JOCHEN SCHWEITZER and LEANNE SOBEL

UTS Business School, University of Technology Sydney

LARS GROEGER

Macquarie Graduate School of Management, Macquarie University

The Design Thinking Mindset: An Assessment of What We Know and What We See in Practice[1]

ABSTRACT

In this article, we provide a comprehensive assessment of the design thinking mindset. First, we review the design and management literature to identify and define key components of a design thinking mindset, before we report initial findings from fifteen in-depth interviews with innovation managers in Australia and Germany, who reflect on their practices while implementing design thinking within their organizations. Our study confirms a set of commonly understood and applied mindsets, but also reveals the impact of organizational constraints on translating cognition into behaviour. We suggest further mapping the different mindsets used in design thinking projects and linking them to extant leadership theory. We argue that this will provide a suitable point of departure for further study of the design thinking mindset, as well as its role for innovation.

KEYWORDS

design thinking

leadership

mindset

1

innovation

human-centred design

INTRODUCTION

The capacity to innovate as a key strategic resource has assumed growing importance for many organizations. A recent study by the Design Management Institute tracked the value of publicly-held companies, and benchmarked the impact that their specific investments in design and innovation had on stock value over time relative to the S&P Index. It showed that design-driven companies outperformed the Standard & Poor's 500 by 228 per cent over the last ten years (Westcott et al., 2013). In addition to this, governments such as those in Australia, Denmark and Britain are promoting an innovation agenda, many of which include programmes that highlight creative problem-solving and design (Cox, 2005; Danish Enterprise & Construction Authority, 2011; Bucolo and King, 2014; MindLab, 2015).

Much has been achieved through the design thinking (DT) movement, but many challenges still remain (Bucolo, Wrigley and Matthews, 2012). Even though extant design theory appears to explain DT (e.g. Dorst, 2011), it is lacking theoretical support within the business and management literature, which has led to ongoing conceptual debate regarding its practical adoption and successful implementation, both as a way to innovate products and services, and as an organizational strategy (Clegg et al., 2011). As such, little is known regarding the role of mindset and leadership when adopting a design-led process to innovation, which we will explore in this article. While definitions of the DT mindset are mostly vague, researchers agree that leadership is central to any attempt to change organizational practices (Day et al., 2014). However, we know little about how managers successfully navigate barriers at the organizational and individual levels when pursuing innovation via DT (Carlgren, 2013).

From a theoretical perspective, DT and innovation leadership literatures have similar intentions, but their interrelations have not been discussed, nor have the particular leadership aspects of a DT approach been explored. The leadership literature has identified certain skills and behaviours as key drivers of innovation, particularly transformational leadership, which has been linked to innovation and creativity-related outcomes (Jung, Chow and Wu, 2003; Jung, Wu and Chow, 2008). Design-led innovation practice, on the other hand, offers many descriptions of design principles, thinking modes, creative behaviours and postures often subsumed under the term 'design thinking mindset'; such terms vary, are often poorly defined, and are mostly based on anecdotal indication of particular attitudes and behaviours of individuals who are implementing a design-led approach. As such, a critical discussion and synthesis of the DT mindset and its different cognitive and behavioural components is missing. Businesses that are aiming to create a design-driven innovation culture and associated mindsets will struggle to do so without knowing the skills and capabilities that are required.

In this research, we draw upon a wide literature review and a series of fifteen interviews with innovation managers. In doing so, we explore a more comprehensive perspective of the DT mindset. Our objective is to link the mindsets we know and those we see in practice with perspectives on leadership, which will allow us to discuss mindset as a leadership behaviour.

BACKGROUND

Design Thinking

The literature on innovation has placed increasing importance on design as an integral capability for innovation and adaptation (Dodgson, Gann and Salter, 2005). Designers, by the very nature of their professional practice, have mastered a set of skills that can be applied to a

wider range of problems (Brown and Katz, 2011). Recently, organizations have been trying to integrate the design approach to solve complex social problems and issues of organizational management, to explore greater synergies between business strategies, and inspire greater product and service innovation (Martin, 2010, 2011; Bucolo, Wrigley and Matthews, 2012).

DT is the attempt at capturing this very process and presenting it as an approach to creative problem-solving, which can be applied more broadly by people who are not necessarily designers. DT is the process that matches people's needs with what is technically feasible and with what a viable business strategy can convert into customer value (Brown, 2008; Liedtka and Ogilvie, 2011).

Large corporations such as Apple, Nike and Proctor & Gamble, are examples of firms that follow a DT approach to innovation (Kessler, 2013). They apply DT to break through 'wicked' problems (Buchanan, 1992; Camillus, 2008) and achieve innovation in business strategy, new approaches toward customer engagement and marketing strategies, and the development of new products and services in the pursuit of this. DT unfolds its full potential during exploration activities that deal with the unknown, and are characterized by uncertainty and ambiguity (Cooper, Junginger and Lockwood, 2009).

There is no single best DT process: it is described as an exploratory process (Brown, 2009, Jakovich, Schweitzer and Edwards, 2012) that usually begins with an initial defining of the problem, followed by exploration of the user and design space, generating possibilities through brainstorming, building and then testing prototypes (often a number of times), and then using the findings to refine the problem resolution.

It is argued that the notion of a DT process is paradoxical, as there is a conceptual conflict between DT principles and a normalization of workflows suggested by such models (Lindberg et al., 2010). Thus, instead of referring to a 'process', design thinkers are thought to navigate through various phases or modes (Nelson and Stolterman, 2003; Brown, 2008; Brown

and Katz, 2011). Design teams will go through these phases repeatedly, simultaneously, at different times and in a non-linear fashion in order to deal with the complexities of wicked problems (Jakovich, Schweitzer and Edwards, 2012).

Following a DT approach without establishing the necessary culture and mindset might not have the desired results, and may even lead to failure (Kimbell, 2012). Recent studies have reported that companies were so fixated on the process that they turned DT into a rigid plan, implemented like any other efficiency-based process that they know well (Nussbaum, 2011). Hence, it is the design state of mind and the behaviours that innovation teams exert that enable the process and activities of DT (Sobel and Groeger, 2013b).

Leadership and Innovation

Like any business operation, innovation requires effective leadership. In fact, the capacity to lead organizational innovation is increasingly important, since business environments are characterized by complexity and uncertainty (KMPG, 2012; Accenture, 2014). But leading innovation requires a different sort of leadership than those called for by other core business activities: it involves skills, behaviours and tactics that encourage (in others) the ability to introduce new products and services, identify and enter new markets, along with a willingness to push boundaries and embrace uncertainty and discovery.

