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EULAKS
(Connecting socio-Economic Research on the Dynamics of the Knowledge Society in the European Union and Latin American and Caribbean Countries)

Mapping and Understanding Euro-LAC International Cooperation in Science and Technology (S&T)

A Questionnaire Survey

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Selected excerpts from interviews

"To ensure a longstanding cooperation, you have to have common interests, you have to get along together so that friendship and trust can grow. You do science collaboration better with your friends" (Carlos Guttiérez, Mexico).

"The best way to initiate sustainable collaboration is to meet people. Communicating through Internet is not enough, since you don't feel committed enough, until you meet the people personally" (Ricardo Masuelli, Argentina).

"When I start a collaboration, I don't actually look at the place. It depends on the questions and the people; for example people that have the right mutants, antibodies or the expertise in a given area" (Jorge Casal, Argentina).

"Cooperation makes people grow" (Raquel Clariguet, Uruguay).

"We feel trust between the two institutions. We built around this cooperation a tremendous network of French-Chilean relations. We created a new breed of students who not only can cooperate from different cultural perspectives, but also from a multidisciplinary point of view. We train people to have a broader understanding" (Juan Correa, Chile).

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Executive Summary

1. This report is based on the results of a questionnaire survey and a series of interviews of Latin American scientists as part of the EULAKS project funded by the European Union[1]. It primarily seeks to better understand what are, at the level of the individual researchers in Latin American and Caribbean countries (LAC) and the EU countries, the main determining factors initiating, promoting and enhancing international collaboration in S&T and the extent to which the internationalisation of their activities contribute to increased knowledge transfer and production in their respective countries. A *web based questionnaire survey* was sent to 14445 scientists and answered by more than 30% of them (4425). In addition, 77 interviews of Latin American scientists in the broad field of biology were conducted in five countries (Argentina, Costa Rica, Mexico and Uruguay) in order to better understand the drivers of international collaboration in their respective life and professional careers.

2. Based on an uncontrolled sample, the results obtained cannot be seen as representative of the targeted population. However, the characteristics presented below show that the group is well distributed among the countries and reflects their level of scientific development (more responses in the most scientifically developed countries). Likewise, the repartition of the respondents in terms of e.g. research areas and gender fit more or less with the known patterns of scientific collaboration between the populations targeted and can be interpreted both through different history and states of scientific development in the respective countries.

3. The good response rate was not evenly distributed. The best rate was from LAC countries with an average response rate of 44.8% compared to European countries with an average of 27.7%. The ten first participating countries (out of 55) concentrate nearly 4/5 of the respondents (78.35%) and include the top scientific producers of the two country groupings namely Brazil, Mexico, Argentina, Chile and Colombia for the LAC countries and Germany, France, United-Kingdom, Italy and Spain for the Member States of the European Union.

4. The top research areas for S&T collaboration between Europe and LAC countries among the respondents is "Biology & environmental sciences" with one-fifth (20.1%) followed by Engineering & Technology (13.9%), Agriculture and Veterinary Sciences (12.3%), Biomedical research (12.2%) and Physics (10.7%). In all other research areas, the respondents are less than 10%.

5. The bulk of the scientists who participated to the questionnaire survey have a permanent position (87% in European countries and 85% in LAC countries) in a research or higher education institution. The respondents are mainly researchers. They spend more time on research than on teaching and other activities (e.g. administration and consulting). One-third of them (35% for LAC countries and 31% for European countries) devote between 41-60% of their time to research activities and they are nearly one-fifth (from 19% to 20%) declaring spending 61-80% of their time to research activities. Those spending as much as 80-100% to research activities are relatively more numerous in European countries (13%) than in LAC countries (6%).

6. "National public funding" is the most important source of funding for both LAC laboratories (47.3%) and European laboratories (43.5%). The increasing importance of national public funding is confirmed by nearly all interviews conducted in Latin America. "Funding from their own institutions" is the second most important source in the two continents: LAC: 30.4% and EU: 24.1%. The main differences for both groups are to be found in the two next sources, i.e. "national private funding" and "funding from international cooperation" from which EU

[1] The project's full name is: "Connecting Socio-economic Research on the Dynamics of the Knowledge Society in the European Union and Latin American and Caribbean Countries (EULAKS)".

laboratories are receiving much more (respectively 21.6% and 18.2%) than the LAC laboratories (respectively 4.8% and 11.8%).

7. The large majority are men. Overall, slightly more than one-quarter (26.4%) are women. Women are better represented in LAC countries (29.2%) compared to Europe (23.0%). However, their participation may vary substantially between Europe and Latin America according to discipline. “Social Sciences & Humanities” is the only discipline for which we find the highest participation of women both in Latin America (44.6%) and in Europe (30.2%). But whereas “Physics” and “Mathematics and Computer Sciences” are the disciplines in which we find the lowest participations of women in Latin America (respectively 11.5% and 19.8%), the participation of women in “Physics” in Europe (23.1%) is more important, followed by “Mathematics & Computer Sciences” (12.7%), “Earth-Ocean-Atmosphere” (13.8%) and “Clinical Medicine” (17.6%). “Engineering & Technology” is the only discipline showing the same participation of women both in Europe and in Latin America (respectively 20.3% and 20.2%).

8. More than two-thirds of the respondents (69%) are between 40 and 60 years, the peak being in the category 40-59 years (36%). Conversely, researchers below 40 year old represent 18% of the overall surveyed population. There are no marked differences between respondents from European and LAC countries except for the late career stages (60-70 years) in which we find relatively more scientists working in Europe. The surveyed population is older than the overall population of scientists in both Europe and Latin America. This would tend to confirm that researchers in mid career stages (40 years and above) are more likely to collaborate internationally than those who are in early career stages.

9. The respondent work mainly in institutions located in their country of birth and nationality. Slightly more than 8% work in a foreign country (155 in LAC countries and 208 in EU countries). While in LAC the majority of “foreigners” comes from the other continent (53% come from Europe) in EU countries they come mainly from the same continent (66.38% come from another European country).

10. The largest part of the sample studied mainly in their home countries. The estimation of the relative importance of studies at home versus abroad for the three main degrees (BSc, MSc and PhD) in Latin America was done for the nationals of the four main science producers in Latin America (Brazil, Mexico, Argentina and Chile). The results are as follows: BSc is overwhelmingly obtained in the country of nationality (from 95% in Mexico up to 99% in Argentina); MSc is also largely obtained in the home country although at a significantly lower level (From 61% in Chile up to 90% in Brazil); PhD is the diploma for which the four countries show the highest degree of disparity. Whereas nearly four-fifth (78%) of scientists of Argentinean nationality got their PhD from a University in Argentina, there is only one-fourth (26%) of scientists having the Chilean nationality that received their PhD in Chile compared to 45% in Mexico and 61% in Brazil.

11. Among the PhD carried out abroad for the LAC scientists in the four main science producers in Latin America, nearly two-third (64%) were obtained in a European country, 28% in North America, 5% in another Latin American country (mainly Brazil, Mexico and Argentina) and 3% in another country (Japan, Russia, New Zealand, Israel and Australia). Among the European receiving countries, France is coming first followed by UK, Spain and Germany. These four countries concentrate the bulk (87.5%) of PhD carried out in Europe. This overall relative domination of Europe for PhD abroad could be explained by the main bias of our survey population composed of Latin America and European scientists who published co-authored papers with scientists from the other region. A variety of situations can also be observed in Europe where a large majority of scientists responding to the survey did all their studies at home (UK 60%, France 57%). Conversely, three-fourth of the scientists in Germany (75%) and in Italy (77%) went abroad for their studies. Spain occupies a medium position.

12. Correlated to the disparity between Latin America countries about studies completed at home or not, the time spent abroad for studies varies also greatly. Twelve percent (12%) spent less than one year abroad for non-degree short term studies and eight percent (8%) spent seven years and more abroad for studies. In between there is a slight peak duration around four years (11%) corresponding mainly to scientists who went abroad for PhD studies. Nevertheless, one can see a large disparity between the countries: in Argentina only 26% of scientists went abroad three years and more, while a large proportion of the scientists from other countries (72% for Colombia, 60% for Mexico and 51% for Uruguay) went abroad from three years up to seven years and more.

13. Why do scientists go abroad for studies? Mainly to seek scientific expertise: nearly 60% answered that the main reason was "scientific expertise developed in the host country" followed by "reputation of the host country likely to promote my career" for two-fifth of them (41.5%). The least important reasons are by far linked to the fact that "members of their families were living in the host country" or that "scientists from their countries were settled in the host country" (3.6% for both reasons). The later result tends to indicate, despite the fact that a tangible number of scientists are working in a country foreign to their country of nationality, that the family and S&T diasporas play a very marginal role in the choice of studying abroad and selecting an institution for such foreign-based studies.

14. In the all surveyed population 42.2% did a post-doc (45% in Europe and 40% in LAC). The relative frequency of post-doc does however vary between countries. Thus, whereas 55% of scientists based in Spanish institutions did a post-doc, they were only 27% in Italy. As in Latin American institutions, Brazilian scientists are more likely to engage in post-doc studies (53%) than Chilean scientists (30%). For the four main science producers in Latin America (Brazil, Mexico, Argentina and Chile), Western Europe is the main destination for post-doc (54.3%) followed by North America (36.4%). It should be noted that more than half (35 out of 60) of the post-doc in Latin America took place in the country of work of the scientists (e.g. 21 out of 28 in Brazil). When comparing these percentages with those observed for PhD studies we can observe that there are significantly less post-doc than PhD spent in Europe (54.3% compared to 64%) and significantly more spent in North America (36.4% compared to 28%). For the five main science producers in Europe (France, Germany, Italy, Spain and the UK), 28.4% of the post-doc were done in the USA and 56% in Europe, mainly in UK, France, and Germany, followed by Spain, Italy and Switzerland.

15. The reasons why scientists went abroad for post-doc are mainly related to their career. The two most important reasons are "scientific expertise developed in the host country" chosen by 68.7% of the respondents followed by "reputation of the host country institution likely to promote my career" chosen by almost the same proportion of respondents: 68.5%. These reasons explain the choice of the country where the post-doc is done.

16. Apart from studies and post-doc, staying abroad for professional reasons for long period of time is quite frequent among the surveyed population. More than a third of the sample (i.e. 1506 persons) has been living abroad for at least six months for reasons that are mainly professional. Among them, 38% had a paid employment in a foreign or international organism, 34% were paid by their institution and 30% were on sabbatical leave (some of them spending several stays abroad). Altogether, 3814 scientists (86.2%) of the surveyed population spent long period abroad (for study, post-doc or other stays exceeding six months).

17. These stays abroad are, according to the respondents, important to boost international collaboration activities.

- More than nine out of ten (91.1%), have published scientific papers with colleagues met during extended stays abroad (stays exceeding six months).

- Foreign co-authors are overwhelmingly (75.4%) colleagues from institutions in which the scientists have worked abroad, followed by colleagues from other institution(s) in the countries where the scientists stayed (46.2%).
- Close to two third (60%) of the respondents who did a PhD in a country different than the one where they work (2080) published papers in co-authorship with their thesis' director.
- A large majority continue to co-publish (55.4% on average and up to 60.9% for the European scientists) or to collaborate in some way (66.0% on average and up to 72.8% for the European scientists). Overwhelmingly, both European and LAC scientists continue to collaborate and to co-publish with some of them once the first collaboration is established. Here again, European scientists tend to be relatively more numerous than their LAC colleagues to continue to collaborate (82.7% compared to 71.9%) or to co-publish (68.8% compared to 56.4%).

18. The frameworks in which these collaborations are taking place are:

- Bilateral cooperation programmes that come first both for the European (74.0%) and the Latin American scientists (71.5%);
- International projects funded by the EU that come in second position for European scientists (43.1%) while international projects not funded by EU come in second for LAC (39.9%);
- Conversely, international projects not funded by EU come in third place for European scientists (42.5%), while EU funded projects come in third position for the Latin American (17.8%).

19. While results emphasise the fact that stays abroad boost international collaboration, one of the main findings of this survey also shows that collaboration today is not necessarily connected with personal links established during stays abroad (or conversely during visits by foreign colleagues to the scientist's institution). Actually, the large majority of scientists surveyed (61% for the Latin American scientists and 63% for the European institutions) did collaborate or co-publish with scientists abroad that they never met during their extended stays abroad. These foreign collaborators (or collaborators living abroad) are by decreasing order of importance:

- Foreign scientists collaborating with them in international projects (for 53.2% of scientists in EU countries and 41.6% of scientists in LAC countries);
- Foreign scientists met at international meetings (for 22% of EU based scientists and 15.8 % of scientists in LAC countries)
- Scientists from their country living abroad (for 9.6 % of EU and 10.9 % for LAC);
- Foreign scientists they never met but with whom they communicate -e.g. through internet- (for 10.5 % of scientists in EU countries and 8.7 % of scientists in LAC countries).

20. When asked about the main difficulties to collaborate or co-publish with foreign scientists, very few important constraints appears except for the "lack of collaborative programmes / funds" considered as important or major by 55% of the scientists working in EU countries and 59% of those working in LAC countries. The other proposed difficulties are mainly considered as "insignificant" or "unimportant" by the large majority of the scientist (57.5% for "institutional cooperation problems to 82% for "problems related to intellectual property").

21. The participation to EU funded programmes over the last fifteen years increased substantially for the scientists in the survey population from 347 participations for FP4 (1994-1998) to 921 participations for FP7 (since 2006). Furthermore, it should be noted that FP7 is still ongoing at the time of the survey. Altogether, European scientists benefited from 1928 participations (71%) and European scientists from 786 participations (29%). The share of LAC scientists has however increased from 24.6% for FP4 to 35.3% for FP7.

22. Another important finding is that the main outcomes of international collaborations are not significantly different for LAC and European scientists although some distinct trends can be noticed. For European scientists these outcomes are related to social and scientific networking activities: “strengthening links with international partners” (72.7%), “participation in new scientific projects” (68.4%) and “participation in conferences, training, etc …” (63.8%). For LAC scientists, international collaboration tends to bring more tangible outcomes such as “learning new techniques” (71%), “publications in high impact journals” (69%) and “access to equipments not available in my country” (42,3%). Other outcomes of importance for both groupings are “international scientific recognition” (64.7% and 62% respectively for European and LAC scientists) and to a lesser extent “greater recognition within my institution” (45.5% and 39.3% respectively for LAC and European scientists). “Increase funding for my lab / institution” (24.4% and 24.6%) as well as “access to equipments not available in my country” (24.0%) for European scientists only are the less important outcomes.

23. For 24.5% of the respondents (1084), international collaboration resulted in increased funding for the scientists’ laboratories or institutions. Very clear differences are to be noted between European and LAC institutions for two funding sources. Not surprisingly, whereas increased funding from the European Union is of particular importance for European institutions (63.6%), it is much less important for LAC institutions (24.9%). Conversely, increased funding “from the home institution” is much more important for LAC institutions (52.7%) than for European institutions (22.0%). Otherwise, increased funding “from another programme or institution in the home country” is important for both LAC (63.7%) and European (61.2%) scientists. Finally, increased funding “from a foreign country (European or other)” is of lesser importance (respectively 34.5% for LAC and 27.8% for European scientists) and increased funding “from another international organization” is even less important (respectively 19.1% for LAC and 17.1% for European scientists).

24. « Writing scientific projects » is an additional outcome brought by international cooperation (respectively 80.6% for EU scientists and 76.9% for LAC scientists). This outcome confirms the idea that the more you collaborate internationally, the more opportunity you have to meet new colleagues, exchange ideas and to « writing new projects » and access new funding scheme in collaboration with foreign colleagues. The second one is «organizing conferences and workshops » (respectively 58.1% for EU and 54.1% for LAC scientists). The other four additional outcomes identified are more important for LAC scientists than for EU scientists. In particular, « participating to scientific committees » is by far more important for LAC scientists (59.9%) than for EU scientists (20.4%). Similarly “participating in scientific journals editorial boards” is a much more important outcome from international collaboration for LAC scientists (45.8%) than for European scientists (12.3%) as well “Organizing trainings” (43.8%) and “publishing scientific books” (37.8%).

25. The collaborations with foreign scientists contributed also (with no significant differences between EU and LAC countries) to increase “the number of co-publications with their scientific partners” (47% a lot and 29.5% moderately), “their recognition in their scientific field” (46.5% a lot and 32% moderately), “the total number of their publications” (44% a lot and 33% moderately) and “the number of their publications in mainstream international journals” (42% a lot and 31% moderately). Conversely, they increase only very marginally “the number of their publication in local journals” (11% a lot and 19% moderately) or “the total number of their publications as sole author” (7% a lot and 9% moderately).

26. A large majority (62.3%) of the scientists did respond to calls for proposals involving international scientific collaboration. However, the proportion of scientists working in a EU country is significantly larger (74.8%) than the proportion of scientists working in a LAC country (52.4%). For the 37.7% having answered that they had not responded to calls for proposal, they highlight two most important reasons why they did not apply to such calls: “too much bureaucracy” and “lack of information”. Whereas more than half of the scientists working in EU

institutions (58.1%) selected “too much bureaucracy” as a main reason not to respond to calls for proposals, they were slightly more than one third (38.4%) in LAC institutions to do so. Conversely, “lack of information about these calls for proposals / funding” was a more important reason for scientists in LAC institutions (49.2%) compared to EU institutions (34.1%).

27. Participation to EU calls is approximately as much important as to other calls with however a major difference between the two groups. Not surprisingly, scientists working in Europe participate more to EU calls (62.3%) than to other calls (37.7%) and conversely, scientists working in LAC countries participate more to other calls (67.0%) compared to EU calls (33%).

28. How is an international project functioning in terms of distribution of role, tasks and budget? The responses to the question “who initiated the project?” indicate that for approximately two-thirds of the scientists (LAC: 66.2%; EU: 63.6%), the project was initiated by their lab/institution alone or together with one (or several) partner labs. Here again, the responses provided by scientists in EU versus LAC institutions are not very different. However, the picture is slightly different for EU projects that are predominantly initiated by “a partner lab” more often for scientists working in a LAC institution (57.8%) compared to scientists working in EU institutions (41.1%). Very few (13.6%) scientists’ lab or institutions in LAC countries were at the origin of a EU funded project compared to scientists working in a European institution (29.5%). For the majority of the scientists, the partners jointly decided (or decide) about the budget distribution, even if scientists working in EU countries are more likely to do so (63.4%) than their partners working in LAC (53.4%). Conversely, budget distribution is more likely to be decided only by others “one or several partner laboratories” for scientists working in LAC (22.5%) compared to scientists working in EU countries (12.0%). Donors or other actors have a very little involvement in deciding about budget distribution in all cases. Regarding EU calls only, the decisions about budget are also taken in a large majority by the laboratory of the scientist (alone or with other partners) however with a significant difference between EU labs (83.3%) and LAC labs (62.8%). Consequently these decisions are more likely to be taken by others (the partners only) for scientist working in LAC (34.8%) than for scientists working in EU countries (15.8%). The involvement of the respondents in the “distribution of tasks” tends to be even more similar between the two groups, regardless the origin of the calls. Scientists working in EU countries decide (alone or together with partners) in 89.3% for all calls of proposals while 83.3% of scientists working in LAC do so. For EU calls only, the difference is slightly more important. While 85.8% of scientists working in EU countries decide (alone or with partners) a smaller but still a very large majority of scientists in LAC (74.3%) do so.

29. Consequently, the large majority of the respondents (83% for the scientists working in LAC et 88% for the scientists working in EU countries) consider that they were able to get involved as much as they wanted in the project related to the “last call for proposal / funding obtained”. However, more scientists (20.5%) working in LAC as compared to scientists working in Europe (12%) considered that, in projects related to EU calls only, they had <u>not</u> been able to get involved as much as they wanted. The first reason given to explain this situation is the lack of time to get involved (38.9 of the scientists in LAC and 33.8 in EU countries) followed by the lack of support from their institution (19.2 in LAC and 24.3 in EU countries). Less than 20% (16.9% in LAC and 18.2% in EU countries) claimed that they should have been able to be better involved if « communication between partners had been better”.

30. This general high level of involvement is also reflected by the way the respondents rank their contribution to the project. In fact, the majority of the scientists rate their contribution either “important for the progress of the project” or “essential for the conduct of the project”. Scientists working in EU countries are however more likely to rate their contribution as essential to the conduct of the project (42.4%) than scientists working in LAC (31.1%). When limited to the EU calls only, the responses to the same questions are following a similar general pattern although they were significantly fewer respondents working in EU countries (37.3%) and even more so in LAC (19.7%) to consider that their contribution is ‘essential for the conduct of the project”.

Conversely, relatively more scientists working in LAC (15.7%) and to a lesser extent in EU countries (10.8%) are of the opinion that their contribution to the project was “limited only to tasks attributed to them”.

31. To the optional questions related to their motivations to participate in calls for proposal, 92.5% (4094) of the scientists have responded. The answers show that although all the proposed reasons were mostly considered as “important” or “essential” (all above 60% in average) the two most important ones are « access to international funding » (77.5%) and « participation to an international expert network » (72.4%). These two first reasons are followed closely (68.8%) by « increased scientific visibility », « greater mobility » and « access to more diverse partnership ». Here the responses from scientists working in LAC and in EU countries diverge more than in other questions. Apart from the motivation "access to international funding" which is, by far the most motivating reason for the scientists working in EU countries (with 80.9% of responses "important" or "essential"), scientists from Latin America are more (or much more) motivated by all the proposed reasons. While “Access to international financing” seems to be the most important motivation (75.1%), it is closely followed by the others: “Access to new technologies / skills, not available in my country "(74.8%)," Participation in international expert network” (74.3%), "Greater mobility (PhD programs, fellowships, research grants)" (73.1%). In fact, one could say that if the scientists working in EU countries are motivated to participate in international tenders, scientists working in LAC seem to have even more stimulating reasons to participate in such calls.

32. To the opposite question, aiming at capturing the importance of the limiting factors to participate in calls of tenders, 4280 persons also answered (i.e. 96.7% of the all sample). Overall, the three main factors that limit the scientists’ participation in international scientific calls for proposals are for a large majority « the difficulties in finding partners and building consortium » with 63.4% of opinions “restrictive, very restrictive” or crippling”, followed at the same level by a « poor knowledge of scientific calls » (63.3%) and «calls / tenders too selective » (62.6%). These factors are not in the same order of importance for the scientists working in LAC and in EU countries. For the former, “Poor knowledge of scientific calls” comes first with 73.3% of opinion of “restrictive”, “very restrictive” and “crippling”, followed by “difficulties in finding partners…” with 69.2% of opinions in the same range, and “calls of tender too selective” with 62% of same opinions. For the EU scientists, the very fist limit in participating is “lack of time” (67%), followed by “calls / tenders are too selective” (63.6%) and “difficulties in finding partners and building consortium” (55.7%). It should be noted that the reason “calls / tenders are too selective” is nearly equally widespread among scientists working in EU countries than among scientists working in LAC (63.6% against 62%). The two last factors “problems linked to cultural differences and languages” and “my institution has not reached a sufficient scientific level” are considered as “unimportant or “little restrictive” by respectively 80% and 82% of the respondents. That is to be related with the fact that the sample is mostly composed by people who lived abroad in several occasions and who publish in several languages.

33. With regard to publication languages, more than half of the LAC scientists (52.9%) and more than two-thirds of the European scientists (70.5%) publish in more than one language. English is used as a publishing language by 68.6% of the scientists working in LAC (55.5% use it as the first language and 13,1% use it as the second language) and 63.5% of the European scientists (53.7% as first language and 9.8% as the second language). Conversely, Spanish is used as the first language by only 31.5 % and as the second language by 39.5% of the LAC scientists. Not surprisingly, except for the scientists working in Spain, Spanish is even less widely used by the European scientists neither as the first language (10.5%) nor as the second one (13.6%).

1. Introduction and background

This study is part of a larger coordination and support action funded by the Framework Programme 7 (FP7-SSH-2007-1) of the European Commission. The project's full name is: "Connecting Socio-economic Research on the Dynamics of the Knowledge Society in the European Union and Latin American and Caribbean Countries (EULAKS)". The main goal of the EULAKS project is to promote the co-operation and support the development of partnerships between communities of SSH scholars, research institutions and agencies in the countries of the European Union (EU) and the countries of Latin America and the Caribbean (LAC).

The results of the questionnaire survey presented below are part of the Work Package 1 (WP1) designed in order to propose policy-oriented analysis that is to be used as information basis for the other Work Packages and to develop policy recommendations for strengthening the international co-operation between the Member States of the European Union (EU) and the countries of Latin America and the Caribbean (LAC). It primarily seeks to better understand what are, at the level of the individual researchers in LAC countries and the EU countries, the main determining factors initiating, promoting and enhancing international collaboration in S&T and the extent to which the internationalisation of their activities contribute to increased knowledge transfer and production in their respective countries. Thus the focus of this study is more on the collaboration between individual researchers (a fundamental determinant in the creation of scientific communities, see for example Gaillard, Krishna, & Waast, 1997) rather than on policies to support international research collaboration although a particular effort will be made to apprehend the specific role played by policy instruments (e.g. calls for proposals/funding promoting international S&T cooperation between Europe and Latin America) developed by EU Member States, LAC countries as well as the European Commission.

A *web based questionnaire survey* was used (cf. questionnaire in appendix 1). The *web based questionnaire survey* approach is now well controlled and has been applied in a diversity of contexts (eg.A.-M. Gaillard & Gaillard, 2009). All scientists in EU Member States and LAC countries who published at least one publication in co-authorship with a scientist from the other country grouping (EU Members States and LAC countries) during the last ten years were invited to participate. A two-step approach was used to target the population of scientists willing to spare the time to fill in a full-fledged questionnaire including 53 questions. 4,425 scientists did complete the questionnaire. The results are analyzed and presented below.

In addition, 77 interviews of Latin American scientists in the broad field of biology were conducted in five countries[2]: Argentina (30 interviews), Chile (15 interviews), Costa Rica (10 interviews), Mexico (13 interviews) and Uruguay (9 interviews). The interview grid is aiming at, among other things, better understand the drivers of international collaboration in their respective life and professional careers (cf. interview grid in appendix 2). All interviews have been transcribed. Although the results of the interviews will be reported elsewhere, they will be used here, whenever appropriate, to illustrate, nuance and validate some of the responses to the questionnaire (cf. names and distribution of scientists interviewed in appendix 3).

[2] Additional interviews were also conducted in parallel in other fields: chemistry and sociology of work. The results were however not available at the time we analyzed the results of the questionnaire.

2. A brief literature review[3]

For the individual researcher, international cooperation and mobility is becoming almost a condition sine qua non when it comes to academic career and impact. But despite a long history of cross-border cooperation between researchers worldwide, there are very few empirical studies on the main drivers of international collaboration in S&T. The determining factors of international collaboration in science and technology are based on a wide range of rationales that go beyond the sole S&T rationales and objectives (Frame and Carpenter, 1979; Luukonen et al., 1992; J. Gaillard, 2001; Wagner, 2008). International co-authorships, for example, occur along clearly discernible geographic lines, suggesting that extra-scientific factors (for example, geography, politics, language) play a strong role in determining who collaborates with whom in the international scientific community (Frame & Carpenter, 1979). Luukkonen et al. (1993) identify social, historical, geopolitical and economic factors as potential drivers of international collaboration in S&T. In a book published some ten years ago, we argued that S&T cooperation policies for development (as part of development aid policies) are based on a variety of complex factors that are often interdependent, including political, diplomatic military, economic humanitarian and scientific factors (J. Gaillard, 1999:272). When analysing the rationales behind international research collaboration, a more recent study published by the European commission distinguishes on one hand « the narrow Science, Technology and Innovation (STI) cooperation paradigm » and the « broad research cooperation paradigm » (Boekholt, Edler, Cunningham, & Flanagan, 2009). In the former paradigm, the drivers are mainly « to improve the quality, scope and critical mass in research by linking national resources and knowledge in other countries ». In the later paradigm, other non-science policy objectives interact with the "intrinsic" science oriented objectives. For example, the urgency of tackling global societal challenges has opened the discussion for more global research programmes. Other drivers such as diplomacy and historical cultural ties between countries and development or bilateral aid have for a long time influenced the choice of partners and may still form a stable influence in the background.

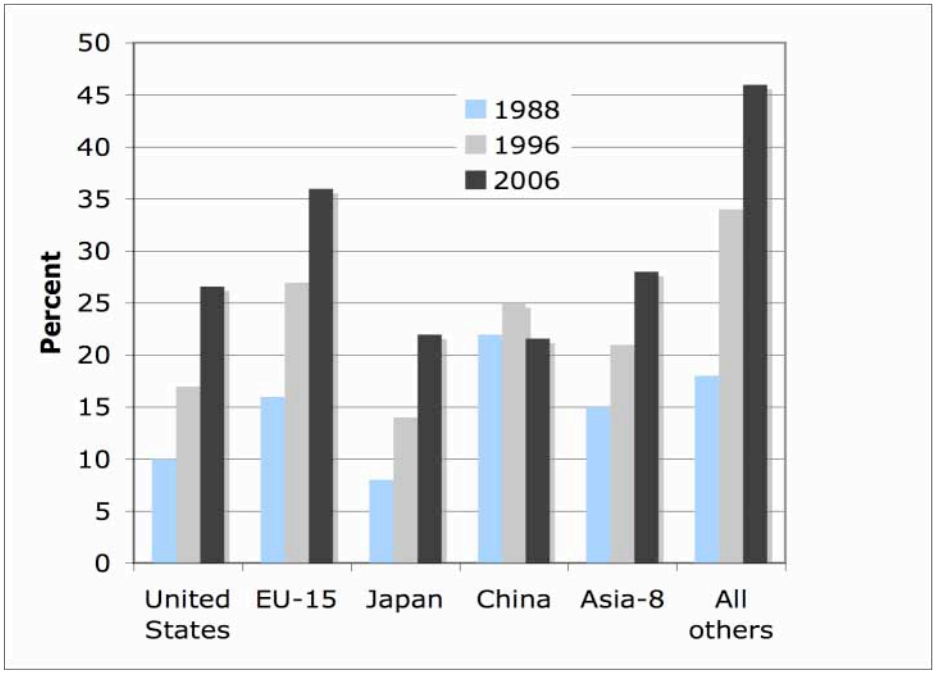
As a result of the growing complexity of science, the ease of face-to-face contact, the Internet, and government incentives, S&T activities are being conducted in an increasingly international manner (Gaillard, 2010; see Figure 1 below). The indicator most often used to capture the scale or intensity of international collaboration in S&T is co-publications of authors from two different countries. Co-publication analysis can tell us something about the relative importance of international collaboration that leads to tangible outputs (publications) and the nature of the cooperation in terms of countries and disciplines (see for instance Glänzel 2001; Adams et al. 2007; Edler et al. 2007; Schmoch/Schubert 2008; Mattison et al. 2008;).

In 2006, for instance, 30% of the world's scientific and technical articles had authors from two or more countries, compared to slightly more than 10% in 1988. One-quarter (26,6%) of articles with U.S. authors had one or more non-U.S. co-authors in 2006; the percentage is more or less similar the Asia-8[4] and slightly lower for China and Japan (NSF and OST, 2008). Between 2001 and 2006, international co-publications have increased in all countries except China, Turkey and Brazil. The higher EU-15 level (36% in 2006) partly reflects the EU's emphasis on collaboration among the member countries as well as the relatively small science base of some EU members. Other countries' high levels of collaboration (46% in 2006) reflect science establishments that may be small (e.g. developing countries) or that may be in the process of being rebuilt (e.g. Eastern European countries).

[3] For a more detailed recent review see Boekholt, Edler, Cunningham & Flanagan, 2009; see also Edler and Flanagan, 2009.

[4] Asia-8 is composed of South Korea, India, Indonesia, Malaysia, Philippines, Singapore, Taiwan and Thailand.

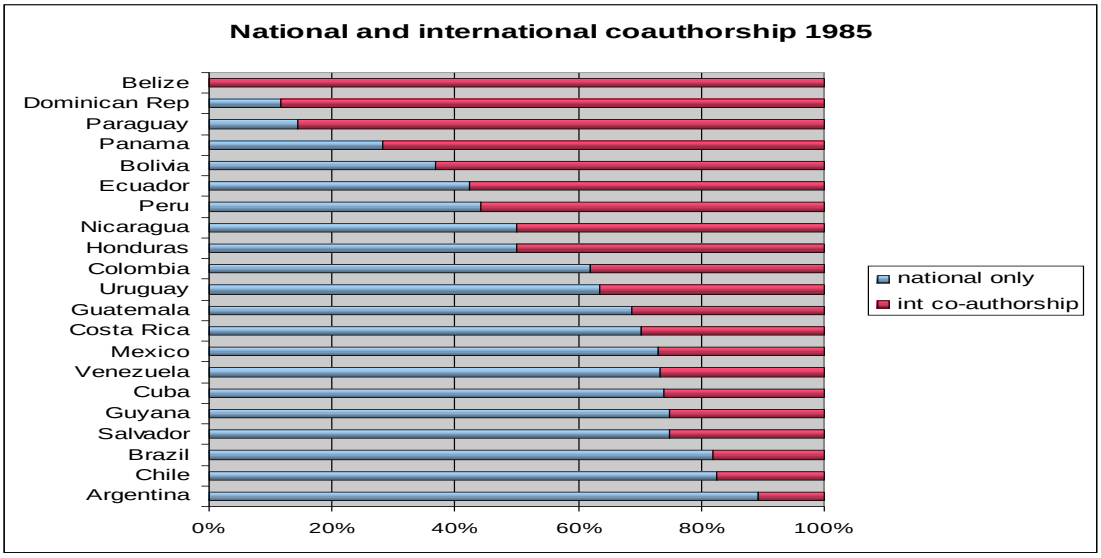
Figure 1. Share of scientific publications with international co-authorship, by country/region (1988, 1996 and 2006)



Source: Thomson ISI and SCI, NSF and OST computing 2008 (Gaillard, 2010)

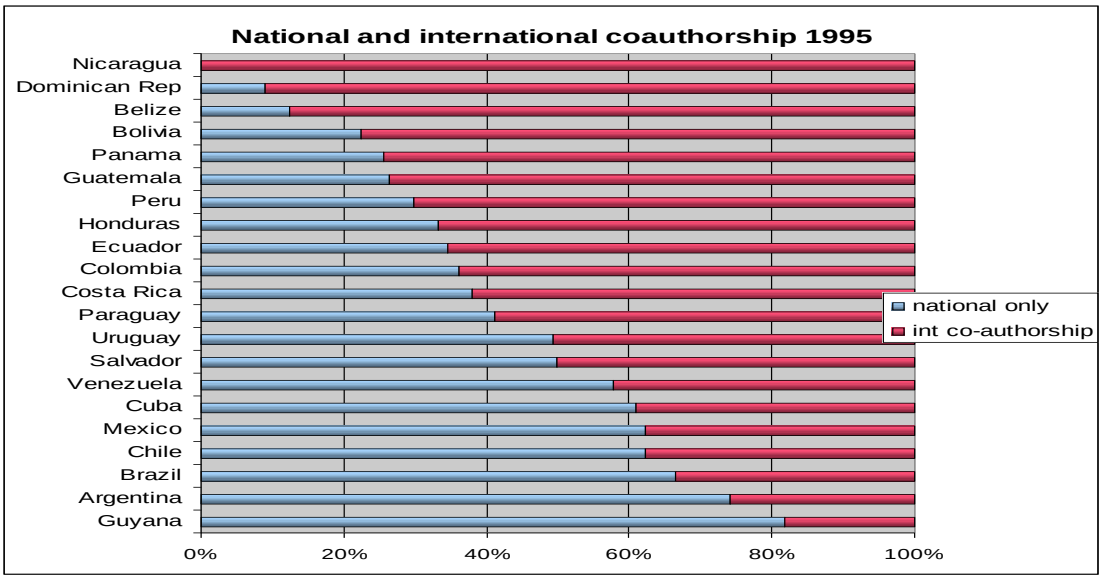
Figure 2, 3 and 4 illustrate the relative growth of the share of publications co-signed with foreign authors in the LAC countries in 1985, 1995 and 2006 respectively. It indicates a rapid and tangible increase in internationalisation of science in all countries. In general, with the exception of Guyana, the larger the country and the national scientific community, the smaller the share of publications signed with foreign co-authors.

