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Rethinking science for sustainable development: Reflexive interaction for a paradigm transformation

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ABSTRACT

If we postulate a need for the transformation of society towards sustainable development, we also need to transform science and overcome the fact/value split that makes it impossible for science to be accountable to society. The orientation of this paradigm transformation in science has been under debate for four decades, generating important theoretical concepts, but they have had limited impact until now. This is due to a contradictory normative science policy framing that science has difficulties dealing with, not least of all because the dominant framing creates a lock-in. We postulate that in addition to introducing transdisciplinarity, science needs to strive for integration of the normative aspect of sustainable development at the meta-level. This requires a strategically managed niche within which scholars and practitioners from many different disciplines can engage in a long-term common learning process, in order to become a "thought collective" (Fleck) capable of initiating the paradigm transformation. Arguing with Piaget that "decentration" is essential to achieve normative orientation and coherence in a learning collective, we introduce a learning approach—Cohn's "Theme-Centred Interaction"—which provides a methodology for explicitly working with the objectivity and subjectivity of statements and positions in a "real-world" context, and for consciously integrating concerns of individuals in their interdependence with the world. This should enable a thought collective to address the epistemological and ethical barriers to science for sustainable development.

1. Introduction

The purpose of science and innovation policies, which are increasingly being formulated with a view to showing how science[1] should be accountable to society (Frodeman & Holbrook, 2011a; Holbrook, 2012), is to help shape society's future. But accountable based on what values? For what kind of future? On the one hand, the declared aim of national research and innovation policies in the global North is generally to increase the international competitiveness of science in order to enhance each nation's competitiveness on the global market. We observe this normative framing in Switzerland—the authors' own national science policy context—where the government's education, research, and innovation funding policy "is based on an awareness of the fact that Switzerland can only maintain and further consolidate its very competitive and

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[1] In this article, science includes all academic disciplines that claim that their research and education activities (or knowledge production and reproduction activities) at universities and other research institutes need to be institutionally recognized and provided with funding. The norms that these disciplines need to live up to in order to be recognized by society and receive adequate funding, are regulated by science policy; these norms thus define disciplines' societal accountability.

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world-class position if it remains a knowledge-based society" (State Secratariat for Education, Research and Innovation 2014: retrieved 25.02.2014). This also occurs in the European context, where the Horizon 2020 research programme was recently launched: the programme "promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness" (Horizon 2020, 2014). However, since the 1970s an increasing number of science policy actors worldwide have been requiring that research and education lead to *sustainable* development and human wellbeing in the long term (Deutsche UNESCO-Kommission, 2012; Fuller & Sardar, 2012; ICSU, 2014; IPCC, 2013; ISSC, 2012: 16; Jahn, 2013; Jantsch, 1972; Miller et al., 2014; Proclim/CASS, 1997; Tàbara & Chabay, 2013: 72; WBGU, 1997; WBGU, 2011; Williams & Woodson, 2012: 222). This is a different, alternative normative framing of research: here the future that needs to be shaped is defined by the norms of human rights and sustainability, rather than by those of international competitiveness and economic growth.

While both normative framings invoke science as a means of innovation, what is considered as innovative is defined differently under the two framings. In the case of the dominant normative "competitiveness" framing, scientific results are expected to contribute to greater competitiveness of a country's economy and institutions (Frederiksen & Beck, 2010: 136; Frodeman & Holbrook, 2011b). By contrast, *sustainability-oriented* science policy considers research to be innovative if it supports the transformation towards more sustainable development.

Science for sustainable development is thus confronted with a fundamental contradiction arising from this *double normative framing of science policy*: can scientists really live up to their role of contributing to sustainable development, while at the same time helping societies achieve only greater economic growth, at the expense of equity and the environment? The answer is no, not really, as the starting point for science for sustainable development is a critique of the social and environmental impacts of the struggle for higher returns on investment among economic units competing on the global market (Jackson, 2011; Ulrich, 2008).

The two normative framings of science policy are generally related to different understandings of science. The dominant "competitiveness" framing is based on the norm of objectivity, which is often defined as value-free. This denial of the need to reflect on values in science has been amply critiqued as flawed, because it is based on a "fact/value split" (van Gigch, 2006: 5) that epistemological theory has proven wrong.[2] This understanding of science postulates that science serves society best by providing "objective" knowledge that enters the market through competitiveness. Our position, on the contrary, is that accountability and value orientation are fundamental for science and require a transformation of the science paradigm and corresponding policies and institutions. Science for sustainable development has long sensed the need to address this issue but it has only just started to understand the magnitude of the problem and the crucial need to make values a core element of "sustainability science" (Miller et al., 2014: see table p. 243).

Indeed, there are different understandings of what science for sustainable development should be (ISSC, 2012; Kapoor, 2007; Schneidewind & Singer-Brodowski, 2013: 227 ff; WBGU, 2012). These differences are due to different understandings of the accountability of science and to the "ambiguous and controversial" meanings attributed to sustainable development (Wuelser, Pohl, & Hirsch Hadorn, 2012: 81).[3] How can we, as scientists who see a need for transformation, truly enable ourselves to contribute to science for sustainable development? First, we need to acknowledge that science always has a societally relevant value dimension. This is not a new claim but insights have not led to a change of practice in science policy and science. Only then will it be possible to adequately clarify the meanings of sustainable development, for example by engaging with a *reflexive* (Voss, Bauknecht, & Kemp, 2006) *and value-conscious form* of transdisciplinary research (Giri, 2002).

Rather than addressing the issue of the value dimension of science once again at the theoretical level and trying to reply to questions such as "what should science for sustainable development *be* and what norms should it be guided by" in even greater detail, we would like to address the challenge from a pragmatic angle and deal with the question: "how can science for sustainable development be *conducted* and how can scientists be empowered to reach out from the margins of academic activities and influence scientific institutions at large?"

The question "how to *do* science for sustainable development" is not a new concern among scientists either. Over the past four decades a number of national and international research groups and institutions have been trying to address the issue, underlining the need for crossing disciplinary boundaries and addressing normative issues inherent in sustainable development (Dahle, 2007; Miller et al., 2008). A recurring answer has been to conduct "transdisciplinary" research (Hirsch Hadorn et al., 2008; Hurni & Wiesmann, 2014; Jantsch, 1972; Nicolescu, 1996; Proclim/CASS, 1997; Wiesmann, Hurni, Ott, & Zingerli, 2011). In this context, scholars have tried to establish the *theoretical and conceptual foundations* of transdisciplinarity (Brandt et al., 2013; Pohl, 2014), leading to numerous different understandings of the new kind of research needed for enabling science to address its societal responsibility, sometimes also under other names [e.g. mode 2 research (Nowotny, Scott, & Gibbons, 2001), post-normal science (Funtowicz & Ravetz, 1993), and futures studies (Sardar, 2009)]. As mentioned above, it is not our aim here to contribute to this conceptual level of the debate. A number of scholars have also refined *methods* for implementing transdisciplinary and other forms of transformative research (Colucci-Gray, Camino, Barbiero, & Gray, 2006;

[2] Hilary Putnam argues that the "fact/value dichotomy" leads to the dogma "that facts are objective and values are subjective" (Putnam, 2002); he then claims that this contradicts the epistemological insight that "'valuation' and 'description' are interdependent—a possibility that is constantly overlooked by positivists and their ilk" (p. 62).

[3] One example of a vague understanding of sustainability can be found in Schensul (2009). He focuses on the "sustainability of interventions", defining it as the sustained effects on participants and organizations; see also p. 252.