

# Engagement of the Argentine scientific diaspora: analysis of the RAICES Program Network of Argentine Researchers and Scientists abroad

POLICY DOCUMENT

**Abstract:** This policy document presents an in-depth analysis of Argentina's RAÍCES Program, a long-standing state policy designed to engage, reconnect, and leverage the Argentine scientific diaspora. Created in 2000 and institutionalized by law in 2008, the program addresses decades of sustained emigration of highly skilled researchers by promoting repatriation, strengthening scientific networks abroad, and fostering international collaboration. Through instruments such as the Return Grant, the César Milstein Grant for short-term research visits, and the formalization of 23 scientific networks in 22 countries, RAÍCES has become one of Argentina's most recognized science and technology initiatives. The study, based on document analysis and interviews with program officials and diaspora members, highlights RAÍCES' contributions to national STI capacities, its integration into Argentina's science diplomacy strategy, and its influence on bilateral cooperation, policy planning, and international visibility. It also identifies challenges—including limited funding and insufficient engagement with the private sector—and underscores the program's continued relevance as a model for Global South countries seeking to strengthen ties with their scientific communities abroad.

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## Introduction

Knowledge plays a fundamental role as a driving force for the economic, scientific, and technological development of nations. In a globalized and interconnected world, it acquires an even more significant meaning. Science constitutes a tool for understanding and transforming both the natural and social realms, and its purpose is inherently universal, as it ultimately seeks the well-being of humanity. It is also an intrinsically international activity; whose findings are universal regardless of the nationality or cultural background of those who produce them. A well-known statement by the French scientist Louis Pasteur in the nineteenth century captures this idea: "Science has no homeland, because knowledge is the heritage of humanity, and the torch that lights the world" (Pasteur, 1888, as cited in Vallery-Radot, 1919, p. 347). In the present day, such universality is reinforced by advances in information and communication technologies, which facilitate the rapid and widespread dissemination of scientific knowledge, reshaping professional and labor markets. Thus, the geographical location of scientists has become increasingly irrelevant, as their knowledge and achievements can be shared globally.

Nonetheless, while science itself may transcend borders, scientists inevitably belong to a nation and remain conscious of their origins. Regardless of the length of their residence abroad, they retain ties to their homeland, acknowledging and valuing the enduring connection with their country of origin. The diaspora has always represented a significant phenomenon of academic and scientific mobility, crossing continents and labor markets, while enriching both the communities of origin and those of destination. In today's globalized and interconnected world, this phenomenon has become even more pronounced.

This case study focuses on Argentina, a country that has experienced a substantial emigration of scientists over the past six decades (Albornoz et al., 2002) and that has addressed this phenomenon through a public policy: the RAÍCES Program. The present work undertakes an in-depth study of this program and is organized into six sections. The first section presents the background and context in which the Program emerged. The second situates the engagement of the Argentine diaspora within national, regional, and global literature, with particular emphasis on researcher mobility, migration, globalization, and specifically on the RAÍCES Program. The third section describes the methodology employed. The fourth outlines the governance framework, institutional arrangements, actors, instruments, operations, and funding of the RAÍCES Program. The fifth addresses lessons learned and best practices, while the sixth and final section discusses the policy implications of the program analyzed.

## 1. Background and Context

Globalization and the growing academic mobility have reshaped the landscape of research and innovation in recent decades. Multiple nations have sought strategies to capitalize on human resources trained abroad, with the aim of strengthening their scientific and technological systems, increasing research productivity, and promoting the transfer of knowledge between the diaspora and the country of origin.

Scientists emigrate from developing countries to developed countries for economic and political reasons, or due to insufficient support for the scientific and technological sectors. While some

emigration is temporary, aimed at pursuing postgraduate, doctoral, or postdoctoral training, the problem arises when it becomes permanent, particularly for young scientists attracted by contexts that offer better professional development opportunities and access to cutting-edge technologies and infrastructure.

In addition, over the past decades, several developed countries have promoted migration policies in response to demographic challenges such as population aging. This scenario has led countries in Latin America to introduce programs and measures to retain scientists, encourage their return, and foster engagement with those who choose not to return to their home countries.

The migration of scientists, engineers, and other highly skilled professionals has become a major concern for government agendas related to science, technology, and higher education policies in developing nations (Albornoz et al., 2002). According to Albornoz and colleagues, this phenomenon occurs because industrialized countries serve as powerful magnets that attract scientific and technological talent from peripheral regions (p. 2). Argentine Nobel Laureate Bernardo Houssay (as cited in Albornoz et al., 2002) emphasized that such migration posed a particularly serious challenge for developing countries, as it deprived them of essential human resources crucial for economic advancement and social organization (p. 4). Houssay's perspective must be understood within the context of the 1960s, a period when global interconnection was far more limited. During that era, short-term mobility could enhance researchers' expertise, whereas permanent migration represented a more detrimental loss for their home countries.

In recent decades, new perspectives on the international mobility of highly qualified human capital have emerged, challenging traditional views and policy approaches to this issue. Logue (as cited in Tejada, 2012) states that during the first decade of the twenty-first century, the discourse shifted from "brain drain" to "brain gain." Today, it is essential to acknowledge the close relationship between globalization and migration. Advances in communication and information technologies, together with knowledge transfer, enhance the connections between diasporas and their countries of origin, facilitate their participation in national economic development, and foster the establishment of scientific networks composed of individuals of the same nationality or region residing in different countries (International Organization for Migration, 2003).

