Designing Solutions to Wicked Problems:

A Manifesto for Transdisciplinary Research and Design

Design Research Institute

RMIT UNIVERSITY

CONTENTS

PARTICIPANTS AND CONTRIBUTORS

David Adams
Professor and Director of the Health Innovations Research Institute, RMIT University

Michele Azzopardi 89
Director, Design Victoria

Tom Barker 89
Professor of Architecture, Design and Innovation, University of Technology Sydney

Lisa Barry 28, 91
Partner and Head of Deloitte's Human Capital Practice

Donald Bates 41, 92
Founding Director, LAB Architecture Studio

Tim Black 93
Director, BKK Architects

Richard Blythe
Head of School of Architecture & Design, RMIT University

Bert Bongers
Associate Professor School of Design, University of Technology Sydney

Andrew Brennan 49, 94
Professor of Philosophy, La Trobe Univesity

Peter Brooks 73
Director, Australian Health Workforce Institute

Andrew Burrow 95
Research Fellow, School of Architecture and Design, RMIT University

Jane Burry 96
Research Fellow, Spatial Information Architecture Laboratory, RMIT University

Mark Burry 15, 81, 99
Federation Fellow and Founding Director Design Research Institute, RMIT University

Tristram Carfrae 25
Tristram Carfrae is principal Arup Fellow

Peter Cebon 104
Melbourne Business School

Andrew Coady 105
Founder & Director, Grand Master Planners

Alexander Cooke 62
Director, Research Evaluation Policy, Australian Research Council

Terry Cutler 18, 81, 83, 86, 107
Principal, Cutler & Company

Harriet Edquist
Professor of Architectural History, RMIT University

Lynda Ford 115
Enterprising Partnerships

THEMES

THE PROBLEM AND WHAT MAKES IT WORTH THE EFFORT

Here we invited three leading practitioners to explore, drawing on their practical experiences, the fundamental question of why this topic matters, and just what makes our efforts to pursue the matter worthwhile. Two of these introductory provocations involved image-intensive presentation backdrops and it is not easy to do justice to these in summary, text-oriented proceedings.

The conversation | Michael Trudgeon, Co-founder and Design Director, Crowd Productions

The idea of conversation

The thing I want to talk about most is the issue of conversation. I want to start by talking about my own and Crowd's experience in relation to thinking through challenges in a transdisciplinary way. For us this is an approach we stumbled upon as opposed to one that was intentionally structured, and later we began to roll this out as a business practice. So what I am about to present is a shambolic model or reflection.

Wicked problems arise because of our aspirations for change …

My own interest in design was very much predicated by my extraordinarily banal childhood in a small country town where I became enamoured of the idea of the real potential for human creativity to change the range of options that surrounded us. And I think that engendered for me a level of complexity in the world that was not immediately embedded in my surroundings. It was something I craved and I guess what I want to say about this kind of grounding is that I think the idea of wicked or complex problems is, in part, something that we invent.

and through the instinct of creativity …

Obviously we have necessity as the mother of invention and the fact that there can be changes that absolutely require us to deal with things that are more complex. But I think there is also great pleasure – and Ranulph Granville touched on this – in inventing complexity and in reflecting on it and wanting to create things that are more intriguing and more challenging than the things that are already around us.

For myself this leads to thinking about the potential for technological change and technological innovation, and that already introduces problems in the sense that change is a problem because it is something that is not embedded entirely in the current circumstance.

The need to respond outside a narrow skill base

So this brings me to the second point I want to raise: transdisciplinary thinking may well revolve around the fact that the problems we might either choose to construct or find ourselves facing somehow or other seem to require a level of response that does not sit comfortably within a disciplinary or a comfortably siloed way of thinking. From my own personal experience I found, in seeking out an education in design, that it was important to develop a series of skills that you could bring to the table in terms of talking about and wanting to change the world, wanting maybe to find solutions to problems or wanting to maybe change the conditions that people find themselves in. So I began wanting a diverse body of knowledge and for that body of knowledge to be coherent, with the different facets able to refer to each other.

