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# The new production of legitimacy: STI policy discourses beyond the contract metaphor

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ABSTRACT

Science, technology and innovation (STI) policy is borne by a set of historically contingent concepts, models, and metaphors. From around 1950 to 1980, its language was dominated by the contract metaphor and the linear model of innovation, both of which have catered for beliefs in stability, orderliness, and distinct social roles for scientists and policymakers. While prominent new models of the 1990s (mode 2, post-normal science, triple helix) had challenged the old contract metaphor, they remained experts' brainchildren. After 2000, in contrast, we observe the emergence and pluralization of several new and powerful concepts. Building on conceptual history and cognitive linguistics, we analyze three of these new concepts: "frontier research," "grand challenges," and "responsible research and innovation" (RRI). Whereas the "frontier" and "grand challenges" convey many layered historical meanings, a distinct metaphorical appeal, and have become popularized beyond expert's communities, the RRI discourse, though the most ambitious one, has not yet shaken off its roots in the bureaucratic structures of the European Commission. Finally, we discuss which conceptual and metaphorical properties enable the career of STI policy discourses in the 21st century.

## 1. Introduction

Until the 1980s, academic reflections on science, technology and innovation (STI) were driven by ideas of differentiation, orderliness and contractual relations between science and society. Against this background, STI policy scholars came to the common understanding that there existed—more or less explicitly—a social contract in the sense of "a map of institutional arrangements and their intellectual underpinnings that dominated science policy from the end of World War II until roughly 1980" (Guston, 2000, p. 39).[1] Seen in historical perspective, the idea of a social contract for science actually never stood on its own feet, but needed institutional *and* symbolic backing. After World War II, for instance, the language of technology transfer and innovation became increasingly important to back the social contract for science and to argue for sustained R & D expenditure. Ideas of transferring scientific results into civilian use were represented in concepts, such as "fall out," "spill over," and, most notably, "spin offs" (Geiger, 1993, pp. 71, 77; Knie and Lengwiler, 2008, p. 175; Shane, 2004, pp. 45–48). As regards the metaphorical backing of the social contract, these early concepts of technology transfer were functional in maintaining a "protected space" for scientists (Rip, 2011). They did not question the relevance of scientific knowledge production but argued for auxiliaries making scientific knowledge transferable. Thinking and arguing in concepts pertaining to technology transfer models was followed—if not overlain—by what scholars labelled in retrospect the "linear model of innovation" (Godin, 2006). Since the 1950s, the linear model propounded the idea that innovation can be scheduled via distinct sequences of action. Although challenged by economists and STI policy scholars for having never grasped the complexity of innovation processes (Rosenberg, 1991; Stokes, 1997; Pielke and Byerly, 1998; Fagerberg, 2005, pp. 8–10), the linear model remains prevalent in STI policy discourses worldwide, though rather as an idea than as a model in the technical and the economist's sense (Godin, 2017).

For some decades (roughly from 1950 to 1980), the alignment of the contract metaphor with technology transfer and innovation models codified quite successfully some problems and tacit presuppositions of research policy. These problems were mirrored in debates about such contested concepts as "basic research" and "applied research" (Pielke, 2012; Schauz 2014; Kaldewey and Schauz, 2018), or, more recently, in notions of "excellence," "interdisciplinarity," and "translational research," to name a few. Sometimes, such concepts function as boundary objects; due to their interpretive flexibility, they can facilitate

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[1] By expounding examples at the intersection of science and politics (e.g. the myth of scientific knowledge as a public good) *and* within the profession of science (e.g. the selfishness of its members turning against each other), Guston (2000, p. 51) henceforth called for what can be clearly understood as an *interpretive turn* on studying the social contract.

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consensus or evoke and fuel contestation. What matters here is that scholars and policymakers need to resort to a common conceptual language. Historically, such a common language was employed either to challenge the importance of investigator-driven basic research or to defend its relevance for innovation processes. In other words, the social contract for science, as well as technology transfer and innovation models, were useful strategies in the everyday "boundary work" of scientists and policymakers (Gieryn, 1983). Yet, boundaring and tailoring (Calvert, 2006)—especially if integrated in broader narratives of scientific and social progress—are more than strategic games: They provide actors in different institutional settings with distinct roles in an imagined innovation process and, thereby, with a sense of identity (Kaldewey, 2013, 2017). They can facilitate consensus or evoke and fuel contestation (Jacob, 2005, p. 198).

This brief discussion should suffice to illustrate that concepts, models and metaphors are powerful not necessarily due to their analytical accuracy, but rather due to their symbolic function in STI policymaking. Against this background, STI policy studies can profit from exploring more thoroughly their role in guiding the interaction between science and politics. To do so, we build on a combination of conceptual history and metaphorical analysis. Conceptual history traces the origins and trajectories of concepts as well as the modifications that occur in their meaning, and therewith it helps to identify "the many layered meanings contained in the actual usage of a concept" (Steinmetz and Freeden, 2017, p. 2).[2] Regarding the actual usage of concepts in STI policy communication, however, conceptual history has to be complemented with insights from cognitive linguistics. Following Lakoff and Johnson (1980),[3] actors from different social domains are likely to be won over if they can associate with a mundane, analogical and figurative language—especially metaphors. In other words, social agreements and—ultimately—legitimacy can only be achieved if complexity is reduced via language. We build on these insights and argue, in line with social constructionism, that neither academic experts nor policymakers can achieve an encompassing and identical imagination or representation of (social) phenomena, but rather deal with historically and contextually contingent sets of concepts, models and metaphors.

