

The design thinking mindset: An assessment of what we know and what we see in practice¹

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In this paper, we provide a comprehensive assessment of the design thinking mindset. First, we review the design and management literature to identify and define key cognitive and behavioural components of a design thinking mindset, before we report our initial findings from 15 in-depth interviews with innovation managers in Australia and Germany who reflect on their practices while implementing design thinking within their organizations. Our explorative study confirms a set of commonly understood and applied mindsets, but also reveals the impact of organisational constraints on translating cognition into behaviour. We suggest to further map the different mindsets used in design thinking projects and link them to extant leadership theory, which – as we argue – provides a suitable point of departure for further study of the design thinking mindset and its role for innovation.

Keywords: Design thinking, leadership, mindset, 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: in the past 10 years, design-driven companies outperformed the Standard & Poor's 500 by 228 per cent (Westcott et al., 2013). Also governments, including Australian, Danish and British governments are

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promoting an innovation agenda, many of which include programs that highlight creative problem solving and design (Bucolo and King, 2014, Queensland Government, 2014, MindLab, 2015, Cox, 2005, Danish Enterprise & Construction Authority, 2011).

Much has been achieved with the design thinking (DT) movement but many challenges remain. 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 as well as organisational strategy (Clegg et al., 2011). So, little is known regarding the role of the mindset and leadership of the people involved when adopting a design-led process to innovation, which we explore in this paper. While definitions of the DT mindset are mostly vague, researchers agree that leadership is central to any attempt of changing organisational practices (Day et al., 2014), yet 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, the DT and innovation leadership literatures have akin 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 has been linked to innovation and creativity related outcomes (Jung et al., 2003, Jung et al., 2008). Design-led innovation practice, on the other hand, so far 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. 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 and a series of 15 interviews with innovation managers. 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 discussing mindset as leadership behaviour.

The remainder of this paper is structured as follows. We present a short overview of the DT process and the importance of leadership in the context of innovation. This is followed by our research methodology, a synthesis of the DT mindset literature and initial empirical results. We conclude the paper with a discussion of results and suggestions for future research.

Background

Design Thinking

The innovation literature has placed increasing importance on design as an integral capability for innovation and adaptation (Dodgson et al., 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, organisations are trying to integrate the design approach to solve complex social problems, issues of organisational management, and exploring greater synergies between business strategies as well as product and service innovation (Martin, 2010, Martin, 2011).

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. As such, 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 including Apple, Nike and Proctor & Gamble as well as venture capital investment firms such as Google Ventures are examples of firms that follow a DT approach to innovation (Kessler, 2013). Such companies apply DT to break through 'wicked' problems (Buchanan, 1992, Camillus, 2008), to uncover a company's potential through innovation in business strategy, new approaches toward customer engagement and marketing strategies, and the development of new products and services in this pursuit. DT unfolds its full potential during exploration activities that deal with the unknown and are characterised by uncertainty and ambiguity (Cooper et al., 2009).

There is no one best DT process; it is described as an exploratory process (Brown, 2009) that usually begins with an initial defining of the problem, followed by exploration of the user and design space, generating possibilities through brainstorming, building prototypes that are then tested, often a number of times, and the findings used 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 normalisation of workflows as 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 and at different times in a nonlinear fashion, in order to deal with the complexities of wicked problems (Jakovich et al., 2012).

Following a DT approach without establishing the necessary culture and mindset might not have the desired results or 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). Before exploring the mindset further we briefly discuss the role of leadership in the context of innovation.

Leadership and innovation

Like any business operation, innovation requires effective leadership. In fact, the capacity to lead organisational innovation is increasingly important since global business environments are characterized by complexity and uncertainty (Accenture, 2014, KMPG, 2012). But leading innovation requires a different sort of leadership than other core business activities call for – it involves skills, behaviours and tactics that encourage (in others) the ability to introduce new products and services or 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). Particularly transformational leadership has been linked to innovation and creativity related outcomes. Transformational leadership (Bass, 1999) is charismatic, inspirational, intellectually stimulating, and individually considerate. This behaviour is particularly relevant in situations of change and 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), and innovation and effectiveness (Jung et al., 2003a, 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 et al., 2007) and encourage 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 and refer much to each other; nor have the leadership aspects of a DT mindset been explored much or how leadership behaviour is an enabler of DT in organisations. What's more, no study has yet explained how leadership behaviours are related to DT capabilities in organisations. There is an opportunity for both research streams to benefit from each other. With this study we aim at bridging this gap and 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, hence, is to explore design mindsets in practice and 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 mindset 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, & Johnson, 2006) of 15 innovation managers who are using 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 et al., 1993), since he or she is familiar with all aspects of the project including prevailing mindsets based either on reflection of own behaviour or based on experiencing and witnessing others.

