CNPq-CISB-Saab AB Mobility Program

Successful story and side effects

Produced by CISB

Project Team:

Alessandra Holmo
Claudio Mazzola
Maria Sampaio

December, 2023

São Paulo, 2023

Summary

1. Background

In Brazil, the interest in strengthening scientific and technological relations with the international environment has received increasing attention from the federal government and has motivated the use of various policy instruments, as well as the significant contribution of public resources, with the main goal of encouraging Brazilians to leave for postgraduate studies and research abroad. Among these instruments, the study abroad scholarship programs managed by CAPES and CNPq have stood out, which aim at full and partial doctoral training and post-doctoral training, especially in developed countries.

The Science without Borders (CsF) program was the forerunner in the student and academic mobility program launched by the federal government in July 2011 and stated as part of the strategy to strengthen the support base of the Brazilian Science, Technology, and Innovation policy.

This study carried out by the Swedish-Brazilian Research and Innovation Center (CISB) will address the implementation and results achieved of a mobility program in partnership with the National Council for Scientific and Technological Development (CNPq) and the Swedish company Saab AB within the scope of the CsF and its continuity after the end of the program.

This study will highlight success stories of some researchers at a personal and institutional level, and the impact on international cooperation and industrial innovation between Brazil and Sweden. In addition, it will address the impacts of an innovative short-term mobility program (one-week trip) as to generate relationship networks and projects for researchers and startups focused on Artificial Intelligence (AI).

2. Introduction

CISB is a private, non-profit association that acts as an international hub to promote dialogue and facilitate collaboration between Brazil and Sweden. On March 6, 2012, CNPq and CISB signed a cooperation agreement, in which they committed to developing and strengthening their collaboration in the field of scientific and technological research, in accordance with their own programs and those jointly approved. Such collaboration would be carried out through the development of projects and activities that would be an integral part of the scientific and technological cooperation programs covered by the agreement.

Within the scope of this cooperation agreement, a work plan was signed aiming to promote scientific and technological activity in areas defined by consensus between CNPq, CISB and Saab AB, a company based in Sweden and one of the founding members of CISB, covered within the Brazilian Science without Borders Program.

The specific Program consisted of joint assistance for the international exchange of students and researchers, granting a total of 100 scholarships, including 1-year scholarships for Brazilian students as part of the sandwich doctorate program and scholarships for up to 2 years of post-doctoral studies for Brazilian researchers. CISB, together with universities, research institutes and Saab AB, may guarantee participants at least three months of internship and/or participation in industrial innovation projects. Scholarship offers would be disseminated annually in the form of specific Joint Calls, to be launched by CNPq.

The Science without Borders Program had its end decreed by the Ministry of Education in April 2017. Consequently, a new work plan was signed between the parties (CNPq, CISB, Saab AB) in May 2018. This grants a total of 50 scholarships and provides in an innovative way funds managed by CISB so that they can support mobility for researchers (short-term trips) as well as monitoring and management activities for the Program within a period of 5 years. In November 2022, this work plan was renewed under the same conditions and within a period of 5 years.

3. CNPq-CISB-Saab Mobility Program

3.1. Joint Calls: Postgraduate Scholarship Grants

To date, September 2023, **8** joint public calls have been launched between CNPq, CISB and Saab AB, in thematic areas of the aeronautical sector with a total of more than 450 project applications and **61** scholarships in Sweden awarded (**36** scholarships for post-doctoral projects and **25** scholarships for sandwich doctoral projects) from **23** distinct universities in various regions of Brazil. On the Swedish side, there are **9** universities and/or research institutes that welcomed visiting researchers.

The contemplated researchers, in addition to having the chance to develop their projects at excellent universities in Sweden, were able to carry them out together with Saab AB through co-supervision of the project execution, thus guaranteeing participation in industry innovation projects.

