for academics capacity building
Industrialised countries and emerging economies	<ul style="list-style-type: none"> boosting competitiveness tackling global challenges jointly increasing participation in international value chains
Developing countries	<ul style="list-style-type: none"> promoting sustainable development addressing global societal challenges

Data source: Commission communication 'Enhancing and focusing EU international cooperation in research and innovation: A strategic approach' ([COM\(2012\) 497 final](#) and [SWD\(2012\) 258 final](#)).

Scientific and technical cooperation agreements under the Euratom Treaty

Twenty-five scientific and technical cooperation [agreements](#) have been signed under the Euratom Treaty, and two non-EU countries are associated under the 2019-2020 Euratom programme:

- Fifteen nuclear research agreements and agreements with nuclear research provisions have been signed, in relation to peaceful uses and nuclear safety.
 - On peaceful uses, there are ten agreements, with: Argentina, Australia, Canada, China, Japan, Kazakhstan, South Africa, Ukraine, the US and Uzbekistan.
 - On nuclear safety, five agreements have been signed, with: Canada, Kazakhstan, Russia, Ukraine and the US.
- Nine specific bilateral agreements have been signed on fusion research: separate agreements have been signed with Brazil, India, Kazakhstan, South Korea, Russia, Ukraine and the US, and two agreements have been signed with Japan (a bilateral cooperation agreement on fusion and a Broader Approach agreement).
- One multilateral ITER agreement has been signed with China, India, Japan, Russia, South Korea and the US.
- Switzerland and Ukraine are third countries associated to the 2019-2020 Euratom programme.

European Research Council implementing arrangements

Between 2012 and 2018, the European Research Council signed thirteen agreements with national agencies in eleven countries (there are agreements signed with two agencies from Australia and with two agencies from Japan): Argentina, Australia, Brazil, Canada, China, India, Japan, Mexico, South Africa, South Korea and the United States.

Third countries associated to the Horizon 2020 programme

Finally, there are sixteen [countries associated to the Horizon 2020](#) programme: Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Iceland, Israel, Moldova, Montenegro, Norway, Serbia, Switzerland, North Macedonia (the former Yugoslav Republic of Macedonia at signature), Tunisia, Turkey and Ukraine (as of March 2019).

Commission implementation reports

The [strategy](#) requires the Commission to draw up a report on implementation every two years. So far, three reports have been published: in 2014, 2016 and 2018. The latest one formed part of the Commission's impact assessment on the Horizon Europe programme proposal.

The Commission reports should 'present how the multi-annual roadmaps have been developed and implemented' and 'assess progress and impact based on the list of indicators provided in the accompanying [Staff Working Document](#)'. The indicators are grouped in three categories: a) widening international cooperation in Horizon 2020; b) international cooperation policies and programmes of the Member States and Associated Countries; c) internationalisation of research and innovation.

Overall, since 2012, progress has been made towards achieving the strategy's objectives, but more needs to be done to harness the full potential of international cooperation in research and innovation and of the 'Open to the World' policy priority. A summary of general findings and conclusions of the three biannual reports is presented below.

2014 report

The first report on the implementation of the EU strategy ([COM\(2014\) 567](#) and [SWD\(2016\) 276](#)) underlined the importance of tools such as Horizon 2020, including MSCA, e-infrastructures, ERC grants and the knowledge and innovation communities (KICs) of the European Institute for Innovation and Technology. Emphasis was also placed on the importance of science diplomacy for communication strategy. The report highlighted progress made on achieving synergies with external policies, such as the Development Cooperation Instrument and the European Neighbourhood Instrument.

In its conclusions, the report stated that progress had been made (since the strategy's launch), but that more needed to be done, including: a) improving the integration of the international cooperation aspects in Horizon 2020 strategic programming and work programmes; b) doing more to remove obstacles to international cooperation; c) achieving better synergy with Member States' and EU external policies; d) using quantitative indicators to monitor the strategy's effectiveness.

2016 report

The second report ([COM\(2016\) 657](#) and [SWD\(2016\) 329](#)) highlighted measures taken in response to the conclusions of the first report and gave recommendations for future action. The report stressed that the objectives of the strategy and the need for coherent action were even more important in 2016 than in 2012. The report also mentioned that the updated roadmaps for international cooperation had been synchronised with Horizon 2020, and that international cooperation remained 'an important aspect of all Euratom activities'. The Commission had addressed the obstacles and taken action to tackle global societal challenges, not least through global health diplomacy. The report also noted that the external dimension of the ERA served 'as a paradigm to gradually shape a vision of a "Global Research Area" with priorities varying according to the EU's specific objectives for each region or country'.