Figure 2. Share of scientific publications with national and international co-authorship in LAC countries in 1985



Source: WOS and UNAM computing, 2010

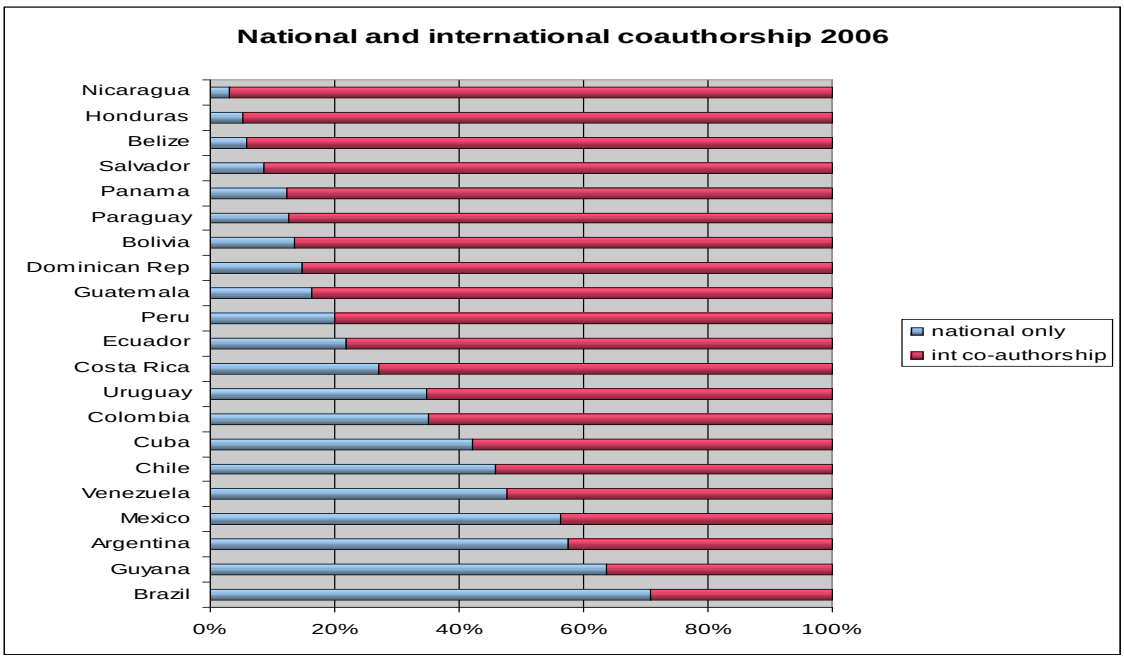
Figure 3. Share of scientific publications with national and international co-authorship in LAC countries in 1995



Source: WOS and UNAM computing, 2010

Thus, Brazil the LAC country with the largest scientific community and highest scientific production has the lowest share of scientific publications in international co-authorship (co-signed with foreign co-authors). This share has however increased from less than 20% in 1985 to 33,5% in 1995, to then decrease to 29% in 2006. As mentioned earlier, Brazil is one of the very few countries (with China and Turkey) that experienced a relative decrease of its share of scientific publications co-signed with foreign co-authors during the last decade.

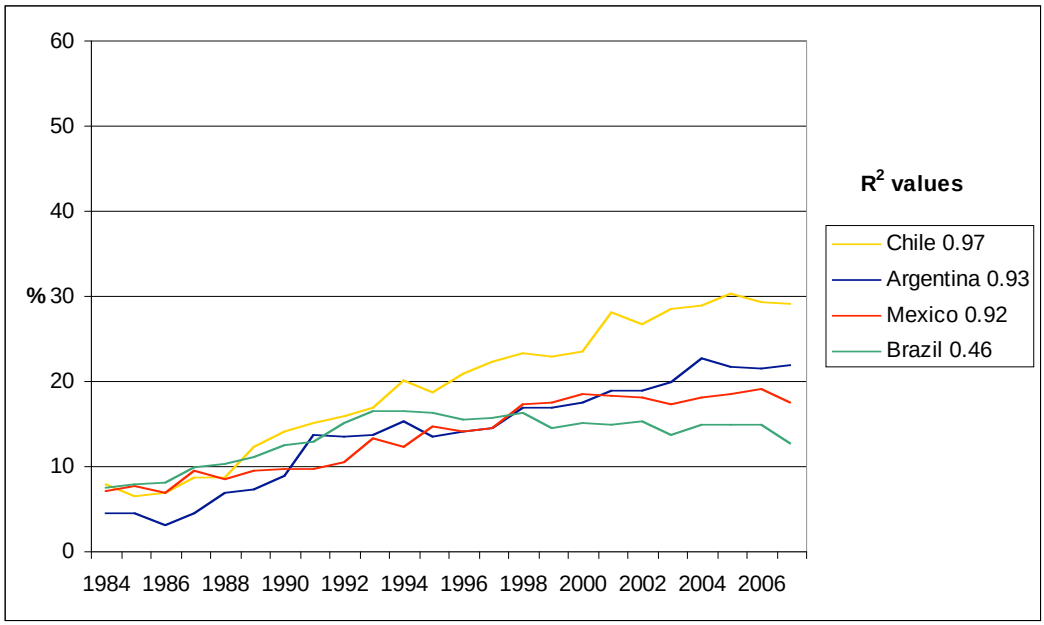
Figure 4. Share of scientific publications with national and international co-authorship in LAC countries in 2006



Source: WOS and UNAM computing, 2010

All other LAC countries continued to increase their share of scientific publications co-signed with foreign co-authors during the last 20 years although the top scientific producers (including also Chile, Argentina and Mexico) have also started to initiate a down turn during the most recent years (cf. Figure 5).

Figure 5. Percentage total production LAC with EU-27 collaboration in all knowledge areas by top producers



Source: Russel, Shirley et al. (2009) EULAKS Bibliometric of co-authorships: Interim Report May 2009, Mexico: UNAM

Further, within this increasingly globalised scientific literature it is worth mentioning that the internationally co-authored papers receive a higher citation impact than national authored papers (Glanzel et al., 2006)[5].

Other patterns of international scientific co-operation are worth considering:

- The more basic the field of research, the greater the proportion of international co-authorships (Frame and Carpenter, 1979).
- The larger the national scientific enterprise, the smaller the proportion of international co-authorship (Frame and Carpenter, 1979).
- Humanities and social sciences remain rather less internationalised than natural sciences (NSF, 2009).
- Non-English speaking and less developed country scientists experience particular difficulties in breaking into international journals covered by WOS/SCI (Gibbs, 1995).

The motivation for researchers to engage in international collaboration can be manifold. The following list compiled by Edler and Flanagan (2009) attempts to convey what broad consensus exists in the literature on international collaboration about motivations and drivers although the relative importance attributed to these motivations by different authors may vary. Amongst the motivations and drivers empahsised in the recent literature (see, for example Archibugi and Iammarino, 1999; Beaver, 2001 ; UNCTAD, 2005 ; Wagner, 2006 ; Wagner and Leydesdorff 2007 ; Edler 2007; Edler et al. 2008) are:

- Access to and acquisition of leading edge and complementary know how,

[5] More recently Schmoch and Schubert (2008) have raised doubts as to whether the higher citation counts observed for international co-publications are a strong and unambigous indicator of higher quality, given that higher citation can also be a result of a larger community (based on the international nature of the work carried out).

- Access to foreign technology markets
- Sharing of the costs and risk with international partners, especially when large infrastructures are needed for basic science (e.g. particle accelerators) or product development (e.g. international telecommunication networks),
- Combination of competences and data located in different countries to tackle issues to complex for researchers from one locations
- Finding solutions for complex scientific and technical problems that could not be solved with domestic resources alone,
- Access to funds from foreign institutions / programmes
- Access to skilled individuals that might have an interest in pursuing opportunities for research in another country (recruiting),
- Access to endemic research subjects, such as natural or social phenomena, etc. which are limited geographically,
- A desire to influence regulatory regimes or standards,
- Improving the impact and visibility of one's research (see above).

A recent study also indicates that female scientists are less likely to collaborate internationally than male (NSF, 2009). Thus, based on a longitudinal survey that follows recipients of research doctorates from U.S. institutions until age 76, NSF found out that while 30% of them do collaborate internationally, respectively 23% of female and 33% of male do so. Data on international collaboration from the National Science Foundation's 2006 Survey of Doctorate Recipients (SDR) was analyzed by sex, research/teaching faculty status, sector of employment (industry, government, academia), minority status, citizenship, presence of children in household, field of study of doctorate, and year of doctorate receipt. Data is included on the extent of travel abroad by the U.S. collaborator and the extent of the foreign collaborators travel to the United States. Selected results of the data indicate that:

- Female doctorates are less likely to collaborate internationally than male doctorates.
- Doctorates who are research faculty have a higher rate of international collaboration than teaching faculty.
- Doctorates employed in business/industry are more likely to collaborate internationally than those employed in government or academia.
- There is not a large variation in international collaboration between doctorates that are U.S. citizens and doctorates that are not U.S. citizens.
- The presence of children in the household does not deter female doctorates from international collaboration but their presence appears to be associated with increased international collaboration among male doctorates.
- Doctorates with degrees in engineering and the physical sciences are more likely to collaborate internationally than doctorates with degrees in other sciences.
- Doctorates that are in mid career stages are more likely to collaborate internationally than doctorates that are in early or late career stages.
- In an international collaboration, foreign collaborators are more likely to travel to the Unites States than for U.S. collaborators to travel abroad.

The cross-border movement of researchers constitutes another factor contributing to the growing internationalisation of science and technology. Whilst the migratory flow of researchers (and indeed of highly-skilled workers more generally) is as old as science itself, there is convincing evidence that the mobility of scientists, at least within OECD member countries, has increased (OCDE, 2002; Gaillard, 2010). Although difficult to measure, a sizeable share of researchers (and highly-skilled workers more generally) originates in the developing countries. Among non-OECD countries the impact of the international mobility of the highly skilled is diverse. The largest developing countries seem not be significantly affected and indeed may

benefit from indirect effects associated with this mobility (return migration, technology watch and transfers, easier access to collaboration …). At the other end of the spectrum, some of the smallest countries, especially in the Caribbean and in Africa, face significant 'emigration rates' of their elites (Dumont & Lemaître, 2005). Indeed the smallest the national highly skilled resource base, the higher the percentage of High Skilled Expatriates. As might be expected, countries that suffer long civil wars (for example Haiti) and /or military regimes (for example Argentina, Chile and Uruguay) have experienced an emigration of their scientists.

To conclude this brief literature review, there is indeed no single factor driving S&T international cooperation activities. In most cases, there is a cumulative set of factors and/or actions by multiple actors that shape the geographical, institutional and thematic focus of international cooperation in S&T.

To capture this diversity and cumulative set of factors and/ or actions, the questionnaire survey is addressing a number of diverse but complementary questions. Some of the main questions addressed are:

- What countries and regions are selected for S&T cooperation?
- On what grounds are countries and regions selected for S&T cooperation from the perspective of individual scientists?
- On what grounds are individual scientists/groups/ institutions selected for postgraduate training, post-doc studies, networking activities and international research projects?
- What factors shape the geographical and thematic focus of international cooperation in S&T?
- To what extent do participation to international conferences, short term visits and longer stay abroad as well as international migration of LAC and EU scientists contribute to international cooperation activities?
- To what extent are national and international policies (i.e. in particular promoted by the European Commission) instrumental in promoting, initiating and enhancing cooperation in S&T?
- To what extent are international S&T collaborations sustainable and what are the main determining factors shaping this sustainability?
- To what extent does international S&T cooperation contribute to knowledge transfer and development?

3. The questionnaire survey

A *web based questionnaire survey* was used (cf. questionnaire in appendix 1). A two-step approach was used to target the population of scientists willing to spare the time to fill in a full-fledged questionnaire including 53 questions.

3.1. The targeted population

A pre-survey was conceived to build a large research sample in order to obtain the widest possible number of scientists involved in international co-operation between Latin American countries and European countries.

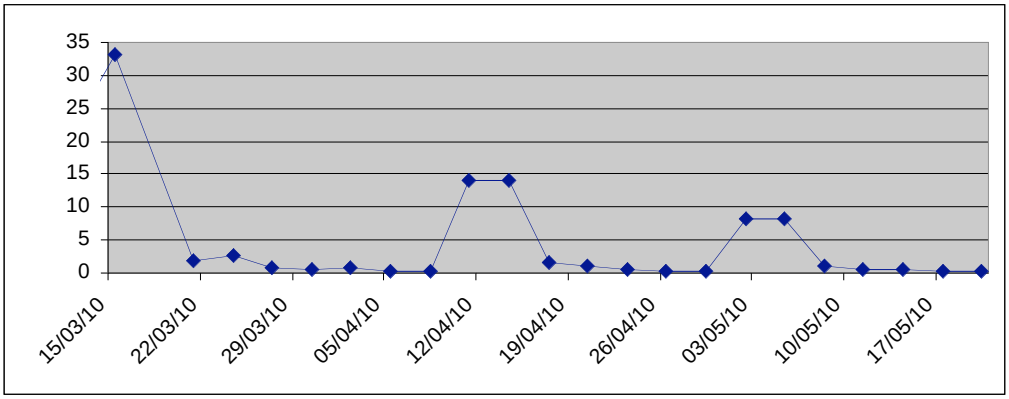
As a first step all scientists in EU Member States and LAC countries who published at least one publication indexed in the Web of Science (SCI, SSCI and AHCI) in co-authorship with a scientist from the other country grouping (EU Members States and LAC countries) from 2003 onwards were invited to participate to the pre-survey. Once identified, these notices provided 40,000 e-mail addresses, which became the bulk of the first mailing list.

A pre-questionnaire was sent to this first mailing list aiming at collecting the addresses of colleagues overseas with whom these scientists had already collaborated or with whom they would like to collaborate in the future. This pre-questionnaire was sent during the spring of 2009 by the Zentrum für Soziale Innovation (ZSI). The pre-survey was closed in November the same year. The response rate was not as good as expected. However, close to 4000 scientists (10%) answered, providing 7032 new addresses of colleagues. The e-mail addresses of all scientists from LAC and Europe having applied jointly to European calls of proposal in the frame of FP6 and FP7 constituted the bulk of the new sample were also added. Altogether and after cleaning, the final list included 14,455 addresses.

3.2. The making of the survey

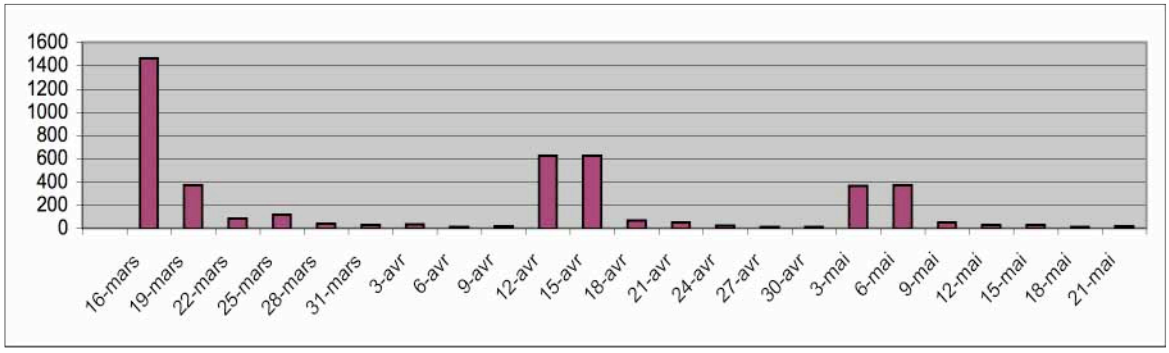
The “lime Survey” open source application http://www.limesurvey.org/ was used for the pre-survey as well as for the survey itself. A first draft questionnaire was sent for testing to a sample of 50 scientists in different countries in four languages (English, French, Portuguese and Spanish). Received comments were taken into consideration to introduce the necessary changes. The survey was put online Saturday 13 March 2010.

Figure 6. Percentage of questionnaires received



Purposely, invitations (launching and reminders) were made on a Saturday. This choice was based on the expectation that most scientists would not have a professional commitment that day but might check their e-mail. It was expected that free time and curiosity combined with the ludic aspect of starting to fill a questionnaire would be a good motivation to start and to continue. The first invitation was sent between 4PM and 6 PM. Amazingly, the questionnaire was immediately completed by more than 400 scientists during the same evening (200 had already answered before the end of the sending[6]). 1464 responses were received during the three first days i.e. exactly one third of the total of the responses. The rhythm of responses (cf. Figure x) was directly related to the invitations. Not less than 86 % of the sample (4425) responded during the 5 days following each invitation: the launching collected 41.5% of the responses, the first reminder (10/04/2010) 26.7% and the second (01/05/2010) 17.7% (cf Figures 6 & 7).

Figure 7. Number of questionnaires received



Two e-mail addresses were created: one in order to communicate with the administrator of the survey and another a "bounce" address where all undelivered messages were reported. Altogether, 2340 messages were sent to the administrator, and 580 bounce messages were reported. A large part of the messages were nevertheless automatic notification of absence but several hundreds reported difficulties to reach the survey through the link provided by the application. The administrator took care of answering all messages and most of the time the correspondent could eventually complete the survey.

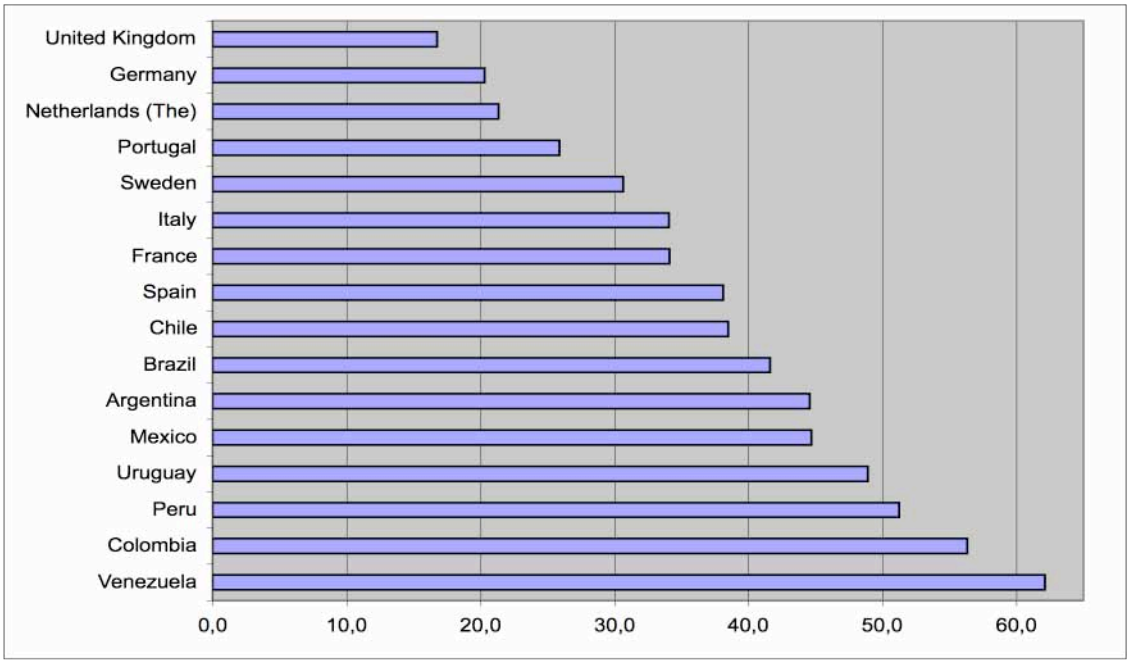
3.3. Response rates

Response rates, after sending two reminders, can be considered as very satisfactory particularly for the LAC countries. Figure 8 presents the response rates in the countries with more than 50 responses.

The lowest response rates are found in Europe: from 16,7% in United Kingdom to 38% in Spain; and the highest response rates in LAC countries from 38,4% in Chile to 62,1% in Venezuela. The Latin countries in Europe (in particular Spain, France and Italy) experience higher response rates than the Anglo-Saxon ones (UK, Germany and the Netherlands).

[6] Invitations to participates were sent in separate blocks of 50 addresses. The all sending process took approximately two hours.

Figure 8. Response rates by countries (at least 50 responses by country)



Tables 1 and 2 present the number of invitations and responses in all participating countries, respectively in Europe (table 1) and in LAC (table 2). European countries altogether have an average response rate of 27.7% to be compared to 44.8% for the LAC countries.

Table 1. European countries

Countries	Invitations	responses	%	Countries	Invitations	responses	%
Austria	142	37	26,1	Latvia	9	1	11,1
Belgium	225	43	19,1	Lithuania	9	3	33,3
Bulgaria	22	9	40,9	Luxembourg	5	2	40,0
Cyprus	6	0	0,0	Malta	0	1	
Czech Republic	37	11	29,7	Netherlands (The)	319	68	21,3
Denmark	119	29	24,4	Norway	84	17	20,2
Estonia	15	3	20,0	Poland	128	35	27,3
Faeroe Islands	3	0		Portugal	236	61	25,8
Finland	88	26	29,5	Romania	42	17	40,5
France	998	340	34,1	Slovakia	22	7	31,8
Germany	825	167	20,2	Slovenia	34	6	17,6
Greece	126	31	24,6	Spain	1251	476	38,0
Hungary	67	13	19,4	Sweden	170	52	30,6
Iceland	11	5	45,5	Switzerland	147	20	13,6
Ireland	51	9	17,6	United Kingdom	856	143	16,7
Italy	714	243	34,0	**Total**	**6761**	**1875**	**27,7**

In addition to the 27 Member States of the European Union, four additional non-member countries participated in Europe: Faeroe Islands, Iceland, Norway and Switzerland. In a few LAC countries (e.g. Bolivia and Panama) the response rate is more than 100%. This is due to the fact that, as a result of a snowball effect, a tangible number of scientists responded without directly receiving from us an invitation to participate. Exchange of e-mails during the questionnaire survey with LAC scientists witnesses their particular interest in the survey.

Table 2. Response rates in LAC countries

Countries	Invitations	Responses	%	Countries	Invitations	Responses	%
Antigua & Barbuda	1	2		Haiti	0	2	
Argentina	1033	460	44,5	Honduras	3	3	
Bolivia	25	26	104,0	Jamaica	15	4	26,7
Brazil	1716	713	41,6	Mexico	1196	534	44,6
Chile	575	221	38,4	Nicaragua	18	13	72,2
Colombia	302	170	56,3	Panama	6	9	150,0
Costa Rica	96	33	34,4	Paraguay	18	10	55,6
Cuba	145	44	30,3	Peru	125	64	51,2
Dominican Republic	4	1	25,0	Saint Vincent and the Grenadines	0	2	
Ecuador	59	43	72,9	Surinam	0	3	
Salvador	9	3	33,3	Uruguay	174	85	48,9
Guatemala	10	7	70,0	Venezuela	153	95	62,1
Guyana	0	1		**Total**	**5683**	**2548**	**44,8**

4. Results

Before going into the results directly relevant to Euro-LAC international cooperation in science & technology (S&T), we present below some of the main characteristics of the scientists who responded to the questionnaire.

4.1. Profile of the population of scientists who responded to the questionnaire

4.1.1.In which countries are the responding researchers located?

4425 scientists working in 55 countries (29 countries in Europe and 26 LAC countries) responded to the questionnaire. The ten first participating countries out of the 55 concentrates nearly 4/5 of the respondents (78.35%) and include the top scientific producers and the top LAC-EU S&T collaborators of the two country groupings namely Brazil, Mexico, Argentina, Chile and Colombia for the LAC countries and Germany, France, United-Kingdom, Italy and Spain for the Member States of the European Union (cf. Table 3). In Europe, all EU Member States participated except Cyprus[7]. In addition, scientists from three non EU Member States namely Iceland, Norway and Switzerland were also invited to participate.

Table 3: Number of responding scientists by country of location of their respective institutions

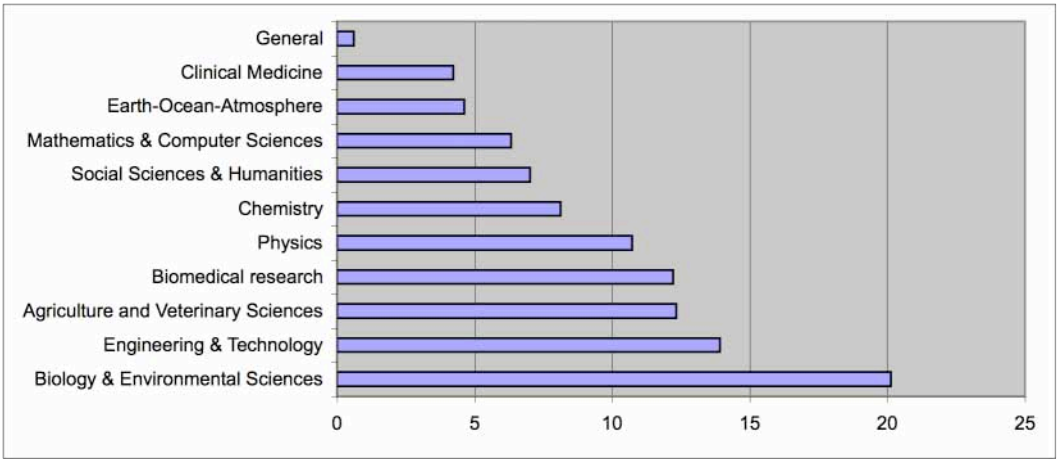
Country of your institution	Number of responses	Country of your institution	Number of responses
Brazil	713	Romania	17
Mexico	534	Hungary	13
Spain	476	Nicaragua	13
Argentina	460	Czech Republic	11
France	340	Paraguay	10
Italy	243	Bulgaria	9
Chile	221	Ireland	9
Colombia	170	Panama	9
Germany	167	Guatemala	7
United Kingdom	143	Slovakia	7
Venezuela	95	Slovenia	6
Uruguay	85	Iceland	5
Netherlands (The)	68	Jamaica	4
Peru	64	Salvador (El)	3
Portugal	61	Estonia	3
Sweden	52	Honduras	3
Cuba	44	Lithuania	3
Belgium	43	Surinam	3
Ecuador	43	Antigua and Barbuda	2
Austria	37	Barbados	2
Poland	35	Haiti	2
Costa Rica	33	Luxembourg	2
Greece	31	Saint Vincent and the Grenadines	2
Denmark	29	Dominican Republic	1
Bolivia	26	Guyana	1
Finland	26	Latvia	1
Switzerland	20	Malta	1
Norway	17	Total	4425

[7] Six scientists in Cyprus were invited to participate but none of them responded despite the two reminders.

4.1.2.In which scientific disciplines are the respondents working?

The top field of research for S&T collaboration between Europe and LAC countries among the respondents to the questionnaire survey is "Biology & environmental sciences" with one-fifth (20.1%) of the respondents followed by Engineering & Technology (13.9%), Agriculture and Veterinary Sciences (12.3%), Biomedical research (12.2%) and Physics (10.7%). In all other research fields, the respondents are less than 10% (cf. Figure 9).

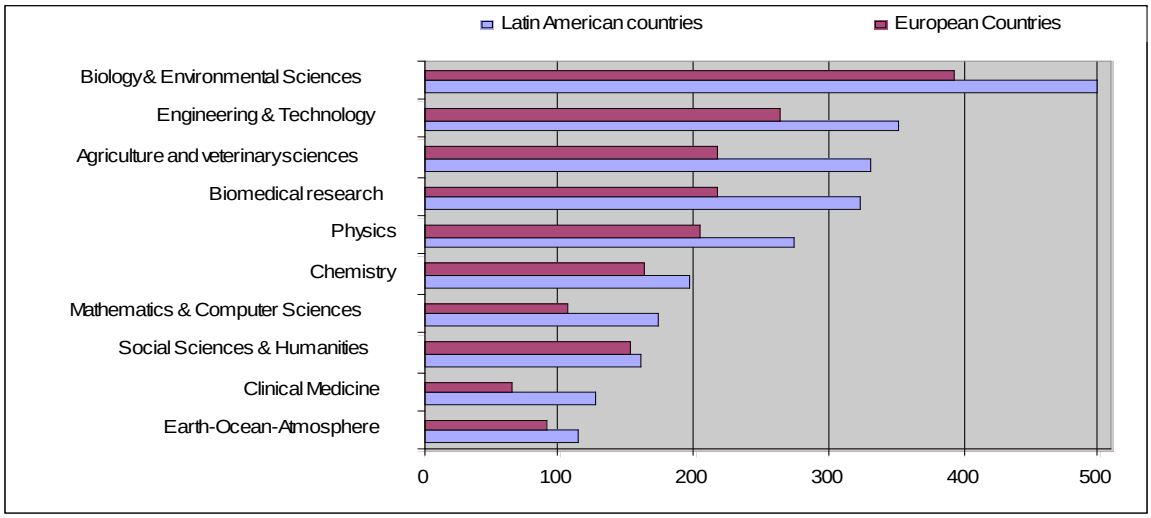
Figure 9. Relative importance (%) of the scientific fields in which the respondents are working



All the sample : 4425 respondents

The fact that "Biology & environmental sciences" is the preferred area of collaboration between European and LAC researchers is not surprising for LAC researchers since it is the strongest scientific field for LAC countries whose scientific production measured in number of publications corresponds to 6% of world science in 2006 (OST, 2008).

Figure 10. Number of respondents by scientific fields in European and LAC countries



All the sample : 4425 respondents

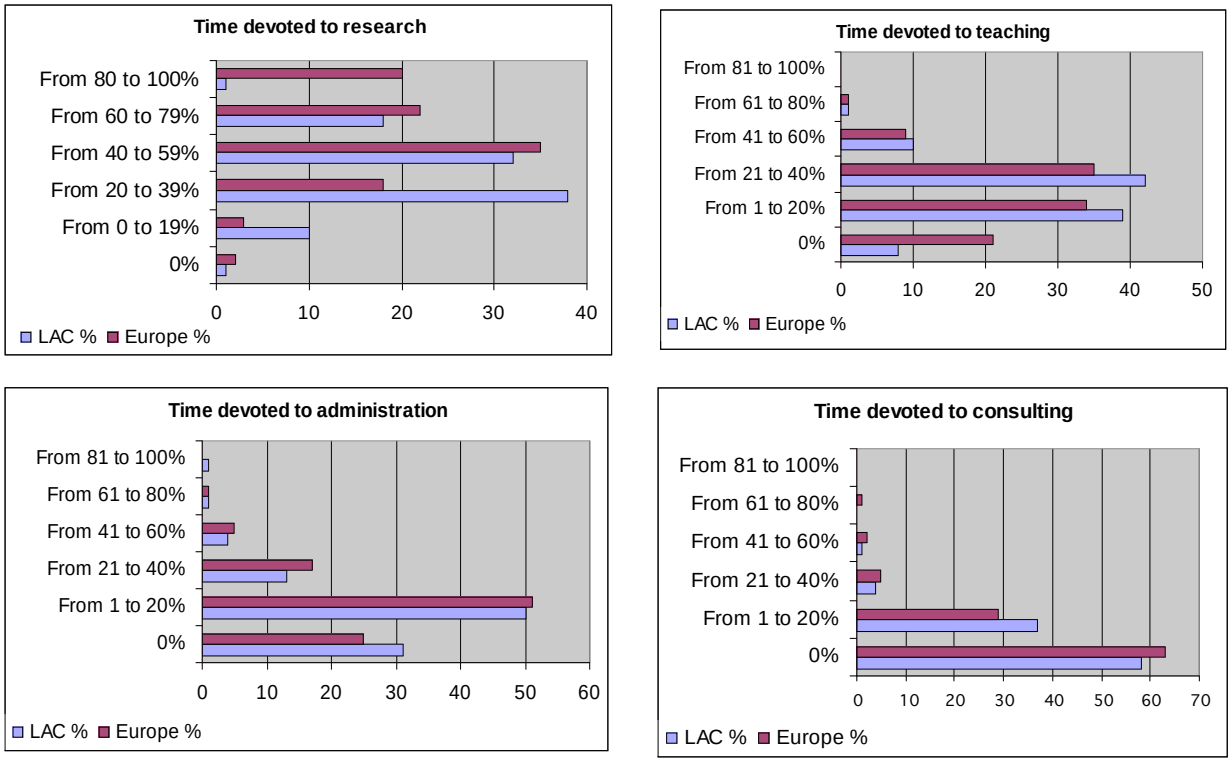
It is more surprising for Europe for which "Biology & environmental sciences" is the weakest field of all with, however, 35.6% as a world-share in 2006. Conversely, Europe is the first world-contributor in mathematics (42.7%) in medical research (41.9%) and physics (41.1%). In other words, the relative importance of the scientific disciplines shown in Figure x are more in line with LAC countries priorities than European countries priorities. As shown in Figure 10, there is no marked differences between the number of respondents from European and LAC countries. They all more or less participate in the same proportions in all scientific fields with the exception

of Social Sciences & Humanities where respondents from European countries are nearly as many as respondents from LAC countries.

