Tools for an EU Science Diplomacy

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Tools for an EU Science Diplomacy

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Executive Summary

1. Science Diplomacy is globally becoming a crucial issue at a time of major crises, but it is still scarcely known and perhaps not optimally used. Europe, in particular 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.

2. There is no uncontested definition of science diplomacy, but there is a general agreement that three varieties of Science Diplomacy can be distinguished: **Diplomacy for Science** is mainly about the facilitation of international scientific collaboration. With **Science in Diplomacy** the roles are reversed: here the scientists are prompted towards supporting foreign policy. **Science for Diplomacy** goes one step further: here science is used as a tool to build and improve relations between states.

3. Science Diplomacy policy or Science Diplomacy practices that are labelled by the stakeholders as such can be referred to as **explicit Science Diplomacy.** But there are also relevant policies and practices that are not labelled as, Science Diplomacy. They can be referred to as **implicit Science Diplomacy**. In order to avoid a too broad approach to Science Diplomacy, one should limit the use of the concept to the explicit policies and practices that involve both S&T policy and Foreign Affairs policy.

4. The EU's competence in science diplomacy is embedded in how S&T policy is dealt with in the European treaties. As such, it can be said that the EU's science diplomacy has to be seen as a shared responsibility. This poses **two major challenges**: (i) how to carve out a specific role for the EU that complements the Science Diplomacy policies of its Member States? and (ii) how to integrate that role in the overall EU's Global Strategy for Foreign and Security Policy?

5. Science diplomacy practices can take many forms and can be classified in three categories:

Strategic tools for Science Diplomacy are policy documents that aim to give directions to what actors want to achieve and how to realize their policy goals. Here we are mainly talking about governmental communications that set out policies for Science Diplomacy.

Operational tools for Science Diplomacy are policy instruments used to put Science Diplomacy into practice. They involve the allocations of specific resources as well as mechanisms on how to use them.

Finally, there are so-called **support tools** for Science Diplomacy that aim to promote or facilitate Science Diplomacy activities.

6. The literature review and internet search revealed that it is not easy to find strategic documents at the level of EU Member States with regard to Science Diplomacy.

7. There exist many different operational tools across the different EU Member States that put Science Diplomacy in action. However, in most cases we are dealing with implicit forms of Science Diplomacy as the concept is not always mentioned. Furthermore, in line with the observed absence of strategic tools, the operational tools are not always clearly linked to Foreign Affairs policies.

8. In general there is no evidence of a lot of support initiatives for Science Diplomacy at the national level in EU Member States.

9. From the review of national Science Diplomacy initiatives it can thus be concluded that most EU Member States do not have a Science Diplomacy strategy. In most cases however, Member States are engaged in some activities that can be labelled as Science Diplomacy. But the national efforts remain in most cases very limited and there are little support structures. On top of it, most national Science Diplomacy activities are at best only loosely connected to Foreign Affairs policies. In other words, **Science Diplomacy is not well developed within most of the EU Member States**.

10. A Science Diplomacy policy of the EU should consist out of two strands: (i) support of the Member States Science Diplomacy policies and practices; and (ii) support of the EUs own Foreign and Security Policy. This can be achieved through implementing the following six **recommendations** to the EU with regard to the elaboration of an EU Science Diplomacy strategy and structure:

11. Supporting the EU Member States in their Science Diplomacy practices:

Recommendation 1: Monitor the development of Science Diplomacy in the EU

Recommendation 2: Create a support structure for Science Diplomacy activities at the level of EU Member States

12. Supporting the EUs Foreign and Security Policy trough a EU Science Diplomacy Strategy:

Recommendation 3: Link the EU's RTD policy with the EFSP

Recommendation 4: Create a culture of Science Diplomacy in the EEAS

Recommendation 5: Improve dialogue and collaboration with regard to Science Diplomacy between all relevant EU institutions

Recommendation 6: Develop a focused EU strategic plan on Science Diplomacy that incorporates the above recommendations.

13**.** The above recommendations can be put in practice through the development of a proper EU Science Diplomacy strategy, similar to what exists for the EU cultural diplomacy. But such a strategy needs not only to focus on the organisational issues. It also needs a vision. One proposal is to focus upon three areas that are a mix of self-interests and aspirations to have a positive impact on the world. These areas are: (i) Science and Technology contributions towards enhancing **regional security** in its neighbourhood and (ii) Science and technology contributions towards improving **European trade** in the world and (iii) Science and Technology contributions towards tackling **global problems**.

1. INTRODUCTION: AIMS AND RATIONALE FOR THE STUDY

Science Diplomacy is globally becoming a crucial issue at a time of major crises, but it is still scarcely known and perhaps not optimally used. Europe, in particular 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 overall aim of this study is to present an evidence-based scanning of the most relevant Science Diplomacy policies, some best practices or tools existing within the EU Member States and in some other relevant countries. This is done through presenting an overview of the concept and relevant tools and practices as well as an explanation of the rationale and process required to set them up. Based upon these assessments, the outlines of the possible principles and target areas for an EU Science Diplomacy are presented as recommendations.

The present study was contracted by the E.U. to Prof. Dr. Luk Van Langenhove (Vrije Universiteit Brussel) through contract NO 3°-CE-0795414/00-43. The work performed by the contractor started on 7/7/2016 and a final report was submitted on 10/12/2016. The work involved a total of 30 working days.

2. CONCEPTUALISING SCIENCE DIPLOMACY

There is no uncontested definition of Science Diplomacy, but there is a general agreement that three varieties of Science Diplomacy can be distinguished[1].

Diplomacy for Science is mainly about the facilitation of international scientific collaboration. Here, classic tools of diplomacy are put to use to support the scientific and technological (S&T) community. It is about using diplomacy in order to establish cooperation agreements at government or institutional level. The goal of diplomacy for science actions is to benefit from foreign science and technology capacity in order to improve the national capacity.

With **Science in Diplomacy** the roles are reversed: here the scientists are prompted towards supporting foreign policy. In times of war, this has resulted in mobilising national scientific and technological resources for the development of arms. In times of peace, this is about using scientific knowledge in foreign policy decisions. The goal of such activities is to improve foreign policy actions through the use of scientific knowledge.

Science for Diplomacy goes one step further: here science is used as a tool to build and improve relations between states. This can be achieved when there are tensions in relations between certain states or when states are faced with common problems that they cannot solve on their own. Scientific collaboration is used here to provide collaborative relationships that are based upon a non-ideological basis. The goal here is to support Foreign Policy actions by mobilising scientific networks.

Conceptualising Science Diplomacy is thus complex and multi-layered. This causes a number of problems. First, there is a risk of overstretching the concept. If seen to broadly, the concept applies to pretty much any practice that involves both science and international actions. Consequently, if everything that involves an international dimension and science is categorised as science diplomacy, then the term risks to lose its meaning. Secondly, 'science diplomacy' is a **label** used by actors to refer to certain policies or actions that involve the engagement of scientific or cultural communities in transnational interactions. In both cases, those policies or activities can or cannot be labelled as Science Diplomacy by the actors themselves. When labelled by the actors as diplomacy policy or Science Diplomacy practices, one can refer to them as **explicit Science Diplomacy.** When not labelled as such, one can refer to them as **implicit Science Diplomacy**. In order to avoid a too broad approach to Science Diplomacy, one should limit the use of the concept to the explicit policies and practices that involve both S&T policy and Foreign Affairs policy.

The implicit and explicit Science Diplomacy policies involve three dimensions that together determine their **impact**[2]:

The **willingness** of the actors to use science for diplomacy goals. This includes the ambitions of the actors as well as interactions with other Foreign Affairs policies and strategies.

