Exploration of bilateral cooperation: Landscape of Swiss scientific collaboration with Latin America

Report on the results of the mapping study of the scientific and academic links between Switzerland and Latin America

1. Introduction and objectives

As part of Switzerland’s strategy to promote bilateral research cooperation with extra-European countries for the period 2013-2016, the State Secretariat for Education, Research and Innovation (SERI) mandated the Ecole Polytechnique Fédérale de Lausanne (EPFL) to lead exploratory activities with Latin America for the purpose of expanding the scope of SERI cooperation in the form of new strategic partnerships.

As a means of achieving this aim, EPFL was entrusted with the task of identifying potential additional partners in the region (with the exception of Brazil, which is already one of the priority countries) that could offer high prospects in terms of cooperation with Switzerland within the fields of science and technology. This was to be accomplished through an exploration task consisting of an evaluation of the actual and potential bilateral scientific capacities and strengths of selected countries in the region.

Three main complementary tasks were implemented for this purpose:

- A mapping study of the scientific and academic links between Switzerland and Latin American countries.
- A round table with the Swiss scientific community to discuss existing and potential forms, strengths and areas of collaboration with Latin American countries.
- The production of fact-sheets and country reports on the science and technology landscape of Latin American countries and the opportunities for cooperation with Switzerland.
2. Mapping study: aims and scope

The mapping study was conducted with a view to obtaining an informed understanding of the scientific and academic relations that Swiss universities, research institutions and their researchers have developed with Latin American countries and scholars up to the present day.

The study gathered primary information on three main issues:

- Existing (past and current) collaborations (joint agreements, joint research projects, and any other type of scientific and academic exchanges) with Latin American countries.
- Education and/or research exchanges related to the mobility of people between Latin America and Switzerland.
- The interest in establishing future scientific cooperation partnerships with those Latin American countries that are considered to have a high potential for scientific collaboration.

Ultimately, the results of the study were intended to help identify any additional potential strategic partnerships within the region that might have high science and technology prospects for cooperation with Switzerland.

3. Methods used in the collection of data

3.1 Survey questionnaires

Two complementary survey questionnaires were prepared for the collection of primary data in Switzerland. One questionnaire targeted the heads of international relations units (“administrators”) at Swiss universities and research institutions, while the other was aimed at researchers and lecturers from these same institutions.

Both questionnaires consisted of six specific close-ended questions related to the following issues: scientific and academic collaborations and agreements with Latin America, the mobility of faculty members and students, the main partner institutions involved, and cooperation prospects and instruments. A final open-ended question was also included in order to offer respondents an opportunity to record any qualitative views and experiences on research cooperation with Latin American partners. Some countries (Colombia, Chile, Mexico, Argentina, Peru, Uruguay and Cuba) were mentioned in the questionnaires by name, while others were included under other Latin American countries.¹

3.2 Dissemination of the survey

The first stage of the dissemination of the survey was an email letter sent ad personam on 9 September 2013 to the Rectors of all 61 of Switzerland’s higher education and research institutions. These institutions included the cantonal universities, the Swiss federal institutes of technology, national research institutes² and universities of applied sciences³. The recipients were asked to forward the survey questionnaires on to a contact person within each institution who could help to deliver them to potential respondents and/or to the person in charge of international cooperation, particularly cooperation with Latin America.

¹The survey questionnaires are shown in Annex 1.
²As defined by the SERI: http://www.sbfi.admin.ch/themen/01367/01679/index.html?lang=fr#sprungmarke1_5
By identifying the right person at each institution, the Rectors and their offices played a key role in the dissemination of the survey questionnaires among the two targeted respondent groups: researchers and lecturers; and the heads of the international relations units (“administrators”).

The initial deadline for answering the questionnaires was 15th October 2013. However, the data collection process was extended until mid-December 2013 in order to ensure a greater number of responses. In all, the survey took 14 weeks, which ran from September to December 2013.

3.3 Response rate

The answered questionnaires were received either by email or in hard-copy form. A total of 117 answered questionnaires were received by the end of the first data collection stage; 92 of these were from researchers and lecturers, and 25 from heads of international relations units. The 25 questionnaires received out of the 61 institutions that had been approached included all 10 Swiss universities and the 2 Swiss federal institutes of technology, representing a response rate of 41%.

With a view to gathering supplementary information and updating the data that was collected during the first stage, the 10 Swiss universities and the 2 Swiss federal institutes of technology were contacted again by email and by telephone in June 2014 and they were asked to answer a complementary questionnaire consisting of 10 questions.

