Advantages and disadvantages of scientific networking in the era of 'globalisation'

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Research collaboration and networking

Science as a social activity is always in transition. This includes novel ways of producing and disseminating knowledge, but also new forms of interaction between research and societal actors in the actual process of doing research.

An important change in academic research is the surge of scientific collaboration in the form of networking. It seems clear that research is moving from an individualistic, disciplinary-based, and place-bound ideal towards a collective, problem-oriented and multi-organizational activity. This trend is connected with the new forms of knowledge production sometimes referred to as the "Triple Helix" or "Mode 2" – where the basic assumption is that knowledge is produced and utilized simultaneously within the academic and the practical fields and with multiple interaction in the knowledge-producing process.[1] Knowledge production and utilization are, according to this perspective, marked by intertwined and interactive activities, involving a mix of organizational and cognitive settings and models.

Collaboration and networking in general – whether between disciplines or between organizational settings and countries – is not only driven by new models of funding (a "collaboration-push" perspective). It is a ubiquitous phenomenon of academic work that can be explained by the search for complementary competencies in the research process, the need for sharing equipment, etc. (a "collaboration-pull"-perspective).

My objective is to discuss the increasing role of multidisciplinary collaboration, by examining the motives for research collaboration among researchers and funding agencies, the economic, political and social context of managed collaboration, the management of collaboration, the effects of managed research collaboration upon research practice and the consequences of research collaboration on research and on society.

Research organization, collaboration and funding

Why academic researchers choose to collaborate – not only within but also between disciplines, with non-academic researchers and between countries – is an old issue in

[1] Henry Etzkowitz and Loet Leydesdorff, 'The dynamics of innovation', Research Policy, 29 (2), (2000), 109-123; Michael Gibbons et al., The New Production of Knowledge (London: SAGE, 1994).

the sociological study of science. In his classic studies, Robert Merton related collaboration to the social stratification of the scientific community, including factors such as age, career opportunities and scientific status.[2] Within the sociology of scientific knowledge (SSK), collaboration is considered an aspect of the local construction of knowledge, in which research collectives construct local "truths" about nature or society. This process is considered endogenous to knowledge production and driven by knowledge interests. Hence, the objects of study are the roles of different groups within scientific collaboration (PhD students, lab technicians, researchers, etc.) and the consequences of their interaction for knowledge production.[3]

Both the Mertonian and SSK approaches provide important insights into the nature of collaboration, and the relationship between collaboration and social factors such as seniority and the production of meaning in collaborative settings. Both analytical programs are, however, genuinely intra-academic in their orientation, and fail to explain the roots and effects of collaboration between different organizational settings, including international research collaboration and networking.

How, then, can research collaboration be analyzed as part of interrelated changes in knowledge production and funding models? The laboratory or research group form the center of modern knowledge production. They produce a number of different outputs, including codified knowledge, embodied competencies and technical devices, which in their turn can be related to the managerial structure and dynamics of scientific growth.[4] And this they to an increasing extent do in collaboration with other research groups (or laboratories). The borders between organizational settings are, as a result, becoming less clear-cut.

To enable an analytical structuration of research groups and their networking strategies, we need a taxanomy of laboratories and groups. Groups and laboratories can be classified on the basis of their orientation in different respects: their orientation towards academic prestige, knowledge dissemination and interaction outside the academic system, the integration between education and research, and their connection to political and governmental targets. Laredo and associates present a taxonomy of research laboratories (and groups), consisting of those with *a focus on certified knowledge*, those with *an invention profile*, and *technical creation laboratories/groups*. This focus does not, however, rule out other activities: the laboratories / groups generally blend many different activities in their work, but one dominates. This, in its turn, can be related to the pattern of research funding, with marked differences between groups with money from industry, research councils, or mission-oriented agencies. Joly and Mangematin present a similar typology of lab

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[2] Robert K. Merton, The Sociology of Science (Chicago: Chicago University Press, 1973).

[3] Karin Knorr-Cetina, Epistemic Cultures (Cambridge: Harvard University Press, 1999); Michel Callon, 'Four Models for the Dynamics of Science', in Sheila Jasanoff et al. (eds.), Handbook of Science and Technology Studies (Thousand Oaks: SAGE, 1995), .

[4] Philippe Laredo and Philippe Mustar, 'Laboratory activity profiles', Scientometrics, 47 (3), (2000), 515-539.

styles.[5] Their typology of ”laboratory styles” is based on three dimensions: scientific productivity, type of funding and the degree of homogeneity in research. On the basis of these dimensions three styles can be distinguished: *specialized clientilist laboratories/groups* (where the mode of operation is defined by a particular set of interests), *general but focused laboratories/groups* (servicing a more diffuse and broad audience, such as an industrial or governmental sector), and *academic laboratories/groups,* which pursue basic science but in cooperation with non-academic actors. The primary aim of this classification is to enhance the ”identification of relations between scientific strategies and types of insertion in networks”.[6] Styles of knowledge production and organization emerge through negotiations between groups or laboratories and other parts of the networks (social interests, funding agencies, etc.).

