

PORTUGUESE SCIENCE DIPLOMACY AND THE NETWORKS OF PORTUGUESE PROFESSIONALS, RESEARCHERS AND GRADUATE STUDENTS ABROAD: FROM THE ESCAPE TO THE CIRCULATION OF BRAINS

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Abstract

Science diplomacy is a field born of the interaction between science and diplomacy. It arises in a context of extension of multilateralism to new actors, including scientists, higher education institutions, laboratories, companies, and cities. The Resolution of the Councils of Ministers No. 78/2016 is the legal matrix of Portuguese science diplomacy, presenting it as one of several pillars for the internationalization of science and technology in the country. Among various actors identified by this resolution, the "Networks constituted by Portuguese Professionals, Researchers and Graduate Students working abroad" have a high potential, especially considering the synergies they can create with embassies, through science advisors, higher education institutions and Portuguese cities. After a contextualization of science diplomacy as a discipline and European and national practice, this paper contributes to this debate through an exploratory reflection on the role of those networks in the operationalization of Portuguese science diplomacy.

Keywords

Science diplomacy; European Union; Portugal; emigration; higher education.

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PORTUGUESE SCIENCE DIPLOMACY AND THE NETWORKS OF PORTUGUESE PROFESSIONALS, RESEARCHERS AND GRADUATE STUDENTS ABROAD: FROM THE ESCAPE TO THE CIRCULATION OF BRAINS¹

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Introduction

The notion of "science diplomacy" refers to a set of practices that cross the sectors of research, higher education, science, technology, and innovation, with the area of international relations, identifying points of common interest and instigating their collaboration in shared challenges. Its wide-ranging nature has resulted, on the one hand, into some conceptual confusion and, on the other, in constant innovation in its application.

This conceptual and pragmatic expansion has led some organizations to reflect on their contribution to science diplomacy. Among these, are the "networks consisting of portuguese professionals, researchers and graduate students abroad", which began to emerge over a decade ago spontaneously by Portuguese emigrants. The Resolution of the Council of Ministers No. 78/2016, which serves as a legal framework for science diplomacy in Portugal, assigns them a role of "interlocutor" between the Government and Portuguese embassies and emigrated researchers. This role of dialogue is an innovation that other countries have also sought to exploit and which, with the right strategy, can become a cornerstone of the future exercise of science diplomacy.

This work is part of a briefing paper written for the Ministry of Foreign Affairs (MNE) and the Ministry of Science, Technology and Higher Education (MCTES), and discusses the role these networks can play in the broader context of Portuguese science diplomacy. It looks at its potential to bring together graduate emigrants, especially those working in the scientific field, to contribute to replacing the term "brain drain" with "brain circulation". Also, it claims that networking and abroad, either temporarily or permanently, is an intrinsic condition for the scientific profession, affecting especially the most peripheral and resourceless countries. It is reasoned that such networks can serve as points of contact between the community and homeland, helping to integrate them into the new environment, while keeping them informed about and promoting their involvement in science made by the Portuguese, in Portugal and the rest of the world. This horizontal (between pairs) and vertical (with the country) interaction allows both

¹ Translated by Hugo Alves.



diplomacy and Portuguese science to include in their action the contribution of national scientists abroad, either through the knowledge obtained, or through the networks they are part of.

The study begins by highlighting the main aspects of the debate on the definition of science diplomacy, including its relationship with the so-called brain drain, then visits its implementation by the European Union (EU). This outline is followed by a more detailed examination of the Portuguese case, particularly to the dynamics most relevant to the networks concerned. Its role – present and potential – is articulated with that of science advisors, Higher Education Institutions (IES) and cities, seeking to follow multiple angles in the life of a researcher. Finally, ideas for the future are presented to contribute to the academic and practical debate around the role of science diplomacy in diplomacy and science. Foreign examples are introduced as illustrations of the arguments.

1. Science as a branch of diplomacy (and vice versa)

Science diplomacy is a relatively new, but rapidly evolving topic. It is part of a framework for the change of multilateralism, today also characterized by a progressive extension of diplomatic practices to other sectors of society. These new practices do not replace traditional diplomacy, which remains one of the most important foreign policy instruments of countries, particularly in the relations between States. Nevertheless, they are part of a gradual evolution of diplomacy, where national and international issues are intertwined in the era of globalization and where their use is not exclusive to governments.

Among the new expressions of diplomacy, science diplomacy is particularly comprehensive. Roughly speaking, it is defined as a "link of practices" (Mendonça, 2016) or a "diffuse interaction" (Aranda, 2019) between the foreign affairs of a State, which are generally coordinated by the ministries of foreign affairs, and its scientific and technological policy, which is managed by the ministries of science. It is about "developing the national environment of research and entrepreneurship while [projecting] in the international arena the strategic interests of the community of reference actors" (Mendonça, 2016). The intersection of two such wide-ranging fields generates a myriad of different approaches and angles assumed by science diplomacy in each State. As such, there is still no complete definition of the concept, or a single model that can be easily replicated (Aranda, 2019).

