INVITED EDITORIAL

Transdisciplinary Research Management: the Case For Specialised Skills[1]

Dr. Jacques de Vos Malan

Abstract

An increasing proportion of research projects are interdisciplinary or even trans-disciplinary in nature, particularly in the case of research directed at addressing the 'wicked' problems that arise in public policy-making. Transdisciplinary work is complex, contestable, often culture-specific and messy. In these projects, the role of the research project manager, as facilitator and intermediary, often becomes crucial. An experienced transdisciplinary project manager will play an important function as a member of the leadership group, bridging and translating between the various disciplinary stakeholders, holding together the conceptual and practical elements of the project. This paper examines four of the specialised skills required of transdisciplinary project managers: the capacity for rigorous scoping; the development of a collaborative culture; familiarity with serious and pervasive ambiguity; and a clear understanding of target audiences. The findings draw on practical experience gained by the Australian Council of Learned Academies (ACOLA) research management team, through the delivery of the program Securing Australia's Future, between 2012 and 2016.

Keywords: Transdisciplinary research, Australia

Introduction

For more than four years, the flagship research activity of the Australian Council of Learned Academies (ACOLA) has been the program called *Securing Australia's Future* (SAF), commissioned by the former Chief Scientist, Prof Ian Chubb in 2012. The program has led to the publication of twelve different interdisciplinary and transdisciplinary reports. The topics

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range from the future of agriculture, through unconventional gas production (also known as 'fracking') to STEM education and the shape of Australian cities. Those reports are all available on the ACOLA website [http://www.acola.org.au/.] Until earlier this year, the author was responsible for the overall management of that research program, which has now come to a close. A comprehensive first approach to transdisciplinary research management is currently in preparation[2]. The current paper is a preview of some of that work to date.   One of the ACOLA SAF projects titled *Delivering Sustainable Urban Mobility*, [Armstrong et al 2015], serves as a case study for this paper.

Much of the work at ACOLA involved the delivery of research reports under constant time pressures, but the Secretariat also ran a reflective study called *Making Interdisciplinary Research Work*, that examined the nature of the work itself. One outcome of that study (the reports of which are on the ACOLA website) was the identification of a series of fifteen steps that seemed essential to successful interdisciplinary or transdisciplinary research projects. These range from the definition of project aims through to succession planning.

For this paper, four specialized skills have been selected that appear important to successful transdisciplinary project management:
- rigorous project scoping
- a collaborative culture
- a capacity to deal with ambiguity; and
- an understanding of the target audiences

These are clearly not the only skills involved in transdisciplinary work and neither are they irrelevant to mono-discipline research management.

It is suggested that, in the case of transdisciplinary research projects, these four skills are essential. In the case of a project bounded by a single discipline, the likelihood that these skills will be less critical and/or that they will be found amongst the researchers themselves are much higher. In a transdisciplinary project, if the skills are not common amongst the researchers or at least held by the project leader, then it is essential that they be held by the project manager.

Rigorous Scoping

The first skill is appropriate project scoping. Throughout the academic world, researchers are customarily taught the importance of framing the right research question. It has been described as "*the single most important*

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[2] *Transdisciplinary Research Management: A First Approach J de Vos Malan MS (2016)*

component of a study" [Bordage and Dawson]. Scoping the research becomes even more important when the question to be answered is a 'wicked problem'. Repko suggests that the two extremes to be avoided are (i) conceiving the problem so broadly that it becomes unmanageable and (ii) setting the problem too narrowly, so that it is not interdisciplinary [Repko 2012]. The fact is that not every problem demands or will benefit from transdisciplinary work. The problem needs to be complex; there should be insights offered by two or more disciplines; and there is often evidence that no single discipline has succeeded in resolving the problem. The problem can therefore be seen as what the National Academies calls "*an unresolved societal need or issue*" [National Academies, 2004]

One of the key distinguishing features of transdisciplinary research is the fact that it takes into account the diversity of 'life-world' as well as the scientific perceptions of problems. Husserl's[3] concept of our *lebenswelt* ('life-world') – the immediate, shared experience of the world around us - is that it underpins all epistemologies.

The ACOLA report titled *Delivering Sustainable Urban Mobility* evolved into dealing with a research question which sat poised between the academic world and the real world: how do we minimize the demand for urban transport, while still allowing cities to accommodate the enormous range of establishments, amenities and services that stakeholders demand? In essence, the report argues that progressive and transparent city planning, deeply informed by consultation with stakeholders, will form the basis of *sustainable* urban mobility. This is in sharp contrast to political convictions, popular sentiment and the wisdom of taxi drivers that building another freeway will eliminate traffic congestion, encourage business and stimulate investment.

For the current purpose, the important fact is that this project began by asking a different question: how will we develop alternative, low-emissions fuels for Australian transport? This is a question which sits within the branch discipline of chemical engineering. The interdisciplinary scoping group worked at this early formulation of the research question, expanding it step by step. The project therefore evolved into an examination of the drivers for and obstacles to sustainable mobility – a far cry from biofuels or electric cars. That may seem obvious now, but without that careful scoping process at the start, the project might have ended up as yet another road transport study.