Technological developments have transformed the production and dissemination of information, facilitating participation from a distance. According to Tejada (2012), the permanent return of human capital is no longer the sole reasonable option. Today, the scientific diaspora can contribute to their country from wherever they reside. Within this context, and recognizing the value that scientists abroad can bring to national systems, initiatives have emerged in Latin America to strengthen mechanisms that connect local research ecosystems with their scientific communities abroad.

The Argentine case is one of them, since the 1960s, the country has faced several waves of scientific emigration for varied reasons, as will be explained later. From the outset, the Argentine State has addressed this problem as part of its science policy. The first initiative for the repatriation of Argentine scientists abroad originated within CONICET under the presidency of Houssay, laying the foundations for future repatriation policies (Bastías, 2023).

As Gómez Hernández (2021) recalls, in 1983, with the return of democracy, the then-Secretariat of Science and Technology (SECYT) established the "National Commission for the Return of

Argentines Abroad,” aimed at providing economic and administrative support for scientists wishing to return to the country. CONICET, in turn, created the Reincorporation and Support Program for Researchers, which reinstated 80 scientists who had been exiled for political or ideological reasons into their former positions (p. 88). By the late 1980s, the Argentine scientific diaspora began to organize informally in countries such as Germany, the United States, and France (Bastías, 2023). To institutionalize these initiatives, the National Program for Engagement with Argentine Scientists and Technologists Abroad (PROCITEXT) was launched under the authority of SECYT and CONICET. This program would serve as the prelude to what later became a genuine State policy: the RAICES Program.

## 2. Review of National, Regional (LAC), and Global Literature

This section presents a literature review related to the case study, its connection with the scientific diaspora, and associated concepts. A global bibliographic review is conducted, analyzing skilled migration, the role of the scientific diaspora, and its relevance in international scientific collaboration, the formation of global networks, and transnational communities. This review provides a conceptual framework for the present case study.

**Gabriela Tejada (2012)** addresses the concept of the scientific diaspora and its potential contribution to the country of origin in a world dominated by the knowledge economy as a mechanism for innovation and technological development. Advances in information and communication technologies allow the diaspora to remain closely connected to their countries of origin, thereby contributing to productive development through the outcomes of their research.

**David and Foray (2002)** assert that activities and economies are increasingly knowledge-based, which has led to strategies designed to channel the flow of technology, knowledge, and other resources from emigrated scientists and skilled professionals in ways that influence economic and social transformations in their countries of origin.

**Castells (1997)** emphasizes the power of global networks in today’s world, altering the role of states as the sole organizers of societal life. This new scenario has led to the emergence of new actors, notably transnational communities. Tejada (2012) further refers to knowledge communities. These concepts directly relate to the role of scientific diasporas in the contemporary international context, functioning as global and regional knowledge networks.

The French Academy contributes a clear perspective on the concept of scientific diasporas, analyzing how developing countries can leverage the experiences and achievements of their scientists residing abroad for their own benefit (Remi et al., 2003). In this regard, Tejada (2012) notes that migrants possess their own identities and a sense of belonging to multiple locations simultaneously.

The literature recognizes a current trend of establishing networks of scientists abroad, fostering connections not only with the country of origin but also with other individuals from their home country in different parts of the world (Butler, as cited in Tejada, 2012). In this way, the diaspora maintains engagement and exerts a positive influence on their origin countries.

One objective of this case study is to demonstrate how the Argentine scientific diaspora forms part of Argentina's science diplomacy. Science diplomacy (SD), according to Vaughan Turekian, former Director of the Center for Science Diplomacy (National Academies of Sciences, Engineering, and Medicine, n.d.), is the use of science to foster collaborative links between societies (Turekian, 2014), which is essential for addressing social challenges at regional or global levels. The American Academy of Arts and Sciences (AAAS) and The Royal Society identify three dimensions of science diplomacy. The first: *diplomacy for science*, which encompasses government efforts to attract actors involved in the development of science, technology, and innovation (STI) to establish agreements or institutional frameworks. The second: *science for diplomacy*, which represents a form of soft power by creating channels that facilitate dialogue and relationships between countries. Finally: *science in diplomacy*, which involves the use of rigorous and reliable data to inform foreign policy decision-making (The Royal Society & AAAS, 2010). In the following sections, the role of the RAÍCES Program as part of Argentina's science diplomacy will be analyzed.

Regarding regional literature, **Rivero and Trejo Peña (2020)** conducted a comparative study on the repatriation programs of Argentina and Mexico, highlighting the value of such programs for national science and technology policies. Concerning brain drain from a Latin American perspective, the true challenge lies in ensuring that skilled mobility does not result in permanent loss but rather presents opportunities opened by globalization. The region must promote strategic alliances and consolidate institutional frameworks related to diaspora engagement and human capital development programs (Didou Aupetit & Gérard, 2009).

A report by the Organisation for Economic Co-operation and Development (OECD, n.d.) on highly skilled labor and international mobility confirms the lack of solid and efficient policies in South American countries regarding the migration of highly qualified human resources (Barrere, Luchilo, & Raffo, 2004).