3.2. CISB Calls: Short-Term Trips (travel grants)

Starting in December 2020, CISB, in partnership with CNPq and Saab AB, has launched special calls to select project ideas and financially support the mobility of researchers or startup representatives focused on AI for a short period of time (short-term trips), usually for a week. The objective is to facilitate connections between Brazilian researchers and Swedish experts and researchers, and structure collaborative projects between the two countries. This mobility fund will facilitate the formation of a bilateral community and, in a long-term perspective, promote innovation between academia, research institutes and Brazilian and Swedish industry in applied AI focusing the aeronautical industry in the first phase, but with high potential for transversality and impact among other sectors.

In 2021 and 2022, **3** calls were launched by the CISB, with a total of 57 submissions of project ideas, with **15** researchers and ***6*** representatives of startups receiving funds that financed the one-week trip to Sweden. In 2022, 2 missions to Sweden were organized by CISB with the recipients: a mission in May composed of AI researchers and a mission in September composed of startups. A new mission is scheduled for November 2023.

The May mission was called “State of the Art of AI & Autonomy R&D&I in Sweden” and aimed to strengthen scientific and technological cooperation ties and facilitate joint projects in the medium term, connecting Brazilian researchers and AI experts to AI programs of cutting-edge AI research initiatives in Sweden. Furthermore, this mission included the participation of special guests, totaling 18 participants at the end. The September mission aimed to connect Brazilian startups to large corporations in Sweden and/or connection platforms to facilitate joint projects and/or new businesses.

4. Results of the CNPq-CISB-Saab Mobility Program: Research of former scholarship holders

CISB carried out a research with former scholarship holders to survey the results, highlight successful stories and the impact of the program, the spillover effect, and its impact on the researchers' careers and their institutions. The research was focused on a group of 44 researchers who had already carried out their research projects and returned to Brazil. Currently within the program scope, we have 8 researchers in Sweden carrying out their projects (included in the 7th joint public call) and 9 researchers will carry out their projects from October 2023 (included in the 8th joint public call).

4.1. Research

The research project began in May 2023, with the first challenge being updating the contacts of former fellows (email, phone, current institution, etc.), as the fellows from the 1st joint call started their projects in Sweden from September 2012. The search for updates was carried out through LinkedIn, CNPq's Lattes Platform, ResearchGate, in addition to contacting their former advisors at Brazilian institutions. Out of the 44 former scholarship holders, 42 had their contact details updated and were contacted via email and/or LinkedIn.

In June 2023, CISB emailed a Google Forms questionnaire to the 42 alumni contacted. This questionnaire was previously validated by CNPq.

The research questions were as follows:

- Full name.

- By which email would you like to be contacted?

- Current institution.

- What have been the main results of your project in terms of research (published articles, works, participation in conferences, patents, etc.) so far?

- In terms of collaboration, did you continue your project and/or start new projects after returning to Brazil? If so, did you obtain funding for this collaboration from funding agencies?

- Still in terms of collaboration (continuity of your project and/or new projects), were there results after your comeback? If so, what were they?

- Through the network established during the project in Sweden, did you involve other researchers from your group and/or other partners (universities and companies, from Sweden or Brazil)? If so, who were they?

- How do you evaluate your participation in the CNPq-CISB-Saab program, in relation to the impact it had on your career?

- Would you like to share any more information or successful stories with us?

- Do you authorize the use of your responses in this survey for the promotion and marketing of CISB and partners? (Yes or no question).

Out the 42 former scholarship holders contacted, 28 responded to the survey, with different degrees of specificity, that is, the survey obtained 67% of responses.

4.2. Analysis of responses

- A significant majority of those who responded to the survey affirmed the importance of the program as a fundamental factor for their professional training;

- There is evidence of patents filed;

- There is a company created by a former scholarship holder, based on the knowledge acquired in the doctoral project;

- 80% of former scholarship holders reported that they still have relationships, contact networks with researchers in Sweden and/or recommend students to have relationships with them;

- 57% of former scholarship holders continued with their research projects upon returning to Brazil;

Regarding the current institution of the former scholarship holders, we can state that 25 former scholarship holders of the program (57% of the total 44) are currently linked to an institution (University/Company) different from the one they were at the time of applying the proposal to the program. Out of these 25 former scholarship holders who

moved to other institutions, 25% are currently working in companies and 75% remain in Universities, 6 of which are living abroad, and of these, 4 are in Sweden.

