

# Drivers of International collaboration in research

Final report



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# **Drivers of International collaboration in research**

## Final Report

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Cataloguing data can be found at the end of this publication.

Luxembourg: Publications Office of the European Union, 2009

ISBN 978-92-79-14232-1

ISSN 1018-5593

doi 10.2777/81914

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*Printed in Belgium*

PRINTED ON WHITE CHLORINE-FREE PAPER



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# Executive Summary

In international cooperation in science, technology and innovation (STI), countries do not only seek partner countries solely on the basis of STI characteristics. There is a wide range of rationales why countries and their science communities enter into cross-border STI cooperation. This study seeks to understand what (policy) considerations are made when establishing and implementing STI linkages with other countries. The report reviews the various drivers behind international STI co-operation and explores the interactions between these drivers. Evidently, the science and technology community has a strong influence on the direction and contents of cross-border STI partnerships. However, a wider set of policy objectives influence today's patterns of STI-collaborations between EU Member States and between the EU Member States and non-EU countries or 'Third Countries'.

At present one can witness a growing policy attention for STI collaboration and in particular the adoption by the European Commission of a "Strategic European Framework for International Science and Technology Cooperation"<sup>1</sup> in 2008 and the establishment by the Council of the European Union of a new European "Strategic Forum for International S&T Cooperation" (SFIC) mandated to drive forward the European partnership for international S&T cooperation<sup>2</sup>.

The growing attention for international STI co-operation policies can be explained by a number of external developments that have triggered the policy debate in recent years:

- The emergence of the BRIC (Brazil, Russia, India, China) countries and particularly China as a country with a large research and technological development capacity that is becoming recognised for meeting high international quality standards
- The increased political debate and urgency of global challenges such as climate change, health issues and sustainable energy resources
- The globalisation of R&D, which is not a new phenomenon, but it is becoming more visible particularly in industrial research and also in the world wide mobility of researchers
- Particularly in Europe, general demographic developments and the decreasing share of graduates in science and engineering have made the shortage of research talent very urgent; STI collaboration can be used to attract talent from partner countries
- The increased policy debates and ambitions in Europe to provide more critical mass and international profile to research excellence, in which partnering with the best plays a big role. The discussion on the European Research Area and the position Europe should play in the global arena has also spurred more discussion on the topic.

When analysing the rationales behind international research collaboration policies, one can distinguish on the one hand the 'narrow STI cooperation paradigm' and the 'broad research cooperation paradigm' (Chapter 4). While every categorisation is a

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<sup>1</sup> COM(2008)588 Communication from the Commission to the Council and the European Parliament, "A Strategic Framework for International Science AND Technology Cooperation".

<sup>2</sup> Conclusions of the Council of the European Union, Competitiveness Council meeting , 2 December 2008.

simplification of reality, it can be observed in policy practice that these paradigms exist alongside each other and their degree of overlap and interaction varies considerably from country to country.

In the **narrow STI cooperation paradigm**, the drivers are mainly to improve the quality, scope and critical mass in science and research by linking national (financial and human) resources and knowledge with resources and knowledge in other countries. The drivers originate from within the science community and are translated in science and research policy instruments. It can have a two-directional aim: to obtain access to state-of-the-art knowledge abroad as well as to attract state-of-the-art knowledge or people to the 'home' country. From the view of the research community, joint research activities are conducted for scientific problem solving. In less R&D developed countries an important 'intrinsic' driver is to build up national STI capabilities through international cooperation.

In the **broad STI cooperation paradigm** other non-science policy objectives interact with the 'intrinsic' science oriented objectives and STI cooperation becomes a means to reach other policy ends. What we have found in the literature and selected country studies is that alongside the 'intrinsic research policy' drivers the four main drivers behind STI cooperation are:

- Improving national competitiveness
- Supporting less developed countries by developing STI capabilities
- Tackling global societal challenges
- Creating good and stable diplomatic relationships (and indirectly ensuring international security)

The narrow 'intrinsic STI paradigm' forms the core of international research collaboration, motivated by the aim to achieve research excellence, to attract scarce human resources for research and also to build STI capabilities through people and institutions. External triggers such as the globalisation of R&D, the urgency of certain global challenges, the emergence of new players on the global research market and the lively policy debate about the place of Europe as the 'most excellent place to do research in the world' have stirred the interest for more strategic thinking on the role of STI collaboration within and outside Europe.

The external triggers have increased the weight of some drivers from the 'broad paradigm': the globalisation of (industrial) R&D has put competitiveness policy goals higher on the agenda. The urgency of certain global challenges has opened the discussion for more global research programmes and facilities on these topics. Other drivers such as diplomacy and historical cultural ties between countries and development aid have for a long time influenced the geographical direction and thematic focus of 'third country' collaboration and still form a stable influence in the background.