National literature focuses on articles addressing the RAÍCES Program. Some studies analyze the program's success, its development as a state policy, its return and diaspora engagement policies, instruments, and impact on national science and technology policy (Spivak L'Hoste & Hubert, 2014; Lopez Bidone, 2014; Gómez Hernández, 2021; Bastías, 2023). Albornoz (et al., 2002) observes migration in general, examining the behavior of scientific communities abroad and estimating the number of highly skilled emigrants. Among their conclusions, they emphasize the general consensus on the need for public policies addressing emigration, such as return policies or networking initiatives (e.g., Red Caldas in Colombia or Argentina's RAÍCES Program). State intervention proves effective when there is a significant and committed scientific diaspora, supported by clear political backing (Albornoz et al., 2002).

Completing the national literature review, official documentation from the Argentine government was considered, including resolutions establishing and implementing the instruments of the RAÍCES Program: creation of the Program (Res. 075/2000), knowledge networks (Res. 1196/2005), the return subsidy (Res. 303/2005), the César Milstein Subprogram (Res. 287/2005), the system of scientific networks abroad (Res. 1017/2017), the RAÍCES and Leloir Awards (Res. 752/2010), the relaunch of the RAÍCES Program providing a renewed impetus (Res. 349/2020), and the program's structure (Res. 135/2021). Additionally, the law establishing the Program as a State policy (Law 26.421/2008) was reviewed.

### 3. Methodology

The methodology applied in this case study is qualitative. The chosen approach is based on understanding experiences and perceptions through the collection and analysis of non-numerical data. Techniques such as interviews and document analysis are used to explore the case study in depth.

In this way, the objective is to analyze the RAICES Program based on the experiences of the actors involved, focusing on participants' perspectives and the context in which the studied phenomenon occurs.

The qualitative research method employed consists of:

- A. An analysis of the documentation supporting the creation and operation of the program (regulations, laws, resolutions, and guidelines);
- B. Interviews with program officials and members of the scientific diaspora.
- C. The analysis of documentation, proved highly valuable as it allowed for a better understanding of the organization, governance, institutionalization, operational processes, management, and instruments of the program.

A total of five interviews were conducted: three with program officials and two with members of the scientific diaspora. The selection criteria for interviewees were based on ensuring the quality and relevance of the information they could provide.

The following table presents the profile of the interviewees:

Participant	Profile
Águeda Menvielle	National Director of International Relations and Director in charge of the RAÍCES Program (1999–2016). Participated in the creation of the Program, its objectives, and guidelines. Designed and planned its instruments. Was the driving force behind the law that established it as a State policy.
Luciano D'Ascenzo	Part of the program team since 2006. He was the " networks of Argentine scientists abroad " Coordinator (2019-2023). Currently continues working in the Program.
Guido Bonino	Part of the program team from 2005 to 2024. "Return and Milstein Subsidies" Coordinator (2019-2023)
José Luis García	Materials technology expert, Sandvik AB, Sweden. Member of the Network of Argentine Scientists in Sweden. Has also worked in Germany and Austria as a network member. Actually, He is the Scientific Coordinator of the Network of Argentine Scientists in Suecia.
Aldo R. Boccaccini	Materials scientist. Professor of Biomaterials and Director of the Biomaterials Institute, Department of Materials Science and Engineering, University of Erlangen-Nuremberg, Germany. Emeritus Coordinator of the Network of Argentine Scientists in Germany and member since its inception.

The selection criteria considered the interviewees' experience and knowledge of the program, whether in its design and management for officials or as beneficiaries of its instruments in the case of scientists. Convenience sampling was also employed, as all interviewees were easily accessible, willing to respond promptly, and demonstrated interest in the topic.

All interviews were conducted in August 2025, and in all cases, participants provided consent for the publication of their information for the purposes of this research.

The type of interview used was semi-structured. While a guide with questions was provided to address the research objectives, the interview dynamics allowed for the emergence of topics of greater relevance to the study.

Regarding the interpretation of the interviews, a thematic analysis was conducted, identifying recurring themes in the data. Reflections on the content were carried out through triangulation, integrating theoretical elements, documents, and testimonies.

## 4. Specificities of the Case Study

This section delves into the governance of the RAICES Program, its implementation mechanisms and instruments, management, activities, participating actors, and funding. The detailed information below stems from the official documentation consulted and the results of the interviews conducted. Based on this, and on the theoretical framework reviewed, the concepts are integrated to draw conclusions regarding best practices and policy implications of the RAICES program (Sections 5 and 6, respectively).

To understand the origin of the program, it is necessary to go back to the repeated exodus of scientists that Argentina experienced for political or economic reasons over the past 60 years, which compelled the government to develop initiatives to address this structural issue. These initiatives (already mentioned in the Background section) culminated in the creation of the RAICES Program. It was necessary to reconnect Argentine scientists abroad with the activities of the then Secretariat of Science, Technology, and Productive Innovation, promote their participation to enhance national capacity in science, technology, and innovation, and integrate it into the production of goods and services. To this end, a special program was created (Res. SECyT 075/2000) to establish procedures for implementing this repatriation and linkage policy.

