REPORT ON SCIENCE, TECHNOLOGY AND INNOVATION DIPLOMACY

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I- Science, Technology and Innovation in Foreign Policy

In a rapidly changing world where new global challenges affect every country, science, technology and innovation (STI) are now one of the driving forces in social and economic progress as well as in promoting globalisation roles that will only intensify in the future.

Many of the responses to these changes can be found in STI. Such responses are themselves important drivers of economic development, but they also represent new challenges, contributing to a reconfiguration of the world of today and, above all, of the future.

In this context, the weight of STI is increasing in every aspect of contemporary society and, specifically, in the current state of international relations, and in any given country's international presence and image worldwide. The capacities to generate scientific or technical advances, to innovate or attract talent, are essential components of soft power, public diplomacy, and, ultimately, the country brand.

Science, Technology and Innovation Diplomacy (STID) is, today, more important than ever for:

1- Contributing to resolving the most pressing challenges of globalisation, such as climate change, pandemics, natural disasters, nuclear proliferation and cybersecurity, building upon scientific knowledge and innovative technology.
2- Achieving long-term sustainable development, in keeping with the Sustainable Development Goals (SDGs) of the 2030 Agenda. Here, as well, science and innovation are essential to resolving and improving food security, water treatment and purification, health and hygiene, energy poverty and shortages, etc.
3- Promoting collaboration and harmony in international relations. The universal nature of science and research, and the speed of change and expansion, favoured by the development of innovative new technologies, offer an opportunity to work together in a spirit of solidarity with other countries as part of major projects, or participating in major research infrastructure programmes. At other times, scientific cooperation can even serve as a communication channel when diplomatic relations are stagnant.
4- As an instrument of soft power and country branding, STID is one of the most relevant and recognised elements in public diplomacy today.
5- Ensuring a framework that is favourable for the competitiveness of companies and for their international leadership in a context of open innovation, by applying the best resources and cooperating in R&D&I with the best partners in the world.

Furthermore, the number and variety of STID stakeholders with activities on an international scale has risen exponentially as a great number of companies, foundations and NGOs are getting involved. This demands an opening up of diplomacy towards these sectors in a joint and unifying effort for the promotion of national interests.

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In this global context, on one hand, countries are tending to shore up their R&D&I, competing to attract talent, to build top-flight STID infrastructure on their territories with the support of international bodies, to host the R&D&I departments of multinational corporations, and to increase their own firms' capacity for innovation through internationalisation.

On the other hand, today's scientific and technological challenges require international cooperation, taking into account the major social challenges we all face. According to the OECD, multinational scientific publications have risen from 9.5% to 23.8% in the last decade, and have fostered greater sophistication in research, thus promoting research collaboration and creating major scientific and technological infrastructure that favour the mobility and international connection of those who work in science and technology

Seen in this light, STID comprises the spectrum of initiatives promoting cooperation in research and innovation, both bilaterally and multilaterally, to seek solutions to problems of common interest, and to favour researchers' mobility and scientific, technological and industrial capacity. This internationalisation of national R&D&I systems will enhance the prestige of researchers and companies, leading to higher levels of social and economic welfare. Moreover, STID makes it possible to rely on such national resources in order to keep open communication channels when diplomatic channels are impossible for political reasons and, ultimately, when they are incorporated into designing national foreign policy goals.

II- Justification of this Report

The State Secretariat for International Cooperation and for Ibero-America (SECIPI) and the State Secretariat for R&D&I (SEIDI), aware of this new global context, decided in November 2015 to create an Advisory Group (AG) comprising representatives of the sectors most interested in strengthening Spanish STID. This AG first met on 18 November, chaired by both Secretaries of State, with its members including SECIPI, SEIDI, the State Secretariat for Trade (SEC), the Conference of Rectors of Spanish Universities (CRUE), the Spanish National Research Council (CSIC), the CEOE Employers Association, the Centre for Industrial and Technological Development (CDTI), Marca España (Brand Spain), the Spanish Foundation for Science and Technology (FECYT), the COTEC Foundation for Innovation, the Ramón Areces Foundation and the Royal Elcano Institute.