4.1.3.Distribution of time between research, teaching and other activities

Overall, the respondents to the questionnaire survey spend more time on research than on teaching and other activities (e.g. administration and consulting). One-third of them (35% for LAC countries and 31% for European countries) devote between 41-60% of their time to research activities and they are nearly one-fifth (20% / 19%) declaring spending 61-80% of their time to research activities. Those spending as much as 80-100% to research activities are relatively more numerous in European countries (13%) than in LAC countries (6%). Very few (1.42%), declare that they spend no time at all to research activities (see Figure 11).

Figure 11. percentage of time devoted to research, teaching, administration and consulting



All the sample : 4425 respondents

Conversely, they spend much less time on teaching. More than 600 of the respondents (13.8%) declare to spend no time at all on teaching. More than one-third of them (35% in European countries and 42% in LAC countries) spend however between 21-40% of their time on teaching. There are far more scientists in Europe spending no time at all on teaching (21%) compared to LAC countries (8%). Whereas research in LAC countries is predominantly taken place in higher education institutions, there are a tangible number of researchers in Europe belonging to research institutions with no teaching obligation at all. The authors of this report are in the later situation.

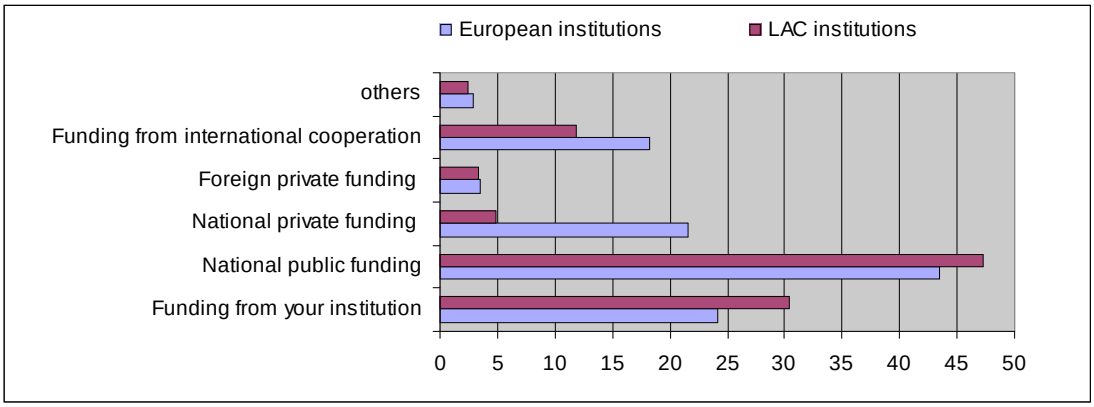
Time devoted to administration is even less important although 50% of them declare spending 1-20% of their time to administration activities. A large majority (59% in LAC countries and 63% in Europe) declare having no consulting activities. The bulk of those who are engaged in consulting activities spend less than 20% of their time to such activities. There are relatively more numerous in LAC countries (37%) compared to European countries (29%).

4.1.4. Research budget's funding sources

The scientists were asked to indicate in percentages the relative importance of different funding sources for their laboratory's budget for 2009. The most important funding source for both LAC laboratories (47.3%) and European laboratories (43.5%) is "National public funding". The increasing importance of national public funding is confirmed by nearly all interviews conducted in Latin America as confirmed by the excerpts reproduced below:

> *"I got quite a lot of funding from the International Atomic Energy Agency (IAEA)," says Carlos, "my main important funding source before I started taping Mexican sources. My main funding source today is definitely coming from national funding sources".*
> *Today, the situation is easier since Uruguay is investing more into research" says Ana. "In 2006, I got a grant (90.000 US$) from the National Institute of Agricultural Science (INIA)".*
> *"The biggest part of my funding today comes from "La Agencia" (Agencia Nacional de Promoción Científica y Tecnológica - Anpcyt)" says Jorge from Argentina.*
> *"Today I enjoy a big grant from the National Agency for Research (Agencia/FONCYT)", says Ricardo, "so I do not feel a great need to go through the somewhat difficult process of applying to a foreign funding scheme".*
> *"Today my main funding sources are coming from CONACYT" says Christian, "during 2006-2008, we were awarded by ANIUS (CONACYT) a 1 million US$ project to formalize and internationalize our collaborations in Chile and outside Chile. 10% of the funding is also coming from the University as a counterpart but not big grants. The councils of all Chilean universities are discussing about how the government can supply additional funding for science in the universities".*

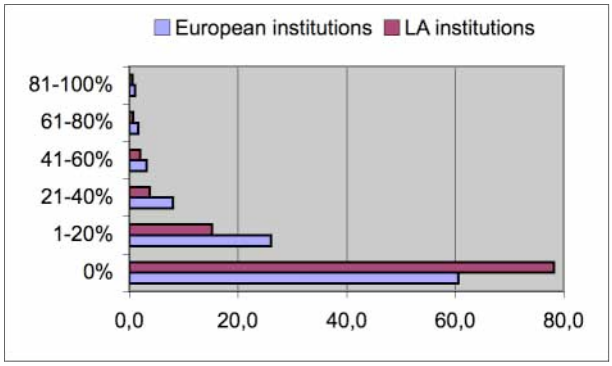
Figure 12. Relative importance of different funding sources in the laboratory's budget for 2009



4214 respondents

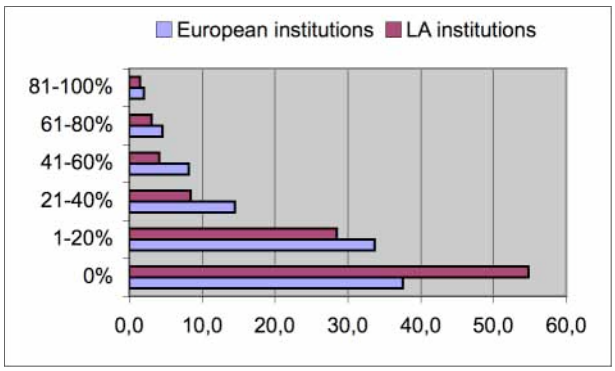
For over one third (36.9%) of the LAC respondents, national public funding corresponds to 60-100% of their laboratory's budget. The second most important funding source for both LAC laboratories (30.4%) and European laboratories (24.1%) is "funding from their own institutions". The main differences in funding sources for both groups are to be found in the two next sources, i.e. "national private funding" and "funding from international cooperation" from which European laboratories are receiving much more (respectively 21.6% and 18.2%) than the LAC laboratories (respectively 4.8% and 11.8%). The detailed relative distribution in funding for "national private funding" and "funding from international cooperation" is shown in respectively Figures x and x. The importance of the last funding source, i.e. "foreign private funding" is low for both groupings (respectively 3.5% and 3.4% for European and LAC labs).

Figure 13. Relative importance of "national private funding"



4214 respondents

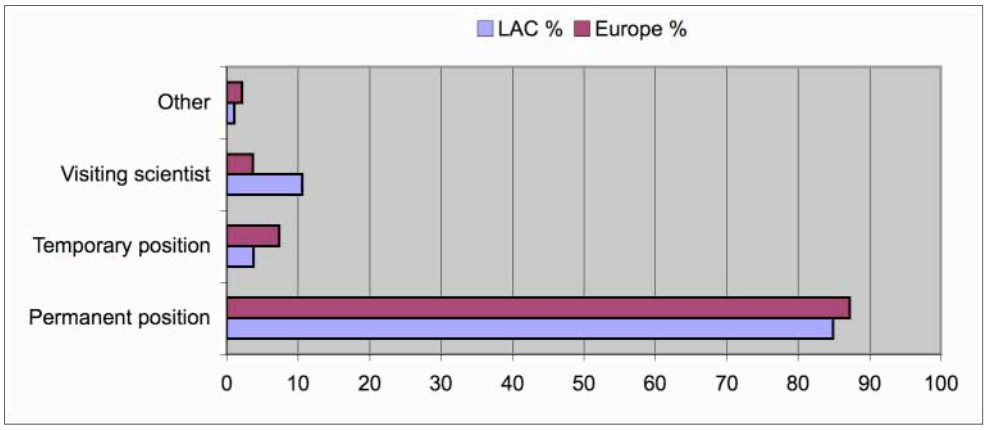
Figure 14. Relative importance of « funding from international cooperation »



4214 respondents

4.1.5.Nature of position

Figure 15. Nature of position



All the sample: 4425 respondents

The bulk of the scientists who participated to the questionnaire survey have a permanent position (87% in European countries and 85% in LAC countries) in a research or higher education institution. Relatively few (4% in Europe and 10% in LAC countries) are visiting scientists and even less (7% in Europe and 4% in LAC countries) have a temporary position (cf. Figure 15). There are relatively more respondents having a temporary position in Europe and more respondents being visiting scientists in LAC countries. The category « other » representing an even smaller proportion (1.4%) includes mainly 21 PhD students, 20 retirees and 13 Emeritus.

4.1.6. Gender

Overall, slightly more than one-quarter (26.4%) of the respondents are women (cf. Table 4). Women are better represented in LAC countries (29.2%) compared to Europe (23.0%)

Table 4. Repartition of gender of respondents in Europe and LAC countries

Genders	Europe	LAC	Total
Males	904 (77,0%)	943 (70.8%)	1847 (73.7%)
Females	270 (23.0%)	388 (29,2%)	658 (26.3%)
Total	1174 (100%)	1331 (100,0%)	2505 (100.0%)

Whilst the participation of women in S&T has increased in the world during the last decades, five countries only have achieved gender parity and there are all in Latin America: Argentina, Cuba, Brazil, Paraguay, and Venezuela[8]. According to available data:

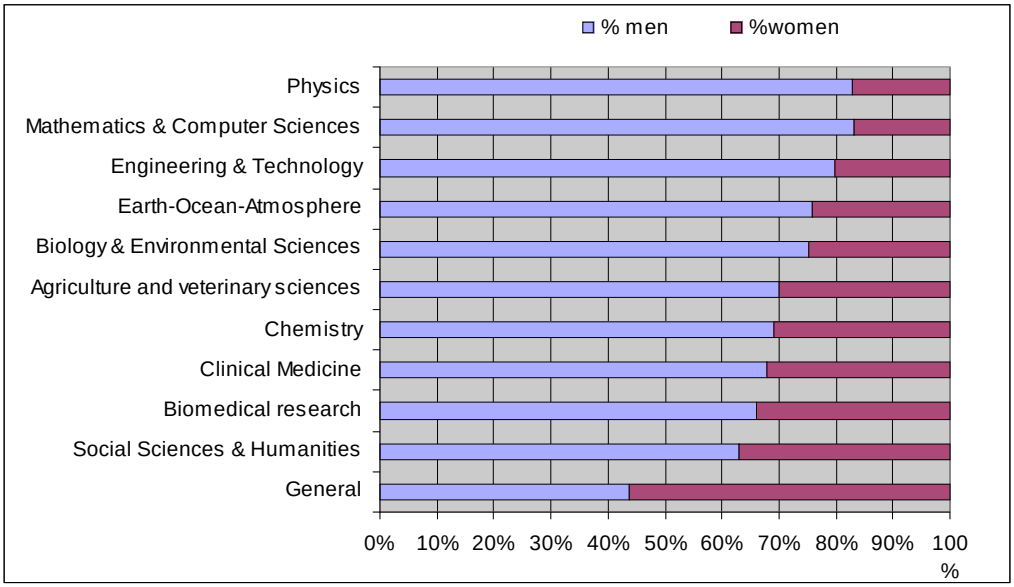
- Women represent slightly more than one-quarter of researchers (29%) worldwide (UIS 2009),
- In LAC countries 46% of researchers are women (UIS, 2009),
- In the European Union (UE 27) 30% of researchers are women (OST, 2008).

A recent study also indicates that female scientists are less likely to collaborate internationally than male (NSF, 2009). Thus, based on a longitudinal survey that follows recipients of research doctorates from U.S. institutions until age 76, NSF found out that while 30% of them do collaborate internationally, respectively 23% of female and 33% of male do so. With the assumption that the above behaviour is likely to be the same in Europe and in LAC countries, we can conclude that the participation of women in our survey is more or less representative of the participation of women in international S&T activities in LAC and European countries.

The participation of women according to research disciplines among the respondents to the questionnaire survey is also following the overall distribution of gender in LAC and European countries albeit at a slightly lower level. This is also probably due to the fact that women are less likely to collaborate internationally than men (see above). Thus, the participation of women in Physics, Mathematics and Computer Sciences (17%) and Engineering & Technology (20%) is much lower than in Clinical research (32%), Biomedical research (34%) and Social Sciences & Humanities (37%).

[8] In contrast, men accounted for approx. or more than 70% of researchers in Chile, Guatemala, Honduras and Mexico.

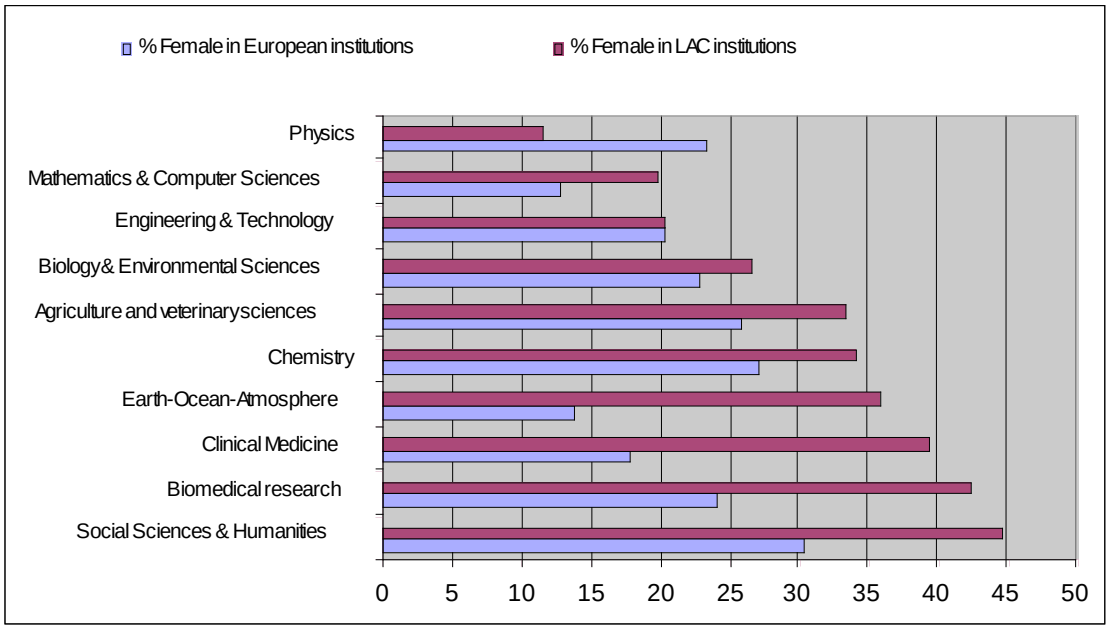
Figure 16. Gender participation according to research disciplines



2088 respondents

Interestingly women are more likely to participate in disciplines in which, according to the NSF study (NSF, 2009) they are less likely to collaborate internationally. As shown by the later study, scientists with degrees in engineering and the physical sciences are more likely to collaborate internationally than scientists with degrees in other sciences and in particular Social Sciences and Humanities.

Figure 17. Relative participation of women according to main disciplines in Europe and in Latin America.



2088 respondents

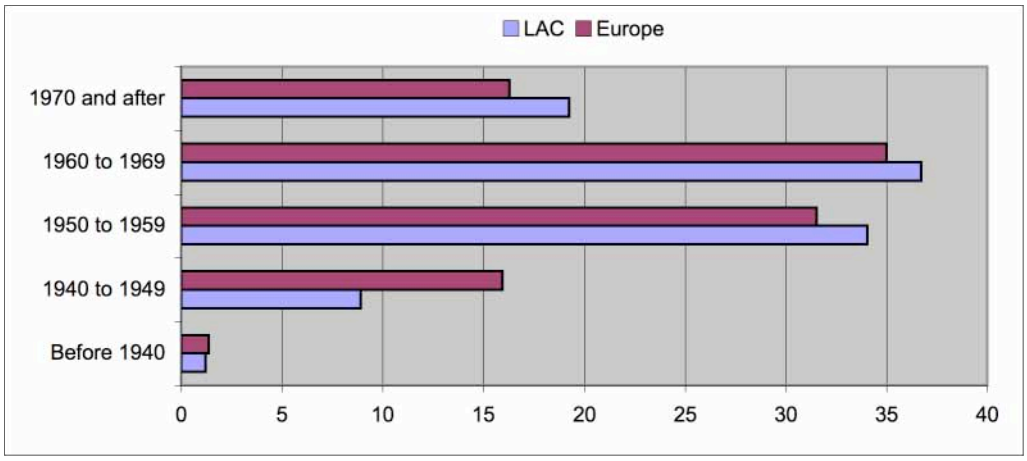
However, the participation of women may vary substantially between Europe and Latin America according to disciplines (cf. Figure 17). “Social Sciences & Humanities” is the only discipline for which we find the highest participation of women both in Latin America (44.6%) and in Europe (30.2%). But whereas “Physics” and “Mathematics and Computer Sciences” are

the disciplines in which we find the lowest participations of women in Latin America (respectively 11.5% and 19.8%), the participation of women in “Physics” in Europe (23.1%) is more important, followed by “Mathematics & Computer Sciences” (12.7%), “Earth-Ocean-Atmosphere” (13.8%) and “Clinical Medicine” (17.6%). “Engineering & Technology” is the only discipline showing the same participation of women both in Europe and in Latin America (respectively 20.3% and 20.2%).

4.1.7. Age

More than two-third of the respondents (69%) are between 40 and 60 years, the peak being in the category 40-59 years (36%). Conversely, researchers below 40 year old represent 18% of the overall surveyed population. There are no marked differences between respondents from European and LAC countries except for the late career stages (60-70 years) in which we find relatively more European scientists.

Figure 18. Respondents participation according to age



2088 respondents

The surveyed population is most likely older than the overall population of scientists in both Europe and Latin America. This would tend to confirm that researchers in mid career stages (40 years and above) are more likely to collaborate internationally than those who are in early or late career stages.

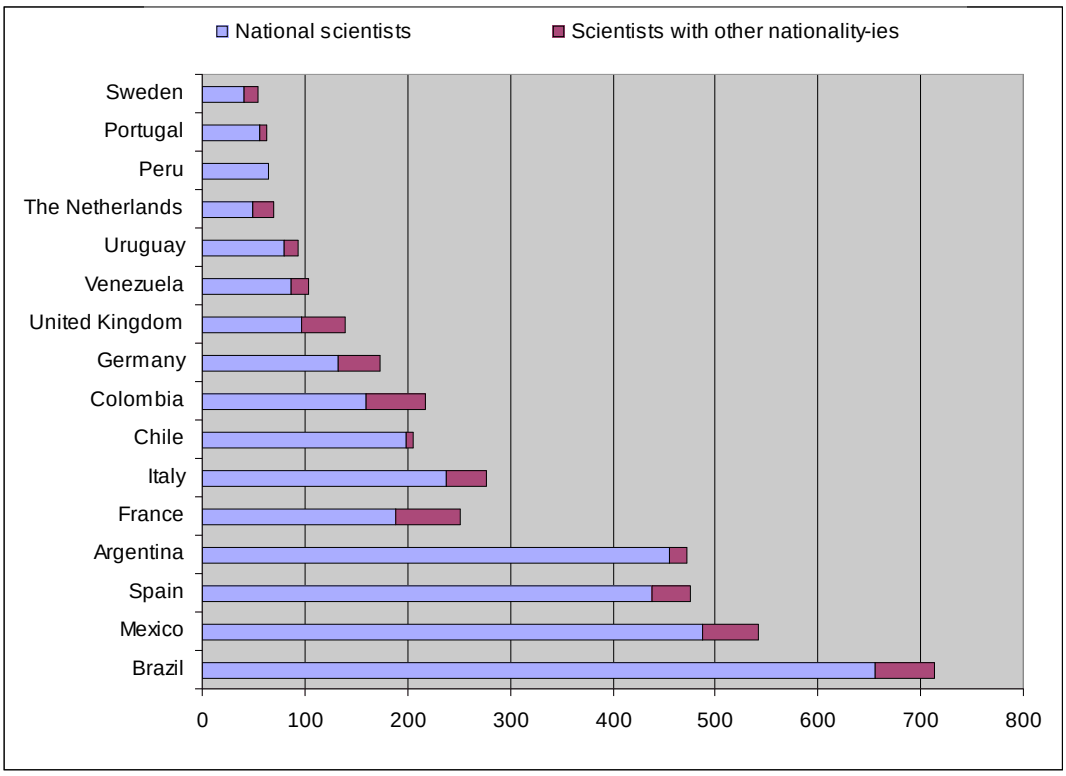
4.2. Nationality, country of work/residence and mobility

Not surprisingly, respondents are mostly nationals from the country of the institution where they work. Yet, almost one out of 10 (9.3%) declared being national from another country (cf. Figure 19). This percentage may however vary significantly from country to country. Whereas all scientists working in Peru are nationals from Peru, one-third (32.2%) of the scientists working in UK declared being nationals from another country. Overall, the share of scientists working in a country different from their country of nationality is less important in Latin American countries (0.8% in Argentina and slightly less than 10% in Brazil, Chile and Mexico) than in European countries (26% in the Netherlands, 21% in Sweden, 20% in Germany and 15% in France).

In Latin America, among the 155 respondents who work in a Latin American institution and who are not national of the country where they work, more than half (53%) have a European nationality, one third (32%) have another Latin American nationality and 15% have another nationality (cf. Figure 20). In Brazil, scientists having another nationality are USA citizens,

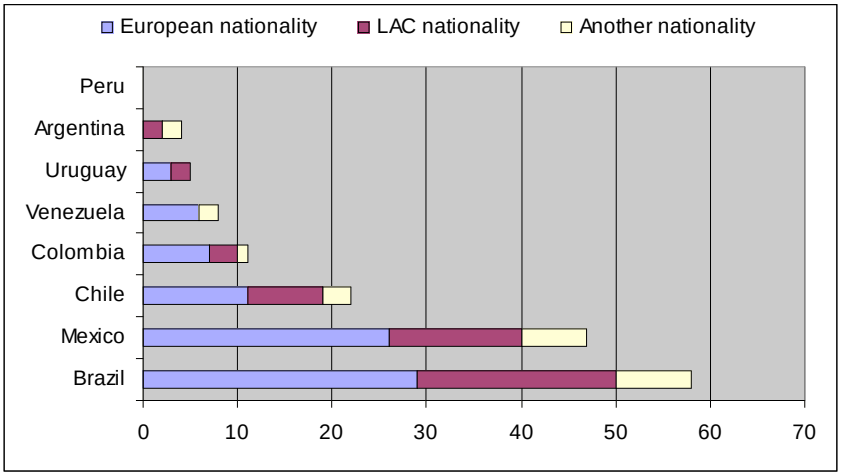
Russian, Ukrainian and Nigerian. In Mexico there are respectively Indian, Russian and Pakistanis.

Figure 19. Number of respondents according to nationalities and country of work



All the sample: 4425 respondents
National scientists = scientists having the nationality of the country of the institution for which they work

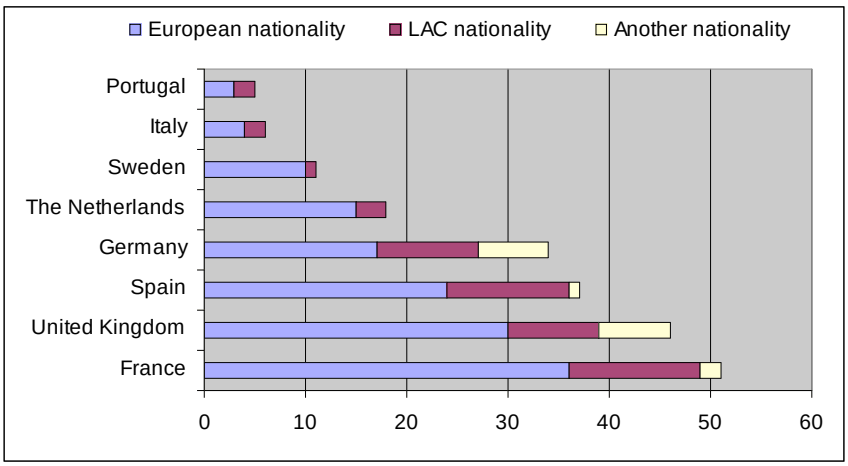
Figure 20. Distribution of non-national scientists working in a Latin American institution



2550 respondents

In Europe, among the 208 respondents who work in a European institution and who are not national of the country where they work, two-thirds (66.8%) have another European nationality confirming the importance of intra-European mobility in S&T in Europe. One-fourth (25%) has a Latin American nationality and 8% have another nationality. In the United Kingdom, scientists having another nationality are US citizen, Australian, South African and Ugandan. In Germany there are respectively from India, Russia, USA, Turkey and Iran.

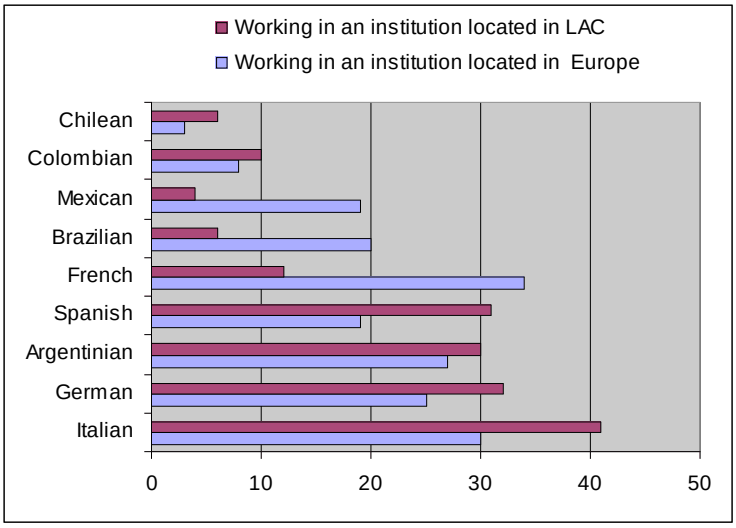
Figure 21. Distribution of non-national scientists working in a European institution



1875 respondents

In an attempt to map the importance and location of the Diaspora, we sorted out the scientists working in an institution located in a country different from the country of their nationality. Countries with at least 150 nationals who responded were selected. The respondents of the nine countries selected represent nearly four-fifths (77.1%) of the sample (cf. Figure 22). For the nine selected countries, approximately one-tenth (10.5%) of the scientists are working in an institution located in a country different from the country of their nationality.

Figure 22. Scientists working in an institution different from their country of nationality



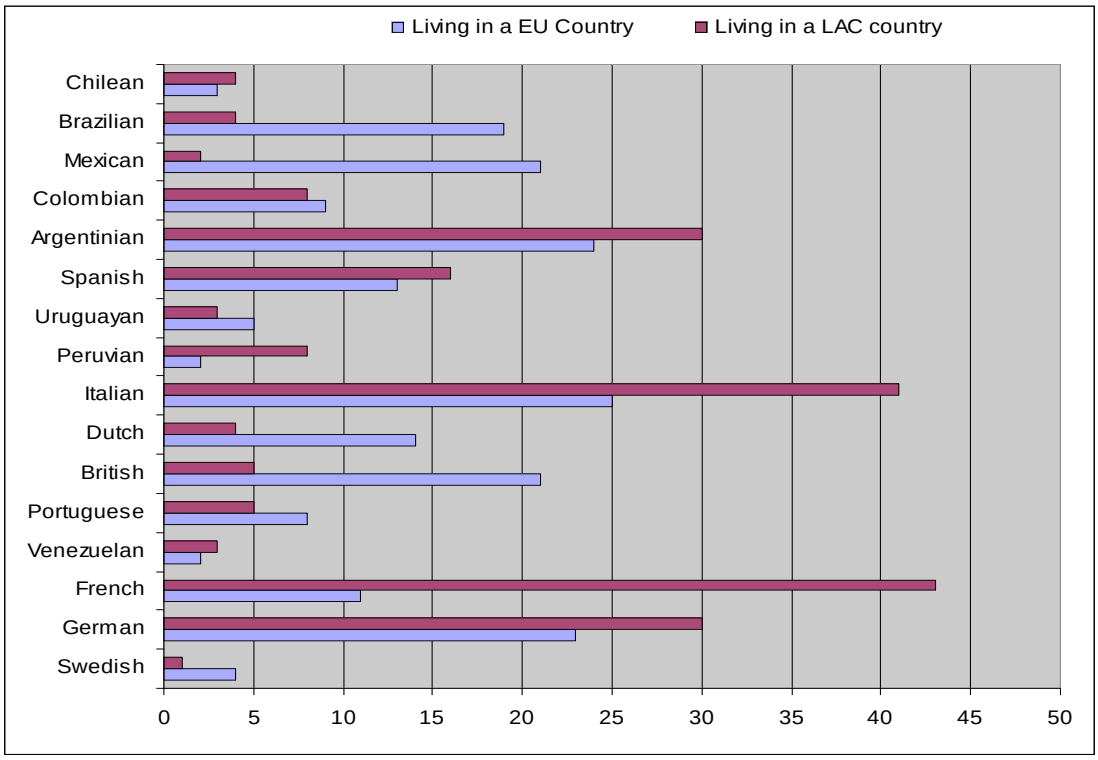
All sample: 4425 respondents

Slightly less than half of the scientists working in an institution located in a country different from their country of nationality (45.7%) are located in Europe and slightly more than half of them are located in Latin America (54.3%). For all selected European countries, European citizen tend to expatriate more to Latin American countries than to another European country. This is particularly the case for French citizen (73.9%), Spanish (62%) and Italian (57.7%). French are predominantly working in Brazil and Mexico, Italian in Argentina, German in Brazil, Chile and Mexico whereas Spanish are much more spread out all over the Latin American continent.

Overall, Latin American scientists in our sample tend to expatriate more (58%) to European countries although their respective behavior varies according to their country of nationality. Approximately four-fifths of the Mexican (82%) and of the Brazilian (77%) in the Diaspora are working in Europe whereas Argentinean scientists tend to expatriate nearly as much (52.6%) to other Latin American countries than to Europe (47.4%). Argentineans are predominantly working

in Brazil, in France and in Spain. Mexican scientists are working in UK and in France as well as in a wide variety of other European countries. Brazilians are working in France and in Portugal as well as in a wide variety of other European countries.

Figure 23: Residence of scientists living in a country different of their country of nationality



3892 responses

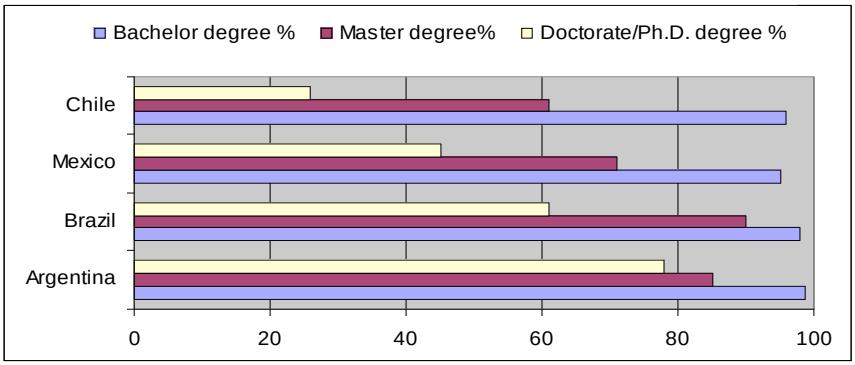
4.3. Studies at home and abroad

Most interviews revealed that studying abroad contributes to establishing new contacts and to the growing internationalisation of science and technology. It can be a choice or a necessity. It could be a necessity when the home country cannot offer the possibility to study in a given discipline. This may however vary according to the level of study and degrees (BSc, MSc and PhD) and according to the level of development of higher education in the home country.

The estimation of the relative importance of studies at home versus abroad for the three main degrees (BSc, MSc and PhD) in Latin America was done for the nationals of the four main science producers in Latin America (Brazil, Mexico, Argentina and Chile) which are at the same time the LAC countries with the best developed higher education as well as graduate and post-graduate systems. The results presented in Figure 24 are as follows:

- BSc is overwhelmingly obtained in the country of nationality (from 95% in Mexico up to 99% in Argentina)
- MSc is also largely obtained in the country of nationality although at a slightly lower level (From 61% in Chile up to 90% in Brazil
- PhD is the diploma for which the four countries under review show the highest degree of disparity. Whereas nearly four-fifth (78%) of scientists of Argentinean nationality got their PhD from a University in Argentina, there are only one-fouth (26%) of scientists having the Chilean nationality that received their PhD in Chile compared to 45% in Mexico and 61% in Brazil.

Figure 24. Relative importance of BSc, MSc and PhD obtained at home by Argentinean, Brazilian, Mexican and Chilean scientists



All the sample: 4425 respondents

Studying in the USA or (Western) Europe
excerpts from a few interviews

"I was always interested in Europe and more particularly Germany" says Diego. My grandfather was very keen about the German people. I was very interested in Hanover because of the very famous vet school. Before leaving I went to the German institute to learn German."

"I was always attracted by Europe by personal choice" says Carlos.

"Since I knew that it would be easier for me to go to the US at anytime in my carrier" says Pablo, "I decided to go to UK".

"The British system is good but you have to be pro-active" says Carlos ... "If you want to be spoon-fed, the American system is probably better."

"In the US, you are framed most of the time to pass course work" says Alberto. "In the US by the time you start your experiments, you already have spent a year or two in courses. In UK (Europe), you are right at the beginning exposed to trial and error and you have time to make mistakes."

"The British system suited me very well" says Roberto. "Not too much control like the American. Assuming you are motivated and self-confident, it is a very good system".

"As a high school student, I went to the states one year as part of an exchange programme in Madison Wisconsin" says Elena. "I was 18 years. I got a cultural choc in the states and was puzzled by the level of ignorance. I end up studying in Sweden"

"During European congresses it is also easy to talk and to communicate with people" says Fernando. American scientists are more complicated and not so much eager to share knowledge. In Europe people are more open. I usually prefer European people."

Overall, for the four Latin American countries, there are slightly more PhD obtained at home (57%) than abroad (43%). Among the PhD abroad nearly two-third (64%) were obtained in a

European country, 28% in North America[9], 5% in another Latin American country (mainly Brazil, Mexico and Argentina) and 3% in another country (Japan, Russia, New Zealand, Israel and Australia). The overall relative domination of Europe for PhD abroad could possibly be explained by the main bias of our survey population composed of LAC and European scientists who published co-authored papers with scientists from the other region (cf. Table 5).