The first actions took place in 2003. "Initially, what we did was register the scientists and technologists living abroad, together with the Argentine Ministry of Foreign Affairs through the various consulates. We had approximately 5,000 researchers registered. From there, a series of actions began both for repatriation and for linkage," stated Eng. Agueda Menvielle in her interview.

"The program received a clear boost between 2004 and 2016" (Bastías, 2023, p. 15). This coincides with a period of significant political support for the science and technology sector, which in the first decade of the 21st century reached 0.64% of GDP in public R&D investment (RICYT, n.d.), while the decade's average was 0.49% (López Bidone, 2014).

The enactment of Law 26.421 (Presidency of the Argentine Nation, 2008) transformed the program into a state policy, giving it strong institutionalization, creating an interinstitutional Advisory Commission under its framework, and securing a portion of the national budget for its implementation.

### **Governance of the RAICES Program**

Since its creation (Res. SECYT 075/2000), the RAICES Program has always been under the authority of the political institution responsible for science, technology, and innovation within the National Public Administration (Bastías, 2023). That is, the highest political authority of the program is the Secretary or Minister of Science, Technology, and Innovation, depending on the organizational status (Law 26.421/2008).

Within the Secretariat/Ministry organizational chart, the RAICES Program has been developed under the National Directorate of International Relations and its successors: –the National Directorate of Cooperation and Institutional Integration and the National Directorate for the Promotion of Scientific Policy. Between 2003 and 2019, these directorates reported directly to the Secretary of State or Minister (Bastías, 2023), while in the case of the last Directorate, it reported to the Secretary of Planning and Science, Technology, and Innovation Policy, who in turn reported to the Minister.

Ministers made political decisions, while Directors were responsible for technical decisions, proposing the annual activity plan and requesting the budget. Together, they decided which activities to fund based on recommendations from the Advisory Commission (AC). This commission was represented by institutions from the Argentine STI system, the Argentine Ministry of Foreign Affairs through the Directorate General for Cultural Affairs, members of the diaspora, repatriated scientists, and the productive sector. They were responsible for making recommendations regarding program instruments, promoting initiatives, projects, and integration activities between Argentine researchers abroad and the country. The Advisory Commission is the governing body of the RAICES Programme, representing the entire Argentine science, technology and innovation system.

CONICET, CONEA, CONAE, INTI, INTA, the National Interuniversity Council, Centro Redes, repatriated scientists, members of foreign networks, private sector representatives such as the UIA (Argentine Industrial Union), and the Argentine Ministry of Foreign Affairs were part of the Commission (Bastías, 2023). Its operation was complemented by two new regulations in 2018 and 2020, formalizing the participation of the diaspora and returnees in the Commission (Annex I, Res. MINCYT 349/2020) (Bastías, 2023).

Although all decisions and grants were always supported by ministerial resolutions authorizing the corresponding budgetary expenditure, some aspects of program management began informally and were gradually formalized over time.

“A technical team (within the National Directorate) carried out the operational part of the instruments and action lines, contact with researchers residing abroad and locally, reception of applications, analysis of evaluations, resolutions for the allocation of grants, and follow-up of reporting”, affirmed Guido Bonino.

## Program Instruments and Mechanisms: Operations and Funding

“The activities of the RAICES Program can be summarized as actions to connect local scientists with Argentine scientists abroad (databases/newsletters/network building); funding for the repatriation of researchers (Return Grant/PIDRI); funding for short-term research visits, cooperation, and training of researchers and doctoral students (Milstein Grants); recognition for scientific cooperation with the country (RAICES and LELOIR Awards)”, summarized Guido Bonino during his interview.

One subprogram is the Return Grant (Res. SECYT 033, 2005), which covers relocation and reintegration expenses in Argentina. “Over 1,400 scientists were repatriated between 2003 and 2023,” stated Luciano D’Ascenzo in his interview. It should be noted that this number peaked until 2015, with fewer repatriations afterward.

Scientific repatriation saw a surge during the period of sustained growth in the scientific-technological sector between 2003 and 2015: first (2003-2007) with increased funding and second (2007-2015) during sector maturation, when the Secretariat was elevated to ministerial rank and science and technology were formally recognized as fundamental for wealth creation and societal well-being (Rivero & Trejo Peña, 2020). During this stage, the MINCYT launched the Argentina Innovadora 2020 Plan, which included the RAICES Program as a specific action for the internationalization of Argentine science (Ministry of Science, Technology, and Innovation, 2020).

The sustained growth of the sector was perceived by many repatriated scientists as an indicator of a favorable context for return (Rivero & Trejo Peña, 2020). The special recruitment call for entering the scientific research career for Argentine researchers abroad and the postdoctoral reintegration fellowships offered by CONICET, on one hand (Luchilo, 2007, pp. 23–27, cited by Bastías, 2023); and the Research and Development Projects for the Placement of Researchers (PIDRI) by the National Agency for the Promotion of Research, Technological Development, and Innovation (Agency I+D+i), on the other hand (Bayle, 2016, pp. 3–4, cited by Bastías, 2023), complemented the RAICES actions to promote the return of scientists.