The **capacity** of the actors to mobilise science for diplomacy goals. This includes the available resources and instruments.

The **acceptance** of Science Diplomacy policies by other actors, including the scientific communities.

The actual Science Diplomacy practices can be studied from a similar perspective: first, one can assess the **willingness** of stakeholders (the communities and S&T policy-makers) to have their activities labelled as Science Diplomacy. Secondly, one can map the **capacities** of these stakeholders to engage in Science Diplomacy. Thirdly, one can study the **acceptance** of these activities being labelled as Science Diplomacy by different actors, including those who develop Science Diplomacy policies. These actors are in first instance states that engage in Science Diplomacy as part of their 'soft power' strategies. But, not only states, but also non-state actors can be active in Science Diplomacy. Amongst them are sub-national regions (such as for instance the German Länder) and supra-national regional organisations (such as the EU). To the extent that

[1] This distinction was first used in the 2010 landmark report published by the U.K. Royal Society and the American Association for the Advancement of Science.

[2] These dimensions have been put forward by Kingah and Van Langenhove (2012) as a conceptual model to study actorness in International Relations.

these governance entities have in their competencies S&T policy and aspects of foreign policy, they too can be regarded as actors in the field of Science Diplomacy. Furthermore, non-governmental entities such as private foundations, international S&T organisations, and even multilateral organisations can engage in Science Diplomacy as well.

Finally, it can be noted that Science Diplomacy can be driven by different **motivations** such as: attraction and access, cooperation and promotion and influencing[3]. **Attraction and access** relates to the ambition of improving national S&T capacities by for instance attracting foreign talents, spotting research potentials, and getting access to foreign research facilities. **Cooperation** is about stimulating the participation of national researchers to international projects and the increase of international joint publications. **Promotion and influencing** relates to the promotion of a country's S&T achievements and to influence other countries' decision-makers and public opinion.

Science Diplomacy is thus not an easy to define practice. A crucial aspect is who initiates it. That can be states that in an instrumental way use science and S&T communities to pursue their Foreign Policy goals in order to promote their national interests. But scientists themselves can also embark upon Science Diplomacy activities without states being directly involved. The present report focuses upon the explicit and implicit capacities of EU Member States for Science Diplomacy with the aim of formulating recommendations towards the EU with regard of what the EU could do as a distinct Science Diplomacy actor.

[3] Flink and Schreiterer (2010) identified three goals to characterise different varieties of Science Diplomacy policies: Access, Promotion and Influence. Ruffini (2015) distinghues between Attraction, Cooperation and Influencing.

3. THE EU AND SCIENCE DIPLOMACY

The EU's competence in science diplomacy is embedded in how S&T policy is dealt with in the European treaties. There is no genuine legal competence for a single European S&T policy, as under article 4(3) TFEU, research, technological development are seen as a shared competence in which the EU can carry out activities, but Member States can also exercise competences in parallel.[4] By virtue of Article 181 TFEU, Member States and the EU must therefore coordinate their policies to ensure a coherent research policy.[5] And Article 180(b) TFEU states that the EU will carry out the promotion of S&T with third countries while complementing that of the Member States. As such, it can be said that the EU's science diplomacy has to be seen as a shared responsibility[6].

The EU has developed a comprehensive international S&T cooperation policy over the past decades. A milestone was achieved in 2008, when the European Commission adopted a 'Strategic European Framework for International Science and technology Cooperation' and established a European 'Strategic Forum for International S&T Cooperation' (SFIC) with the objective "to facilitate (…) the international dimension of ERA"[7]. Across the board, two overall sets of objectives for international S&T cooperation can be distinguished: (i) intrinsic objectives, directly aimed at cooperation among researchers and large-scale infrastructure building and (ii) external ones focusing on the support of other polices such as foreign policy, trade policy or development policy[8]. The importance of international cooperation in S&T is explicitly recognised in Horizon 2020. In the 2012 Communication of the E.C., entitled '*Enhancing and focusing EU international cooperation in research and innovation: a strategic approach*', three core objectives for international cooperation with non-Member States are outlined:

(i) Strengthening the Union's excellence and attractiveness in research and innovation as well as its economic and industrial competitiveness;

(ii) Tackling global societal challenges; and

(iii) Supporting the Union's external policies.[9]

The communication also states that cooperation in research and innovation will make use of Science Diplomacy to achieve soft power and improve relations with third countries[10]. In the document COM (2012) 497, it is clearly stated that such international cooperation should support the EU's external polices by coordinating closely with enlargement, neighbourhood, trade and its Common Foreign and Security Policy (CFPS). The same document also mentions that science diplomacy has to be used as an instrument of soft power "and as a mechanism for improving relations with key countries and regions". A similar point of view is expressed in COM (2014)339Final, where it is stressed that further efforts need to be made in addressing the external dimension of Research and Innovation policy. But despite the mentioning of the term 'science diplomacy' in that strategic document and despite the broad range of science diplomacy related activities in the Horizon 2020 programme, the E.C. has long not labelled its science diplomacy activities as such[11]. This has however recently changed when Carlos Moedas, the EU Commissioner for Research, Science and Innovation, took office in November 2014. In a speech delivered at the European Institute in Washington on 1 June 2015, boldly stated that he wants "*science diplomacy to play a leading role in our global outreach for its uniting power*".[12] In that same speech, he compared Science Diplomacy to a torch that can "*light the way, where other kinds of politics and diplomacy have failed*".

Recent geopolitical developments have certainly increased the relevance of Science Diplomacy as an instrument for European soft power and as a mechanism for improving relations between the EU

[4] Prange-Gstöhl, 2010, p.231.
[5] ibid.
[6] Houët, 2014, p. 17.
[7] http://www.consilium.europa.eu/policies/era/sfic
[8] See the INCO monitoring report "Overview of international science, technology and innovation cooperation between Member States and countries outside the EU and the development of a future monitoring mechanism" (2012, p. 11);
[9] European Commission, Enhancing and focusing EU international cooperation in research and innovation: a strategic approach', COM (2012) 497 final, Brussels, 14.9.2012. p.4.
[10] Ibid., p.6.
[11] Herlitschka, 2013, p. 42. Quoted in Houët, 2014, p.20.
[12] Moedas, C. The EU approach to science diplomacy. https://ec.europa.eu/commission/2014-2019/moedas/announcements/eu-approach-science-diplomacy_en

and key countries and regions across the world. But this poses two major challenges: (i) how to carve out a specific role for the EU that complements the Science Diplomacy policies of its Member States? and (ii) how to integrate that role in the overall EU's Global Strategy for Foreign and Security Policy?

4. ILLUSTRATIVE MAPPING OF SCIENCE DIPLOMACY TOOLS OR INSTRUMENTS USED BY NATIONAL GOVERNMENTS

4.1. Methodology

Given the shared competences for science diplomacy between the EU and its Member States, it makes sense to have a close look at what exists at the national levels before discussing what could or should be done at the EU level.

The illustrative mapping undertaken for this study has been based upon:

A literature review aimed at a preliminary screening of implicit and explicit Science Diplomacy policies and practices in selected EU Member States and some other countries;

A more in-depth analysis of Science Diplomacy policies and practices in selected EU Member States and some non-EU countries based upon collation and analysis of documentation, available databases and informal interviews with practitioners.

Preliminary results of the mapping exercise have been presented at a closed workshop with peers and E.C. officials of DG RTD in Brussels on 20 October 2016. A draft report was also shared with the members of the RISE "Open to the world" Group and discussed at a Group meeting on 23 November 2016.