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

Participants had on average 12 years working experience in their respective industry, which included health care, business services, chemical, finance, IT and real estate. Their ages ranged from the early 30s to the mid 50s, and their education levels ranged from undergraduate to doctorate degrees. Four respondents were female and nine male. Their organisations are multinationals with design-lead innovation initiatives under way in all or parts of the organisation. We approached individuals from these organisations as their companies are amongst the innovation leaders 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, separate, 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 loaded into Nvivo software for analysis. We asked participants to reflect upon their practices of DT in 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 further 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 unique ways in which individuals view a particular domain (Eden, 1992). This approach enables subjects to reflect on the identified components and permits 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 review of relevant literatures.

Design thinking mindsets

The literature that explores DT often articulates a mix of elements, tools and approaches required to see DT realised in individuals and organisations (Sobel and Groeger, 2013a). Most academic and practitioner oriented publications portrait what can only be described as ideal DT attributes and conditions, which relate to individuals, organisations, physical environments, tools and more (e.g. IDEO, 2009). As such in any given literature, it is not easy to refine an exact understanding of the complete elements that can be considered a DT mindset. 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) and behavioural (doing) and affective (feeling) components of a mindset (Rosenberg and Hovland, 1960). While such 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 (Kimbrell, 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 different mindsets as identified in the literature and is explained in detail below.

[Insert Figure 1 about here]

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, as explained by Kelley and Kelley (2013, p. 85), is “the ability to see and experience through another person's eyes, to recognize why people do what they do”. This experience of the DT process is identified as being one of the defining attributes embodied and enacted by persons practicing DT (see also Berger, 2009, Brown, 2008, Liedtka and Ogilvie, 2011, Martin, 2009). Being empathetic allows participants to understand social context (Badke-Schaub et al., 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 in thinking through design problems as a way of connecting more empathically with users and in gaining deeper insight into user experiences (Cooper et al., 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 or wanting to read situations. Others have linked the empathy mindset to a ‘people first’ approach (Brown, 2008) or having emotional intelligence (Clark and Smith, 2010) and good interpersonal skills (Matthews et al., 2011). Hence, being empathetic towards people's needs and context considers both the needs of customers or user 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, examining 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 along with interpreting the stories that people tell (d.school, 2011). This mindset enables the team to conceptualise the problem and a solution that people desire.

2. Collaboratively geared and embracing diversity

In order to deal with the multiple facets and interdependencies of innovation projects, the use of interdisciplinary teams is common to all DT projects. Being collaboratively geared depicts a persons' ability to easily integrate with such teams and to examine and confront team dynamics and to 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 the expedition of 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 at times innovation managers are required

to be mindful of dominant personalities having the potential to kill off ideas rather than promoting them (Jevnaker, 2000, Badke-Schaub, 2010). Hence, being conscious of having to withstand and resolve the issues and conflicts that purposely-diverse teams can have is of utmost value when going through the DT process. Innovation managers are aware of the transformational power that diverse teams can bring to the process and they encourage collaboration beyond the usual disciplines to tap into knowledge and experiences that may provide the missing piece to the innovation puzzle. Along those lines Liedtka and Ogilvie (2011) argue innovation managers need to be comfortable in working with teams and 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 (Burdick and Willis, 2011, Michlewski, 2008, Clark and Smith, 2010). Finally, being collaboratively geared and embracing diversity entails building positive team camaraderie, developing trust and respect between collaborators, supported by a belief in shared ownership, and strong 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 et al., 2012). This mindset is often fuelled by curiosity and accelerated by leading multiple small tests that engage people with artefacts and prototypes to test assumptions and features in action and to solicit feedback. Hence, inquisitiveness and an appetite for learning are present throughout the project 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 volume 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 through the process of generating and developing new assumptions and ideas, managing mutual interest and processing failure and feedback to become the seed for better solutions. Hence, a key attribute that has been widely mentioned as integral to this mindset is a desire to learn; including learning about others, challenging existing frames of thinking and seeking out new contexts in which to learn something (Liedtka and Ogilvie, 2011, Jenkins, 2010, Brown, 2008, Cooper et al., 2009, Michlewski, 2008).

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 to a DT mindset (Berger, 2009, Brown, 2008, Badke-Schaub et al., 2010, Matthews et al., 2011, Kelley and Kelley, 2013, Boland and Collopy, 2004, Adams et al., 2011, Miller and Moultrie, 2013).