Another subprogram is the Milstein Grant (Res. SECYT 287/2005), which allows short-term visits to Argentina to conduct a work agenda at Argentine institutions. From its creation until 2021, 359 grants were awarded. According to one of the interviewees, “This grant is one of the most successful tools for maintaining the connection between the diaspora and the home country. It allows giving lectures, conferences, supervising theses, organizing work meetings, or promoting future research projects. Additionally, it has a social effect, reconnecting scientists with their roots and loved ones.”

A central instrument has been the Networks of Scientists Abroad, which initially were formed informally and later formalized through regulations and resolutions. In 2017, the System of Networks of Argentine Scientists Abroad (RCAE) was created. The networks are composed of Argentine scientists in each country of residence. They have a Scientific Coordinator appointed by the RAICES Program, who selects a Technical Coordinator and a Scientific Committee. They participate in the construction of the national STI plan, promote job opportunities in Argentina, foster connections between the diaspora and the scientific community in Argentina, and act as advisors and promoters of cooperation programs between Argentina and the host country (Res. MINCYT 1017/2017).

“In the 1980s and early 1990s there were already private, non-profit activities... In Germany, we had the Association of Argentine University Professionals; it was altruistic work without a formal connection to official or government institutions in Argentina. With the establishment of RAICES program, the network became professionalized, and contacts were registered with RAICES,” stated Aldo R. Boccaccini, Coordinator of the Germany network, in his interview.

“Intensive work with the NETWORKS was promoted, totaling today 23 networks in 22 countries,” confirmed one of the interviewed officials. There is a high concentration of Argentine researchers in Europe. In the Americas, mostly in the United States and Brazil. In Oceania, networks are established in Australia and New Zealand. In Asia, only in Israel and China (Bastías, 2023). The networks sometimes emerge from the diaspora members’ own initiative, and in other cases are political decisions by the RAICES authorities (Bastías, 2023).

The construction and implementation of the RCAEs are carried out jointly with the Argentine Foreign Ministry. The diaspora meets at Argentine embassies or consulates to carry out their activities alongside diplomats, constituting a form of “science diplomacy,” which will be addressed in the next section. Internal network and inter-network meetings, discussion forums, workshops, and meetings with visiting Argentine delegations are regularly held.

As a mechanism for promotion and engagement with the diaspora, the RAICES Award recognizes diaspora members who have strengthened national scientific and technological capacities, and the Luis Federico Leloir Award recognizes foreign researchers who have promoted international cooperation with Argentina (Res. MINCYT 752/2010).

The Agency, currently named the National Agency for the Promotion of Research, Technological Development, and Innovation, had a funding line for scientific and technological projects (PICT), with a special section for RAICES, facilitating the participation and financing of Argentine researchers residing abroad in projects (PICT RAICES).

The instruments described in this section were managed by the RAICES technical team. Calls for the grants described were opened, applications were evaluated by the Advisory Commission, which presented a merit ranking in a formal Act. MINCYT authorities made the final decision based on budget availability. The grant was then formalized through a ministerial resolution.

## 5. Lessons Learned

The RAICES program constitutes one of the main best practices in Argentine science policy. The results achieved regarding the number of networks of Argentine scientists abroad (23 networks in 22 countries), Milstein Grants awarded (359), and 1,400 returning researchers demonstrate its reach. However, it is not merely about numbers but rather the effects that these actions have had on engagement with the diaspora and their impact on international scientific cooperation programs. Some specific cases are presented below.

### **According to López Bidone (2014):**

The alliance between the Foundation for Science and Technology (FCT) of the Ministry of Science, Technology, and Higher Education of Portugal, aimed at facilitating exchanges

between Argentine and Portuguese research groups. Within this framework, there is a research project on the modifications generated by urbanized areas in the hydrological cycle in general and in groundwater management in particular. The leadership of the Portuguese research group is held by an Argentine researcher from the RAICES Group, who carries out her activities at the National Laboratory of Civil Engineering (LNEC) in Lisbon. In Argentina, the project is led by a researcher working at the Faculty of Natural Sciences and Museum of the National University of La Plata. Another case is the agreement between the Institute of Biomedicine and the Partner Institute of the Max Planck Society in Germany (IBioBA-MPSP), in association with the Max Planck Society (MPS). This endeavor has been based on various types of scientific collaborations, joint projects, and Argentine visits to different Max Planck Institutes; Workshop on Biosciences and Nanotechnology, MPS–SECyT, 2005; funding for joint research projects ANPCyT–MPS, where the six partner research groups between MP Institutes and Argentine universities and/or institutes have strengthened institutional links. An example of a successful case from Max Planck Innovation is the development of a novel cancer treatment. (pp. 14–15).

These are just a few examples; however, an extensive list of collaborative projects with the active participation of the Argentine scientific diaspora could be enumerated. In addition, Argentine scientists abroad have been promoters, evaluators, and advisors for programs such as ECOS SUD, with MOST of Israel, with MAE of Italy, and the Argentine-German University Center (Secretaría de Innovación, Ciencia y Tecnología, n.d.). They have also participated as experts in Argentine delegations to meetings abroad and contributed to the development of Argentine science policy when called upon.

The RAICES Program has strengthened engagement with the diaspora and, through international cooperation, has effectively enhanced national scientific and technological capacities. RAICES promoted the necessary development of adequate channels for effective interaction among all actors to maximize potential contributions. It played a proactive role by facilitating the establishment of links with scientific diasporas, supporting the creation of associations and networks, disseminating information, activities, and resources, and promoting greater recognition of the diasporas' value as well as best practices (López Bidone, 2014).

