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**THE INTERNATIONALISATION
OF PUBLIC SECTOR
RESEARCH THROUGH
INTERNATIONAL JOINT
LABORATORIES**

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THE INTERNATIONALISATION OF PUBLIC SECTOR RESEARCH THROUGH INTERNATIONAL JOINT LABORATORIES.

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ABSTRACT

This paper analyses the emergence of public sector international joint laboratories as an increasingly important new phenomenon in the internationalisation of public sector research. Using a survey and interview-based qualitative methodology, it explores the trends in the establishment of such labs, the aims for which they are established and the extent to which these aims are met. We find a considerable degree of organisational diversity among them in terms of size, structure, resources and legal status. Since the French CNRS and the German MPG have been very active organisations in the set up of joint laboratories, the paper undertakes two case studies of instruments of these organisations based on background literature and in depth interviews. We argue that the joint labs they establish are examples of the institutionalisation of previously self-organised international collaboration dynamics and that these public research organisations have developed these international collaboration instruments with specific organisational goals.

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1. INTRODUCTION

National governments increasingly see international research collaboration as a positive phenomenon. In order to facilitate it they offer various forms of institutional support ranging from international agreements which allow researchers from different countries to work together and share data, research material and research infrastructure and various measures to promote mobility and collaboration, to funding the establishment of research infrastructures in a different country. At the meso-level, public research organisations have also engaged in the set up of research laboratories in foreign countries. This paper focuses precisely on the various types of international joint laboratories which have been formed in the past decades. Joint laboratory in this paper refers to a variety of units which differ in size, structure and legal status. It is thus defined as a “unit”, with a physical research infrastructure, which receives support from a foreign public research organisation and carries its name.

The last two decades saw a rapid rise in the establishment of R&D units by companies in foreign countries. This study does not include these private laboratories or the public-private international laboratories set up by multinational corporations in universities or research institutes. The focus is not on large multinational research institutes like CERN, the EMBL, EBI, and ITER either. Rather the paper concentrates on the establishment of often relatively small research laboratories in universities or research institutes in a different country, the main aim of which is to facilitate research collaboration between organisations and their researchers in two countries. This paper focuses on the organisational level and explores a new type of institutional support offered by public research organisations. The establishment and support of international joint laboratories is part of the organisational policy of large research performing organisations in Europe and reflects the institutionalisation of previous spontaneous collaborative dynamics through the development of governance structures for international scientific collaboration among two partners.

As French and German public research organisations have been very active in the establishment of such sub-organisations they receive special attention though joint labs have also been established by other European, North American and Asian (Pacific) research organisations. The phenomenon is relevant not only because it is becoming an important element of the internationalisation strategy of some of the major European public research organisations which are key actors in their research systems, but also because it has become a prominent feature of the internationalisation of the research systems of countries like China (Jonkers, 2010). The trend is expected to become more prominent in other Western and large emerging research systems as well. In 2008, the European Commission announced the promotion of virtual joint centres and international joint laboratories between the EU and third countries in its strategic European framework for international science and technology cooperation (COM, 2008). The novelty of the topic is twofold. First, these developments are taking place at the meso-level of

research organisations (and not at the level of national governments or individual researchers); secondly, these establishments involve bilateral (but not multilateral) infrastructure.

The paper has two aims. Firstly, to present an overview of the growth in the number of joint laboratories in the last decades and the different organisational forms they have adopted. Secondly, to address the question of why public research organisations engage in the establishment of these joint labs and the extent to which the goals that drive these initiatives are being met. The article is organised as follows: in the next section we contextualise the study with some of the literature relevant for the topic; in section 3 we describe the methodology; section 4 presents the general findings showing firstly, an overview of the growth of the phenomenon and a description of the different types of joint labs, and secondly, the results of a survey addressing various descriptive comparative dimensions of the joint labs along with the motivations for their establishment. In section 5 we undertake a more in depth case study of two instruments: the German Max Planck Society Partner Groups, and the CNRS Mixed International Units. We conclude with a summary of the main arguments and some implications for policy and future research.

2. INTERNATIONALISATION OF PUBLIC SECTOR RESEARCH: LEVELS AND MOTIVATIONS

In this section we first review some of the work that has highlighted the different levels at which internationalisation of research may take place, and secondly, we explore some of the literature that focuses on the motivations of research organisations to engage in international collaboration.

The internationalisation of research has been addressed in various publications, but the focus has been mostly on individual collaboration or on corporate R&D. The internationalisation of public sector research has been studied from various perspectives (Stein, 2002; Aksnes et al. 2008; Greenaway, 1996, Beerkens & Derwende 2007; Geuna 1998). The growth of collaborative science between Europe and other regions in the last two decades has been manifested in the increase of co-publication (Carayannis & Laget, 2004, Wagner, 2005, Jappe, 2006). Dynamics in international research collaboration are said to follow the logic of a self-organising process (Leydesdorff & Wagner, 2005) and to be dominated by informal cooperation between scientists. Despite the importance of organically-formed ties on collaborative science, however, international research collaboration often depends on institutional support (Amanatidou, 2002; Chung, 2002). The relevant institutional support might be provided at various levels and leads to different types of projects: corporate partnerships (usually large scale big science projects or facilities), team collaboration (with diverse levels of formality) and interpersonal collaboration (highly dependent on relations between researchers and research groups) (Smith & Katz, 2000, Wagner, 2002). Georghiou (1998) argued that formal arrangements were beginning to catch up with the very substantial extent of bottom up global cooperation in research between

industrialised countries. He also pointed to some additional modalities of international cooperation such as: researchers' exchange and fellowships, workshops, cooperative networks, participation in national programmes of the collaborating country, and the establishment of subsidiary laboratories.