The successful stories highlighted by the researchers were:

Prof. Emilia Villani (1st Call): had 5 articles directly related to the postdoctoral, in addition to several articles related to the collaboration with Sweden. In terms of continuity, she and her partners had a project approved in the FINEP-VINNOVA call, co-guidance with a Brazilian scholarship, as well as other international cooperation initiatives. Emilia was also responsible, at ITA, for several cooperation actions with Sweden, such as organizing workshops, implementing CISB-Saab chairs and creating the BARINet network (Brazilian Aerospace Research and Innovation Network), a strategic partner of SARC (Swedish Aerospace Research Center), which aims to encourage cooperation between aerospace researchers. These actions consumed effort and time, but he believes they resulted in a significant contribution to cooperation, with infinite consequences. She is currently Professor and Vice-president of Postgraduate Studies. LinkedIn: https://www.linkedin.com/in/emilia-villani-414b17149/

Dr. Carlos Natalino (2nd Call): had two articles published in international conferences and two in magazines, one patent, establishment of collaboration between Swedish and Brazilian research groups. At first, the collaboration continued without funding, however, through research into smart cities, Vinnova funded part of the collaboration. The collaboration between the research groups continues to produce results, such as two publications in a journal and 5 visits from Brazilian researchers. He is currently a Researcher at Chalmers University of Technology. LinkedIn: https://www.linkedin.com/in/carlosnatalino/

Prof. Renato Machado (2nd Call): had several journals published, participated in conferences, supervised dissertations and theses defended in the area of the post-doctoral project. In terms of continuity, his partners in Sweden had 5 projects approved by funding agencies after returning to Brazil: 4 in Brazil and 1 in Sweden. The experience was a turning point in his career, as the results of the post-doctoral project led to greater visibility as a researcher, and he currently leads the research group in the area at ITA. He is currently a Professor at ITA. LinkedIn: https://www.linkedin.com/in/renato-machado-126a1836/

Prof. Mauro Sampaio (3rd Call): participated in a conference and had an article applied. Collaboration with Sweden existed for a while and sought partnership with the Porto de Santos upon returning to Brazil, without success. He disseminated the work within the FEI, UFABC and other communities, having had several interactions. He had a good understanding of the Swedish university-company interaction model and set up PASCM (applied project in supply chain management) to develop applied university-company projects, and obtained funds, having already carried out 15 projects with direct financing from companies. He is currently a Professor and Researcher at the FEI University Center LinkedIn: https://www.linkedin.com/in/mauro-sampaio-7249b95/

Prof. Danilo Carastan (4th Call): had three full articles published and six published in conferences. Collaborations have continued and expanded since the original project with support from CISB-CNPq-Saab carried out in 2016, with collaborations being expanded with Saab, Chalmers University of Technology (CTH), Linköping University and other companies linked to the projects in progress. Workshops and events were also held at conferences in Brazil, Sweden and online, involving Brazilian and Swedish researchers and companies, and collaborations continue to grow more and more. The research themes in partnership with Saab and CTH allowed the opening of new research themes in their group, including the aeronautical and graphene areas. The projects developed in collaboration with Swedish companies were essential for UFABC to have, in 2020, the accreditation of its first and only Embrapii unit to date, the Materials Science, Technology and Innovation Group (CTIM), of which Danilo is a member part of the coordination. He is currently an Associate Professor at UFABC. LinkedIn: https://www.linkedin.com/in/danilo-carastan-21461519/