This report arose out of these efforts, including a series of recommendations to the Ministry of Foreign Affairs and Cooperation (MAEC) and SEIDI to strengthen the central government's actions abroad in defence and promotion of Spain's interests more efficiently, by taking advantage of the opportunities presented by Spain's strength in science, technology and innovation.

The proposed recommendations include drawing up a document to establish and guide the central government's actions abroad in the STI field, in countries that are strategic for Spain; instruments and organisational reforms to improve coordination between the General State Administration and different actors in the system; proposals to strengthen collaboration with other European, Ibero-American and emerging countries; STID training actions; and finally, activities to address the international scope of communicating and disseminating Spanish STI as an instrument of public diplomacy, strengthening this way the relationship between STI and society.

Spain must be able to invest sufficiently in STI in order to:

- Create a solid base for stepping up the country's competitiveness,
- Attract talent and foreign investment, which contribute to the creation of skilled jobs, raise the productivity of our exports, and improve our image abroad,
- Strengthen research and technology cooperation, which enriches innovative capacity and internationalises our research centres and our corporations,
- Contribute to consolidating an advanced society according to the terms of the United Nations.

III- Current Situation of STID

STID, within the framework of public diplomacy, is a reflection of the importance that each country and government grants to science and innovative technology in designing and implementing its foreign policy.

To that end, the most developed countries have adopted measures aimed at raising the profile of science and technology in decision-making on international affairs, strengthening their STID activities. The USA, United Kingdom, Japan and New Zealand have created the position of Scientific Advisor in their respective Foreign Ministries; the United Kingdom and Switzerland have integrated their Scientific Councils into their Industrial Councils to better recruit world-class scientists and carry out collaborations, whilst promoting the internationalisation of innovation.

In this context, the European Union is promoting a Strategy of Science Diplomacy, encompassed within its policy of opening European science and technology to global cooperation. Given that diplomatic actions fall within a global context, it is important to seek the alignment of national STID strategies with this European strategy.

The success of science and technology diplomacy depends to a large extent on adequately projecting national strengths when integrating science and technology into decision-making.

USA

The USA leads the world in R&D&I investment (27% of the total), closely followed by China. The USA invests more than 2.7% of its GDP in research and development (totalling $456.1 billion in 2013). The private sector contributes 65.2% of total R&D&I, with the Federal Government providing 26.7%. Moreover, the USA is one of the world's most innovative countries (Global Innovation Index, 2014). Of the top ten universities in the world, six are in the USA (2015). In 2014, the USA published 539,723 papers, making it number-one worldwide. That same year, 15% of the most-cited articles were published in the USA.

International scientific and technological cooperation has also become a leading aspect of US foreign policy. The Department of State (DoS) has a Science and Technology Adviser to the Secretary of State, making the USA one of four countries in the world with such a government position. The American Association for the Advancement of Science (AAAS), in coordination with the DoS, runs an ambitious grant programme for training scientists in the areas of science and technology policy within the US government. The DoS scientific diplomacy strategy focuses on promoting overall participation from public- and private-sector organisations in areas that involve science and technology.

United Kingdom

The United Kingdom invested 1.66% of its GDP in R&D&I in 2013 (£28.87 billion, approximately €36.53 billion[1]). Although it represents only 3.2% of world expenditure in R&D&I, 16.5% of the world's most-cited scientific articles were published there in 2014 (a total of 153,020 papers, ranking the United Kingdom third internationally in scientific production). The United Kingdom has a network of seven national Research Councils, divided by disciplines, which support many universities and international centres of excellence which, together with the Innovate UK technological innovation network, provide up to 30% of total funding in R&D&I (£8.77 billion). The UK business sector provides 46% of R&D&I funding (£13.34 billion). The United Kingdom gets up to 19% of its R&D&I funds from European and other foreign sources (£5.39 billion) and had a strong not-for-profit private sector which provides up to 5% of total funding (£1.36 billion). In total, approximately 377,000 people work full-time in the R&D&I field.