Working with change is a seductive proposition

For me, suddenly there came a point where architecture as a particular body of knowledge was no longer satisfactory. So an education in architecture, and wanting to practise in that particular discipline, ceased at some point to provide the kinds of solutions – or the kinds of strategies – that for me were going to be crucial in addressing the problems I was interested in looking at. As I said, this was a self-made problem because I was interested in the idea of creativity and innovation almost in its own right, and the possibility of working with change was a seductive proposition.

Now, I was lucky enough to become involved with the people at the Centre for Design at RMIT, who were preoccupied with what they saw as a genuine

foundation for change: responding to climate change. And the conclusion from the work they had been doing was that what was required was behaviour change and technological innovation in order to address what they saw as a very real and intractable problem: the generation of pollution and consumption of energy. And I think what became central for me and our practice was the question of how you could engage with introducing changes that would meet the sorts of challenges this problem raised.

Transdisciplinarity is an inherently messy business

The conclusion I have come to very slowly is that conversation is absolutely central to progress. What is interesting within the idea of transdisciplinarity is the idea of conversation: how to auspice a conversation that sits outside our own discipline. We have already had Terry Cutler's apt reference to the Tower of Babel. How does one curate, maintain and promote conversations that are extra-disciplinary? The overriding notion is that within conversation there will be the seed for shaping a solution or shaping engagement with a problem. But there will also be a willingness to begin to examine territories that represent areas where you didn't know you didn't know what you needed to know. Inherent within this notion of the transdisciplinary is the idea that Ranulph touched on, and that is the idea of the messy.

Transdisciplinary practice as theatre

The particular project I would like to use as an example began with a conversation as transdisciplinary practice. The project is the development of a new flagship store for the Road Transport Authority in New South Wales. As designers we embarked on a scoping programme that was more like a theatrical programme than an architectural exercise. We liaised with dramaturges, directors and scriptwriters. The reason we did this was that we wanted to initiate a conversation with the client about the fact that we can see there is a huge number of possibilities for the way they could operate within their particular domain, which are these centres, these retail environments. In the process we were going to ask them to make some huge changes to the way they thought about their business.

We constructed what we call a cardboard box theatre set. We laid out, at full scale in a warehouse, the project that we were going to design and we asked our clients to come in and literally walk through it, like an improvisational session or script reading. Now our interest in things like dramaturgy and scriptwriting and prototyping, of which this was a special prototype, was not driven by a desire to combine an enormous number of other things with our architectural level of practice. We actually wanted to design buildings, and we wanted to design buildings that we thought would address things that were particularly significant or that we thought were incredibly valuable.

'Rehearsing the design is a way of understanding what it is you are doing.'

We had come to employ and collaborate with people from other disciplines simply because we had discovered a huge impasse: we could not bring to fruition the ideas that we were most interested in addressing without in fact extending the conversation substantially – extending that conversation to include other disciplines and extending that conversation to include our client and as many members of the client stakeholder group as we could possibly involve.

So I will finish by saying that we see this issue of collective engagement and collective conversation, and what I will therefore call a transdisciplinary mode of thinking, as the inevitable moment when one steps over the boundary of convention.

For ourselves, this flirtation with the non-conventional is compulsive, partly because we find it seductive to look at the possibilities of innovation and partly because, collectively, we are now facing enormous changes, some of which are social and others of which are environmental. This is why this attempt to address the ways ahead through transdisciplinarity is very worthwhile.

RANULPH GLANVILLE

Do the various manifestations of extra-disciplinarity (inter-/multi-/cross-/pluri-/trans-) represent differences in activity or simply differences in degree and scale?

These terms have been used in such different ways and by so many people – since first compared and defined[36] – that I am not convinced there is a community of meaning. Here, I only attempt to show what they mean to me.

The difference lies in the ways the disciplines are intended to interconnect (what they are supposed to share) and in levels. 'Interdisciplinary' points to the area shared between disciplines (their intersection). 'Meta-disciplinary' (the important one missing from the list) indicates a discipline that stands over others (a difference of level and inclusion), often commenting on them. Mathematics is often used as a meta-discipline. While the 'interdisciplinary' may bring (sometimes completely inappropriate) novelty, it tends to minimise sharing, in the sense of shared material.[37] What I call 'meta-disciplinary' increases sharing. 'Transdisciplinary' seems to be a term that has become specialised but involves a sense of transgression of boundaries.