An important issue is to study how research groups/laboratories are inserted into networks of different kinds; how these networks influence their organization; and the type of knowledge produced and disseminated, and, finally, how networks influence the composition of the groups and the forms of research collaboration (uni-disciplinary, multidisciplinary, transdisciplinary, service interaction, substantial collaboration etc.).

An important aspect of contemporary research is therefore the extended research group, sometimes referred to as “research collectives”. Research groups have, more or less always, been the dominant organizational model in many of the natural-science and biomedical fields, but their importance has grown with the collectivization of research and the increasing complexity of the organizational environment for researchers. Hence, the transition from groups to collectives highlights the fact that the laboratory is not an isolated entity but integrated with other organizations, technologies, etc.[2] The key to productivity and scientific progress therefore seems to be the management of internal and external relationships within research collectives.

With the rise of research collaboration follows an increasing need for research management. The role of network managers is becoming much more important with the new models of research performance. Traditionally, research on leadership in research groups has focused on the internal role of the leader, i.e. the leader as an organizer of social interaction within the group.[3] Although the need for internal coherence certainly has not decreased with the emergence of post-academic science, a number of other responsibilities have become at least as important. In her study of a research group in molecular biology, Karin Knorr-Cetina found that leaders in dynamic fields have to pursue a dual strategy: they must be active outside the laboratory, for instance in funding agencies, public debates, in scientific networks, etc., but they must also supervise and to some extent participate in the work within their groups, in order to be accepted as leaders not only in organizational but also in

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[5] P.B. Joly and V. Mangematin, ‘Profile of Public Laboratories, Industrial Partnerships and Organisation of R & D’, Research Policy, 25, (1996), 901-922.

[6] Ibid., 907.

[2] Philippe Laredo (1999). *The Development of a Reproducible Method for the Characterization of a Large Set of Research Collectivties.* Paris: Armines/CSI.

[3] Rikard Stankiewicz (1979). *Leadership & the Performance of Research Groups.* Lund: RPI.

intellectual terms.[4] Another study has emphasized that the demands on research leaders have grown with the increasing heterogeneity of research funding, the new political and economic demands on science and the remaining orientation toward scientific excellence.[5] As regards the first of these points, EU funding, strategic research funding, consulting and societal contracts have become increasingly important while the role of traditional faculty and research council funding has been declining, although they remain important sources of funding. Nonetheless, the financial portfolio of a research group is much larger and much more varied now than it was, say, 20 or 30 years ago, when faculty and research council funding was enough to support a relatively large research group. With reference to the second point, we have seen a surge of political demands for the societal and economic utility and the user-orientation of research groups. The third point establishes an important paradox: while the demands for utility, from both financial and political patrons, take up much of the attention of researchers and research leaders, the traditional demands for originality and scientific excellence still exist. Hence, research leaders have to balance quite a number of different demands: finding their way through a heterogeneous system of funding, responding to the demands for relevance and utility, and orienting the work of their groups toward highly innovative research lines.

Networks and centers are not only dependent on managerial structures that improve motivation and integration among participants. They must also be secured in financial and organizational terms. This calls for financial leadership, including an openness to novel sources of research funding (outside the sphere of research councils, university funding, etc.). In his studies of changes in the norms system in the academic system, Henry Etzkowitz has emphasized the importance of ”academic entrepreneurs” in the reconfiguration of research.[7] On the basis of this, he discerns a move towards a new mode of operation in the academic system, blending academic prestige with commercial objectives. This move is driven by academic leaders searching for new financial sources, but also new intellectual influences.[8] Research groups develop new models of work, such as networking, not only because of shrinking funds for ”pure” academic research, but also because of an increasing societal interest for connections with research groups and labs, and encouragement from government and top echelons of the university system.[9] This move cannot be uncomplicated, however, given resistance from academics and research sponsors connected to traditional norms.

Collaboration and politics

Collaboration is a fairly vague concept. Katz & Martin have argued that it is difficult to separate collaboration from loose configurations of interacting scientists: it cannot

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[4] Karin Knorr-Cetina (1999). *Epistemic Cultures*. Cambridge, Mass.: Harvard U.P.

[5] Elizabeth Shove (2000). ‘Reciprocities and Reputations’, in Merle Jacob & Tomas Hellström (eds.), *The Future of Knowledge Production in the Academy*. Buckingham: Open U.P.

[7] Henry Etzkowitz, ‘Entrepreneurial Science in the Academy’, Social Problems, 36 (1), 1989, 14-29.

[8] Cf. Sheila Slaughter and Larry L. Leslie, Academic Capitalism (Baltimore: Johns Hopkins University Press, 1997).

[9] Cf. Rebecca S. Lowen, Creating the Cold War University (Berkeley: University of California Press, 1997).

be measured by citation analysis alone, since co-authorship in itself does not signify ”genuine” collaboration but instead, sometimes, only very indirect forms of interaction.[11] Hence, we need an informed understanding of what collaboration really is, and which forms it can take. Furthermore, it can be argued that the virtues of collaboration may be overestimated: it may entail time-consuming efforts to merge the interests and values of the collaborative parties. The advantages of collaboration are sometimes assumed *a priori* by funding agencies and state officials, which disregard the costs and difficulties of collaboration.