Having this in mind, we contend that STI policy discourses in the 1990s were *not* based on popular and thus familiar metaphors that would easily convey ideas and images within and across social contexts: While academic concepts of "post-normal science" (Funtowicz and Ravetz, 1993), "mode 2" (Gibbons et al., 1994), and the "triple helix" model (Etzkowitz and Leydesdorff, 2000) reflect the search for a new contract between science and society (Hessels et al., 2009), they remain brainchildren of their very expert communities. As a consequence, those concepts have not resulted in STI policy discourses as influential and commonsensical as the allegedly outdated models of technology transfer and linear innovation. The fact that in the meantime we are confronted with semantic aberrations such as "mode 3 knowledge production in quadruple helix innovation systems" (Carayannis and Campbell, 2012) demonstrates that STI policy in the 21st century has not yet learned to speak a plausible, catchy language.

In the following, we reflect on how the language of STI policy has developed in the 21st century. We reconstruct and compare the trajectory of three recent STI policy discourses as well as the metaphors, models and concepts employed within these. First, we analyze a discourse that materialized in the European Research Council and evolved around the metaphorical notion of "frontier research," which was introduced by an expert group explicitly as a substitute for the old concept of "basic research." Second, we reconstruct a discourse that focuses on the idea that science and society have to cooperate to tackle the "grand challenges" of our time. Finally, we interpret the framework of "responsible research and innovation" (RRI) as a new STI policy discourse, which is more formalized than the other two and more intentionally introduced by influential actors in the field of European research and innovation policy.

We elect these three cases because they share several characteristics, while at the same time they differ in various respects and illustrate the diversity of legitimation strategies in contemporary STI policy. First, the three discourses are associated with the idea of a social contract between science and society, thus they are all entangled in the historical roots of 20th century research policy. At the same time, they build on different concepts and therewith carry a diverse historical baggage. Notwithstanding their historicity, they are presented to the public as radically new ways of doing research and STI policy. The three discourses are not to be interpreted in isolation. The concepts they use are linked to each other and must be regarded as a complex semantic field, in which the meaning of every concept is related to other parts of the field. Furthermore, and more concretely, the three discourses all have become particularly prominent in the transnational research policy of the European Union (EU), while at the same time they are, to various degrees, rooted in ideas originally stemming from the United States (US). Thus, there is good reason to assume that they are representative for semantic developments that are not restricted to certain language communities. The three cases are not exhaustive, as several other STI policy discourses could be added to this list and are worth analyzing in a similar way. Yet, they are strong enough to corroborate the main argument: Concepts matter in STI policy, and in the recent past new modes of producing legitimacy have disseminated.

## 2. Frontier Research

In April 2005, the European Commission proposed the European Research Council (ERC) as part of the Seventh Research Framework Programme (FP7), which finally passed parliamentary voting and Council decision in December 2006. Before then, the Commission had abstained from the idea of basic research funding for two reasons. First, EU R & D-funding was bound to serve industry's competitiveness (principle of "European added value"), and second, the EU was not to adopt policies that were or could be realized on a lower level of governance responsibility (principle of subsidiarity). In the co-decision procedure for FP7, the Commission—increasingly pressured by scientific interest groups, especially from the life science community and from like-minded science policymakers to establish an ERC—substituted "basic research" for the new term "frontier research" (Flink, 2016, p. 159).

It is conspicuous that "frontier research" and no other term was elected, especially because the frontier is not an accustomed concept in Europe (Flink, 2016, p. 231–235). Its most famous roots lie in the 19th century, where the frontier portrayed the process of exploring and exploiting the Americas (Ceccarelli, 2013). With Frederick Jackson s (1893, 1921); s (1893, 1921) famous treatise on this process, the literal frontier was immensely mythified in public (Coleman, 1966), especially via Turner's (1921, p. 37) heroic characterization of the frontiersmen:

> "[…] that practical, inventive turn of mind, quick to find expedients; that masterful grasp of material things, lacking in the artistic but powerful to effect great ends; that restless, nervous energy; that dominant individualism, working for good and for evil."

Turner portrayed the forging of a "special American character […] marked by fierce individualism, pragmatism, and egalitarianism"

[2] Traditionally, conceptual history is associated with Reinhart Koselleck, and, particularly, with the monumental work on *Geschichtliche Grundbegriffe*, edited by Otto Brunner, Werner Conze and Reinhart Koselleck, and published in nine volumes between 1972 and 1997. In the last years, the approach has increasingly been taken up by an international community of historians and applied to a broad range of issues related to language. For the state of the art see Pernau and Sachsenmaier (2016) and Müller and Schmieder (2016).

[3] It is worth mentioning that the cognitively structuring effects of metaphors were intensely researched in linguistics and psychology (Jäkel, 1997; Moser, 2000). In view of the linguistic turn, interpretive policy analysis treats metaphors as crucial discursive elements for both daily and expert language; see e. g. Milliken (1999), Hülsse (2006), and Carver and Pikalo (2008).