Thus, internationalisation of research can refer at least to three different levels: the macro level of nations and governments' policies, the meso level of organisations such as universities, PROs, firms and others, and the individual level of collaboration through co-publication (for reviews see Katz & Martin, 1997, Glänzel & Schubert, 2004). At the macro level, memoranda of understanding and formal agreements signed between national governments tend to be necessary for allowing researchers in different countries to collaborate and for the use of national research infrastructure by foreigners. At the intermediary level, funding agencies such as research councils from two or more countries have also signed agreements so that they can provide financial support targeted at collaborative projects by researchers in the respective research systems. Research organisations can also provide various kinds of (financial and non-financial) support to facilitate international research collaboration by the researchers they employ. The level of the research system on which this paper focuses is precisely the intermediary level of the research organisation.

Why would research organisations want to engage in international collaboration? The literature on international activities of public research organisations is scarce and despite their increase in the last decade, the establishment of international joint laboratories in both developed and developing countries has not yet been studied with the exception of two case studies of single joint laboratories in China (Bonnema et al., 2006, Grumbach, 2007) and an analysis of their impact on international collaboration in the Chinese system (Jonkers 2009).

Private sector R&D international collaboration, on the contrary, has attracted a lot of scholarly attention on the drivers for international alliances or for the externalisation of R&D units, which has been documented to have increased substantially over the last two decades (Zedtwitz & Gassmann 2002:570). Among the motivations of firms to engage in such collaboration economic research has pointed out the role of "cost sharing" "skill and capability sharing" and "increasing competitive advantages in global markets" as key drivers (Sakakibara, 1997). Although we acknowledge that firms engage in international collaboration not only to secure markets but also with knowledge-seeking motivations, it is our contention that economic approaches do not fully capture the variety of rationales of public sector research organisations. As Katz & Martin (1997) and Beaver (2001) described, there are various motivations why researchers engage in (international) research collaborations and by extension why research organisations would support this behaviour. One of the most cited is related to the increasing costs of R&D performance, which lead to the need of pooling available resources, funds, and skills from different organisations. Increasing specialisation within scientific fields, growing

interdisciplinarity and complex instrumentations and technologies requiring specialised expertise have also been associated to a higher propensity to collaborate. Many of the factors favouring collaboration are also favouring international collaboration. However, the creation of international research facilities, regardless of their size, often requires institutional support.

Georghiou (1998) analysing global cooperation in research in broader terms and including the public sector, classifies motivations to collaborate internationally into two categories. On the one hand, there would be direct benefits such as the access to complementary expertise, knowledge and skills. On the other, indirect or strategic motivations are driven by political, economic or institutional goals. For instance, international research cooperation might enlarge the scope or the scale of research and improve access to funding sources; additionally, reputational benefits can be derived from research ventures in other countries and attract students or post-docs to the home organisation. Apart from these international reputational and visibility gains, learning benefits may also derive from exchanges and research visits abroad. Past partnership has also been signalled as a relevant variable in explaining inter-organisational alliance decisions and subsequent cooperation between those actors (Gulati & Gargiulo, 1999). In this regard, maintaining in strong contact with former alumni or visiting scholars might be relevant motivations for further international collaboration too. Supporting a foreign research organisation might also be framed as a medium term investment in future collaborators. The motivations for the establishment of international joint labs which will be explored in this paper include several of those identified in these previous works.

This paper contributes to the literature by depicting the growing phenomena of international joint laboratories and its diversity, analysing how some public research organisations have made international cooperation and collaboration a part of their strategy with specific goals, and how these centres have centralised some control over previously bottom-up dominated dynamics through the institutionalisation of support.

3. METHODOLOGY

This study focuses solely on joint labs established by public sector research institutes or universities together with local partners in foreign countries. We focus on laboratories which imply the set up or support of a physical infrastructure in a different country, involve two partners and range from single research units or groups to larger joint centres. We do not focus here on the so-called “big science” facilities or on internet-mediated science collaborations, labelled “collaboratories” or “laboratories without walls” in which researchers are connected, and share instruments and data independently of time and location (Finholt, 2003).

One of the other common features of the joint labs is that the foreign parent organisation

partially gives its name to the joint lab, thus implying a commitment of reputational capital. The joint labs (units or centres) of interest are actively involved in carrying out research and the selection therefore does not include representative offices or units whose main mission is higher education.

