Full Proposal Submission

Section 1: General Project Information

Project Title: How can open science collaborations meet social needs in non-hegemonic countries?
Duration of Project: 24 months
Countries included in this project: Argentina, Brazil, Mexico
Regions included in this project: Latin America
Research Themes: (T4) Potential impacts (positive and negative) of open and collaborative science
Justification of Research Themes: This project attempts to analyse the conditions under which open and collaborative scientific networks cooperate in the production and effective use of knowledge oriented to attend to social problems. We examine the dynamics of knowledge production in two Latin American research networks and attempt to understand the role of international collaboration and of open and collaborative science in regards to the applicability of scientific outputs in different social contexts (tropical disease and territorial governance). By assessing the risks and benefits of open and collaborative science, the outputs and outcomes of the project are expected to raise awareness among the stakeholders implicated in the topics under study. This is to be achieved by organizing workshops and engaging four types of stakeholders: policymakers, funding agencies, scholars, and social groups affected by the studied problems and needs.
Total Budget Cost (CAD): 79,778.00

Section 3: Proposed Study Information

Research Project Abstract

WORD LIMIT: 250.

The aim of this project is to analyse under which conditions open and collaborative scientific networks cooperate in the effective use of the knowledge that is produced to attend to social problems. We examine the dynamics of knowledge production in two Latin American research networks, and attempt to understand the role of international collaboration and of open and collaborative science in regards to the applicability of scientific outputs in different social contexts.

The project draws mainly on three interrelated frameworks from science, technology and society studies: the co-production of knowledge, tensions between centres and peripheries, and cognitive exploitation. The methodological strategy combines quantitative and qualitative techniques: first, we follow the actors in the settings of knowledge production; this approach is then complemented by a quantitative analysis of research outputs and

collaborations. By integrating these two strategies, we intend to show the dynamics, themes, and terms of collaboration, but also, to identify how the problems are scientifically and politically defined, and which are the solutions proposed to address those problems. The two scientific networks taken as case studies are dedicated to tropical diseases research in Latin America, and to territorial governance in Mexico. Both networks cooperate via different collaborative media and open platforms to a considerable extent.

By assessing the risks and benefits of open and collaborative science, the outputs and outcomes of the project are expected to raise awareness among the stakeholders implicated in the topics under study. This can be achieved by organizing workshops and engaging four types of stakeholders: policymakers, funding agencies, scholars, and social groups affected by the studied problems and needs.

Research Problem, Significant and Justification

WORD LIMIT: 1,000. Please provide a brief overview of relevant literature and highlight the knowledge gaps that this project will address. Indicate the size and scope of the problem, as well as how the problem relates to the purpose and goals of OCSDNet; broader national development priorities, and the research and capacity needs of the countries involved.

This project draws chiefly on three contributions from the STS field and from the sociology of knowledge, which can be synthetically grouped around three key concepts: (a) the co-production of knowledge; (b) the tensions between scientific centres and peripheries; and (c) the concept of cognitive exploitation. The latter addresses possible knowledge gaps in the existing STS literature in regards to the emerging risks and benefits from open and collaborative knowledge production in the southern contexts, including specific literature on the concept of open science.

(a) Rather than considering social problems as self-evident, we understand their existence as the result of dynamic and conflictive historical processes, or, more specifically, as the result of a co-production process, in which science, society, and politics are inextricably engaged (Gusfield, 1984; Jasanoff, 2004). This is to say that the definition of social problems is, itself, problematically related to the production of scientific knowledge, and that scientific problems are simultaneously oriented by contingent definitions of social problems. Therefore, outputs of science that are intended to address social problems or demands are both affected by and affecting on the definition of such problems and needs (Kreimer & Zabala, 2006, 2007; Kreimer, 2014).

The definition of a social problem normally entails certain “legitimate,” “natural,” or “rational” solutions, and exclude others which are not. When the definition of a problem is complex or too extensive, scientists can become enrolled in order to vindicate a certain orientation in the definition of the problem and to exclude or downplay the others (Kreimer, 2011).