The results are presented below, according to a classification scheme introduced in the next section. For each of the different categories and types of tools, specific examples are briefly introduced together with some general observations and conclusions. Next, a more detailed overview is presented of some country approaches, both inside and outside the EU. These overviews were selected because they can qualify as best practices at national level. The criteria for selecting the best practices were (i) the combination of strategic, operational and support tools and (ii) the existence of an institutional framework for Science Diplomacy in the country. Neither the general overview, nor the listed best practices, aim to be exhaustive. To this end, a more detailed study based upon questionnaires to the respective governments should be undertaken.

4.2. Classifying tools for Science Diplomacy

The mapping exercise documented in the paragraphs below revealed that what is considered as implicit or explicit science diplomacy practices can take many forms. Such practices can emerge spontaneous, but most often they will be the result of deliberate policies and/or support schemes with an involvement of some governmental agencies. Based upon the collected cases, a classification scheme has been constructed that allows to classify the most important available governmental tools and instruments that can be used in promoting or supporting science diplomacy. The classification scheme involves three categories: strategic tools, operational tools and support tools.

A. Strategic Tools

Strategic tools for Science Diplomacy are policy documents that aim to give directions to what actors want to achieve and how to realise their policy goals. Here we are mainly talking about **governmental communications** that set out policies for Science Diplomacy. Such documents can contain general 'visions' of what a government aims to achieve or it can be more specific strategy declarations issued by the government or a governmental department, such as a Ministry of Science and Technology Policy or the Department of Foreign Affairs.

Moreover, in principle it is possible that such strategic documents also occur at the level of subnational entities with governance responsibilities in either science and technology policy or foreign relations. And of course, semi-governmental institutions such as Research Foundations or Academies can issue strategic documents with a Science Diplomacy perspective as well.

B. Operational Tools

Operational tools for Science Diplomacy are policy instruments used to put Science Diplomacy into practice. They involve the allocations of specific resources as well as mechanisms on how to use them. There exist many different operational tools to put Science Diplomacy in action.

A first important category contains the **bilateral or multilateral S&T cooperation agreements** between two or more states. These can take the form of:

(i) Umbrella or framework agreements that promote scientific or technological cooperation, or

(ii) Specific agreements between two or more states or governmental agencies that cover topical points of collaborations.

Many of these agreements focus upon mobility schemes between the counties involved or upon joint projects. A special case of such agreements are the ones that foresee in the creation of joint international S&T institutions by two or more states.

A second category, dealing with 'science IN diplomacy' are the **S&T advisory boards** at the level of states. These advice systems can take the form of a council or high-level group. They can be installed at the level of the Prime Minister or be related to the department of Foreign Affairs or the Ministry for Science and Technology. In principle such bodies can also be institutionalized, as for instance a S&T office within a department of Foreign Affairs. In all cases the purpose is to inject scientific knowledge into state governance.

A third category are the **S&T advisors attached to embassies** where the objective is to assist the national diplomatic mission in establishing cooperation with the scientists of the country where the embassy is located.

Fourthly, there is the **opening of national or regional research funding schemes** to third party researchers. This can take the form of financial support of individual fellowships or staff exchange programmes, financial support for specific cross-border S&T cooperation programmes or joint calls for S&T projects issued by two or more states.

C. Support tools

Finally, there are so-called support tools for Science Diplomacy that aim to promote or facilitate Science Diplomacy activities. These tools include:

- Training activities regarding science diplomacy. Audiences can be either diplomats or scientists.
- Awareness building activities geared towards scientists or diplomats.
- Dialogue and consultation platforms.

Next to these supporting practices, governments can also set up or fund specific agencies that support the organisation of certain operational tools for Science Diplomacy.

4.3. Strategic Tools for Science Diplomacy at national level

The literature review and internet search revealed that it is not easy to find strategic documents at the level of EU Member States with regard to science diplomacy. This is certainly related to the fact that 'Science Diplomacy', contrary to for instance 'Cultural Diplomacy', is a relatively new concept and thus not yet widespread in national policy-making circles.

There are however exceptions of EU Member States that have some kind of national strategy documents for Science Diplomacy. Amongst them are France, Spain and Germany. Their strategic

visions will be presented in Section Five of this report. Furthermore, it could be observed that some EU Member States are currently in the process of developing governmental strategies. This seems to be the case for Belgium, where on 1 December 2016, a conference on the topic "Science Diplomacy in Belgium" was organised by the federal Science Policy Office and the Flemish and Walloon/Brussels regional administrations for Science Policy.

Outside the EU, some countries also offer strategic tools for science diplomacy. This is especially the case for the USA and Japan (see again Section Five of this report). But in general, one can conclude that the strategic thinking about Science Diplomacy as an instrument in the context of Foreign Affairs and international relations is not well articulated.

4.4. Operational tools for Science Diplomacy at the national level

There exist many different operational tools across the different EU Member States that put Science Diplomacy in action. However, in most cases we are dealing with implicit forms of Science Diplomacy as the concept is not always mentioned. Furthermore, in line with the observed absence of strategic tools, the operational tools are not always clearly linked to Foreign Affairs policies. Below is an overview of the main categories of operational tools, illustrated with some examples.

4.4.1. Bilateral or Multilateral S&T Cooperation Agreements

There exists an incredible amount of especially bilateral agreements between countries that deal with one or another form of international S&T cooperation. Fikkers and Horvat (2014) analyse in their study on the effectiveness of S&T cooperation, more than 100 bilateral agreements involving the EU, its Member States and the US. But the total amount of such agreements is far higher. An internet survey of what exists in Germany revealed that for that country alone more than 120 bilateral agreements can be identified.

Given the sheer amount of S&T international cooperation agreements, it is no surprise that the drivers and motives of states to engage in international cooperation vary to a great extent. Flanagan et al (2012) have identified two broad sets of objectives for international S&T cooperation: (i) **intrinsic objectives**, directly aimed toward S&T substantiation such as cooperation among researchers or setting up large-scale infrastructures and (ii) **external objectives** focusing on the support of other policies such as foreign policies, economic/market policies or development policies[13]. A similar distinction is made by Fikkers and Horvat who distinguish between agreements linked to quality, scope and critical mass in S&T and agreements that include non-science policy objectives. Across these two categories, they identified 15 different reasons for signing international S&T agreements on a spectrum that ranges from 'narrow' agreements to 'broad' agreements:

1. Increase in cooperation
2. Exchange of experience
3. Reaching changes in R&D funding patterns
4. Improving R&D economies of scale
5. Increasing access to research infrastructures
6. Increasing human capital
7. Improving research reputation of countries
8. Increasing innovation and market orientation

[13] Flanagan, K. Et al (2012).

9. Developing common strategies
10. Achieving research excellence
11. S&T capacity building
12. Highlighting cooperation during a diplomatic visit
13. Protecting security
14. Transforming a diplomatic relationship
15. Promoting public diplomacy

The first eleven reasons fall under the narrow S&T agreements paradigm; the last four reasons are related to the broad S&T agreements paradigm.

All EU member states have concluded many such agreements, but only few of them refer to 'science diplomacy' explicitly as most of the bilateral agreements are related to intrinsic scientific drivers of striving for excellence and improving the national science system. This is probably related to the fact that in most cases, international agreements are dealt with by the ministries responsible for S&T as they normally have internationalisation in their portfolio. **Germany** and **Italy** are good examples that deviate from that position as the lead role is shared with the Ministry of Foreign Affairs. In 2012 for instance the Italian Ministry of Foreign Affairs and the Ministry for Research created together the *Innovitalia* platform.

In some cases, governments have set up dedicated agencies or intermediaries that play a pivotal role in the implementation of S&T cooperation. This is for instance the case in **Germany** with DAAD and in **Denmark** with the Funding Agency Coordination of International Tasks. In the **UK**, the British Council takes up this role, together with the research councils, the academies and the Science and Innovation Network (SIN), the DFID funds for international science and research for the purpose of international development.