The institutionalization of the Program through the Law that made it a state policy ensured its continuity, stability, and funding, allowing the maintenance of its instruments and activities (Law 26.421/2008). Coordination with the instruments of the Agency and CONICET leveraged resources, providing opportunities for scientists who wish to return or engage.

The coordination with the instruments of the Agency and CONICET leveraged resources, providing opportunities for scientists wishing to return or engage. The governance of the program and its structure (Res. SECYT 075/2000; Res. MCT 349/2020; Res. MCT 135/2021), developed within the Ministry of Science and Technology in collaboration with the Argentine Ministry of Foreign Affairs, is also highlighted as a best practice. Together with coordination with other institutions within the national STI system through the Advisory Commission; –which includes universities and the private sector.– this constitutes a comprehensive governmental policy strategy.

In 2020, an evaluation based on the lessons learned indicated the need to improve certain processes. Some previously defunded instruments were reactivated, and new lines of action were established. Regulations were redesigned, subsidy amounts improved, and new networks were formalized in Brazil, Mexico, and China. A new area of work was introduced, focusing on engagement with universities and research institutes.

The ongoing adaptation of the RAICES Program to address the challenge of scientific brain drain has been noteworthy. Program officials interviewed emphasized the value of the Argentine diaspora and its potential contribution to the country: “There are Argentines leading science and technology organizations in France, for example, or at NASA or in various top-level organizations. They are true Argentine ambassadors working for the country because Argentine scientists appreciate the entire public education they received, and this gratitude compels them to give back. This is the enormous value of the RAICES Network” (Agueda Menvielle, interviewee). “Human Capital Abroad is an Invaluable Resource: The program demonstrates that the Argentine scientific diaspora is not an irretrievable ‘brain drain’ but a strategic and committed resource willing to actively collaborate with the national STI system” (Luciano D’Ascenzo, interviewee).

Diaspora members interviewed also highlighted the benefits of the Program: “In my opinion, Argentine scientists abroad (largely trained in public universities) are interested in contributing to the Argentine system, as most maintain academic and scientific contacts with Argentina. There are countless examples of academic and scientific cooperation projects showing that this interaction has been highly fruitful. The Argentine system can leverage its academics and professionals abroad and access contacts in prestigious centers and international cooperation programs” (José Luis García, interviewee). “Every Argentine who left is not a lost Argentine for the country; on the contrary, the country can capitalize on that knowledge, utilize and optimize contacts. Scientific and technical interaction is very valuable and active through RAICES, and it has a multiplier effect on other activities” (Aldo R. Boccaccini, interviewee).

The weaknesses and challenges faced by the program must also be acknowledged. It has not always had sufficient funding to sustain all its instruments and activities, highlighting the need for political and financial support for such programs. Periods of strong political support for the STI sector have strengthened RAICES with significant funding.

“The program’s weakness relates to the budget available for funding activities. Most institutions abroad and their programs require co-financing to implement activities. We have found this to be one of the main difficulties in expanding engagement activities between Argentina and foreign institutions” (José Luis García, interviewee).

Another current weakness is the lack of engagement with the national and international private sector. It is suggested to incorporate a line connecting Argentine diaspora technologists or professionals working in private companies. “Engagement with the diaspora cannot be limited to universities; Argentines working in companies abroad should be included, especially technologists. For example, in Germany, we organised recently an innovation forum in medicine and medical technology successfully, and it should be replicated in other areas. It is essential to connect with Argentine technological hubs through these forums. We have started to organise such events with hubs in Santa Fé and Córdoba. Engaging the private sector and moving beyond the science-only bubble is crucial. Industrial promotion must be part of RAICES” (Aldo R. Boccaccini, interviewee).

In conclusion, the achievements of the Program, its adaptability to different contexts, continuity, governance, and instruments that strengthened the Argentine STI system are acknowledged. It is also noted that sustained funding and the need to strengthen links with the national and international productive sector remain pending tasks.

## 6. Policy Implications

From this case study, several political implications emerge, which are presented below according to the following categories:

### Direct Implications:

#### 1. Effects on State Policy

Law 26.421 establishes the RAICES program as a “State policy,” whereby the government directly intervenes to address a structural problem, namely the effects of brain drain on the country’s scientific, technological, and economic development. The law ensures a policy strategy that transcends a single administration and is sustainable over time, as it reflects the approval of all political factions (Cueto & Guardamagna, 2012). This guarantees the continuity of the RAICES Program as a public policy, despite changes in government.

#### 2. Effects on Science, Technology, and Innovation Policy

The Argentine diaspora has been consulted and has participated in the construction of the National Science, Technology, and Innovation Plan 2030, under the Secretariat of Planning and Science, Technology, and Innovation Policy of the former MINCYT (Presidency of the Argentine Nation, 2021). Additionally, they have directly contributed to international scientific policy through the promotion of collaborative programs. Some examples were mentioned in previous sections, such as projects in Mercosur, CYTED, or with the Max Planck Society in Germany (López Bidone, 2014).