Table 5. Geographical distribution of number of PhD degrees for Argentinean, Brazilian, Mexican and Chilean scientists

Country of nationality	PhD at home	PhD abroad				Total
		Europe	North America	in another LAC country	Others	
Argentina	376	61	27	17	4	485
Brazil	410	189	59	5	5	668
Chile	48	85	40	7	2	182
Mexico	221	170	96	8	14	509
Total	1055	505	222	37	25	1844

A comparison with available statistics from Mexico (cf Table 6)tends however to indicate (at least for Mexico) that the above geographical distribution of PhDs is very close to the geographical distribution of highest diploma of Mexican scientists being members of the Sistema Nacional de Investigadores (SNI) in 2009 (Gérard, manuscript). 15,561 Mexican scientists are members of SNI in 2009 (approximately 40-60% of the overall population of scientists in Mexico). The above geographical distribution of PhDs is also rather close to another survey during 2007-2008 of Mexican academics active in higher education institutions in Mexico ((Villaseñor Amésquita et al. 2009).

Table 6. Relative importance of the geographical distribution of PhD[10] abroad for Mexican scientists: comparison between the SNI population and the EULAKS surveyed population

PhD in	(Western) Europe	North America	In another LAC	Others	Total
EULAKS	59.0%	33.3%	2.8%	4.9%	100.0%
SNI*	55.9%	33.1%	3.3%	7.7%	100.0%
Survey 2007-2008**	49.5%	36.2%	5.4%	8.6%	100.0%

*The information is unknown for 2.4% of the scientists.
**Based on 1973 returned questionnaire from academics staff in higher education institutions in Mexico (Villaseñor Amésquita et al. 2009)
The percentages have been re-calculated based on 100% of known responses.

In the EULAKS population the percentage of PhDs in Europe is slightly higher (59.0% compared to 55.9% for SNI) but the difference is not very significant. The difference is more significant (59.0% compared to 49.5%) with the results of the survey carried out during 2007-2008 but the later survey include a rather small sample (1973) of all Mexican academics active in higher Education in Mexico (Villaseñor Amésquita et al. 2009), many of whom are not carrying out research activities. For the sake of comparison, the SNI population is for many characteristics (including age, disciplines … etc …) is more relevant here. This would tend to invalidate (at least for Mexico) that doing a PhD abroad is a determining driver for establishing and strengthening S&T collaboration with scientists from the laboratory/ institution/country of your PhD.

A study published in 2005 in Chile by the Science Academy indicates that out of a total of

[9] Overwhelmingly in the USA (92%).

[10] Most SNI members (94.5%) have a doctoral degree. In very exceptional cases, a significant quality scientific output can compensate for the absence of a PhD. This would be particularly the case for older scientists.

1905 Chilean researchers that got a FONDECYT[11] grant during the period 1990-2004, 507 scientists got their PhD degrees in USA, 669 got them in the European Union, 92 in Latin America, 52 somewhere else (e.g Japan, Eastern Europe and so on) and 585 in Chile (Asenjo & Correa, 2005). The details of the comparison with the EULAKS surveyed population is given in table 7.

Table 7. Relative importance of the geographical distribution of PhD abroad for Chilean scientists: comparison between the FONDECYT population and the EULAKS surveyed population

Population	PhD abroad				Total
	Europe (Western)	North America	in another LAC country	Others	
EULAKS	85 (63.4%)	40 (29.9%)	7 (5.2%)	2 (1.5%)	182 (100%)
FONDECYT	669 (50.7%)	507 (38.4%)*	92 (7.0%)	52 (3.9%)	1320 (100%)

**USA only*

The comparison shows that whereas the European Union is the leading provider for PhDs abroad in both populations (EULAKS and FONDECYT) in Chile, there are relatively and significantly more PhDs obtained in the European Union in the EULAKS population (63.4%) compared to FONDECYT's (50.7%). In the case of Chile, the overall relative domination of Europe for PhD abroad in the EULAKS population may possibly be explained by the main bias of the EULAKS surveyed population composed of LAC and European scientists who published co-authored papers with scientists from the other region. In the later case, doing a PhD in Europe could marginally promote the establishment and strengthening of S&T collaboration with scientists from the laboratory/ institution/country of your PhD.

The overall EULAKS data however indicate that you can do your PhD at home to a very large extent (57% for the four main science producers in Latin America) and collaborate internationally as well as publish scientific papers with foreign scientists in Europe. This is the case for more than half of the scientists in the four main LAC science producing countries. In addition, getting his or her PhDs in North America or in another LAC country does not preclude him or her to collaborate with Europe. Furthermore, as shown by a few interviews conducted in Mexico in animal production, doing a PhD abroad is not a sufficient condition for ensuring that scientific collaborations will be established in a sustainable manner after the PhD is over.

The main host countries for PhD studies in Europe by decreasing order of importance are: France, UK, Spain and Germany (cf. table 8). France is coming first or very close to first with UK for Brazil and Mexico. Spain is the preferred country for Argentina and Chile. Germany follows but at a much lower level. These four European countries concentrate the bulk (87.5%) of PhD carried out in Europe. Remaining countries but at a much lower level are Austria, Belgium, Italy, The Netherlands, Norway, Portugal (for Brazil only), Sweden and Switzerland.

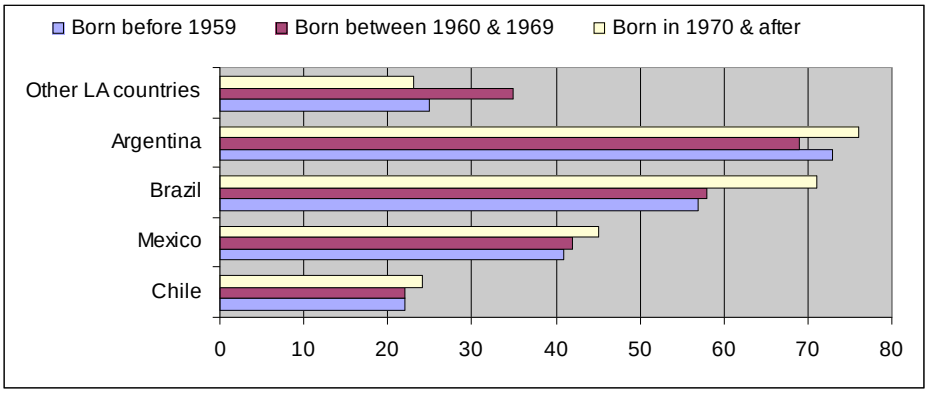
Table 8. PhD degrees in Europe for Argentinean, Brazilian, Mexican and Chilean scientists

Nationality	PhD in Europe					Total
	France	UK	Spain	Germany	Others	
Argentina	11	11	18	7	14	61
Brazil	66	62	12	25	24	189
Chile	25	11	29	12	8	85
Mexico	56	58	25	14	17	170
Total	158	142	84	58	63	505

[11] FONDECYT is a the most competitive national research grant scheme in Chile.

For the top four science-producing countries in Latin America, the relative importance of PhD obtained at home increases slightly in the youngest age category (born in 1970 and above) although the difference except for Brazil is not really significant (cf. Figure x).

Figure 25. Relative importance of PhD obtained at home according to age categories



683 respondents

For all other LAC countries the percentage of PhD obtained at home decreases. This somewhat unexpected result may however be due to the fact that the number of scientists in the youngest age category in our surveyed population is under-represented: scientists below 40 years old represent 18% only of the overall surveyed population. The above-mentioned study on the SNI members in Mexico (Gérard, manuscript), also reveals that, as far as Mexico is concerned, a real break in trend is only observed in the early 1990s when Mexican future scientists are increasingly trained in Mexico.

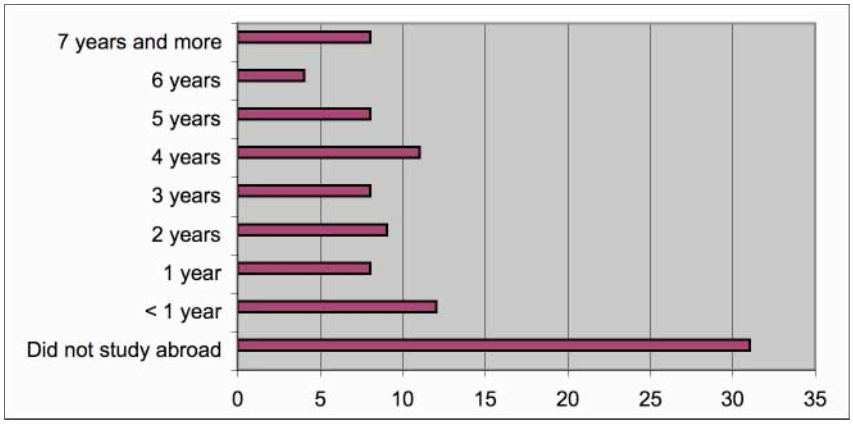
Overall, close to one-third (31%) of the respondents did not study abroad at all. Twelve percent (12%) spent less than one year abroad for non-degree short term studies and eight percent (8%) spent seven years and more than seven years abroad for their studies. In between there is a slight peak duration around four years (11%) corresponding mainly to scientists who went abroad for PhD studies. Figure x below is presenting the all range of duration of stays abroad from less than one year to seven and more than seven years. Situations do vary a lot from individuals to individuals but several interviews (cf. excerpts below), particularly among the oldest scientists, revealed that they were often offered to stay in the host institution after getting their PhDs for a one-year post-doctoral stay or for a longer contractual commitment. Some accepted the offer; others felt they had a moral obligation to go back to their home country, even when they were not secured a position.

"At the end of my PhD, my PhD supervisor asked me if I wanted to stay but I said no because I wanted to go back to Mexico" .... said Pablo who is today an Emeritus Professor. "What a different story nowadays. In those days, you had a dream of helping your country to develop, sort of a mission in life as you were lucky enough to get the opportunity of doing graduate studies … not anymore I am afraid."

"I stayed in the UK after my PhD for one year post-doc" says Pablo. "I was then offered a three year contract but I decided to come back to Mexico. I felt it was time to come back home otherwise, I would have been away nearly 10 years".

"I came back home as soon as I could after the dictatorship to join the Department of Animal Production and Pasture at the Faculty of Agriculture" said Sandra.

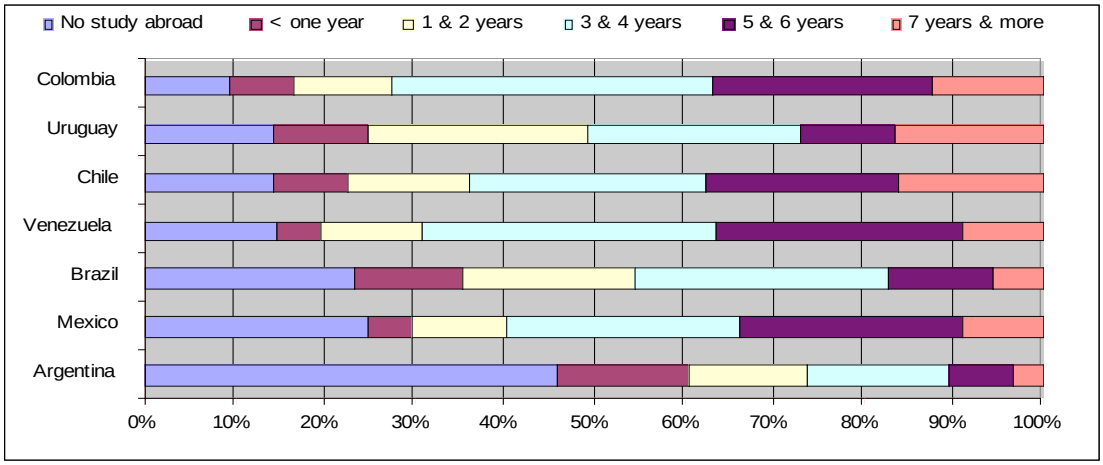
Figure 26. Number of years spent abroad for studies (in % of people)



4251 respondents

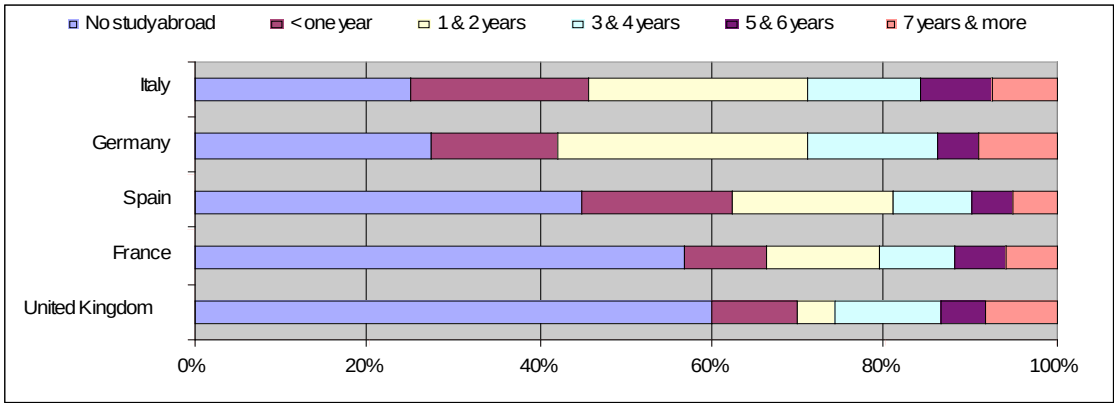
For Latin American scientists, time spent abroad varies also greatly according to countries. Argentina is by far the country having the highest number of scientists who didn't study abroad at all (46%), whereas most scientists in Venezuela, Chile, Uruguay and Colombia have the lowest (from 9% to 15%) (cf. Figure 27). A large proportion (from 51% for Uruguay up 72% for Colombia) of the scientists from the later countries as well as from Mexico (60%) went abroad from three years up to seven years and more.

Figure 27. Relative importance of stays abroad for studies for some of the main Latin American countries



2144 respondents

Figure 28. Relative importance of stays abroad for studies for the main European countries

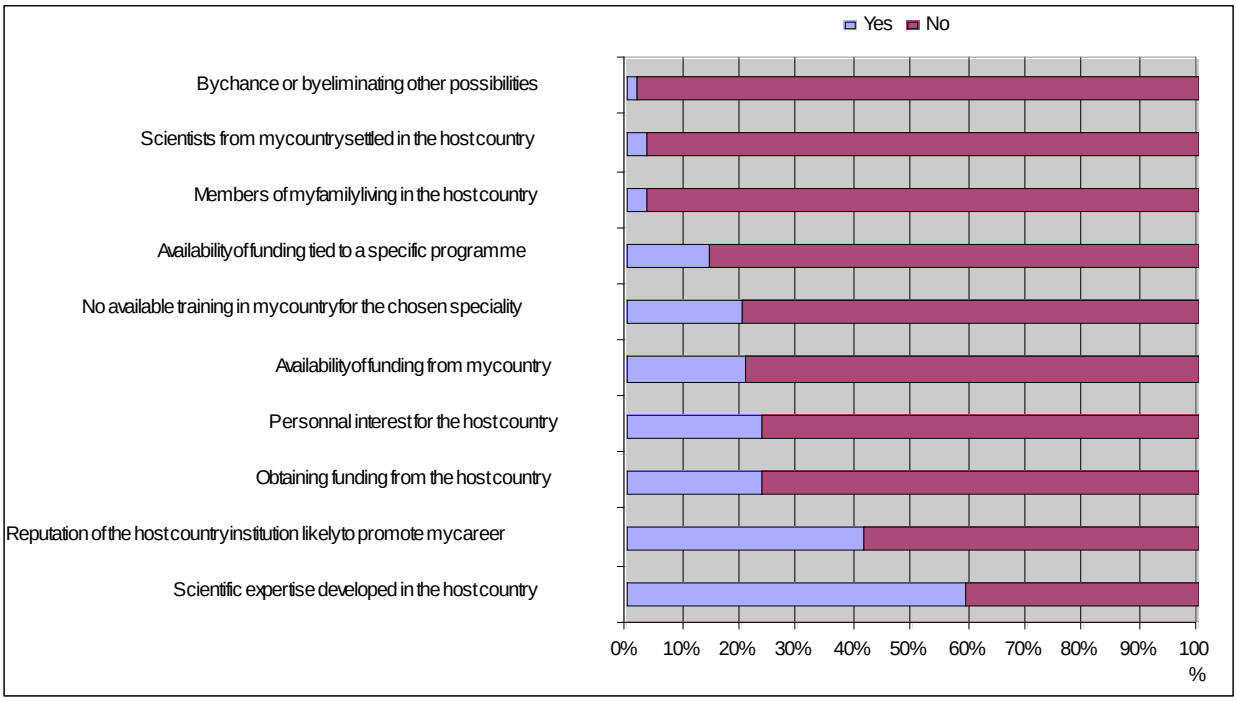


1405 respondents

A variety of situations can also be observed in Europe where a large majority of scientists responding to our survey from UK (60%) and from France (57%) did all their studies at home. Conversely, three fourth of the scientists in Germany (75%) and in Italy (77%) went abroad for their studies. Spain occupies a medium position (cf. Figure 28).

A number of reasons were proposed in the questionnaire to the surveyed scientists pertaining to why they went abroad for studying including scientific, personal and other reasons. The results are presented in Figure 29. The two questions related to scientific reputation and expertise are on the top of the list. Nearly 60% answered that the main reason was "scientific expertise developed in the host country" followed by "reputation of the host country likely to promote my career" for two-fifth of them (41.5%).

Figure 29. Reasons why scientists went abroad for studies



3086 respondents

The least important reasons are by far linked to the fact that "members of their families were living in the host country" or that "scientists from their countries were settled in the host country" (3.6% for both reasons). The later result tends to indicate, despite the fact that a tangible number of scientists are working in a country foreign to their country of nationality, that the family and S&T diasporas play a very marginal role in the choice of studying abroad and selecting an institution for such foreign-based studies.

In between, there are a number of additional reasons considered as important. "Personal interest for the host country" and "obtaining funding from the host country" are two such reasons selected by 23.6% of the respondents as confirmed by the excerpts from interviews below.

> *"I was always interested in Europe and more particularly Germany" says Pedro. My grandfather liked the German people very much. Most of my friends had an FAO scholarships as a « give it ». I had to go to the Embassy and apply for a scholarship from DAAD. I was very interested in Hanover because of the very famous vet school. Before leaving I went to the German institute to learn German."*

"I got a grant from the British Council (in 1968) … and went to the Royal veterinary college in London."

"Availability of funding from my country" is also an important reason for more than one-fifth (21%) of the respondents.

"I was studying plant responses to light in Buenos Aires. While reading the literature, I came across Harry Smith's name from the University of Leicester (UK). I wrote to him and got a nice answer. I got a fellowship both from CONICET and a two-years (1987-1989) fellowship from the Overseas Research Student Scheme (U.K). I stayed two years in Leicester and managed the PhD in two years."

"I got a grant from CONACYT (Mexico) to study in France in the mid 1980s" says Leonardo. "I selected France because it was the most advanced country on goat reproduction. The French Embassy in Mexico helped me to select a host institution".

"No available training in my country for the chosen speciality" is also mentioned by slightly more than one-fifth (20.5%) of the respondents.

"At the time I got my first degree in Montevideo (1995), they were no possibility to continue for a MSc ... At that time, Prof. Mats Forsberg (SLU, Sweden) came to give a post-graduate course at the University for one week. … Mats invited me to Sweden in 1997 for a couple of months … In May 1997, Mats invited me to register as a MSc student and I defended in April 1998. I defended my PhD thesis in 2001."

The respondents were given the opportunity to provide other reasons. A number of other reasons were provided including "to learn or improve my knowledge of foreign languages, to discover new countries through travelling, to get to know other cultures and to follow my spouse". Among them, political exile came rather strongly for respondents from Argentina, Brazil, Chile and Uruguay although expressed in different ways from "the political situation made pursuing doctoral studies in my country impossible" to "political persecution" and "I was sent in exile by the military dictatorship". The later reasons came also very strongly in a few interviews conducted in Argentina, Chile and Uruguay as witnessed by the excerpt below from an interview conducted in Uruguay:

"During the dictatorship in Uruguay, I emigrated together with my ex. husband (also a vet) to Mexico" says Sandra. I met Professor Carlos Galina at UNAM and stayed 7 years in Mexico where I got my MSc degree in 1987 (UNAM) on local breeds of sheeps. I worked for UNAM, INIFAB and Tecnologico Monterey in Queretaro. I came back home as soon as I could, after the dictatorship was over, to join the Department of Animal Production and Pasture at the Faculty of Agriculture in Montevideo".

Whatever the reasons to go abroad for doctoral studies, except for a few exceptional cases such as difficulties to work or communicate with the PhD supervisor, the large majority among the scientists interviewed expressed their satisfaction with the many outcomes derived from their stay abroad. Many kept contact with their PhD supervisors and other colleagues at the institution where they did theirs PhDs.

"After my PhD, I continued to visit INRA Nouzilly once a year, to carry out joint-projects and to publish with my PhD supervisor as well as other colleagues at INRA", says Antonio. "They also came to visit and work with us in Mexico".

“My PhD supervisor invited me to Sweden in 1997 for a couple of months. He sent me to two courses for doctoral students attended mainly by Nordic people” says Ana. “It was very difficult at the beginning but very challenging. Mats (PhD supervisor) really builds up my self-confidence. At the beginning in Sweden, I was a bit shy. My spoken English was not as good as the other students. But very shortly, I realized that I had nothing to loose. So I started to be more active in the course. For my PhD thesis I wrote four papers. It was so easy altogether to do research in Sweden. I spent 18 months in Sweden in six stays. Travelling back and forth between Uruguay and Sweden. I defended my PhD thesis in 2001”.

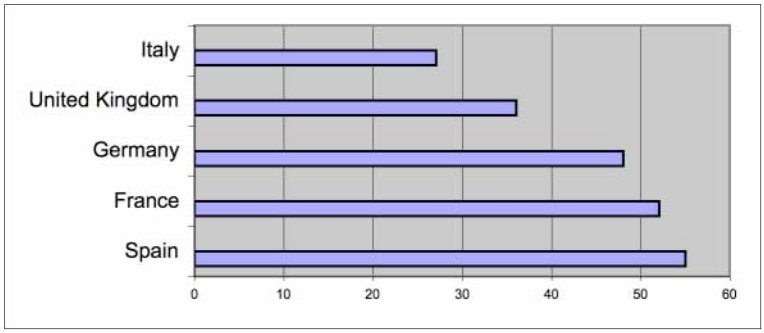
“I enjoyed very much my stay in UK” says Carlos. “I met my British wife during my PhD. After finishing my PhD, we stayed in Scotland for one more year to do a post-doc. It was a very productive PhD”, says Carlos. “I kept in touch and continued collaborating with them on a yearly basis”. He did come back as a visiting scholar nearly every year since then and continued to co-author publications with his British colleagues since that time. Same people but not the same university (first the University of Edinburgh for PhD and first stay and then the University of Nottingham). Although the experiments changed, the main research line remained the same: endocrinology control of follicular development”.

“I defended my thesis in 1998 with Mats Forsberg (SLU) as my main supervisor, Elsa Garofalo as the local adviser, and Graeme Martin (University of Western Australia) as rapporteur” says Sandra. “I enjoyed very much my time in Sweden where I could write scientific papers and make a number of scientific contacts. I brought my daughter at least two times to Sweden. Following the PhD defence, I discussed at Mats’ home together with Graeme Martin, the possibility for me to do a post-doc and I ended up doing it together with Graeme Martin in 2000, one full year at the University of Western Australia”.

4.4. Post-doctoral studies

Among the 4,425 scientists who responded to the survey, 1,868 (42.2%) did a post-doc. There are relatively less women scientists (39.5%) that did a post-doc compared to men (45.1%) but the difference is not as important as we may have expected. Overall, slightly more scientists based in a European institution (45% - 46.9% male and 41.5% female) did a post-doc, compared to scientists based in a Latin American institution (40% - 43.5% male and 38.1% female). The relative frequency of post-doc does however vary between countries. Thus, whereas 55% of scientists based in Spanish institutions did a post-doc, they were 27% only in Italy (cf. Figure 30).

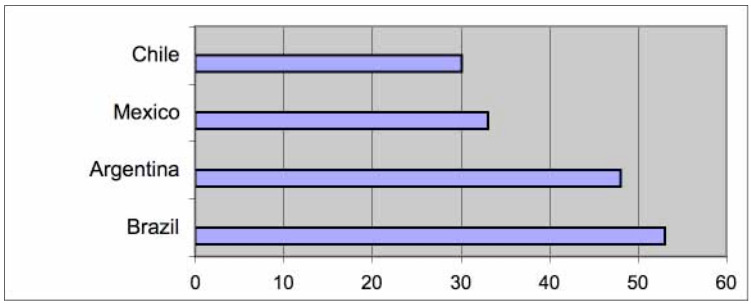
Figure 30. Relative occurrence of post-doc for scientists based in five European countries



853 respondents

In Latin American institutions, Brazilian scientists are more likely to engage in post-doc studies (53%) than Chilean scientists (30%).The 841 respondents from Argentina, Brazil, Chile and Mexico who did a post-doc declared altogether 984 post-doc. Several declared more than one host country for one post-doc and others did more than one post-doc. For the four above-mentioned Latin American countries altogether, Western Europe is the main destination for post-doc (54.3%) followed by North America (36.4%), Latin America (6.1%) and other countries (3.2%). It should be noted that more than half (35 out of 60) of the post-doc in Latin America took place in the country of work of the scientists (e.g. 21 out of 28 in Brazil).

Figure 31. Relative occurrence of post-doc for scientists based in four LAC countries



1015 respondents

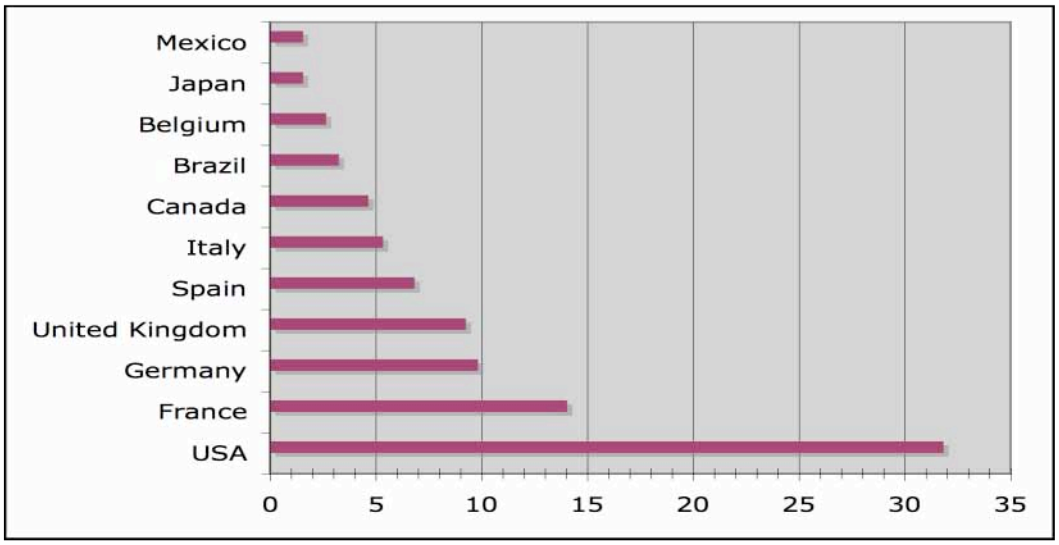
When comparing the former percentages with those observed for PhD studies we can observed that there are significantly less post-doc spent in Europe compared to PhD studies (54.3% compared to 64%) and significantly more spent in North America (36.4% compared to 28%). The number of post-doc spent in LAC and/or other countries are more or less comparable (cf. table 9).

Table 9. Geographical distribution of post-doc for scientists working in Argentina, Brazil, Chile and Mexico

Post-doc in	Europe (Western)	North America	LAC (*)	Others	Total
Brazil	249 (53.7%)	169 (36.4%)	28 (21) (6.0%)	18 (3.9%)	464 (100%)
Argentina	147 (59.3%)	86 (34.7%)	11 (0) (4.4%)	4 (1.6%)	248 (100%)
Mexico	102 (51.3%)	75 (37.7%)	14 (10) (7.0%)	8 (4.0%)	199 (100%)
Chile	36 (49.3%)	28 (38.4%)	7 (4) (9.6%)	2 (2.7%)	73 (100%)
Total	534 (54.3%)	358 (36.4%)	60 (35) (6.1%)	32 (3.2%)	984 (100%)
Comparison PhD studies	64%	28%	5%	3%	100%

(*) = number of post-doc in home country.

Figure 32. Top 11 host countries for post-doc for scientists working in Argentina, Brazil, Chile and Mexico



862 respondents

Figure 32 displays the top 11 host countries for post-doc for scientists working in Argentina, Brazil, Chile and Mexico. These 11 countries host 90% of the post-doc. USA (31.8%) is by far the preferred country of destination for post-doc. They are followed by France (14%), Germany (9.8%), United Kingdom (9.2%), Spain (6.8%) and Italy (5.3%).

For the five main science producers in the European Union (Spain, France, Germany, Italy and UK), Western Europe is the main destination for post-doctoral studies with a marked preference to carry out the post-doc in another European country (cf. table 10). The later result confirms the importance of intra-European mobility in S&T in Europe. Out of 418 post-doc, 77 (18.4%) were carried out in the home country. The tendency to carry out the post doc in the home country varies greatly between Spain (11%) and UK (50%) although the sample for UK is very small. Overall one third (33.2%) of the European scientists have selected North America (mainly USA for 85.4% of them) to carry out their post-doctoral studies. The later percentage is comparable to the one obtained for the Latin American scientists (36.4%). USA is particularly attractive for UK and France. There are relatively few who selected a Latin America country (6.2%) and even fewer who went to another country (4.4%). The preferred destinations in Latin America are Mexico, Brazil, Cuba and Venezuela.

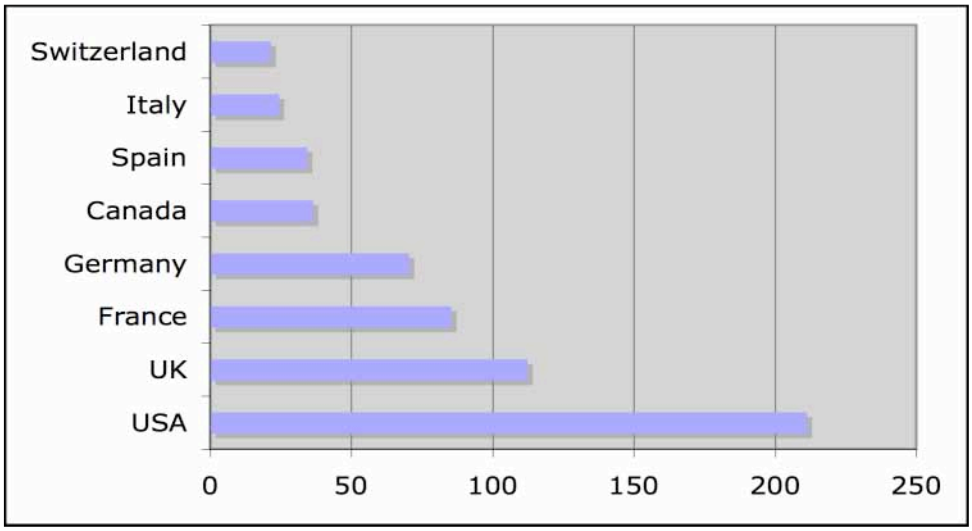
Table 10. Geographical distribution of post-doc for scientists working in Spain, France, Germany, Italy and UK

Post-doc in	Europe (*) (Western)	North America	LAC	Others	Total
Spain	200 (22) (61.3%)	100 (30.7%)	22 (6.7%)	4 (1.2%)	326 (100%)
France	96 (21) (50.8%)	71 (37.6%)	14 (7.4%)	8 (4.2%)	189 (100%)
Germany	45 (15) (49.4%)	31 (34.1%)	6 (6.6%)	9 (9.9%)	91 (100%)
Italy	55 (8) (65.5%)	23 (27.4%)	0 (0.0%)	6 (7.1%)	84 (100%)
UK	22 (11) (40.7%)	22 (40.7%)	4 (7.4%)	6 (11.1%)	54 (100%)
Total	418 (77) (56.2%)	247 (33.2%)	46 (6.2%)	33 (4.4%)	744 (100%)

(*) = number of post-doc in home country.

Figure 33 displays the top 8 host countries for post-doc for scientists working in Spain, France, Germany, Italy and UK. These 8 countries host 80% of the post-doc. USA (28.4%) is by far the preferred country of destination for post-doc. They are followed by UK, France, Germany, Canada, Spain, Italy and Switzerland.

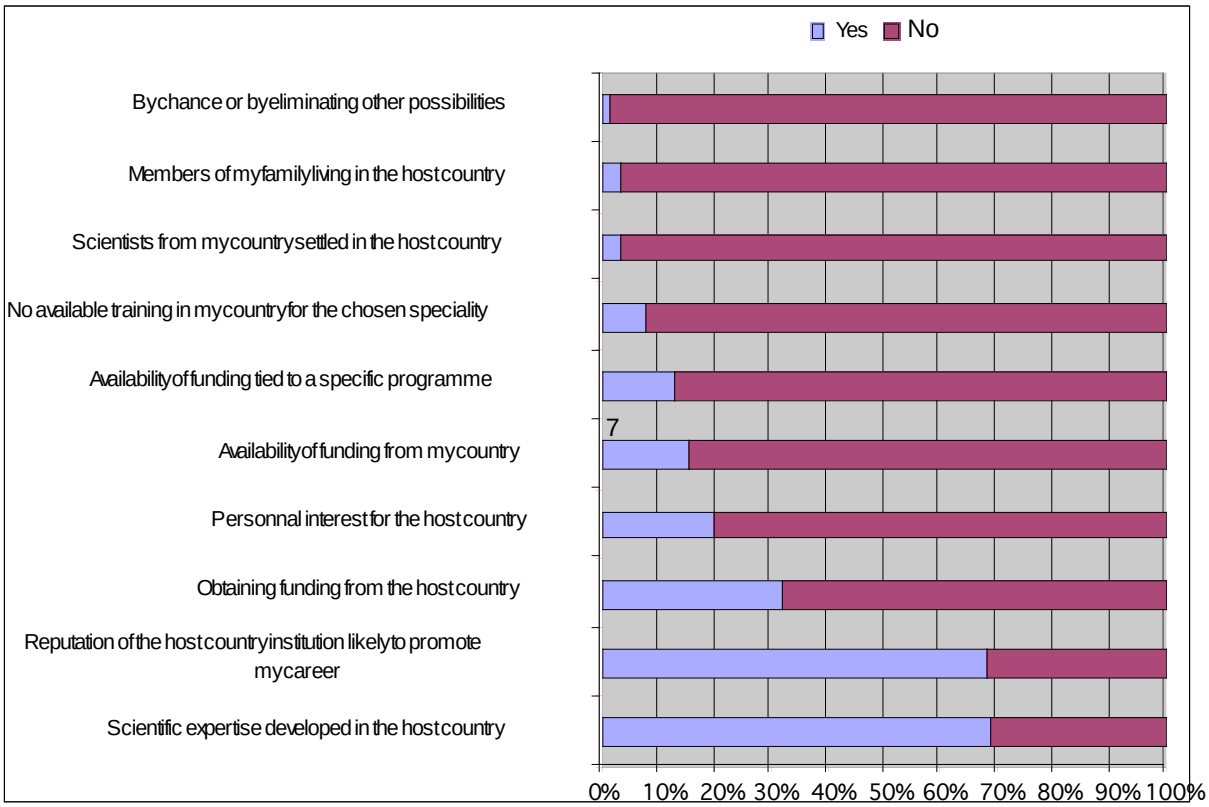
Figure 33. Top 11 host countries for post-doc for scientists working in Spain, France, Germany, Italy and UK



627 respondents

The reasons why scientists went abroad for post-doctoral studies are quite similar to those given for studying abroad. They do however stress even more the importance of scientific expertise and career, the two most important reasons being the "The reputation of host country institution likely to promote my career" and "Scientific expertise developed in the host country" receiving almost 70% of positive answers (cf. Figure 34).