Prof. Luiz Gonzaga Trabasso (4th Call): As a result of the collaboration with Sweden, the Human Factors in Engineering and Aeronautics laboratory (HumAer) was implemented. This was a technological gap, at the ITA Manufacturing Competence Center, as well as the development of a postgraduate discipline titled “Human Factors in Engineering.” The HumAer laboratory was implemented in an integrated manner with the Fapesp SIVOR project = Flight Simulator with Robotic Motion Platform which, in turn, evolved into the status of CPE = ITA-Embraer-FAPESP Engineering Research Center. There were two master's degree theses and two scientific articles published

in magazines. He is currently Chief Researcher at the SENAI Institute for Innovation in Laser Manufacturing and Processing Systems. LinkedIn: https://www.linkedin.com/in/lu%C3%ADs-gonzaga-trabasso-89506b187/

Dr. Fabiola Paula Costa (5th Call): had an article published in the JGTP magazine (Journal of Engineering for Gas Turbine and Power) and at the AIAA (American Institute of Aeronautics and Astronautics) Aeroacoustics conference in 2022. The project was not continued, however the knowledge acquired in research into computational aeroacoustics of propellers was fundamental for its implementation in the current company. Currently works at Embraer. LinkedIn: https://www.linkedin.com/in/fab%C3%ADola-paula-costa-2305638a/

Prof. Bruna Palm (6th Call): had 3 articles published as a result of her post-doctoral project, having been hired by BTH at the end of her 4th month of project in Sweden. It is a collaboration with her former research group in Brazil and in an integrated way with his new research group at BTH. Her advisor in the postgraduate program continues to be one of your biggest partners, and your postdoctoral project helped to consolidate partnerships that emerged in your sandwich doctorate also done at BTH in 2019. She is currently an Associate Professor at Blekinge Institute of Technology (BTH). LinkedIn: https://www.linkedin.com/in/bruna-palm-92a161175/

Prof. Fabio Verdi (6th Call): had an article published in a European workshop in 2021 and a patent filed as a result of his project. Furthermore, there was an article published at the SIGMETRICS conference, one of the most difficult and popular conferences in the area of computer networks, and this was a great result obtained. The project continued and currently has a postdoctoral student from his research group at KTH under the supervision of the same professor who received him for his postdoctoral studies. It also involved researchers from UFU (Federal University of Uberlândia) and the Federal Institute of Southern Minas in this collaboration. He is currently an Associate Professor at UFSCar (Federal University of São Carlos), Sorocaba campus. LinkedIn: https://www.linkedin.com/in/f%C3%A1bio-luciano-verdi-aa9bb34/

5. Mission results 2022: Survey with the participants

CISB carried out a survey with mission participants in 2022, in order to understand the impact of the mission and main achievements in terms of projects and/or collaborations.

In August 2023, CISB emailed a Google Forms questionnaire to 23 participants in the 2022 missions.

The survey questions were as follows:

- Full name

- By which email do you prefer to be contacted

- Current Institution

- What are the main results resulting from your participation in a mission to Sweden in 2022 so far?

- And in terms of collaboration, did you continue any connections made during the mission that generated a new project after returning to Brazil? If so, have you obtained funding for this collaboration from funding agencies?

- Through your network established during the mission in Sweden, did you involve other researchers from your group and/or other partners (universities and companies, from Sweden or Brazil)? If so, what were they?

- Would you like to share with us any successful stories or other information about the impact of your participation in the mission?

- Do you authorize the use of your answers to this questionnaire in the dissemination and marketing actions of CISB and partners? Yes or no

Out of the 23 participants contacted, 15 responded to the survey, that is, the survey obtained 65% of responses.

The main findings of the survey were:

5.1. Researchers

In general, all participants expanded their networking with mission participants and Swedish institutions, strengthened cooperation ties and generated new projects.

In terms of continuity and concrete results, several reports were obtained:

- AI courses currently being discussed with Prof. Fredrik Heintz and two different institutions in Brazil;

- 1 applied project with partners found during the mission in the Eureka Globastars Vinnova Fapesp call. Project approved;

- 2 postdoc projects applied by the participants, with the supervisors meeting during the mission, in the call CNPq-CISB-Saab 72/2022. Approved projects;

- 1 applied project with partners found during the mission in the Vinnova Staff Exchange Applied AI (mobility) call. Project approved;

- 2 researchers established a partnership with Swedish actors, who have a project financed in Sweden and are currently looking for financing in Brazil;

- Other results were reported in the research by participants, but were not authorized for publication.