(b) This mutual engagement of social and scientific problems is complicated even further by the underlying tensions of scientific development in peripheral contexts. In the scholarly

literature, such tensions have been traditionally attributed to the tradeoffs between visibility and international recognition of scientists, on the one hand, and the ability to industrialize and effectively apply such scientific knowledge, on the other. The concept of integrated subordination has thus been coined to account for the overall pattern under which scientists are integrated into international scientific collaboration networks: research groups in peripheral contexts adopt hegemonic research agendas to increase their visibility and rise resources, but compromise, in this way, their ability to effectively undertake scientific problems based on local needs and demands (Kreimer, 2006, 2010b; cf. Varsavsky, 2010).

The concept of applicable knowledge not applied (or KANA) was originally proposed to understand knowledge outputs under the patterns of integrated subordination, given that the amount of knowledge produced in peripheral contexts that is effectively used for its own societies is significantly low (Kreimer & Thomas, 2006).

(c) In recent years, however, the traditional circumstances of worldwide knowledge production have been dramatically modified. Globalization processes taking place in science—together with the formation of larger research networks—generate, at once, risks and opportunities in peripheral regions. On the one hand, research capacities in peripheral contexts may be empowered by the formation of South-South networks. These new collaboration patterns for the south allow research in peripheral societies to do away without the direct intervention of hegemonic research centres, whose perception of social needs and demands in southern contexts is absent or distorted.

Risks, on the other hand, may still arise through a series of processes that we identified as cognitive exploitation. This concept entails a relationship by which certain knowledge outputs, originally generated from non-profit objectives, become ultimately appropriated and turned into a source of profit by a different set of stakeholders (Kreimer & Zukerfeld, 2014). In this way, open and collaborative science is particularly prone to the risks of cognitive exploitation for two reasons. First, collaborative research platforms (e.g., genomic databases) allow central research groups to benefit from research conducted by peripheral groups without having to engage in the social or spatial contexts where research takes place (cf. Latour, 1987). Second, ineffective intellectual property regulations enable central stakeholders to own and profit from the knowledge originally produced in peripheral contexts with considerable freedom (Codner, Becerra, & Díaz, 2012; Zukerfeld, 2010). Although there are different subsets of knowledge involved in cognitive exploitation process, here we shall focus on two: exploitation of scientific and informational knowledge. The latter applies to knowledge produced in the form of digital information (e.g., software), and largely overlaps with scientific knowledge in the case of genomic databases.

Other cases of cognitive exploitation have been detected by Fecher and Friesike's (2014) review of the literature on open science. Exploitation, in this case, does not arise from internationally asymmetric relationships in science production processes, but from citizens and broader audiences engaging with them. The authors review cases in which citizens are, in practice, enrolled in science production processes as mere free workforce via online volunteering networks. Fecher and Friesike understand such treatment of open science as a

set of preoccupations put forward by what they call “the public school of thought,” which is in part “concerned with the accessibility of the research process (the production)” (p. 19). The “infrastructure school,” on the other hand (which deals with technical architecture of collaboration), is concerned with distributed computing and social collaboration networks, but the authors do not deal with the case of genomic databases and repositories specifically. The three other open science schools in this classification, encompass issues related to alternative impact measurement (“measurement school”), synergy of research (“pragmatic school”), and access to knowledge (“democratic school”). Indeed, the public and the infrastructure schools, as well as the ”pragmatic” one, can offer analytical tools to account for the risks of open science from the chosen case studies (see below).

To detect and understand the risks and benefits of open and collaborative science, we have chosen two Latin American research networks as empirical case studies. The first one is centred around tropical disease research (particularly, Chagas disease) and involves research groups in Argentina and Brazil who have strong ties with the World Health Organization’s Special Programme for Research and Training in Tropical Disease (TDR). The second one is the case of social and political sciences research in Mexico (particularly, the Iberoamerican Network on Territorial Ordering [RIDOT]).

Chagas disease (tripanosomiasis Americana) is officially considered to affect over eight million people in Latin America (WHO, 2014). Specialists, however, claim this to be a severe underestimation of the actual number of infected (~25 million). Chagas is a neglected and “silent” disease (rarely showing symptoms until its chronic phase) that mostly affects poor rural population with inadequate housing. Chagas disease research in Argentinean and Brazilian molecular biology is endowed with an outstanding material and symbolic significance, as well as with great deals of local and international recognition (Kreimer, 2010a).