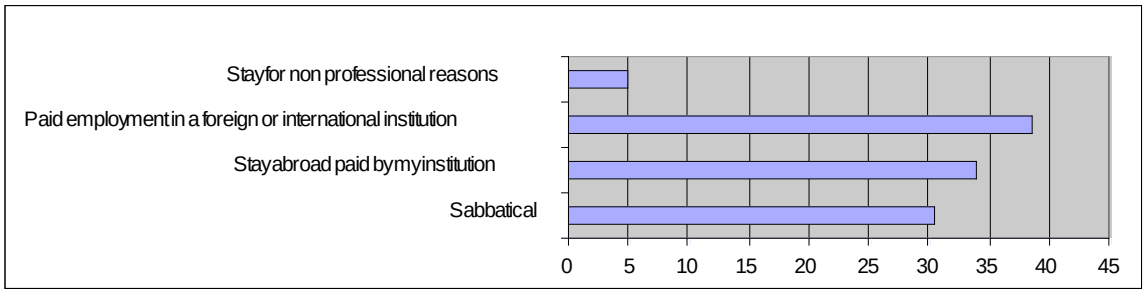
Figure 34. Reasons why scientists went abroad for post-doctoral studies



1870 respondents

To the question: " Have you made other stays abroad exceeding 6 months" 1506 scientists answered "yes" (33% from LAC and 36% from Europe). The nature of these stays is overwhelming for professional reasons (only 5% of the respondents did stay for non professional reasons).

Figure 35. Nature of stays abroad exceeding 6 months



1506 respondents

4.5. International collaborations: nature, frequency and permanency

Altogether, 3814 scientists (86.2%) of our surveyed population spent long period abroad (for study, post-doc or other stays exceeding six months). To what extent did these stays abroad contribute to the promotion of international collaboration activities? With whom and in what institutional context do these collaboration take place? What is their degree of lastingness?

First of all, more than nine out of ten (91.1%), have published scientific papers with colleagues met during extended stays abroad (stays exceeding six months). Undoubtedly, this first result confirms that extended stays abroad significantly contribute to publishing scientific papers in co-authorship with foreign scientists met during extended stays abroad. Who are these foreign co-authors? As shown in Figure x, theses foreign co-authors are overwhelmingly (75.4%) colleagues from institutions in which the scientists have worked abroad, followed by colleagues from other institution(s) in the countries where the scientists stayed (46.2%). This is confirmed by many interviews conducted as illustrated by the excerpts of interviews reproduced below:

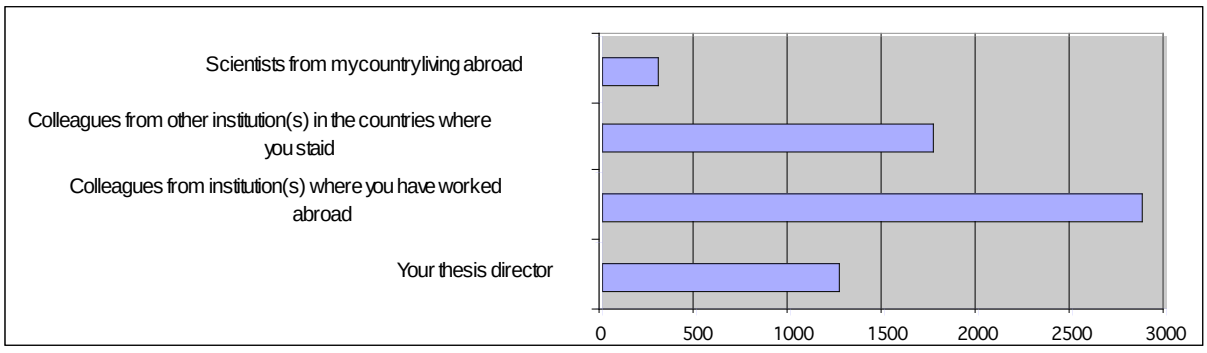
"I met a big part of my scientific community during my PhD in Sweden", says Regina. I am still in contact with many of them and continue to publish with some of them. Most of my best international collaborations today are rooted in my Swedish time".

"I published a few papers with my supervisor" says Jorge (Jorge published altogether 8 papers with H. Smith, his supervisor). "We remained in touch for some time. While in UK, I also met and worked with Gary Whitelam from the same department. Gary was working very closely with Harry Smith and since Harry got sick, I came to work more closely with Gary (Jorge published papers with Gary many years after the PhD)".

Only one third of the respondents (33.4%) published papers in co-authorship with his/her thesis' director. It should however be noted that not all did their PhD abroad. Out of 3814 who went abroad for PhD studies, 2080 did a PhD in a country different from the one of their institution. Out of them 1273 (or 61.2%) responded that they co-published papers with their PhD thesis' director. Nevertheless, more than one third of the respondents who did a PhD abroad published no paper at all in co-authorship with their thesis' director (cf. Figure 36).

The last and by far less important category, i.e. "scientists from my country living abroad", concerns 298 respondents only (or 7.8% of them).

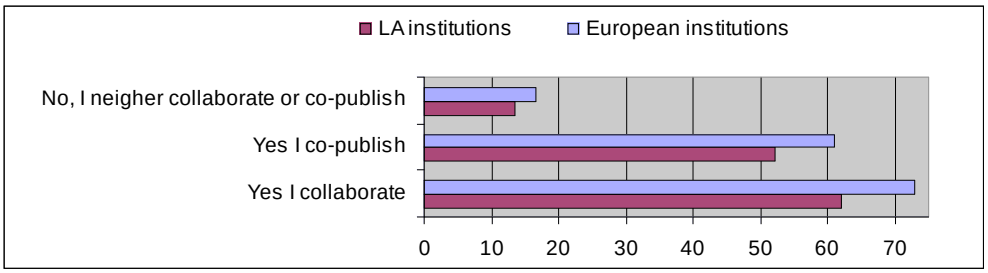
Figure 36. With what colleagues know or met abroad did you publish in co-authorship (%)?



3814 respondents (Europe= 1552; LAC= 2262)

As shown in Figure 37, a minority of them (16.6% for the European scientists and 13.6% for the Latin American scientists) do not continue to co-publish or to collaborate with colleagues known or met abroad.

Figure 37. Do you you continue today to collaborate or to publish with some of the colleagues met or known abroad (%)?



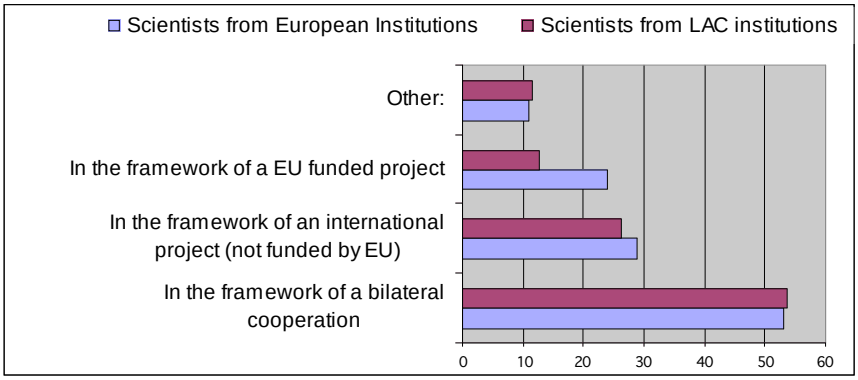
3814 respondents (Europe= 1552; LAC= 2262) = 100%

A large majority continues to co-publish (55.4% on average and up to 60.9% for the European scientists) or to collaborate in some way (66.0% and up to 72.8% for the European scientists) as also confirmed by many interviews conducted with Latin American scientists:

> *"It was a very productive PhD", says Carlos. "I kept in touch and continued collaborating with them on a yearly basis. I did come back as a visiting scholar nearly every year since then and continued to co-author publications with my British colleagues since that time: same people but not the same university (first the University of Edinburgh where I did my PhD and then the University of Nottingham). Although the experiments changed, the main research line remained the same: endocrinology control of follicular development".*

In which institutional context do these collaborations (including co-publications) take place? For more than half of them, these collaborations are taking place in the framework of a bilateral cooperation programme both for the Latin American scientists (53.7%) and for the European scientists (53.2%). Many countries have developed such bilateral cooperation schemes over last two decades (cf. Figure x).

Figure 38. In which institutional framework do these collaborations with foreign scientists met during extended stays abroad take place (%)?



3814 respondents (Europe= 1552; LAC= 2262)

The second institutional framework by order of importance is an international project (not funded by EU) again with the same relative importance both in Latin America (26.2) and in Europe (28.9%). EU funded project are coming in third position but more to the benefit of European scientists (24.0%) as compared to Latin American scientists (12.7%).

For 433 respondents (overall 11.3%), other reasons were also mentioned (cf. Figure x). More than half of them (58.9%), mentioned a number of reasons that could be grouped under a generic category « without or outside any institutional framework ». These would, among others, include reasons such as "mutual or shared personal scientific interests", "friendship", and "spontaneous collaboration". An other important reason mentioned by 69 of them (15.9%) is "national (only)

funding scheme". Other additional but less important reasons by decreasing order of importance would include:

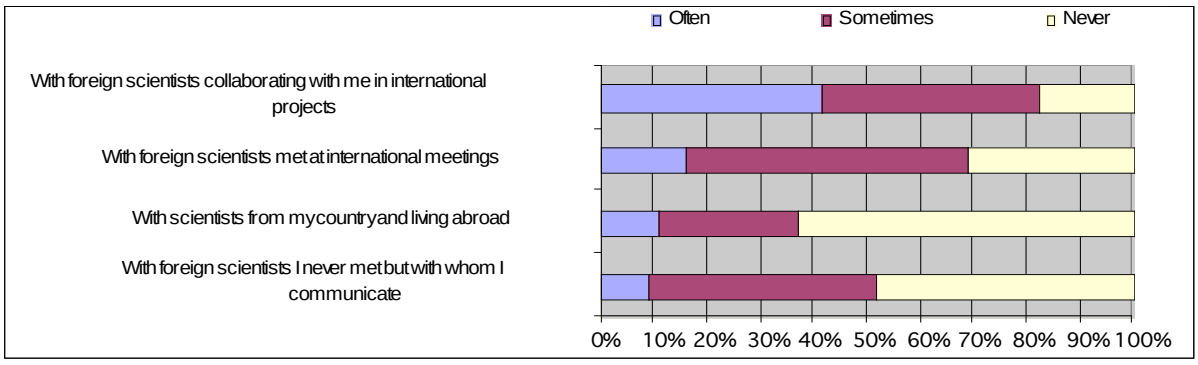
- institutional/University or local funding programmes
- visiting scientists schemes (including sabbaticals)
- private funding schemes
- Other European funding scheme (e.g. ESF)
- via internet
- using funds from other projects
- regional funding schemes
- Doctoral thesis programmes

Conversely, we did also ask our surveyed population, whether they did collaborate or co-publish with scientists abroad that they never met during their extended stays abroad. The large majority of them (61% for the Latin American scientists and 63% for the European institutions) did in fact collaborate or co-publish with scientists abroad that they never met during their extended stays abroad. These foreign collaborators (or collaborators living abroad) are by decreasing order of importance (cf Figure x & x):

1. Foreign scientists collaborating with them in international projects
2. Foreign scientists met at international meetings
3. Foreign scientists they never met but with whom they communicate (e.g. through internet)
4. Scientists from their country living abroad

Figure 39 & 40 display, for respectively the Latin American scientists and the European scientists, the frequency of collaboration with the above mentioned collaborators using three categories: often, sometimes and never. At first glance, the similitude of the two figures, implying that LAC and European scientists would have more or less the same patent and frequency of collaboration in certain contexts and with certain colleagues, is striking.

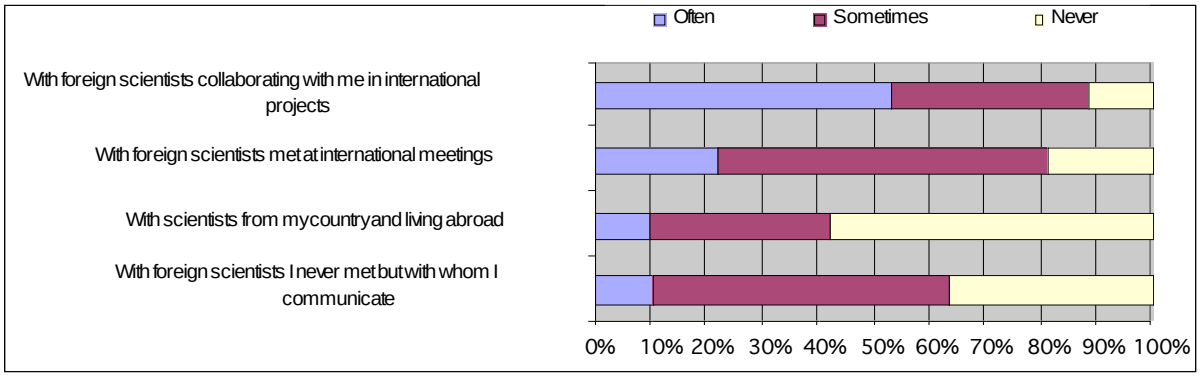
Figure 39. Frequency of collaboration for Latin American scientists with scientists abroad not met during extended visits abroad (%)



1383 respondents

The European scientists would however tend to collaborate more often "with foreign colleagues in the framework of international projects" (53.2% compared to 41.6%) and "with foreign scientists met at international meetings" (22.0% compared to 15.6%). They also tend to collaborate more (often + sometimes) "with foreign scientists they never met but with whom they communicate" (63.4% compared to 51.8%).

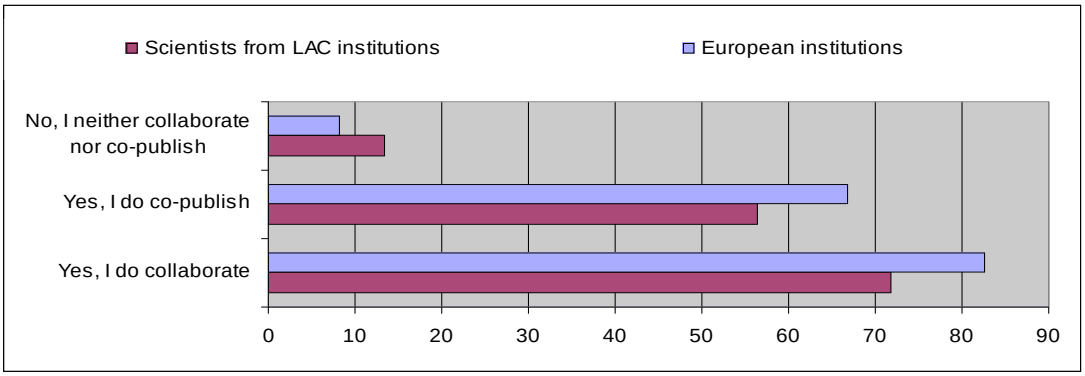
Figure 40. Frequency of collaboration for European scientists with scientists abroad not met during extended visits abroad (%)



1176 respondents

Overwhelmingly, both European and LAC scientists continue to collaborate and to co-publish with some of them once the first collaboration is established (cf. Figure 41). Here again, European scientists tend to be relatively more numerous than their LAC colleagues to continue to collaborate (82.7% compared to 71.9%) or to co-publish (68.8% compared to 56.4%).

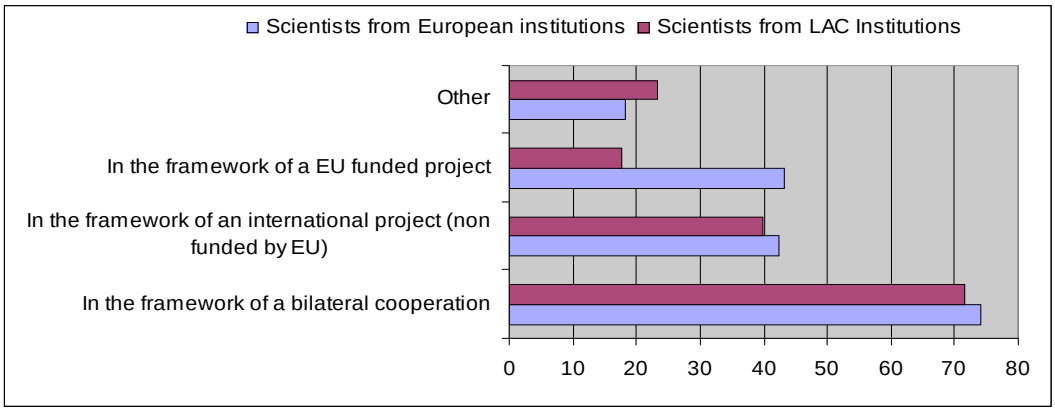
Figure 41. Do you continue to collaborate with any of them (%)?



2559 responses

In which institutional context do these collaborations (including co-publications) take place? As found earlier in the case of collaborations initiated with scientists met during extended stays abroad, these collaborations are even more overwhelmingly taking place in the framework of a bilateral cooperation programme both for the Latin American scientists (71.5%) and for the European scientists (74.0%). The second institutional framework by order of importance is also an international project (not funded by EU) with more or less the same relative importance both in Latin America (39.9%) and in Europe (42.5%). But contrarily to what we found earlier the framework of an EU funded project is slightly more important (43.1% compared to 42.5%) coming in second position for the European scientists (43.1%). Here again cooperating is the framework of an EU project is more to the benefit of European scientists (43.1%) as compared to Latin American scientists (17.8%).

Figure 42. In which institutional framework do these collaborations with foreign scientists not met or known during extended stays abroad take place (%)?



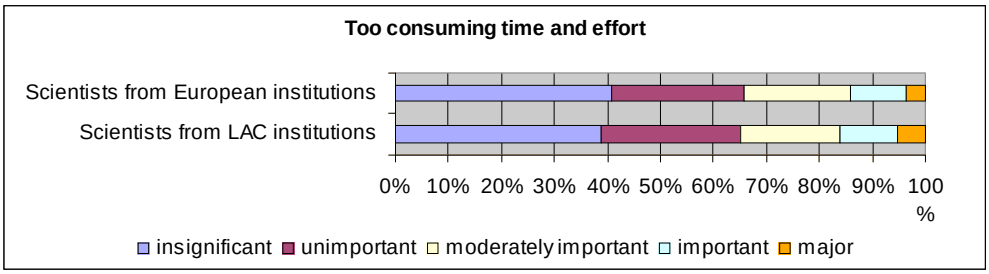
2278 responses

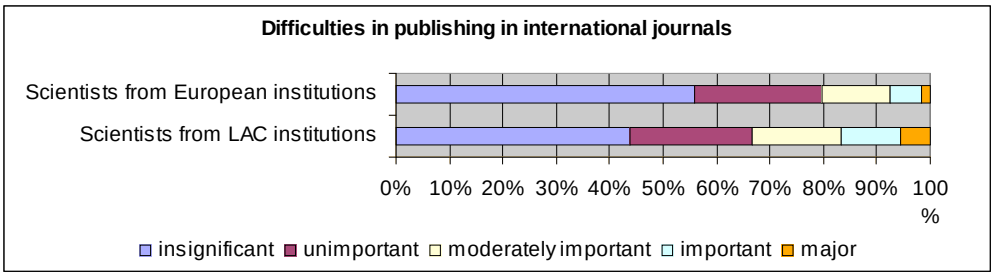
For a tangible number of respondents (13.4% for European scientists and 17.8% for Latin American scientists), other reasons were also mentioned (cf. Figure 42). About half of them (46.7%), mentioned a number of reasons that could be grouped under a generic category « without or outside any institutional framework ». Other additional reasons by decreasing order of importance would include:

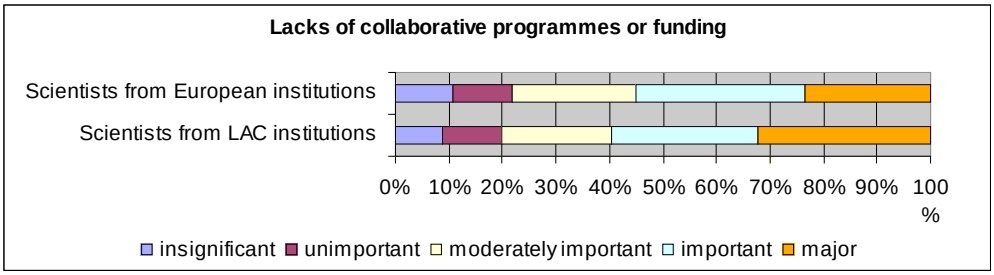
- National (only) funding schemes
- institutional/University or local funding programmes
- visiting scientists schemes (including sabbaticals)
- private funding schemes
- via internet
- regional funding schemes
- doctoral thesis programmes
- publication of a book
- management of a scientific journal.

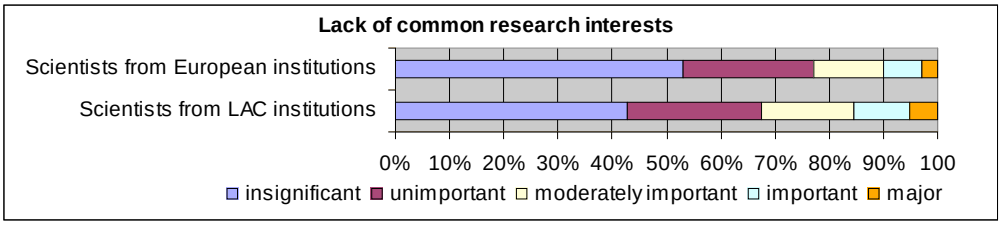
In an attempt to measure the main constraints to collaborate or co-publish with foreign scientists, a series of perceived difficulties were proposed to be rated from 1 = insignificant to 5 = major. Here again, the responses do not differ greatly between the European scientists and the Latin American scientists (cf. Figure 43).

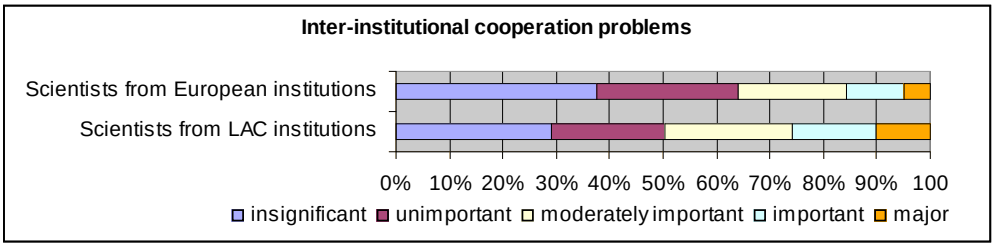
Figure 43. What are the main difficulties to collaborate / co-publish with foreign scientists?

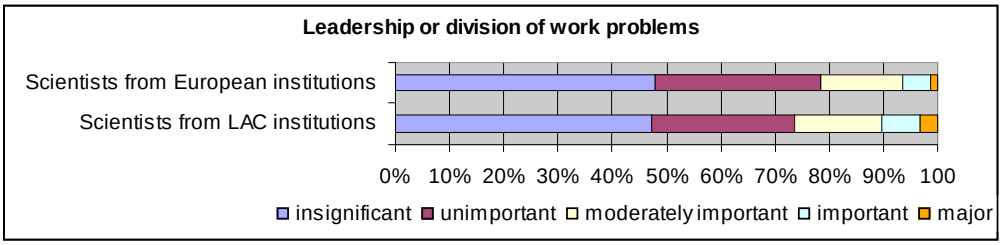


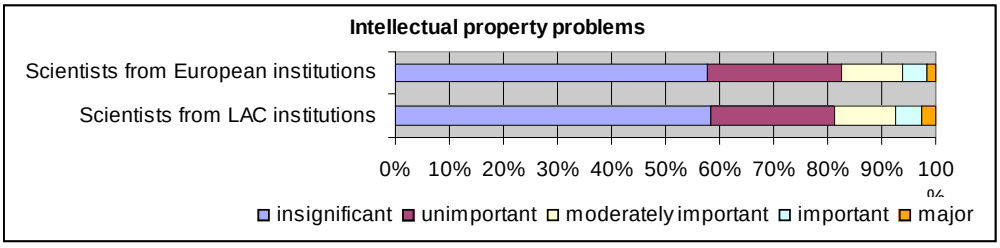

Difficulties in publishing in international journals
Scientists from European institutions
Scientists from LAC institutions
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100 %
insignificant unimportant moderately important important major


Lacks of collaborative programmes or funding
Scientists from European institutions
Scientists from LAC institutions
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100 %
insignificant unimportant moderately important important major


Lack of common research interests
Scientists from European institutions
Scientists from LAC institutions
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100
insignificant unimportant moderately important important major


Inter-institutional cooperation problems
Scientists from European institutions
Scientists from LAC institutions
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100
insignificant unimportant moderately important important major


Leadership or division of work problems
Scientists from European institutions
Scientists from LAC institutions
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100
insignificant unimportant moderately important important major


Intellectual property problems
Scientists from European institutions
Scientists from LAC institutions
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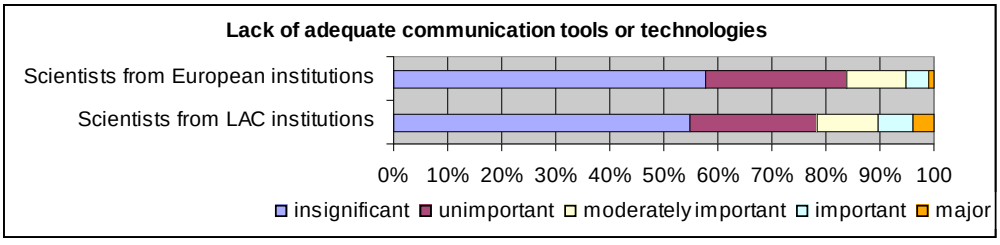
Lack of adequate communication tools or technologies
Scientists from European institutions
Scientists from LAC institutions
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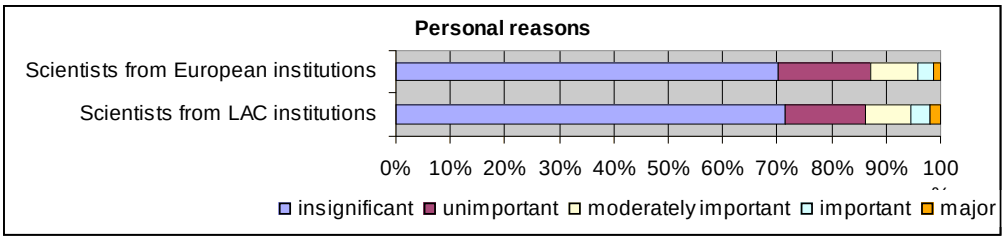
insignificant unimportant moderately important important major



All the sample: 4425 respondents

As shown in the previous figures, most of the proposed potential difficulties were not perceived as such by the respondents except for "lacks of collaborative programmes or funding" that was considered as a main difficulty (from major to moderately important) by four-fifth of the respondents. « Inter-institutional cooperation problems » are also considered as a main difficulty particularly for half of the LAC respondents (from major to moderately important) compared to slightly more than one third (35.8%) for the European respondents. "Publishing in international journals" and the "lack of common research interest" are considered as a main difficulty (from major to moderately important) by one third (respectively 34.7% and 32.4%) of the LAC respondents.

With reference to publishing in international journals, several interviews stressed that the participation of foreign colleagues is not necessarily the royal route to publishing in international journals:

> *"Publishing co-authored publications with foreign colleagues may help you to get established when you are not recognized, but publishing papers with foreign collaborators are not necessarily easier to publish than papers with Argentinean colleagues".*

> *"Why so few foreign co-authors (outside Latin America) despite many contacts in UK, Australia, US, Ireland … etc? "In fact I didn't need to", said Carlos. "Collaborations with foreign colleagues are mainly important for training students, learning techniques, getting advice from them … etc. There is probably a peculiarity in my research", said Carlos "a) it is not very expensive and b) it is not very technique oriented, hence I did not need to have someone running tests for me, but I treasure the advice from scientists in developed countries, I have always asked people around the world about checking on my manuscripts as well as advising on designing experiments and so on …"*

Most of the other perceived difficulties were considered as insignificant or as unimportant for up to 80% or more of the respondents. "Leadership or division of work", for example, that is often perceived as an important constraint in North-South cooperation programmes due to the asymmetry of the collaboration and the dominance of the partner in the North (Gaillard, 1994) was only perceived as a major, important and moderately important constraint by respectively 3%, 5.2% and 15.9% of the LAC respondents.

Another potential difficulty that is not recorded in the Figure x but that came out during the interviews as a serious limitation to international collaboration is lack of time but the lack of time may be overcome through the involvement of graduate students as expressed in one of the following excerpts:

> *"I am more and more deep in paper work. Administration and coordinating the projects does'nt leave much time for science, keeping up-to-date with the literature and looking for new international partners".*

"Most often the bottleneck is time" says Carlos. "You often happen to discuss opportunities for future collaboration when meeting scientists during trips or at conferences like in France recently. But as soon as you are back home, you have other priorities. The key to the problem is to involve graduate students and let them have the opportunity. Publications with students from Costa Rica, Brazil and Sweden are a good proof that this link (through graduate students) is a good way of collaborating".

International collaboration activities can also go through up and done due to the change of interest and or change of institution of one of the partners:

"Thanks to my second post-doc in Seattle, I continued to collaborate and publish with Prof. Lucas Comai (last paper in 2006) said Ricardo but the collaboration somewhat phased out while Comai moved to California to start a new lab at the University of Davis. I recently ask him to resume the collaboration but Comai has too many other commitments. The collaboration with CIP also somewhat discontinued. CIP is mainly interested in collaborating with INTA-Balcarce in Mar del Plata".

Another constraint expressed during interviews by a number of LAC scientists working in provincial universities is linked to the dichotomy capital versus provinces:

"The groups in Buenos Aires are much more likely to participate in international collaborations that groups in the provinces. Likewise, the lion's share of research funding is going to the same group e.g. INTA in Castelar while my group in Mendoza is only getting peanuts most of the case".

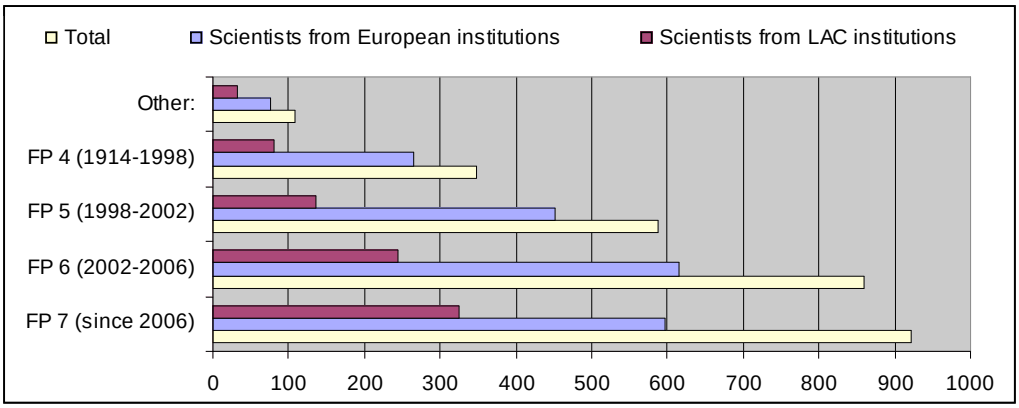
"Research funding is concentrated in Santiago and provincial universities like Valdivia do receive less support. Regional universities need to develop a critical mass for science. New regional programmes, funded by CONACYT, started this year around Talca for fruit production and Puerto Montt for aquaculture but about 30-35% of S&T fundings only are in the regions today".

