Scientific research and social responsibility[1]

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Abstract
Contrary to the powerful image of ivory tower scholarship, aiming to make an impact on society has become an integral part of scholarly practices. This impact emerges through teaching, commercialization of research findings, public engagement, and advice for policy and practice. The latter role requires a solid scientific evidence base. Aligning science and policy is a well-known challenge. I describe ways in which actors ranging from individual scholars, to the organizations where they work, and macro-level players such as publishers, research funders and governments can help advance interaction and communication between the spheres of scholarship and policy. Using firsthand experience in negotiating the boundaries between research and decision making, I describe the context in which the European Commission's Group of Chief Scientific Advisors works and identify conditions which, in my personal view, make its scientific advice giving effective.

Key words: societal impact of research, scientific advice, research metrics, evidence synthesis, Scientific Advice Mechanism

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Scientific research and social responsibility

Academics[2] regularly face allegations that they inhabit an ivory tower, presumably oblivious to practice, policy and citizen engagement. It is important to note, however, that the image of ivory tower scholarship, though powerful, is not consistent with reality. Social responsibility, or, aiming to make an impact on society has become an integral part of scholarly practices (Baron, 2010). The emphasis on social responsibility has, to a certain extent, evolved from changing views within the academic community on who the customers of scientific insights might be, but clearly has also been spurred by citizen involvement, priorities of funding organizations, and governmental pressures.

The impact of scientific research on society emerges in a number of ways. The first pertains to one of universities' earliest roles: *teaching*. In recent years, concerns have been raised about the time and efforts that academics devote to educational tasks (Boyer, 2010). Given the strong emphasis on numbers of publications and obtaining external research funding, the quality of teaching receives limited credit points at many universities (Frey & Osterloh, 2010). Incentive systems tend to motivate scholars towards excellence in research rather than excellence in imparting knowledge to students. Several initiatives have been adopted in North America, Europe and Australia to redress the imbalance between teaching and research and to focus university leaders' attention on the quality of teaching and learning and on the structures to support it (Chalmers, 2011).

The *commercialization* of research findings is a second form of social impact. Caution is advised, however, in equating usefulness to society with the potential of profit making. Paths towards commercialization of research findings are rarely straightforward and predictable (Weckowska, 2015). Moreover, scientific disciplines differ in the extent to which they lend themselves to marketing of their research in patents and business products. Findings from technology, engineering and medicine are more readily translated into commercial activities than are those from the social sciences and humanities (Benneworth & Jongbloed, 2010). As pointed out by Olmos-Peñuela, Benneworth, and Elena Castro-Martínez (2015), the arts and humanities are not 'less', but 'differently' useful. One of their strengths lies in reflexivity, the capacity to recognize structural and cultural forces shaping societal developments.

[2] I use the term "academics" and "scientists" interchangeably to emphasize that scholarship embraces a wide range of disciplines: not only the natural and life sciences, but also engineering, humanities and the social sciences.

Public engagement is a third form of social impact, involving activities such as lectures for the general public, presentations on personal websites, letters to the editors of newspapers, professional publications, and consultations by journalists. Disseminating scientific findings to audiences outside academia has gained increasing importance in recent decades (Weingart, 1998). On one hand, there is a greater recognition of the moral obligation to help the public understanding of science. On the other hand, seeking publicity is driven by shifting conditions for doing science, namely a greater prominence of having research funded or making it pay off (Marcinkowski, Kohring, Fürst, & Friedrichsmeier, 2014). The way in which researchers engage with the media has gone almost unnoticed as an area of ethical concern (Meyer & Sandøe, 2012). Transgressions against good scientific conduct involve the revelation of not yet published findings, speaking about topics that are outside one's area of expertise, overselling research findings, downplaying uncertainty or disagreement, and concealing possible conflicts of interest. Meyer and Sandøe point out that dishonesty in public relations may come back to haunt the scientific community.

A fourth form of social impact involves scientific evidence for *policy and practice.* I will devote most attention to this form of social impact because it is where I have most expertise.

Academics vis-à-vis practitioners and policymakers

A survey of the literature broadly reveals three roles for academics in their engagement with practitioners and policymakers (e.g. Marris, 1990; OECD, 2015; Pielke, 2007). The first is that of the *sense maker*, who presents what is known on the basis of the scientific literature and what is not known. A key part of sense making is the recognition and minimization of biases through the identification of the ways in which evidence is selected and interpreted (Parkhurst, 2016). The second role is that of the *engineer*, who demonstrates, relying on empirical research findings, the effectiveness of solutions and identifies the need for tailored solutions. Here it is crucial to address questions such as: what works, what does not work, and when (i.e. under what conditions) is a proposed measure likely (or less likely) to have the desired impact (Davies, Nutley, & Smith, 2000). The third role is that of the *co-developer*, who responds to questions and requests for evidence and identifies upcoming evidence needs. Continuing dialogue between the academic and the decision maker is critical in this regard, to ensure on one hand that the policy or practical issue can actually be

addressed by science, and on the other hand that the science advice is timely and appropriate (Bremer, 2013).