One of the most consensual definitions was created by the Royal Society (United Kingdom) and the American Association for the Advancement of Science (AAAS) in 2010, in their "New Frontiers in Science Diplomacy". It is based on three pillars: *diplomacy for science*, when diplomacy facilitates the conception of scientific partnerships; *science for diplomacy*, when science enables the growth of diplomatic relations; and *science in diplomacy*, when foreign policy objectives are informed by scientific advice. Since then, these terms combined have been used by various institutions as a shared understanding of an activity still under development. More recently, the EL-CSID² project, funded by Horizon 2020, proposed a fourth pillar called *diplomacy in science*, to incorporate

² European Leadership in Cultural, Science and Innovation Diplomacy - el-csid.eu.



diplomatic practices in science. According to EL-CSID, it may be easier to repair the fragmentation of society, combat skepticism about science and increase its impact on social debates and professionalize the dialogue between scientists and policy makers (Van Langenhove, 2021).

To achieve these goals, science diplomacy makes use of various tactical and operational tools. At the strategic level, joint declarations are issued between States, regions or institutions, and the seat in international organizations is used to highlight the importance of a given scientific agenda. The operative level is based on international collaboration agreements, such as CERN³ or SESAME⁴. The latter brings together scientists from various Middle Eastern States, including some without diplomatic relations with each other, creating an environment conducive to the success of "science for diplomacy". The Intergovernmental Panel on Climate Change (IPCC) is another major example (Van Langenhove, 2016), as it gathers a multidisciplinary group of scientists and diplomats responsible for monitoring the Paris Agreement on climate change, thus being an illustration of "science in diplomacy". Other working tools include advisory councils on science and technology, allocation of science advisors to embassies, inclusion of foreign scientists in national science and technology funding schemes, academic exchange programs, international scientific collaboration programs, among others.

The implementation of science diplomacy should also include campaigns promoting its results and dedicated training programmes, these being perhaps the least worked fields (Van Langenhove, 2016). The lack of a career of science diplomacy hinders the creation of a formative offer since the subject tends to reside mainly in oral discourse as a reference to practices that combine science and diplomacy. Added to this difficulty, is the fact that some scientists do not consider that part of their work can be labelled as a type of diplomacy. Consequently, not all science professionals are trained to acquire the skills necessary for diplomatic practice and not all diplomats know science (as an abstract field) with the necessary depth. Issues such as these have increased criticism around the lack of mechanisms for assessing the effectiveness of science diplomacy (Flink, 2021).

The application of these tools requires the joint work of highly qualified human resources in various sectors. The S4D4C⁵ project identified five groups of actors relevant to science diplomacy: the government sector (including subnational governments and public agencies); the intergovernmental sector and supranational organizations; the private sector (from start-ups to multinationals), universities and scientific research sector (including national academies, research councils or prominent individuals); and the civil society sector (Elorza *et al.*, 2021). One of the main difficulties of science diplomacy is the complex coordination of so many actors. According to the conclusions of S4D4C, there is a direct relationship between the level of effectiveness of this coordination and the scope of a State's science diplomacy.

The mandatory inclusion of political and diplomatic actors is one of the main characteristics that distinguishes science diplomacy from international scientific collaboration in general. Science diplomacy is a weighted result between science and political priorities, a coexistence that is not always harmonious, as "science represents

³ European Organization for Nuclear Research.

⁴ Synchrotron-Light for Experimental Science and Applications in the Middle East.

⁵ Using Science for/in Diplomacy for addressing global Challenges "s4d4c.eu.



'objectivity' and 'truth', [and] diplomacy represents 'interest' and 'commitment'" (Mendonça, 2016). Some scientists fear that science may be instrumentalized by the *realpolitik*, especially considering science diplomacy is primarily a branch of diplomacy and, therefore, may be subject to logics potentially adverse to science (Muller, 2021). Countries such as the United Kingdom (UK) and China, and even the EU through Horizon 2020-funded projects, have increased their investment in science, aiming to expand their soft power, i.e., their ability to attract and influence international relations. Although the narrative around science diplomacy is mostly positive, emphasizing words like "cooperation" and "universality", the practice shows that this will not always be the case and that there is always another side of the coin. Today, science diplomacy also reflects logics of national interests and power dynamics, a trend accelerated by the COVID-19 pandemic (Fägersten, 2021).

Effective science diplomacy can have yet another perverse effect. By attracting to a given country the best global talents, it can contribute for both the enrichment of a State and the impoverishment of others. These movements tend to agglutinate in major scientific and technological centers worldwide, feeding a vicious circle of perpetuation of the imbalances that are at the origin of this same emigration. Science diplomacy can contribute to the perpetuation of migratory dynamics between centers and peripheries.

On the other hand, through the implementation of networks of professionals and researchers abroad, science diplomacy also offers States the possibility to stay connected to their brains "on the run", and these can contribute to the development of their country from a distance. Due to the hybrid nature of cooperation and competition of science, permanent or temporary emigration is intrinsic to the scientific profession. Through its tools, science diplomacy offers solutions to the breaking of the vicious circle, contributing to the expression "brain drain" replacement by "brain circulation", that is, the notion that researchers – national and foreign – have phases of their careers inside and outside the country and that both situations can add value to national science. This motion contributes to a country's science diplomacy gaining and distributing influence in decision-making processes in international organizations. By promoting the link to the home country, such networks can play an important role in correcting imbalances, helping to ensure that science diplomacy is not a zero-sum game.