Tripanosoma cruzi, the causal agent of Chagas, became a “legitimate” scientific object in Argentinean and Brazilian molecular biology since the 1970s. In recent years, genomic networks studying T. cruzi (together with its complete sequencing) have extended the scientific significance of the organism to developed countries.

In spite of this scientific expansion, genomic approaches and resources used in Chagas research have also contributed in “purifying” the disease by separating its genomic aspects from the conditions that give rise to it high incidence in poor areas. In this context, international cooperation is explicitly encouraged by scientific policy as a means to optimize and socialize the production of applicable knowledge, but implicitly oriented to restrain collaboration, almost exclusively, with the most prestigious research centres to increase visibility.

The second case is the study of the Iberoamerican research network dedicated to study and advise on planification in sustainable territorial development in the region (RIDOT), for which we will make the Mexican case a focus of our attention. RIDOT’s research objectives are linked to the development challenges faced by territorial government policies. This research

network especially takes into account those policies aimed to tackle down the unforeseen challenges that spawn from climate change and globalization processes in the region.

Our aim is to identify the factors and motivations that lead Mexican researchers and teams to take on problem agendas or internationally "hyped" conceptual and methodologies frameworks, as well as analysing the effects of such interaction upon the development of social sciences and policies. We encourage reflecting on this issue beyond the theoretical frameworks of the Mexican society by exploring the networks to which researchers and institutions are linked, understanding their action as practices, as well as analysing the dynamics they engage in by using technologies and platforms for scientific communication and knowledge production.

Research Questions and Objectives

WORD LIMIT: 500. Outline your project's central research question(s), sub-questions, and objectives. There must be congruency between the questions, objectives, research design and methods. You should highlight how the study's questions and objectives will contribute to the research themes of the OCSDNet.

Our questions intend to assess potential impacts (positive and negative) of open and collaborative science, especially regarding the social use of knowledge by local peripheral societies. The central research question, therefore, is intended to determine under what conditions can open collaboration networks contribute to an effective use of knowledge in peripheral societies; which consequences are associated to more or less open networks, and what is the specific role of the technical organization of open research collaboration.

This is to ask:

What factors affect—positively and negatively—open and collaborative science within these networks? What does openness mean in the contexts of these networks?

How are Latin American research groups integrated into international research networks? What is the role of epistemological and technical motivations, of international visibility, and of the social use of knowledge, respectively?

What are the mechanisms of knowledge circulation and sharing in these scientific networks? To what extent are they "open" and collaborative? What are their facilitators and constraints?

Who are the most frequent partners and how is power and decision-making distributed—including research agendas—within the networks? What other stakeholders participate in the formation of these networks besides research teams themselves? What are the governance structures of these scientific networks? How do they affect the open and collaborative character of these networks?

What are the variables determining the Latin American research groups participation in more

or less open or collaborative networks? What is the role of traditional incentives such as social and economic capital (recognition and funding)? How are the technical, institutional, and epistemological factors affecting this traditional model of scientist's motivation and exchange?

What is the role played by the international cooperation policies in each country in regards to the integration of collaborative networks? Do South-South and North-South scientific networks operate in the same way, in terms of the adoption of open and collaborative science mechanisms and values? At last, does openness contribute to the adoption of research agendas more connected to social problems?

The aim of this project is to analyse under which conditions open and collaborative scientific networks have the ability to cooperate in the effective use of the knowledge produced to attend specific social problems. This is, more specifically, to

a) Identify the formation of collaboration networks, and the different actors and elements that take part in them.

b) Analyse knowledge production, circulation and sharing means (communication and collaboration platforms, research instruments and tools) and outputs (papers, patents, institutional documents).

c) Single out the factors and motivations that lead researchers and teams to take on problem agendas, conceptual and methodological frameworks, problem definitions, and collaboration platforms.

d) Provide a reflexive and participative review of the scientific treatment of social problems that includes the project stakeholders.

Stakeholders

WORD LIMIT: 250. Identify and briefly describe your project's stakeholders. How will your project respond to their needs and interests?