Its activities of science diplomacy include: 1) The Science and Innovation Network, encompassing 90 workers in 28 countries and 47 cities worldwide, co-financed by the Business, Innovation and Skills (BIS) and the Foreign and Commonwealth Office (FCO), and which fosters collaboration between the United Kingdom and the science and innovation communities of other countries. 2) The Newton Fund, encompassing grants, projects and assistance for knowledge transfer, for scientific collaboration in 15 developing countries. BIS administers it and seeks partners (British Council and scientific academies) for their implementation. In 2021, it will receive £150 million a year. 3) The Global Challenges Research Fund, managing £1.5 billion for international scientific collaboration on development cooperation.

Germany

Germany leads Europe in R&D&I investment in absolute terms, with €80.2 billion, or 2.85% of its GDP. In 2014, Germany accounted for 41% of all applications to the European Patent Office, placing it second worldwide in patents per capita, topped only by Japan. In 2014, 146,648 scientific papers were published, placing Germany fourth worldwide in scientific production. Moreover, in 2014, 14.8% of the most cited articles were authored by researchers from German institutions. Slightly behind the United Kingdom, Germany accounts for 17.3% of the EU's Horizon 2020 projects.

The estimated number of R&D&I staff in Germany, calculated as the full-time equivalent (FTE) is nearly 590,000, approximately 14 FTE per 1000 labour force.

Germany invests a great deal of effort in international cooperation in the fields of education and science through its Ministry of Foreign Affairs. For instance, since 2009, Germany has been building "Science Houses" in other countries, devoted exclusively to disseminating German innovation and science.

[1] Exchange rate May 2016

Since 2008, the German Ministry of Education and Science has had its own office for the internationalisation of science, and several clusters that receive expert advice on the issue. The Ministry of Education and Science invested €3.4 billion in international research projects between 2009 and 2013. Another of the Germany's most important science ambassadors is the German Academic Exchange Service (DAAD), which annually provides grants to 120,000 researchers and others worldwide.

Japan

For at least the last decade, Japan has been investing more than 3% of its annual GDP in R&D&I, with the goal of reaching 4% of GDP in the near future. Spending levels are, percentage-wise, similar to those of some European countries such as Finland, and higher than those of countries well-known for their R&D&I, such as Germany and the United States. The percentage of gross domestic expenditure on research and development (GERD) financed by industry in Japan was 76.12% in 2013, according to the OECD. This investment has resulted in a large number of renowned scientists, and a total of more than 892,000 researchers (OECD, 2013); a high number of Japanese patents, with 227,142 registered; and a major production of scientific publications.

Regarding science diplomacy, the Japanese government established its main policy lines in a document drawn up in May 2015 by a group of experts in the field. This document specifically establishes 15 lines of action for developing science diplomacy.

Spain

The Spanish R&D&I system is not immune to these trends. Spain's STI Strategy (known as the EECTI) considers the international projection of our system's agents to be a critical competitiveness factor which should contribute to enhancing Spain's scientific, industrial and business capacity.

STID activities fall within this international dimension of our R&D&I system. Traditionally, there has been fluid cooperation between the national ministries with R&D&I responsibilities and MAEC, both regarding foreign action and development cooperation, as well as monitoring the activities of joint bilateral committees with those countries having R&D&I cooperation and collaboration agreements with Spain.

In the current MAEC structure, the AECID's Directorate for Cultural and Scientific Relations is responsible for international relations and agreements in the scientific field, and for promoting and developing scientific relations with other countries, in coordination with SEIDI. In recent years, the Directorate for Cultural and Scientific Relations has been promoting greater involvement of Spain's Embassies in the area of science diplomacy, mainly through their

Cultural Counsellors, with a notable rise in STID activities, especially in those countries in which there is an Association of Spanish Scientists Abroad.