Members of the diaspora engage with projects in their country of origin, thereby stimulating scientific and economic development through cooperation. Distance is not an impediment. Furthermore, the periodic visits to Argentina promoted by the RAICES Program are highly functional for these objectives.

The RAICES program demonstrates a particular interest in fostering engagement without requiring physical return, encouraging interaction with institutions in Argentina (López Bidone, 2014). These collaborations and their outcomes have had a significant impact on enhancing Argentina’s scientific and technological capacities, a priority of national scientific policy. A clear example is the establishment of the Max Planck Institute for Biomedicine in partnership with CONICET, located in the Scientific and Technological Hub, home to CONICET and the current Secretariat.

#### 3. Effects on Foreign Policy and International Relations (Regional and Global Scope)

RAICES Program actions are situated at the intersection of science and international relations, forming part of both scientific and foreign policy. The Argentine Ministry of Foreign Affairs participates in the program through the Advisory Committee via the National Directorate of Consular Affairs (Law 26.421/2008) and is directly involved in diaspora activities through Argentine Embassies and Consulates abroad. These representations provide venues for Argentine scientific networks abroad to convene, organize discussion panels, exchange scientific information, analyze future projects, and gain insight into the state of science in Argentina. Diplomats responsible

for scientific affairs and Ambassadors often participate. Virtual or in-person meetings are held with Argentine government science and technology authorities to exchange ideas on scientific policy directions. These actions position the Program as a clear component of Argentine science diplomacy.

As noted in previous sections, three dimensions of science diplomacy are reflected in RAICES Program actions as follows:

- A. The networks of Argentine scientists abroad (RCAE) promote scientific collaboration agreements between their countries of residence and Argentina, with the involvement of the Argentine Ministry of Foreign Affairs and the institution responsible for science and technology (MINCYT/SECYT/CONICET). They participate in meetings and activities at Argentine representations abroad (embassies and consulates), collaborating with diplomatic actions in STI (diplomacy for science).
- B. Argentine scientists abroad foster bilateral links between STI institutions in Argentina and abroad through their knowledge of the scientific systems in their countries of residence and in Argentina. They generate a bilateral agenda for scientific collaboration benefiting the scientific and technological systems of both countries, addressing societal problems or challenges (science for diplomacy).
- C. Diaspora members often act as scientific advisors, providing data and science information to diplomats for decision-making in foreign policy. In this way, Argentine diplomacy, together with political authorities in STI, takes positions at international forums or party summits on strategic issues such as climate change, biodiversity, food security, or oceanic research, based on scientific knowledge provided by scientists in the diaspora who are consulted similarly to those residing in Argentina. Diaspora members may even be selected by the Argentine government to represent the country in technical meetings as experts or advisors on specific topics if the meeting coincides with their location (science in diplomacy).

The RCAEs also perform a function in promoting Argentine science abroad, being distributed across 23 networks worldwide. In continuous liaison with the Argentine Government through foreign and scientific policy, the diaspora promotes these policy strategies globally, disseminating their objectives and main guidelines. Argentine scientists abroad act as true ambassadors of Argentine science.

Regionally, the RAICES Program has gained significant recognition. It has been consulted on several occasions regarding its implementation, considered a model replicable in other countries in the region. Common characteristics of Global South countries, particularly in Latin America (developing countries with low STI investment, weak STI institutional frameworks, and a large scientific diaspora abroad) make the RAICES Program observed as a policy strategy that could be adapted or copied in other countries with similar conditions. The institutionalization achieved, its continuity as a State policy, and the valuable connections established through the networks of Argentine scientists abroad constitute a strategy that can be successfully replicated, adapting it to the realities and particularities of each country.

#### 4. Effects on Economic Policy and Productive Development

Several international collaboration projects involving diaspora members have had significant economic impacts, such as the development of patents and commercialization of technological advancements. For instance, the Leloir Institute joint ventures with Chile in areas such as gene therapy vectors (cancer), and with the USA, Spain, and Uruguay. A startup is being developed by the consortium FIL/StartupLocal/Pharma Company: Immunonano, which holds 8 patents (5 in early stages and 3 licensed) (López Bidone, 2014).

This impact could be even greater if government policies better integrated scientific and economic policy. As science and technology become more closely linked to productive innovation and the knowledge economy is considered a driver of development, the RAICES Program could include new actions recognizing the potential of Argentine scientists, technologists, and professionals working in the foreign productive sector as strategic assets for national innovation and development.

##### *Indirect Implications*

The RAICES Program is linked to traditional diplomacy but also to public diplomacy, as it influences international public opinion through the diaspora and functions as a tool of “soft power” distributed worldwide (Manheim, 1994).

RAICES activities also influence national public opinion. The program appears in institutional documents as well as in journalistic articles (Spivak L’Hoste & Hubert, 2014, p. 4). Its actions have had media coverage, particularly through the voices of repatriated Argentine scientists who recognize the program’s value for their return and reintegration into the country. According to the RAICES Program (2013), testimonies of repatriated researchers demonstrate a positive impact on public opinion by highlighting the implemented policy (RAICES Program, 2013).