What is transdisciplinary research collaboration? Who leads transdisciplinary research teams? Is it a 'leadership' issue, or is it 'ownership' or 'curatorship' of a challenge or 'authorship' of thought leadership that informs the way problems are transformed into actions?

In some ways it depends on whether there is a purposeful, lead research project, or whether two or more groups are trying to find out how to communicate with each other. The first is perhaps a matter of leadership, the second of conversation or dialogue.

Important, externally generated criteria (effectiveness and efficiency) are best guaranteed by strong, centralised leadership. However, in some ways, this seems to work against the spirit and intention of transdisciplinary design research.

Do new problems require new approaches? Has the scale of wicked problems that need to be tackled created new challenges for large-scale innovation?

The way this question is posed is interesting; I believe there can be value in a wicked problem's wickedness. A related area is the undecidable question (which arises not so much from paradox as from epistemological limitations). It may be more important to retain wickedness and undecidability, and to learn what they offer, than to dispose of them. 'Undecidable questions' implies that we are free to choose the decision we make, rather than being governed by an implicit logic. This changes both how we value solutions and our explicit understanding of responsibility.

To keep wickedness and undecidability is indeed a new approach: it means that problems (which we see as impediments, needing to be solved) may not, actually, need to be solved – we may value them just because they are problems.

Should transdisciplinary research teams be solution finders rather than problem solvers? What are the design spaces for effective solution finding?

Assuming I understand the terminology, my answer is 'solution-finders': this is one of the points Rittell and Webber make in introducing the concept of wickedness. De Zeeuw, working on ways of reducing wickedness, talks of constantly improving quality as a means of dealing with wicked problems.[38]

Why has there been more of a natural tendency to extra-disciplinarity and transdisciplinarity in some domains than in others? What lessons can be learned? What are the implications?

A very speculative response: some areas are already essentially meta-disciplinary (to use my preferred concept), including all areas of design, philosophy, and so on. These are areas free of traditional discipline boundaries – boundaries that, as we push research, become narrower and less firm and thus less limiting. Disciplines that become used as meta-disciplines may be less aware of this, since their function is not to see boundaries in what they 'comment' upon: if you value the boundaries and prefer to remain within your field you will see this as transgression; whereas, for these meta-disciplines, the boundaries don't really exist! (Of course, there are boundaries between these disciplines, too: I am organising a conference to discuss differences and similarities between art, cybernetics, design and mathematics; see details below.)

Why has there been so little exemplary practice?

Transdisciplinary design research presumes a generosity and openness on behalf of all taking part. But it's hard to be open and generous in a climate that is closed, grabbing, cut-throat and constrained. This is the ethical answer. We live in a world where such qualities are extolled and claimed to be inherently superior (for instance, the forces of nature). Such accounts forget that descriptions and theories are made by us, based on our observations, and that we live in a post-modern world where we appreciate the value of science without believing that science holds the truth.

Those who don't see limits don't see them. This is the perceptual answer. In every situation we are in, there are limitations: what makes our position this, as opposed to that, is that we accept certain views and do not accept others. Taking a position enables us to see, but it also blinds us. Every position excludes us from seeing some of what others see. So it is possible to take a position in which the limits we are trying to overcome are not seen (by others) as limits or are not seen as denying anything significant.

Why has design not been a core innovation contribution?

I wonder if this is really so. What is the basis for this claim? What's the evidence? Designers believe they lead innovation, and design has been sold as what makes the difference in product development and marketing, bringing added value.

I believe design offers a way of solving problems that is different from that offered by science because design is concerned with working with a continuously expanding whole, rather than fragmenting into atomic parts and then re-assembling. This also implies different measures and criteria of satisfaction and success. Many in design research do not see this: they want design to become scientific and treat design as flawed (or underdeveloped) science. To do so is to lose the very qualities that make design different and special. However, designers are very bad at explaining (and extolling) this. This view of design is not the only one, but I argue that it is crucial.[39]

How might the creative disciplines participate in transdisciplinary research teams tackling problems not typically in the design domain?