In addition, there are other Directorates-General, such as that for the United Nations and Human Rights, depending on the State Secretariat for Foreign Affairs (SEAEX), which deals with environmental affairs, with an Ambassador-at-Large for Environmental Affairs, a Deputy Director-General for International Technical Organisations, and which has under its aegis an Agricultural, Food and Environmental Organisations Service. Moreover, the Directorate-General for Foreign Policy and Security maintains two scientific advisors who deal with non-proliferation and disarmament affairs, and an Ambassador-at-Large for Cybersecurity who monitors issues related to information and communication technologies.

The Office of the High Commissioner for Marca España has attached a great deal of importance to the STI sector, as a attribute, in its strategy of promoting our country image through disseminating Spanish scientific and technological advances, the innovative capacity of our business sector, and the talent of our scientists.

As set forth in the Science Act of 2011, as well as in the Spanish Science, Technology and Innovation Strategy implemented under its mandate (specifically, Article 10 of Royal Decree 345/12), SEIDI is responsible for managing international R&D&I relations and for representing Spain in international programmes, forums and organisations—both international and EU—within its scope of authority. These activities are carried out in coordination with MAEC, pursuant to the National Foreign Service Action Act (known as LASEE 2/2014).

The State Research Agency (AEI) and the Centre for the Development of Industrial Technology (CDTI) are the funding agencies for implementing these policies. The CDTI's high-profile activity focuses on internationalising business innovation, with a worldwide network currently comprising nine delegates and 22 fellows in 28 countries, all with the mission of contributing to optimising the technological position of innovative Spanish companies at the international level.

SEC supports the internationalisation of Spanish companies and the attraction of foreign investment through its worldwide network of 98 Economic and Trade Offices and through ICEX, Spain's Export and Investment Office, by defending Spain's economic and trade interests, supporting activities of Spanish companies abroad, and orientating and assisting potential foreign investors.

Promotional activities in the innovation field are specific and complementary to those in commercialisation, since they occur at different stages in the product life-cycles and the collective of businesses that they target partly coincides. Within the area of these complementary actions, SEC and CDTI have signed an agreement to channel the CDTI's action abroad in close cooperation with the Spanish Embassies' Economic and Trade Offices, facilitating the appointment of CDTI fellows at these Offices and the training of Trade Counsellors on issues related to technological innovation.

Since early 2014, SEIDI—through FECYT and in coordination with MAEC—has begun launching new forms of collaboration, such as including scientific advisers at the Embassies in London, Berlin and Washington to promote the activities of their communities of Spanish scientists abroad, with notable success. The figure of Scientific Affairs Adviser fulfils the mission of raising the profile of Spanish science abroad, including the scientific agenda in the Embassies' everyday activities. In addition, they support Spanish scientists living abroad, and establish direct dialogue with the most advanced countries in the fields of science and technology.

Another of SEIDI's actions, through FECYT, is the creation of the Science Diplomacy Network, encompassing 23 foreign Embassies accredited in Spain, through their counsellors in the R&D&I field.

This administrative structure bases its activity on the Spanish STI System (SECTI), which has centres of research excellence, such as the Severo Ochoa Centres and the María de Maeztu Units, which have been recognised as leading international centres open to international collaboration. These centres' evaluation committees comprise internationally renowned foreign scientists (including Nobel laureates).

SECTI also has a wide variety of Singular Scientific and Technical Infrastructures (known by their Spanish acronym ICTS): major facilities, resources, equipment and services, unique in their fields, which are devoted to cutting-edge, high-quality research and technological development. They are available to the Spanish and international scientific, technological and industrial communities.

In the industrial sphere, many Spanish companies with a marked technological bent are participating or competing in the construction of major STI infrastructures, or are carrying out projects with a notable technological component together with foreign partners within the framework of international multilateral or bilateral programmes. In this regard, attracting international investment in the field of R&D&I is another element to strengthen the system.