Irrespective of these difficulties, collaboration has become a research policy trend in most countries. The emergence of collaborative programs is, in its turn, an element in the evolution of a new model of research steering, stressing the orchestration of public, private and semi-private resources. This model, in its turn, is part of a general trend in public sector management towards *governance* as the primary measure for regulation, rather than top-down steering, or *government*.[14] In this respect, governance represents the orchestration of resources, actors and organizations, linked together towards various goals. An important aspect of governance is the discursive harmonization of interests among a heterogeneous set of actors – that is, a negotiated and not pre-given mode of action.

In research funding, this new model of governance, mixing autonomy for the research groups and a focus on applications, sets goals for knowledge production, while daily research activities are decided by the research groups and their leaders. The end-result is evaluated according to its contribution to both academic and a non-academic targets. These trends are, however, not unambiguous, and some claim the permanent need for multiple and separate funding mechanisms.[15]

Following the rise of research collaboration programs and scientific networks, we should expect a rise of hybrid organizational solutions, combining managerial structures with systems that provide academic recognition and flexibility. The orientation of focused support combines research council and mission-oriented agency organizational models: it builds on existing disciplines, but tries to reorganize, and manage, disciplinary researchers. Rather than being transdisciplinary, with disciplinary boundaries disappearing altogether, new combinations of existing fields appear.[17] This organizational model is not without problems, though, since it leads to tensions within and between academic environments. As John Ziman puts it:

‘Multidisciplinary team research thus creates both opportunities and difficulties. By transcending the cognitive boundaries of existing disciplines, and looking at a scientific or technological problem from a number of different points of view, it can bring unprecedented intellectual and technical power to its solution. But it is not a

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[11] J. Sylvan Katz and Ben R. Martin, ‘What is research collaboration?’, Research Policy, 26, (1997), 1-18.

[14] Bob Jessop, ‘The Governance of Complexity and the Complexity of Governance’, in Ash Amin and Joachim Hausner (eds.), Beyond Markets and Hierarchy (Aldershot: Edward Elgar, 1997).

[15] Reinder J. van Duinen, ‘European Research Councils and the Triple Helix’, Science and Public Policy, 25 (6), (1998), 381-386.

[17] John Ziman, Prometheus Bound (Cambridge: Cambridge University Press, 1994).

simple matter to arrange, and generates significant changes in the way scientists are trained and employed, in their professional commitments, and in the practical organization of the work of research.'[18]

This indicates that disciplines are still important in the intellectual and organizational foundation of academic research, as exemplified by predominantly disciplinary Ph.D. training, conferences, and journals. Nonetheless, disciplinary researchers are more and more integrated into "teams" and constellations of researchers within and outside the academic system, tackling practical issues from a number of perspectives. Thus, the disciplinary researchers function as a "pool" of researchers reproducing scientific frontiers.[19] The collaborative programs intend to make this connection more stable and lasting, and, at least in the long run, contribute to the evolution of new socio-cognitive constellations ("post-disciplinary" research).

Concluding comments: advantages and disadvantages of scientific networks

To sum up, it can be claimed that collaboration between disciplines and organizational settings plays an increasingly important role in academic work, and that it is a central part in the reconfiguration of knowledge production towards more "permeable" forms. It is not merely a policy trend, but also an increasingly important aspect of knowledge production. Thus, research collaboration is also reflecting structural changes in the knowledge production process itself. Like all forms of networking and collaboration, it builds on an organizational logic of resource maximization, a separation of "core" and "peripheral" activities within the different nodes of a network. Put in more crude terms, networks include the value-creating centers, not the impoverished peripheries. This is part of a broader change in societal organization, from hierarchical integration to decentralized networking. Manuel Castells describes the network society as one, where "dominant functions are organized in networks pertaining to a space of flows that links them up around the world, while fragmenting subordinate functions, and people, in the multiple spaces of places, made up of locales increasingly segregated and disconnected from each other".[6] In parallel to this, scientific networks function as flexible instruments, to connect value-producing units throughout the world. Network entrepreneurs and their environments function as hubs of these networks, while participants throughout the world represent the nodes. This development is indeed to be welcomed, as a way to improve our understanding of the world and the interchange between researchers, irrespective of nationality, disciplinary or organizational belonging, etc. On the other hand, networks may destroy the connections between the nodes and their local environments, such as disciplinary communities, local universities, students, communities, etc. It is here that the challenge to leaders ("hubs") and participants ("nodes") in research networks lies, namely to try to incorporate both flows and places in knowledge production, to be global and local at the same time. This challenge is all the more important for research networks that aim at studying processes of exclusion, such as SASNET.

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[18] Ibid., 63.

[19] Chandra Mukerji, A Fragile Power (Princeton: Princeton University Press, 1989).

[6] Manuel Castells, The Rise of the Network Society (Oxford: Blackwell, 1996), 476.