To accelerate the advancement of the implementation of science diplomacy strategies in the world, in its final report, EL-CSID proposes a set of recommendations (EL-CSID, 2019). Firstly, it points to the need for greater theorization on the subject, especially in connection with the theories of International Relations, and based on case studies on successes and failures of science diplomacy. Secondly, the exchange of good practices should be fostered, especially between scientists and other professionals, as well as communication between them and policy makers. Thirdly, the investigation states that scientists should be more attentive to the consequences of their work in international relations, working on networks with an impact on science diplomacy. Finally, it is recommended that policy makers monitor this activity, incorporating it into their work and rejecting political blockages to the advancement of science.



2. Science diplomacy of the European Union

In June 2015, Carlos Moedas, then European Commissioner for Research, Science, and Innovation, in a speech addressed to the European Institute in Washington DC, said that "science diplomacy presents an unparalleled opportunity to address today's political, demographic and environmental challenges through language and the universal expression of scientific endeavor" (Moedas, 2015). The following year, the EU Global Strategy, the guiding document for European external action, indicated science diplomacy to resolve conflicts. Since then, EU has outlined six general objectives for its science diplomacy: to establish a free environment for scientists; to agree on the principles of scientific cooperation; to promote the capacity of cultural and science diplomacy in the context of its external action; to connect other foreign policy strategies to science diplomacy; to increase cohesion between member States; and to understand the role of actors in science diplomacy, some of which may be more strategic if left independent (Fägersten, 2021).

In this sense, EU has been including science diplomacy in some of its programmes and instruments. This is visible in the work of institutions like the European Research Council (ERC) or the Joint Research Centre (JRC) and in programmes such as Horizon 2020, the Marie Skłodowska-Curie Actions, or Erasmus+, which – including its Jean Monnet actions – receives direct funding from the European External Action Service (EEAS), to extend the role of the education sector in European external action. More recently, EU has integrated *alumni* from these and other programmes into its diplomatic strategy to create networks of *alumni* "ambassadors" of the European cause (Ferreira-Pereira and Mourato Pinto, 2021). The Euraxess network, which consists of more than 600 information points in 42 European countries with several links to other parts of the world, is another central tool in the European strategy for the area.

Horizon 2020 has provided the creation of the EU science diplomacy cluster (science-diplomacy.eu), which consists of three sibling projects: EL-CSID (finished in 2019); S4D4C (completed in 2021), which has created a free virtual course open to the public; and InsSciDE⁶ (ending in 2022). In 2019, the communities boosted by these projects launched the "Madrid Declaration on Science diplomacy", with the aim of fostering the conduct of science-informed external policies, increasing the productivity of international relations, and expanding the capacity to face global challenges. The Madrid Declaration argues that science diplomacy must have citizens at the heart of its action and must be able to show results frequently. This community has been very active in creating proposals for EU science diplomacy, calling for the EU to encourage the training of its member States, foster the creation of a European community of professionals in this field and make a stronger link between science and tackling against global challenges (Melchor, Elorza, Lacunza, 2021). In 2021, this cluster was transformed into the EU Science Diplomacy Alliance, which offers training and advice opportunities, to form a European community of science diplomacy. It is a challenging task, considering that the field will be fractured in thematic areas, such as energy, water, health, and others. The

⁶ Inventing a shared Science Diplomacy for Europe - insscide.eu.



focus should be the creation of spaces for the exchange of ideas and the provision of training opportunities (Hartl, 2021).

The EU action is also based on a network of thirteen scientific advisers distributed around the world and coordinated from Brussels by the Strategic Forum for International Cooperation in Science and Technology (SFIC), a collaboration between the EEAS and the Directorate-General for Research and Innovation of the European Commission (Council of the EU, 2016). They are allocated to countries of strategic interest to the EU⁷, the most recent being created in 2020 in the UK, following Brexit⁸. The advisers promote EU research programmes to increase their international profile and foster collaboration between member States' advisers by organizing monthly meetings (Ruffini, 2021a). As for SFIC, it is equipped with a team specializing in science diplomacy, which launched in September 2020 the working paper "Anchoring Science Diplomacy in Horizon Europe – Developing Specific Subjects and Activities". This document stresses the need for greater connection between Horizon Europe and the European strategy for science diplomacy, with the desire to create greater synergies between different policies, as reflected in the 2016 EU Global Strategy. The Horizon Europe Strategic Plan 2021-24 dedicates a chapter to international cooperation, highlighting the role of science diplomacy.

These initiatives are also an EU contribution to the reform of multilateralism. They aim to make it more inclusive through the participation of non-state actors and disengaged from national logic (Muller, 2021), and to strengthen the mechanisms for solving transnational challenges, including global commons, such as climate change (Van Langenhove, 2016). The Union wants science diplomacy to increase its soft power and the capacity for action as an international actor. Overall, science diplomacy serves to renew the EU's image by adding the idea of an environmentally sustainable continent based on a development model based on science and technology, to the original peace project (Muller, 2021).