Leadership research has long identified certain skills and behaviours of people who drive innovation (Mumford et al., 2002). Transformational leadership (Bass, 1999) in particular has been linked to innovation and creativity-related outcomes. It is charismatic, inspirational, intellectually stimulating and individually considerate, which is particularly relevant in situations of change. Transformational leadership has also been linked to increased levels of motivation and creativity (Shin and Zhou, 2003), organizational performance (Jung and Avolio, 1999; Gumusluoglu and Ilsev, 2009), as well as innovation and effectiveness (Jung, Chow and

Wu, 2003; Schweitzer, 2014) and knowledge creation (Schweitzer and Gudergan, 2010). Indeed, it has been suggested that transformational leadership could be shared among team members, thus substituting the need for a strong, single leader (Pearce and Conger, 2002; Carson, Tesluk and Marrone, 2007), encouraging teams that have the time, resources and tools to jointly explore the unknown. Hence, innovation leaders are more likely to be team players and keen experimenters than isolated decision-makers. Recent studies suggest that innovation leaders help challenge assumptions, create experiments with customers and interpret results in an effort to prepare the organization to accept new ideas (Furr and Dyer, 2014).

Despite having similar goals and articulating similar behaviours, the innovation leadership and DT literatures do not cite or refer much to each other. Moreover, the leadership aspects of a DT mindset have not been explored much, nor how leadership behaviour is an enabler of DT in organizations. No study has yet explained how leadership behaviours are related to DT capabilities in organizations. There is therefore an opportunity for both research streams to benefit from each other. With this study we aim at bridging this gap. We take the view that a leadership perspective is suitable in explaining the effect of DT on innovation processes and innovation culture in organizations. Our goal is to examine the specific behavioural and cognitive components of a DT mindset, and to propose a framework of design-leadership behaviours that, when applied, can help achieve innovation objectives. Hence, our particular objective here is to identify and define key cognitive and behavioural components of a DT mindset, based both on a systematic literature review and observation in practice. The purpose of the empirical study is to explore design mindsets in practice to inform further research directions.

RESEARCH METHOD

Literature Analysis

We conducted a systematic review and analysed the literature to identify themes, patterns and connections that define a DT mindset. Sources were included that specifically related to recent and relevant managerial publications on DT, as well as academic research on a designer's approach to problem-solving. Quotes from the texts provided the data for the analysis. We used an open coding and constant comparative technique to produce profiles of different DT mindsets across the evaluated literature (Strauss and Corbin, 1990). The content of each source relating to a DT mindset was coded to identify concepts; we then identified similarities and differences within and across the sources to ensure consistency and generate convergence (Pielstick, 1998). Following this process, we identified eleven themes, which together constitute a provisional profile of the DT mindset. [2]

Interviews

We collected and analysed data from a purposive sample (Guest, Bunce and Johnson, 2006) of fifteen innovation managers who use DT within their organization in the context of innovation projects. Participants were drawn from organizations either operating in Australia or Germany. The unit of analysis in this study is the innovation manager, since it is the cognition, behaviours and resulting practices of the individual that determines the nature and effectiveness of the innovation project. We chose innovation managers who had operational responsibility for the innovation outcome to be the key informant (Kumar, Stern and Anderson, 1993) since he or she is familiar with all aspects of the project, including prevailing mindsets based either on reflection of own behaviour or experiencing and witnessing others.

Participants had on average twelve years working experience in their respective industry, which included healthcare, business services, chemical, finance, IT and real estate. Their ages ranged from early thirties to the mid-fifties, and their education levels ranged from undergraduate to doctorate degrees. Four respondents were female and nine male. Their

organizations are multinationals with design-led innovation initiatives under way in all or parts of the organization. We approached individuals from these organizations because their companies are amongst the most innovative within their industry, and could therefore provide a benchmark for how DT mindsets are present and supportive in implementing a design approach.

Data Collection: Instruments and Procedures

One-on-one, individual, tape and video recorded interviews were conducted in on-site conference rooms and offices at the organizational setting at prescheduled times. The interviews lasted around one hour, were professionally transcribed and subsequently loaded into NVivo software for analysis. We asked participants to reflect upon their practices of DT with regards to a specific innovation project they were involved with, and to describe the mindsets that they practice or observe in others. For each mindset, we asked about how that mindset revealed itself in practice, which behaviour or cognitions they attribute to that mindset, and whether they thought a mindset was effective. We asked for specific examples and used probing questions to clarify our understanding. During the interviews, subjects were also asked to support their verbal descriptions of a DT mindset with a form of cognitive mapping on paper. Cognitive maps provide graphical descriptions of the unique ways in which individuals view a particular domain (Eden, 1992). This approach enables subjects to reflect on the identified components, and permits us to probe *why* concepts are important and *how* they are interrelated.

Verbatim transcripts of the interviews and field notes were coded in line with qualitative research guidelines (Spiggle, 1994). Interview coding initially focused on finding evidence of those DT mindsets that were previously identified via the review of the relevant literatures.

DESIGN THINKING MINDSETS

The literature that explores DT often articulates a mix of elements, tools and approaches required to see DT realized in individuals and organizations (Sobel and Groeger, 2013a). Most academic and practitioner-oriented publications portray what can only be described as 'ideal' DT attributes and conditions, which relate to individuals, organizations, physical environments, tools, etc. (e.g. IDEO, 2009). It is not easy to refine an exact understanding of the complete elements that can be considered a DT mindset in any given literature. However, elements of the DT mindset are described in many ways throughout the literature, often based on circumstantial evidence rather than empirical research.

Here we review the literature following a suggested grouping identified as reoccurring and repeatedly mentioned themes. According to social psychology literature, such themes should be separated into cognitive (thinking), behavioural (doing) and affective (feeling) components of a mindset (Rosenberg and Hovland, 1960). While such a perspective aids in better understanding the nature of the mindset, we believe that ultimately it is not possible to clearly separate the thinking from the doing, or the practice from the practitioner (Kimbell, 2011). We therefore present both cognitive and behavioural components within each theme as we see them emerging.

Figure 1 provides an overview of the eleven mindsets identified in the literature.

Figure 1: The eleven design thinking mindsets.