The country review revealed a wide set of (national and international) actors involved in launching and implementing initiatives for research collaboration. Cross-cutting coordination at the national (or trans-national) level, between the involved policy domains and between different levels of the research policy community – with the aim to align instruments, to select target countries or, thematic themes – is still an exception although many countries are working towards a more strategic framework. For those issues that need an urgent global approach, few strategic fora exist that can help to launch a dialogue in order to set priorities and define joint actions.

Given that the development of international STI collaboration is becoming a key dimension in the strategic considerations of governments, funding agencies, research organisations and individual researchers, and given the move towards a broad paradigm, one might expect to find evidence of elaborated strategic intelligence and indicator systems to support and inform strategies and activities. Whilst some data collection and analysis is undertaken, it still appears that – beyond a small set of well

established basic indicators such as co-publications, co-inventions or participation in the EU framework programmes – the use of indicators to support systematic and holistic policy making by national governments remains limited.

The study team proposes a strategy cycle approach conceptualising indicator needs in support of policy and strategy at four major ‘stages’, which correspond to key policy-making activities (Chapter 5). The first stage refers to indicators to assess the *status quo* in international collaboration activities. The second stage is about setting targets and making policy choices. The third stage needs indicators to understand the international ‘opportunity environment’. And finally the fourth stage is about monitoring and evaluating international collaboration policies. On the basis of our country survey and literature review the report (Chapter 6) summarises how countries use indicators and metrics to develop and assess internationalisation policies. The sophistication and use of policy evidence, strategic intelligence and indicators varies considerably across countries. The general finding remains: indicator use to underpin internationalisation policies shows room for improvement. Policy makers across the world are increasingly aware of that and are in the process of developing better approaches. The study team provides proposals for a set of indicators and which policy actors should conduct actions to improve the data collection, design and use of this basic set of indicators (Chapter 7).

To support and validate the study an international conference was organised in October 2008, with many stakeholders from the STI policy community (see Background Report 4). The **main messages** that came from the conference were:

- International S&T collaboration could be made more effective and efficient through greater programme co-ordination between countries (and with international organisations and foundations) and through pooling of effort;
- International science and technology co-operation is both a policy goal and an instrument to support other policy goals (such as development, competitiveness, health and diplomacy). STI collaboration could become a more powerful policy tool if strategic policy frameworks were better developed to align diverse policy objectives;
- Few countries have developed a good impact assessment and measurement system to evaluate whether international collaboration policies have desired effects. Furthermore, there are still large gaps in the data provision that could support these assessments.

In summary the study has shown that a number of trends are emerging regarding international research collaboration and the use of policy evidence on behalf of this:

1. The policy attention for international research collaboration is growing rapidly in all countries. Globalisation (of markets and R&D), fast emerging large economies (India, China) and the opening up of their STI systems, the urgency of global challenges, scarcity of human resources in research are external factors that have spurred this growing attention to the subject;
2. In terms of policy drivers we have established a ‘narrow paradigm’ (stemming from the dynamics of science and research) and a ‘broader paradigm’ (stemming from additional policy objectives that use STI collaboration as a mechanism to achieve supplementary goals). The diverse sets of drivers interact with each other, even if they are not ‘co-ordinated’ in a formal sense by the policy domains and actors behind those drivers and particularly when international STI collaboration is not a purely bottom-up process run by the research performing actors themselves;
3. International STI collaboration policies and programmes that combine various policy drivers (e.g. research excellence with a diplomatic choice for the geography, scope and scale of research with improving competitiveness in specific thematic areas) usually have very fuzzy goals and the envisaged outcomes and impacts are

not well defined. In such cases, setting up a coherent set of indicators to define its success on all fronts becomes difficult;

4. While policy makers and research funders apply many assumptions regarding how international STI collaboration has an effect on various policy goals, these are rarely specified or operationalised in the implementation of the instruments in place. Particularly in the 'broad paradigm' the causal relationships between the desired effect and the contribution of international STI collaboration programmes cannot be established;
5. Given the multitude of actors involved in implementing STI collaboration, the variety of drivers, the different starting position of countries and the parallel use of bottom-up and more top-down strategies, it is not likely that EU Member States can easily develop a coherent evaluation and indicator framework. Nevertheless a starting set consisting of a 'bottom-line' framework and a set of key indicators starting from the 'narrow' paradigm would be a necessary first step.

## 1. Introduction

Policies to support international collaboration in research have a long history and many initiatives, programmes, collaboration agreements have been put in place. Globalisation has intensified the need to develop these policies more strategically and to make them more effective. The experience of, and factors affecting, the level of international research collaboration of major funding countries and of funding recipients prove to be very diverse. This report written jointly by the Technopolis Group and the Manchester Institute of Innovation Research (The University of Manchester), is a synthesis of a research project conducted on behalf of the European Commission DG Research. The project included two major blocks: the organisation of a conference on the topic of international research collaboration and a study on the same topic. This report mainly builds on the study conducted by both teams, but also includes input from an international conference held within the context of this project.<sup>3</sup>

## 2. The aim and focus of this study

The ERA Green Paper (EC 2007) stressed the importance of opening to the world: “The challenge is to make sure that international research cooperation contributes effectively to stability, security and prosperity in the world”. It poses the question how the European Commission and EU Member States can work together to define priorities for international science, technology and innovation (STI) cooperation with the other dimensions of external relations.