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[3] *Edmund Husserl (1859-1938) German philosopher, established the school of phenomenology*

A Collaborative Culture

Turning now to the second skill under discussion, transdisciplinary teams are necessarily heterogeneous and complex. The expert working group appointed to guide this ACOLA project comprised an urban planner, a historian, an expert in public health and an engineer. An unplanned benefit of the initial scoping process was that it gave the group members an opportunity to test the waters, to explore each other's areas of specialized disciplinary knowledge and their style of engagement. With skillful chairing by the project leader and enthusiastic participation, the group members laid the groundwork for their own successful collaboration, at a point where anything and everything still seemed possible. Further down the track of this 10-month project, that culture would prove important when the group began facing potentially divisive questions such as how to factor climate change into urban mobility; whether to advocate for active modes of transportation such as walking and cycling in preference to the motor-car; and how to frame policy recommendations so that they were not trapped in the inner-city versus outer metropolitan warfare.

This slow process was not simply a matter of a few handshakes or a collegiate nod-and-wink. What happened was that from the scoping stage, a complex group process began to evolve, whereby power shifted over time from one researcher to another, depending on which discipline seemed to dominate any particular issue. And that also included finding an appropriate role for the project manager.

With hindsight it seems clear that what was happening was that the work was beginning a new cycle of integration. The project was, in fact, simply demonstrating the recursive nature of transdisciplinary work.

Another aspect of that complex group dynamic is the intimate relationship between the project leader and the project manager. They share responsibility for ensuring, as Hollaender points out, that "*boundaries do not become barriers*". They do this by constantly improving communications and the exchange of knowledge within the team and beyond. Transdisciplinary teams are often transient. In the case study, there were at least twenty-six people who contributed to the work in varying degrees. Only five remained with the project from beginning to end and are cited as authors.

The development of new scientific knowledge and the successful practical application of existing knowledge rests upon collaborative research and the involvement of non-academic participants – Husserl's *lebenswelt*

again. To cite just one example, the immunofiltration assay technology developed in Canada was of relatively specialised value until applied as a rapid and cheap field diagnostic test for filoviruses like Marburg and Ebola in West and Central Africa [Lucht, Formenty, Feldmann]. The assay kit made it possible to confirm a diagnosis in the bush, without electrical power, within thirty minutes. In the world of epidemiology, this has had extraordinary implications in recent years.

Serious And Pervasive Ambiguity

The third skill is coping with ambiguity. What is known as the 'scientific method' is largely directed at substantially reducing the ambiguous. There is a series of short guides published by the Institute for The Study of Science Technology and Innovation at the University of Edinburgh. In one of these, Joyce Tait and Catherine Lyall highlight the importance for a good interdisciplinary researcher of having a high tolerance for ambiguity.

Paul Griffiths and Karola Stotz have distinguished between good and bad kinds of ambiguity and suggested that an ideal degree and type of ambiguity might even stimulate research. A paper produced at Stanford University in California by Cravens, Ulibarri and others, raises the issue of creativity in research, hinting at a role for this idiosyncratic process – often more closely associated with the creative arts than science – in extending our tolerance for ambiguity.

Outside of quantum physics, science generally prefers to eliminate the ambiguous. But pervasive ambiguity – left unresolved - is, of course, central to much artistic work. Japanese *haiku* poetry, Abstract Expressionist painting, indeterminate music and other art forms trade on the fact that many ideograms and other images are open to multiple interpretations, creating a rich, multi-layered field of possibilities at every turn. Adorno and Ehrenzweig both wrote about the modernist tendency to break down the coherent structures of earlier art forms and the introduction of disorder, probability, randomness and indeterminacy. The key work in this area is Umberto Eco's *Opera Aperta*, which has much to say about ambiguity as a creative force.

Understanding Target Audiences

Finally, one may focus on the target audience. In a paper aimed at providing guidelines to the public service in recognizing and addressing wicked problems, the Australian Public Service Commission (APSC) provides examples of these complex challenges, including: climate change, obesity, Indigenous disadvantage and land degradation. These are all serious and urgent matters that meet the National Academies' test for issues that demand

transdisciplinary attention, namely that they should represent "*an unresolved societal need or issue*".

Unlike curiosity-driven research, almost all transdisciplinary research projects do not take place in private. In each case, the research agenda will be – or at least should be – substantially influenced by the target audience. If the research project deals with climate change, for example, the successful transdisciplinary research manager will remain mindful of the emphasis and tone called for to reach the ears of meteorologists, architects, planners, politicians or farmers, each with their own special insights, prejudices and concerns. Understanding the different targets and communicating effectively to them is what completes the virtuous circle.

As research managers in the policy sector, the ACOLA Secretariat soon learnt that not only which Government is in power, but also which individuals occupy key ministerial positions had a considerable effect on the reception accorded to the ACOLA research reports.

Conclusion
Increasingly, the research challenges that need to be addressed, at least in the public policy-making arena, are complex, contestable and messy. As such they will demand a transdisciplinary approach. And given that transdisciplinary research inevitably involves drawing together (and holding together) subject specialists from a variety of academic backgrounds, the role of the research project manager has become crucial. One conception of transdisciplinary projects is based on the notion of repeated cycles of integration, that is referred to earlier as the 'recursive nature' of transdisciplinary work. Each new issue or contribution, however small, demands a rapid conceptual reappraisal of the whole. It has been described as "controlled confrontation" [Hollaender].

It is suggested that managing these 'controlled confrontation' processes requires research managers with specialist skills. This a skill set that is barely recognized as such but one to which careful attention should be paid, in academia, in government and in industry to ensure that an adequate and appropriately-skilled supply of transdisciplinary research project managers is available in future.

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