3. Portuguese science diplomacy

Portuguese science diplomacy was defined by the Council of Ministers Resolution No. 78/2016 and stated that "it must be understood as the coherent and systematic use of resources and initiatives in the areas of science and technology, in the framework of Portugal's European and foreign policy, to pursue the purposes of this policy and, namely, the promotion of the national image and interests, opportunities for knowledge, communication and reciprocal collaboration between the country and other States, people's contacts and public diplomacy". Although this definition has a one-way understanding, looking mainly at the contribution that science brings to Portuguese diplomacy, the whole resolution presents several actions aiming to internationalize Portuguese science through greater interaction with the country's foreign policy. To create a "policy of internationalization of higher education and science and technology", this internationalization enhances scientific and technological research in Portugal, contributes to cooperation with third countries and is a vehicle for "support to consortia

⁷ Canada (open 1977), United States of America (1980), Australia (1988), China (1991), Russia (2000), India (2001), Saudi Arabia (2002), Japan (2002), Brazil (2008), Ethiopia (2013), Korea (2014) and Egypt (n.d.).

⁸ No information on the nationality of the/a counselor/a.



and strategic partnerships that affirm the country and its natives in Europe and the world, and attracts qualified human resources". A greater relationship with faculties and scientific communities abroad is also an intention.

This set of objectives will give science diplomacy a multidisciplinary nature that is difficult to implement. In this sense, a close collaboration has been created between MNE and MCTES and some competencies are delegated to Secretariats of State of the Portuguese Communities, Internationalization and Science, Technology and Higher Education. The coordination of implementation on the ground is largely in charge of the Foundation for Science and Technology (FCT), the National Agency for Scientific and Technological Culture (Living Science), the National Innovation Agency (ANI) and the Agency for Investment and Foreign Trade of Portugal (AICEP). The Portuguese diplomatic corps monitors the development of the theme in the respective countries, organizing events for scientific dissemination and stimulating local communities of Portuguese scientists. There is also the role played by the "networks of Portuguese professionals, researchers and graduate students working abroad", described in the next segments.

3.1. Networks of Portuguese Professionals, Researchers and Graduate Students working abroad

According to Eurostat (2019), while 10.8% of the Portuguese live in other EU member States, only 1.1% of Spaniards do so. Despite the socio-economic reasons that often motivate emigration, the Portuguese diaspora, including lusodescendants, is one of Portugal's main assets abroad. To encourage their (re-)approach to the country, the resolution aims to promote the creation of "Networks made up of Portuguese Professionals, Researchers and Graduate Students working abroad", acting as "priority interlocutors of the central services of MNE and MCTES, as well as the diplomatic and consular network, with a view to representing and promoting Portugal's interests and image in those countries" (Presidency of the Council of Ministers, 2016). The dynamization of this "academic and scientific associativism" is under responsibility of the Secretariat of State for the Portuguese Communities, and it is FCT's concern to stimulate the relationship with the Portuguese scientific diaspora, attracting it to employment at homeland. There are currently seven associations: AGRAFr (France), AGRAPS (Switzerland), APEI Benelux (Belgium, Netherlands, and Luxembourg), ASPPA (Germany), PAPS (United States of America and Canada), PARSUK (United Kingdom), Nordic SPOT (Denmark, Finland, Iceland, Norway, and Sweden). They arise from the capacity of self-organization of the Portuguese community, some of which precede in several years the publication of Resolution No. 78/2016. Although without homogeneity, its work is done in coordination with Portuguese embassies. There is also a still meager involvement with the respective councilors of communities; FCT has formal cooperation protocols established with some, and the objective is to extend them to all. The protocol with PARSUK has resulted in the creation of a scientific council formed by the Portuguese scientific diaspora in the UK.

The events organized by these associations, which are not limited to science diplomacy, include the promotion of Portuguese IES among their communities, organization of scientific debates in formal and informal contexts, online and offline, dissemination of the



activities of Portuguese communities beyond the scientific world, etc. For example, PARSUK and FCT collaborate in the organization of an annual competition to support scientific mobility between Portugal and the UK, called the Bilateral Research Fund, which obtains hundreds of applications for an overall funding of €15,000. APEI Benelux, on the other hand, develops an annual activity to disseminate Portuguese IES to Portuguese secondary school students at the European School in Brussels, attracting them to the Portuguese higher education. Once a year, all organizations collaborate in the organization of GraPE – Forum of Portuguese graduates abroad, looking to promote discussion among professionals residing in the country and abroad. In its ninth edition, the event attracted several public and private institutions, including two ministers and a former European Commissioner; it is likely to become a showcase of research carried out by Portuguese around the world.

Born from associativism, these networks have the potential to give Portuguese researchers abroad greater ownership over Portuguese science diplomacy in their host country, contributing to the term "brain drain" being replaced by "brain circulation". For this to happen, Portuguese institutions must be aware of both the potential and limitations of associativism, integrating it appropriately into Portuguese science diplomacy. Voluntary work cannot replace the professional and should be subject of appropriate recognition and appreciation by the responsible entities. Plus, the acquisition of a global scale is dependent on centralized coordination, which must identify synergies between these networks and embassies, through science advisors, IES and Portuguese cities.