1. Empathetic Towards People's Needs and Context

Human-centeredness is at the heart of DT. Leavy (2011) suggests that the advantage of design-led innovation is its creation of opportunities based on emotion-rich innovations in product meanings. Empathy is 'the ability to see and experience through another person's eyes, to recognize why people do what they do' (Kelley and Kelley, 2013, p.85). This experience of the DT process is identified as being one of the defining attributes embodied and enacted by persons practicing DT (see also Brown, 2008; Berger, 2009; Martin, 2009; Liedtka and Ogilvie, 2011). Being empathetic allows participants to understand social context (Badke-Schaub, Roozenburg and Cardoso, 2010) by 'concentrating on people' and the insights they can provide in understanding context and opportunities for customers and companies commercially (Michlewski, 2008).

Associated activities leading to empathetic insights include working together with others (Adams et al., 2011), listening and observing (Miller and Moultrie, 2013) and observation of others (Brown, 2008). Such an empathic approach may also see participants

explore people-based scenarios when thinking through design problems; this supports a way of both connecting more empathically with users and gaining deeper insight into user experiences (Cooper, Junginger and Lockwood, 2009). When looking at the attitudes that underlie this mindset, Liedtka and Ogilvie (2011) suggest a wish to deeply understand others' experiences, whereas Dorst (2011) sees it as having the desire to read situations. Others have linked the empathy mindset to a 'people first' approach (Brown, 2008), or to having emotional intelligence (Clark and Smith, 2010) and good interpersonal skills (Matthews, Bucolo and Wrigley, 2011). Hence, being empathetic towards people's needs and context considers both the needs of customers/users and those of the innovation team. In other words, empathy extends beyond the user to all stakeholders of the innovation process. It requires observation, interaction with and understanding of the problems people have, and examining the needs, dreams and behaviours of the people for whom a solution is sought. The purpose of being empathetic, observing and engaging is to see problems with a fresh set of eyes, by seeing the physical manifestations of behaviour and interpreting the stories that people tell (d.school, 2011).

2. Collaboratively Geared and Embracing Diversity

The use of interdisciplinary teams in order to deal with the multiple facets and interdependencies of innovation projects is common to all DT projects. Being collaboratively geared depicts a persons' ability to easily integrate with teams, examine and confront team dynamics, as well as embrace each individual's personality, expertise and working style as a necessary condition to benefit from the advantages of multi-disciplinary collaboration.

Hence, building on the concept of embodying an empathic approach, collaboration and knowledge sharing are key activities that promote rapid problem-solving through knowledge transfer and the development of new ideas (Jevnaker, 2000; Clark and Smith,

2010; Burdick and Willis, 2011; Hassi and Laakso, 2011). In order to foster collaboration, DT experts encourage behaviours like 'building on the energy of others' and 'deferring or avoiding judgement' (Kelley and Kelley, 2013, p.183). Likewise, Berger (2009) sees 'acknowledging others specialisations, knowledge and expertise' as an important attitude.

While this mindset rests upon the idea that diverse teams produce greater innovation than single-discipline teams, it has been recognized that innovation managers are sometimes required to be mindful of dominant personalities potentially killing off ideas rather than promoting them (Jevnaker, 2000; Badke-Schaub, Roozenburg and Cardoso, 2010). Hence, being conscious of having to withstand and resolve the issues and conflicts that purposely-diverse teams can have is of utmost value. Innovation managers are aware of the transformational power that diverse teams can bring to the process, so they encourage collaboration beyond the usual disciplines to tap into areas that may provide the missing piece to the innovation puzzle. Along those lines, Liedtka and Ogilvie (2011) argue innovation managers must have good listening and communication skills. Others have added that people who are good at building relationships and bringing disparate groups of people together are of great value to innovation teams (Michlewski, 2008; Clark and Smith, 2010; Burdick and Willis, 2011). Finally, being collaboratively geared and embracing diversity entails building positive team camaraderie, and developing trust and respect between collaborators; this is supported by a belief in shared ownership and inclusivity (Jevnaker, 2000; Brown, 2008).

3. Inquisitive and Open to New Perspectives and Learning

While managing high levels of uncertainty, DT practitioners follow a process of discovery and learning by exploring, experimenting, testing and gathering feedback from multiple stakeholders (Plattner, Meinel and Leifer, 2012). This mindset is often fuelled by curiosity and accelerated by leading multiple small tests that engage people with artefacts and prototypes;

these test assumptions and features in action in order to solicit feedback. Inquisitiveness and an appetite for learning are therefore present throughout the project so as to understand customer and market context more thoroughly (Adams et al., 2011; Kelley and Kelley, 2013). The process of gathering insights from others requires the DT practitioner to discover new perspectives by engaging in one's own 'intuition, instinct, tacit knowledge' (Brown, 2009, p.378). Synthesis is required to process large volumes of data, which involves the identification, reading and distillation of themes (Michlewski, 2008). Dorst (2011) describes this as the discovery of the relationship between signs, things, actions and thoughts.

But even when results do not match assumptions, when prototypes fail to convince and when ideas disappoint, valuable data is captured and processed to iterate the solution. It requires an inquisitive, open and positive mind to engage stakeholders, lead the process of generating and developing new assumptions and ideas, as well as managing mutual interest and processing failure and feedback to become the seed for better solutions. Hence, a key attribute is a desire to learn – this includes learning about others, challenging existing frames of thinking and seeking out new contexts in which to learn something (Brown, 2008; Michlewski, 2008; Cooper, Junginger and Lockwood, 2009; Jenkins, 2010; Liedtka and Ogilvie, 2011).

The learning process is undeniably central to the process of iterating between divergent and convergent phases of the DT process. According to Liedtka and Ogilvie (2011, p.8), 'design insists that we prepare ourselves to iterate our way to a solution, so managers who thought like designers would see themselves as learners'. Many others share this view, and argue that 'learning by doing' and 'planning the learning' throughout the process is essential (Boland and Collopy, 2004; Brown, 2008; Berger, 2009; Badke-Schaub, Roozenburg and Cardoso, 2010; Adams et al., 2011; Matthews, Bucolo and Wrigley, 2011; Kelley and Kelley, 2013; Miller and Moultrie, 2013).

Underlying such eagerness to learn and know is curiosity, which is a mental state or approach to life that inspires learning in problem-based scenarios (Adams et al., 2011; Matthews, Bucolo and Wrigley, 2011). Curiosity fuels one's owns intuition, instinct and tacit knowledge to discover new perspectives. Liedtka and Ogilvie (2011, p.12) suggest that designers value the 'pursuit of novelty, and dislike of the status quo', in contrast to traditional business-types valuing the 'pursuit of control and stability'. Curiosity may be brought about by 'repositioning' problems (Martin, 2009, p.11), searching for information and the generation of ideas (Buchanan, 1992), being a cultural explorer, and bringing 'a spirit of exploration and challenge' to the design process (Matthews, Bucolo and Wrigley, 2011, p.384).