Underlying such eagerness to learn and know is curiosity, which is a mental state or approach to life that inspires the learning in problem-based scenarios (Adams et al., 2011, Matthews et al., 2011). It's curiosity that fuels one's own 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 generation of ideas (Buchanan, 1992), being a cultural explorer and bringing “a spirit of exploration and challenge” to the design process (Matthews et al., 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 what stage of the design process the team is engaged in and what behaviours and goals it may have at any given moment. Most importantly, 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 utilise divergent and convergent thinking at different times. Divergence and convergence best relate to the conflict between creating choices and making choices. They contend that most people will analyse and then converge upon a single outcome, but DT practitioners know when and how to utilise divergent thinking to first 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 realising the connections between seemingly unrelated insights and themes - as such 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 mental process as integrative thinking: “the metaskill of being able to face two (or more) opposing ideas or models and instead of choosing one versus the others”. Various authors recognise 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 (Badke-Schaub et al., 2010, Michlewski, 2008, Brown, 2008).

As discussed by Martin (2009), such process needs not 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 awareness of and the ability to balance analytic mastery with intuitive originality.

Elsewhere, different thinking modes that individuals employ when using DT have also been described as abductive reasoning (Burdick & Willis, 2011, Martin, 2009), emotional intelligence (Martin and Euchner, 2012, Brown and Katz, 2011), informed intuition (Brian, 2011, Clark and Smith, 2010), the mental iteration of ideas (Kelley and Kelley, 2013, Clark and Smith, 2010, Eagen et al., Teixeira, 2002, Martin, 2009, Cross, 1982) 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 his or her awareness of different project phases as well as the relevant tools and techniques to employ.

5. Experiential intelligence

Experiential intelligence depicts a preference for trying out ideas by making mock-ups, drawing-up what thoughts or ideas may look like, building models and creating something tangible to experiment with as a way of transforming ideas into something that can be experienced and therefore tested. Michlewski (2008) suggests ‘experimentalism’ as a method that is aimed at iterating towards a ‘better’ answer. This is because a trial and error approach results in learning where the process allows seeking feedback and re-working a solution quickly (Martin, 2009). The importance of an explorative approach to DT problems has been cited widely (Brown and Katz, 2011, Brown, 2008, Goldschmidt and Rodgers, 2013) as providing the opportunity of identifying and working through constraints or studying extremes (Liedtka and Ogilvie, 2011).

Another aspect of experiential intelligence is that it allows people to transfer intangible ideas and concepts into tangible outcomes (Clark and Smith, 2010). Throughout the DT literature there is ample notion of the importance of presenting data in visual ways, telling stories, testing via physical prototypes and other types or 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”. Brining 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 and how it might live in context.

Artefacts, prototypes and other physical manifestations are entwined with ‘storytelling’, which is realised through the process of visualising ideas, thoughts and problems (Michlewski, 2008) via drawings but also via verbalisation and the written word (Cooper et al., 2009, Matthews et al., 2011). Kelley and Kelley (2013p. 97) recommend visualising 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 great communication tool to sell new ideas to new audiences and 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 leading to resolving ideas and an externalized thinking process in seeking better ways to communicate.

6. Taking action deliberately and overt

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 get out into the real world and engage users, do prototyping 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 first-hand experiences and experimentation that happens earlier and more frequently compared to usual problem solving. The literature often discusses the role of action and purposeful thought enacted by designers to curate and assemble thoughts, physical manifestations, and in building structure and hierarchy in all numbers of outcomes (Badke-Schaub, 2010, Hassi and Laakso, 2011, Michlewski, 2008).

Similarly, action orientation refers to an ability of dissecting big tasks and picking a starting point. This might mean to quickly build one of the many possible solutions as a prototype to get feedback on that one option, since data on one option is better than no data on many options.

Such action and therefore intent is also carried across into the way in which productive DT practitioners pursue with great focus the resolutions and outcomes for problems (Buchanan, 1992, Kelley and Kelley, 2013). Action-bias serves as a great tool to influence change, to initiate action among teams and others, demonstrate positive, and productive behaviour in working through and resolving complex problems (Beverland and Farrelly, 2007, Kelley and Kelley, 2013, Goldschmidt and Rodgers, 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 consciously creative approach to work and in doing so are comfortable with creative methods, thinking and expression. 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 are role-play, creating a physical model, or expressing ideas as drawings. Authors commonly argue that it is the role of the designer to build the 'creative confidence' of themselves and others when building momentum in a DT project (Beverland and Farrelly, 2007, Kimbell, 2009, Kelley and Kelley, 2013, Burdick and Willis, 2011).