4.4.2. S&T advisory boards

Not all EU Member States have S&T advisory boards or structures that support governments. Good examples can be found in **the Netherlands**, **Finland** or the **UK**. The UK has had a long-standing tradition of employing a Chief Scientific Adviser, with direct access to the Prime Minister. Today this General Chief Scientific Adviser heads the 80-strong Government Office for Science while each ministry has a specific adviser. Interestingly, these practices are hardly ever labelled as science diplomacy.

A classic example of Science in Diplomacy, is the support of governmental foreign policy through input from the scientific community. This can be part of the mandate of a general advisory board for the government or it can be organised at the level of the Department of Foreign Affairs. In both cases however, this is mostly an implicit form of Science Diplomacy, as these practices are seldom labelled as Science Diplomacy.

Most European Member States have a scientific institute that is either directly attached to the Ministry of Foreign Affairs or that operates independently but in close connection to Foreign Affairs. This is for example the case in **Belgium** (The Egmont Institute for International Relations), the **UK** (Chatham House) or in **the Netherlands** (Clingendael).

4.4.3. S&T Advisors attached to Embassies or Foreign Affairs Departments

Only few countries in the world have created the position of Scientific Adviser in their respective Foreign Affairs ministries. This is for instance the case in the **US**, **Japan**, **New Zealand** and the **UK**. In the **US**, the State Department has a Science and Technology Advisor to the Secretary of State. The Department of State Science Diplomacy strategy focuses upon overall participation from public and private sector organisations in areas that involve S&T. The American Association for the Advancement of Science (AAAS), in coordination with the State Department runs an ambitious grant programme for training scientists in the areas of S&T policy within the US Government.

A number of countries have S&T attachés or overseas liaison offices in third countries. This is the case amongst others in **Austria**, **Denmark**, **Germany**, **Italy**, **the Netherlands**, **Sweden** and the **UK**.

Italy for instance has a network of experts and attachés that operates in 20 countries. They are people from Italian research bodies and universities and their role is to showcase and capitalise on the sectors of excellence in S&T and support the advancement of Italian companies in advanced technology sectors. The information they gather is circulated electronically to the Italian S&T communities.

As for the **UK**, there the Science and Innovation network (SIN), jointly run by the Foreign and Commonwealth Office and the Department for Business, Innovation and Skills. The network consists of around 90 staff members, based in British Embassies across 28 countries and 47 cities worldwide.

4.4.4. Opening of National or Regional Research Funding Schemes

International research cooperation is often seen as a form of Science Diplomacy as scientists have indeed a long tradition of cross-border collaborations. It is however debatable to what extent these collaborations count as Science Diplomacy as in most cases the scientists involved will not define their practices as such. Nevertheless, some states have developed explicit policies towards supporting international S&T collaborations. Often the driving force behind such policies is the belief that the national S&T capacity will benefit from such internationalisation. Next to investing in funding collaboration schemes this can also lead to a policy of opening up national funding schemes for foreign scientists. In some cases, the international research collaboration is stimulated as a way to retain cross-border contacts in situations where the 'normal' diplomatic relations are difficult. And, some countries invest in international S&T collaboration because they believe that their national interest is best served by research that addresses global problems.

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. The German Ministry of Education and Science has, since 2008, 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.

In the **UK**, two initiatives deserve to be mentioned: the Newton Fund and the Global Challenges Research Fund. The Newton Fund, administered by the BIS (now the BEIS), encompasses grants, projects and assistance for knowledge transfer and for scientific collaboration in 15 developing countries. The implementation is done by the British Council, the research councils and scientific academies. The Global Challenges Research Fund focuses upon international collaboration for development cooperation.

4.5. Support tools at the national level

In general, there seems to be no evidence of a lot of support initiatives at the national level in EU Member States. This in contrast with the US where since 2008, the AAAS Centre for Science Diplomacy is guided by the overarching goal of using science to build bridges between countries and to promote scientific cooperation as an essential element of foreign policy. The main purpose of such support actions are awareness-building and capacity-building in both the S&T and diplomatic communities. This can be done by organising trainings, conferences and exchange programmes.

5. SELECTED SUCCESS-STORIES OF NATIONAL SCIENCE DIPLOMACY TOOLS

The above illustrative mapping shows that at present the occurrence of Science Diplomacy at national level in the EU Member States is in a majority of cases happening without a clear strategic vision. Furthermore, the diversity of tools that are available are only in a limited number of cases involving Foreign Affairs. And also, in many cases, the tools that are used are not labelled as Science Diplomacy tools. Finally, there seems to be a general lack of support tools. In other words, Science Diplomacy is in general not well developed across EU Member States.

Nevertheless, there are some success stories to report. In order to qualify as a 'success story', the following criteria should be (more or less) met:

- There is a national strategy for Science Diplomacy available;
- The deployment of the tools involves not only S&T actors but also Foreign Affairs;
- There is an adequate institutional structure available.

Below is an overview of some of these success stories.

5.1. Science Diplomacy of Germany

Germany has a longstanding engagement in Science Diplomacy that dates back to the end of World War II when its first science diplomats were sent to Israel. Today the German strategy for Science Diplomacy is spelled out in two strategic documents: the "Strengthening Germany's role in the global knowledge society: Strategy of the Federal Government for the Internationalisation of Science and Research", published by the German Federal Ministry of Education and Research (BMBF) in 2008 and the "Connecting Worlds of Knowledge" (Aussenwissenschaftspolitik) published in 2009 by the German Federal Foreign Office (AA). Notwithstanding the fact that there are thus two different strategic documents, there seems to be a good collaboration between BMBF and AA, although coordination is reported to be sometimes difficult (Dogan, 2015, p. 116).

The BMBF strategy has four main targets:

- To ensure that the German researchers engage in scientific cooperation with the best research teams in the world and that Germany becomes the first choice for the best researchers in the world;
- To ensure that German companies have a good place in the world's leading and newly emerging high-tech markets in the world and to cooperate with the best R&D centres in the world;
- To increase long term cooperation with the developing countries in Africa, Latin America and Asia in the areas of education, research and development;
- To assign Germany international responsibility in combating global challenges in the areas of climate, health, security and migration.

The second strategic document focusses on "more education, science and research" and aims to contribute to finding common solutions to global problems. One of the important components of this strategy is to provide graduate fellowships for studies related to the neighbouring regions of Europe that are politically unstable.

Next to the ministries, several other players are also involved. Amongst them are the national research centres in Germany (e.g. the Max Planck Society, the Helmholtz Association, the Fraunhofer Society…).

A special place is taken by the German Research Foundation (DFG), a self-governing body of German public-funded research. It is co-funded by the Federal Government and the regional governments (Länder) and adopts a science-driven "bottom-up" approach. As it is independent, it is not part of the German Aussenwissenshaftspolitik. Nevertheless, DFG has its own internationalisation strategy with offices abroad that participate in the DWIH and a number of bilateral cooperation agreements.

Another key-player is the German Academic Exchange Service (DAAD), an independent association that gets funding from several governmental institutions. Members of DAAD are the German universities. The 2020 Strategy of DAAD mentions three ways of action: i) scholarships to the best researchers from Germany and abroad, ii) structures of internationality such as international degree programs or bilateral funded universities and iii) developing and providing expertise on academic collaborations. DAAD annually provides grants to about 120.000 researchers.

Since the late 1960s Germany has appointed German Science Counsellors in several of its embassies. First in the US, France and Israel, later in the UK, Japan, India and Brazil and also in Brussels at its representation to the E.U. The system of Science Counsellors is a shared responsibility of BMBF and AA. Final decisions to appoint a Science Counsellor is made by AA. The financing comes from BMBF. Today, there are around 20 German science diplomats in the world. Their responsibilities differ from country to country.