3.2. The Science Advisor

Council of Ministers Resolution No 78/2016 introduced the figure of the "Science Advisor", trying to centralize information on a single professional, responsible for "promoting scientific employment" (Presidency of the Council of Ministers, 2016). After the appointment of FCT and under the responsibility of main embassies, science advisors may be an addition to economic advisors, forming a team with great potential for attracting investment and knowledge to Portugal.

International examples: the various forms of the science advisor

Germany organizes international years of science to give visibility to bilateral scientific relations with a theme country for a year. Switzerland has Swiss outreach homes abroad, which are its own institutes based with major global scientific and technological hubs such as Silicon Valley, New York, or Shanghai. Denmark has appointed a representative for Silicon Valley-accredited technology and Austria has created the Office of Science and Technology in Washington DC. Spain has set up a network of science diplomacy in Madrid that builds on the dynamic of contact between the officials of embassies accredited in the city. Through this network, it disseminates its information and obtains some from other countries. France has the Agence Nationale de la Recherche, which compiles and disseminates information through its network of science advisors placed in its embassies. This information is of interest to French public authorities, private companies, research laboratories, and all those linked to investment in science. The UK created the Science and Innovation Network, mobilizing around 100 professionals to work on eleven thematic programmes located in forty countries.



While graduate associations may play the role of boosting their peers, their work is limited by their volunteering status, and they cannot implement government strategies. Through their set of skills, science advisors will be able to play this role by supporting FCT, embassies and networks in the local implementation of science diplomacy. Despite their potential, and although there are professionals seconded to perform some of these tasks, Portugal did not name any science advisor.

3.3. Higher Education Institutions

IES are one of the fundamental axes of science diplomacy, whether for their central role in higher education, research, innovation, business liaisons, or the promotion they provide to the cities that host them. They have the unique ability to bridge science and technology with education and youth. These characteristics make universities active and passive actors of diplomatic action; sometimes they speak of about "higher education diplomacy" (Ferreira-Pereira and Mourato Pinto, 2021; Ruffini, 2021b).

However, analyzing articles on the role of IES in science diplomacy, many of these have chosen to remain on the sidelines, possibly for reasons of political independence and universality of knowledge, leaving the emphasis on researchers and student flows. The most recent debates have focused on models of independent involvement of IES in science diplomacy. From a national perspective, these include policies attracting foreign students, training professionals in science diplomacy, managing *alumni* networks, and using European funds to increase their influence and contribute to national soft power. From a more global perspective, they can contribute to greater academic knowledge about science diplomacy, form frameworks for international organizations, promote the adoption of multidisciplinary approaches in diplomatic issues, or be vehicles of international cooperation through networks of universities (Ruffini, 2021b).

The internationalization of Portuguese IES has grown in Portugal in the last decade and has resulted in a positive balance in the international flow of higher education students; there are more foreign students in Portugal than the other way around. Almost half of them come from Lusophony, which is explained by cultural ties and academic cooperation agreements between IES and governments of Portuguese-speaking countries. The UNESCO Science LP (Portuguese Language) Center has been important in this context through the offer of training and doctoral scholarships to students from Portuguese-speaking African Countries (PALOP). On the other hand, almost half of Portuguese students abroad are distributed across the UK, France, and Spain (UNESCO, 2019).

FCT plays a central role in this area by training and financing national IES and creating partnerships with foreign entities. Among several examples, stands out the initiative GoPortugal – Global Science and Technology Partnerships⁹, that promotes collaboration between Portugal and foreign higher education institutes of international reputation. In 2017 there were almost 55,000 researchers in the country, of which 4,647 (8.4%) were foreigners. Brazil continues to emerge as the main country of origin (27.1%), while PALOP countries have a lower representation, not reaching 6%. European countries are

⁹ <http://www.fct.pt/apoios/cooptrans/goportugal.phtml.en>.



the main source of the income, mainly Spain (14.8%), Italy (9%) and Germany (4.1%) (DGEEC, 2019).

The growth potential of the European public is particularly important, especially in view of the EU's plans for the sector through the allocation of €95.5 billion to Horizon Europe in the period 2021-2027. Portugal has gradually increased its capacity to raise and execute these funds, having been a net recipient of Horizon 2020 (PERIN, 2022: 3). Portugal network in Europe Research and Innovation Network (PERIN), launched in early 2021, sets out the objective of "attracting around €2 billion of EU funding in the areas of Research and Innovation" (PERIN, 2022: 2) over the duration of Horizon Europe. For that, it will be necessary to mobilize the country's scientific community, while looking at the opportunities created by the European Research and Education Areas and "European Universities". Also important are regionalized initiatives, such as the IACOBUS Program, signed in 2014 between IES of Northern Portugal and Galicia, Spain, to exchange employees, including scientists. In seven editions, the program has funded more than 1,000 research projects in the Galicia-North of Portugal Euro region (CCDR-N, 2021).