For people to be confident they must have an understanding of creativity and be sympathetic to the way creative thinking works for others; they need to 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 to be 'quantitatively predictive' (Cox, 2005, Jevnaker, 2000, Badke-Schaub et al., 2010, Miller and Moultrie, 2013). The process of creativity also requires one to rest on 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. As such the process takes time and DT practitioners display patience in seeing the creative process through.

In order to support creative activities and nurture early creative thoughts into plausible solutions, 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 ones acquired experience and knowledge with that of new knowledge (Cox, 2005, Dziersk, 2009, Kelley and Kelley, 2013, Miller and Moultrie, 2013, Michlewski, 2008), to "think through design" (Buchanan, 1992, p. 51) and form a picture of what this might look like (Cooper et al., 2009).

In addition to the way DT professionals understand and manifest their thoughts creatively there are many other behavioural attributes that encourage creativity. Authors have identified some of these conditions as simply being: patient of the process and keeping a sense of humour (Badke-Schaub et al., 2010), encouraging freedom and the space for creative exploration (Kelley and Kelley, 2013), and the realisation 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 in order 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: “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 mono-causal relationship that explains the innovation dilemma and leads to a great solution. It is in this context in which DT practitioners are faced with situations that require them to make decisions based on the future potential of a solution over what is already known to work – bringing with it an element of risk that is compounded by a fear of failure and ambiguity due to its unknown nature (Kelley and Littman, 2001, Kelley and Kelley, 2013, Goldschmidt and Rodgers, 2013, Michlewski, 2008).

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

When taking a holistic approach and accepting uncertainty as par for the course, the DT practitioner is able to consider simultaneously numerous factors including customer needs, technological feasibility, organisational constraints, regulatory implications, competitive forces, resource availability, 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 to be playful with uncertainty rather than being restricted by it enables the DT practitioner to create innovations that are not mere incremental improvements but have the potential to be disruptive (Martin, 2009).

9. Modelling behaviour

DT practitioners have a sense for 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 the 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 often due to their ability of placing their own egos aside while calming those of others and ensuring that all ideas, and insights are contributed without judgement and therefore assessed equally (Brown, 2008, Kelley and Kelley, 2013, Hassi and Laakso, 2011). 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 (talking out aloud or internally thinking through things), 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 concept of ‘self-efficacy’ (Bandura, 1925, Patterson et al., 2007) and argue that ‘guided mastery’ is what DT practitioners do well. Modelling behaviour is to build DT capabilities and the 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 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 mobilises action and allow for 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 of DT teams and important for building momentum in projects and for realising new ideas as innovative outcomes (Beverland and Farrelly, 2007). Kelley & Kelley (2013, p. 116) too suggest that optimism or as they describe it, ‘urgent optimism’ is manifested by a designers 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 the optimism that pushes ideas from just that, ideas, into the reality of a project or into an experimenting with new ideas or thinking in other directions.

10. Desire and determination to make a difference

Related to modelling behaviour and optimism - but distinctive as we suggest - is the DT practitioners’ innate desire to make a difference, improve situations and the determination to see ideas realised. Desire is an important quality as it provides the opportunity to see potential for change in situations and 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 (Kelley and Kelley, 2013, Dorst, 2011, Boland and Collopy, 2004, Paton and Dorst, 2011). Important in this context seems that practitioners seek to be a ‘catalyst for transformation’ by having a ‘well-directed discipline and a strong voice of intent’ (Kelley and Kelley, 2013, Berger, 2009). 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 and therefore requires justification and at times vigorous debate.

It is recognised that DT involves a high level of determination 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 and other individuals or groups. While there are invariably different opinions, council and tendencies, as well as insights and data from past experience (Martin, 2009), the DT practitioner has a mindset of critical questioning and “building on the ideas of others” (Kelley and Kelley, 2013, p.184). Critical questioning depicts the ability to keep an open-mind about possibilities at especially 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 synthesising information and ideas (Adams et al., 2011) where the DT practitioner questions bias and beliefs or tests the relevance of ideas first. This mindset ensures project teams don’t 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 'beginners mind' is a prevalent term used in the literature (Buchanan, 1992, Kelley and Kelley, 2013, Goldschmidt and Rodgers, 2013, Dorst, 2011, Badke-Schaub et al., 2010, Adams et al., 2011, Miller and Moultrie, 2013, Michlewski, 2008).