The data for this study was collected in 2009 through various means. First, an internet search was used, complemented by the annual reports and other official publications of the MPG and CNRS for the identification of international joint laboratories and their basic features. This data was also used to monitor the evolution of the number of international joint labs over the last 15 years. The directors of the labs identified or their parental organisations were approached to confirm their existence and the year in which they were established. The first part of the results section presents the findings from this part of the study which consists of a general overview of the phenomenon.

In a second round of the survey, the directors of the international joint labs were solicited for information about the motivations for the establishment of the international joint labs, the degree of success, and a number of other questions. Our aim was to further map the differences between the various types of joint labs. Of the 115 directors of joint laboratories to whom an email questionnaire was sent 33 responded. Around half of the respondents (17) were the heads of so-called Partner Groups from the German Max Planck Society. The second part of the results section presents the findings from this part of the data collection.

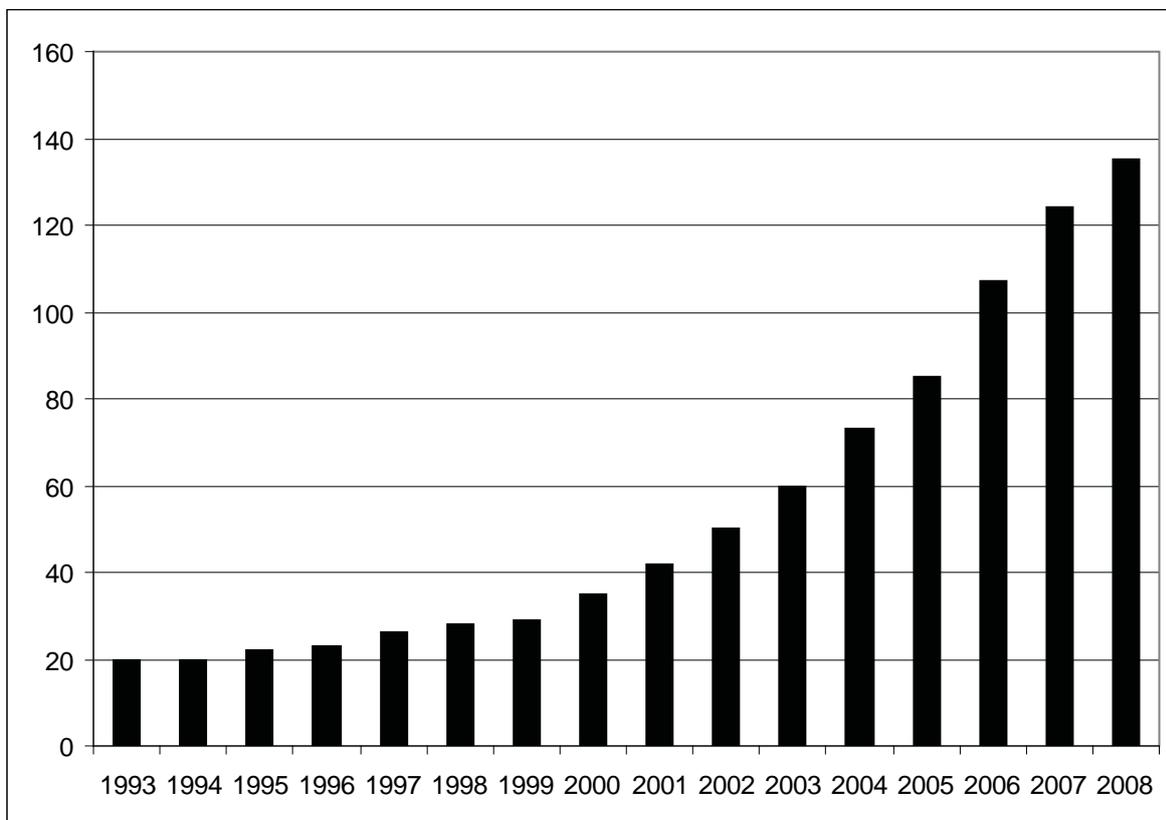
In order to complement the survey, a final approach to data collection involved a more in depth qualitative case study of two programmes for the establishment of joint laboratories: the MPG Partner Groups and the CNRS mixed international units (UMI). Secondary sources were analysed to build the institutional context of those instruments. As a complement, we conducted two semi-structured in depth interviews with high level representatives of the organisations including the international cooperation department of the German Max Planck Society and the French CNRS, which support most of the joint laboratories through the set up of specific programmes. The respondents were asked similar questions as those which were asked to the directors of the joint laboratories. This was complemented with some background questions which were used together with background literature to construct the case studies.

4. RESULTS

a) Trends in the establishment of joint labs and an overview of their different forms.

On the basis of a review of annual reports of research organisations and an internet survey a total of around 160 joint labs were identified in the period 1993-2008¹, some of which have already been closed since their establishment.

Figure 1 Number of international joint labs at different points in time



Source: Own elaboration based on institutional publications and institutional websites.

While aggregating many different forms of international joint laboratories, figure 1 does show that the phenomenon is increasing over time². It is interesting to note that of the 135 joint labs identified in 2008, 86 were part of a program. The German Max Planck partner-groups form the largest group among these with 40 labs followed by the CNRS UMI (17).