4.6. Participations to EU funded programmes

The number of participations to EU funded programmes over the last fifteen years increased substantially for the scientists in our surveyed population from 347 participation for FP4 (1994-1998) to 921 participations for FP7 (since 2006). Furthermore, it should be noted that FP7 is still ongoing at the time of the survey. Altogether, European scientists benefited from 1928 participations (71%) and European scientists from 786 participations (29%). The share of LAC scientists has however increased from 24.6% for FP4 to 35.3% for FP7 (cf. Figure 44). Among the 110 "other" participations, the most important programmes are by decreasing order of importance:

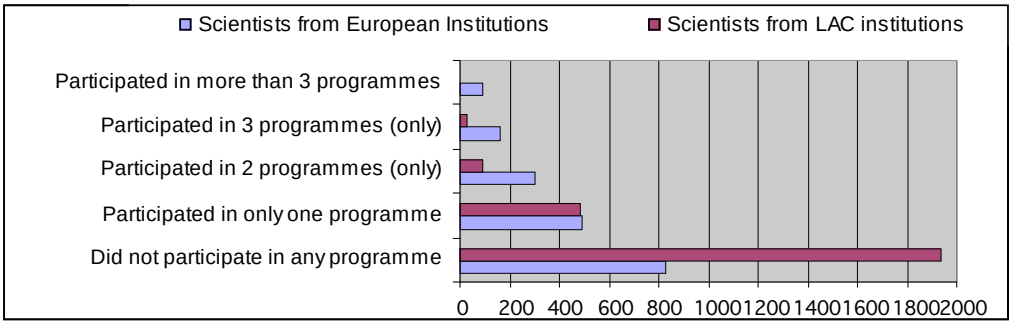
1)INTERREG	2)COST	3)EUROPE AID	4)ALBAN
5)INCO	6)INTAS	7)FP3	8)LIFE
9)ERASMUS	10)EUREKA		

Figure 44. Participations to EU funded programmes by European and LAC scientists (number of participations)



679 respondents (466 scientists from European countries & 213 from LAC countries)

Figure 45. Frequency of participations to EU funded programmes (number of participations)



Total sample = 4425 respondents

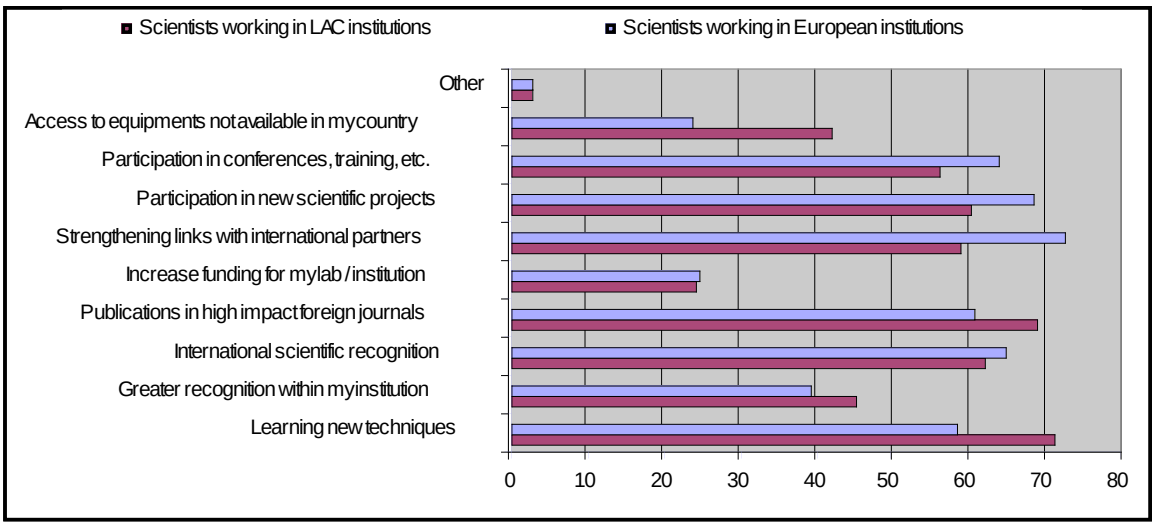
Yet, whereas more than half (55.9%) of the European scientists participated, they were only one fourth (24.1%) of the LAC respondents to participate. Likewise, European scientists tend to participate to more than one programme compared to their Latin American partners. Very few LAC scientists participated to two programmes (93), three programmes (29) or more than three programmes (7) (cf. Figure 45).

4.7. International collaborations: impacts and outcomes

In an attempt to characterize the main outcomes of international collaborations we proposed a series of outcomes to the surveyed scientists from which they could choose all that applied to their specific situation. The results of this question are shown in Figure 46. Although the relative importance of many of the proposed outcomes is not too significantly different for LAC and European scientists, it is possible to notice some distinct trends. The main outcomes for European scientists are related to social and scientific networking activities: “strengthening links with international partners” (72.7%), “participation in new scientific projects” (68.4%) and “participation in conferences, training, etc …” (63.8%). For LAC scientists, international collaboration tend to bring more tangible outcome such as “learning new techniques” (71,0%), “publications in high impact journals” (69,0%) and “access to equipments not available in my country” (42,3%). Other outcomes of importance for both groupings are “international scientific recognition” (64.7% and 62.0% respectively for European and LAC scientists) and to a lesser extent “greater recognition within my institution” (45.5% and 39.3% respectively for LAC and European scientists). “Increase funding for my lab / institution” (24.4% and 24.6%) as well as

"access to equipments not available in my country" (24.0%) for European scientists only are the less important outcomes (cf. Figure 46).

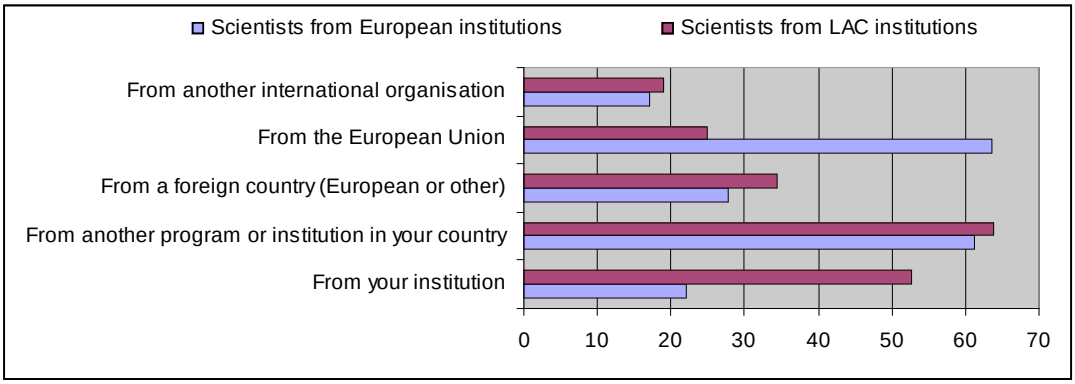
Figure 46. Main outcomes of international collaboration (%)



Total sample: 4425 respondents

For 1084 respondents (24.5%), international collaboration resulted in increased funding for the scientists' laboratories or institutions. Very clear differences are to be noted between European and LAC institutions for two funding sources. Not surprisingly, whereas increased funding from the European Union is of particular importance for European institutions (63.6%), it is much less important for LAC institutions (24.9%). Conversely, increased funding "from the home institution" is much more important for LAC institutions (52.7%) than for European institutions (22.0%). Otherwise, increased funding "from another programme or institution in the home country" is important for both LAC (63.7%) and European (61.2%) scientists. Finally, increased funding "from a foreign country (European or other)" is of lesser importance (respectively 34.5% for LAC and 27.8% for European scientists) and increased funding "from another international organization" is even less important (respectively 19.1% for LAC and 17.1% for European scientists)

Figure 47. Main sources of increased funding for my lab / institution resulting from international collaboration (%)



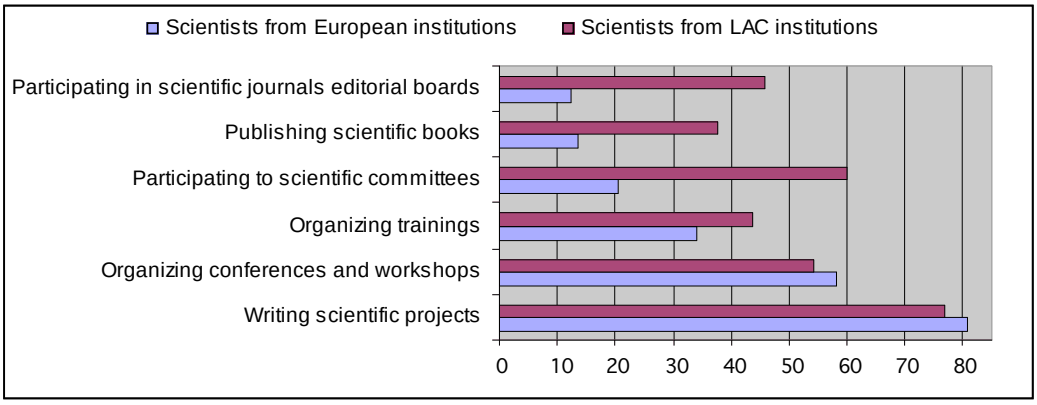
1084 respondents

What other additional outcomes are brought by international cooperation ? The most important one both for LAC and European scientists is « writing scientific projects » (respectively 80.6% for European and 76.9% for LAC scientists). This outcome is also coming very strongly from the interviews conducted. The more you collaborate internationally, the more opportunity you have

to meet new colleagues, exchange ideas and to « writing new projects » and access new funding scheme in collaboration with foreign colleagues.

> *"We just submitted a project to the Agencia Española de Cooperación Internacional para el Desarrollo (AECID) together with colleagues from INIA from Spain (among them Antonio Gonzales Bullnes). I met Antonio at the University Austral in Chile. He was a jury member of one Chilean scientist (Vet.) who worked with Antonio in Madrid. I was also part of the jury and got to know Antonio. When I was in Spain last August, we defined the scope of our project proposal with Antonio. The project is to study the fertility of sheeps at high altitude, effects of hypoxa and also to describe the effects of antioxidant vitamins in the improvement of the reproductive indexes".*

Figure 48. Additional outcomes of international cooperation



All sample: 4425 respondents

The second one is «organizing conferences and workshops » (respectively 58.1% for European and 54.1% for LAC scientists). The other four additional outcomes identified are far more important for LAC scientists than to European scientists (cf. Figure 48). In particular, « participating to scientific committees » is by far more important for LAC scientists (59.9%) than for European scientists (20.4%). Similarly "participating in scientific journals editorial boards" is a much more important outcome from international collaboration for LAC scientists (45.8%) than for European scientists (12.3%). "Organizing trainings" (43.8%) and "publishing scientific books" (37.8%) are two are also two important outcomes of international collaboration for LAC scientists. The following excerpt of an interview with a Chilean oceanographer and ecologist who spent his entire career in Southern Chile is capturing many of these additional outcomes:

> *"As a consequence of my international collaborations particularly with France and Germany on Harmful Algal Bloom (HAB), I became associated to a number of international red tide networks e.g. the UNESCO red tide programme. I was introduced by a French IFREMER scientist to the steering committee of the Global Ecology and Oceanography in Harmful Algal Bloom (GEOHAB). Through that committee, I was in contact with many scientists in different parts of the world not too much related with research but rather related to planning and monitoring activities related to red tides. In Chile, I was the leader of the working group on HABs and as such linked to the National Oceanographic Commission (NOC) and to the Intergovernmental Oceanographic Commission (IOC). I attend every two years the meeting of the IOC red tides programme. Some regional groups were created as part of the IOC activities such as FANSA (Floraciones de Alguas Novicias, Sur America) involving representatives from Ecuador, Peru, Chile. There are different groups throughout the world. Because of all these involvements, I became the head of an intergovernmental panel on HABs (IPHAB) that*

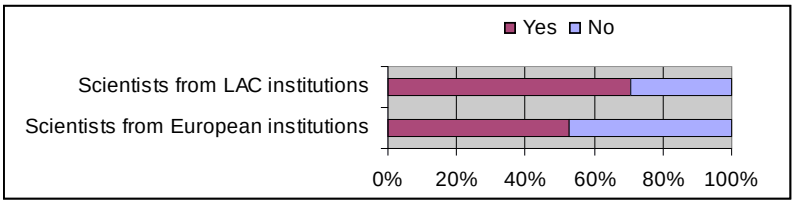
belongs to the IOC. We organized red tide meetings in the Philippines and China.

We are at present preparing a proposal for funding to be submitted to the European Commission with scientists from different parts of the world. The leader is from Ireland. The other partners are from South Africa (Cape Town), China, Spain, Chile and UK. There is a need to have long time series on red tide. For the straight of Magellan there are data from the early 90s. The idea is to analyze and compare the information on red tide in different part of the world and develop comparative methods and possibly prediction models. It will be the first opportunity for us to collaborate with China and South Africa thanks to the European Commission."

4.8. Impact of international collaboration on publication outputs

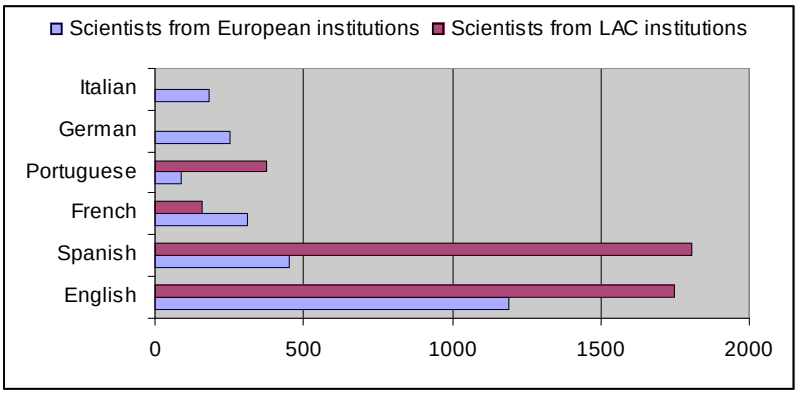
More than half of the LAC scientists (52.9%) and more than two-third of the European scientists (70.5%) publish in more than one language (cf. Figure 49). English is the first language of publication followed by Spanish, French and Portuguese. Two-third (66.3%) publish in English and half (50.9%) publish in Spanish. One-tenth only uses French (10.6%) or Portuguese (10.5%) as a publication language and even fewer uses German (5.9%) or Italian (4.2%). (cf. Figure 50).

Figure 49. Do you publish in different languages?



All sample: 4425 respondents

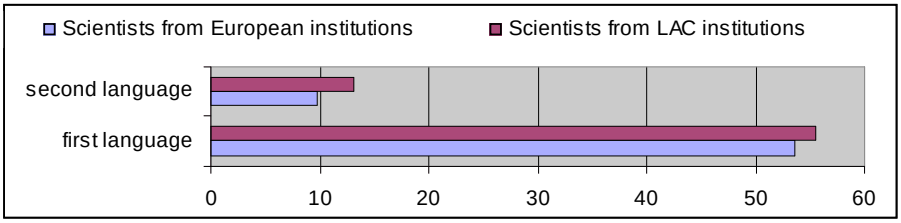
Figure 50. The main languages of publication



All sample: 4425 respondents

English is used as the first publication language by more than half (55.5%) and as a second language by more than one-tenth (13.1%) of the LAC scientists compared half (53.7%) and one-tenth (9.8%) of the European scientists (cf. Figure 51).

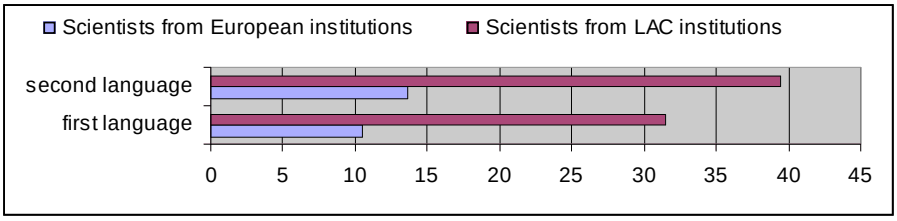
Figure 51. English as publication language



All sample: 4425 respondents

Conversely, Spanish is used as the first language by 31.5 % and as the second language by 39.5% of the LAC scientists. Not surprisingly Spanish is not widely used by the European scientists neither as the first language (10.5%) nor second language (13.6%) (cf. Figure 52).

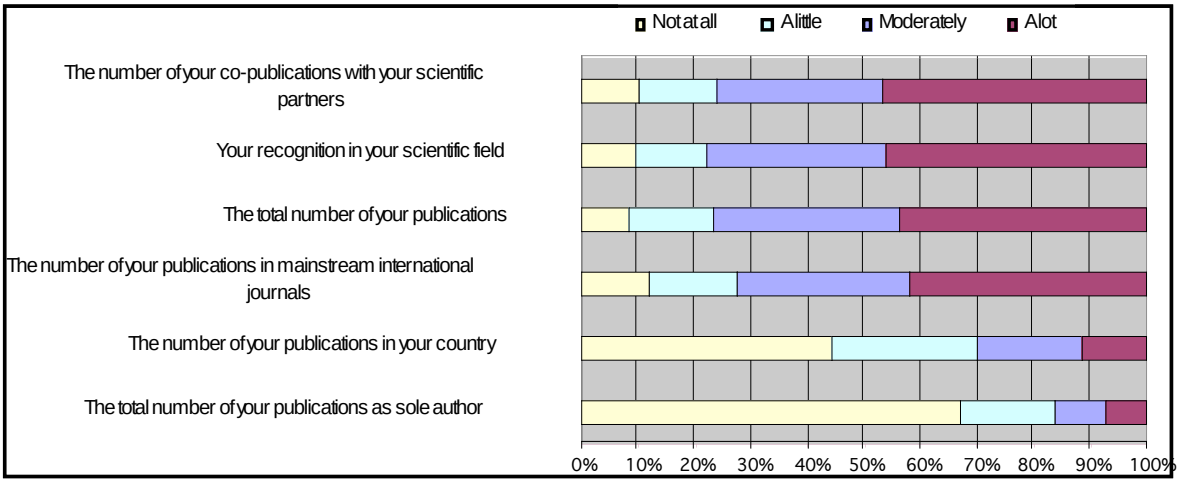
Figure 52. Spanish as publication language



All sample: 4425 respondents

To what extent did international collaboration contribute to increased publication outputs? The answers received from 4287 scientists are presented in Figure 53.

Figure 53. Scientific activities that collaborations with foreign scientists contributed to increase



4287 respondents

According to them, their collaborations with foreign scientists contributed to increase "the number of co-publications with their scientific partners" (47% a lot and 29.5% moderately), "their recognition in their scientific field" (46.5% a lot and 32% moderately), "the total number of their publications" (44% a lot and 33% moderately) and "the number of their publications in mainstream international journals" (42% a lot and 31% moderately). Conversely, they increase only very marginally "the number of their publication in local journals" (11% a lot and 19% moderately) or "the total number of their publications as sole author" (7% a lot and 9% moderately) (cf. Figure 53).

Figure 54. Type of publication that foreign collaboration contributed to increase (for respectively European and LAC scientists)?

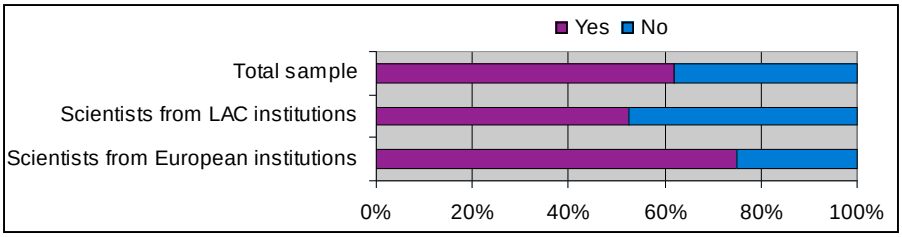
4287 responses

4.9. Responding to calls for tenders involving international scientific collaboration

4.9.1. A majority of surveyed scientists do respond to calls for proposals

While a large majority (62.3%) of scientists in our surveyed population do respond to calls for proposals involving international scientific collaboration a larger share of scientists working in European institutions (74.8%) are doing so compared to scientists working in LAC institutions (52.4%) (cf. Figure 55).

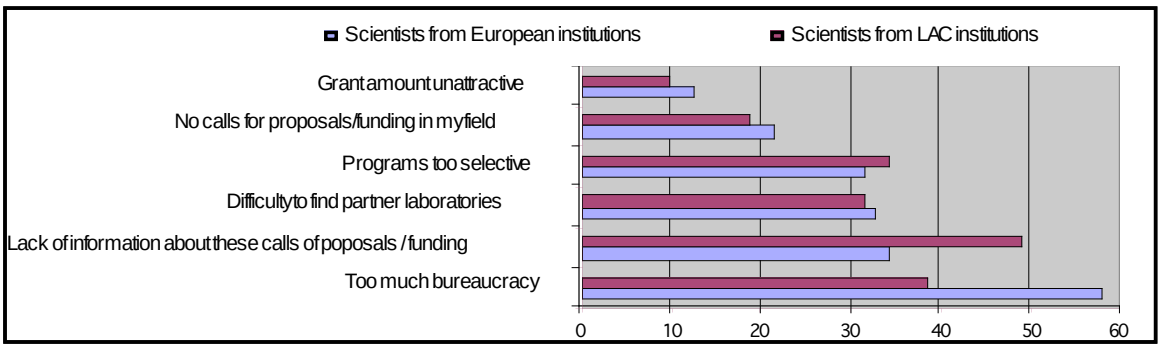
Figure 55. Have you responded to calls / tenders involving international scientific collaboration?



All the sample: 4425 respondents

The 1686 scientists (38.1%) responding "no" to the preceding question were provided with a number of reasons that could explain why they do not respond to calls for proposals involving international scientific collaboration. The scientists could select all reasons that applied to their particular case. Here again the responses between scientists in European and LAC institutions are following a very similar pattern except for the two most important reasons: "too much bureaucracy" and "lack of information" (cf. Figure 56). Whereas more than half of the scientists working in European institutions (58.1%) selected "too much bureaucracy" as a main reason not to respond to calls for proposals, they were slightly more than one third (38.4%) in LAC institutions to do so. Conversely, "lack of information about these calls for proposals / funding" was a more important reason for scientists in LAC institutions (49.2%) compared to European institutions (34.1%).

Figure 56. If not, why?



1686 respondents

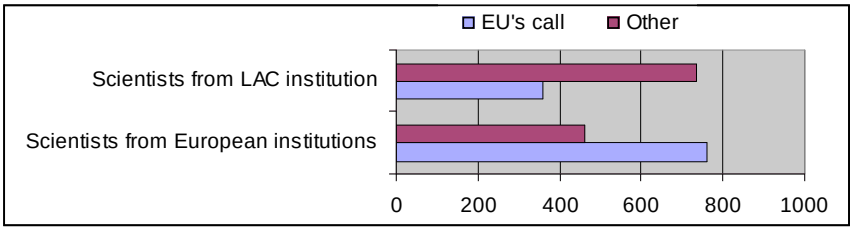
The following reasons "difficulty to find partner laboratories" and "programmes too selective" concern approximately one third of the respondents irrespective of whether they work in European or LAC institutions. The two last reasons "no calls for proposals / funding in my field" and "grant amount unattractive" are less important with respectively approximately 20% and 10% of the respondents. A number of other reasons were also provided by 103 scientists (41 in Europe and 62 in LAC). The most important other reasons by order of importance were the lack of need or interest, the lack of time, language problems and the fact that there is enough funding available from national or bilateral funding programmes. Other less frequently mentioned reasons

are “non-transparent and confusing decision process”, “most programmes support travel grants while we need funds for field work and analysis” or even “EU-FP programmes are a complete bluff and do not stimulate real collaborations”.

4.9.2. Participation to EU calls is approximately as much important as to other calls

In an attempt to estimate, the relative importance of EU calls compared to other calls, the scientists were asked a number of questions related to the last call for proposal / funding won. Not surprisingly, scientists working in Europe participate more to EU calls (62.3%) than to other calls and conversely, scientists working in LAC countries participate more to other calls (67.0%) compared to EU’s calls (37.7%) and conversely, scientists working in LAC countries participate more to other calls (67%) compared to EU’s calls (33%) (cf. Figure 57).

Figure 57. Last call obtained: organisation promoting the call

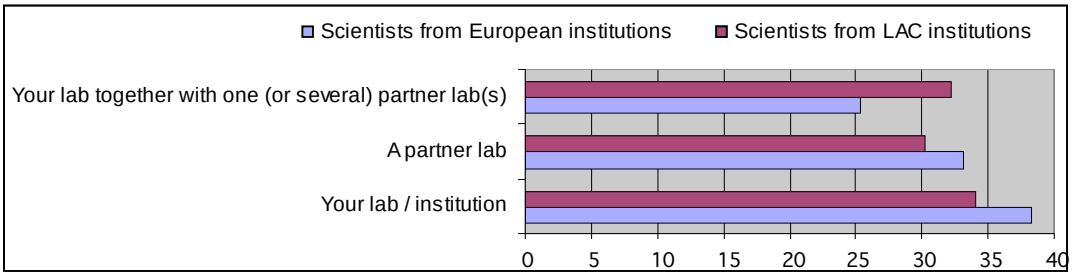


2217 respondents (EU = 1223, LAC = 1094)

4.9.3. The functioning of international projects: distribution of role, tasks and budget

Responses to the question “who initiated the project?” indicate that projects are initiated in approximately the same proportion by the scientists’ lab / institution (EU: 38.2%; LAC: 34.0%), a partner lab (EU:33.3%; LAC: 30.2%) or a the scientists’ lab together with one (or several) partner lab(s) (EU: 25.4%; LAC:32.2%). To sum up, for approximately two-third of the scientists (LAC: 66.2%; EU: 63.6%) the project was initiated by their lab/institution alone or together with one (or several) partner labs (cf. Figure 58).

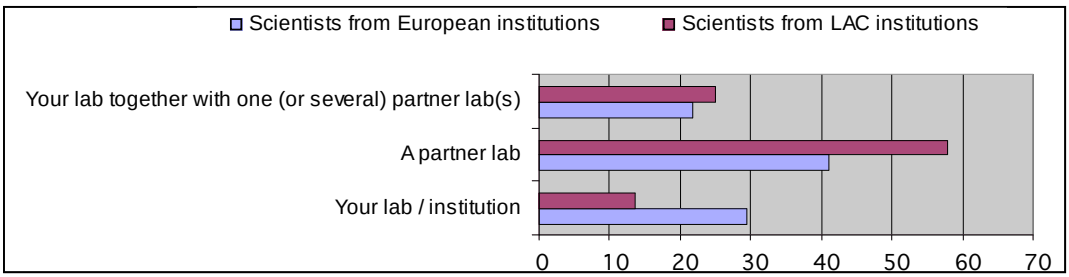
Figure 58. Who initiated the project (all calls)?



2217 respondents (EU = 1223, LAC = 1094)

Here again, the responses provided by scientists in European versus LAC institutions are not very different. However, the picture is slightly different if we isolate the responses concerning EUs’ calls only (cf. Figure 59).

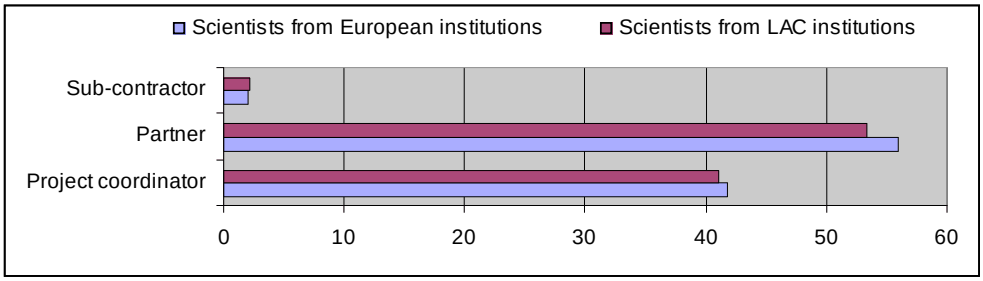
Figure 59. Who initiated the project (EUs' calls only)? *1123 respondents (EU = 762, LAC = 361)*



In the later case, EU projects are predominantly initiated by a partner lab and even more so for scientists working in a LAC institution (57.8%) compared to scientists working in European institutions (41.1%). Very few (13.6%) scientists' lab or institutions in Latin America were at the origin of a EU funded project compared to scientists working in a European institution (29.5%).

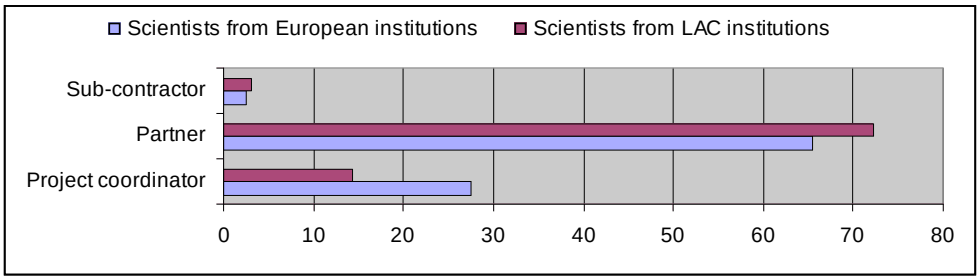
Although, the majority of the scientists (EU : 56.0% ; LAC : 53.4%) played the role of partners in the projects supported by all calls, a great proprtion of them (EU : 41.8% ; LAC : 41.0) declared themselses as being Project coordinators. Very few are (or were) sub-contractors (EU : 2.0% ; LAC : 2.1%).

Figure 60. What was (or what is) your role in this project (all calls)



2217 respondents (EU = 1223, LAC = 1094)

Again, the picture differs slightly when isolating the responses concerning EUs' calls only (cf. Figure 61). Whereas most scientists are overwhelmingly playing the role of partners (LAC 72.3%, EU 65.5%), there are many more scientists working in Europe being project coordinators (209 or 27.4%) compared to Latin American scientists (66 or 14.4%). **Figure 61. What was (or what is) your role in this project (all calls)**

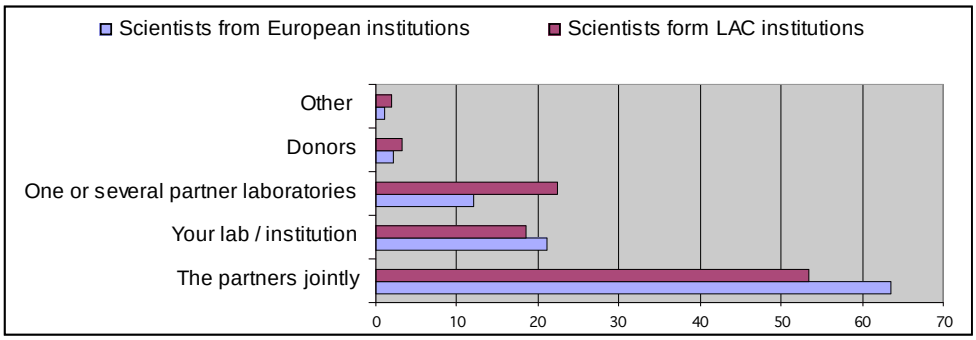


1123 respondents (EU = 762, LAC = 361)

Based on our own experience of a few EU projects, a number of scientists working in Latin America declared being project coordinators when they were national coordinators only. Taking the later observation in consideration, the number and relative importance of project coordinators in Latin America is probably even less important than reported. The number and relative importance of sub-contractors are very limited both for scientists working in Latin America (3.0) and for scientists working in Europe (2.5%).

For the majority of the scientists, the partners jointly decided (or decide) about the budget distribution, even if scientists working in Europe are slightly more likely to do it (63.4%) than their partners working in Latin America (53.4%).

Figure 62. Who decided (or decide) about the budget distribution? (all calls)

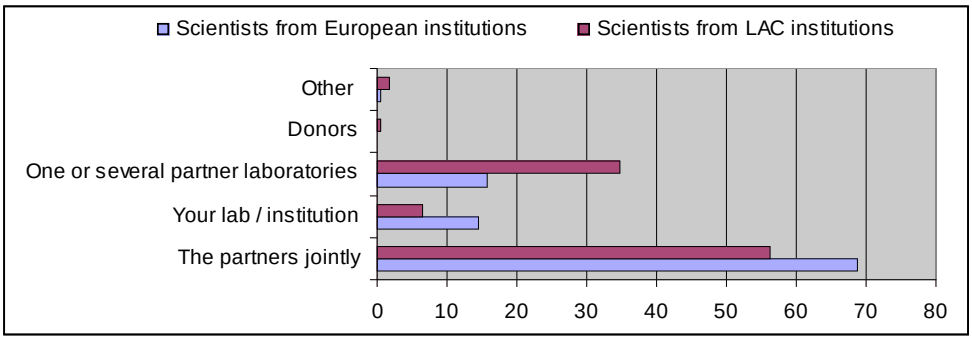


2217 respondents (EU = 1223, LAC = 1094)

Conversely, budget distribution is more likely to be decided by partners "one or several partner laboratories" for scientists working in Latin America (22.5%) compared to scientists working in Europe (12.0%). Donors or other actors have little involvement in deciding about budget distribution (cf. Figure 62).

Regarding EU's calls only, the decisions about budget are also taken in a large majority by the laboratory of the scientist (alone or with others) with a significant difference between European labs (83.3%) and LAC labs (62.8%). Consequently these decisions are more likely to be taken by others "One or several partner laboratories" for scientist working in Latin America (34.8%) than for scientists working in Europe (15.8%) (cf. Figure 63).

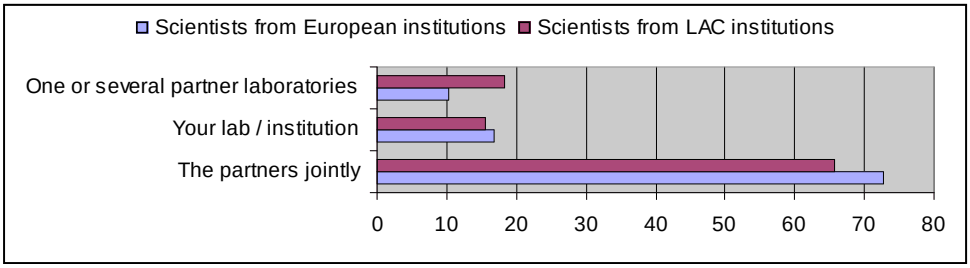
Figure 63. Who decided (or decide) about the budget distribution? (EU's calls)



1123 respondents (EU = 762, LAC = 361)

Similarly, decisions about the distribution of tasks are overwhelmingly taken by the partners jointly (EU: 72.6%, LAC: 65.7%) but such a decision is more likely to be taken by "one or several partner laboratories" if you are a scientists working in Latin America (18.2%) than if you are a scientist working in Europe (10.3%) (cf. Figure 64).

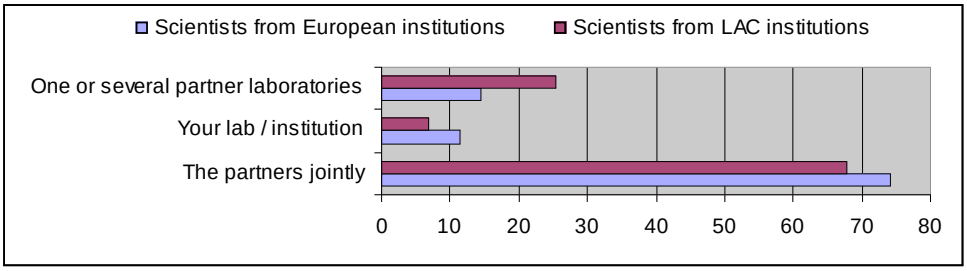
Figure 64. Who decided (or decides) about the distribution of tasks? (all calls)



2217 respondents (EU = 1223, LAC = 1094)

Regarding decision about distribution of tasks, the picture is even more similar when considering EU's calls only than for decisions about budget distribution.