Critical questioning also places the initial design problem at the heart of the project and throughout the process. DT practitioners are wary of retaining its place to ensure focus is maintained (Kelley and Kelley, 2013) and that the team does not lose sight of what they are working towards. Critical questioning is the ability to deconstruct and reframe (or framing) problems by questioning how the initial design problem or 'wicked problem' (Buchanan, 1992) has come to be in the first place (Paton and Dorst, 2011, Boland and Collopy, 2004). All of which is critical for DT practitioners to do, 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 idealised behaviour, which when applied and exploited leads to successful DT projects. 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. Precisely because a theoretical and ultimately practical understanding of what DT practitioners do and how they act upon their knowledge is missing, DT is often perceived as vague in nature.

However, despite the differences in the theoretical realm, there seems to be agreement on certain mindsets and associated idealised 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 synthesise the current body of academic and practitioner oriented literature.

Our observations are neither exhaustive nor mutually exclusive; they provide a useful heuristic and systematic basis for comparison and enable us to explore the associations between 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.

Further, 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.

This example highlights how the value of *Empathetic 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 pre-defined 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.

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. Dan for example 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 in reality not often implemented 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.

Inquisitive and open to new perspectives and learning

Being open to new perspective 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*” and acknowledges the need to provide feedback loops and opportunity 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 overt

Many of the respondents emphasized the importance of being ‘action-orientated’, which according to Alex 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 only a necessary and 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 previously mentioned car maker example. So 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*” 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 the 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 of design-led innovation.

My experience 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)

Thus, supporting DT practitioners in their quest to innovate through the practice of DT requires ‘space’ to do so. The space to test ideas away from prying eyes and negative critical thought 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’ amongst in urging teams to strive forward and continue to push on with the solving of complex problems and persist despite any hurdles that face them throughout. Kim further emphasised 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.

Many respondents further describe *modelling behavior* in practice as a powerful version of word of mouth or dissemination concepts within teams. The more people display DT

behaviours the more it will be discussed and 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” and Guy spoke of “change agents” and “evangelists” that are crucial at the early stages of implementing DT to instigate 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, having the desire from the outset to create change and pursue DT for innovation:

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.

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

Discussion

The data indicate that our respondents practice most of the mindsets that we had identified via review of the literature. However, the particular facets of a DT mindset, which are described by managers, vary greatly across our sample. Respondents don't distinguish precisely between proposed mindsets, but rather view, for example ‘experiential intelligence’ and ‘taking action’ 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 four, some up to eight different mindsets. We assume that different educational backgrounds and different levels of design (thinking) expertise are plausible explanations for these differences.

Focussing on the behavioural aspects, of the DT mindsets that we observed in the sample, highlights the importance of certain competencies that can also be found in the leadership literature. For example, transformational leaders are described as encouraging an 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 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.

Further, effective leaders are described by charismatic behaviour with a clear vision and sense of purpose. Our results seem to support the importance of such behaviour, yet not necessarily embodied by one charismatic leader, but rather a form of shared leadership with full commitment to the team (Pearce et al., 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, to question assumptions, and to challenge 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 for applying a DT mindset in organisations and developing 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 organisations. Our results suggest that the mindsets observed in our study correspond with full-range leadership theory, and in particular transformational leadership.

This is relevant for businesses that draw upon a design led approach to innovation because it suggests that there is major importance 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 organisational level of 'readiness' for a design-led innovation approach might be an important factor to influence the presence and effectiveness of DT mindsets. To illustrate this, while a DT mindset are often easily comprehended conceptually, we noted that it is difficult for participants to apply and demonstrate them openly within their organisation. In fact, some participants in this study have described organisational context as the most critical impediment to successful design thinking. Participants reported that in some organisations certain mindsets were acceptable only within the immediate innovation team but not beyond. Some DT team were referred to as 'protected species', which 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 organisation, also acting as a 'sales person' internally, navigating organisational politics and budget constraints on behalf of the team. In contrast, teams without a 'guard' felt that they spend 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 executives-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 putting DT to work because of preconceptions, organisational barriers and constraints particularly in large organisation 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 organisations. Hence, while in our study and conceptual discussion we have focused on the role of mindset as leadership within innovation teams with the objective of generating innovative outcomes, a similarly important question is the 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 organisational innovation. Previous research in this area has been little, mostly due to DT only slowly finding its way into organisational innovation practices. As not many organisations have adopted a DT approach (for long), observing changes in manager's 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 empirically test it on a larger scale. We advocate studying the extent to which DT mindset and associated leadership behaviour jointly affect the achievement of innovation objectives, how DT mindsets affect leadership and vice versa how leadership affects the development of DT mindsets. The causality of such relationships has long been vague in both leadership and learning research and further research is recommended.

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