4. Mindful of Process and Thinking Modes

Being mindful of process and thinking modes depicts awareness about the work that one does, how one does that work, why one does it in a particular way, and about how one will improve the methods being used. Mindfulness means being keenly aware of the stage of the design process the team is engaged in, and what behaviours and goals it may have at any given moment. This mindset refers to awareness about when a team needs to be highly generative versus when it needs to converge on a single solution path. Flavell (1976) defines this as the ability to 'know what you know'. Brown and Katz (2011) argue that when engaged in a design process, the phases will require participants to utilize divergent and convergent thinking at different times. Divergence and convergence best relate to the conflict between creating choices and making choices. Most people will analyse and then converge upon a single outcome, whereas DT practitioners know when and how to utilize divergent thinking to create diverse options, before converging and moving toward a single option.

Authors who describe the different thinking modes in which a DT practitioner engages throughout a project make further references to this mindset. For example, Buchanan (1992)

argues that designers are good at realizing the connections between seemingly unrelated insights and themes. They are asked to utilize what Berger (2009) describes as 'integral intelligence', which includes being able to consider customer and business needs when applying DT. Martin (2009, p.165) describes this as integrative thinking: 'the metaskill of being able to face two (or more) opposing ideas or models instead of choosing one versus the other'.

Various authors recognize the ability to engage in integrative thinking modes as an important way to articulate processes of consolidating, reconciling and resolving otherwise conflicting data sets or information into innovative outcomes (Brown, 2008; Michlewski, 2008; Badke-Schaub, Roozenburg and Cardoso, 2010). As discussed by Martin (2009), processes such as these do not require much reliance on analytical thinking, as this would restrict new ideas from coming to light. Being mindful of process and thinking modes equally relates to the design thinkers' ability to balance analytic mastery with intuitive originality.

Different thinking modes that individuals employ when using DT have also been described as 'abductive reasoning' (Martin, 2009; Burdick and Willis, 2011), 'emotional intelligence' (Brown and Katz, 2011; Martin and Euchner, 2012), 'informed intuition' (Clark and Smith, 2010; Leavy, 2011), the 'mental iteration of ideas' (Cross, 1982; Teixeira, 2002; Martin, 2009; Clark and Smith, 2010; Eagen et al., 2011; Kelley and Kelley, 2013) and adopting an approach that follows an 'open systems view' (Liedtka and Ogilvie, 2011).

While different thinking modes and phases are relevant for DT, it is important to mention that the mindset we identify here is not the thinking mode or phase itself, but the person's mindfulness of using or alternating between different modes, and their awareness of which different project phases, tools and techniques to employ.

5. Experiential Intelligence

Experiential intelligence depicts a preference for trying out ideas by making mock-ups, drawing what thoughts or ideas may look like, building models or creating something tangible to experiment with as a way of transforming ideas into something that can be experienced and tested. Michlewski (2008) suggests 'experimentalism' as iterating towards a 'better' answer. A trial and error approach allows seeing which part of the process generates feedback and quickly reworking of a solution (Martin, 2009). The importance of an explorative approach has been widely cited (Brown, 2008; Brown and Katz, 2011; Goldschmidt and Rodgers, 2013) as providing the opportunity to identify and work through constraints or to study extremes (Liedtka and Ogilvie, 2011).

Another aspect of experiential intelligence is that it allows people to transfer intangible ideas into tangible outcomes (Clark and Smith, 2010). There is ample evidence throughout the DT literature of the importance of presenting data in visual ways, of telling stories, testing via physical prototypes, as well as other manifestations of ideas and data. The purpose is to refine understanding, communicate meaning, or test and promote feedback. For example, Boland and Collopy (2004, p.13) suggest 'mind, hand, heart, and materials are a closely integrated instrument of cognition and creativity'. Bringing an idea to life involves rapid prototyping, working with tangibles, and considering aesthetics, beauty and taste (Kimbell, 2009). Along similar lines, Brown (2008) discusses 'artefacts' that one can engage with to test or better explain the nature of the idea, as well as how it might act in context.

Artefacts, prototypes and other physical manifestations are entwined with 'storytelling', which is realized through the process of visualizing ideas, thoughts and problems (Michlewski, 2008) via drawings, as well as via verbalization and the written word (Cooper, Junginger and Lockwood, 2009; Matthews, Bucolo and Wrigley, 2011). Kelley and Kelley (2013, p.97) recommend visualizing experiences through a drawing or diagram, with

the objective 'to debunk assumptions and reveal how people think about and prioritize their activities'. They also view storytelling and visualization as a great communication tool with which to sell new ideas to new audiences, to seek approval or to move ideas forward into realization. Many DT authors have discussed this process as 'visual thinking', or using mental imagery in the process of thinking through design problems and translating ideas into visual narratives (Kelley and Kelley, 2013). Here, visualization is an internal thinking process that can lead to resolving ideas, while an externalized thinking process looks at better ways to communicate.

6. Taking Action Deliberately and Overtly

An orientation towards action – or 'bias toward action' – means choosing action-oriented behaviour over discussion and conceptual or analytical behaviour. It is a preference to move into the real world to engage users; to prototype and test ideas as a manner of getting a team unstuck or inspire new thinking. However, action orientation does not mean that people do not 'think things through'; rather it means that decisions are not only based on discussion or thinking processes, but also on earlier first-hand experiences and experimentation. Others have discussed the role of action and purposeful thought enacted by designers to curate and assemble thoughts and physical manifestations, as well as in building structure and hierarchy (Michlewski, 2008; Badke-Schaub, Roozenburg and Cardoso, 2010; Hassi and Laakso, 2011).

Action orientation also refers to an ability to dissect large tasks and define a starting point. This might mean to quickly build one of many possible solutions to receive feedback since data on one option is better than no data on many options. Such action is also carried across into the way in which DT practitioners pursue resolutions for problems with great focus (Buchanan, 1992; Kelley and Kelley, 2013). Action bias serves as a profound tool in influencing change, initiating action among teams and others, and in demonstrating positive

and productive behaviour when resolving complex problems (Beverland and Farrelly, 2007; Goldschmidt and Rodgers, 2013; Kelley and Kelley, 2013). Action bias is a core aptitude in that it drives the process, encourages experimentation and provides the catalyst for innovation endeavours to get off the ground.