3.4 Preparation of data analysis

The research fields of the existing (past and current) joint research projects between Swiss and Latin American partners mentioned by survey respondents were classified according to the official taxonomy of science fields in order to facilitate the sorting of priority topics for collaboration with the different countries. In addition to this, the comments made by the researchers and “administrators” in relation to their collaboration experiences with partners from Latin American countries, the difficulties they faced, and the opportunities and future prospects were sorted, and the recurring issues were synthesized to facilitate an analysis of the main observations.

3.5 Limitations of the study

It should be noted that the data gathered by the mapping study is based only on the information provided by the respondents who participated in the survey, and these data do not represent the Swiss scientific community as a whole. Furthermore, the information was collected during a limited period of time, and therefore it must be considered as a snapshot of the particular situation at that specific time.

4. Information gathered and complementary data

The data obtained through the survey questionnaires provided information on the following specific aspects:

- Institutional agreements between Swiss and Latin American institutions on scientific or educational cooperation.
- Exchanges of lecturers, researchers and students between Latin American countries and Switzerland.
- Research collaborations between Swiss and Latin American partners (including research area and duration).
Latin American universities and research institutions that maintain an ongoing collaboration with their Swiss counterparts.

- Interest in, and planned future collaboration with Latin American partners, by country, institution and research area.
- Funding instruments of interest in terms of collaboration with Latin America.
- Comments provided by both researchers and “administrators” with regard to their experiences of collaboration with Latin American partners; difficulties faced, an overview of opportunities and future prospects.

The following supplementary information was obtained from other sources to complement the data that had been gathered:

- Number of Swiss-based researchers from Latin American countries supported by the Swiss National Science Foundation (SNSF) between 2008 and 2013 through any of the following main instruments: programmes, careers and projects *(Source: SNSF)*.
- Number of Latin American students enrolled at Swiss universities, universities of applied sciences and Universities of teachers’ education *(Source: Swiss Statistics Office)*.
- Number of scholarships granted to students from Latin America since 1961 *(Source: Swiss Government Scholarships Office)*.
- Diverse information on existing collaboration between Switzerland and some Latin American countries *(Source: Swiss Embassies in Latin American countries)*.
- Number and content of MOOCs in Latin America *(Source: EPFL)*.

5. Results

The mapping study identified a wide range of countries, types of agreements, research projects, actual partnership exchanges and future prospects, revealing the interest of the Swiss research and academic community in cooperating with Latin America. Five countries, (Argentina, Chile, Colombia, Mexico and Peru) stood out because of the intensity of their already existing collaboration with Switzerland and their potential in terms of increasing it.

5.1 Institutional agreements and exchanges of lecturers and students

Institutional agreements of various kinds between universities and research institutes as well as the exchange of students and scholars are factors that enhance bilateral scientific and academic cooperation between two countries. Figure 1 shows Mexico as the Latin American country with the largest number of institutional agreements for educational exchange or scientific cooperation with Swiss universities, followed by Argentina, Colombia and Chile. In terms of the magnitude of exchanges of faculty members and students, we see a higher level of mobility of lecturers, researchers and students from Latin American countries to Switzerland, while moves in the opposite direction are rare.

We can see that Colombia is the Latin American country with the largest number of lecturers, researchers and students coming to Switzerland, followed by Mexico, Argentina, Peru and Chile (Figure 2). Taken together, these 5 countries account for 88% of all movements of faculty members and students from Latin American countries to Switzerland documented by the study.

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4 The results of the mapping study were presented at the Round Table discussion held at EPFL on 09. Sept. 2014. The presentation is shown in Annex 2.
5.2 Research collaborations

Joint research endeavours are another factor enhancing scientific cooperation between two countries. Research partnerships are regarded as an elaborated form of scientific cooperation and they are frequently seen as providing a potential for various added-value components in comparison to non-collaborative research. Collaborative research is a powerful instrument in terms of contributing to knowledge generation, scientific advancement and capacity building for the benefit of all the parties involved.

The mapping study helped to observe and assess the magnitude of the scientific and academic collaboration between Latin American countries and Switzerland. According to the survey, Mexico is the Latin American country with the largest number of past and present research collaborations with Switzerland, followed by Argentina and Peru (Figure 3). For each of the individual countries,
Figure 3: Total number of research collaborations between Swiss and Latin American partners, by country

Source: EPFL mapping study, 2013-2014

Figure 4 below shows the main research areas identified by the study in which they have collaborated with Switzerland.