The German Federal Foreign Office also established a structure abroad that is labelled "The German House for Science and Innovation" (Deutsches Wissenschafts und Innovationshaus – DWIH) in selected cities such as New York, Sao Paulo, Moscow, New Delhi and Tokyo. It aims to gather offices of German research institutes under one roof abroad and are regarded as "windows" of the German research around the world. The one in Sao Paulo for instance was inaugurated in 2012 and focuses on the disseminations of information on funding opportunities in Germany, the organisation of information and brokerage events, and the building of networks between Brazilian and German researchers.

As mentioned in the previous section, Germany is involved in many bilateral S&T cooperation agreements. An important focus here is the increase of the international mobility of students. A lot of attention also goes to cooperation with developing countries. Here the BMBF cooperates with the Federal Ministry of Economic Cooperation and Development.

5.2. Science Diplomacy of Spain

In 2016 **Spain** published a report entitled "INFORME SOBRE DIPLOMACIA CIENTÍFICA, TECNOLÓGICA Y DE INNOVACIÓN". This report is issued by an Advisory Group created in November 2015 by the State Secretariat for Cooperation and for Ibero-America (SECIPI) and the State Secretariat for R&D&i (SEIDI). The Advisory Group (AG) comprises representatives of the sectors most interested in strengthening Spanish STID. This AG first met on 18 November 2015, 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.

The report that arose out of these efforts, includes a series of recommendations to the Ministry of Foreign Affairs and Cooperation (MAEC) and SEIDI to shore up the central government's actions abroad in the areas of defence and of promoting Spain's interests more efficiently, 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 orient the central government's actions abroad in the STI field, in countries that are strategic for Spain; instruments and organisational reforms to improve coordination with 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 the relationship between STI and society as a whole.

The report also formulates some general strategic thoughts on the need for S&T investments and international collaboration. It sees S&T as 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 exports, and improve the image abroad, strengthen research and technology cooperation, which aims to enrich innovative capacity and internationalise the research centres and corporations, and contribute to consolidating an advanced society according to the terms of the United Nations.

In the last years, the Spanish government has set up a new model to foster science diplomacy, in a joint effort of two Ministries (Ministry of Foreign Affairs and Ministry of Economy, where R&D&I currently sits). In a quite new bottom-up phenomenon, the creation and growth of associations of Spanish researchers abroad with very strong advocacy, visibility, networking and international cooperation agendas has triggered the deployment of a whole science diplomacy strategy in the country. The strategy aims at improving bilateral relations, at improving the prestige of Spanish researchers abroad and at integrating the Spanish diaspora as a crucial asset to the system. FECYT is coordinating this strategy, in full cooperation with the rest of the stakeholders.

The Spanish Foundation for Science and Technology (FECYT) is an institution with vast experience in Science and Technology Cooperation. It supports the Ministry of Economy in the Spanish participation in different international fora, e.g. the European Research Area (ERA) and OCDE. Also, FECYT works on monitoring the progress of the Spanish R&D system and runs different projects communicating science to the general public. FECYT, under the mandate of the Ministry, also works closely with researchers, offering them useful services such as access to scientific information and support in terms of mobility and career development. FECYT also participates in several FP7 projects in the field of mobility of researchers and scientific information e-infrastructures. The current project portfolio includes:

Euraxess top III: making European research careers more attractive by developing new services and enhancing the current services of the EURAXESS network. The EURAXESS network is a Pan-European initiative in 37 countries with national web portals and over 200 Service Centres and Local Contact Points at research institutions, established to facilitate researcher mobility by providing key practical information and qualified hands-on assistance to mobile researchers.

PIPERS: Policy into Practice: EURAXESS Researcher Skills for Career Development. The project aims at supporting researcher career development by identifying and cascading existing good practice and training resources and developing new tools to support proactive management of researcher career paths.

EURAXIND: this project intends to improve the services that EURAXESS can offer to R&D&I industries with the final aim of fostering inter-sectoral mobility and increase the recruitment of researchers in the private sector.

OpenAIRE plus: 'Open access infrastructure for research in Europe Plus'. OpenAIRE aims to support the implementation of Open Access in Europe. It provides the means to promote and realise the widespread adoption of the Open Access Policy, as set out by the ERC Scientific Council Guidelines for Open Access and the Open Access pilot launched by the European Commission.

A number of Spanish embassies now offer a systematic approach to science diplomacy. The Embassy of Spain in the UK for instance has an office for cultural and Scientific Affairs that organises activities that fall under three headings:

Science for Embassy

Here the main activity is the production of 'Science Reports' that watch the science and technology policies in the UK.

Science at the Embassy

This programme includes the organisation of science debates and conferences at the embassy, as well as the setting up of a website that provides data about science and technology in Spain. Also, a 'science day' is organised that serves as an official reception to Spanish scientists in the UK.

Embassy for Science

This programme includes the fostering of bilateral collaborations between Spanish and UK researchers, the promotion of the Spanish S&T system to the UK public. With the 'Science in the Classroom, the Embassy invites on a monthly basis Spanish scientists to give lectures in order to inspire young students to pursue STEM careers. The programme also supports the Society of

Spanish Researchers in the UK, an independent learned society that promotes networking between scientists, science outreach, bilateral collaborations and the provision of expert advice (see: http://www.sruk.org.uk).

Perhaps the most innovative part of the Embassy for Science programme is the Ambassadors for Science where scientists shadow diplomats. This new scheme 'Ambassadors for Science' aims to bring together scientists and diplomats in order to get both professionals from two different worlds closer and to allow them to experience each other's world. This shadowing programme between scientists and diplomats is launched for the first time in a Spanish Embassy. Both scientists and diplomats will get exposed to the ins and outs of their respective worlds: science and diplomacy. This will allow them to find common interests that could promote the development of better science diplomacy.

Whereas scientists shall receive introductory seminars about the Spanish diplomatic action, diplomats will receive basic notions about the performance of science at the global level, and how it is structured in both the Spanish and British national systems of Science and Technology. Scientists will also shadow diplomats on their daily routine to learn about the diplomatic activity. Conversely, diplomats shall visit scientists' job place to get an insight first-hand about the world of science, technology and research. This scheme took place in the Embassy of Spain in London with the purposes of not only becoming an annual scheme, but also expanding it to other diplomatic delegations.

The programme "Ambassadors for Science" aims to bring closer distant fields such as science and diplomacy by a shared experience of scientists and diplomats. The first session opened a debate focused on the necessity of more science outreach and the development of scientific advice for a better policy-making process.

How could scientists influence the Spanish diplomatic action? How could diplomats help scientists to better perform their research? Creating a middle ground between scientists and diplomats to solve these and other questions is the main objective of "Ambassadors for Science", a pioneering programme that aims to contribute in the development of Spanish science diplomacy. On 17th May 2016, nine scientists and nine diplomats gathered at the Spanish Embassy in London for the first session of this programme. The session was opened by the Ambassador of Spain to the United Kingdom HE Federico Trillo-Figueroa, who welcomed all attendees stressing the importance of building new collaboration ways so diplomacy and science could deliver results to tackle the crucial societal challenges ahead such as climatic change, the spread of diseases, or energy sustainability.

5.3. Science Diplomacy of France

The Ministry of Foreign Affairs of **France** has since 2011 a strategic framework document, entitled "Une diplomatie scientifique pour la France". The strategy is organised around four axes:

- The defence of the French S&T interests, closely related to the French economic interests;
- The utilisation of S&T cooperation as a diplomatic tool (dialogue with closed states or states moving out of a crisis; encouragement of regional cooperation, in particular the Euro-Mediterranean space; promotion of South-South cooperation);
- The contribution of science to the understanding of global challenges, particularly in the context of international actions (climate, preservation of diversity…);
- The promotion of science for development as integral part of its public support to development.

