



Identifying and addressing challenges faced by transdisciplinary research teams in climate change research



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ABSTRACT

Transdisciplinary research is increasingly used in projects dealing with transitions to sustainable, resilient and low-carbon societies. Transdisciplinary research projects require collaboration and coordination between researchers from different disciplinary backgrounds. Academic literature provides valuable insights on designing, facilitating, leading and evaluating transdisciplinary projects. While a substantial body of literature explores the challenges associated with transdisciplinary research, there is a scarcity of case studies exploring the challenges faced during different phases of project execution. In this paper we present a reflective account and analysis of our experiences during the first fifteen months of a transdisciplinary research project. The project is used as a case study, following a participatory action research methodology. Our findings verified the three types of challenge mentioned in the literature – inherent, institutional and teamwork related. This paper identifies a fourth type – emergent – that has not been discussed in the literature. Emergent challenges introduce uncertainty into TDR projects and are uncontrollable. Such challenges require research consortium leaders to develop adaptive strategies, and to take a mediation and leadership role in dealing with them. The article makes the following recommendations: emergent challenges require emergent strategies; funding should be more flexible to account for the nature of TDR research; TDR could be evaluated on the basis of its overall impact rather than on inflexible ‘deliverables’; academic publishing strategies must be incorporated into TDR projects; team development and co-location should be facilitated; and academic institutions should include performance and promotion criteria encouraging researchers to undertake roles in TDR projects.

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1. Introduction

Research into mitigation of and adaptation to climate change requires not only scientific knowledge of the climate system but also expertise in technical and social sciences in order to transform our current socio-technical systems. As a result such projects require not only development and integration of academic and non-academic expert knowledge in a collaborative way but also public outreach and engagement needs to be undertaken by these collaborative research consortiums to enable deliberation and action on institutional, socio-cultural, organizational and technological change that is urgently required. Transdisciplinary research (TDR) is increasingly accepted as the appropriate approach for

complex and socially relevant problems, specifically when dealing with transitions to sustainable, resilient and low-carbon societies (Kinzig, 2001; Pohl, 2005; Boon et al., 2014; Lang et al., 2012).

Cities are increasingly the focus of interventionist research projects dealing with climate change adaptation and mitigation. This is due to the global urban demographic shift with more than 50% of the population now living in urban conditions, and because cities contribute around 70–80% of greenhouse gas emissions. It is also because of the growing economic and political importance of cities (OECD, 2010; Satterthwaite and Dodman, 2009; UN-Habitat, 2011; UNEP, 2011; Ryan, 2013). Patterns of production and consumption are defined shaped by urban living. Despite having no formal standing as actors within global processes to address climate change, cities have become a locus for action (Rosenzweig et al., 2010; Bulkeley, 2010). Cities involve complex and dynamic interactions between built and urban form, technology, social and cultural behaviour and systems of provision (energy, water, food,

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transport, waste and information). Therefore, it is no surprise that the term “wicked problem” was first conceived in urban planning theory (Rittel and Webber, 1973). Also, urban research was one of the earliest areas to adopt transdisciplinary approaches (Ramadier, 2004).

Collaboration and coordination between researchers from different disciplines is one of the main characteristics of TDR (Bergmann et al., 2005; Burger and Kamber, 2003; Guggenheim, 2006; Max-Neef, 2005; Wickson et al., 2006; Späth, 2008; Zierhofer and Burger, 2007). TDR is similar to other types of collaborative research yet has three distinctive qualities: 1. It is agenda driven (Max-Neef, 2005; Wickson et al., 2006; Hirsch Hadorn et al., 2006; Pohl and Hirsch Hadorn, 2007; Wiek, 2007; Späth, 2008); 2. It aims not only at the integration of knowledge from different disciplines but also presumes theoretical and methodological transformation of each discipline will take place through the process of research (Bergmann et al., 2005; Wickson et al., 2006; Guggenheim, 2006; Zierhofer and Burger, 2007); 3. It involves non-academic participants with significant stakes in the research problem and process, either directly as researchers or indirectly as informants (Burger and Kamber, 2003; Bergmann et al., 2005; Max-Neef, 2005; Wickson et al., 2006; Guggenheim, 2006; Zierhofer and Burger, 2007; Späth, 2008).