This project initially takes into account four types of stakeholders:

1) Policymakers in the areas of science, technology and innovation (particularly in international cooperation offices), as well as in the fields of health and social affairs. Institutions awarding local funding to support the participation of researchers in international networks or consortiums are to be especially taken into account, as a way to refine the selection of this first type of stakeholder. In the design of scientific international collaboration policies, particularly, these institutions might take into consideration the open or closed character of the research consortia and data circulation, as well as their consequences for the local industrialization of knowledge.

2) Non-government organizations and/or research funding agencies. Namely,

A. Special Programme in Research and Training for Neglected Disease, World Health Organization (TDR)
B. Drugs for Neglected Disease Initiative (DNDi)
C. Mexican Council of Social Sciences (COMECSO)

3) Scholars: especially junior researchers from life sciences and from social and human sciences.

4) Social groups affected by the studied problems and needs. Precisely, as we pointed out in previous texts (Kreimer, 2011), their ability to act in the public arena—even the self-awareness of the affected populations—tends to be very weak. This is due to the fact that they do not often perceive the issues in question as "public problems," or because they lack of the rhetoric or the organizational skills to intervene in a public arena. This, in turn, is usually why other actors speak "on their behalf": namely, scientists, NGOs, policy makers, medical doctors, etc. Here we intend to detect the existence of "spokespersons" who intervene on the basis of their respective interests, and attempt to contribute to modifying this situation as a longer-term impact of our project.

Since our initial objectives are aimed to identifying the individuals and organisations that effectively take part in research collaboration networks (or in the definition of social problems and solutions), the emergence of stakeholders that are not considered in this classification cannot be a priori ruled out.

Research Design & Methods

WORD LIMIT: 1,000. In this section, applicants should clearly indicate and justify the proposed study design. You should discuss how you intend to collect the data that you will need to achieve the study's objectives and answer the project's research questions. You should clearly outline how each data collection activity will contribute to the study objectives.

The methodological strategy will be deployed both in the analysis of primary and secondary data, on the basis of qualitative (1) and quantitative techniques (2).

For the first stage (1.1), we will start by "following the actors": this is a strategy that corresponds to the approach raised by laboratory studies (Latour & Woolgar, 1979; Latour, 1987), which consists in following the research groups at the different loci of knowledge production. Participants will be inquired about their actual research links, funding sources, institutional settings and general practices, in order to generate a rich description of the network. Key informant interviews will be conducted as qualitative in-depth interviews to assess the elements that are perceived as motivations, facilitators, and constraints, and which affect on the researchers' actual collaboration practices, open or closed. In the same way, interviews shall assess the researchers' stance on the social problems which their investigations are related to.

Simultaneously (1.2), we will identify the groups and actors that are formally related to the networks, according to the links that can be singled out using institutional documents, websites, and various written and documentary sources in other media and supports. At last, we will determine different levels of regulation which might affect the open and collaborative character of international scientific networks (particularly, intellectual property rights).

For the second stage (2), we will observe and analyse the features and the dynamics of collaboration between groups in each field using bibliometric tools. Here, after collecting all the papers produced by each group, we will develop a keyword strategy to access the information, working in collaboration with specialists in each field. Data will be initially analyzed as a whole in order to determine its general structure (2.1), and then separated into five year periods to track the evolution of the fields (dynamics), finding shared actors that appear in consecutive periods (2.2).

Whereas traditional bibliometric analysis has chiefly relied on co-citation analysis, we are working with new resources such as bibliographic and heterogeneous coupling methods (Grauwin et al., 2012) that also allow us to explore the cognitive and the semantic contents of the papers being analysed (Berners-Lee & Hendler, 2001; Latour, Jensen, Venturin, Grauwin, & Boullier, 2012). Such methods analyse not only shared referenced, but also integrate as shared title words, authors, referenced journals, keywords, subjects, addresses, and so into analysis.

Complex networks can therefore be surveyed and recreated with greater insight and precision. Data obtained with these methods provide a better account of "disciplinarity cohesion" and enable following the intellectual links of the scientist through their production, to be contextualized with our initial qualitative approximation (1). Emerging dynamics will be further understood by applying graphic analysis to the complex datasets obtained from cross analysis of shared references, including title words, keywords, authors, and journals (Grauwin & Jensen, 2011; Rafols & Leydesdorff, 2010; van den Besselaar & Leydesdorff, 1996). This will allow us to map the spatial and temporal dynamics of the networks, to identify the participation of non-academic actors in publications, and to assess co-authorship in quantitative (intensity) and qualitative (thematic) terms .