Successful execution of these three roles requires a solid scientific evidence base. The old adage is 'garbage in, garbage out' (Tweedie, Mengersen, & Eccleston, 1994). If the quality of empirical data is poor, the science advisor has insufficient methodological grounds for drawing reliable and valid inferences. If the filter for a literature search is inappropriately focused, the advisor may miss important sources or collect a great deal of irrelevant and potentially misleading material. A seminal report published in 2018 by the Royal Society and the Academy of Medical Sciences in the United Kingdom (see also Donnelly et al., 2018) makes the case for *evidence synthesis* for policy, the practice of bringing together scientific knowledge from a range of sources and disciplines to inform public debate and decision-making on specific issues. Such a synthesis relies on the availability of high-quality primary research relevant to the policy question. Poor-quality evidence severely limits the utility of the resulting synthesis evidence. According to the report, a truthful, concise and unbiased synthesis of the evidence is one of the most valuable contributions the scholarly community can offer policymakers and practitioners.

The challenge of aligning science and policy

Aligning science and policy is a well-known challenge (Cairney, Oliver, & Wellstead, 2016). In what follows I describe ways in which actors ranging from individual scholars, to the organizations where they work, and macro-level players such as publishers, research funders and governments can help advance interaction and communication between the spheres of scholarship and policy.

What can *individual researchers* do? Academics receive ample training in how to identify a research niche, a specialized corner of their scholarly field where they have the potential to bring important, new knowledge. Identifying contributions to the research literature is part and parcel of writing the introduction of a publication or conceiving a grant proposal. Academics receive considerably less instruction and practice in how to define the significance of their work for policy and practice. Ferguson (2016) provides a practical strategy. He urges researchers to consider what they have discovered, why it is important, and what they have done about their discovery. I would like to point out that building links with policymakers requires patience and resources. It helps if academics work with organisations specialising in the research-policy interface. An example of such an organization is Public

Policy Exchange[3] who organise events in London and Brussels where researchers can engage in dialogue with local practitioners, civil servants and other stakeholders.

What can the *academic community* do? As Ferguson (2016, p. 455) points out: "What you measure is what you get" (see also Hicks, Wouters, Waltman, De Rijke, & Rafols, 2015; Moher, Naudet, Cristea, Miedema, Ioannidis, & Goodman, 2018). When the number of publications and citations are the dominant assessment criteria, attention is drawn away from the question of what scholars do and why their work matters. The academic community is working towards finding ways to reward scientists for research efforts that have translational impact and societal added value. Benedictus and Miedema (2016), for example, have suggested to value impact outputs as high-quality research endeavors in their own right. The academic community is also looking for ways to better enable scholars to engage with policy makers and practitioners. Tyler (2017) has suggested to set up dedicated policy-impact units staffed by professionals who are skilled at navigating policy and academia (see also Meyer, 2010). Such units should provide space and time to scientists to talk about how to do impactful research and to develop and evaluate best practices.

What can *other parties* do? Monitoring and assessing whether research results have contributed to policy and practice is not a straightforward enterprise (Bornman, 2013). Impacts tend to be diffuse, to be part of a larger package, to operate across national borders, and to take a long time before they are visible, making it difficult to attribute them to specific research outcomes. Nevertheless, there are a number of ways to facilitate researchers' efforts to make an impact on society. The first is that users of scholarly information acknowledge insights from science. The Royal Society and the Academy of Medical Sciences (2108) argue that the *public sector* needs consistently to cite the academic references that have informed a policy decision. Such a practice would also enable scholars to track whether and how their work has been picked up by decision makers.

A second suggestion, again put forward by the Royal Society and the Academy of Medical Sciences (2108), is that *publishers* champion evidence synthesis articles as high-quality research in their own right. As noted above, evidence synthesis articles contain no new research, but provide a critical evaluation of existing insights relevant to an identified policy question. They differ from a standard review in that their aim is to inform policy makers, and thus are tailored to the requirements of a non-research audience. In 2018, Royal

[3] For information, see http://www.publicpolicyexchange.co.uk

Society Publishing launched the evidence synthesis article type for three of its journals: *Proceedings A*, *Proceedings B*, and *Royal Society Open Science*.[4]

Funding organisations also have a role to play. According to Tyler (2017), they should refrain from financing research projects that treat policy impact as an afterthought. Rather, funders should support policy-relevant work only when the applicants have given serious attention to their impact plan. Good proposals will have been developed in dialogue with decision makers, and they will describe when and how stakeholders will be involved in the study—either to provide ongoing communication about the policy issues, or to be kept at a distance to avoid influencing the research process. Fundable proposals will also contain tangible outputs for decision makers such as policy briefs, reports and interactive seminars. Finally, procedures should be put in place so that discussion with policy makers can continue for years after the study is finished.