The investment and attention paid to the internationalization of Portuguese science may result in an increasing number of researchers in the country, whether domestic or foreign. Inherently to their profession, it is expected that they emigrate on a temporary or permanent basis, to integrate other teams and projects. Currently, IES develop their strategies of involvement of their *alumni* in isolation, providing them with information and offers. However, this model faces difficulties, as research is based on several institutions, laboratories, companies, etc.; the *alma mater* is only a chapter in the career of a researcher and graduate. Both the "brain circulation" effect and the impact of investments can be multiplied through an international monitoring strategy of national *alumni*, framed by the strategy for science diplomacy, which include Portuguese and foreign graduates from national universities. Due to their insertion in scientific associativism and their horizontal structure, the networks can be the cornerstones of this strategy.

Soon, IES will also be challenged to look at their school and formative offer in the context of science diplomacy. A study of the S4D4C project (Melchor, Elorza, Lacunza, 2021) recommends the creation of mixed training programs for scientists and diplomats, equipping them with the skills needed for this field. The curriculum of these programmes should follow national priorities, but their implementation should include as many face-to-face sessions, as distance ones, to include emigrated Portuguese scientists more easily.

International examples: training programs in science diplomacy

The University of Warsaw has an academy for science diplomacy and Barcelona's SciTech DiploHub offers training on the subject. Zurich's ETH works closely with Swiss science advisors, creating a direct link between national science diplomacy and students. The American Academy for the Progress of Science (AAAS) and The World Academy of Sciences (TWAS) offer in Trieste, Switzerland, a training program for trainers in science diplomacy. The Institute of International Relations of the University of São Paulo, Brazil, organizes every year the São Paulo School of Advanced Science in Science diplomacy and Innovation Diplomacy, which consists of five days of intensive training.



3.4. Cities

Cities are fundamental elements of science diplomacy; they centralize the triangle formed by science, companies, and industry. Together, they form poles of attraction for highly qualified professionals, including foreigners and emigrated Portuguese scientists. The country has several poles, like TagusPark (Oeiras), the Atlantic International Research Centre (Angra do Heroísmo), or the Braga-Guimarães axis, which includes the Iberian International Laboratory of Nanotechnology. Cities such as Covilhã, Coimbra or Évora, where the weight of students is disproportionate, but also Porto, Lisbon, or Aveiro, are very important for national science diplomacy. In all these examples stands out the partnership between municipalities, IES and local companies, favorable to for the setting of highly qualified human resources. Science diplomacy can serve to strengthen this relationship by contributing to talents fixation and attracting foreign direct investment, including in internationally little-known regions. For this reason, the Secretary of State for the Valorization of the Interior is involved in this dynamic.

International examples: Barcelona SciTech DiploHub

The Barcelona case is paradigmatic, because it is an example of "paradiplomacy", that is, international relations led by a government other than the national (Cornago, 2018). Under the municipality's coordination, "SciTech DiploHub" consortium was formed, which includes several local higher education institutions, companies, laboratories, and other entities relevant to the "first city to implement a strategy of scientific and technological diplomacy". It also intends to map and boost a community of "Barcelona *alumni*", which constitutes a "global network of scientists, technology experts, and leaders in innovation formed (...) in the knowledge ecosystem of the city and those currently residing abroad." Members of this network are considered ambassadors of the city and are connected through a virtual platform. A monthly newsletter keeps them informed about professional local offers and they are given a professional advice program. Finally, "Barcelona *Alumni*" are encouraged to share their stories, and personal affinities are fostered at exclusive events, like the "Barcelona Alumni Glo bal Summit" and the "Barcelona Innovation Days", which are decentralized to other worldwide cities, such as Boston, USA, or London, UK (SciTech DiploHub, 2021). In the case of Barcelona, the involvement of the municipality is a key factor for the success of the platform.

In a context of permanent circulation of qualified professionals, both cities and IES are simultaneously points of origin and arrival. This dual condition makes the follow-up of the careers of these professionals a difficult task, where Portugal has already taken important steps. One of the main examples is the Global Portuguese Network (GPS), created in 2016 because of a partnership between Aveiro University, Viva Science Agency, Francisco Manuel dos Santos Foundation, Altice company and Portuguese networks abroad. Quickly, there were more than 4.300 people on the platform in 126 different countries, who benefited from a newsletter, a search engine that finds Portuguese colleagues all over the world, and the possibility of participating in an exclusive annual event. Users can enter information about their professional achievements and share opportunities and opinions. The associations of graduates have reserved spaces in the platform, from which they can disclose important information only to Portuguese residents in their countries. The GPS platform currently has partnerships



with television channels, newspapers and podcasts, and members are invited to speak publicly on the most varied topics. However, despite its success, the growth of the platform has been slower in recent years. While from the user's point of view the platform is at the state-of-the-art level, after the first years of mapping the Portuguese scientific diaspora, there is a need to draw up an equally ambitious plan for potentializing this information, particularly in the context of science diplomacy.

International examples: THE EU Alumni

To achieve objectives like those of the GPS Platform, the EU is conducting the EU *Alumni* Engagement Initiative pilot project. It is funded by the European External Action Service and aims to form a community of *alumni* based on peer relationships. The community is locally energized by the Erasmus *alumni* networks and Marie Curie actions and by EU delegations. The goal is to create channels through which EU can share information and make contributions to local strategies. Communication is done through a newsletter and online and offline events. In addition, EU invites *alumni* of academic exchange programmes to represent it both at its Study in Europe events and at major international higher education fairs (NAFSA, EAIE, etc.). While EU professionals are dedicated to building partnerships with other organizations and third countries, *alumni* share their personal history in these events to attract them to European programmes.

