Practical integration: The art of balancing values, institutions and knowledge — lessons from the History of British Public Health and Town Planning

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A B S T R A C T

The paper uses two historical examples, public health (1840—1880) and town planning (1945—1975) in Britain, to analyse the challenges faced by goal-driven research, an increasingly important trend in science policy, as exemplified by the prominence of calls for addressing Grand Challenges. Two key points are argued. (1) Given that the aim of research addressing social or global problems is to contribute to improving things, this research should include all the steps necessary to bring science and technology to fruition. This need is captured by the idea of *practical integration*, which brings this type of research under the umbrella of *collective practical reason* rather than under the aegis of science. Achieving practical integration is difficult for many reasons: the complexity of social needs, the plurality of values at stake, the limitation of our knowledge, the elusive nature of the skills needed to deal with uncertainty, incomplete information and asymmetries of power. Nevertheless, drawing from the lessons of the case studies, it is argued that (2) practical integration needs a proper balance between values, institutions and knowledge: i.e. a combination of mutual support and mutual limitation. Pursuing such a balance provides a flexible strategy for approximating practical integration.

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When citing this paper, please use the full journal title *Studies in History and Philosophy of Biological and Biomedical Sciences*

> *Research for policy-making and practical action*
> *is inevitably conducted in a political context.*
> *If research is to be 'useful'*
> *it must relate to the art of the possible*
> (Pahl, 1975, p. 5)
>
> *the stakes here are not to make sciences 'progress',*
> *but to raise to the challenges facing society*
> (Stengers, 2002, p. 98)

Grand Challenges are increasingly shaping research policy, its funding schemes and priorities. This is nowhere more apparent than in the biomedical and biological sciences, since 'society's need for the results of biological research has never been greater' (Losos et al., 2013, p. 1). The medical sciences have a long tradition of mediating between pursuing scientific understanding and putting it into practice, i.e. caring for the health of patients. Medicine has a dual image of an art and a science, and is indeed a discipline whose mission is as much to make patients' care grounded in sound scientific knowledge as to make clinical research conducive to better diagnoses, therapies and prevention. The biological sciences have surely not been without relations with practice, for instance in farming, husbandry, pharmacology and food production, but only in the last decades this practical vocation has taken a whole new dimension.[1] The transformation is taking place at different levels: the life sciences themselves are being transformed by new approaches like *integrative* biology and *systems* biology; biotechnologies and bioindustry are attracting unprecedented investments and attention; the social and cultural impact of life sciences and biotechnologies are stimulating a growing amount of

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[1] Some interesting examples of the relations between agriculture and biology are explored in a special issue on biology and agriculture published in 2006 in the Journal of the History of Biology. The papers highlight that the relation has by no means been one of linear application of biological discoveries to agricultural practices.

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research in the humanities and the social sciences, so that that bioethics and biopolitics have become familiar concepts.[2]

The biological and biomedical sciences have thus a special interest in Grand Challenges: they are ideally positioned to produce research that has profound impact on urgent problems; but they are also facing risks, for promising impact without being able to deliver effective results can backfire quite seriously. It is therefore necessary to understand how to play the game, because what they are called to do is not just science.[3] This paper attempts to provide some ideas and perspectives that can help: 1) researchers in understanding what to expect when participating in Grand Challenges and what to consider when planning their strategies; 2) scholars interested in some current transformations in the practice of science.

In the first section of this paper I argue that Grand Challenges calls for a broad concept of integration that, besides making possible collaboration across disciplines, enables knowledge to issue into viable action. This brings us into the domain of practical reason, hence the label *practical integration*. This idea stresses that engaging in research aimed at tackling the problems of society requires a methodological and epistemological shift from the focus on validity characteristic of academic disciplines to an orientation towards relevance and effectiveness, towards what can work *here and now* in promoting well-being.

Achieving practical integration cannot be a matter of following a strict method or procedure: on the contrary it requires flexibility, imagination and ongoing learning. Thus I propose a heuristic perspective that is flexible, but sufficient to focus attention and efforts on the key factors of practical integration: values, institutions and knowledge. This perspective is illustrated through two case studies (two *ante litteram* Grand Challenges) that occupy sections 2 and 3 of the paper: Public Health in Victorian Britain, and Town Planning in post WWII Britain. These examples show how important it is to reach an ecological balance between values, institutions and knowledge: i.e. a dynamic balance through which each dimension both feeds and limits the others. They are also a good reminder—as I explain in the conclusion—of the need to be humble and realistic in our aims: rather than solving problems, our best hope is to build our ability to cope with them and to react and readjust to changing circumstances.