As a result of the efforts along the past three decades, Spain has a substantially higher profile in STI circles. For example, in the European Framework Programme for Research: Horizon 2020, in which all countries compete for funding on an equal footing, Spain currently ranks fourth, in terms of grants obtained in 2015, with 9.7% of the EU-28 total, only behind Germany, the UK and France. These are excellent results, exceeding even those attained under the Seventh Framework Programme (ranking sixth, with 8.3% of the EU-28 total), as well as the ambitious goals initially set for Horizon 2020 (9.5%).

Regarding the production of scientific articles, the total topped 77,000 in 2014, representing 3.19% of total worldwide production and tenth in the worldwide ranking. Of the articles published in 2014, 44.69% were from research carried out in collaboration with foreign institutions, showing the high level of internationalisation of science in Spain.

Looking at this exponential increase, it seems advisable for Spain to take advantage of its strengths to innovate further in implementing STID, beyond the practices already been carrying out to date. To this end, the entire national administration should be imbued with a STI culture, including scientists and other experts in the definition and implementation of foreign policy goals and their participation as channels of communication when diplomacy, for political reasons, is unable to play its traditional role.

The consolidation of English as the *lingua franca* of science, and of English-language platforms for disseminating scientific knowledge as validators of STI production should also lead to a reflection on the present and future of the Spanish language in the knowledge society and in the international circulation of scientific production. STID should consider it an essential goal to contribute to protecting and promoting Spanish in scientific circles, in collaboration with other Spanish-speaking countries.

The Spanish government needs to give greater priority to the science and technology component of its foreign action in the STI areas of its different departments, both to promote the image of a modern, advanced Spain and to attract foreign investors to create quality jobs, making the country a magnet for attracting scientific and technological talent, and increasing exports based on better productivity.

International cooperation in science and innovation must be a responsibility shared by the entire national administration: by MAEC, as the ministry responsible for coordinating the foreign actions of all national stakeholders, and by SEIDI, as the body responsible for Spain's STI foreign policy, to achieve a revamped, strengthened scientific and technological diplomacy that is efficient and up-to-date.

The following section features a series of recommendations for better organising all STID actions.

IV- Recommendations

1. Responding to Global Challenges

One of the four general objectives of Spain's current Science, Technology and Innovation Strategy (EECTI 2013-2020) is to foster R&D&I activities addressing global challenges and, more specifically, those affecting Spanish society. In particular, the EECTI, aligned with the European Union's science policy, identifies the following major challenges: i) health, demographic change and well-being; ii) food security and quality, sustainable agricultural activity, sustainability of natural resources, marine and maritime research; iii) safe, sustainable and clean energy; iv) smart, sustainable and integrated transportation; v) climate change action and efficient use of resources and raw materials; vi) social changes and innovations vii) digital economy and society; and viii) security, protection and defence.

Each and every one of these areas is inextricably linked to the Sustainable Development Goals (SDGs) of the 2030 Agenda, compliance with which constitutes a priority commitment for Spain.

Moreover, the EECTI establishes that the globalisation of knowledge, of technologies and of innovation markets makes the international leadership capacities of public institutions, universities, research groups and businesses a key differentiating factor in a highly competitive environment.

Recommended STID activities for responding to major global challenges:

1. To give a higher profile to scientific and technological research related to major social challenges:
    - To organise bilateral and international seminars in countries of interest about these challenges. Promote meetings and presentations in international organisations and facilities.
    - To hold informal meetings with different national and international R&D&I agents.
    - To disseminate the scientific and technological findings of Spanish companies and scientific institutions.
    - To inform R&D&I managers—both public and private—in countries of interest about the excellence and the opportunities of our system with regard to major social challenges.
    - To highlight best practices in the use of Structural Funds and the principal results achieved.

2. In development cooperation:
    - To participate in and promote bilateral and multilateral programmes related to the SDGs linked to the field of STI, as well as to the technological facilitation mechanism.
    - To support staff training and the design and construction of STI centres and infrastructures.