5.2. Startups

All startups that responded to the survey reported that they expanded their networking with Brazilian entrepreneurs (participants in the mission) and were able to learn about the Swedish innovation ecosystem. One of the startups reported that it can better understand the current state of the company's technology and review its strategic positioning.

Regarding the results, the startup Pix Force stands out, which reported good results resulting from contact with SaaB AB, having an advanced dialogue on a project at the moment and which was invited to participate in SynerLeap (ABB's innovation hub) through a project that offers guidance, investment and exclusive access to ABB networks, customers and technology.

Both Aquarela Analytics and Pix Force also reported that they have advanced dialogue with Scania in Sweden at the moment.

6. Saab and its vision about the Mobility Program.

For Saab, the mobility program has been “fundamental for the collaboration, just like a ‘start engine’ to get researchers from Brazil to go to Sweden and do projects initially at the Swedish universities. The Saab specialists as supervisors got a strong connection to the “industrial relevance” part in combination with the “academic excellence” from the University. Strong personal connections, built upon trust and reliance, for long lasting network building.”

The mobility program also contributes to innovation, as the exchange of PhD students and researchers comes with new insights that are capable of expanding Saab’s technology horizon. The students and researchers also often bring knowledge on subjects that Saab has not yet had the availability to explore. The main contributions of the program within the framework of Brazil Sweden cooperation, according to Saab, have been: the methodology, lab creation and technology maturity. Program was able to enhance the effect of ”Professor Chair” network and activities as well.

As for the short-term missions, “the program creates connection with top-class researchers in Brazil for long term within areas, both new like Graphene or more established technologies like in the field of Aerodynamics, but where future technology needs to be explored and developed for enhanced capability. It is a necessity to have academic involvement since it is the base for education of new students that will get a knowledge and interest in the Aeronautical industries benefitting both countries long term. The Gripen program will be a long-term relationship over many decades, why relationships and knowledge sharing is such an important factor.”

7. Conclusion

The CNPq-CISB-Saab mobility program has become an integrated, dynamic and continuous model, as it began within the scope of the CsF program with a company as a partner and continued through renewals over time, having established a continuous program and with a long-term vision. This made it possible to establish a strengthening of the institutional relationship; strong research network and closer relationships between research groups in the medium and long term, enabling results with greater impact compared to traditional mobility programs that are very focused on training the individual abroad.

Furthermore, due to its continuity and an extensive marketing campaign of the program over the years, led by CISB, it has been possible to have scholarship recipients from Universities from all regions of Brazil (ITA, Unicamp, USP, UFPA, UFPE, UFRGS, UnB among others) which gives the program capillarity and opportunities for researchers from all over the country.

Through the program we also observed the dissemination of knowledge from different perspectives and with an exponential increase in the impact of the program on the Brazilian innovation ecosystem and on our society, examples being it is the creation of the HumAer laboratory, the BARINet network and the PASCM initiative and its capacity to leverage projects with industry at FEI.

In the case of former scholarship holders who settled in Universities in Sweden, they represent points of strengthening research between the two countries, evidenced by the continuity of their relationships with their institutions and groups of origin in Brazil.

It is also noteworthy that the former scholarship holders became part of a bilateral Brazil-Sweden community in aeronautics, through their projects that are part of cooperation and participation in bilateral workshops between Brazil and Sweden in Aeronautics, which has its own Governance between the two countries.

Regarding the model dynamics, the offer of short-term trips stands out due to the potential for results (applications for scholarships in the CNPq-CISB-Saab Program, connections that gave rise to International Business University projects (2x2), strengthening of Brazil-Sweden research network, projects between startups and Swedish companies, etc.)

As a recommendation, we indicate that this program should be disseminated more widely in the Brazilian ecosystem and that it be expanded to other countries and with relationships with companies, focused on long-term results from the perspective of forming international research and innovation networks.