1. Grand Challenges as collective practical reason

1.1. The coming of Grand Challenges

Grand Challenges are becoming an increasingly fashionable concept in science policy (Calvert, 2013; Efstathiou, 2016; Jones, 2010; Lund Declaration, 2009). While the concept is vague and has been used in different ways (Brooks, Leach, Lucas, & Millstone, 2009), its growing popularity is arguably due to its linking research priorities and important social goals (Calvert, 2013; Jones, 2010). Grand Challenges (henceforth GCs) are emerging as a banner to promote scientific research and technological innovation that contribute to tackle problems of great social relevance and to promote human well-being. GCs can thus be used as a broad blanket term to indicate all efforts to use and mobilise scientific and technological research to address serious challenges that are very relevant for society (cf. the

notion of 'grand in scope challenges', Efstathiou, 2016). GCs are an upshot of 'the public's increasingly insistent demand that publicly funded research and education clearly show their connections to community needs' (Frodeman, Mitcham, & Sacks, 2001, s.p.): a demand that has fuelled the rise of mission-oriented science and transdisciplinarity. GCs are typically large and ambitious projects with time-horizon of more than one decade (cf. EPSRC, 2014, p. 4). Examples of issues that are the object of GCs are climate change, sustainable cities, clear water supply, antibiotic resistance (cf. IET, 2013)—all problems that require the contribution of the life sciences.

The aim of GCs calls is not just to describe and understand these issues: it is to deploy science and technology to make things better.[4] Grand Challenges can therefore be seen as an interesting case of *collective practical reason*, for '[p]ractical reason aims at action that succeeds in furthering human well-being' (Kekes, 2010, p. 3). Responses to GCs can be described in the same way: aiming at promoting human well-being through *successful action*, where success is understood in terms of *effectiveness*, not in terms of *efficacy*. Thinking in terms of practical reason helps us in having clear that we are in a domain different from pure science with its methods and standards: we are instead in a domain akin to politics and its 'logic'.[5]

By looking at GCs as collective practical reason we can see integration not only as an attempt to enable the knowledge and methods of different disciplines to work together, but also as the need to bring together knowledge and praxis. I call this integration of research and of collective action **practical integration** to distinguish it from the more familiar *epistemic integration*.[6] While epistemic integration aims at making possible for different scientific disciplines, theories and methods to work together coherently, practical integration aims at successful action in actual given circumstances.[7] Practical

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[2] On the transformation of biology and its increasing social relevance see Palsson, 2000; National Research Council, 2009; Robinson et al. 2010; Wake, 2008; Losos et al. 2013; on the growing importance of biotechnologies and on the growth of biotech industry see Rifkin, 1999; Venter & Cohen, 2004; Dyson, 2007; and Rasmussen, 2014.

[3] As a reviewer of the collection of essays *A New Century of Biology* cogently put it: 'a major challenge for biologists in the new century is to define an effective strategy for integrating the biological sciences with global economics and human social structure' (Bernardello, 2002, p. 235).

[4] In order to be useful the concept of GCs need to be separated from an optimistic faith in technical solutions and silver bullets that, according to Brooks et al. (2009), often accompanies them. Nothing prevents from using the notion of GCs in association with a much more modest idiom that articulates the task in terms of problem-coping (cf. Funtowicz & Ravetz, 1993, p. 99) and tackling challenges (cf. Brown et al., 2010).

[5] Daniel Sarewitz (1996, especially chaps. 8 and 9) has compellingly argued that dogmatic faith in scientific and technological solutions has become a surrogate for social action and has misdirected social efforts. I agree with his analysis and I do not believe that GCs are in themselves a solution—they may even reinforce this trend. My hope is that if we can foster an understanding of GCs according to which their criteria of success need to be external to science, then we can escape the false and dangerous myths chastised by Sarewitz.

[6] I use the expression 'epistemic integration' to denote the prevailing concern of the literature on interdisciplinary integration: namely 'to overcome the conceptual and methodological boundaries between the prevailing fields of research' (Huutoniemi, Thompson Klein, Bruun, & Hukkinen, 2010, p. 81). This kind of integration is at the core of influential understandings of interdisciplinarity. According to the often quoted report of the U.S. Committee on Facilitating Interdisciplinary Research for instance, 'Interdisciplinary research (IDR) is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge' (National Research Council, 2004, p. 2). The centrality of the epistemic and cognitive dimension of integration is common in the literature on interdisciplinarity (see for instance Brister, 2016; Defila & Di Giulio, 2015; Green & Wolkenhauer, 2012; Miller et al., 2008; Wagner et al., 2011). While institutional and communicative aspects are often examined too (see for instance Gerson, 2013; National Research Council, 2004, Chaps. 4–5; O'Rourke & Crowley, 2013), integration is primarily an epistemic/cognitive concept.

[7] My distinction between epistemic and practical integration is similar to Jahn and colleagues' distinction between integration in interdisciplinarity and transdisciplinarity (Jahn, Bergmann, & Keil, 2012, p. 2). However I see two advantages in making the distinction in terms of epistemic and practical integration. The first reason is to avoid that disagreement—which still exists—about the understanding of transdisciplinarity casts confusion on the nature of the distinction. The second reason is that the notion of practical integration makes much clearer how large and important is the gap between these two types of integration and that while epistemic integration is subsumed under practical integration its epistemic standards cannot apply to practical integration.