3. In the Horizon 2020 Programme:
    - To use the Horizon 2020 Programme as a STID vehicle, fostering the inclusion of Spanish entities and scientists in consortiums promoted by other countries under said Programme.
    - To foster the presence of Member States in pan-European R&D&I installations with headquarters or sub-headquarters in Spain.
    - To promote the participation of institutions and entities in major initiatives involving social challenges, as well as fostering the participation of STI agents from other Member and Associated States in initiatives led by Spain.

2. Promoting International Business Leadership in R&D&I

Compliance with the EECTI's goal of promoting business leadership in R&D&I requires that the public administration adopts measures to support the international dissemination of Spanish technology, supporting R&D&I business projects in collaboration with agents from other countries, and the global marketing of new products and innovative services through the corresponding promotion actions abroad.

Moreover, MAEC's Foreign Action Strategy sets forth as one of its actions regarding research, development and innovation, the promotion of sustained technological action abroad, capable of building a solid international reputation for the assets generated by Spanish business and scientific sectors' R&D activity, increasing their international cooperation with the most innovative actors from other countries, and promoting a strong investment mobility aimed at improving Spanish companies' technological capacities inside and outside Spain.

Furthermore, the Strategic Plan for the Internationalisation of Spain's Economy, in its "Fostering Innovation" line, addresses the need to combine fostering innovation with promoting internationalisation to enhance Spain's export potential, incorporating goods with greater added value and higher technological content.

Recommendations on STID activities relating to international R&D&I business leadership

- To enhance CDTI support instruments for companies' international technological cooperation.
- To establish, in the short and medium term, new bilateral agreements and programmes with innovation management institutions in third countries.
- Systematic participation of SEIDI in the Council Foundations of Spain with Third countries.
- To strengthen ICEX programmes that support the internationalisation of Spanish technology and innovation companies.

3. Improving Coordination within the General State Administration

Modern STID is conceived as networking with multiple agents (governmental and non-governmental) involved. Its governance, therefore, requires an effort in coordination and integration of the different stakeholders and strategies working towards shared interests.

Today, Spain's STID-related foreign action is multiple and diverse—albeit scarcely coordinated—with the participation of the following actors:

- Cultural Counsellors at Spanish Embassies. In certain cases, these Counsellors perform tasks involving scientific issues.
- Network of Spanish Economic and Trade Offices abroad.
- Permanent Representation of Spain to the EU (REPER).
- CDTI's network abroad.
- Scientific coordinators from FECYT in Washington, Berlin and London.
- Spain's participation in international scientific and technological organisations and infrastructures.

The following actions are recommended to strengthen STID actions:

- Including MAEC in the R&D&I policy coordination bodies, especially in the Delegate Commission for Scientific and Technological Policy.

- Creating a National Network of STI Advisors, reporting to the President of the Government, to MAEC and, if possible, to each of the Ministers, for them to be promptly informed of STI issues related to their respective areas of responsibility. This will make it easier to take certain political decisions, knowing and assessing the existing scientific evidence and technological trends.

- Drafting a joint MAEC-SEIDI document in collaboration with SEC, describing Spain's STI-related foreign action position towards the different priority countries, and the periodic review and updating of said document in line with national scientific and technological priorities.

- Consistent with the above-mentioned position document, it is recommended that MAEC sends an instruction to all its Directorates-General and Embassies underlining the importance of issues having an STI dimension, and the advisability of appointing a focal point for its monitoring.

- Creating the figure of sectoral Scientific and Technological Counsellors at strategic Embassies.

- At those embassies without such a figure, accrediting Cultural Counsellors as Cultural and Scientific Counsellors, and accrediting Economic and Trade Counsellors as Economic, Trade and Technological Counsellors.

- Expanding and consolidating the current network of SEIDI advisors specialised in STI, ensuring their full integration in Embassies pursuant to the coordination principle.

  Regarding these last three items, MAEC, SEIDI and SEC shall agree on the most appropriate option in each situation.

- Without prejudice to the MAEC Scientific Advisor, appointing an Ambassador-at-Large for STID, reporting to the State Secretariat for International Cooperation.

- Creating a stable Working Group for information-sharing and monitoring STID activities in which the units considered appropriate by MAEC, SEIDI and SIC are participating, organising a yearly meeting to evaluate the results and plan the activities for the coming year.