## Conclusion

The case study demonstrates that the RAICES program is a state policy that has successfully mitigated the effects of significant emigration of scientists and technologists through various mechanisms, recovering knowledge previously considered lost and reintegrating it into the national science and technology system. Without genuine political and institutional support, the program would not have been able to sustain or develop itself. It continues to benefit from the stability afforded by its status as law. The program has enormous potential to further expand and strengthen ties with the scientific diaspora, broadening its scope by incorporating and connecting with scientists and technologists in the productive sector. The effects and implications of RAICES, which are evident in both the national scientific and technological spheres and in international scientific collaboration, could also be beneficially extended to the field of international economic relations.

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- Official documentation consulted:** Resolutions, Law, National Plan 2030, Argentina Innovadora 2020 Plan, included as Annex 1.

## Annex 1: Official Documentation

Topic	Resolution, number, and year	Summary/Comments
Creation of the RAICES Program	075/2000	The RAICES Program was created within the Secretariat for Science, Technology and Productive Innovation with the purpose of promoting the participation of Argentine researchers residing abroad in advisory and evaluation activities, as well as in seminars and academic events.
Creation of knowledge networks	1196/2005	Refers to the creation of four knowledge networks through which forums and meetings were held with Argentine experts and scientists residing both in Argentina and abroad, with the objective of exchanging information and knowledge, as well as generating joint activities in a specific area.
Creation of the return grant	303/2005	Establishes the most important grant of the Program, providing funding to researchers wishing to return to Argentina to cover their relocation expenses (including those of their families) and ensuring a position in an institution of the public or private science and technology system.
Creation of the César Milstein Subprogram	287/2005	Established one of the Program's key instruments, known as the Milstein Grant. It provides funding for short stays in Argentina by Argentine researchers residing abroad to carry out activities such as lectures, forums, etc.
Creation of the system of networks of Argentine scientists abroad	1017/2017	While the networks of Argentine scientists abroad existed since the beginning of the Program, this resolution formalized the existing ones and created a regulated procedure for establishing new networks.
Creation of the RAICES and Leloir awards	752/2010	Establishes the Luis Federico Leloir Award to recognize the work of foreign scientists who have significantly contributed to promoting and expanding scientific, technological, and innovation collaboration with Argentina. It also creates the "RAICES" International Cooperation Award in Science, Technology, and Innovation for Argentine researchers abroad who have strengthened the country's scientific and technological capacities.
Relaunch of the RAICES Program	349/2020	After a period of underfunding and partial neglect between 2016 and 2019, the Program was relaunched, highlighting its instruments and placing strong emphasis on engaging the Argentine diaspora through the strengthening of existing scientific networks and the creation of new ones in countries where they had not yet been established.
Structure of the RAICES Program	135/2021	Formalizes the Program's organizational structure, strengthening its institutional framework and ensuring a more organized and consequently more efficient functioning.

*Continues...*

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Topic	Resolution, number, and year	Summary/Comments
Law 26.421	Enacted October 22, 2008	<p>Establishes RAICES as a State policy. Objectives of the Program:</p> <ul style="list-style-type: none"> <li>a) Develop networks linking Argentine researchers abroad with those residing in the country;</li> <li>b) Disseminate the country's scientific and technological activities abroad;</li> <li>c) Improve the quality and availability of information on highly qualified Argentine researchers and professionals residing abroad;</li> <li>d) Integrate Argentine researchers abroad into scientific research, technological development, and innovation activities promoted by the National Government through the Ministry of Science, Technology and Productive Innovation, the National Agency for Scientific and Technological Promotion, CONICET, and other public science and technology agencies;</li> <li>e) Facilitate the return of highly qualified researchers, technologists, and professionals wishing to reintegrate and continue their professional activities in Argentine institutions;</li> <li>f) Involve the country's productive sector, foundations, and NGOs in the Program's actions.</li> </ul> <p>An aspect to highlight is the creation of the Advisory Committee: <b>ARTICLE 7:</b> The RAICES Program shall have an Advisory Committee composed of up to TEN (10) members, one of whom must be appointed by the Ministry of Foreign Affairs, International Trade, and Worship, through the Directorate General of Consular Affairs. These members shall be responsible for proposing and implementing the evolution of the present program, providing new contributions regarding policy proposals and instruments to promote initiatives, projects, and integration activities of Argentine researchers abroad with our country. The remaining members of the Advisory Committee shall be selected based on their experience in science, technology, and innovation activities and shall be appointed by the Minister of Science, Technology, and Productive Innovation or the authority who replaces them.</p>
Argentina Innovadora 2020 Plan	Presented on March 12, 2013, at the Government House	<p><i>Argentina Innovadora 2020</i> sets out the main axes of public policy in Science, Technology, and Innovation (STI) to provide an effective response to the challenges posed by society. The guidelines of the National Science, Technology, and Innovation Plan arise from the experience accumulated over years of management. This allowed for a thorough survey of the needs and capacities of the Argentine scientific system and the construction of a foundation from which to propose a national model where science and technology act as drivers of economic development and social inclusion. The RAICES Program is included within the axes of the internationalization of science.</p>
National Science, Technology, and Innovation Plan 2030	Approved by Law 27,738 on October 24, 2023	<p>This instrument defines the axes of the country's scientific and technological policy. Unlike previous plans, it was approved by law with the agreement of all political forces in the country. The participation of all sectors in its construction was key, including Argentine scientists residing abroad.</p>