Figure 65. Who decided (or decides) about the distribution of tasks? (EU's calls)



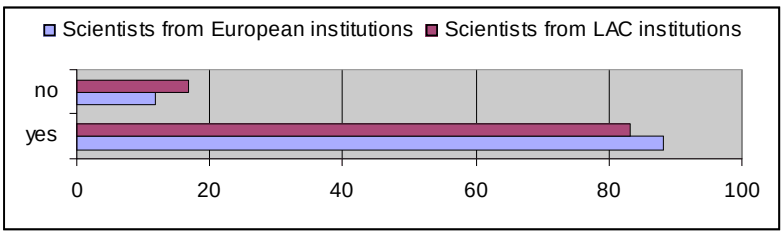
1123 respondents (EU = 762, LAC = 361)

Overall, the above responses concerning decisions about the distribution of role, tasks and budget in international projects between European and Latin American scientists tend to indicate that the asymmetry of relations which was pointed as a burning issue back in the 1970s and 1980s has been turned into a more equal partnership.

4.9.4. Degree of involvement

The large majority of the respondents (83% for the scientists working in LA et 88% for the scientists working in Europe) consider that they were able to get involved as much as they wanted in the project related to the last call for proposal / funding obtained (cf Figure 66)

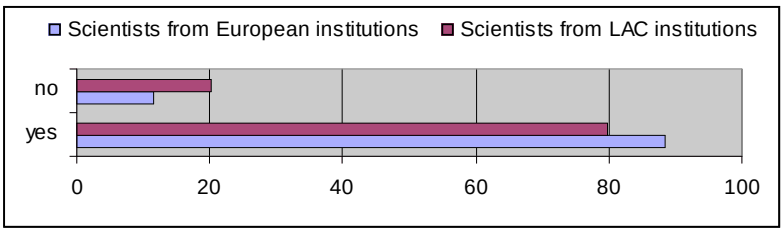
Figure 66. Have you been able to get involved as much as you wanted in this project?



2217 respondents (EU = 1223, LAC = 1094)

However, more scientists (20.5%) working in LAC as compared to scientists working in Europe (12%) responded they were <u>not</u> able to get involved as much as they wanted when considering the projects related to a EU call only (cf. Figure 67).

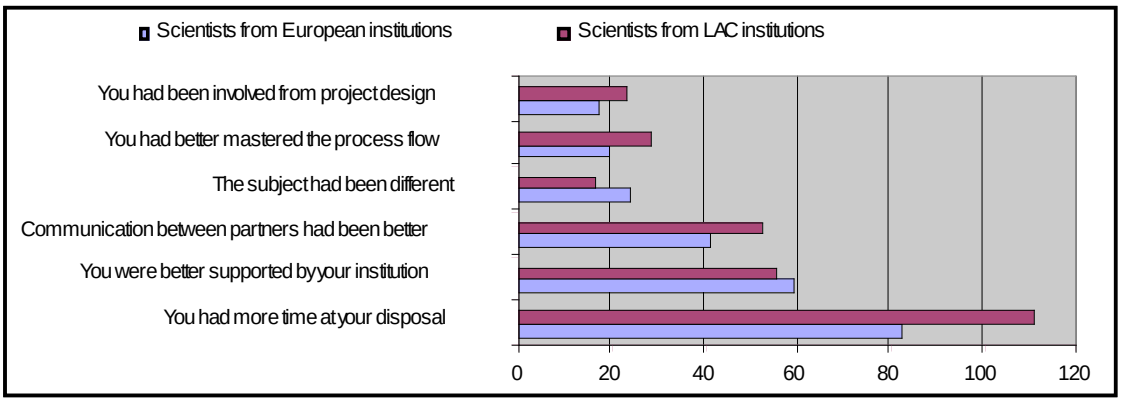
Figure 67. Have you been able to get involved as much as you wanted in this project? (EU's calls)



1123 respondents (EU = 762, LAC = 361)

The scientists who responded "no" to the previous question overwhelmingly (for approximately two-thirds of them) claimed that they could have been more involved if they had more time at their disposal to contribute to the project.

Figure 68. Could you have been more involved if? (answered "no" to previous question)



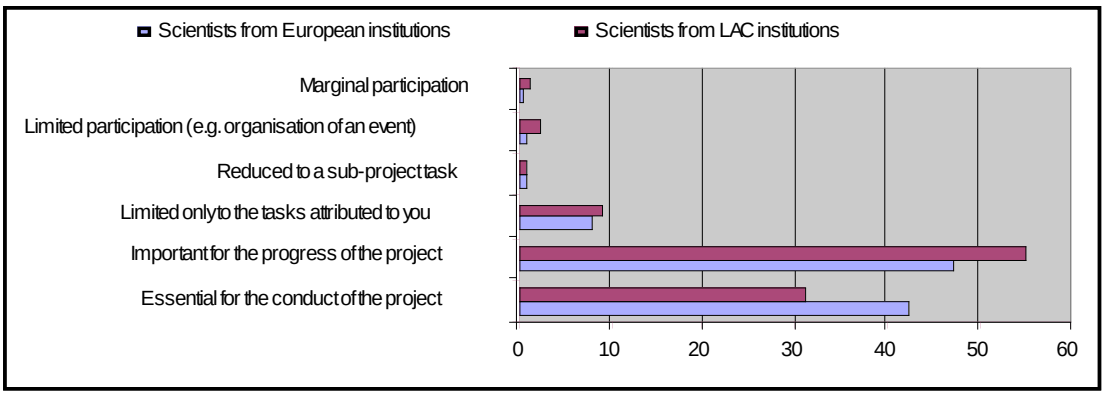
308 respondents (EU = 134, LAC = 174)

They were also of the opinion, but to a lesser extent (less than one-third), that they could have been more involved if "they were better supported by their institution" and if "communication between partners had been better". The other reasons given concern too few people too be significant (cf. Figure 68).

4.9.5. Level of contribution

Still reflecting on the project related to the last call for proposal obtained, the majority of the scientists rate their contribution to the project either "important for the progress of the project" or "essential for the conduct of the project".

Figure 69: How would you rate your contribution to this project? (all calls)



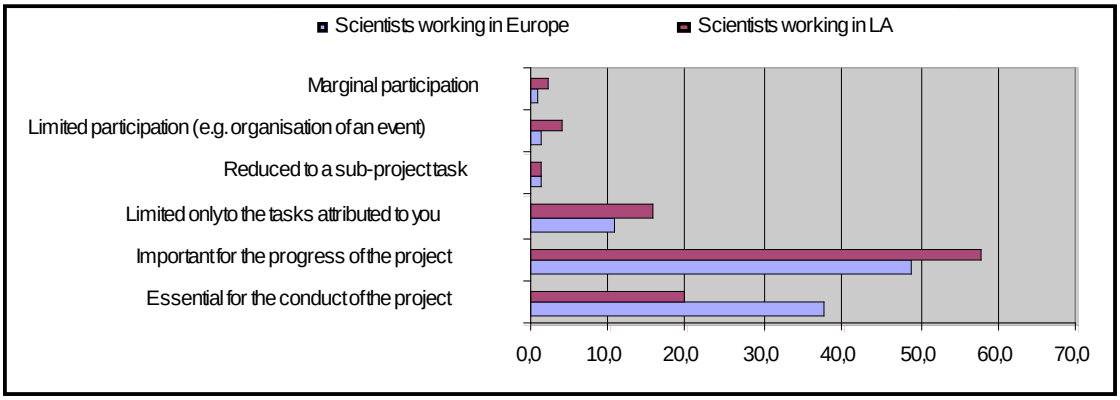
2217 respondents (EU = 1223, LAC = 1094)

Scientists working in Europe were however more likely to rate their contribution as essential to the conduct of the project (42.4%) than scientists working in LAC (31.1%). The other

proposed levels of contribution were considered as much less important (cf. Figure 69). Few respondents (less than 10%) responded that their contribution was “limited only to the tasks attributed to them” and even less that it was a “limited participation”, “reduced to a sub-project task” or even marginal participation (around or less than 1%).

When limited to the EU calls only, the responses to the same questions are following a similar general pattern although they were significantly fewer respondents working in Europe (37.3%) and even more so in LAC (19.7%) who considered that their contribution was ‘essential for the conduct of the project”. Conversely, they were relatively more scientists working in LAC (15.7%) and to a lesser extent in Europe (10.8%) who were of the opinion that their contribution to the project was “limited only to tasks attributed to them” (cf. Figure 70).

Figure 70. How would you rate your contribution to this project? (EU calls only)

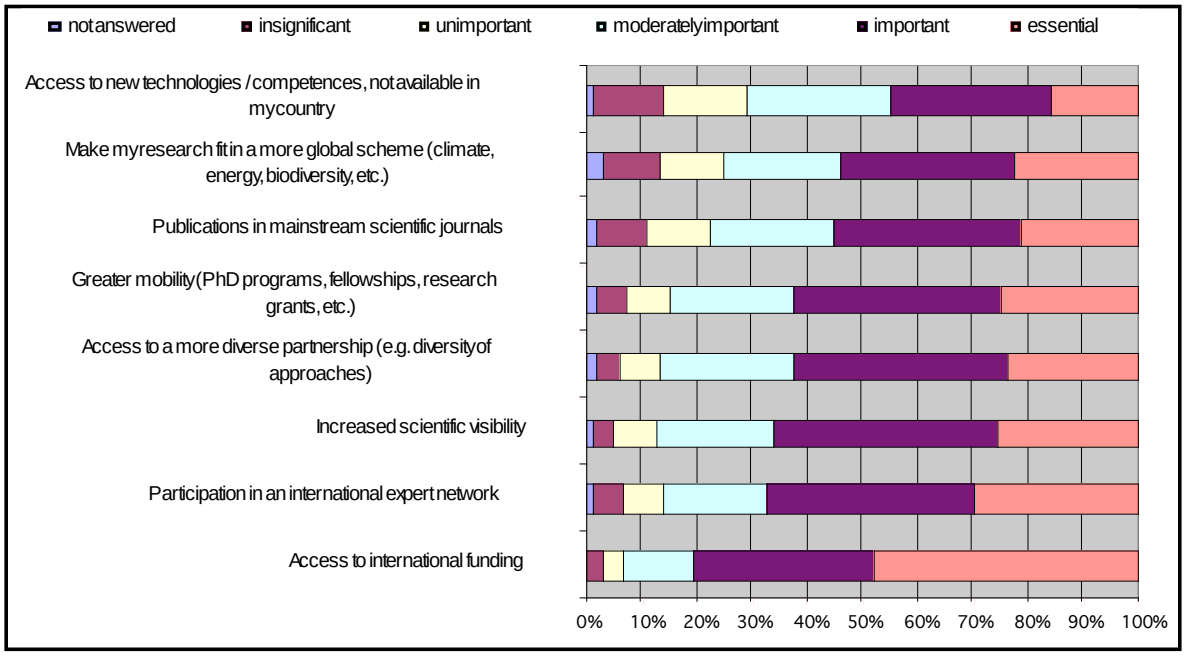


1123 respondents (EU = 762, LAC = 361)

4.9.6. Motivations to participate

In an attempt to characterize what motivate the surveyed scientists to participate to an international call for proposals, they were provided a number of reasons. 4091 scientists responded (92.5%) although this question was optional. The results are presented in Figures 71 and 72 for respectively scientists working in European countries and scientists working in LAC countries. Although all reasons were considered as « important » or « essential » by a large majority of the respondents in the two groups, the results differ significantly on expected benefits between them. The most important for European scientist is « access to international funding » (80.9%). The other reasons are, by decreasing importance: « participation to an international expert network » (67.3%), followed closely by « increased scientific visibility » (66.1%), “Access to a more diverse partnership (e.g. diversity of approaches)” (62.8%) « greater mobility » (62.5%).

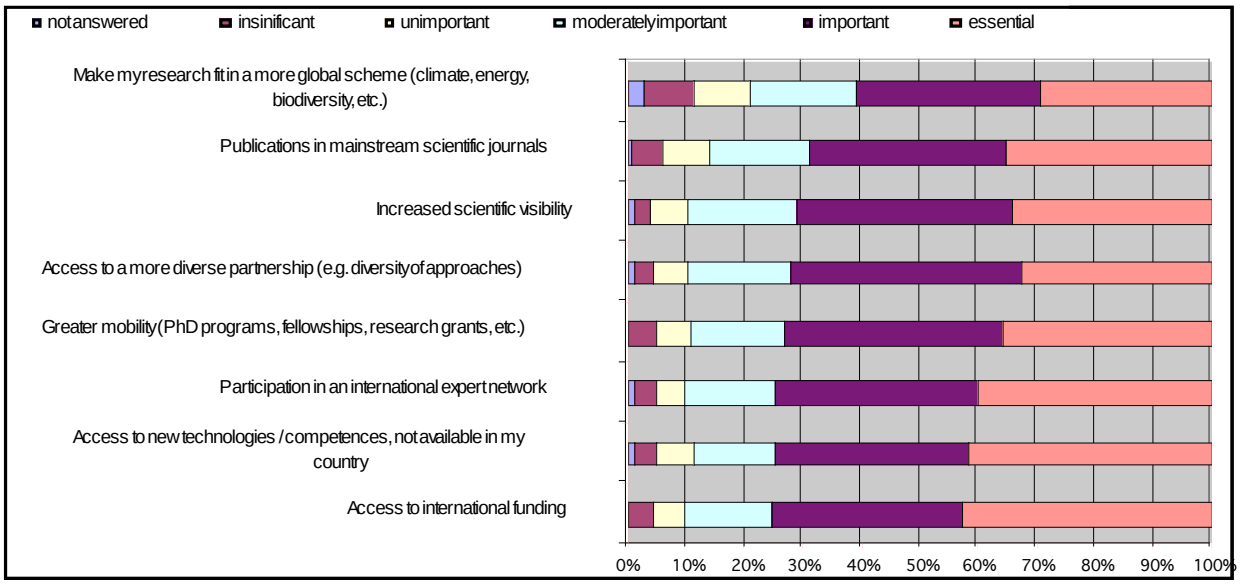
Figure 71. Reasons that motivate scientists to participate to international calls for proposals for scientists from European countries



1760 responsdents

The two following reasons are still motivating the majority of European scientists: namely « publications in mainstream scientific journals » (55.1%), and « make my research fit in a more global scheme (climate, energy, biodiversity, etc.) (53.9%). Not surprisingly, the last reason for European scientists is « access to technologies / competences, not available in my country » (with only 45.3% of opinions “important” or “essential”.

Figure 72. Reasons that motivate scientists to participate to international calls for proposals for scientists from Latin American countries



2331 respondents

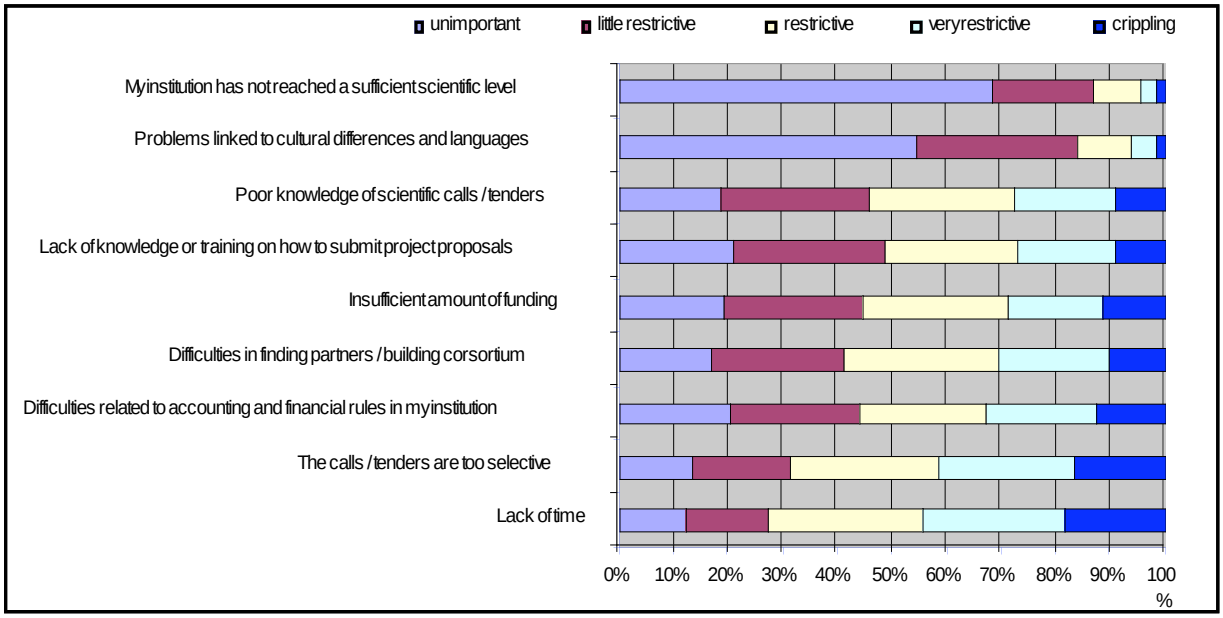
While “access to international funding” is also the most important motivation for the LAC scientists (75.1% of opinions give it as “important” or “essential”), it is very closely followed by the others: “access to new technologies / skills, not available in my country "(74.8%)," participation in international expert network (74.5%), "Greater mobility (PhD programs, fellowships, research grants, etc.. "(73.1%). While both Europeans and Latin Americans are

motivated to participate in an international tender as showed in Figures 71 and 72, scientists working in LAC countries are as much interested by accessing funding than by accessing technologies, participating in international networking activities and greater mobility (cf. Figure 72).

4.9.7. Limiting factors to participate

Overall the three main factors that limit the scientists' participation in international scientific calls for proposals are for a large majority of the respondents « poor knowledge of scientific calls» (63.4%), « calls/tenders are too selective » (62.6%), and « the difficulties in finding partners and building consortium » (63.4%) (cf Figure 71).

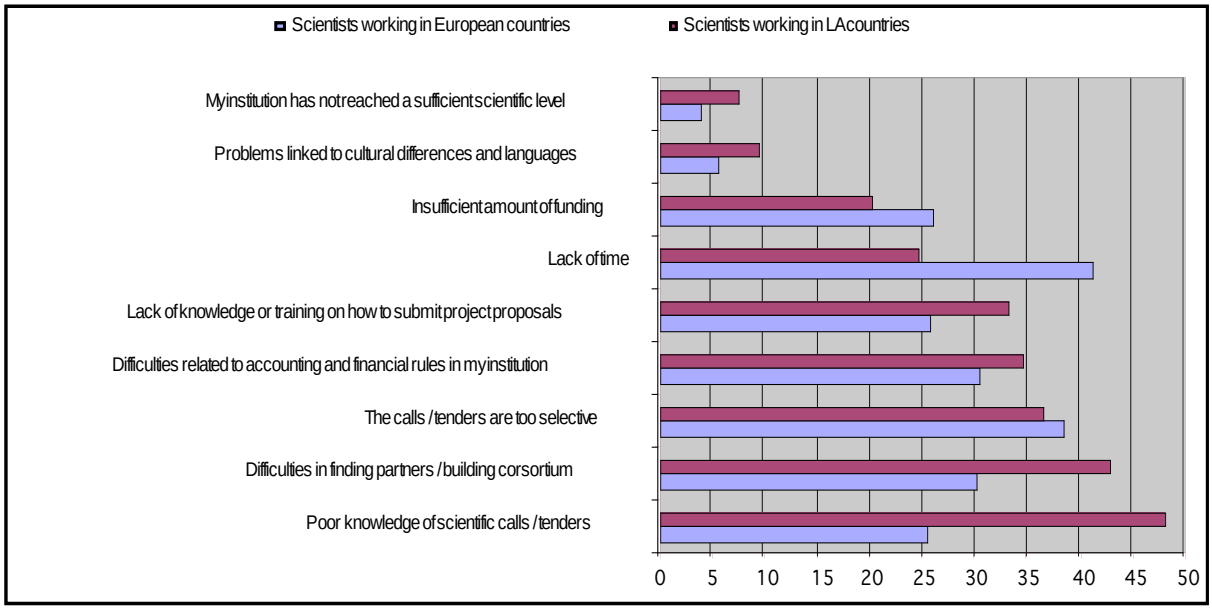
Figure 73. Among the following considerations, indicate those that limit your participation in international scientific calls for proposals/funding ?



4280 respondants

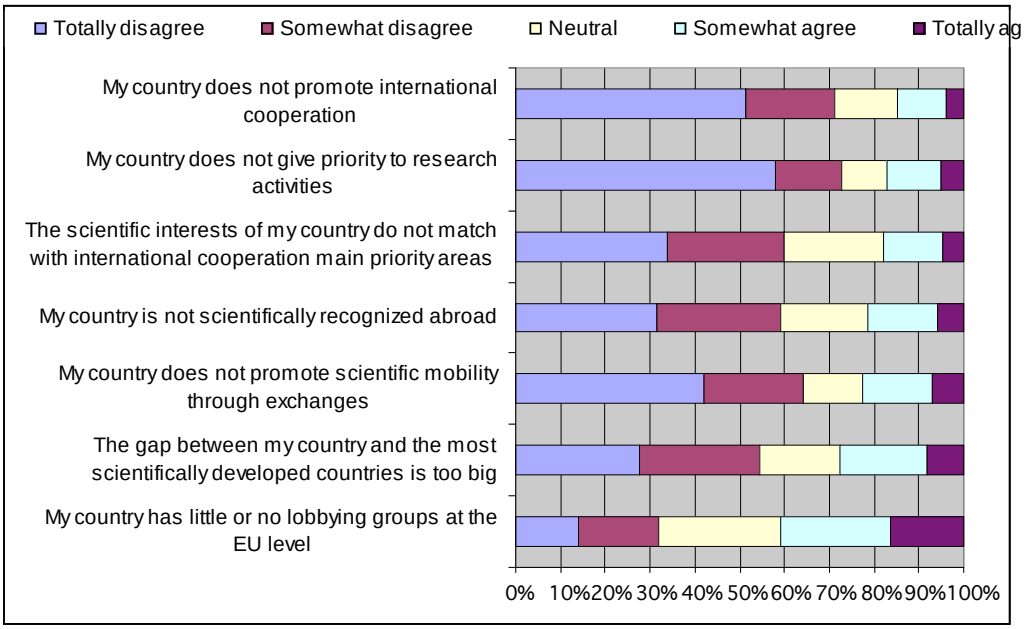
There are proportionally many more scientists from LAC countries that considered that having a "poor knowledge of scientific calls / tenders" or "difficulties in finding partners / building consortium" were "crippling" or "very restrictive" limiting factors to participating in international scientific calls for proposals compared with scientists working in Europe (cf. Figure 74). Additional statements were proposed to scientists working in LAC only (cf. Figures 73, 74 and 75). While up to 41% of them "somewhat agree" or totally agree" that "his/her country has little or no lobbying groups at the EU level and nearly 30% "somewhat agree" or "totally agree" that "the gap between his/her country and scientifically developed countries is too big", they were respectively 22% and 21% to "somewhat agree" or "totally agree" that "his/her country does not promote scientific mobility through exchanges" and "my country is not scientifically recognized abroad". The other three statements received slightly less than 20% of agreement (total or somewhat) by the responding scientists (cf. Figure 75).

Figure 74. "Very restrictive" and "crippling" considerations that limit participation in international scientific call for proposal



4280 respondents

Figure 75. Do you agree with the following statements? (scientists working in LAC only)



2550 respondents

Positioning related to these statements may however vary significantly between countries in Latin America. Latin American countries were therefore divided into two groups: the top four scientific countries (Argentina, Brazil, Chile and Mexico) and the remaining countries with more than 50 responses (Colombia, Peru, Uruguay and Venezuela). As expected, the responses from the scientists of the first group are more likely to differ significantly with the proposed statements than the responses from the scientists of the second group (cf. Figure 76 and 77)

Figure 76. “Somewhat agree” and “totally agree” (Argentina, Brazil, Chile and Mexico)

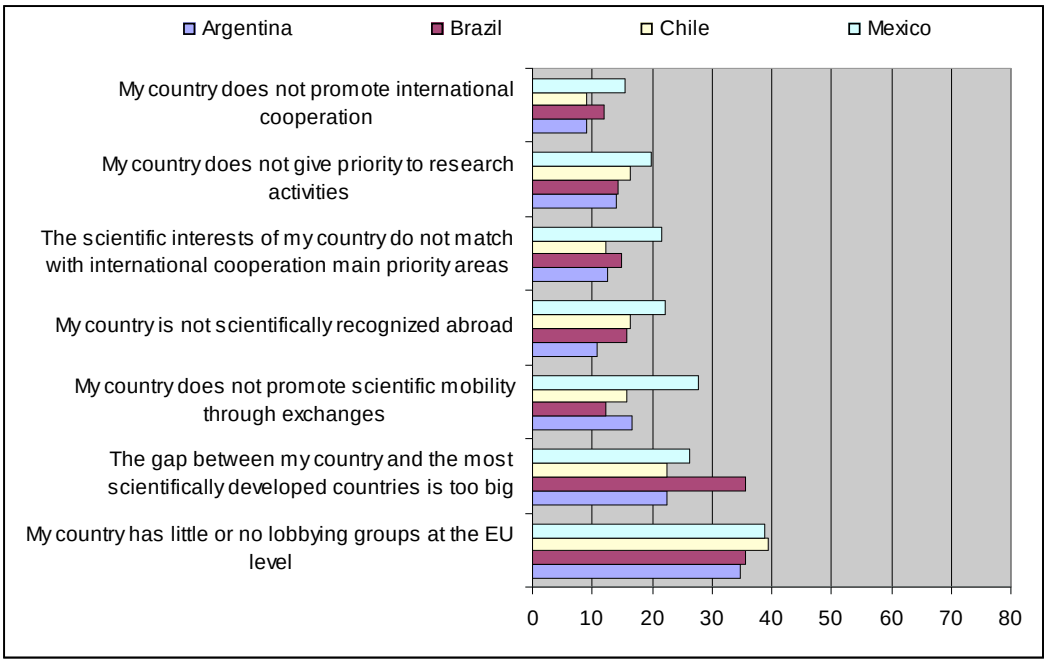
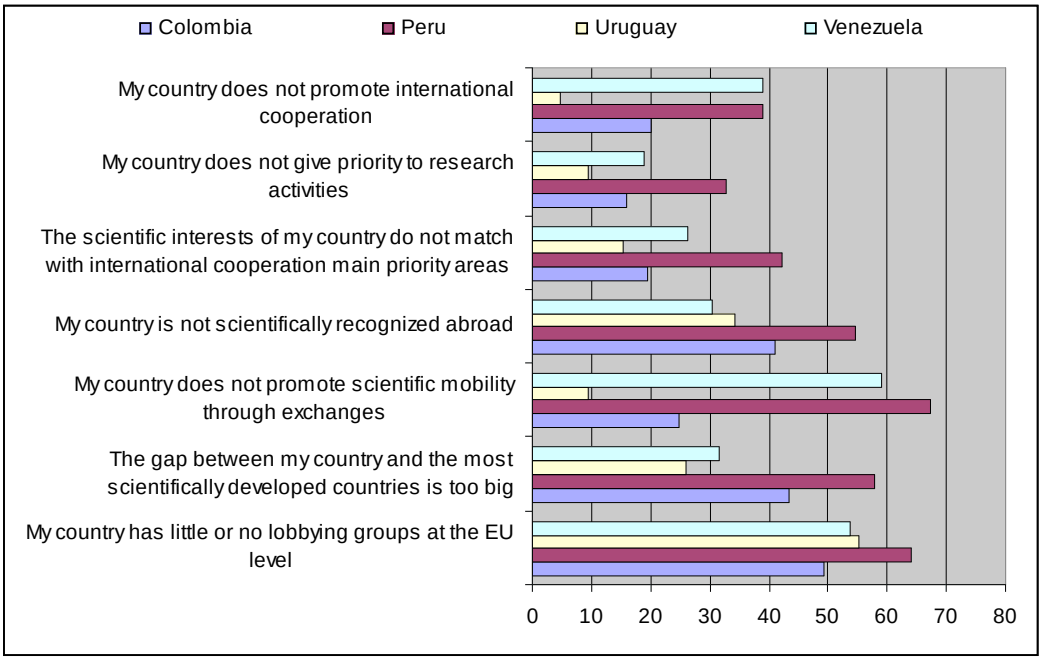


Figure 77. “Somewhat agree” and “totally agree” (Columbia, Peru, Uruguay, Venezuela)
(countries with more than 50 responses)



5. Conclusion

The main results of our survey on international scientific collaborations taking place between the EU and the LAC scientists have been summarized in the executive summary and reviewed in details in the report. Before outlining some more analytical questions, we would like to briefly present below some of the major findings and, of particular, of the more striking ones.

A first word is needed about the representativity of this survey. While at no point can we claim to have a "representative" survey, we do believe the sample that responded in Latin American countries is very close to the research population in these countries. The sex and discipline distribution seems to follow the ones we know about in the statistics provided on these countries. Moreover, the high response rate to our requests for LAC scientists (44,8%) and the relatively low one for EU scientists (27.7%) show a very strong interest for the subject of scientific collaborations with Europe in Latin America. A rather unusually high number of persons responded spontaneously after having been informed by some colleague about the survey. Also the distribution by discipline of our respondents in LAC countries corresponds to the distributions that we have found with the bibliometric analysis of co-authorships. Again the figures for European respondents do not match the world distribution or the national distribution of research output as measured by publication counts. Our results are thus in line with the LAC production, not the European production. And the results of the survey should be read more *from the standpoint of Latin American researchers, and not so much from the standpoint of European researchers*. This is an important caveat: most policy tools are designed from the EU towards the partner countries. All the international cooperation policy is designed in these terms also; as a policy specialist in Brussels told us, "the clients for the FP7, and more generally speaking university and culture cooperation, are always the same!" (anon., pers. comm.). Many of the opinions expressed in the survey can thus be understood as voice oriented towards Europe, and not vice-versa.

We should also take the specific responses from the social sciences with great care and caution. Again here, even more than in the case of the natural sciences, we have no reference population (collaborating scientists from both sides of the Atlantic). But we do know that social sciences occupy a seemingly important portion of the academic population and this is not reflected by numbers of international collaborations or responses to this questionnaire. In this particular disciplinary area, the dynamic for collaboration is very much influenced by specificities of the production: more books, more local and empirical fieldwork, rather few theoretical efforts are characteristics often mentioned in the Latin American region as far as social sciences are concerned (Kreimer 2010; Vessuri & Sonsiré López 2010). The on-going analysis of the sociology of work in the EULAKS projects should shed some light in a field that has marked preference for Europe for at least the last 40 years, based on a considerable number of persons studying abroad and creating many institutions, both academic and non-academic, when returning home.

In terms of methodology, the report is based on the main results of the questionnaire survey and descriptive statistics. We would need to undergo a more in-depth analysis in order to get causal analysis and deduction-oriented results, based on more explicit formulation of hypothesis. Moreover, the size of the sample should permit to make additional analysis that could be limited to one specific area such as environmental sciences, health related disciplines or social sciences and humanities. This additional effort is considerable in term of time and is programmed as a future activity of the EULAKS teams mobilized in our Workpackage. Nonetheless, this first appraisal is very illuminating.

The questionnaire gives a photography at a specific time. We wanted to have a more dynamic approach and this is intrinsically difficult: survey tools are ill-fitted for dynamic analysis. Nonetheless, we have stratified the responses e.g. by age, gender, country of work …etc. The sample seems to be a little older than the overall population and that is an expected bias for this survey: older researchers tend to have more experience in collaborations in general and thus answer more willingly. But an alternative explanation would tend to confirm that researchers in mid career stages (40 years and above) are more likely to collaborate internationally than those who are in early or late career stages.

We expected our Survey to show a 'generation effect' i.e. different participations to collaboration and studies abroad among the different generations. This is of particular importance in the choice of country and we wanted to know whether the researchers were more prone to study in Europe in the older generations as opposed to US/Canada for the younger generations. This analysis is not easy to undertake because it depends on many factors such as the degree obtained, the type of residence abroad, the existence of scholarships or not, the existence of a specific specialty in the home country, and last but not least the age. But as discussed above mid career and older scientists are over-represented in our sample so that we could not find any clear trend when it comes to "generation effect".

Respondents are mostly nationals from the country of the institution where they work. Yet, almost one out of 10 (9.3%) declared being national from another country. Overall, Latin American scientists in our sample tend to expatriate more (58%) to European countries although their respective behaviour varies according to their country of nationality. Approximately four-fifths of the Mexican scientists (82%) and of the Brazilian scientists (77%) in the diaspora are working in Europe whereas Argentinean scientists tend to expatriate nearly as much (52.6%) to other Latin American countries than to Europe (47.4%). Argentineans are predominantly working in Brazil, in France and in Spain. Mexican scientists are working in UK and in France as well as in a wide variety of other European countries. Brazilian scientists are working in France and in Portugal as well as in a wide variety of other European countries.

As far as studies are concerned, we limited the analysis to the four larger countries Brazil, Mexico, Argentina and Chile. Overall, degrees are mainly obtained at home, with the exception of PhDs in Mexico and Chile. Nonetheless, as compared to other degrees, PhDs are more frequently obtained in a foreign country. Also, the disparities between countries are larger as far as PhDs are concerned: 78% of scientists of Argentinean nationality got their PhD from a University in Argentina, 26% of scientists having the Chilean nationality received it in Chile; in between this figure compares to 45% in Mexico and 61% in Brazil.

It should be stressed that 64% of PhDs were obtained in Europe, 28% in North America (overwhemingly USA) and 5% in another LAC country. This is not a biased result: statistics in Mexico and Chile tend to demonstrate a similar –if not exactly the same –distribution of the preference to carry out PhD studies abroad. Here comes one of the more surprising results: when limiting the comparison to the country of study of the member of the SNI in Mexico, we have a similar distribution for PhDs abroad and in Europe; when comparing with another (smaller) survey that was carried out among all academics in Mexico, the numbers were significantly different (see pages 34 and after). Is this a proof that studies abroad in Europe do not necessarily entail research co-operations later on with European partners? It is not exactly so for the case of Chile which we examine in some detail above (see table 5). To study in Europe or elsewhere does not seem to be the first necessary step to further research collaborations with Europe. Doing a PhD abroad is not a sufficient condition in ensuring later on, sustainable research collaborations. Holding a post-doc position is another matter and seems to play a more important role. Among our respondents 42.2% did a post-doc (45% in Europe and 40% in LAC). For LAC scientists

Western Europe is the main destination for post-doc (54.3%) followed by North America (36.4%, mainly USA). For European scientists (from Spain, France, Germany, Italy and UK), Western Europe is also the main destination for post-doctoral studies with a marked preference to carry out the post-doc in another European country a result that confirms the importance of intra-European mobility in S&T in Europe. But as an individual country, the US is chosen as the prefered country for post-doc.