4. Ideas for the future

Portuguese science diplomacy is still taking its first steps and as there is neither a complete definition, nor a single model for its implementation; the options for the future are many. This list presents some ideas, for the operationalization of Portuguese science diplomacy.

I - National strategy for science diplomacy: the potential for greater coordination and more synergy

After the publication of the legislation in 2016 and the first years of experimentation, the current moment may be ideal for the creation of a strategy for Portuguese science diplomacy. Considering the growing number of actors involved, the lack of a global articulation strategy prevents its potential from being fully exploited. Such strategy could increase the effectiveness of science diplomacy by identifying synergies guided by a coordinating structure of most relevant actors. The latter does not have to be a new entity since the law already provides for the division of responsibilities. The Madrid Declaration introduces some of the most important principles on which this strategy can be based.

The Portuguese networks abroad are among the entities that can add value to national science diplomacy through greater coordination and establishment of national objectives measurable and situated in time. Today, these seven organizations focus on activities carried out in their territories, functioning as a global network almost only during the GraPE Forum. Some of current activities are of interest to Portuguese science diplomacy and others are the result of protocols with FCT, such as PARSUK's Bilateral Research Fund, ensuring greater synergies with national priorities. However, the global network



effect requires a centrally coordinated and operationalized strategy in conjunction with other local actors, such as science advisors. International activities could be organized more easily, such as promotional campaigns, cycles of decentralized common theme events, among others. The design of this central strategy should include a total respect for the independence of these associations and contribute to the strengthening of their associativism. Besides having in mind Portuguese graduates and scientists in emigration, it should also pay attention to the motivation of active members in the associations, including them in the creation of strategies, in the coordinating structure and events and programs that value their volunteer time. This will guarantee a better representation of Portuguese graduate emigrants' interests before the State and vice versa.

A national strategy could also contribute to rethinking the disparity in the graphic identity and nomenclatures of different organizations. Its alignment, which should not neglect associative independence, can instantly strengthen the global network effect of Portuguese emigrated graduates, increasing the visibility of the country's science abroad and spreading that it takes place all over the world. To Portuguese scientists in transit, it would be easier to find local associations and capture the attention of potential global partners. This is, for example, the case of Spain, whose majority of associations are called "Asociación de Científicos Españoles en [country]" and all an apple as their logo, maintaining a greater graphic unit and thus increasing mutual exposure. The work of global *alumni* associations from EU programmes, such as the Erasmus Student Network, the Marie Curie *Alumni* Association, or the EIT *Alumni*, can serve as inspiration for this approach.

As the network is widened, the greater the need for general coordination of its work, either through the self-organization of associations, or the creation of an institutional position dedicated to it. The activities organized by the networks of Portuguese professionals and researchers abroad could better converse with others of Portuguese diplomacy and science.

Such strategy could also explore a better articulation between GraPE events, Encontro Ciência and the annual GPS network event. Since there is a partial overlap of target audiences, the discussion of a national strategy for science diplomacy may identify redundancies to be eliminated and synergies to be created, resulting in greater visibility and less budgeting. By bringing various actors to the same location, the event could include a segment dedicated to the discussion of science diplomacy strategies. This occasion could serve to organize discussion panels on the expansion and consolidation of networks abroad, the discussion of strategies for the involvement of lusodescendants, or the deepening of the GPS platform. Finally, this joint work could result in greater funding for Portuguese science diplomacy activities, notably through the Horizon Europe programme or the COST¹⁰ network, thus fuelling the implementation of the objectives of the PERIN networkPNAID.

This plan should also include a better inclusion of Portugal in science diplomacy forums, such as the new EU Science Diplomacy Alliance. Partnerships with science advisors from the EU and their member States stationed in countries strategic to the national interest should be encouraged. Portuguese cities also play an important role through their

¹⁰ European Cooperation in Science and Technology - cost.eu.



international partnerships and talents attraction initiatives. Finally, science funding entities will be able to hearten their principal researchers to include science diplomacy actions in their projects. To this end, MNE will specify the objectives to achieve in this field and, in collaboration with MCTES, agree on the priorities by science projects in Portugal.

That should pay attention to the public communication of results and the need for cyclical success evaluation, an aspect that would even be innovative in the global context and could position Portugal at the center of the academic debate on science diplomacy.

II - Human resources at the heart of the strategy

Portuguese science diplomacy should be based on the principle of brain circulation, concerned not only with attracting more talented professionals, but also in following-up those educated in the country (Portuguese or not) throughout their career abroad. Through their activity, Portuguese networks abroad promote socialization between emigrants and Luso descendants and provide opportunities for the creation of more networks. Some already offer newsletters and survival guides for Portuguese newcomers. These services in several countries facilitate the maintenance of the link between Portugal and the emigrated researchers. This monitoring can grow if there is dialogue with other initiatives, such as the GPS network or the *alumni* programs of IES, which also offer newsletters and events.

