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Getting the right design or getting the design right: An observation of 18 industry projects progressing through a structured design thinking process

“Even if you do a brilliant job of building what you originally set out to build, if it is the wrong product, it still constitutes a failure. Likewise, you also fail if you build the right product the wrong way. Stated another way, we must adopt an approach that inherently aspires to get the right design as well as get the design right. The former, which is one of the prime objectives of the up-front design phase, is the part that is too often absent in today’s practice.” (Buxton, 2010).

References

- Al-debei, M.M., El-Haddadeh, R. & Avison, D., 2008. Defining the Business Model in the New World of Digital Business. In Proceedings of the Americas Conference on Information Systems (AMCIS). pp. 1–11.
- Argyris, C., 2004. Reasons and Rationalizations: Limits to Organizational Knowledge.
- Martin, R.L., 2009. The Design of Business: Why Design Thinking is the Next Competitive Advantage
- Blank, S.G. & Dorf, B., 2012. The startup owner’s manual: The step-by-step guide for building a great company, K&S Ranch, Incorporated.
- Boland, R.J. et al., 2008. Managing as Designing: Lessons for Organization Leaders from the Design Practice of Frank O. Gehry. *Design Issues*, 24, pp.10–25.
- Borja de Mozota, B., 2008. A Theoretical Model for Design in Management Science. *Design Management Journal*, 3, pp.30–37.
- Bowden, E.M. et al., 2005. New approaches to demystifying insight. *Trends in Cognitive Sciences*, 9, pp.322–328.
- Brown, T., 2008. Design thinking. *Harvard Business Review*, 86.
- Buxton, B., 2010. Sketching user experiences: getting the design right and the right design. Morgan Kaufmann.
- Chinn, C.A. & Brewer, W.F., 1993. Factors that influence how people respond to anomalous data. In Proceedings of the Fifteenth Annual Conference of the Cognitive Science Society. pp. 318–323.
- Cross, N., 2001. Designerly ways of knowing: design discipline versus design science. *Design Issues*, 17(3), pp.49–55.
- Dunne, D. & Martin, R., 2006. Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning and Education*, 5, pp.512–523.
- Heskett, J., 2001. Past, Present, and Future in Design for Industry. *Design Issues*, 17, pp.18–26.
- Intertradeireland., A Study Of The Design Services Sector On The Island Of Ireland. Intertradeireland, 2009. Print.
- Johansson, Sköldbberg, U., Woodilla, J. & Çetinkaya, M., 2013. Design thinking: past, present and possible futures. *Creativity and Innovation Management*, 22(2), pp.121–146.
- Klein, G. & Jarosz, A., 2011. A Naturalistic Study of Insight. *Journal of Cognitive Engineering and Decision Making*, 5, pp.335–351.
- Kretschmar, A., 2003. The economic effects of design. National Agency for Enterprise and Housing, Copenhagen: Denmark
- Lawlor, Patrick, et al. Design-Driven Innovation: Why It Matters For SME Competitiveness. 2015. Web. 18 Feb. 2015.

Harvard business professor Theodore Levitt once said *“People don’t want to buy a quarter-inch drill, they want to buy a quarter-inch hole”* This quote, often used by design thinking promoters, re-prioritises human needs in place of traditional market data. This has the effect of repositioning design thinking from *‘supplying a solution’* for a defined problem to *‘serving a need’* to an open ended problem. Here, design thinking takes the role of a strategic driver at the front end of innovation processes. By this emphasis design offers its full potential, where one can identify a problems root cause and work towards *‘the right design’*.

Characterising ‘getting the right design’ v. ‘getting the design right’

Design thinking (DT) puts us close to people, and being close to people helps shift our thinking and understanding. People influence us to view projects from a needs perspective as opposed to a solution perspective - shifting us from drills to holes. Design utilises cognitive processes, tools and methodologies that are very well suited to identifying deep routed unmet needs. This affords a bird’s eye view of opportunities and is not bound by existing fixes. It is about *“considering many other ideas and then choosing between them”* (Greenberg et al. 2011). In fact, key to a successful DT initiative is the ability to refrain from ‘fixing’ oneself on a solution or idea too early. This

can happen at any point in the process, as Tohidi et. al. (2006) point out, *“once a design is prototyped and tested, it hardly ever gets rejected by the users. Rather, it typically leads to an iterative improvement of the same design, rather than a return to the drawing board (which might lead to an alternative right design)”*.

Unfortunately, the full potential of DT is often missed when participants utilise the process to work primarily, or even solely as an add on at the back end of innovation processes for the purpose of *‘getting the design right’*.

In the 1980s Henry Mintzberg famously characterised two distinct patterns of strategy formation; emergent and deliberate. A deliberate strategy sticks to its starting goals and pre-determines the project outcome at the point of its initiation. An emergent strategy allows new learnings throughout the process to gradually influence and shape its strategic direction. Through emergence, the outcome is only truly known at the point of project completion (Mintzberg & Waters, 1985). We relate Mintzberg’s two polar ends of the ‘strategy continuum’ to differences observed in DT approaches, where emphasis moves between *‘getting the right design’* and *‘getting the design right’*.