In its conclusions, the report stressed the need for further improvements with regard to using Horizon 2020 for international cooperation. It also underlined the need for science and technology (S&T) policy dialogues and cooperation roadmaps to continue serving as a basis for priority-setting in Horizon 2020 programming. The report called for further action: to broaden international

participation and to strengthen the EU's role in global multilateral forums and international organisations; to ensure good framework conditions for international cooperation within a vision of a 'global research area'; to strengthen synergies with the actions of Member States; and to use science diplomacy more extensively as an EU external policy instrument.

2018 report

The [third report](#) acknowledged the greater international dimension in the Horizon 2020 programme from 2018 to 2020. Several regional dialogues and meetings with countries had been organised. Nevertheless, the participation of entities from non-associated countries remained unsatisfactory and was still lower than under the previous programme, namely the seventh framework programme for 2007 to 2013 (FP7). The Commission stated that it planned to extend opportunities for association in the Horizon Europe programme.

The Joint Research Centre ([JRC](#)) had built up its collaboration with international partners and multilateral organisations. Several multilateral initiatives, for instance on global health, climate change and clean energy, had been set up. Synergies with Member States' action had been strengthened by involving third countries in joint programmes. Synergies with the EU's external policies had also been strengthened, for instance with regard to western Balkan and neighbourhood countries. This process had involved science diplomacy.

In its conclusions, the report underlined that EU international cooperation in research and innovation (R&I) should contribute, inter alia, to the EU's economic objectives and EU external competitiveness. The report also stressed the need to increase non-EU countries' participation in EU initiatives. One future priority should be researcher mobility and access to research infrastructure globally. The report also pointed to the importance of establishing other cooperation priorities on the basis of thematic and geographical cooperation, while ensuring that cooperation was mutually beneficial.

Horizon 2020 as a tool to implement the EU strategy

The Horizon 2020 programme is one of the main tools used to implement the strategy on international cooperation in research and innovation. The EU strategy underlines the openness of Horizon 2020 to international cooperation. The programme is fully open to participation from all over the world. The ERC and MSCA are open to researchers from 16 [associated countries](#) and non-associated non-EU countries. The 'research infrastructures' activity places a specific focus on international cooperation and the e-Infrastructures component has an inherent international dimension, supporting collaboration through digital means.

The strategy also stresses that international cooperation activities within Horizon 2020 should be maintained at least at FP7 levels

Box 4 – Participation of associated countries and third countries in FP7 and in Horizon 2020

Key indicators		FP7 2007- 2013	Horizon 2020 2014- 2020, as of 1.1.2017	Difference
Associated countries	share of applications	8.4 %	7.1 %	↓ 1.3 pp
	share of participations	8.2 %	7.0 %	↓ 1.2 pp
	share of EU contribution	9.0 %	6.5 %	↓ 2.5 pp
Third countries	share of applications	5.6 %	3.1 %	↓ 2.5 pp
	share of participations	3.6 %	1.9 %	↓ 1.7 pp
	share of EU contribution	1.3 %	0.6 %	↓ 0.7 pp

Data source: [Interim Evaluation of Horizon 2020](#), European Commission,

(2007-2013). So far, the level is lower. According to the Commission's [interim evaluation](#) of Horizon 2020 (H2020), the share of participation of associated countries was at 7 % in H2020, compared with 8.2 % in FP7, whereas the share of participation of third countries was at 1.9 % in H2020, compared with 3.6% in FP7. Furthermore, the number of countries participating in each programme differs. The data for H2020 covers only three years of programme implementation however, whereas the FP7 data covers seven years (see Box 4).

According to the Commission's [ex-post evaluation of FP7](#), 170 countries participated in FP7 projects. Under Horizon 2020, as of May 2017, 188 countries had submitted applications and 131 countries had received funding ([SWD\(2017\) 221](#)).

According to the Commission's [2019 Monitoring Flash](#) on international cooperation:

- 4 700 organisations from 124 non-EU countries (16 associated countries and 108 third countries) have taken part in H2020 projects. They represent, respectively, 7 % and 4 % of those participating so far (8 % and 3 % of applications);
- in terms of funding, associated countries account for 8 % of the EU contribution provided through the programme (€3 billion), while non-associated third countries represent only 0.6 % of funding (€0.23 billion). Their own contribution amounts to €300 million;
- non-associated countries have been represented mainly by participants from higher education (58 % of which have taken part in MSCA).