There are many different views of what design is, some flatly contradicting others. In my interpretation designing is a way of working, one way of approaching, wicked problems (see above). One thing designers do is to handle complexity in a way that is quite different from the atomism of science. Rather than break down to small elements and then recombine, design works by accretion in an expanding yet constant whole (sometimes rejected and totally overthrown).[40]

Designing offers us a different way of working (and works to different criteria). It also works to value the unique and different (the new), rather than to find and value the (repeatable) same.

This view is in contrast to that where design has become associated with various problem areas and with the (artefactual) outcome of a process, rather than being a way of working – a verb!

Are transdisciplinary design researchers more effective when contributing to projects and case studies or is there an essential theory to be espoused?

I still don't know: I have argued that some approaches/subjects are intended as transdisciplinary, such as mathematics. But I have become wary of theories being applied to disciplines other than those in and for which they were developed, unless we are very careful and very alert. While they may bring refreshing novelty and new insight we must always be alert to the danger that they are irrelevant and bring distraction or even the enforced invasion of the alien.

I am, however, convinced that taking practice seriously, both in the manner of Donald Schön[41] and of the *Research through Practice* doctorates at RMIT's School of Architecture and Design, is an important matter with lessons for practitioners in many fields.

Does it matter that we cannot agree on a definition of design?

I am not so much interested in a definition of design (or of anything else) as in finding some essential and distinctive element that might characterise it (and which I believe I know: it's a circular conversation held with the self, which I imply but do not articulate above). Rather than a definition, I prefer to allow the social meaning of words to become apparent as they are explored and used.

Are there generational issues at stake: are early- and late-career researchers in a better position to be flexible than mid-career researchers who might be more protective of their hard-won expertise and standing?

Possibly. Perhaps probably. But unless I am making generalisations such as this myself I am suspicious of them! There are recognised risks in researching outside conventional, single subjects; and in using less-accepted approaches. Late-career researchers may have authority that lends credibility to research, and also have less to lose than those building their careers. Equally, those early in their careers may have less to lose. Sadly, this reflects the politics of success in the academic world rather than a search for knowledge.

In transdisciplinary research should we distinguish between the analysts and the synthesists, and if so, to what advantage?

If we do distinguish between them it should only be to encourage them to cross over (trans-gress). We must be careful, ourselves, not to lose the inter/trans/meta- prefixes that we are interested in, to over-definition. If we wish to cross (and hence reduce) boundaries we should be wary of setting up new boundaries.

To what extent is the creation of a transdisciplinary research dialogue a wicked problem itself? Is there in fact a definable outcome?

A wicked problem is essentially a problem of under-specification, contradiction or paradox; that is, there is something in the way the problem is set up that denies logical outcome. This is both a structural difficulty and an in-principle difficulty. I find it difficult to see the approach of the transdisciplinary as being a wicked problem in this sense. There may be social problems that relate to those facing particular wicked problems. But if problems that are rooted in the social are paraded as wicked, I would be inclined to deny their essential wickedness because I'm not sure they are in-principle problems deep in the structure.

That is why I refer to the way the problem is set up. If we find a wicked problem, we may be able to find a different way of presenting it such that it is no longer wicked, perhaps not even a problem. This approach is obviously not a 'positivist' approach, and does not assume that the problem is in the world; rather, it assumes it is in our description of the world: we construct situations so that there are problems, and some of the situations we construct are wicked.

How do we educate or develop the creative transdisciplinarian?

Someone who is transdisciplinary is able to be flexible in their thinking and to cross boundaries. They can see metaphors and analogies and explore them. They are open-minded and generous to others, and they know how to listen with empathy and creatively.

While there might be useful tools, and courses that could help (familiar in all sorts of 'lateral' thinking courses), I think that, in the main, this is a problem of attitude. Then the educational process will be something like that which has turned smoking from the fashionable norm into the activity of outcasts.

How can we demonstrate effectiveness?

This is another good question. A key element is recognition of quality by peers. Another element could be the appearance of a solution (resolution, dissolution) that surprises and brings delight.

What are the institutional barriers to effectiveness?