While sharing some similar features, most notably their establishment in a foreign host organisation or foreign research system, the international joint labs are far from homogeneous. In order to provide more insight in the diverse nature of the joint laboratories, we made an attempt to systematise their basic features. Table 1 provides a schematic overview of the different types of joint organisations considered in this study. They are grouped by country.

Table 1 Overview of the main types of joint laboratories

Countries	Type	Characteristics
France-various	CNRS/INSERM UMI International Joint Units	<ul style="list-style-type: none"> - own physical research infrastructure - large in size relative to the other labs in this table - An existing lab or centre can be granted UMI status after an administrative procedure - in developed as well as emerging research systems - with CNRS/INSERM director and 'local' co-director
Germany-various	MPG partner-group	<ul style="list-style-type: none"> - own physical research infrastructure - small in size relative to UMI - tends to be headed by a researcher who returned to his/her home country after working in an MPG institute - in emerging research systems - with director from host country
Germany-China	MPG Junior research group	<ul style="list-style-type: none"> - own physical research infrastructure - small in size relative to UMI - in China (only six have been established/identified in the past 10 years) - with director from host country (selected in open international recruitment procedure)
Various countries	Joint institutes	<ul style="list-style-type: none"> - own legal identity - larger in size than the joint labs - contain a number of laboratories (with exceptions: Shanghai institute of advanced studies) - tend to have a director from the parent country
Various countries (e.g. FA-US, IT-JPN, CH-AUS)	Mirror laboratories	<ul style="list-style-type: none"> - joint laboratories set up in both parts of a bilateral/bi-organisational pair - both sides with physical research infrastructure
Various countries	(Single) joint laboratories	<ul style="list-style-type: none"> - Joint laboratories established in one of the collaboration organisations by a variety of universities and research organisations. - with physical research infrastructure

Source: own elaboration based on institutional publications, institutional websites and exchanges with the directors of joint labs.

Where the German and French research organisations are most active in the establishment of international joint labs in foreign countries, organisations in other countries have also done so. British research organisations have established around 7 international joint labs in China, American organisations (and universities) have done so (at least) 9 times in China and once in France. Australian universities established 3 joint labs in Chinese research organisations, Italian universities and research organisations established 2 in China and 2 in Japan, the Dutch Wageningen University had one joint lab in an institute of the Chinese Academy of Agricultural Sciences and Japanese organisations established a further 3 joint labs in China and one in Italy. The latter is a “mirror lab” of an Italian-Japanese lab.

China stands out as a host country for international joint laboratories with 71 of such joint labs having been established. It is followed at considerable distance by India (12-16), Japan (10), Argentina (6), and France (9).

b) Basic comparative features of the joint labs and motivations for their establishment

To gain more insight in the differences between the joint labs their directors were surveyed with a number of simple questions on the size and structure of the lab, the ownership and degree of financial support by the partner organisations, the nationality or origin of the director, their perception of the motivations to establish (or fund) the joint lab and the extent to which its goals are being met. Next we present the main findings.

Basic comparative features

International joint laboratories are very diverse in terms of size. The joint institutes and the institutes on foreign soils (partially) established by the MPG in Florida and Shanghai and the Pasteur Institute in various countries are, or will become, considerably larger in terms of their size and budget than single joint laboratories. In contrast, The MPG Partner Groups tend to have between 3 and 6 permanent researchers. In three cases the size of the Partner Groups was reported to be considerably larger (up to 25 permanent researchers). The size of the groups depends largely on the resources the researchers receive from their home institution. Among the rest of the joint labs there were two with 2 to 4 researchers, four with 5 to 10 permanent researchers and 4 with over 15 permanent researchers. The CNRS UMI are larger in comparison. They were reported to have a minimum size of around 10 to 12 researchers ranging up to 50. The core of a standard UMI tends to have around 20 researchers but with associated groups it can be much larger.

Apart from size another interesting difference between the joint labs is the share of the financial burden carried by each of the partner organisations. Most of the joint labs received funds from other sources than the parent organisations. In the case of the Partner Groups the MPG provides only seed funding. In several cases, including the CNRS UMI, the two national sides provide 50 % of the budget each. In other cases a division is made in which one side provides the research infrastructure and the other is responsible for the main share of the salaries and operating expenditures. The foreign partner may also continue to pay its nationals' salaries or provide grants for stays of junior and senior researchers. It is interesting to highlight that 75% of the labs reported not to have a legal identity independent from the host organisations.

We have also analysed whether the joint labs are headed (and staffed) by a researcher employed by or originating from the parent or the host organisation. The MPG junior research groups in China explicitly recruited overseas Chinese researchers and the MPG Partner Groups are headed by a researcher who has returned to his or her home country/organisation. The French UMI tend to be headed by CNRS researchers (not necessarily with French nationality) living abroad. The same is true for the (co-)directors of the (larger) institutes established on foreign soil. In the case of the UMI it is important to indicate that they also have a co-director from the

host organisation and that management responsibilities are shared. The majority of the directors of the joint labs who responded to the survey had the nationality of the host country. In several cases respondents indicated that there were two directors or coordinators of the lab which would then have the nationality of both the host and partner-country – in some cases these were the so-called mirror laboratories.