According to the 2019 Monitoring Flash, the level of participation of private companies from non-associated countries is quite low: 12 % compared with 35 % for EU Member States). The most active associated countries have so far been: Switzerland (37 % of associated country participants), Norway (23 %), Israel (17 %), Turkey (9 %) and Serbia (4 %). Among third countries, the most active have been: the US (28 % of third countries participants), China (9 %), Canada (6 %), Australia (5 %), South Africa and Brazil (4 % each), and Argentine, Japan and Russian Federation (3% each). The Commission also points out that 'associated countries such as the candidate countries and most countries from the European Neighbourhood Policy tend to show lower performances than the EU average in terms of the quantity, quality and success of their applications'.

More data on cooperation with third countries within H2020 can be also found on the [Horizon Dashboard](#) website.

European Research Council grants for associated countries

The European Research Council (ERC) is a tool with a [mission](#) 'to encourage the highest quality research in Europe through competitive funding and to support investigator-driven frontier research across all fields, on the basis of scientific excellence'. The ERC offers grants that enable new opportunities to be identified in different fields of research. The total ERC 2014-2020 budget is €13.1 billion, which represents 17 % of the Horizon 2020 budget (€77 billion).

Box 5 – European Research Council grants received by associated countries (2007-2018)

Country	Number of grants received			Domains in which grants were received		
	Total	2007-2013	2014-2018	Life sciences	Physical sciences & engineering	Social sciences & humanities
Iceland	5	1	4	3	1	1
Israel	574	257	317	242	286	46
Norway	113	43	70	34	37	42
Serbia	2	0	2	0	1	1
Switzerland	698	338	360	282	364	52
Turkey	19	5	14	2	11	6
Total	1 411	644	767	563	700	148

Data source: ERC statistical [data](#) (accessed: 27.9.2019).

According to ERC statistical [data](#), since 2007 more than 9 000 projects from EU Member States and associated countries have received funding, of which 6 of the 16 associated countries (Iceland, Israel, Norway, Serbia, Switzerland and Turkey) have received 1 411 grants (644 in the 2007-2013 period and 767 between 2014 and 2018).

The biggest number of grants were received by Switzerland (698 grants), Israel (574) and Norway (113). Most of the grants were received in domains such as physical sciences and engineering – 700, followed by life sciences – 563 and social sciences and humanities – 148 (more detailed information is provided in Box 5).

An example of international cooperation

The EU-Japan [agreement](#) on cooperation in R&I was signed in 2011. The Commission [underlines](#) that 'cooperation with Japan is a particular priority for the EU as the potential to work for mutual benefit in a wide range of areas is especially strong' owing mainly to the fact that the two sides share many of the same challenges (e.g. energy security and ageing populations). Japan can participate in most of the actions under Horizon 2020.

In November 2017, at its fourth meeting, the Joint Committee on Scientific and Technological Cooperation between Japan and the EU [examined](#) potential priority areas for future cooperation: a) ICT (one of the most active areas of cooperation so far); b) transport, including aeronautics, a strategic area for cooperation with Japan, and c) nanosafety, advanced materials (including critical materials) and regulatory science. In addition to those areas, they pinpointed considerable cooperation in the field of nuclear research (both fission and fusion), and on the EU's Future and Emerging Technologies (FET) projects on the human brain (developing a large-scale simulation of a human brain), graphene, and quantum technologies.

The two sides also assessed progress made and shared success stories, e.g. two projects financed within Horizon 2020: the [SHEFAE 2](#) project aimed at producing an efficient, light and compact integrated heat exchange system for saving energy; and the [VISION](#) project, aimed at developing an automatic landing system and trouble detection system, using image processing and intelligent control, for safer flights.

The updated [roadmap](#) for cooperation between the EU and Japan provided statistical information on Japan's participation in H2020 projects. As of October 2018, 377 Japanese applicants had been involved in 313 eligible proposals on collaborative actions, which led to 30 successful projects, involving 33 Japanese participants, and a success rate of 21.5 % (compared with 15.8 % overall). Japanese beneficiaries have received €2.5 million from the EU and €3.0 million from non-EU sources. They have participated mainly in the MSCA, and in thematic areas such as: environment research, nanotechnologies and advanced materials (NMBP), and nuclear research cooperation through Euratom. According to the [Horizon Dashboard](#), the H2020 net contribution to Japan amounts to €3.24 million to date.

Science diplomacy as a means of implementing EU strategy

In its publication [New frontiers in science diplomacy](#) the Royal Society defines science diplomacy as a concept that can be applied to the role of science, technology and innovation on three levels (see Box 6). The Royal Society also specifies that 'science diplomacy seeks to strengthen the symbiosis between the interests and motivations of the scientific and foreign policy communities. For the former, international cooperation is often driven by a desire to access the best people, research facilities or new sources of funding. For the latter, science offers useful networks and channels of communication that can be used to support wider policy goals'.