7. Consciously Creative

DT professionals have a conscious creative approach to work;. they encourage others to partake in behaviours that nurture and inspire the creation of new ideas and expressions. Creativity is critical to DT as a mode to explore and express less tangible and more subjective content by making the abstract or non-experienced come to life. Examples of creative expression include role play, creating a physical model or expressing ideas as drawings. Authors commonly argue that it is the role of the designer to build their own and other's 'creative confidence' (Beverland and Farrelly, 2007; Kimbell, 2009; Burdick and Willis, 2011; Kelley and Kelley, 2013).

In order for people to be confident, they must have an understanding of creativity; they must also be sympathetic to the way creative thinking works for others, be creative champions and lead a creativity agenda (Kelley and Kelley, 2013). Creative understanding involves acknowledging mistakes, minimizing hierarchy, nurturing the ideas of others, inspiring and motivating people, encouraging imagination and resisting the urge to be 'quantitatively predictive' (Jevnaker, 2000; Cox, 2005; Badke-Schaub, Roozenburg and Cardoso, 2010; Miller and Moultrie, 2013). Creativity also requires one to think over ideas for a period of time to formulate correlations, or simply in order to find inspiration. This process is what Kelley and Kelley (2013) call 'engaged relaxed attention': the mental space in which to resolve problems and hit on ideas. The process takes time and DT practitioners must display patience in seeing through the creative process.

In order to support creative activities and nurture early creative thoughts into plausible ideas, the DT professional must be conscious in the sense that he or she is aware of the conditions and process required to see creativity flourish. Boland and Collopy (2004, p.1) call this the 'design attitude, which appreciates that the cost of not conceiving of a better course of action than those that are already being considered is often much higher than making the "wrong" choice among them'. It is having a refined ability to naturally go about using one's acquired experience and knowledge with that of new knowledge (Cox, 2005; Michlewski, 2008; Dziersk, 2009; Kelley and Kelley, 2013; Miller and Moultrie, 2013); to 'think through design' (Buchanan, 1992, p.51) and form a picture of what this might look like (Cooper, Junginger and Lockwood, 2009).

There are many other behavioural attributes that encourage creativity. Authors have identified some of these conditions as being patient of the process and keeping a sense of humour (Badke-Schaub, Roozenburg and Cardoso, 2010); encouraging freedom and the space for creative exploration (Kelley and Kelley, 2013); and the realization of creative manifestations. These behaviours often grant others who are involved in the process a permission to be creative. Adams et al. (2011) suggest the act of encouraging playfulness or building trust as a way to foster expressive behaviour.

8. Accepting of Uncertainty and Open to Risk

DT teams are often charged with creating solutions for a future that is very different from the present, thereby 'creating something that isn't' (Liedtka and Ogilvie, 2011, p.7). In the context of complex situations and convoluted user needs, there is hardly ever a single piece of data or monocausal relationship that explains the innovation dilemma or leads to a great solution. It is in this context that DT practitioners are require to make decisions based on the future potential of a solution, bringing with it an element of risk that is compounded by a fear of failure and

ambiguity (Kelley and Littman, 2001; Michlewski, 2008; Goldschmidt and Rodgers, 2013; Kelley and Kelley, 2013).

Beyond those doubts about entering into a design process without 'knowing' the outcomes, the time and number of iterations required to refine these outcome are less known. Hence, it is no surprise that a DT practitioner must be accepting and embracing of uncertainty over extended periods (Boland and Collopy, 2004; Adams et al., 2011; Hassi and Laakso, 2011; Liedtka and Ogilvie, 2011; Kelley and Kelley, 2013). The DT process requires participants to diligently work through information and to immerse oneself in complex data, which, if not worked through in detail and given the time required, can result in sub-standard outcomes (Leavy, 2011).

When taking a holistic approach and accepting uncertainty as par for the course, the DT practitioner is able to consider numerous factors simultaneously, including customer needs, technological feasibility, organizational constraints, regulatory implications, competitive forces, resource availability and strategic implications, as well as costs and benefits of various solution proposals (Jacoby and Rodriguez, 2007; Johansson and Woodilla, 2009). The ability to consider a problem as a whole and be playful with uncertainty (rather than being restricted by it) enables the DT practitioner to create innovations that are not merely incremental improvements, but have the potential to be truly disruptive (Martin, 2009).

9. Modelling Behaviour

DT practitioners have a sense of what is required to see a project through; they build momentum on projects and bring together disparate groups of people in doing so. This is important for the DT process because much of it can be new to those involved. Hence, practitioners become 'advocates for creativity and design' (Michlewski, 2008, p.16) by modelling positive behaviour and attitude when undertaking DT processes.

A modelling behaviour mindset occurs in team situations and individual encounters with superiors. Since collaboration is an important aspect of DT, its practitioners are particularly good at steering fruitful team discussions; this is often due to their ability of placing their own egos aside while calming those of others, as well as ensuring that all ideas and insights are contributed without judgement and therefore assessed equally (Brown, 2008; Hassi and Laakso, 2011; Kelley and Kelley, 2013). Building on this, Beverland and Farrelly (2007) identify that in order to encourage others to share insights and productive discussion, DT practitioners are masters of communicating ideas and promoting the communication of ideas by others. They suggest that they achieve this through engaged talking (i.e. talking aloud or internally thinking things through), creative arguing, or initiating activities such as 'show and tell'.

In order to introduce DT, practitioners share their experiences and guide others through application and immersion. Kelley and Kelley (2013) take inspiration from Albert Bandura's (1997) concept of 'self-efficacy' (cf. Patterson et al., 2007), and argue that 'guided mastery' is what DT practitioners do well. Modelling behaviour allows a development of DT capabilities and confidence in others via the gradual exposure and intensification of challenges over a period of time. The DT practitioner models behaviour and guides others' expectations of the creative process by drawing upon their own past experiences, acquired insights, knowledge and personal expertise (Jevnaker, 2000) to help DT novices gain creative confidence.

An important feature of modelling DT behaviour is the ability to display a relentless sense of optimism. Authors have noted this as being a trait that mobilizes action and engenders extra confidence within people to push through challenging situations, especially in the face of adverse challenges, resistance and major setbacks. Optimism is a state of mind for DT teams, and is important for building momentum in projects and realizing new ideas as innovative outcomes (Beverland and Farrelly, 2007). Kelley and Kelley (2013, p.116) suggest that

optimism – or as they describe it, 'urgent optimism' – is manifested by a designer's ability to 'move forward, knowing they will not always be right but optimistic about their ability to experiment and conduct midcourse correction further down the road'. It is a critical part of the modelling behaviour mindset because it is optimism that pushes ideas from just that – ideas – into the reality of a project, or into experimenting with new ideas or thinking in other directions.