Finally, it is interesting to note that in general international joint labs are not established to last indefinitely. The Max Planck Partner Groups are established for a maximum of five years on the basis of evaluation. In the other joint labs whose directors responded to the survey, there is more variation. Some are established for two or three years. A number of others have already been established for five years and expect that the agreement will be extended because there is sufficient interest. The French UMI are evaluated every four years and can last up to 12 years.

Motivations for establishing international joint laboratories ad accomplishment

To explore the motivations and the extent to which the organisational goals have been met, a distinction was made between the organisations which establish joint labs in foreign research systems (here called “parent organisations”) and those organisations which host foreign labs.

The respondents were asked to rate several potential motivations which the parent organisation was perceived to have had for the establishment of the joint lab in terms of importance on a scale from 1 to 10. Table 2 provides a ranking of average values attached to the different motivations (1 indicates that this motivations received the highest average score and 8 indicates it received the lowest average score). In addition to asking the respondents to indicate the importance, which they thought the parent organisation attached to various motivations, we also asked them to indicate the value which they considered the host organisation to attach to these motivations. Finally, we asked them to indicate, for both the partner and host organisation, the extent to which the parent organisation’s goals have been met by the functioning of the joint laboratory/centre.

Table 2 indicates that the two motivations which the surveyed lab directors considered to be most important for both the parent and the host organisations are 1) to increase their international visibility and 2) to provide institutional support for international research collaboration. The respondents also consider that the joint lab has contributed most to the fulfilment of these goals in addition to – for the parent organisation - the continued access to alumni (table 3). For the host organisation an important motivation for the establishment of the joint lab is the access it gives to specialised knowledge and skills. Among the responses to the question of whether the various goals have been met by the functioning of the joint laboratory, the realisation of this goal is highest as well. It is furthermore clear that access to funding is considered to be more important to the host organisation than to the parent organisation. By contrast the motivation

to gain access to scientific manpower and students is considered to be more important as a motivation for the parent organisation than it is for the host organisation.

Table 2 Questionnaire responses about the (perceived) motivations for the establishment of the joint laboratory (N=35)

	Motivation for parent organisation	Motivation for host organisation
Institutional support for international research collaboration	2	2
Gaining international visibility	1	1
Support for a foreign research organisation	6	6
Maintaining in strong contact with former alumni/colleagues	4	7
Gaining access to specialised knowledge and skills	7	3
Gaining access to research infrastructure	5	8
Gaining access to scientific manpower and students	3	5
Gaining access to funding	8	4

Table 3 Questionnaire responses about the (perceived) extent to which the organisational goals are met by the joint laboratory (N=35)

	Is this goal met for parent organisation	Is this goal met for host organisation
Institutional support for international research collaboration	3	3
Gaining international visibility	2	2
Support for a foreign research organisation	5	8
Maintaining in strong contact with former alumni/colleagues	1	7
Gaining access to specialised knowledge and skills	6 or 7	1
Gaining access to research infrastructure	6 or 7	6
Gaining access to scientific manpower and students	4	5
Gaining access to funding	8	4

5. MPG PARTNER GROUPS AND CNRS INTERNATIONAL MIXED UNITS: INTERNATIONALISATION THROUGH DIFFERENT INSTRUMENTS

The German Max Planck Society (MPG) and the French CNRS are large public sector research performing organisations. The MPG comprises 80 institutes and employs around 4,800 permanent researchers, the CNRS is even larger, employing 11,600 scientists, and comprising 9 institutes plus more than 1000 research units, the majority of which are mixed units with universities. In 2009, almost 31% of MPG scientists were foreign nationals, and 52% of junior and guest scientists came from abroad. Likewise, the CNRS annually receives 5000 visiting scientists and 15% of its permanent researchers are foreign. The large number of joint laboratories established by the MPG and the CNRS indicates that these organisations consider their establishment as a central element of their internationalisation. Based on background literature and interviews with the directors of the international relation divisions of the MPG and the CNRS we explored the cases of two different instruments more in depth.

Case study of the MPG Partner Groups

In the mid 1980s, the MPG established a Max Planck Guest professor laboratory in Shanghai. In the mid 1990s, this was followed by several “junior research groups” in China, which were

modelled on its tested model of junior research groups in its German institutes (Max Planck Gesellschaft 2007). Since the beginning of this century, the MPG set up another instrument, the MPG Partner Groups which will be discussed in more depth in this section. Apart from the Partner Groups and the junior research groups the MPG has also established complete joint institutes such as the MPG Florida institute and the MPG institute for computational biology in Shanghai.