The EU strategy for international cooperation in research and innovation promotes the use of science diplomacy as an instrument of soft power and a mechanism for improving relations with key countries and regions. The three reports on the implementation of the strategy, as quoted

above, stressed the need to further improve the use of science diplomacy to achieve the strategy objectives.

In 2016, the Commission published a document [Open innovation, open science, open to the world – a vision for Europe](#) that underlined that fostering international cooperation in R&I is a strategic priority. This enables the EU to 'access the latest knowledge and the best talent worldwide, tackle global societal challenges more effectively, create business opportunities in new and emerging markets, and use science diplomacy as an influential instrument of external policy'. The report also presented several examples of EU science diplomacy actions, e.g. EU-CELAC and EU-PRIMA.

In 2017, the Commission published a report on [Tools for an EU Science Diplomacy](#), prepared by Professor Luk Van Langenhove of the Vrije Universiteit Brussel (Belgium), whose first words underlined that 'Europe, in particularly the EU, has a high level of scientific excellence and should therefore be able to mobilise its scientific potential as a main means of action within its external policies'. The report also points out that science diplomacy 'is not well developed within most of the EU Member States'. The report recommended that the EU should support the Member States' policies and practices while also supporting EU foreign and security policy.

The European External Action Service ([EEAS](#)) underlines that science cooperation is a 'fantastic way' to develop 'links of all kinds (human, political, business oriented...)', and maintain them 'when other kinds of direct relations are difficult (cf. Iran)'. It goes on to state that scientific exchanges offer opportunities to raise awareness among third countries' scientific communities of EU 'values, visions and priorities'. The EEAS also encourages proactive international cooperation (in line with the strategic approach expressed in the strategy) aimed at:

- developing a common 'knowledge and innovation space' in the EU Neighbourhood;
- developing S&T agreements with more strategic partners (Australia, Brazil, Canada, Chile, China, Korea, India, Mexico, New Zealand, Russia, South Africa, US, etc.;
- maintaining policy dialogue and platforms on science, technology and innovation (STI) cooperation at regional level (Africa, ASEAN, Central Asia, Gulf, LAC, Pacific);
- supporting development policy by enhancing human potential and infrastructures, designing new services and products, or providing evidence both on cross-cutting issues (such as poverty eradication) and sector-specific actions.

Box 6 – Three dimensions of science diplomacy

- Science in diplomacy – informing foreign policy objectives with scientific advice
- Diplomacy for science – facilitating international science cooperation
- Science for diplomacy – using science cooperation to improve international relations between countries

Source: [New frontiers in science diplomacy](#), the Royal Society, United Kingdom, 2010.

The Horizon 2020 programme also uses science diplomacy as a tool to enhance cooperation with non-EU countries. This has been underlined in the programme regulation, in work programmes, and in the Council Decision establishing the specific programme implementing Horizon 2020. The latest stressed the need to use diplomacy in the formal and informal international arena with governmental and non-governmental actors.

Examples of EU science diplomacy networks

Inventing a shared Science Diplomacy for Europe ([InsSciDE](#)) is a project funded by Horizon 2020, within the call for proposals 'Strengthening Europe's position in the global context: science diplomacy and intercultural relations' – ENG-GLOBALLY-01-2017. The project runs from 1 December 2017 to 30 November 2021 and is managed by the Centre National de la Recherche Scientifique (CNRS), France, together with 14 partners from 11 countries. The project aims to build on Europe's science

diplomacy capital, for instance by sparking a dialogue, and highlighting the contribution of science academies and networks of science diplomats to addressing global challenges.

The project was based on the hypothesis that EU Member States have a wealth of science diplomacy experience on which they can draw, but that practice is either fragmented, under-recognised, or 'lacking an overall model that can consolidate and leverage this knowledge for Europe'. In January 2019, during a three-day [conference](#) in Cracow, Poland, international experts and researchers in science diplomacy, 250 diplomats-in-training from over 50 countries, and other science diplomacy practitioners discussed key contemporary and historical science diplomacy topics and cases. In April 2019, the first policy brief on [Building an Interdisciplinary European Science Diplomacy](#) was published, targeting EU institutional governance, research and funding, pedagogy and knowledge transfer.