10. Desire and Determination to Make a Difference

Related to modelling behaviour and optimism (yet, as we suggest, distinctive) is the DT practitioners' innate desire to make a difference, improve situations and the determination to see ideas realized. Desire is an important quality as it provides the opportunity to see potential for change in situations, as well as the ability to identify where or how it might be beneficial. A number of authors have explored an individual's desire to see change and create new solutions from the outset (Boland and Collopy, 2004; Dorst, 2011; Paton and Dorst, 2011; Kelley and Kelley, 2013). It seems important in this context that practitioners seek to be a 'catalyst for transformation' by having a 'well-directed discipline and a strong voice of intent' (Berger, 2009; Kelley and Kelley, 2013). Jenkins (2010, p.39) notes more holistically that DT practitioners have a desire to 'develop the skills, structures, and processes to generate value from valuable insights'. In the pursuit of great outcomes (and in order to accept the DT solution), a state of change is almost always guaranteed, which is often met with opposition. It therefore requires justification and at times vigorous debate.

It is recognized that DT involves a high level of determination – either this or the ability to present the proposed outcome to those not yet convinced of its merit with a high degree of confidence and resolve. As such, practitioners are comfortable with the possibility of conflict;

they have strong self-efficacy, are resilient, and skilled at persuasion and negotiation (Martin, 2010).

11. Critically Questioning

DT involves the input of many stakeholders and numerous interactions with working teams, other individuals or groups. While there are invariably different opinions, debates and tendencies – as well as varied insights and data from past experience (Martin, 2009) – the DT practitioner possesses a mindset of critical questioning and the ability to build on the ideas of others (Kelley and Kelley, 2013). Critical questioning involves keeping an open mind about possibilities, especially during early stages. This is important because it ensures that ideas are not suppressed without validation, and that good ideas survive to then be developed into more impactful outcomes. Without critical questioning, consensus may be formed around false truths. Critical questioning is most useful when iterating or synthesizing information and ideas (Adams et al., 2011), whereby the DT practitioner questions bias and beliefs or initially tests the relevance of ideas. This mindset ensures project teams do not fall into the trap of being guided by decisions that are based on old ways of thinking (Boland and Collopy, 2004; Martin, 2009). To avoid bias and working in familiar frames, the notion of adopting a 'beginner's mind' is a prevalent term used in the literature (Buchanan, 1992; Michlewski, 2008; Badke-Schaub, Roozenburg and Cardoso, 2010; Adams et al., 2011; Dorst, 2011; Goldschmidt and Rodgers, 2013; Kelley and Kelley, 2013; Miller and Moultrie, 2013).

Critical questioning also places the initial design problem at the heart of the project, as well as throughout the remainder of the process; DT practitioners are wary of keeping it central in order to ensure focus is maintained (Kelley and Kelley, 2013) and so that the team does not lose sight of what they are working towards. Critical questioning is the ability to deconstruct and reframe (or frame) problems by questioning how the initial design problem or 'wicked

problem' (Buchanan, 1992) has come to be in the first place (Boland and Collopy, 2004; Paton and Dorst, 2011). All of this is critical for DT practitioners to assume in order to understand how one might go about solving such problems (Liedtka and Ogilvie, 2011).

DESIGN THINKING MINDSET IN PRACTICE

Irrespective of the particular terms used, each of the previously described emerging mindsets is almost always portrayed in the context of idealized behaviour, which, when applied and exploited, leads to successful DT projects. The innate characteristics, underlying cognitive patterns, assumptions and resulting behaviours of DT practitioners are accentuated from a particular perspective. As we note, a common set of ways of 'thinking' and ways of 'doing' is missing. DT is often perceived as vague in nature precisely because a theoretical and ultimately practical understanding of what DT practitioners do when acting upon their knowledge is missing.

However, despite the differences in the theoretical realm, there seems to be agreement on certain mindsets and associated idealized behaviours that allow us to infer what a common DT mindset might look like. In what follows, we provide examples of our emerging mindsets, which we believe combine and synthesize the current body of academic and practitioner-oriented literature.

Our observations are neither exhaustive nor mutually exclusive; rather, they provide a useful heuristic and systematic basis for comparison, enabling us to explore the associations between the DT mindset and ultimately the identification of specific aspects of leadership behaviour in design-thinking projects. In the following, we provide a selected overview of how innovation managers apply a mindset (or a component thereof) in practice. Real names have been replaced with pseudonyms.

Empathetic Towards People's Needs and Context

Respondent Julie explained how being empathetic towards people's needs changed the way senior members of her team engage with customers:

> Recently, some of the members of our team – quite senior members – went down and spent a day with one of our tenants. They actually went and sat in their space, interacted with their staff, talked about what they do every day, what their challenges are, how do you find dealing with our business? So we do a lot more of going out and talking to our customers, spending time in their businesses, trying to understand where we could add value to them. That's not something that we would have really done 18 months ago. (Julie)

In addition to this, Dave explained that it has always been 'all about users' in the software industry, which suggests that a human-centred approach is well established. Interestingly, he then highlighted a difference between user- and human-centeredness: 'You forget that these users are actually people. I mean, it's like a user can be like a machine, clicking on things. But they are actual people'. Only by actively engaging and interacting with 'real people' does his team manage to bridge the gap between thinking about users and designing for humans. He then described a project with a premium car manufacturer, during which the user context was not fully accounted for:

> They had conducted a massive study about millionaires in Russia buying cars and the buyers of the car said: 'Yeah, it's great to buy these cars, it's really fun and so on, but who of your idiot engineers had the idea to put a massage seat for my driver?' Because at that

time you couldn't buy a massage seat in the back. And in Russia everyone's sitting in the

back – you have a driver. (Dave)

This example highlights how the value of empathy towards people's needs and context depends on a rigorous and context-specific execution that goes far beyond just talking more to your customers.