The strategic document also situates the efforts in Science Diplomacy as part of the French cultural diplomacy and as a tool to strengthen France's influence in the world. In 2013, a new strategic report was published that has formalised its objectives and a plan of action that was jointly prepared by the Ministry of Foreign Affairs and the Ministry of Higher Education and Research. The report spells out how the two ministries closely work together to ensure the consistency of France's actions and aims to contribute to a reinforcement of the interactions between the French scientists and the French diplomatic network.

5.4. Science Diplomacy in Switzerland

Switzerland has a long tradition in science diplomacy that started already in 1958 when a science attaché was sent to the US. Soon scientific attaché posts were also created in Washington, Tokyo and Moscow. Their main role was to track scientific progress in these countries and to maintain links with Swiss scientists working abroad. Since then, Swiss Science Diplomacy became gradually more and more institutionalised as a full-fledged part of the Swiss Foreign Policy. Today it is a good example of how a national approach for Science Diplomacy can be organised and it demonstrates how a government can work in this respect together with private partners.

The Swiss Science Diplomacy policy is embedded in the regular four-year **Dispatch on Education, Research and Innovation** of the Federal Council (BFI Botschaft) that is endorsed by the Parliament. Furthermore there is a document "the Swiss International Strategy, Research and Innovation" that is developed by an interdepartmental working group headed by the State Secretariat for Education, Research and Innovation (SERI) and approved by the Federal Council. In that way, all the Swiss Science Diplomacy actions are based upon specific policy goals, set by the Swiss government for four-year legislative periods.

The current governmental policy for Science Diplomacy is also addressed in the "Message on Switzerland's International Cooperation in 2013-2016". This strategy document aims at establishing consistence between development policy and sectorial policies, including research.

One of the main instruments for the Swiss Science Diplomacy is **Swissnex**, a network of science and technology offices and counsellors at the Swiss embassies aimed at connecting Switzerland with the world's innovative hubs. The offices of the Swissnex counsellors are a governmental information, promotion and bridging platform aimed to support the international activities of the Swiss education, research and innovation landscape. The network is managed by the State Secretariat for Education, Research and Innovation (SERI) in cooperation with the Federal Department of Foreign Affairs (FDFA).

Since 2003, the network has relied on public and private funding (one third from the SERI and two thirds from other sources). Each Swissnex branch offers a variety of services to Swiss companies, academics, policy-makers, and others.

Today there are six Swissnex consular annexes in so-called 'hot spots' for science and innovation. These are currently six Swissnex branches: Boston (2000), San Francisco (2003), Singapore (2004-2015, ceased operations), Shanghai, China (2007), Bangalore, India (2011) and Rio de Janeiro, Brazil (2013). Furthermore, there are also 18 science and technology counsellors at selected Swiss embassies in Beijing, Berlin, Brasilia, Brussels, Canberra, New Delhi, London, Madrid, Moscow, Ottawa, Paris, Pretoria, Rome, Santiago, Seoul, Tokyo, Vienna and Washington.

Each of the Swissnex offices has its specific goals and focus. Swissnex Boston, the network's first location, opened in 2000 to pioneer "science diplomacy" in Cambridge, Massachusetts. Situated strategically between the Massachusetts Institute of Technology and Harvard University, Swissnex Boston works closely with higher education institutions in both Switzerland and the Greater Boston Area. The region, due to its highly dynamic start-up ecosystem and leading role in biotech and biomedical research, is also fertile ground for Swissnex Boston's start-up programs.

Swissnex India, Consulate General of Switzerland is located in India's start-up capital and education hub: Bangalore, close to the central business district. Services offered by Swissnex India include CTI India market entry camp covering fact finding (digital assistance) for start-ups, market validation (field immersion for 1-3 weeks) and market entry (1-3 months), focus group discussions for Swiss researchers, professors and start-ups, start-up coaching, public events, university affairs, alumni networking, workspace, and more. Public events organised by Swissnex India cover topics such as applied research, robotics, innovative design, augmented reality, sustainable architecture, etc.

Swissnex San Francisco offers services that include public events, study tours, start-up coaching, innovation consulting, press outreach, social media training, university affairs, alumni networking, workspace, and more. Swissnex San Francisco hosts the three-month CTI Start-up US Market Entry CAMP for Swiss start-ups, and worked on a two-year social media program for all Swiss institutions of higher education, now called the Digital Campus.

Swissnex Singapore ceased its operations by the end of September 2015.The remaining two staff members from SERI have been transferred to the "Science and Technology Office" at the local FDFA office, the Embassy of Switzerland, Singapore.

Next to Swissnex, the Swiss Science Diplomacy also involves a number of other tools, such as:

The current objectives and policy goals for the Swiss Science Diplomacy are documented in a strategy note "Education, Research and Innovation policy guidelines and objectives" that includes annual plans of specific activities for each location. The mandate for the network can be summarised as follows (cf. Schlegel, 2014): to promote Switzerland as an excellent partner for cooperation in science, technology, and innovation; to connect academia, government, private sector, and civil society and to create and maintain an extensive network at home and in the host country; to facilitate academic programs, global innovation strategies, and knowledge exchange; to support internationalization efforts of Swiss academic institutions, and R&D-based spin-offs and start-ups; to inform on developments in science, technology, education, and innovation policies; to build trust, confidence, and relations—bottom-up and top-down at the same time; and to create an open-minded, innovative space for critical thinking and collaborative networking.

5.5. Science Diplomacy in the UK

In the **UK**, the Government Office for Science is currently preparing a communication "International Science and Innovation – A Strategy for Government" that is intended as a guide for the Government's network overseas and aims to provide the political and economic context for the UK's international science and innovation work, an outline of the tools and resources available to support it, and sets out some of the current UK priorities. This document does not explicitly mention 'science diplomacy' but it deals with objectives that are in general congruent with what is labelled as science diplomacy. Amongst them are: maintaining the excellence of the UK research base by ensuring UK researchers have the opportunity to work with the best in the world and access large-scale facilities; ensuring the UK has early access to new knowledge, technologies and markets including by developing R&D and innovation partnerships, supporting UK business to deliver economic growth; attracting talented researchers and students from around the world to work and study in the UK, and promoting outward mobility of UK researchers to improve skills and expand networks, for both the benefit of the UK and partner countries; enhancing the UK's reputation for excellence in research and innovation to promote inward investment and trade; maintaining the UK's ability to influence how global challenges are tackled and identified; using research and innovation to meet international development goals, support crisis planning and protect our security; promoting good use of science by other countries when making policy decisions in which the UK has an interest and in intergovernmental or multilateral discussions; using research and innovation to build positive relationships that build long term trust and gives the UK a platform to promote other foreign policy goals including open trade, democracy and respect for human rights. The communication also mentions a set of priorities regarding the global challenges that S&T can address: risk and resilience, energy and climate change, data and analytics, skills and lifelong learning, future of the seas, and innovation and emerging technologies.

In the UK, several organisations play a role at the operational level of Science Diplomacy, but a pivotal role is given to the **British Council**. This organisation has been established in 1934, with the purpose to create a friendly knowledge and understanding between the people of the UK and other countries. With more than 200 offices, in over 100 countries around the world, connecting millions of people with the United Kingdom through programmes and services in English, the Arts, Education, Science and Society. One of the five charitable purposes of the British Council is to 'encourage cultural, scientific, technological and other educational co-operation between the United Kingdom and other countries' and through its science work it aims to build stronger global science communities, fuelling prosperity and social benefit for current and future generations. The British Council operates at arms-length of the UK Government and operates according to the principles of mutual benefit, sustainable relationships, co-creation and partnership and 'engagement, not isolation'.