European Parliament resolution

In its 2017 resolution on the assessment of Horizon 2020 implementation with a view to the interim evaluation and the ninth framework programme proposal ([2016/2147\(INI\)](#)), the European Parliament stressed, not least, that global cooperation is an important means of strengthening European research and that the framework programmes should contribute to ensuring that Europe remains a key global player. Parliament also underlined the importance of science diplomacy. While noting that international participation had fallen from 5 % in FP7 to 2.8 % in Horizon 2020, Parliament also called on the Commission to review the terms of international cooperation in framework programmes and to establish concrete, immediate measures and a long-term strategic vision and structure to support this objective. In this regard it welcomed initiatives such as the Joint Baltic Sea Research and Development Programme ([BONUS](#)) and the Partnership on Research and Innovation in the Mediterranean Area ([PRIMA](#)).

The [European implementation assessment](#) on Horizon 2020, prepared by EPRS in 2017 to serve as a factual base for the preparation of the above-mentioned resolution, underlined that despite being mainstreamed into the different parts of the H2020 work programmes, international cooperation had progressed significantly slower than under the previous programme, FP7. The report also stressed the importance of international cooperation, as research outputs based on collaborative projects – particularly international collaboration – have a higher citation impact. The report also adds that international collaboration can foster the development of technological capabilities and innovations.

Horizon 2020 Advisory Group on International Cooperation

The Horizon 2020 Advisory Group on International Cooperation prepared two reports: a [2014 report](#) for the 2016-2017 work programme and a [2016 report](#) for the 2018-20 work programme.

The advisory group stressed that the first phase of H2020 had resulted in a dramatic reduction in international cooperation. This could be partially explained by the new funding rules for Brazil, Russia, India, China and Mexico (the BRICMs), but was also due to turmoil in Europe's neighbourhood. Moreover, in contrast to FP7, there was no dedicated international cooperation scheme, there were no specific international cooperation actions (SICAs) under H2020. There was also a decrease in the number of work programme topics that mandated international participation.

The advisory group's recommendations included involving the public and private sectors as well as public-public cooperation, establishing a specific Horizon 2020/Eureka scheme to support international cooperation among research-intensive SMEs, devoting special attention to increasing the mobility of European researchers to third countries and vice versa, striving for coordinated and joint calls between the EU and third countries, and avoiding EU jargon when drafting work programmes. They also stressed that international cooperation should allow long-term capacity and partnership building to tackle scientific, societal and economic challenges.

International cooperation in 'Horizon Europe' (2021-2027)

In September 2019, Jean-Eric Paquet, Director-General for Research and Innovation in the European Commission [stated](#) that 'the future of European research must be inclusive'.

The Commission's [2019 Monitoring Flash](#) underlines that international cooperation in Horizon Europe 'should aim to strengthen the EU's research and innovation excellence, attractiveness and economic and industrial competitiveness, to tackle global challenges, as embodied in the UN SDGs, and to support the Union's external policies'. The document also recommends 1) extending the programme to include the association of third countries and to make cooperation and co-funding as smooth as possible; 2) continuing EU funding of entities from low- to mid-income countries and only exceptionally of entities from industrialised countries; 3) launching targeted measures to pursue strategic international cooperation in line with EU priorities; and 4) being more proactive in seeking synergies with other EU programmes, including the external instrument.

The Commission's [interim evaluation](#) of Horizon 2020 identifies several areas for improvement that applied to Horizon 2020 but may apply also to a new framework programme, including the need to strengthen international cooperation and reinforce openness.

The explanatory memorandum introducing the proposal for a regulation establishing Horizon Europe ([COM\(2018\) 435](#)) specifies that this programme 'will significantly strengthen international cooperation which is crucial to ensure access to talent, knowledge, know-how, facilities and markets worldwide, to effectively tackle global challenges and to implement global commitments. It is planned that the programme will intensify cooperation and extend association agreements to include countries with excellent science, technology and innovation capacities' and 'will continue to fund entities from low-to-mid income countries, and to fund entities from industrialised and emerging economies only if they possess essential competence or facilities'. Article 12 of the proposed regulation defines the rules for the association of third countries.

Conclusions

The EU cooperates with third countries and international organisations to promote a high level of research and innovation. In 2012, the Commission structured this cooperation within a new strategy. That strategy pointed to the Horizon 2020 programme and 'science diplomacy' as the two main tools for its implementation.

Implementation of the strategy is progressing but improvements are necessary, not least with a view to raising the level of non-EU countries' participation in the current Horizon 2020 programme (which is lower than it was under the previous FP7) and in the future Horizon Europe programme. It is also important to secure better use of science diplomacy at Member State and EU level.

The European Parliament, in its 2017 resolution, called on the Commission to review the terms of international cooperation in framework programmes and to establish concrete, immediate measures and a long-term strategic vision and structure to support this objective.

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