European Commission's Group of Chief Scientific Advisors

As one of the European Commission's Group of Chief Scientific Advisors (GCSA), I have firsthand experience in negotiating the boundaries between research and decision making. I gladly take the opportunity to describe the context in which the GCSA works and to identify conditions which, in my personal view, make our scientific advice giving effective.

The European Commission established the GCSA in 2015 to provide high-quality, timely and independent scientific advice on pertinent policy issues. The seven members serve in their personal capacity, and they are supported by a team of about 20 dedicated researchers (known as 'the Unit') at the Directorate-General for Research and Innovation in Brussels. The GCSA and the Unit work closely with SAPEA (Science Advice for Policy by European Academies), a consortium of approximately 100 academies and learned societies in over 40 countries across Europe, spanning the disciplines of engineering, humanities, medicine, natural sciences and social sciences. Together, the GCSA, the Unit, and SAPEA form the so-called Scientific Advice Mechanism (SAM).[5]

Soon after the GCSA was established, we devised rules of procedure,[6] which are not set in stone but might be amended as new insights arise. To emphasize our impartiality, we

[4] For details, see https://royalsociety.org/topics-policy/projects/evidence-synthesis/
[5] For more information, see https://ec.europa.eu/research/sam/index.cfm?pg=about
[6] See https://ec.europa.eu/research/sam/pdf/sam-hlg_rules_of_procedure.pdf

focus on science for policy and do not engage in policy for science. A manifestation of our independence is that we are not employed by the European Commission; neither do we in any way give the impression that we represent the views of the European Commission. We publicly report any ties with industry and non-governmental organizations. All communications are transparent and are posted on the website of the Scientific Advice Mechanism. The advice we provide can be solicited and unsolicited. At the request of the European Commission, we have worked on cybersecurity, CO_2 emissions from passenger cars, new techniques in biotechnology, food from the oceans, plant protection products, and carbon capture and utilization. Topics that we have developed ourselves are micro and nano plastics, climate change and health, sustainable food systems, and making sense of science under conditions of uncertainty and complexity.

Judging from newspaper citations and policy documents that cite our publications, but also from feedback by the European Commission, our advice is being used. A factor that has contributed to our success is that we work in a *consultative* way with Commission services during the problem scoping phase—without compromising our independence. Repeated dialogue helps clarify the policy issues for which advice is sought, and also helps determine whether, where and how science can contribute insights to aid decision making. The scoping phase ends in the identification of policy-relevant questions that call for a review of the relevant scientific evidence. The actual evidence review is carried out by SAPEA in conjunction with the Unit. An overview of the European policy landscape is conducted concomitantly by the Unit for the purpose of identifying contingencies for European Commission decision making. The evidence review together with the policy overview serves as the basis for our "scientific opinion", the actual recommendations to the European Commission. Additional factors underlying the effectiveness of our work emerge here. Links with the European science academies and learned societies provide us with the *best of science*, enabling us to speak with authority. Information on the policy landscape enables us to *tailor* our recommendations to relevant regulations and laws, increasing the likelihood that they will be put into practice. We present our recommendations to relevant stakeholders before publishing them, which provides an opportunity to receive input that we might have overlooked and to hear whether our views find support from interested parties. I would like to emphasize that we do not adapt our recommendations in response to stakeholder feedback.

A final word

The provision of scientific advice is of most use where the science is most contested (Gluckman, 2014). It is when the issues are urgent, complex and high on the political agenda (e.g. climate change, migration), citizens hold strong positions based on their values, and the scientific evidence is incomplete, uncertain, and derives from multiple disciplines. System thinking (Arnold & Wade, 2015) by scientists can come in to help the policy community to understand complex problems, by identifying interconnecting parts, nonlinearities, feedback processes, different levels, dynamics over time, and so forth. In addition, it is crucial to acknowledge that science is *not value-free* (Douglas, 2009). Values play in many science-related decisions, such as those about what to study, what methods to use, what constitutes sufficient evidence, and what research to finance. Importantly, the scientific approach is designed to limit (or identify and mitigate) the influence of values. There is no better alternative than the scientific approach.

Scientific advice is about presenting a rigorous and comprehensive analysis of what is known and what is not known. Scientific advice, in and of itself, does not make policy. It is only one of the resources used by policy makers (Cairney, 2016). Other inputs are public opinion, political ideology, the electoral contract, fiscal obligations, and international obligations. Scientists should identify hoe the policy process works and seek to influence it on that basis. I fully agree with Tyler (2017) who states that the academic community has a duty to ensure that research evidence is brought to bear on policy and legislation to keep democracies healthy.

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