Partner Groups should be analysed by taking into account the institutional context of the MPG, a large research organisation with a long tradition of supporting individuals. In these Partner Groups a foreign researcher, with proven research records and profile, who has worked in a Max Planck Institute and is working on a topic which is relevant to this institute, is supported for three years after returning to his/her home country. After successful evaluation the agreement can be extended by another two years. The group leaders are offered some funding (approximately 20,000 euro annually), support by a bilateral scientific advisory board, and strong ties to their former host institutions to continue their research lines (Max Planck Gesellschaft 2008, 2009). The MPG funding should be regarded as seed or incentive funding to help in the establishment of the group and especially to support collaboration with the MPG. It is not the basic support of the group, which is expected to generate funding from other sources in the host country. The researchers who lead the Partner Groups also profit from the commitment and ties with their former employer and the enhanced visibility and prestige which the continued affiliation with the MPG constitutes.

Partner Groups are thus based on the previous existence of collaborative ties. Proposals for the establishment of a Partner Group can only be submitted by the director of a Max Planck Institute – they can not apply themselves. This leads to a high level of pre-selection. The proposals are screened for the quality of the candidate and the quality, significance and originality of the proposed collaborative project and its potential impact on the current work of the Max Planck Institute. *“The program is highly selective. Of the 600 visiting Indian researchers [a number which includes PhD students] only a small number of Post-docs have been proposed by the head of their host institute to become the head of a Partner Group. For other countries, the ratio is even smaller.”* Following a positive (peer reviewed) evaluation of the proposal, the decision to establish a partner-group is made by the president of the MPG.

“While the Partner Group scheme is a top down instrument the participating scientists fill the scheme bottom up with content. The partner-groups are individually oriented career development programs aimed at international collaboration. The researcher returns home and has his or her own lab. The main funding comes from his or her home institution” (interview with international relations division of the MPG).

The MPG Partner Groups do not have an independent legal personality. They are integrated in a foreign organisation and there is no ownership of MPG. In the partnership an agreement is made, however, about the partial MPG ownership of intellectual property. Since 2000, the MPG has

established 18 of such Partner Groups in China. Since 2004, the same model has been followed in Argentina (6), in India (8), in Poland (4), in Uruguay (1), as well as in Slovakia, Russia, Czech Republic, Hungary and Turkey (Max Planck Gesellschaft 2009, personal communication with the international relations division of the MPG). In 2009, the number of partner-groups in India is to have grown till 16 (Max Planck Gesellschaft 2008).

The MPG Partner Groups are an instrument to support international collaboration even if a boost to career development in the host country can also be one of the potential positive side effects (personal communication MPG international relations division).³ The prime motivations for the set up of the Partner Groups are thus to offer institutional support for international research collaboration between individual groups, the strengthening of ties between the Max Planck institutes and the foreign research organisation, access to high-performance foreign research institutes and an attempt to remain in contact with researchers in whom is invested during their stay in Germany (Max Planck Gesellschaft 2009). The most important motivation, as revealed in the interviews, was maintaining a strong contact with former alumni/colleagues. For the MPG gaining access to funding, support of foreign research organisations, and providing institutional support for research collaboration are not very important issues. They are, however, important for the partner-group leaders. Furthermore from a policy perspective, the MPG wants to counteract brain drain by offering an incentive to return home. As it was clearly stated in the interviews:

“Especially in Eastern Europe this has been welcomed, because researchers from these countries tend to move westwards, after staying in MPG, rather than return home and it offers them an incentive to return home. From a science policy point of view the partner-groups are highly welcomed and we try to match this with national programs in these countries. It was so successful in China because it exactly matches with the hundred talent program of the Chinese Academy of Sciences” “On the long term this enables the MPG to have research partners in these rapidly emerging countries which [...] feeds back into the MPG institutes [themselves]” (interview with MPG international relations division).

Our initial overview of the development of joint labs in recent decades made clear their regional location was quite diverse but followed a pattern by which in the majority of the cases MPG originated labs in the Partner Group programme tended to be in emerging systems. When asked about this issue, it was clearly stated that this was a conscious decision:

“The partner-groups are consciously established in emerging research systems. In more developed research systems, researchers do not have sufficient interest in having the opportunity to apply for this relatively modest sum offered through this scheme. The economic situation and competition in such countries have another shape than in China or India. In the case of the EU and the USA there are also different instruments to support international collaboration” (interview MPG international relations division).

However, the Max Planck Society has also established a joint laboratory in Japan (1), Spain (1) and in 2008 a research institute in the US (1). It appears apparent that the motivation for the establishment of these units in developed research system differs from the joint labs in developing and emerging research systems. Apart from offering institutional support for research collaboration and the strengthening of institutional ties in general, these (sub) organisations are established to gain access to the specific knowledge, skills or research infrastructure present in this organisation or region. The MPG international relations division representative indicated that from his perspective the number of Partner Groups should increase further. It was also pointed out that in the (near) future there may be opportunities for the most successful partner-groups to reach a further level of support for international collaboration in the form of larger joint centres.