The creation of co-operation is to be understood less under the policy of the EU and more under the analytical frame of the institutionalization of research in Latin America (Vessuri 1996) and developing countries in general (Losego & Arvanitis 2008) as the analytical framework of "invisible college", that is to say the networking of scientists around objects and scientific interests (Wagner 2008). Overall, responses from the surveyed scientists concerning decisions about the distribution of role, tasks and budget in international projects between European and Latin American scientists tend to indicate that the asymmetry of relations which was pointed as a burning issue back in the 1970s and 1980s has been turned into a more equal partnership. Thus we must understand that the EULAKS survey witnesses less a relation between "unequal partners" (Gaillard 1994; Rodríguez-Clemente, Arvanitis & González-Aranda 2008), than a relation between partners felt as unequally endowed with resources but equals in terms of scientific capabilities. The rich European countries are less devoted to promote research activities in LAC, and more inclined to engage in research as a by-product of "associate partnerships" where the Europeans see and feel co-operation as a partnership with high level scientists seen as equals to them in terms of training and access to knowledge. Differences are thus more in terms of access to some instruments or financial means but not so much in terms of incomplete training or partial scientific background.

These general observations rely also on the reasons to do research that were presented to researchers. To begin with scientists mentioned mainly scientific reputation and scientific expertise for the reasons why they chose to study abroad (Figure 29). Nearly 60% answered that the main reason was "scientific expertise developed in the host country" followed by "reputation of the host country likely to promote my career" for two-fifth of them (41.5%). Nevertheless, among the reasons to collaborate we found some differences between EU and LAC scientists but not that important (Figure 44). The main outcomes of collaborations for EU scientists are related to social and scientific networking activities: "strengthening links with international partners" (72.7%), "participation in new scientific projects" (68.4%) and "participation in conferences, training, etc …" (63.8%). For LAC scientists, international collaboration tends to bring more tangible outcome such as "learning new techniques" (71,0%), "publications in high impact journals" (69,0%) and "access to equipments not available in my country" (42,3%). Other outcomes of importance for both groupings are "international scientific recognition" (64.7% and 62.0% respectively for EU and LAC scientists) and to a lesser extent "greater recognition within my institution" (45.5% and 39.3% respectively for LAC and EU scientists). "Increase funding for my lab / institution" (24.4% and 24.6%) as well as "access to equipments not available in my country" (24.0%) for EU scientists only are the less important outcomes (cf. Figure 46).

Many questions are made on how and with whom they engaged their collaborations. It is quite clear that the stays abroad –with the partial exception for studies- do influence research collaborations: 86% of our respondents made long stays abroad and 91% have co-published with colleagues met during extended stays abroad (stays exceeding six months). Collaboration is continuous over time. Yet, half of them (51%), collaborate or co-publish often or sometimes with foreign colleagues that they never met.

Finally, we asked to the surveyed population working in LAC countries only to give their opinion on some rather negative general statements about the scientific and institutional context (cf. Figures 75, 76 and 77). It should be noted that only one of these statements gathered

agreement easily: “My country has little or no lobbying groups at the EU level”: up to 41% of them “somewhat agree” or totally agree”. All other statements were rather gathering disagreement than agreement. “The gap between his/her country and scientifically developed countries is too big”, collected around 30% of “somewhat agree” or “totally agree”; and “his/her country does not promote scientific mobility through exchanges” and “my country is not scientifically recognized abroad” collected 22% and 21%. The other three statements received slightly less than 20% of agreement (total or somewhat) by the responding scientists (cf. Figure 75).

Opinions on the role of research and the recognition of one’s country are different according to the country. Overall, Argentina, Brazil, Chile and Mexico differ in the opinion’s profiles of answer than other LAC countries. Responses from scientists working in Peru confirms that Peru is lagging behind whereas a country like Venezuela shows sharp contrasts in the responses. We thus have a rather varied panorama of opinions but interestingly, except for a few countries such as Peru, rather confident statements about the scientific endeavour in their countries.[12] These are probably the result of ten years of permanent reshaping of the scientific environment in the main LAC countries. As we stated before, it is this institutional context that seems to profoundly affect the collaborations rather than the policies of funding institutions, be they the EU or others.

It does not mean that policies do not affect choices in terms of collaboration but that the main choices and constraints are given by the institutional context. As far as cooperation policies are concerned, the opinions of the respondents on the reasons why they applied to calls for proposals are quite interesting. Let us remind that nearly two-thirds (63.3%) of respondents applied a call for proposal. For the 37.7% remaining that didn’t apply we presented a number of possible reasons to understand why. The main constraints for EU scientists are the bureaucratic burdens whereas for LA scientists it is rather the lack of knowledge concerning the calls themselves. The difficulty to find partners and the high selectivity of the programmes is mentioned in 30% of the cases for both EU and LA scientists that did not respond to calls.

For all the respondents we offered a number of reasons on motivations to participate to a call for proposals. The results are presented in Figures 71 and 72 for respectively scientists working in European countries and scientists working in LAC countries. Although all reasons were considered as « important » or « essential » by a large majority of the respondents in the two groups, the results differ significantly on expected benefits between them. The most important for European scientist is « access to international funding » (80.9%). The other reasons are, by decreasing importance: « participation to an international expert network » (67.3%), followed closely by « increased scientific visibility » (66.1%), “Access to a more diverse partnership (e.g. diversity of approaches)” (62.8%) and « greater mobility » (62.5%). The two following reasons are still motivating the majority of European scientists: namely « publications in mainstream scientific journals » (55.1%), and « make my research fit in a more global scheme (climate, energy, biodiversity, etc.) (53.9%). Not surprisingly, the last reason for European scientists is « access to technologies / competences, not available in my country » (with only 45.3% of opinions “important” or “essential”.

While “access to international funding” is also the most important motivation for the LAC scientists (75.1% of opinions give it as “important” or “essential”), it is very closely followed by the others: “access to new technologies / skills, not available in my country "(74.8%)," participation in international expert network (74.5%), "Greater mobility (PhD programs, fellowships, research grants, etc.. "(73.1%). While both Europeans and Latin Americans are

[12] It should however be noted that only countries with more than 50 responses were considered in the analysis (see Figure 77).

motivated to participate in an international tender as showed in Figures 71 and 72, scientists working in LAC countries are as much interested by accessing funding than by accessing technologies, participating in international networking activities and greater mobility (cf. Figure 72).

We could detail more the responses to the questionnaire by thematic areas, generations and country. This would give us a more detailed insight in the making of collaborations and we do intend to do so in the future. In the meantime, the following important general aspects can be underlined:

- The institutional context plays a major role as far as collaborations are concerned. The number of collaborations can increase either because one enters as dependent of a powerful partner or as equal in intellectual terms. The later is the case between most LAC partnerships with Europe as reported by the questionnaire and mostly all scientists living in LAC countries agree to the fact that science could be in a better position but is already strong enough to be considered as equal partner with Europe. In addition institutional and national funding programmes promoting international cooperation are becoming increasingly important in LAC, notably in the four main scientific countries.
- The EU builds partnership based on a certain cultural proximity and interestingly this is despite the fact that the USA is an important country for post-docs for LAC as for EU scientists who did a post-doc abroad; but the main reason to collaborate is definitely not "cultural" but rather lies in the scientific reputation of the partner institution/researcher. The overall EULAKS data also indicate that one can do a PhD at home to a very large extent (57% for the four main science producers in Latin America) or with the USA and collaborate internationally as well as publish scientific papers with scientists in Europe. This is the case for more than half of the scientists in the four main LAC science producing countries. In addition, getting a PhD in North America or in another LAC country does not preclude scientists to collaborate with Europe.
- Scientists choose to work not with a foreign country or institution but with a scientific partner: an individual or a laboratory that is going to be his/her partner in the future. Bilateral funding schemes are the more frequently mentioned and this reflects the active policy of France, Spain and UK (mainly). Most international collaboration born out of either a personal contact when working in a lab abroad or through conferences and other meetings. Friendship and trust do also play a very important role as confirmed by most interviews: "you do science collaboration better with your friends", says a scientist from Mexico.

Scientific reputation and other scientific interest seem to be paramount when seeking a partnership. Policy can only find a way to encourage these collaborations when previous scientific interest is secured.

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Appendix 1: List of acronyms

EU	European Union
EULAKS	Connecting Socio-economic Research on the Dynamics of the Knowledge Society in the European Union and Latin American and Caribbean Countries
FP7	Framework Programme 7
IRD	Institut de Recherche pour le Développement
LAC	Latin American and Caribbean Countries
NSF	National Science Foundation
OST	Observatoire des Sciences et des Techniques
S&T	Science & Technology
STI	Science, Technology & Innovation
SSH	Social Sciences and Humanities
UMR	Unité Mixte de Recherche
UNAM	Universidad Nacional de México
WP	Work Package
WOS	Web of Science
ZSI	Zentrum fur Soziale Innovation (Centre for Social Innovation)

Appendix 2: The questionnaire

Group 1 - Your institutional affiliation

1 **Name of your institution** *
Please write your answer here:

2 Country of your institution *
Please choose **only one** of the following:

3 Your field of research *
Please choose **only one** of the following:

Agriculture, Biology & Environmental Sciences
Biomedical research
Chemistry
Clinical Medicine
Engineering, Technology
Humanities
Mathematics
Physics
Social sciences
Other

4 Nature of your position *
Please choose **only one** of the following:
Visiting scientist
Temporary position
Other
How is you time divided (in %) between the following activities
Please write your answer(s) here:
Teaching
Research
Administration
Consulting
Other
The total amount should reach 100%

Group 2 - Your stays abroad

6 Country of birth, nationality and residence

Your country of birth	Your country of nationality	Your country of residence

7 Countries where you did your studies

Bachelor or equivalent	Master or equivalent	Doctoral degree / PhD

8 Number of years spent abroad during your studies?
Please choose **only one** of the following:
I did not study abroad
< 1 year
1 year
2 years
3 years
4 years
5 years
6 years
7 years and more

9 Reasons why you went abroad for study
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '6 [Q5]' (Did you study abroad ?)
Please choose **all** that apply: Personal interest for the host country
Members of my family living in the host country
Scientists from my country settled in the host country
Scientific expertise developed in the host country
Reputation of the host country institution likely to promote my career
Obtaining funding from the host country
Availability of funding from my country
Availability of funding tied to a specific programme
No available training in my country for the chosen speciality
By chance or by eliminating other possibilities
Other:

10 Have you done a post-doc abroad? *
Please choose **only one** of the following:

Yes	No

12 In what country did you do your post-doc? *
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '10 (Have you done a post-doc abroad?)
Please choose **all** that apply:
Austria
Australia
Belgium
Canadá
Denmark
Finland
France
Germany
Ireland
Italy
The Netherlands
Norway
Spain
Sweden
United Kingdom
United States of America
Other:

13 Why did you choose the country where you did your post-doc?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '10' (Have you done a post-doc abroad?)
Please choose **all** that apply:
Personal interest for the host country
Members of my family living in the host country
Scientists of my home country settled in the host country
Scientific expertise developed in the host country
Reputation of the host country institution likely to promote my career
Obtaining funding from the host country
Availability of funding from my country
Availability of funding tied to a specific programme
No available training in my country for the chosen speciality
By chance or by eliminating other possibilities
Other:

13 Have you made other stays abroad exceeding 6 months *
Please choose **only one** of the following:

Yes	No

14 Name this country / these countries *
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question 13 (Have you made other stays abroad exceeding 6 months in a country different than the one where you did your PhD or post-doc?)
Please choose **all** that apply:
Austria
Australia
Belgium
Canada
Denmark
Finland
France
Germany
Ireland
Italy
Mexico
The Netherlands
Norway
Spain
Sweden
United Kingdom
United States of America
Other:

15 Nature of this (these) stay(s) abroad *
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '14 [Q7]' (Have you made other stays abroad exceeding 6 months in a country different than the one where you did your PhD or post-doc?)
Please choose **all** that apply:
Sabbatical
Stay abroad paid by my institution
Paid employment in a foreign or international institution
Stay for non-professional reasons
Other:

Group 3 - Your foreign collaborations

16 Have you published with colleagues known or met during your visit(s) abroad?
Please choose only one **of the following:**

Yes	No

17 Who are these colleagues?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '16]' (Have you published with colleagues known or met during your visit(s) abroad?)
Please choose **all** that apply:
Your thesis director
Colleagues from institution(s) where you have worked abroad
Colleagues from other institution(s) in the countries where you staid
Scientists from my country living abroad
Other:

18 Do you continue today to collaborate or to publish with some of them?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '16' (Have you published with colleagues known or met during your visit(s) abroad?)
Please choose **all** that apply:
Yes, I collaborate
Yes, I co-publish
No, I neither collaborate nor co-publish

19 In which institutional framework do these collaborations / co-publications take place?
Only answer this question if the following conditions are met:
° Answer was 'Yes, I collaborate' or 'Yes, I co-publish' at question '18' (Do you continue today to collaborate or to publish with some of them?)
Please choose **all** that apply:
In the framework of a bilateral cooperation
In the framework of an international project (not funded by EU)
In the framework of a EU funded project
Other:

20 Did you collaborate or co-publish with scientists from abroad *that you never met* during your visits abroad *(i.e. visits for studies, post-doc or visits exceeding 6 months)*?
Please choose **only one** of the following:

Yes	No

21 What is the frequency of these collaborations
with scientists from abroad that you never met during your stays abroad (i.e. visits for studies, post-doc or visits exceeding 6 months)?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '21 [Q8.2]' (Did you collaborate or co-publish with scientists from abroad that you never met during your visits abroad (more than 6 months)?)
Please choose the appropriate response for each item:

	Never	Sometimes	Often
With scientists from my country and living abroad			
With foreign scientists collaborating with me in international projects			
With foreign scientists met at international meetings			
With foreign scientists I never met but with whom I communicate			

22 Do you continue today to collaborate with any of them?
Any of them = *scientists from abroad that you never met during your stays abroad for studies, post-doc or visits exceeding 6 months)?*
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '20' (Did you collaborate or co-publish with scientists from abroad that you never met during your visits abroad ?)
Please choose **all** that apply:
Yes I do collaborate
Yes, I do co-publish
No, I neither collaborate nor co-publish

23 In which institutional framework do (or did) these collaborations take place?

Only answer this question if the following conditions are met:
° Answer was at question 20' (Do you continue today to collaborate with any of them?)
Please choose **all** that apply:
In the framework of a bilateral cooperation
In the framework of an international project (non funded by EU)
In the framework of a EU funded project
Other:

24 For those who have collaborated (or collaborate) to EU funded projects, please indicate these programmes
Please choose **all** that apply: FP 4 (1994-1998)
FP 5 (1998-2002)
FP 6 (2002-2006)
FP 7 (since 2006)
Other:

25 What are the main difficulties to collaborate / co-publish with foreign scientists? *
Please choose the appropriate response for each item:

	1	2	3	4	5
Too consuming of time and effort					
Difficulties in publishing in international journals					
Lack of collaborative programs or funding					
Lack of common research interests					
Inter-institutional cooperation problems					
Leadership or division of work problems					
Intellectual property problems					
Lack of adequate communication tools or technologies					
Personal reasons					

1 = insignificant, 2 = unimportant, 3 = moderately important, 4 = important, 5 = major

Group 4 - Foreign collaborations results and outcomes

26 What have been the outcomes of your collaborations with foreign scientists?
Please choose **all** that apply:
Learning new techniques
Greater recognition within my institution
International scientific recognition
Publications in high impact foreign journals
Increase funding for my lab / institution
Strengthening links with international partners
Participation in new scientific projects
Participation in conferences, training, etc.
Access to equipments not available in my country
Other:

27 If foreign collaboration has resulted in increased funding for your lab / institution, please indicate the source of these funds
Only answer this question if the following conditions are met:
° Answer was at question 26 (What have been the outcomes of your collaborations with foreign scientists?)
Please choose **all** that apply:
From your institution
From another program or institution in your country
From a foreign country (European or other)
From the European Union
From another international organisation
Other:

28 Please specify the name of the international organisation(s) that have contributed to increase funding to your lab / institution
Only answer this question if the following conditions are met:
° Answer was at question '29 [Q9.1]' (If foreign collaboration has resulted in increased funding for your lab / institution, please indicate the source of these funds)
Please write your answer(s) here:

International organisation 1	
International organisation 2	
International organisation 3	
International organisation 4	

29 Please indicate in percentage (%) the relative importance of the following funding sources in your lab's budget for 2009.
Please write your answer(s) here:

Funding from your institution	
National public funding	
National private funding	
Foreign private funding	
Funding from international cooperation	
others	

The total amount of these percentages should reach 100

30 These collaborations have contributed for you or for your lab to increase the following activities:
Please choose **all** that apply:
Writing scientific projects
Organizing conferences and workshops
Organizing trainings
Publishing scientific books
Participating to scientific committees
Participating in scientific journals editorial boards
Other:

Group 5 - Your publications

31 What are the major scientific journals in which you publish?
Please write your answer(s) here:

Journal 1	
Journal 2	
Journal 3	
Journal 4	
Journal 5	
Journal 6	

32 Do you publish in different languages?
Please choose **only one** of the following:

Yes	No

33 What is your most frequently used language of publication?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '32 [Q12]' (Do you publish in different languages?)
Please choose **only one** of the following:

first language	Other

34 What is your second most frequently used language of publication?
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '32 [Q12]' (Do you publish in different languages?)
Please choose **only one** of the following:

second language	Other

35 Did your collaborations with foreign scientists contributed to increase:
Please choose the appropriate response for each item:

	1	2	3	4
The total number of your publications as sole author				
The number of your co-publications with your scientific partners				
The number of your publications in your country				
The number of your publications in mainstream international journals				
The total number of your publications				
Your recognition in your scientific field				

1 = Not at all 2 = A little, 3 = Moderately, 4 = A lot

Group 6 - Responding to calls for tenders

36 Have you responded to calls / tenders involving international scientific collaboration? *
Please choose **only one** of the following:

Yes	No

37 If not, why? *
Only answer this question if the following conditions are met:
° Answer was 'No' at question '36 [Q14]' (Have you responded to calls / tenders involving international scientific collaboration?)
Please choose **all** that apply:
Lack of information about these calls of poposals / funding
No calls for proposals/funding in my field
Difficulty to find partner laboratories
Grant amount unattractive
Too much bureaucracy
Programs too selective
Other:

38 You applied to calls for proposals/funding promoting international collaborations. Please name the most important ones.
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '36 [Q14]' (Have you responded to calls for proposals/funding involving international scientific collaboration?)
Please write your answer(s) here:

First	
Second	
Third	
Fourth	

39 The following questions relate to your *last call for proposal/funding won*
Organisation promoting this call / tender
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '36 [Q14]' (Have you responded to calls for proposals/funding involving international scientific collaboration?)
Please choose **only one** of the following:
European Union
Other

40 Who initiated the project?
Only answer this question if the following conditions are met:
° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)
Please choose **only one** of the following:
Your lab / institution
A partner lab
Your lab and one (or several) partner lab(s)
Other

41 What was (or what is) your role in this project?
Only answer this question if the following conditions are met:
° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)
Please choose **only one** of the following:
Project coordinator
Partner
Sub-contractor
Other

42 Who decided (or decides) about the budget distribution?
Only answer this question if the following conditions are met:
° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)
Please choose **only one** of the following:
Your lab / institution
One or several partner laboratories
The partners jointly
Other

43 Who decided (or decides) about the distribution of tasks?
Only answer this question if the following conditions are met:
° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)
Please choose **only one** of the following:
Your lab / institution
One or several partner laboratories
The partners jointly
Other

44 Have you been able to get involved as much as you wanted in this project?

Only answer this question if the following conditions are met:

° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)

Please choose **only one** of the following:

Yes	No

45 Could you have been more involved if...

Only answer this question if the following conditions are met:

° Answer was 'No' at question '46 [Q14.5]' (Have you been able to get involved as much as you wanted in this project?)

Please choose **all** that apply:

You had more time at your disposal
You have been involved from project design
You were better supported by your institution
The subject had been different
You had better mastered the process flow
Communication between partners had been better

46 How would you rate your contribution to this project?

Only answer this question if the following conditions are met:

° Answer was NOT at question '39 [Q15]' (The following questions relate to your last to calls for proposals/funding won Organisation promoting this call / tender)

Please choose **only one** of the following:

Essential for the conduct of the project
Important for the progress of the project
Limited only to the tasks attributed to you
Reduced to a sub-project task
Limited participation (e.g. organisation of an event)
Marginal participation

47 Among the following reasons, indicate those that would motivate you to participate to an international call of proposals/funding

Please choose the appropriate response for each item:

	1	2	3	4	5
Access to international funding					
Greater mobility (PhD programs, fellowships, research grants, etc.)					
Make my research fit in a more global scheme (climate, energy, biodiversity, etc.)					
Participation in an international expert network					
Access to a more diverse partnership (e.g. diversity of approaches)					
Increased scientific visibility					
Access to new technologies / competences, not available in my country					
Publications in mainstream scientific journals					

1 = insignificant, 2 = unimportant, 3 = moderately important, 4 = important , 5 = essential

48 Among the following considerations, indicate those that limit your participation in international scientific calls for proposals/funding

Please choose the appropriate response for each item:

	1	2	3	4	5
Poor knowledge of scientific calls / tenders					
Difficulties in finding partners / building corsortium					
Lack of knowledge or training on how to submit project proposals					
Difficulties related to accounting and financial rules in my institution					
Problems linked to cultural differences and languages					
My institution has not reached a sufficient scientific level					
The calls / tenders are too selective					
Insufficient amount of funding					
Lack of time					

1 = unimportant, 2 = little restrictive, 3 = restrictive, 4 = very restrictive, 5 = crippling

49 Do you agree with the following statements?
Only answer this question if the following conditions are met:
° Answer was 'Venezuela' or 'Uruguay' or 'Surinam' or 'El Salvador' or 'Saint Vincent and the Grenadines' or 'Saint Kitts and Nevis' or 'Peru' or 'Paraguay' or 'Panama' or 'Nicaragua' or 'Mexico' or 'Lucia' or 'Jamaica' or 'Honduras' or 'Haiti' or 'Guyana' or 'Guatemala' or 'Grenada' or 'Ecuador' or 'Dominican Republic' or 'Dominica' or 'Cuba' or 'Costa Rica' or 'Colombia' or 'Chile' or 'Brazil' or 'Bolivia' or 'Belize' or 'Barbados' or 'Antigua and Barbuda' or 'Argentina' at question '2 [Q2]' (Country of your institution)
Please choose the appropriate response for each item:

	1	2	3	4	5
My country does not give priority to research activities					
My country does not promote scientific mobility through exchanges					
My country does not promote international cooperation					
The gap between my country and the most scientifically developed countries is too big					
My country is not scientifically recognized abroad					
The scientific interests of my country do not match with international cooperation main priority areas					
My country has little or no lobbying groups at the EU level					

1 = Totally disagree, 2 = Somewhat disagree, 3 = Neutral, 4 = Somewhat agree, 5 = Totally agree

50 Have you had access to international funding without applying to a call of proposals/funding?
Please choose **only one** of the following:

Yes	No

51 If yes, name the corresponding funding organizations
Only answer this question if the following conditions are met:
° Answer was 'Yes' at question '53 [Q17]' (Have you had access to international funding without applying to a call / tender?)
Please write your answer(s) here:

First funding organization	
Second funding organization	
Third funding organization	
Fourth funding organization	
Fifth funding organization	

Group 7 - Personal data

52 In order to measure the impact of personal relationships on international collaborations, we would like you to answer, for you and your spouse, the following questions:
Please write your answer(s) here:

What is your nationality?	What is your country of birth?
What is the nationality of your spouse?	What is the country of birth of your spouse?

53 Your gender

Male	Female

53 Your year of birth

Appendix 3: Interview guideline

Task 1.3 Analysis of scientific communities and collaborative EU-LAC research networks

Main objective: "examine the constitution and the nature of knowledge of scientific communities in different fields and in particular the role of international co-operation in the dynamics of knowledge development in the field in which the scientists are engaged".

1. Why did you become a scientist?

What inspired you to work in research? Relative importance of Figure head (parent, teacher, etc) / fellowship for postgraduate studies at a critical time / social status / job security / contribute to knowledge advancement / career prospects /intellectual stimulation / opportunity to meet other people in your country or abroad / be part of the international scientific community.

2. In which institutions and countries did you carry out your graduate and undergraduate studies and why?

3. In the case you did part of your studies abroad,
    a. Was it by choice because you got an opportunity (e.g. fellowship) to study abroad, because you had relatives abroad, others?
    b. Describe the conditions under which your studies abroad were carried out, eg. sandwich programme or full time studies abroad, fellowship vs. other support, mastering a foreign language or not, difficulties or not to adapt to new conditions or culture?
    c. Was your PhD thesis written and submitted in a foreign language? Did you continue to write and publish (even partly) in the same foreign language? Did you publish in another foreign language? Why?
    d. Did you publish papers with your PhD thesis foreign supervisor immediately after your thesis? If not, why?
    e. Back in your country did you continue to publish with your foreign PhD supervisors or other foreign scientists from the same institution, other foreign scientists? If not, why?
    f. Are you still in contact with your PhD supervisor today and are you still collaborating with him?
    g. Through (or during) your stay abroad were you able to establish additional contacts with other scientists and institutions?

4. In the case you studied in your country, did you do a post-doc in a foreign country? In this case, in which country? Did it generate new scientific collaborations? If yes, Could you describe them?

5. Since the beginning of your research career, were did you spend your sabbaticals?

6. How did your research interests evolve during your scientific career (from thesis up to now)? What were the main objects / themes? If you have changed your research interests when did it happen and why?

7. Are you well acquainted with calls for proposals promoting scientific collaboration with foreign countries: in your country, with a specific European country or Europe, in the rest of the World? If yes, mention the ones you know.

8. Did you ever apply to such a call for proposals? If not why? If yes were you successful?

9. Name and describe the preparation of the most recent call for proposals to which you participated: who was the initiator? Who selected the research project? How was the budget/tasks constructed and distributed?

10. Could you tell us about the administration of the project(s), outputs and outcomes of the collaboration: strengths and weaknesses; degree of satisfaction; rewards derived from the collaboration (invitation to conferences, publications, patents, networking … etc); etc…

11. Does your present research work necessitate to learn new techniques abroad (not available in your country) and to collaborate with foreign institutions and scientists?

12. Could you kindly provide the list of foreign institutions/scientists with whom you did collaborate during your career and specify how (exchange of correspondence, information, students, scientists, training, and project in collaboration … etc). Were you satisfied with these collaborations?

13. Do you consider that your institution gives you all the support you need in order to be well connected with the international community?

14. What is the relative contribution of international funding in your research?

Appendix 4: List of scientists interviewed

Interviews Argentina (30)

(Buenos Aires, Cordoba and Mendoza)

Name of scientists interviewed	Institution	Interview conducted by	cv	Scientists e-mail
Buenos Aires				
Jorge Casal	UBA Agro	JG/VU	yes	casal@agro.uba.ar
Adriana Bentancor	UBA	AMG	yes	aben@fvet.uba.ar
Alberto Kornblihtt	UBA	JG/AMG/PP	yes	ark@fbmc.fcen.uba.ar
Walter Farina	FCEN UBA	JG/AMG	yes	walter@fbmc.fcen.uba.ar
Esteban Hopp	UBA/INTA	JG	yes	ehopp@cnia.inta.gov.ar
Angel Cataldi	INTA	AMG	yes	acataldi@cnia.inta.gov.ar
Norma Paniego	INTA	JG	yes	npaniego@cnia.inta.gov.ar
Marisa Farber	INTA	AMG	yes	mfarber@cnia.inta.gov.ar
Alejandro Castello		VU	yes	castelloaa@gmail.com
Martin Rumbo		VU	yes	martinr@biol.unlp.edu.ar
Alejandro Mentaberry		VU	yes	amentaberry@yahoo.com.ar
Rolando Rossi		VU	yes	rcr@retina.ar
Diego Golombek		VU	yes	dgolombek@unq.edu.ar
Antonio Diaz Paleo	INTA	VU	yes	adiazpaleo@cnia.inta.gov.ar
Mariano Grasselli		VU/PP	yes	mgrasse@unq.edu.ar
Fernando Carrari		PP	yes	fcarrari@cnia.inta.gov.ar
Marcelo Yanovsky		PP	yes	yanovsky@agro.uba.ar
Pablo Schwarzbaum		PP	yes	pablos@qb.ffyb.uba.ar
Susana Puntarulo		PP	yes	susanap@ffyb.uba.ar
Mario Ermácora		PP	yes	ermacora@unq.edu.ar
Cordoba				
Graciella Villadores	UNC	JG	yes	gvalladares@efn.uncor.edu
Adriana Salvo	UNC	AMG	yes	asalvo@com.uncor.edu
Gabriel Bernardello	UNC	JG/AMG	yes	gabyberna@gmail.com
Edith Taleisnik	IFFIVE	JG	yes	etaleisnik@iffive.inta.gov.ar
Silvina Vargas Gil	IFFIVE	AMG	yes	svargasgil@correo.inta.gov.ar
Marcelo Rosmini	UCC	JG	yes	mrosmini@ucc.edu.ar
Eduardo Frank	UCC	AMG	yes	frank@uccor.edu.ar
Juan Carlos Boggio	UCC	JG/AMG	yes	jcboggio@campus1.uccor.edu.ar
Mendoza				
Sandra Garcia Lampasona	UNCuyo	AMG	yes	sgarcia@fca.uncu.edu.ar
Ricardo Masuelli	UNCuyo	JG	yes	rmasuelli@gmail.com

Interviews Chile (15)

(Santiago, Valparaiso, Valdivia & Perto Montt))

Name of scientists interviewed	Institution	Interview conducted by	cv	Scientists e-mail
Santiago				
Victor Hugo Paraguez	FCVP-UC	JG	ok	vparragu@abello.dic.uchile.cl
Cristian Estades	FCF-UC	AMG	ok	cestades@uchile.cl
Bessie Urquieta	FCVP-UC	JG	sr	burquiet@uchile.cl
Bernabé Santelices	FCB-PUC	JG	ok	bsantelices@bio.puc.cl
Juan Correa	FCB-PUC	AMG	ok	jcorrea@bio.puc.cl
Luis F. Larrondo	FCB-PUC	JG	ok	llarrond@bio.puc.cl
Valparaíso				
Juan Carlos Quiroz	IFOP	JG/AMG	ok	jquiroz@ifop.com juquiroz@udec.cl
Valdivia				
Leyla Cardenas	UACH	JG/AMG	ok	leylacardenas@uach.cl
Oscar Chaparro	UACH	AMG	sr	ochaparr@uach.cl
Jorge Toro	UACH	JG	ok	jtoro@uach.cl
Roberto Godoy	UACH	AMG	ok	rgodoy@uach.cl
Christian Figueroa	UACH	JG	ok	christianfigueroa@uach.cl
Puerto Montt				
Leonardo Guzman	IFOP	JG/AMG	sr	lguzman@ifop.cl
Sandra Bravo Seguro		JG/AMG	ok	sbravo@spm.uach.cl
Alejandro Buschmann	I-Mar-ULL	JG/AMG	ok	abuschma@ulagos.cl

Interviews Costa Rica (10)

(San José)

Name of scientists interviewed	Interview conducted by	CV	Scientists e-mail
ESCUELA DE MEDICINA VETERINARIA, UNIVERSIDAD NACIONAL			
Caterina GUZMAN VERRI	Jane Russell	Yes	
Carlos JIMENEZ	JR	Yes	
Gabriela DOLZ	JR	Yes	
Bernardo VARGAS	JR	Yes	
Juan Jose ROMERO	JR	Yes	
Edgardo MORENO ROBLES	JR	Yes	
INSTITUTO CLODOMIRO PICADO, UNIV. COSTA RICA			
Bruno LOMONTE	JR	Yes	
Jose Maria GUTIERREZ	JR	Yes	
Marieta FLORES DIAZ (Spanish)	JR	Yes	
Alexandra RUCAVADO (Spanish)	JR	Yes	

Interviews Mexico (13)

UNAM (Mexico city, Experimental Station Martinez de la Torre), Veracruz University

February 2009

Name	Location	Interview conducted by	Duration (recording)	CV
FMVZ – UNAM				
Carlos Gutierrez	UNAM	JG & AMG	1H06	Yes
Rosa Paramo	UNAM	JG & AMG	34	Yes
Javier Valencia	UNAM	JG & AMG	51	Yes
Carlos Galina	UNAM	JG & AMG	20 + 44	Yes
Experimental Station Martinez de la Torre (UNAM)				
Miguel Alonso Martinez	M. de la Torre	AMG	46	
Epigmenio Castillo	M. de la Torre	JG	58	Yes
Rosi Riaño	M. de la Torre	JG	1H20	Yes
Rebeca Acosta	M. de la Torre	AMG	55	Yes
Braulio Valles	M. de la Torre	JG	52	Yes
Universidad Veracruzana, Veracruz				
Felipe Montiel	Veracruz	JG & AMG	36	Yes
Colegio de Postgraduados, Veracruz				
Eusebio Ortega Jiménez	Veracruz	JG & AMG	56	
Pablo Díaz Rivera	Veracruz	JG & AMG	5 + 27	
Universidad Autónoma Agraria "Antonio Narro" (UAAAN) Unidad-Laguna, Torreón				
José Delgadillo	Torréon	CG & JG	13	OK

Interviews Uruguay (9)

(Montevideo)

Name of scientists interviewed	Institution	Interview conducted by	cv	Scientists e-mail
Facultad de Veterinaria - UdelaR				
Raquel Perez	FV-UdelaR	JG	ok	raquelperezclariget@gmail.com
Celia Tasende	FV-UdelaR	AMG	ok	ctasende@adinet.com.uy
Ana Meikle	FV-UdelaR	JG	ok	anamei@adinet.com.uy
Rodolfo Ungerfelt	FV-UdelaR	AMG	ok	rungerfeld@gmail.com
Cecilia Cajarville	FV-UdelaR	JG	rs	ccajarville@gmail.com
Daniel Cavestany	FV-UdelaR	AMG	ok	daniel.cavestany@gmail.com
Instituto de Investigaciones Biologicas Clemente Estable (IIBCE)				
Elena Fabiano	IIBCE	AMG	ok	efabiano@iibce.edu.uy
Silvia Bautista	IIBCE	JG	ok	silvia@iibce.edu.uy
Facultad de Quimica – UdelaR				
Alberto Nieto	FQ-UdelaR	JG/AMG	ok	anieto15@gmail.com