Figure 4: Main areas of research collaboration between Switzerland and Latin America, by country

Source: EPFL mapping study, 2013-2014

Figure 5 below shows the number of research collaborations between Swiss researchers and their counterparts in Latin American countries identified by the study, compared to their GERD/GDP for 2013, and their population. We can see that five countries stand out because of the magnitude of their scientific and academic collaboration with Switzerland. These countries are Mexico, Argentina, Chile, Peru and Colombia. However, we can see that only the first three countries are backed by the highest GERD/GDP % in the region (Mexico 0.46%, Chile 0.67% and Argentina 0.51%), whereas the GERD/GDP % for Peru and Colombia is low in comparison to the intensity of their research collaborations with Switzerland.
5.3 Countries and universities of greatest interest

Mexico is the Latin American country most recommended by researchers for collaborations, followed by Colombia and Argentina (Figure 6). In terms of Latin American institutions of interest to Swiss researchers, Mexico’s leading university, the Universidad Nacional Autónoma de Mexico (UNAM), heads the ranking of higher education institutions in Latin America most recommended by survey respondents; it is followed by the Universidad de Buenos Aires in Argentina and the Universidad de Chile in Chile, which occupy second and third place respectively. We were able to observe that all of the top 10 most-mentioned Latin American institutions are located in the 5 leading countries (2 from Mexico; 2 from Argentina; 3 from Chile; 2 from Colombia and 1 from Peru). The only exception is FLACSO in Ecuador, which shares tenth position with the Universidad Nacional de la Plata in Argentina.

Figure 6: Number of mentions of Latin American countries of interest to Swiss researchers

Source: EPFL mapping study, 2013-2014

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5 The indicator for Gross Domestic Expenditure on R&D as a percentage of GDP (GERD/GDP) is commonly used to assess the level and trends of R&D expenditure in relation to GDP at a given point in time.
5.4 Students enrolment

In terms of Latin American students enrolled at Swiss higher education institutions, according to the Swiss Federal Statistical Office, Colombia and Mexico were the two countries with the largest numbers in 2013, with 294 and 269 respectively, followed by Peru (121), Argentina (107) and Chile (92) (Figure 8). Figure 9 shows the evolution of the total number of Latin American students enrolled at Swiss higher education institutions during the period from 2000 to 2013. While we can observe an increasing trend in the number of enrolments of students from Colombia and Mexico during the period, enrolments of students from the other countries remain stable or else show a slight decrease, as in the case of Peru.

Figure 8: Number of Latin American students enrolled at Swiss higher education institutions (2013)

Source: Swiss Federal Statistical Office
5.5 Research grants and scholarships awarded

Researchers and students from Latin American countries have benefited from research funding and scholarship schemes offered by Switzerland. With regard to research, the Swiss National Science Foundation (SNSF) offers several funding schemes, which researchers from Latin American countries based at a Swiss public institution are eligible to apply for.

Figure 10 below shows the total number of Swiss-based researchers from Latin American countries who were supported by the SNSF between 2008 and 2013 through any of the following instruments: programmes, careers and projects. We can see that Argentina and Mexico, with 18 and 16 respectively, are the two top countries of origin for Latin American researchers awarded the largest number of grants; these countries are followed by Peru with 8, and then Colombia and Chile, with 6 and 5 respectively.

Figure 10: Number of researchers from Latin American countries based in Switzerland and supported by SNSF funding instruments (2008-2013)

Source: Swiss National Science Foundation
Swiss scholarships are a funding instrument commonly used to encourage scientific and academic relations with eligible countries, and to support the development of the capacity of talented students from these countries. The Swiss Government Scholarship, which has been awarded since 1961, is the leading instrument used to support students from abroad and it allows recipients to pursue doctoral and postdoctoral research in Switzerland at one of the publicly funded universities or recognised institutions. Many applicants from Latin American countries have already benefited from these grants.

According to data from the Swiss Government Scholarships Office, students from Colombia, with 147 scholarships, represent the country group from Latin America with the largest number of scholarships awarded since 1961, followed by Mexico and Peru in second and third place, with 114 and 108 scholarships respectively (Figure 11).

