Integrating science and society in European Framework Programmes: Trends in project-level solicitations

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ABSTRACT

As part of a larger trend across industrialized nations, European research policy discourse has placed increasing emphasis on socio-technical integration: the explicit incorporation of activities devoted to broader social aspects into scientific activities. In order to compare these high-level integration discourses against patterns at the level of resource allocation, we analyze nearly 2500 research solicitations from the three European Framework Programmes for R&D during the period 1998–2010. We identify four distinct types of integration (socio-ethical, stakeholder, socio-economic and industrial) that occur either as core or parallel components of R&D solicitations. Quantitative analysis reveals an overall trend towards increasing integration, with requests integrating industrial and socio-economic aspects substantially outnumbering those integrating socio-ethical and stakeholder aspects—by a 2 to 1 margin. Meanwhile, calls for socio-technical integration have become slightly more *extensive* (ranging across a broader range of research areas addressed), significantly more *pervasive* (shifting from the periphery to the core of R&D practices), and arguably less *diverse* (involving a wider variety of integration types) over time. The relative lack of attention to socio-ethical aspects and stakeholder participation in European research is particularly notable given that we focus on potentially controversial areas (life sciences, energy, and nanotechnology), which likely overemphasizes the prevalence of integration throughout the Framework Programmes.

1. Introduction

As part of a larger trend across industrialized nations, European research policy discourse has placed increasing emphasis on socio-technical integration: the explicit incorporation of activities devoted to broadening the social and ethical aspects that are taken into account during core scientific and engineering research and development (R&D) activities in such a way as to shape R&D pathways in socially desirable ways. Policy mandates for socio-technical integration have been documented in the United States (Bennett and Sarewitz, 2006; Fisher and Mahajan, 2006a), the United Kingdom (Macnaghten et al., 2005; Owen and Goldberg, 2010), Canada (Genome British Columbia, 2011; Ommer and Coasts Under Stress Research Project Team, 2007), and throughout Europe (Stegmaier, 2009; Goorden et al., 2008).

This emphasis is also observed throughout the consecutive European Framework Programmes (FP) for Research and Technological Development, the European Union's main policy instrument for guiding European research. While some forms of integration can be traced back to earlier Framework Programmes, such as the consideration of Ethical, Legal and Social Aspects (ELSA) of research in the Second Framework Programme (FP2), the overall importance attached to the integration of ELSA and other modes of social considerations appears to have grown considerably since FP5.

In part of an attempt to legitimize potentially controversial forms of publicly funded science and technology, the policy discourse on integration also reflects more explicitly normative and substantive goals, such as making R&D processes more inclusive and accountable and opening up new research alternatives and meanings, and suggests that the success of the European research endeavor at least to some extent rests on the successful integration of science and society. The proposition of integrating science and society at the level of the research project, however, implies changes in both structure and agency regarding how science is

justified, organized and conducted (e.g., Fisher et al., 2006; Gibbons et al., 1994; Smith et al., 2005). We expect that it faces considerable challenges, especially to the extent that it may signal alterations to established scientific cultural norms and institutional practices. We therefore ask to what extent the emphasis on socio-technical integration in high-level policy discourse plays out at the more practical level of formal solicitations for R&D delivery.

In order to trace the various trends in integration in strategic policy discourse and gauge their effects at more practical levels of decision making and allocation, we have analyzed nearly 2500 science and engineering research solicitations from indicative research areas in three EU Framework Programmes over a 12-year period: FP5 (1998–2002), FP6 (2002–2006) and FP7 (2007–2013 [our analysis ends in 2010]). Research solicitations are an understudied, yet widespread mechanism for the delivery of strategic R&D goals by means of allocating resources for new science and engineering research projects, such as those called for inside the Framework Programmes. They allow us to look at policy discourse and practices at more fine-grained and routinized levels of science policy implementation in order to compare these to more prominent discourse and decision contexts. Hence, we focus on research solicitations within Framework Programmes as a bellwether for other forms of the integration of science and society. The analysis tracks the extent to which the research that is solicited in science and engineering areas is pervaded by the visions for socio-technical integration alluded to above, such as those coming from the FP7 "Science in Society" research area and other policy discourses.

