

1.15 Do scientists know best? Limitations and opportunities for STI policies to shape cross-border research collaborations in Europe

International research collaboration is one of traditional and increasingly important forms for organization of research and production and knowledge. While scientists have already for centuries exchanged information and interacted across borders in networks known as 'invisible colleges' (Wagner, 2008), today international research collaboration is intensifying. One of typical indicators of international research collaboration, namely international co-authorships have increased from 10% of the Web of Science articles in 1990 to 25% in 2011 (Wagner, Park and Leydesdorff, 2015). A number of reasons internal and external to science are usually invoked to explain growth of international research collaboration including increasing specialization of science, escalating costs of equipment, development of information and communication technologies, and need to address cross-border challenges.

Support for international research collaboration has also been on agenda of international organizations, European Union institutions, national governments, and private foundations that see international research collaboration as one of the ways to address so called Grand Challenges, i.e. major socio-economic problems in areas such as energy, health and environment (Ulnicane, 2016). However, a message emerging from some of the main contributions to (international) research collaboration studies is quite sceptical about the role of public policy. A number of key authors on this topic (Engels and Ruschenburg, 2008; Melin, 2000; Wagner, 2008; Wagner and Leydesdorff, 2005) suggest that successful research collaborations result from self-organization of scientists who know best with whom to collaborate and how to organize their collaborations, while public policy play a limited or even counter-productive role facilitating emergence of 'artificial networks' lacking coherence and ability to produce high quality research.

Against this background, this paper analyses long-term international collaborations in nano S&T in Europe to study, firstly, if and what role do public policy play in shaping these collaborations and, secondly, how does self-organization of scientists and role of public policy interact in these collaborations. The seven international research collaborations studied have lasted for more than 10 and some even 20 years and have included informal collaboration outside common externally funded projects as well as a number of common projects funded either by bilateral or diverse European funding schemes (FET, Marie Curie training networks, European Science Foundation projects, etc).

The seven longitudinal case studies integrate multiple data sources including publication, project, organizational and CV data, interviews with 61 collaborating scientists and site visits to 31 leading nano S&T institutes in Germany, Netherlands, France, Belgium and United Kingdom (Ulnicane, 2015). Data collection in particular focused on continuity and change in long-term collaborations, namely if and how externally funded projects within these collaborations influence choice of topics, partners and forms of interaction. A specific method of individual research trails was used to study continuity and change of topics of collaborating scientists. Individual research trails (Glaser and Laudel, 2015) study bibliographic coupling (understood as common references) among publications of a scientist; combined with analysis of acknowledgments in these publications, it allows to analyse if a new externally funded project leads to a change of research topic.

Evidence from the case studies suggests that in successful long-term collaborations self-organization of collaborating scientists and influence of policy are not always conflicting forces in tension with one other but often reinforcing processes. Strong self-organization dynamics typically explain emergence of collaboration when core partners decide to start common research as a result of initial interaction during research visits, conferences, etc. Then very quickly self-organization begin to interact with policy when key collaborators choose which policy scheme they are going to apply for common externally funded projects that best fit their research agendas and strategies. Requirements of different funding schemes for international collaboration (e.g. different schemes supported by the EU Framework Programmes) vary considerably in terms of aims, thematic guidance, type of research, partners and forms of interaction, as well as size of projects supported. While previous studies have

suggested that specific requirements of funding programmes might lead to counter-productive 'artificial collaborations', evidence in this study indicates that key collaborators very carefully choose among diverse funding schemes to find the one that would provide the best opportunities to do exactly kind of research that they want to do – for some networks that mean applying for a funding scheme supporting applied research on a pre-defined topic they have collaborated before, while for other scientists it mean applying for a research training network scheme allowing to do fundamental research on a topic of their own choice. Although collaborators might find some funding scheme requirements – on interdisciplinarity, heterogeneous partners, and accountability – challenging, they also appreciate long-term benefits of learning about other disciplines and extending their networks. Moreover, self-organization can also have problematic side when it facilitates narrow networks where inclusion/exclusion is based on gender and national stereotypes, which policy attempts to counter-act.

The proposed topic on relationship between the role of policy and self-organization in international research collaboration is highly relevant for the topic of the conference 'The future of STI – The future of STI policy. New practices and models of research and innovation as a challenge for STI policy'. As international research collaboration is increasing and as STI policies are increasingly concerned with supporting research tackling cross-border social and economic challenges, it is important to understand not only opportunities for future STI policies but also their limitations and interactions with other processes such as self-organization of the research community that can be an important factor for success of policies. This paper takes an innovative approach to study the role of STI policies because it does not start with a specific funding scheme and then assess its affects but it rather starts with successful international collaborations lasting over 10 and 20 years and leading to diverse scientific outcomes and outputs and then carefully traces if and how policies – in particular funding schemes – have influenced these collaborations. The paper uses a number of innovative methods such as longitudinal case studies and individual research trails of collaborating scientists to do that. It provides important lessons on the role of self-organization and bottom-up processes for success of STI funding schemes which are particularly relevant in times when policy-makers prioritize top-down initiatives as the main way to support research tackling societal challenges.

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Author

Inga Ulnicane

University of Vienna, Institute for European Integration Research EIF

Strohgasse 45/DG
A-1030, Vienna, Austria

inga.ulnicane@univie.ac.at

+43 1 4277 224 14

http://www.researchgate.net/profile/Inga_Ulnicane