Academic scholarship includes evaluations of transdisciplinary projects and performance of TDR teams (e.g. Bergmann et al., 2005; Klein, 2008; Polk, 2014; Roux et al., 2010; Späth, 2008; Stokols et al., 2003; Walter et al., 2007) and helpful resources about designing TDR and leading TDR teams (Bennett et al., 2010; Pohl and Hirsch Hadorn, 2007; Hirsch Hadorn et al., 2008). There is also a substantial body of literature exploring the challenges associated with TDR (Stokols et al., 2008), a summary of which we report in Section 2. This literature includes challenges associated with knowledge integration (e.g. Zierhofer and Burger, 2007), methodological challenges (e.g. Pohl and Hirsch Hadorn, 2008; Polk, 2014), challenges associated with both theoretical and practical knowledge generation in TDR (Jahn et al., 2012) and challenges of collaborating across disciplinary boundaries (e.g. Cheruvelil et al., 2014) and with stakeholders (e.g. Polk, 2015). In these studies, the exploration of challenges is framed with references to the research process (such as studies on challenges associated with integration of knowledge or on methodological challenges) or with a focus on specific challenges experienced by TDR team members (such as related to team formation or team communication). There are also studies which mention challenges associated with TDR projects, some discussing interrelationships between these challenges without a particular focus on teams' experiences (e.g. Lang et al., 2012). Nevertheless, despite this richness in literature, there are no case studies systematically reporting on the challenges experienced by TDR teams during different phases of project execution.

In this paper we present a reflective account and analysis of our experiences during the early phases of a TDR project with the aim of identifying challenges encountered by TDR teams during project execution and propose strategies for addressing them. We focus on the first fifteen months of an ongoing (four year) project about low-carbon transitions in Australian cities as a case study. The overall methodology we used was a participatory action research approach executed from the beginning of and run in parallel with the subject case study. A range of methods covering document analysis of project progress meeting minutes, reflective research journaling, and collaborative group reflection informed the case study findings.

The following section reviews existing literature about challenges faced by TDR teams and provides a conceptual framework for our case study analysis. The third section explains the case study and research methodology. The fourth section reports the case study findings on challenges faced by the research team, how these

were managed or mitigated, and overall insights derived from the case study. The final section provides the recommendations we propose and our concluding remarks.

2. Challenges faced by transdisciplinary research teams: summary of literature

Despite the potential of TDR to tackle complex, real-world problems better than disciplinary research, academic literature suggests that TDR poses challenges that need to be considered and overcome through strategies developed as part of the research.

Integration is an inherent and arguably the most challenging characteristic of TDR (Bammer, 2005; Pohl, 2014). It is also a core quality criterion for research validity in TDR along with consensus on problem framing, research objectives and methodology and diffusion of results among research users (Defila and Di Giulio, 2015). There are different types of integration in TDR such as epistemological integration between different disciplines, integration of empirical, experiential and intuitive types of knowledge, integration of qualitative and quantitative knowledge, integration of theoretical and practical knowledge, integration of the researcher with the research subject and integration of different levels of reality (e.g. Bergmann et al., 2005; Burger and Kamber, 2003; Lang et al., 2012; Max-Neef, 2005; Pohl et al., 2008; Scholz and Tietje, 2002; Wickson et al., 2006; Zierhofer and Burger, 2007).

Real world problems are complex and contextual; i.e. bound by time and space. They are unique and require unique approaches and solutions. TDR projects are not based on hypothesis testing; nor do they generate theory that can be tested through replication of experiments. While the results of transdisciplinary research are valid for the specific context the research has taken part in, such research still aims at generality through provision of insights, models and approaches that can be used in other research contexts (Pohl and Hirsch Hadorn, 2008; Wiesmann et al., 2008). However, the non-traditional aspects of transdisciplinary research raise issues regarding quality and evaluation of projects. Because TDR projects are not replicable and lack a disciplinary vantage point, few exceptions aside (e.g. Helström, 2015), evaluation of these projects is mostly carried out looking at the process and formal features of research rather than outcomes and content (Guggenheim, 2006; Wickson et al., 2006). There are mechanisms and criteria suggested for quality control and evaluation of transdisciplinary research (e.g. Bergmann et al., 2005; Guggenheim, 2006; Späth, 2008; Walter et al., 2007; Wickson et al., 2006).

Nevertheless, academic institutions do not tend to evaluate TDR projects in this way. TDR projects can be perceived to lack ‘rigor’ and leading to institutional challenges associated with TDR. Despite the increasing number of transdisciplinary researchers, this critical mass is still marginalised. There is a lack of networks and well-established journals, threat of not being employed in academia (for students on research training) or threat of being disadvantaged in career advancement (for early career researchers), and funding rules, evaluation criteria and organisational structures are predominantly in favour of disciplinary research (Bammer, 2005; Boon et al., 2014; Harris et al., 2009; Goring et al., 2014; Kueffer et al., 2007; Lauto and Sengoku, 2015; Pohl et al., 2008; Polk, 2014; Russell, 2005; Tress et al., 2005). Recently, Lyall et al. (2015) argued that, at least in the UK, transdisciplinary research is receiving better funding. They stated that the evidence is in the increasing demand of UK Treasury for demonstration of non-academic measurable impact from research and a focus on addressing complex societal issues. Based on our experiences, we can state anecdotally that a similar situation is observable in Australia too. Also, since 2004 the Swiss Academy of Sciences has been giving a national award to acknowledge outstanding

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