In order to situate the integration of science and society broadly and within a general context, we expand the notion of socio-technical integration to include a range of related meanings identified in the FPs, including the consideration of aspects ranging from economic to ethical; the participation of stakeholder groups ranging from private industry to public citizenry; and interdisciplinary collaborations between social and natural scientists.[1]

2. Socio-technical integration in EU research policy

Consideration of social and ethical aspects of scientific and engineering research has long been on the agenda of European policy makers. High-level calls for integration can be found as early as FP2 (1987–1991), which mandated research on the ethical, legal and social aspects (ELSA) of scientific research. Similarly, calls for the integration of the socio-economic dimensions can be found in FP4 (1994–1998) through its "Targeted Socio-Economic Research" programme. Yet from FP5 onwards, both the quantity and quality of calls for integration intensify. The emphasis on socio-technical integration can be understood as largely motivated by a series of events that in the last two decades have progressively eroded the legitimacy of the European science and technology governance system, raising concerns over the social uptake of scientific-technological innovations. This erosion of legitimacy has been diagnosed, by the social studies of science first, and by policymakers later, as responding to the uneasiness of society with an innovation model in which public concerns about science and technology are not adequately considered.

The food crises that affected Europe in the 1990s (such as "mad cow" disease, foot and mouth disease, and dioxin contamination in chickens) were seen as highlighting the deficiencies of risk analysis and regulatory procedures and created a general perception that policymakers were more aligned with the interests of industry than with the public interest, which "*undermined public confidence in expert-based policy-making*" (Commission of the European Communities, 2001, p. 19). The European backlash against agri-food biotechnology—fueled in part by the experience of these food crises—was interpreted as a social reaction against what an important sector of the European publics considered was the uncritical development of a potentially dangerous and unethical technology, whose health, environmental and ethical risks were arguably under-analyzed and under-regulated (EGE, 2009; Gaskell, 2008).[2] These experiences have, it is largely concluded, forced policymakers to focus not only on the policy objectives that originally justified R&D investments, but also on demonstrating to European publics that the social and ethical principles behind publicly funded R&D practices are robust (McDonell, 1997). Over the last two decades pressure has also grown for scientific research to be evaluated not solely according to narrowly defined economic or technological criteria (Bozeman, 2007; Schuurbiers, 2010; von Schomberg, 2012), but according to a plurality of social and public values and interests (Heap, 2004; Wilsdon and Willis, 2004; Ziman, 1998). Descriptions of scientific research in terms of "Mode-2" (Nowotny et al., 2001), "post-normal" (Funtowicz and Ravetz, 1993), and "post-academic" (Ziman, 2000) science all relocate scientific legitimacy in a broader societal space.

Socio-technical integration is thus framed by policy makers to a considerable extent as a legitimizing resource that is intended to facilitate the societal uptake of scientific-technological innovations and, consequently, the EU's strategic goal, set in the Lisbon Strategy, of becoming "*the leading knowledge-based economy in the world*" (European Council, 2000, p. 12). This strategic vision of integration is evident in the development and inception of the European Research Area (ERA): in the working document *Science, society and the citizen in Europe*, the European Commission claimed, in the light of the "*growing skepticism*" and "*hostility*" of society towards the advances in knowledge and technology, that the relationships between science, technology and society "*have to change because of the impact of science and research on competitiveness, growth and jobs and on the quality of life in Europe*" (Commission of the European Communities, 2000a, p. 5). However, in addition to this instrumental framing, there are also indications that more normative goals also informed the ERA. According to Busquin, "*democratic governance must ensure that social and economic issues are taken into consideration in research activities*" (Busquin, 2003, p. 6). More recently, and in the more specific context of the Framework Programmes, the Commission stated that "*For Europe to become the most advanced knowledge society in the world, it is imperative that legitimate societal concerns and needs concerning science and technology development are taken on board*" (European Commission, 2007a, p. 4; see also European Commission, 2003a, p. 10).

Thus, alongside instrumental justifications for socio-technical integration, and even within the same statement, it is also framed substantively, as an early and potential source of critical reflection on R&D activities, as well as normatively, as a form of more inclusive and accountable governance of research and innovation. In the rest of this section, we continue to elucidate the multiplicity of policy

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[1] Notably, we distinguish socio-technical integration from compliance, e.g., with regulatory standards and ethical principles, which also has an established policy history. Thus, we do not take into account the fact that R&D activities in the EU Framework Programmes must be carried out "*in compliance with fundamental ethical principles*" (see The European Parliament and the Council of the European Union, 1999, p. 6; 2002a, p. 3; 2006, p. 5). In our view, principle-based compliance does not imply the same degree of institutional changes for the core of R&D activities as does socio-technical integration.

[2] In the particular case of the governance of agri-food biotechnology, European policymakers tried to overcome social resistance to this technology with a set of regulatory reforms which included some integration measures, such as rules for mandatory information to the public prior to commercialization of GMOs, the introduction of ethical advice as an additional criterion for decision making, or the socio-economic assessment of approved GMOs (The European Parliament and the Council of the European Union, 2001).