In the context of human resources, the creation of a specialized communication for lusodescendants should be considered; the creation of a special contingent in access to higher education, which reserves 7% of the vacancies for emigrants and their families, was an important contribution to the increase of Portugal's attractiveness to this population. The 600 vacancies filled in the 2020-2021 school year, out of a total of 3500, show that the initiative was of interest and that there is room to grow. However, the attraction of emigrant graduates and lusodescendants depends on other factors, such as streamlining equivalences of academic and professional qualifications obtained abroad, an objective that is now integrated in the National Diaspora Investment Support Program (PNAID). Long-term measures should also pay attention to Portuguese teaching abroad, which should be based on a clear distinction between Portuguese as a mother tongue and as a foreign language. Today, lusodescendants are integrated into mixed classes, where linguistic and sociocultural immersion may not have the necessary depth for their greater future relationship with the country (CCP Europa, 2018). In the medium and long terms, this and other challenges related to the inclusion of lusodescendants may weaken the objectives of programs such as PNAID or PERIN network. Due to their physical proximity and their model based on peer interaction, associations of graduates can also play a relevant role here, especially if they receive appropriate training from the State.

III - Training in science diplomacy

Portuguese IES and research centers will be increasingly challenged to provide training in science diplomacy aimed for young people who decide to pursue this career and professionals who choose to specialize in a subject. While international centers can offer



programs open to the Portuguese, equipping them with theoretical knowledge and examples from other countries, only a formative offer accompanied by national institutions can respond to the specific needs of the country. As training in science diplomacy gains international interest, particularly from academics, the construction of this offer may also consider the rest of Lusophony, as well as foreign researchers interested in Portuguese diplomacy and science, thus supporting its internationalization.

The country may even consider the creation of a career associated with science diplomacy by following a specific postgraduate training. This could be done by offering training in the IES and/or by developing training programmes for diplomats and interested scientists. This model could include training of both Portuguese graduate associations abroad and researchers and managers of most relevant scientific projects. The creation of a central strategy empowers modular programs in conjunction with existing programs.

In addition, IES should continue to focus on acquiring skills relevant to this career, notably through more opportunities for the internationalization of their students and researchers. PERIN network could contribute to this by intending to "triple the number of students in mobility in higher education", especially through the Erasmus+ Programme (PERIN, 2022: 2). Skills gained after an international experience can be exposed through a reflection programme, as suggested by the Erasmus Skills¹¹ project, funded by Erasmus+. As for incoming students, the institutions should promote their involvement in the creation and active implementation of their internationalization strategies (Mourato Pinto and Benke-Åberg, 2019), like in the Barcelona example. These involvements of "internationalized" students contribute to the acquisition of important skills for science diplomacy. Finally, IES vocational training support offices should receive instructions on opportunities in the area to better advise interested pupils.

IV - Towards Team Portugal

Lastly, and because science diplomacy is only one of the expressions of Portuguese diplomacy and science, the conception of a strategy for this field should have as main objective the better integration of what Portugal already does. The aim is to create a single "Portugal Team", which should meet periodically and aggregate the main actors, such as the different advisers in embassies, the Councillors of the Portuguese Communities, emigrated entrepreneurs, networks, etc. The latter could disseminate with greater ownership the most relevant messages of Portuguese foreign science and policy among its members, effectively involving scientists in national diplomacy and thus expanding the reach of national soft power. For a country with limited resources, geographically small and peripheral in the European context, the extension of soft power through emigration has a potential for relative power gains that can be better explored. The creation of a Portugal Team could facilitate the creation of a unique message, increasing the effectiveness of the new expressions of the country's diplomacy. It is about building the governance of Portuguese science diplomacy, blurring institutional boundaries, and promoting the interdisciplinarity and collaborative spirit that are essential to it.

¹¹ erasmuskills.eu sorry.



Conclusion

Scientific production in Portugal is reaching a new level with a record number of publications, registered patents, and brain circulation inside and outside the country. This climate of innovation, associated with the growing number of students in higher education, the potential of both diaspora and Lusophony and the possibilities opened by European funds, make this the right time for a strong focus on science diplomacy. This paper sought to identify some dynamics resulting from the implementation Resolution of the Council of Ministers No. 78/2016, especially those most relevant to the networks of Portuguese professionals and researchers abroad, to contributing to the debate on the subject. It is useful a national strategy for science diplomacy that promotes academic and scientific associativism of the Portuguese diaspora for supporting careers without national barriers, but still connected to the country and contributing to its progress, even from abroad.

Part of the future success of Portuguese science diplomacy relies on its ability to capture its graduates, through IES, cities, and embassies. In all of them, networks abroad can play a key role in combining formal and informal dimensions of international experience, promoting a good integration of Portuguese out of homeland, and attracting foreigners to investigate in the country. They are fundamental in this "circulation of brains" that modern science promotes and in which Portugal has been involved. By keeping graduates linked to homeland, Portugal may be able to capture more foreign direct investment and increase its profile in international organizations. Through this strategy, the country can contribute more actively to the definition of science diplomacy, clarifying practices and discourses, creating communication strategies, and establishing dedicated careers.

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