The maps and networks generated from (2.1) and (2.2) are meaningful inputs to read and rethink the interviews conducted in the first stage (1.1 and 1.2); both strategies will be improved from crossing these sets of data (Gläser & Grit, 2014).

Given that we understand *mobility* as a meaningful form of scientific cooperation, during this stage we will also trace and analyse young researchers' training in international centres and universities (2.3).

Finally, integrating the data obtained from (1) and (2), we will also observe the articulation of the networks in terms of the actors' motivations: whether they respond to institutional policies or regulations, to the relationships with other actors to industrialize knowledge, or to

other factors that operate as stimulus for the formation of networks. This will be contrasted with the analysis of (discursive) network objectives, the goals of the funding agencies or institutions that sponsor them, and the overall funding structure.

A comparative analysis will be carried out from different variables that are present in each case study.

Moreover, two workshops, to be organized one per year, are part of the methodological strategy, in the sense they will allow a preliminary control of initial research results, as well as sharing results and incorporating the points of view from other disciplines and areas of expertise (see below).

Analysis & Synthesis

WORD LIMIT: 1,000. Describe how you intend to organize, examine and model data to arrive at conclusions and insights.

Integrating the data from quantitative and qualitative analysis (see above) will allow a systematic, comparative understanding of the variables and categories collected from each case study, as well as their evolution in different temporal, spatial, thematic, institutional and regulatory contexts.

Systematic and comparative analysis, in turn, is aimed to determine if the two networks taken as case studies show differential behavior in terms of dynamics, structures of collaboration, and disciplinary/thematic grouping, respectively.

Regulation frameworks, formal or not, are particularly important in the case of Chagas Disease because of the explicitly open nature of genomic databases, which enables direct appropriation of knowledge on behalf of central groups and institutions. In the case of the territorial governance network, knowledge appropriation on behalf of central actors may have other appropriation mechanisms, and therefore, it is important to single down the variables that make their dynamics different from biomedical and genomic databases. As a consequence, contrasts between formal and informal regulation mechanisms and governance of knowledge production and sharing will be made explicit.

Two workshops will be organized (one per year), in order to evaluate results from research. These will contain summaries, analysis and discussion of the initial research results, and will be structured around the variables determining participation dynamics in more or less open networks.

Outcomes & Outputs

WORD LIMIT: 700. Describe the major project outputs and intended outcomes. Your project outputs should creatively reflect the principles of open and collaborative science.

We intend to design an empirical and conceptual approach that allows us to underpin the risks and opportunities that emerge from open and collaborative research networks. This will be initially implemented from the Latin American perspective, but also expected to shed light on the central variables that make it possible to extend the analysis to other networks with participation of scientists from different developing contexts. Departing from the empirical data on tropical disease and territorial governance research networks in Latin America, we aim to enhance the conceptual framework put forward by the OCSD Network, and to refine the analytical methodologies in order to compare different networks and settings, as well as the role of the various platforms and support instances for the development of science in the Global South.

In sum, the outputs of research will be:

a. Reports, papers, and PhD theses. These, eventually serve as a basis for a comparative book on open and collaborative science in development.
b. Presentations and participation in conferences dedicated to the studied subjects.

All this elements constitute an initial output of research, which, after engaging in open discussion workshops with experts, will finally take the form of more elaborated reports specifically targeted to decision makers in the areas of S&T and international scientific collaboration.

Therefore, the above mentioned outputs will be used as inputs for the actual production of the outcomes by raising awareness among the stakeholders implicated in the topics under study. The means by which the outcomes will be achieved depend mostly on the type of stakeholder implicated in our project: this is, (1) science and technology, health and social affairs policymakers; (2) non-government and research funding agencies; (3) scholars; (4) and the social groups affected by the studied problems and needs.

Communication and engagement with stakeholders (1) and (2) is to be achieved by means of briefing documents that summarize the project's results and provide a critical consideration of the risks and benefits of open and collaborative science in the selected countries. In other words, our most crucial outcome shall be a series of recommendations concerning science, technology and international cooperation policies.