- Identifying and disseminating the principal international forums relevant for STID, such as the International Network for Government Science Advice, producing an annual calendar of the principal events and their subject matter in order to facilitate Spanish participation.

4. Strengthening Cooperation with Other Countries

The priorities of Spain's STI activities abroad focus mainly on Europe, Ibero-America and the Mediterranean countries. Within the framework of bilateral cooperation with other countries, relations with emerging countries and with certain very STI-intensive countries, such as the United States and Japan, are given priority. The intensity and focus of these activities will depend on the degree of development of STI systems in the different countries involved.

There are many success stories of collaboration between Spanish R&D&I funding agencies and their international counterparts in promoting STI programmes bilaterally or multilaterally. Furthermore, Spanish Embassies provide crucial support for promoting these programmes.

Spanish STI agents have participated in and led specific activities related to these programmes, many of them carried out as part of a competitive process; they also have bilateral agreements with international counterparts to conduct STI activities.

The following recommendations aim to align STI-related collaboration and Spain's foreign policy.

4.1. General recommendations

1. Incorporate science and technology as an integral part of bilateral relations with all countries.
2. Periodically update an inventory of bilateral STI cooperation involving the different agents in Spain's R&D&I System.
3. Strengthen the role of Embassies with regard to STID:
    - Using the Embassies to give visibility to cooperation being carried out by Spanish R&D&I agents in the countries where they are located.
    - Informing the Embassies of the most important initiatives or events organised by or involving Spanish R&D&I agents in relation to different countries.
    - Disseminating Spain's STI capabilities.

4.2. Recommendations on cooperation within the framework of the European Union

1. To adopt on a general basis the recommendations regarding global challenges in Horizon 2020 described in section IV.1 (Recommendation 3) of this report.
2. To give visibility, through Spain's Embassies, to the strength and high competitiveness of Spain's STI system, underpinned by participation and leadership in H2020.
3. To use STID so that Spain's STI and geostrategic interests are reflected in the decisions of the Strategic Forum for International Science and Technology Cooperation (SFIC), an advisory group to the Council and the European Commission.
4. To use STID as the foundation for establishing consensus-based actions with other EU members in Spain's priority geostrategic areas, such as the Maghreb and Latin America.

5. To take advantage of Destination Europe events and of the EU's EURAXESS platform to attract talent and promote STI activities in Europe and in third countries.

4.3. **Recommendations on collaboration with Ibero-American countries**

1. To boost the use of the Spanish language in the worldwide flow of knowledge, stimulating the production and dissemination of scientific and technological content in Spanish.
2. To help the Science and Technology for Development (CYTED) programme become the reference point for cooperation in the region. To this end, the following is proposed:
    - To support the creation of a platform of financing agencies in the EU-CELAC (Community of Latin American and Caribbean States) area, where the CYTED Secretariat General would be the technical management office for H2020 projects regarding Ibero-America.
    - To boost the participation of transnational groups in European projects through CYTED.
    - To foster greater involvement of participating countries in CYTED.
    - To strengthen its innovation sub-programme, IBEROEKA.
3. To establish an individualised bilateral cooperation strategy with Ibero-American countries in line with Spain's Foreign Action Strategy, featuring specific actions depending on each country's income and R&D&I system development:
    - Including scientific, technological and innovation tours in all the visits by the region's leaders or ministers to Spain.
    - Opening up Centres of Excellence and Unique Scientific and Technical Infrastructures (ICTS) to collaboration with Ibero-American countries.
    - Encouraging participation in the construction and operation of major scientific and technological infrastructures, taking into consideration:
        i. Training in their design, construction, management and operation.
        ii. Dissemination of the know-how of Spain's science industry.
    - Encouraging the creation of sectoral business associations, in the framework of IBEROEKA or other bilateral programmes on innovation.
    - Cooperating to strengthen Ibero-American STI systems, taking advantage of the Country Partnership Frameworks, as is the case with Ecuador.
    - Reactivating the Working Group of the Cooperation Council on Research, Innovation and Studies on and for Development.