The adoption by the European Commission of a "Strategic European Framework for International Science and Technology Cooperation" in 2008 provided a number of underlying principles to guide the development of European research cooperation with the rest of the world. The Communication also provided a stimulus for the Council to establish a new European "Strategic Forum for International S&T Cooperation" (SFIC) mandated to drive forward the European partnership for international S&T cooperation.

Our team, commissioned by the European Commission, DG Research, was tasked to conduct a study on the factors which influence international research co-operation policy and hence the scale, conduct and development of international research cooperation.

The study consists of a literature review, the analysis of STI cooperation policies in 10 EU-countries<sup>4</sup> and 10 non-EU countries<sup>5</sup> and thirdly the identification and development of a set of indicators to measure the progress and success of international STI cooperation policy. The information on the 20 countries was collected through desk research mainly and some telephone interviews with policy makers responsible for STI collaboration. Alongside this study, the team organised an international conference on the topic, which took place in Brussels on 13-14 October 2008. The results of the conference are also included in the findings of this synthesis report. A

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<sup>3</sup> Conference on Drivers of International Collaboration in Research, held on 13 & 14 October, Brussels.

<sup>4</sup> Estonia, Finland, France, Germany, Ireland, Poland, the Netherlands, Spain, Sweden and the United Kingdom

<sup>5</sup> Australia, Brazil, Canada, China, India, Japan, Mexico, Russia, South-Africa and the United States.

more detailed account of the conference can be found in a separate report (Background Report 4). The **main messages** that came from the conference were:

- International S&T collaboration could be made more effective and efficient through greater programme co-ordination between countries (and with international organisations and foundations) and through pooling of effort;
- International science and technology co-operation is both a policy goal and an instrument to support other policy goals (such as development, competitiveness, health and diplomacy). STI collaboration could become a more powerful policy tool if strategic policy frameworks were better developed to align diverse policy objectives;
- Few countries have developed a good impact assessment and measurement system to evaluate whether international collaboration policies have desired effects. Furthermore, there are still large gaps in the data provision that could support these assessments.

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More effective and efficient STI collaborations through greater programme co-ordination between countries

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Factors which influence international research co-operation

The first task of the study was an identification and assessment of the importance of factors, which influence international research co-operation policy and how this influences the development of EU international STI co-operation programmes and policies. Focus was placed on building an understanding of the global international STI cooperation environment, covering issues such as how countries and regions are selected for cooperation at research policy level, what actors are involved in launching STI co-operations and whether this forms part of a wider STI internationalisation strategy. Thus the study looks at STI cooperation policy, and in particular the set of decisions and actions that affect the size, scope and contents of STI co-operation programmes between countries. The focus of this study is not on inter-European cooperation but on cooperation between EU-countries with non-EU countries, and cooperation between non-EU countries. From a European perspective this is referred to as 'Third Country' cooperation. The background on STI collaboration is discussed in chapter 3 and the factors and drivers influencing policies in chapter 4.

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Identification of appropriate practical indicators

The second task of the study was the identification of appropriate practical indicators, which have been or could be used to assess success of international research co-operation; and, how these are/could be used in policy decision making. The rationale for this is that policy-making needs to take account of its goals and achievements, must be aware of the points of departure and should be explicit about the direction in which it wants to influence the research community. Whilst there are a whole range of indicators to measure the international activities of firms and individual researchers, little is known about the use of indicators and analysis of the internationalisation of policies and programmes and its effects. The review of countries suggest that most policymakers are still in the process of defining good measures for success of international STI cooperation and the indicators that could be used for measuring them. The second part of this report, chapters 5 and 6, will therefore be devoted to a conceptualisation of indicators to support international S&T policy making about the internationalisation of STI and a discussion of trends and obvious gaps. The basis for these considerations is a literature review and a review of the 20 countries. This screening explores trends and gaps in the usage of indicators as a basis for subsequent analysis and to make recommendations about how to improve the use of indicators in the future.

































of aligning instruments, selecting target countries or themes, etc. – is still an exception although many countries are working towards a more strategic framework. For those issues that need an urgent global approach, few strategic fora exist that can help to launch a dialogue in order to set priorities and define joint actions.

















These two challenges of course have implications for the design and use of indicators throughout the strategic policy cycle. The most serious challenge lies in the definition of targets for international STI collaboration as often the specific contribution of STI and STI collaboration to the goals within domains is not clearly defined.





































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European Commission

**EUR 24195 — Drivers of International collaboration in research**

Luxembourg: Publications Office of the European Union

2009 — 56 pp. — B5, e.g. 17.6 x 25 cm

ISBN 978-92-79-14232-1

doi 10.2777/81914



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Publications Office

ISBN 978-92-79-14232-1



9 789279 142321