Researchers (3) will be engaged via dedicated workshops. Such workshops are expected to allow exchanging expertise and experience, and to provide a reflexive approach to the project's problems and findings. For these we shall undertake initiatives supported by action proposals.

The affected social groups, on the other hand, can only be engaged after stakeholders (1), (2) and (3) have taken part in sharing the project outputs. In this way, feedback from the workshops and, to a lesser extent, from briefing documents, shall contribute to yielding a more reflexive, controlled and negotiated approach to the definition and intended solutions to social problems. As a mid to long-term outcome goal, considerations on the risk and benefits of open collaboration are expected to be explicitly included in scientific research

and science policy agenda.

As we have pointed out in previous investigations (v.g., Kreimer, 2011), it is notably challenging for those affected by the problems under study (mostly, poor collectives from rural areas with scarce intercommunication) to be in possession of the political, material, and symbolic means that would allow them to put forward their own views of (and solutions to) the problem. The consequences, therefore, entail two main risks: (a) the naturalization of the unfavorable conditions and (b) intervention from third parties that translate or reformulate the problem in ways that do not necessarily match their needs and demands. Outcomes should not only clarify the involvement of third parties or spokespersons, but also foresee the means to address them all as a longer-term impact.

Furthermore, we will encourage our audience and target groups to reflect on this issue beyond the specific framing of Latin American rural areas (Mexico and Chagas endemic zones) by exploring the networks to which researchers and institutions are linked, understanding their action as practices, as well as analysing the dynamics they engage with using technologies and platforms for scientific communication and knowledge production.

Knowledge Translation & Dissemination

WORD LIMIT: 700. Describe how you will disseminate your outputs. To ensure that the results of your study are applied to address development challenges, explain how you intend to package, disseminate and promote the application of your findings amongst relevant stakeholder groups.

Two workshops will be held in Argentina and Mexico (one per year) with representatives from non-government organizations, science policy and decision makers, and researchers from different fields. Workshops are thought as exchange spaces, where the preliminary results of our research will be communicated and discussed.

Briefing documents are to be tailored to the particular needs of each institutional setting. For instance, presentations are to be prepared for addressing research outputs with experts in local and international scholarly meetings. Outputs, also in the form of reports, will be drafted and circulated before each workshop in order to pre-test partial results and eventually allow (informal) peer-review. All these, in turn, are planned to be permanently available online under open license agreements.

Most importantly, two PhD students will be trained and will carry out their doctoral dissertation undertaking the questions and problems posed in this investigation.

A less foreseeable form of output corresponds to those stakeholders or actors that have not been originally detected, but emerge from networking, scientific output, and documentary analysis. This will certainly require the creation of specific communication formats and channels according to their nature; however, close contact with the stakeholders that have been sketched out in previous sections (public policy, funding and non-government agencies, and young researchers) offers a pathway to engagement and collaboration via

interactive expertise (Collins & Evans, 2002).

Network Connections & Interactions

WORD LIMIT: 500. Illustrate how you will contribute to the overall OCSDNet framework and themes. Draw on other initiatives and approaches discussed at the OCSDNet workshop, if applicable.

As suggested in Fecher and Friesike (2014) and discussed in the OCSDNet Background Paper, open science is an umbrella term which not only needs to encompass the complexities of open and collaborative science in the twenty-first century, but also take into account the contextual singularities in the Global South together with the needs and constrains of science in development. As we have posed above, this can only be achieved via a reflexive, negotiated approach to the risks, challenges and potential benefits of open and collaborative science. We intend to part from merely descriptive case studies, on the one hand, and from purely theoretical, top-down speculation, on the other; we intend to build, instead, collectively accessible middle-range outputs that can be changed or revised over time, that engage multiple actors concerned with open and collaborative science challenges, and that can be turned into outcomes with their collaboration. Achieving positive impacts is, therefore, not only an intellectual endeavour but also a political and technological one. In this project we attempted to address both by engaging the stakeholders of our case study, sharing and exchanging with OCSDNet participants, and taking advantage (while being aware of the risks) of shared digital platforms.

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