![Figure 11: Number of scholarships granted to Latin American students since 1961](source: Swiss Government Scholarships Office)

### 5.6 Overall comparison of results per country

Five individual factors derived from the information gathered through the survey were used to evaluate the accomplishment of the individual Latin American countries in terms of the scope of their scientific and academic cooperation with Switzerland, and to enable a comparison amongst them.

These factors are:

- The presence of lecturers, researchers and students from Latin American countries in Switzerland (measured by the number of faculty members and students from Latin America at Swiss institutions during the academic year 2013-14).
- Institutional agreements on scientific or educational cooperation between Swiss and Latin American institutions (measured by the number of agreements).
- Existing (past and present) research collaboration between Swiss and Latin American partners (measured by the total number of joint research projects between Swiss and Latin American researchers).
- Latin American universities and research institutions mentioned as having potential for scientific collaboration with Switzerland (number of mentions).
- Interest in, and planned future collaboration with Latin American partners, by country (number of mentions).
For each factor, the country’s accomplishment was measured by first applying a decreasing coefficient value (0.7, 0.5, 0.33, 0.25, 0.2, 0.166, etc.) to each, and then adding the results of all the factors per country, giving the same weight to each. Figure 12 shows the result of this, by country. We can see that the five countries that stand out due to the intensity of their already existing collaborations with Switzerland and their potential in terms of increasing scientific and academic cooperation with Swiss scientists or institutions, according to the study are Mexico, Argentina, Colombia, Chile and Peru.

Figure 12: Overall comparison of results per country

![Graph showing comparison per country]

5.7 Collaboration experiences and prospects

The survey respondents were asked to assess their collaboration experiences with Latin America. The qualitative information gathered illustrates some of the main difficulties faced by Swiss researchers and administrators when working with partners from the region, as well as the opportunities they see in cooperation of this type.

The main difficulties mentioned by respondents were the limited resources in terms of funding and infrastructure, unstable political and economic contexts, lengthy communication and administration, and language differences. Furthermore, as a result of the increase in student mobility, the question of return and the relevance of a physical presence in the home country to avoid brain drain were also seen as an important challenge requiring special attention with regard to bilateral scientific cooperation.

As far as opportunities are concerned, the findings of the study reveal the interest that the Swiss scientific and academic community has in cooperating with Latin America. It recognises the potential benefits on both sides for science, technology and innovation resulting from this type of cross-cultural cooperation, the improvements in the quality of research and infrastructure in some countries in the region, the prospects of addressing new scientific challenges and research fields of mutual interest, as well as the role played by return students and scholars who stay temporarily in Switzerland, insofar as they act as leverage to establish or reinforce scientific cooperation.

Finally, administrators were asked for their opinion on six specific funding instruments that may support research collaboration with Latin American partnerships: joint research projects, seed money, academy-industry training, symposia and conferences, and flash projects. The instruments that were more commonly mentioned by respondents were: joint research projects, seed money, flash projects, and symposia and conferences. Additional instruments that the respondents mentioned as being beneficial for establishing or reinforcing research partnerships included individual grants, mobility funds and dual masters.

6 Detailed results of the 5 leading countries (Mexico, Argentina, Colombia, Chile and Peru) are shown in Annex 3.
6. Conclusions

The mapping study revealed the magnitude of Swiss scientific and academic cooperation with Latin American countries. The study identified a wide range of countries, types of agreements, research projects, partnerships and exchanges as part of the cooperation between Switzerland and Latin America. The study also revealed the main countries, institutions and areas of interest.

Findings from the study highlighted the interest of the Swiss scientific and academic community to cooperate with Latin America, and the positive expectations of the potential results of such collaborations. Those who have already collaborated with Latin American countries recognise the benefits that derive from such cooperation, but they also mentioned some of the major difficulties that are encountered, as well as the need for funding mechanisms that can support research collaboration with Latin American partnerships.

Five countries - namely Argentina, Chile, Colombia, Mexico and Peru - stood out in the study because of the intensity of their already existing collaborations with Switzerland in terms of institutional agreements and research collaborations, the presence of their nationals among faculty members and students at Swiss institutions, and the interest of Swiss researchers with regard to establishing or increasing their collaboration with some of the universities and research institutions in those countries in particular areas.

Annexes

Annex 1: Survey questionnaires
Annex 2: Presentation of results 9 Sept. 2014
Annex 3: Detailed results of the 5 leading countries (Mexico, Argentina, Colombia, Chile and Peru)*

* This annex shows the most updated numbers for some of the data presented in Annex 2.