5.6. Science Diplomacy in the US

Science Diplomacy has a long tradition in the US. There has been a Scientific Advisor in the Department of State since 1950s. The office of Science Advisor and Special Assistant to the Secretary of State became officially a bureau in 1965; the "Office of International Scientific and technological Affairs". Since then, several initiatives and organisational structures were developed that dealt with the international dimension of US Science and Technology.

A key development was the 1999 National Research Council report that prompted Secretary of State Albright to set up a task force that resulted in the 2000 policy statement "Science and Diplomacy: Strengthening State for the 21st Century". In response to that report, the State Department upgraded its S&T capabilities and established in 2000 its 'Office of the Science and

Technology Advisor' (STAS). The Science and Technology Advisor to the Secretary of State acts as an independent adviser to both State Department and USAID. It is placed within the State Department and has a small support staff. STAS is complementary to the Bureau of Oceans and International Environmental and Scientific Affairs (OES), which is responsible for S&T related foreign policy issues related to the Artic, infectious diseases, climate change, space and bilateral cooperation. The official mandate of STAS is to develop competency in and advise on S&T, to increase the S&T presence and promote the awareness of its relevance within the Department of State, and to serve as a liaison to the S&T community (Pincus, 2014).

A new era of the US Science Diplomacy started when on 4 June 2009, President Obama announced in Cairo that the US was taking a number of actions regarding international S&T cooperation with the Middle East and other regions of the world. Amongst them were the launch of a new fund to support technological development, the opening of centres for excellence in Africa, the Middle East and Southeast Asia as well as the appointment of science envoys.

A new law on the International Scientific and Technological Cooperation was approved by the US Congress in March 2009 that allowed to send US science attaché's all over the world and that established a global scientific fund aimed at enhancing international cooperation in the areas of S&T. In November 2009, Secretary of State Hillary Clinton appointed three envoys to the Middle East, North Africa and Southeast Asia. In 2012, three new envoys were appointed. The US Science Envoys programme intends to develop long-term partnerships with the target countries based upon scientific cooperation and trust.

On that occasion, the US State Department identified some key elements of success in Science Diplomacy activities: (1) breaking new grounds in some selected areas of science; (2) transformative nature of the programs; (3) addressing the main developmental issues related to human development and poverty; (4) the promotion of the sustainable use of natural resources; (5) the stimulation of new jobs and investments in the private sector and (6) the collaborative and output oriented nature of the projects.

Today, the State Department is the lead federal agency in terms of developing S&T agreements. But in the absence of a US Ministry of Science, the White House also is involved. This is done at the level of the White House Office of Science and Technology Policy (OSTP) – founded in 1976 – of which the Director is mandated to advise the President on international S&T cooperation policies and the role of S&T in Foreign Relations. For this there an Assistant to the Director for International Relations that serves as a liaison to DOS and the international offices of the NSF as well as to the science liaisons of foreign country embassies in the US.

On top of that, several other US governmental and non-governmental institutions play a role in the US Science Diplomacy. A major player in this respect is the American Association for the Advancement of Science (AAAS) and its Centre for Science Diplomacy that was established in 2008. Its mandate is to increase the bridging role of science in international relations and to increase the role of scientific cooperation in foreign policy. The AAAS Centre for Science Diplomacy is especially active in supporting the policies and practices of Science Diplomacy as it engages in awareness and capacity building.

In 2007, the State Department, together with USAID, prepared a strategic plan for the period 2007-2012, that identified a number of strategic tools for the US Science Diplomacy. In 2015, the National Research Council issued a critical report on the status of Science Diplomacy in the US. This report, "Diplomacy for the 21st Century: Embedding a Culture of Science and Technology Throughout the Department of State", urged the government to further increase its attention to the S&T dimensions of Foreign Policy. It was stated that "A culture change is needed throughout the State Department and its embassies so that competence in S&T should be considered equal in importance to language fluency and area expertise as a critical aspect of diplomacy that will be practiced throughout the world in the 21st century".

One year later, in May 2016 the Committee on Homeland and National Security of the National Science and Technology Council also issued a strategic document: "A 21st Century Science, Technology, and Innovation Strategy for America's national Security". In this report a strategy is proposed on how the S&T community should evolve to address the challenges and opportunities imposed by a new landscape of national technology concerns in the 21st century. This strategy calls to ensure:

- The ability to access the best talent in the world for the national security mission;
- Proactive and collaborative investments necessary for critical national S&T needs;
- Intelligent management of national security S&T and associated risks, to achieve the best outcomes; and
- Adoption of transformative frameworks and innovative practices from the private sector for the national security mission.

The US has a number of operational tools for Science Diplomacy that aim to put its strategy into action. One of them is the *Science & Technology Policy Fellowships* programme of the AAAS that allows about 200 researchers on a yearly basis to work on the interface of science and public policy within several governmental organisations. Another operational tool is the *Jefferson Science Fellowhip* programe that allows researchers to work for the State Department or USAID as scientific counselers on Foreign Affairs issues. Furthermore, several American embassies have science councelers. They are grouped in the network of *Environment, Science, Technology and Health Officers* and organised in 12 regional hubs. On top of that the National Science Foundations has offices in Paris, Bejijng, Tokyo and Brussels.

5.7. Science Diplomacy in Japan

Outside the EU it is worthwhile to refer to **Japan** as the Prime Minister's Cabinet Office's Council for Science and Technology Policy (CSTP) issued in 2008 a report "Toward the reinforcement of Science and Technology Diplomacy" that called for linking S&T with foreign policy so as to achieve their mutual development. In 2011, the Japanese government designated Science Diplomacy as an issue of national importance in its 24th five-year national strategy on science, technology, and innovation. In that strategic document, it was stated that Science Diplomacy should not only be about establishing good relations with other countries, but also aim at realising national interests and strengthening Japan's international competitiveness. The Japanese Foreign Minister appointed in September 2015, Japan's first S&T advisor to the Minister of foreign affairs. The Government also established in May 2015 its main policy lines for Science Diplomacy based upon the advice of a group of experts in the field. This highly detailed document establishes 15 lines of action for developing scientific diplomacy. The Japanese Science Diplomacy is now built around three pillars: research cooperation with developing countries to resolve global problems; research cooperation with technologically advanced countries to develop cutting-edge technology; and cooperation based upon and equal partnership with East Asian countries. Within this framework, several operational tools have been developed. For instance, Japan now has several bilateral cooperation agreements with countries such as the US, India, the UK, Switzerland and the EU. Another tool is the SATREPS programme that promotes international joint research on global issues. It should also be noted that in Japan, there are multiple actors in the government that can carry out their own Science Diplomacy. Next to the Ministry of Foreign Affairs, also the Ministry for Agriculture and Fisheries, the Ministry of Heath, the Ministry of Environment and the Ministry of Telecommunications have their own Science Diplomacy policy.

6. RECOMMENDATIONS FOR AN EU SCIENCE DIPLOMACY

6.1. Conclusions from the mapping exercise

From the review of national Science Diplomacy initiatives, it can be concluded that most EU Member States do not have a coherent and comprehensive Science Diplomacy **strategy**. In a lot of cases however, Member States are engaged in activities that can be labelled as Science Diplomacy as they are deploying Science Diplomacy **tools** even in the absence of a national strategy. But such national efforts remain very limited in most cases and there are little or no national support structures available. On top of it, most national Science Diplomacy activities of EU Member States are not or are at best only loosely connected to Foreign Affairs policies. In other words, Science Diplomacy is not well developed within most of the EU Member States.