4.4. **Recommendations on collaboration with Maghreb countries**

1. To open up Centres of Excellence and Unique Scientific and Technical Infrastructures (ICTS) for collaboration with Maghreb countries.
2. To provide training in STI and its management.
3. To strengthen the role of the Secretariat of the Union for the Mediterranean (UfM) in Barcelona as the *ad hoc* secretariat of the 5+5 Programme, and possibly of the future EU Partnership for Research and Innovation in the Mediterranean Area (PRIMA) programme, as a hub for initiatives carried out by the EU in the Mediterranean.

4. To strengthen strategic coherence between the UfM and PRIMA.
5. To support, in the diplomatic sphere, the development of bilateral STI agreements.

4.5. **Recommendations on collaboration with emerging countries**

1. To carry out follow-up activities to strengthen the STI MoUs signed with emerging countries.
2. To support the development of current or newly-established bilateral innovation programmes through bilateral calls for applications.

5. Training Human Resources in STID

The proposed recommendations focus on consolidating the career of Spanish General State Administration staff who work in STID, and on related training aspects.

The priority goal of these training measures is to raise awareness among officials responsible for Spain's foreign action of STI's relevance as a key element in the positive foreign projection of Spain.

Recommendations:

- To provide regular STID training to staff seconded abroad. Strengthen the role of the Diplomatic School in STID training for Foreign Service staff, through its courses and programmes.
- To draft a list of "best practices" and recommendations that should be implemented in Spain.
- To strengthen institutional collaboration through the temporary incorporation into MAEC of officials who are scientific policy experts from other Ministries, to work on these issues; also temporarily incorporate one or more diplomats into the Ministry of the Economy and Competitiveness.
- To organise training visits to Centres and Units of Excellence of the Spanish System of Science, Technology and Innovation.
- To promote an established career path in STID.
- To study the implementation of a pilot programme of grants for postdoctoral scientists to learn first-hand about policymaking in a Ministry, Legislative Chamber or Embassy, following the model of AAAS Science and Technology Policy Fellowships.

6. Improving Communication and Dissemination of STID

Societies in developed countries have begun to see science and technology differently, and this has led to a new relationship between STI and society. The public has to become a basic pillar of the R&D&I system.

Today, civil society insists on playing an active role in STI governance, on participating in designing goals and analysing the usefulness of its outcomes, thanks to new digital technologies (Open Access, Open Innovation, Big Data and Open Science) that facilitate the globalisation of the scientific community.

Moreover, in addition to fostering the recognition of science and innovation, it is crucial for STID to be underpinned by Spain's scientific and innovative strengths in its public diplomacy so as to enhance our country's image and social and economic appeal.

It is equally important to improve strategies for communicating opportunities and benefits offered by Spain for developing STI activities. To this end, the aim is not only to describe the current financing programmes and the system's strengths, but also to produce appealing and innovative communication strategies, including examples or cases that may be considered success stories for attracting talent.

For all these reasons, the following recommendations are suggested:

- To draft a communication strategy proposing the production of promotional materials on the opportunities offered by Spain's Science, Technology and Innovation System (SECTI).
- To promote the circulation and dissemination of scientific knowledge also in Spanish language, in collaboration with other Spanish-speaking communities. To achieve this, STID will support work on the systematisation and standardisation of science terminology in our language, raise the media profile of Spanish science, and uphold the creation of international scientific projects and networks that ensure the visibility of Spanish STI production.
- To support and promote Associations of Spanish Scientists Abroad and intensify relations between the Embassies and these Associations. The activities carried out by the Associations constitute positive reinforcement for traditional foreign action, because they raise the profile of science done by Spaniards, promoting its internationalisation, facilitating the creation of new networks, and expanding the Embassies' activity.
- To strengthen the current Science Diplomacy Network, comprising officials from foreign Embassies accredited to Spain, so that it may serve as a communication channel.