Kim explains how she manages the conflict of having no predefined ending to an empathy phase, and the requirements for clearly defined timelines and budgets:

We will stop the empathy phase when we feel we're ready; when we start hearing the same things over and over again, we'll stop. We did give them a loose timeline because the company likes bureaucracy and likes a statement of work. But I've set it up that I've asked for more budget than we need and more time than we may need to give us that flexibility in design thinking. (Kim)

Collaboratively Geared and Embracing Diversity

Most of the respondents stressed the importance of working in teams, but diversity in background was not seen to be that important. For example, Dan said, 'It really doesn't matter what their background is', as long as there is a strong willingness and commitment to the team. While the hypothetical benefit of diverse teams is acknowledged by most, it is not often implemented in reality due to limited resources, which we observed in most of the organizations. On the other hand, Dave, who works in a department with a deeply embedded DT culture, illustrates how a collaborative spirit is applied in practice:

We have a calendar for staffing reasons. So every time there's a new project, there is an invite sent out by the guy who has acquired the project. Then, by accepting or declining the request, you say you are interested in doing this project. So it's a very open way of deciding what you want to work on. He [the manager] has the trust that we keep ourselves busy, so to speak; that we don't hang around and do nothing. Instead, he says, 'You choose what you want to do and apply for it'. (Dave)

Inquisitive and Open to New Perspectives and Learning

Being open to new perspectives and learning allows teams the ability and permission to fail and learn about how to improve things. Alex notes: 'Failure at the right time is a good thing because it allows us to refine our idea before making expensive mistakes'. He also acknowledges the need to provide feedback loops and opportunities to learn and test ideas. Joseph describes himself as neither being 'interested in the detail' nor 'passionate about the delivery', but rather feels at his best when 'coming up with the ideas'. He is very reflective about his strengths and weaknesses within a design-led innovation project, and complements his skills with team members that give him the opportunity to live out his 'natural curiosity' as they take the lead during more convergent phases of a project.

Taking Action Deliberately and Overtly

Many of the respondents emphasized the importance of being 'action-orientated'. According to Alex, this means to 'talk with your hands. Because we're all very good at PowerPoint slides, but difficult to engage an audience when all you're presenting is a concept on paper without the ability for someone to proactively engage with it'. However, others explained that rough prototyping and action orientation is a necessity, but not a sufficient condition to implement creative ideas. In particular Will, Frank and Dave expressed the required need for real 'making' expertise in a team. Dave explained this in the context of the previously mentioned car

manufacturer example: while the engineer 'forgets to put the seat in the back because he "thinks Germany" and doesn't "think Russia"', the team still 'really, really need the skills to do things' in order to test the perspectives that other team members might bring in – 'You cannot have design thinking without design. Yeah, that's the saying: without design doing. So you really need experts who can build things'.

Consciously Creative

Many respondents explained that a regular business context does not provide an appropriate environment to be consciously creative. However, as soon as support among stakeholders is established, then momentum is built for a pathway to design-led innovation.

> My experience [of] having separation from the bureaucracy and the checklists and the project plans and the budgets and all the resource constraints of the bank; being able to work in an environment that's free from all of those and having that separation to really think freely and have more flexibility has been invaluable for our design-thinking project. (Kim)

Hence, supporting DT practitioners in their quest to innovate through DT requires 'space' to do so. The space to test ideas away from prying eyes and negative critical thought is often associated with company bureaucracy.

> I also conduct experiments and do usability testing for prototypes. It's a very broad and varied, and the scope is very open. The great thing about where I work is we're not exposed to the bureaucracy and the red tape and the expectations […] upstairs. We're very

much given creative freedom to explore areas, problem spaces and bring new ideas to the bank. (Kim)

Modelling Behaviour

Optimism is a concept that can be 'contagious' in urging teams to strive towards the solving of complex problems and persist despite any hurdles that they may face. Kim further emphasized the importance of optimism from the management team:

> Because if you really take it seriously, then design thinking is not open ended, but an open process in the sense that you don't know what the result will be. Because you're going on a journey, you're going out in order to find something new. If you don't go on that journey with optimism, and with this mindset of 'it's a challenge not a problem', you will just fail. But this is the big problem, because this optimism doesn't only have to be your own optimism. I mean it's great if you are optimistic and your team maybe is optimistic. But if your management is not optimistic, then it really sucks. (Kim)

Many respondents further describe practical modelling behaviour as a powerful version of word-of-mouth or dissemination of concepts within teams. The more people display DT behaviours, the more it will be discussed and thus the more people will become aware of it. As Vito explained: '[After training] we found people from across the business. So they went back to their business units and obviously that started a little wildfire, and had people talking and communicating in a different way'.

Alex also highlights this need for 'people that are going to be successful advocates in design thinking', while Guy spoke of 'change agents' and 'evangelists' that are crucial at the early stages of implementing DT for instigating support among stakeholders.

Desire and Determination to Make a Difference

Being authentic in the role of a change agent requires a strong desire, and an intentional and passionate approach to DT in practice. Kim refers to herself as 'design-thinking evangelist' and inspirer. She claims to have the desire to create change and pursue DT for innovation from the outset:

> I would classify myself as a design-thinking evangelist in the company. I was so interested in design-thinking, I knew I had to create role for myself within the company. My job title is Innovation Manager, so I work in the lab and I need to work with start-ups, small businesses, clients and people upstairs to create new ideas. I see design thinking as very much an integral part of that toolkit. I'm also expected to run events to inspire staff members and connect them with the outside world. (Kim)

Joseph even went so far as to compare his passion for DT with 'a honeymoon – it's new and exciting'.

DISCUSSION

The data indicates that our respondents practice most of the mindsets that we had identified via the literature review. However, the particular facets of a DT mindset described by managers vary greatly across our sample. Respondents do not distinguish precisely between proposed mindsets, but rather view 'experiential intelligence' and 'taking action', for example, as behaviours that go hand in hand. While we see some degree of common understanding of the most relevant cognitions and behaviours across the sample, it is not as pronounced as previous research would suggest. Similarly, we noted that not one of the respondents touched on all

mindsets, but usually referred to between four and eight different mindsets. We assume that different educational backgrounds and different levels of design (thinking) expertise are plausible explanations for these differences.

Focusing on the behavioural aspects of the DT mindsets that we observed in the sample highlights the importance of certain competencies that can be found in the leadership literature. For example, transformational leaders are described as encouraging of individually considerate behaviour, which inspires innovation teams to share ideas and influences their decisions (Bass, 1999). Through a manager's understanding, support and encouragement, innovation team members are likely to take more risks when experimenting with ideas. What is described as a leader's inspirational and stimulating conduct is closely linked to the DT mindset of 'modelling behaviour' and 'critical questioning', both of which have been mentioned widely in our interviews.