Barriers include those of context (for instance, financial rewards and the effect they are having on motivation, openness and study); professional possessiveness; suggestions that the transdisciplinary is weak; poor journals with poor rankings. Equally important are the points indicated above about professional standing. There is also a degree of suspicion in the interdisciplinary, sometimes hiding an intellectual laziness or fear.

Another related matter is that of attitude. Approaches such as the transdisciplinary and the meta-disciplinary require behaviours that are at odds with those we have been encouraged to believe lead to success, requiring openness, honesty, generosity, good listening – unfashionable concepts in today's world, which is characterised by mechanisms of selfishness, greed and determinism.

As someone who has moved between disciplines, and balanced several together at once, I can attest to these difficulties and barriers. Yet, now that there is an interest in the transdisciplinary, they have become an advantage. The wheel turns.

Should we distinguish between trans-national challenges and their local footprints? What are the different scales of transdisciplinary action and their implications for patterns of collaboration?

I'm not sure I understand this question. It's outside my experience, but I was and remain interested to learn about it.

Notes

36 E. Jantsch, 'Towards Interdisciplinarity and Transdisciplinarity, in Education and Innovation', *Interdisciplinarity: problems of teaching and research in universities*, OECD, Paris, 1972, pp. 97–120.

37 R. Glanville,'Appropriate Theory', in *Proceedings of FutureGround Conference of the Design Research Society*, Monash University, Melbourne (on CD), 2005.

38 R. Glanville, Doing the Right Thing: The Problems of... Gerard de Zeeuw, Academic Guerilla, in R. Glanville (guest editor), 'Gerard de Zeeuw – a Festschrift', special issue of *Systems Research and Behavioural Science*, vol. 19, no. 2, 2002.

39 R. Glanville, 'Design and Cybernetics', Cybernetics and Human Knowing, vol. 16, nos 3–4, pp. 175–86, 2009.

40 For a more thorough explanation of my view, see Glanville, 2009.

41 D. Schön, *The Reflective Practitioner: How the Professions Think in Action*, Basic Books London, 1983.

Artful art as an interventionist strategy in transdisciplinary design

ELIZABETH GRIERSON

To be *artful* is to be skilled at achieving a desired end: to be 'full of art' and aware of the value of artifice. From this starting point my provocation considers the role of art as a transdisciplinary practice in the field of design. The proposition is that art, as an artful practice, occupies a transdisciplinary field, and as such it has much to offer design as a way of activating forces of creative thinking, production and meaning-making. In its expanded form art has the capacity to open the terrain of the problem-identifying, problem-setting, problem-exploring and problem-solving nature of design to a new set of relations.

There is a customary way of thinking about art that can separate it too easily from design. This separation is based on perceiving art as an aesthetic construction to do with two-, three- or four-dimensional forms and practices, something that gives viewers pleasure and is somehow distanced from the quotidian exigencies of economic futures. I want to contest this proposition by thinking about art as something other, something more and something active in the realm of design – an activating force. If we think about design as a largely instrumentalised practice then arguably there is no room for art there. However, if we mobilise design as something more, other and beyond the instrumental or teleological, then we might find this line of thought worth pursuing.

The globalisation of knowledge transfer in the practices of our economic futures is demanding new ways of thinking about design as a transdisciplinary practice, a conduit for creative and innovative solutions for a 'clever' economy. Within the realm of design, art as a creative way of thinking, designing and communicating has the capacity to engender economic and social advantage in a range of ways. As an economic sector the creative and cultural industries are growing exponentially, globally, with continual processes of inventing and incorporating new networks of production, distribution and consumption. Art responds by inventing new ways of seeing, producing and relating to the world – and I speak here of art in its widest sense of aesthetic knowledge production, be it physically or virtually initiated and manifested. Such knowledge is easily accessible through critical and rational forms of analysis, but it goes further – art knowledge entertains risk and allows the free-fall into new territories. Such ways of practising are crucial in the innovative world of design and are readily available if and when designers call on artists for collaborative and creative solutions.

Perhaps the most concerning factor for art as a way of designing is that one would think that in entering the design field, as a form of activation and signing, there would be an increase in art's chances for legitimation. Far from it: often the non-legitimating processes are doubled, trebled as art faces the same time-entrusted battle for recognition in the serious stakes of knowledge