Case study of the CNRS UMI

Along with the German research organisations their French counterparts have been also very active in the establishment of international joint labs. The CNRS has a long institutional tradition in the set up and support of mixed units. The status of the CNRS international mixed units (UMI) is similar to the around 1000 Joint Research Units which the CNRS has established in many French research organisations. They are evaluated in the same way and researchers in the UMI can apply to all the calls for proposals in national and EU programs. A UMI brings together in the same laboratory researchers, engineers, and technicians assigned to it by CNRS and by the foreign partner institution. It is headed by a laboratory director, appointed jointly by CNRS and the partner institution. The director is responsible for the management of all of the resources made available to the laboratory (CNRS 2009a).

The UMI have their own legal personality. They can best be understood as a type of joint venture in which ownership is shared 50-50 between the CNRS and the host organisation. The CNRS UMI receive a considerably large investment in research infrastructure and operating costs from their parent organisation. It is difficult to get an exact figure of the amount of resources invested by the CNRS in its UMI in part because there are large differences in the costs of research in different disciplines and in part because investments are made by different CNRS departments. The CNRS respondents – qualifying this statement as an (informed) estimation – indicated that this investment would be minimum 200,000 € ranging up to 2 million €

Since 2002, the CNRS has established 20 International Mixed Units (UMI) in China (1), Japan (3), Singapore (1), Vietnam (1), the US (2), Canada (1), Russia (1), Brazil (1), Chile (1), Mexico (1) Holland (1), Austria (1), and France (3).

The most important motivation for the establishment of the UMI by the CNRS was to place CNRS researchers at a position of excellence. In comparison to the other international cooperation

mechanisms of the CNRS the costs of and investments in UMI are high. *“There are only around 18 [20] UMI worldwide and when the CNRS decides to establish one the subject has to be considered excellent by a scientific committee.”* All of the motivations listed in table 2 were considered to be relevant although the motivation to maintain in contact with former alumni/students was reported to be the least important.

“The people [working] in the UMI are high level people. Contacts with former alumni students already exist. It is nice if it helps, but it is not a central motivation” (interview with CNRS international relations department).

Another motivation that was highlighted in the interview and that was not initially included was to create a team of experts in a specific field. The UMI can last up to 12 years, and there are cases, such as one in Japan where up to 70 people who have been working or been trained there for one year or more. The training of a (large) number of experts with cultural experience of a different research system and country is thus also an important motivation for the CNRS to establish the UMI. Finally, a further motivation for the set up of UMI has been to try and gain access to industries who may join or who may become a partner in the UMI. This is illustrated by the case of the UMI in Singapore where the CNRS is trying to involve some companies (pers. com. CNRS international relations department).

The UMI are often set up on the basis of existing collaborative ties too. They tend to be a fruit of previous experiences, of several years through other structures, by the researchers involved.

“This sounds very “bottom up”. It is also possible that it happens “top-down”. If we are approached by an actor high up in the organisation or even industry [which asks if] there are possibilities to do something with a specific country or organisation. In this case we can discuss with partners in the foreign country what we can do and this probably will not be a small type of action but an UMI may be a possibility. The CNRS Chairman makes the specific decision to go ahead with the establishment of an UMI or not”. (interview with CNRS international relations division) Existing research centres (outside France) can also apply to become a UMI. After going through an administrative procedure they gain UMI status and access to funding.

Most UMI are located in developed research systems. The respondent from the CNRS explained that this was because the UMI are often the result of a long standing cooperation.

“The CNRS international relations office hardly ever decides that “we need to do something with a country”. For example in Vietnam we [CNRS researchers] have been working for a long time. It was not a choice to start working in Vietnam [in the form of a UMI] but we [CNRS researchers] have been working there for a long time and even if it is not a developed country and not necessarily the most easy one we [the CNRS international relations office] decided to proceed” (interview with CNRS international relations department).

In the long term the CNRS international relations office aims to have coverage in all fields where the CNRS is considered excellent. It would also like to have a full geographical coverage. At present the CNRS international relations office has 10 regional offices in the world. Through these offices some top down guidance can be offered, but bottom up interactions determine in the end where a UMI will be established. This happens primarily in the US and East Asia. This is mainly because these research systems are more developed than others. There are more likely to be strong collaborative ties that could form the basis for the UMI and on average the possibilities to achieve excellence in such countries are also larger.

The respondent from the CNRS international relations department indicated that from his perspective there was no need to establish more UMI. Since the UMI is the structure through which the CNRS aspires for excellence in international collaboration, he considered it more important to concentrate more means in terms of funding, facilities, and number of resources in this instrument.

6. CONCLUSIONS

The set up and/or support of foreign joint laboratories have become important elements of the internationalisation of public sector research worldwide in the last two decades. In this paper, we have provided a global overview of this growing phenomenon and have analysed more deeply those originated from two large research funding and performing organisations in France and Germany. We have found a considerable degree of organisational and institutional diversity among them, showing how joint labs are very diverse in terms of structure, size, resources, and legal status. Many of them are established by two individual research performing organisations in two partner countries, but in more than half of the cases they form part of a larger programme set up at a higher (intermediary) level of the research system.