Furthermore, effective leaders are described as having charismatic behaviour, with a clear vision and sense of purpose. Our results seem to support the importance of such behaviour; however, they are not necessarily embodied by one charismatic leader, but rather form a shared leadership with full commitment to the team (Pearce, Conger and Locke, 2008). Enactments of the 'consciously creative' and 'critically questioning' mindsets are also reflected in leadership behaviours known to facilitate innovation. Inspiring teams to be creative and innovative includes challenging their beliefs and values, questioning their assumptions and challenging the status quo. Hence, the extent to which a leader intellectually stimulates team members influences their critical thinking (Bass, 1999).

Overall, the findings support our call for a leadership perspective to develop a systematic, theoretically sound and pragmatic approach when applying a DT mindset in organizations wanting to develop DT capabilities. Leadership behaviours generally have a systematic impact on various strategic, organizational and individual processes and outcomes.

Transformational leadership stresses a positive impact on innovation, entrepreneurship and learning. Transactional leadership, on the other hand, although not supporting innovative activity, supports the management of established innovation capabilities in organizations. Our results suggest that the mindsets observed in our study correspond with full-range leadership theory, particularly transformational leadership.

This is relevant for businesses that draw upon a design-led approach to innovation because it suggests that there are major issues with adopting a mindset which can be achieved by practicing specific leadership styles. If leadership is not a trait but a learnable behaviour, the implications are that much more effort should be spent on developing a DT mindset than on following a DT process. While a business can adopt the processes and learn new innovation practices rather quickly, it is people's capabilities and exhibited behaviours that will eventually help achieve innovation objectives with long-lasting strategic impact.

In addition to our findings in regards to the DT mindset in practice (as per our initial research question), we also find that the organizational level of 'readiness' for a design-led innovation approach might be an important factor in influencing the presence and effectiveness of DT mindsets. To illustrate this, while a DT mindset is often easily comprehended conceptually, we noted that it is difficult for participants to apply and demonstrate them openly within their organization. In fact, some participants in this study have described organizational context as the most critical impediment to successful design thinking. Participants reported that in some organizations, certain mindsets were acceptable only within the immediate innovation team, but not beyond. Some DT teams were referred to as 'protected species', who enjoyed creative freedom and cultural autonomy while being guarded by a member of the executive team. This 'guard' would be responsible for translating the methods and outcomes of the innovation team to the rest of the organization; they would also act as a 'sales person' internally, navigating organizational politics and budget constraints on behalf of the team. In

contrast, teams without a 'guard' felt that they spent too much time on creating an artificial box and language around the creative work that they were engaging in, taking valuable time away from their core duties.

This raises important questions about leading design-led innovation initiatives. While practitioners understand that a DT mindset is required, there seems to be a problem with letting DT teams do what they need to do due to lacking support from executive-level leaders, who either don't see the value of a design-led approach, or fail to communicate its value to peers and other governance bodies. We note that participants in this study who reported on their DT practices often struggle in putting DT to work because of preconceptions, organizational barriers and constraints (particularly in large organizations), as well as a lack of understanding of what DT is and what it does. The DT mindsets that were described by participants are largely at odds with common bureaucratic structures and cultures in their organizations. Hence, while in our study and conceptual discussion we have focused on the role of mindsets within innovation teams with the objective of generating innovative outcomes, a similarly important question is one of gaining and sustaining executive leadership support for design-led innovation initiatives.

CONCLUSION AND FUTURE RESEARCH

Our research is important because it investigates the intricacies of DT mindsets and leadership in the context of organizational innovation. Previous research in this area has been scarce, mostly due to DT only slowly finding its way into organizational innovation practices. As not many organizations have adopted a DT approach (so far), observing changes in managers' actions and behaviours has not yet been possible. Our first findings are encouraging, suggesting a contribution to the design-led innovation literature arising from a deeper, more nuanced exploration of a design-thinking mindset and associated leadership behaviours.

Further research needs to be done to advance this emerging model of DT mindsets, and to test it empirically on a larger scale. We advocate studying the extent to which DT mindsets and associated leadership behaviour jointly affect the achievement of innovation objectives, how DT mindsets affect leadership and vice versa. The causality of such relationships has long been vague in both leadership and learning research, and thus further research is recommended.

NOTES

[2] The research is ongoing and we assume further refinement of the mindset profile.

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CONTRIBUTOR DETAILS

Jochen Schweitzer teaches strategy and innovation at the Business School of the University of Technology Sydney. He is Research Stream Leader at the Centre for Management and Organisation Studies, and Co-founder and Director of U.lab, a multidisciplinary innovation hub. Jochen is a Visiting Scholar at Stanford University and has taught design thinking at the Hasso Plattner Institute – School of Design Thinking. His professional experience is in business planning, organizational transformation, change management and innovation. His research focuses on issues of strategic management, collaboration, entrepreneurship and innovation, with a special interest in design thinking, urban planning and open innovation. His work has been published in academic journals and books, and has also been presented and recognized internationally.

Contact: UTS Business School, University of Technology Sydney, 14-28 Ultimo Road,

Ultimo, NSW 2007Australia

E-mail: jochen.schweitzer@uts.edu.au

Lars Groeger teaches marketing management, consumer behaviour and design thinking to MBA students and executives in Sydney and Hong Kong. MGSM's MBA is ranked among the world's top 100 MBA programmes. He is a frequent speaker at international conferences,

business forums and workshops in Australia, Europe, the United States and China. Lars also advises leading global corporations and start-ups on creative problem-solving and marketing strategy. His research explores design thinking capabilities and leadership, as well as online and offline word-of-mouth, and has been published in leading academic and professional journals. He is currently visiting the HPI School of Design Thinking in Potsdam, Germany.

Contact: Macquarie Graduate School of Management, Macquarie University, North Ryde, NSW 2109 Australia

E-mail: lars.groeger@mgsm.edu.au

Leanne Sobel is a design strategist with a unique blend of design and business expertise. Over the past decade she has worked in a variety of roles within the creative industries and corporate spaces, including design, brand and research strategy, design education, graphic design, public relations, marketing communications and project management. Leanne conducted a research study in 2012 that explored the status of design thinking in Australia. Subsequent articles she wrote on the subject were published in the *Financial Times*, *Design Management Institute Review* and *Business Review Australia*. Leanne holds a holds a Master of Management degree from Macquarie Graduate School of Management, and a BA in communication design from Swinburne University of Technology. Leanne is currently a design strategist for Deloitte and a casual lecturer at Billy Blue College of Design. She recently held positions as a casual researcher for the University of Technology, Sydney and Macquarie Graduate School of Management.

Contact: UTS Business School, University of Technology Sydney, 14-28 Ultimo Road,

Ultimo, NSW 2007Australia

E-mail: leannegsobel@gmail.com