6.2. Guiding principles for EU action

One of the challenges in defining an EU Science Diplomacy strategy is the relation between what is done at the level of the Member States and what can be done at EU level. As shown by the mapping exercise, some Member States already have some own science diplomacy policy and tools available. It will therefore be necessary to respect the complementarity and subsidiarity as outlined in the Treaty on the Functioning of the European Union.

Within this context, a Science Diplomacy strategy of the EU should consist out of two strands: supporting of the Member States' Science Diplomacy policies and practices; and supporting the EU's own Foreign and Security Policy.

Below is a set of six **recommendations** for the EU on how to elaborate an EU Science Diplomacy strategy and structure and a **proposal** for the development of an EU vision on Science Diplomacy.

6.2.1. Supporting the EU Member States in their Science Diplomacy practices

Recommendation 1: Monitor the development of Science Diplomacy in the EU

Given the many different forms of Science Diplomacy activities at the level of EU Member States, a EU monitoring service should be set up in order to map and assess on a permanent basis the on-going Science Diplomacy in Europe. This would help both the Member States and the EU in formulating their Science Diplomacy policies and create the basis for a mutual learning from each other's best practices.

Recommendation 2: Create a support structure for Science Diplomacy activities at the level of EU Member States

The capacities of EU Member states to engage in Science Diplomacy are very uneven. Here the EU could help Member States by organising training and awareness activities at a European level. This could also help in building bridges between Science Diplomacy undertaken at the level of the Member States and at EU level.

6.2.2. Supporting the EU's Foreign and Security Policy trough an EU Science Diplomacy Strategy

Recommendation 3: Link the EU's RTD policy with the EFSP

Whatever take one follows with regard to science diplomacy, it is clear that it has to be part of a more general foreign policy. This also holds true for the EU. But the recently adopted Global Strategy for the EU's Foreign and Security Policy does not mention Science Diplomacy and references to research are marginal. On the other hand, the High Commissioner did release a specific note on cultural diplomacy. A similar communication on science diplomacy, jointly issued by the High Commissioner and the Commissioner for RTD would be a first strategic step towards an alignment of the EU's RTD policy with the EFSP.

Recommendation 4: Create a culture of Science Diplomacy in the EEAS

It should be clear that whatever the strategic choices made for a future EU Science Diplomacy policy, there is also a need to ensure that it becomes a fully-fledged part of the wider EU strategy for external actions. Today, Science Diplomacy is already mentioned as one of the policy domains of the EEAS, but it is not central to its strategy. As a first step, a Committee on Science Diplomacy capacities in the EEAS could be set up with the task to produce a comprehensive report on the actual and potential role of S&T in the functioning of the EEAS. Such a report could lead to recommendations on incentives for EEAS diplomats to follow career tracks that include international science engagement, how to get the most out of existing EU S&T agreements and exchange programmes and on how EEAS could best leverage the S&T community to strengthen relations between the EU and the rest of the world

Recommendation 5: Improve dialogue and collaboration with regard to Science Diplomacy between all relevant EU institutions

Science diplomacy is a practice that at EU level primarily involves the RTD and EEAS. But it should also be linked to the policies and activities of other DGs such as DG TRADE, DG CULTURE and DG DEVCO. For this the existing intra-E.C. communications need to be strengthened, for example by having an EU Science Diplomacy focal point in each of the concerned administrations.

Recommendation 6: Develop a focused EU strategic plan on Science Diplomacy that incorporates the above recommendations.

A first step towards the development of a genuine EU agenda for Science Diplomacy, could be a joint declaration of the Commissioner for RTD and the High Representative, as has been the case for the EU's cultural diplomacy strategy. The latter materialised after a preparatory action that collected ideas from a large consultation round. A similar preparatory action on Science Diplomacy should be envisaged. This could upgrade the EU's effort in S&T support and embed it better within its external policy as well as develop unexploited synergies between the 'Open to the World' RTD strategy and the EU's Foreign and External Relations Policy.

6.3. A proposal for the development of an EU vision on Science Diplomacy

The above recommendations can be put in practice through the development of a proper EU Science Diplomacy strategy, similar to what exists for EU cultural diplomacy. But such a strategy needs not only to focus on the organisational issues. It also needs a vision.

My proposal would be to focus upon three areas that are a mix of self-interests and aspirations to have a positive impact on the world. These areas are: (i) Science and Technology contributions towards enhancing **regional security** in its neighbourhood, (ii) Science and technology contributions towards improving European **trade** in the world, and (iii) Science and Technology contributions towards tackling **global problems**.

A first avenue for streamlining the EU's Science Diplomacy activities could thus be a **focus on the European eastern and southern surrounding regions** that contain many conflict areas and even weak and failed states that pose serious security threats for the EU. Here Science Diplomacy could serve as a means to build and strengthen relations and trust between the EU and its regional neighbourhood by connecting their scientific communities better to the EU scientific world.

The EU is the largest economy of the world and the largest trading block. This is reflected in the fact that the EU is the top trading partner for 80 countries while the US for instance is the prime trading partner for 20 countries. The EU negotiates many different trade related agreements with countries and regions all over the world with the aim of removing barriers to trade. This opens a second avenue for an EU Science Diplomacy focus as part of these barriers relate to technical standards and norms. There is clear link between such barriers and scientific knowledge and technological developments so **research cooperation between trade partners can pave the way for future regulations**.

It is clear that neither trade and economics, nor regional security - however important they are for Europe - can be the only concerns in the EU's relationships with third countries. There is today a worldwide consensus that the world is faced with a number of global problems that cannot be tackled at the level of individual states. And those global problems are of such a nature that they involve scientific knowledge in order to describe them. In other words, science can play a role in dealing with global problems and thus be used for the benefit of the world community. This opens a third avenue for an EU Science Diplomacy which actually is already reflected in the current Horizon 2020 programme. It focuses on several societal challenges such as health, demographic change and wellbeing, food security, energy, climate action and secure societies. **Aligning the EU's Horizon 2020 programme with the UN's sustainable development agenda** might be a third avenue for further developing an EU Science Diplomacy strategy (Van Langenhove, 2016).

ANNEXES

1. Officials and academics consulted

- **Francisco Andrés**, project Office Coordinator, Royal Institute ELCANO, Spain
- **Nart Dohjoka**, Program Manager – Science Diplomacy program, Royal Scientific Society, Jordan
- **Aidan Gilligan,** CEO SciCom
- **Claire McNulty**, Global Science Lead, British Council, UK.
- **Lorenzo Melchior**, Science Coordinator, Spanish Foundation for Science and Technology (FECYT), Spanish Embassy in London
- **Guillermo Orts**, Science Coordinator, Spanish Foundation for Science and Technology (FECYT), Spanish Embassy in Berlin
- **Nina Salden,** DAAD Aussenstelle Brussels
- **Marga Gual Soler**, Project director – Center for Science Diplomacy, AAAS, USA

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This report maps national Science Diplomacy tools used in a sample of EU Member States and some countries outside the EU. The examples of Science Diplomacy are classified in three categories: strategic tools, operational tools and support tools. Furthermore, more detailed descriptions of Science Diplomacy policies and practices are presented for some selected countries: Germany, Spain, France, Switzerland, the UK, the US and Japan. Based upon an assessment of what exists in the EU at national levels and what exists outside the EU, a set of six recommendations towards the EU is presented regarding the further development of an EU strategy for Science Diplomacy. These recommendations deal with how the EU can contribute to supporting the Member States Science Diplomacy policies and practices and with how an EU Science Diplomacy can be elaborated that is in tune with the EUs Foreign and External Relations policy. The report ends with a proposal regarding the strategic vision that should underpin the EUs efforts to enhance its Science Diplomacy capacities.

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