International scientific collaboration has been growing for a long time and it has been argued to occur more or less spontaneously. Why would organisations want to engage in the institutionalisation of collaboration through the establishment of joint labs? Taking the organisation as the unit of analysis, we have addressed this question by showing that motivations are diverse and not equally important. For example, access to the best knowledge and teams needed to conduct excellent research has revealed to be a major objective in the case of the French UMI. Nevertheless, the importance of cost-sharing or skill-sharing motivations should not be overemphasised. It seems clear that economic rationales fall short of capturing the variety of goals of public sector research organisations for engaging in international cooperation. As the German case of the Partner Groups highlights, maintaining and strengthening foreign research networks and professional ties between foreign researchers and their former host organisations have been important drivers of this instrument with the implicit policy component of counteracting brain drain in emerging R&D systems. According to our survey, and as far as

the parent organisation is concerned, motivations related to access to specialised knowledge and funding were revealed as less salient, at least in the short term. As the survey revealed, providing institutional support for international cooperation in high quality research was the major goal.

Internationalization of public sector research is institutionally embedded and this has an effect on the variety of programmes and instruments through which many joint labs have been set up. The MPG has a tradition of supporting individuals and its Partner Group programme has been designed accordingly. The CNRS has experience with mixed units within the French national borders, and its UMI framework has a strong focus on developing mixed structures too. The different approaches have a reflection not only on the size, structure, time frame and amount of resources involved in the joint labs, but also on the perception of the issues to be improved in the future: whereas the MPG high level respondent would favour a quantitative expansion of the Partner Groups, CNRS interviewees emphasised the need for a stronger financial support for the existing UMI rather than an increase in their numbers.

As expected, in both cases, the instruments have responded to previously existing and long standing collaborative links, and therefore, represent an example of institutionalisation of international collaboration dynamics generated bottom-up which reflect, as identified in the literature, the importance of prior ties between actors on subsequent cooperation. However, we have found that in both cases managerial and/or strategic decisions have also had a role. Our German (MPG) qualitative data suggests that decisions about the location of international joint labs in emerging systems were a conscious organisational policy choice. Supporting the return of (excellent) foreign researchers to their own emerging research system and facilitating collaboration with MPG researchers appears to allow the MPG to maintain in contact with them. One could make the hypothesis that if instead they had gone to other Western research systems these contacts might have been lost. Approval of a French UMI is also subjected to evaluation at the managerial level. It seems clear that against a background of micro science interaction dynamics, the establishment of joint labs, of which the UMI and the Partner Groups are examples, involves a substantial degree of centralisation and top down decisions as regards setting up, evaluation, funding and support. Survey results also support the idea that a major motivation for the parent organisations has been to gain or increase their international visibility as an actor, a goal that rates high also in the accomplishment assessment.

This paper has addressed the motivations that public sector research organisations may have for the establishment of joint labs and the benefits that they may derive from this. Apart from benefits, however, there may also be costs involved in this type of activities. Apart from the direct material costs associated with funding these joint laboratories one could think of the potential dilution or loss in “reputational capital” to prestigious institutions as the Max Planck Society and the CNRS. Actions to prevent this latter type of costs to materialise involve the high

degree of selectivity in deciding on the establishment of the joint laboratories, the transfer of organisational know-how of the parent organisation and related to this, the evaluations to which the joint laboratories are subjected.

We believe our research has some policy implications for research organisations. The international joint laboratories analysed here involve, in various degrees, the set up of structures, governance and evaluation mechanisms on arenas previously dominated by self-organised micro collaborations. From an organisational policy perspective, these instruments and programmes might contribute to develop more strategic internationalisation approaches, prioritise certain fields, and target resources to specific topics, or regions. Public research centres in many countries have historically developed links with other actors and even created mixed centres with national counterparts. The shift to choosing partners beyond national borders might involve greater risks but also interesting gains.

Public sector-originated international joint laboratories are a relatively new phenomenon. Further research is needed to better understand their dynamics. Subjective perceptions about the fulfilment of the objectives are overwhelmingly positive from both the parent and the host organisations perspective; however, it would be interesting to explore the performance of these labs in terms of collaborative research outputs. It could also be interesting to explore whether the variation in funding mechanism used for different types of joint laboratories have an effect on their impact on and integration in the host organisation. At the macro level, another interesting question for future analysis is whether international policy diffusion may lead more and more European research councils to set up of joint laboratories.

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¹ In this data the (over 80) Laboratoires Internationales Associés (LIA) and Laboratoires Europeennes Associés (LEA) from the French CNRS and INSERM were not included as these ‘laboratories without walls’ are more associations of laboratories – around a project - rather than actual physical laboratories (see also CNRS, 2009b). The SinoGerman Cooperation groups of the DFG and NSFC and other virtual joint laboratories were also excluded since they do not involve a physical infrastructure.

² The increase in web traffic over this period may have introduced a certain bias in favour of later years as information on the establishment of joint labs in the early years may not have been found using this approach. Interested readers may refer to Jonkers (2010) for an overview of the variety of joint labs established in China.

³ The respondent in the international relations division of the MPG emphasised that the Partner Groups are individually oriented career development programs aimed at international collaboration rather than joint labs. In this study, we do consider the Partner Groups as joint laboratories, since they meet our definition

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