Following 18 innovation projects with real organisations, this paper provides an observation on how DT is operationalised. In the next sections we situate DT in management discourse for the purpose of business innovation. To delineate the business elements available for innovation, we draw on the business model canvas. We identify assumptions as key anchors of an innovation project at different points of its progression. To track these assumptions, we draw on Klein's triple insight model (Klein & Jarosz, 2011) and identify, measure and describe the assumption shifts throughout the DT process over five business model dimensions.

The project focuses on two overarching process scenarios; *'getting the right design' and 'getting the design right'*. We have identified three key drivers of the DT process that impact these two scenarios. The three key drivers include; a designers investment at each process phase, the designers acceptance of tool findings, and the designers position relative to the organisation. In conclusion, we offer suggestions and implications for further research.

What is Design Thinking

Today, the globalisation of markets and the socio-cultural factors controlling them pose both increasing challenges and opportunities for business. A creative void has opened in a management practice dominated by analytical tools. A model of design has formed to consolidate this void and deliver innovation. Design thinking has evolved at the nexus, where business management and design practice overlap. Because of its simplicity, it is learnable and transferable across disciplinary boundaries and enhances existing skillsets. According to one strong proponent; *"We are on the cusp of a design revolution in business. Today's business people don't [just] need to understand designers better. They need to become designers."* (Dunne and Martin, 2006 p.513)

In fact, the discipline of design has always been impacted by trends outside of its field (Findeli 2005, Heskett, 2001). Today's design theory is moving towards a strategy concept, as a knowledge building and interpretive process informed by social science methods.

Here, its value lies in its ability to interpret observations and transform them into ideas, visionary scenarios and concepts, services, new products and processes (de Mozota, 2008). A growing body of work in the areas of design management, design science, and design thinking in particular reinforce a paradigm shift towards the business application and the focus on social science methods (Findeli, 2005). This is further endorsed by a number of governmental reports (Kretschmar, 2003, Intertrade Ireland, 2009, Lawlor, et al., 2015) positing design as strategy to be of greater importance when compared against design as styling or design as process. In this paper we explore further two schools of thought dominating design thinking, but for a comprehensive introduction, overview and analysis we recommend the work of a number of authors (Brown, 2009; Martin, 2009; Liedtka & Ogilvie, 2011; Boland and Collopy, 2008; Ryan & Devitt, 2014).

Two schools of thought

Within the DT literature there are, what Johansson and Woodilla (2010) refer to as two distinct discourses, a "design discourse" and a "management discourse". The former looks at "the way designers think as they work", the latter sees design thinking as a "method for innovation and creating value". The focus of this paper is on the management discourse of DT, but the authors, as both academics and experienced design practitioners draw from both, seeing distinct value in bringing the two even closer together.

Today, two dominant schools of thought have emerged in applied design thinking; the Stanford d-School method, driven by professor David Kelley and the Darden Business School method, driven by professor Jeanne Liedtka. While both schools consist of a similar set of broad stages, Darden most successfully situates design in management discourse and speaks through some familiar strategy concepts. By this, the reach of DT is expanded beyond simple user benefits to a strategic driver of business growth which includes operations appraisal. The Darden school was selected as the primary method for the DT module structure and for this study. Figure 1 below presents the Darden

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References

- Liedtka, J. & Ogilvie, T., 2011. Designing for growth: A design thinking toolkit for managers, Columbia University Press.
- Lindberg, T., Noweski, C. & Meinel, C., 2010. Evolving discourses on design thinking: how design cognition inspires meta-disciplinary creative collaboration. *Technoetic Arts: a Journal of Speculative Research*, 8, pp.31–37.
- Mintzberg, H. & Waters, J.A., 1985. Of strategies, deliberate and emergent. *Strategic Management Journal*, 6, pp.257–272. Available at: <http://www.jstor.org/stable/2486186>.
- Osterwalder, A. & Pigneur, Y., 2010. *Business Model Generation: A Handbook For Visionaries, Game Changers, And Challengers* Author: Alexander Osterwalder, Yves., Wiley.
- Ries, E., 2011. *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* 1a ed., Crown Business.
- Rittel, H.W.J. & Webber, M.M., 1973. Dilemmas in a general theory of planning. *Policy sciences*, 4(2), pp.155–169.
- Ryan, M.P. & Devitt, F., 2014. An investigation into design thinking behaviours in early stage radical innovation. , (September), pp.2–4.
- Schön, D.A. & Rein, M., 1994. *Frame reflection: toward the resolution of intractable policy controversies*.
- Tohidi, M. et al., 2006. Getting the right design and the design right. In *Proceedings of ACM CHI 2006 Conference on Human Factors in Computing Systems*. pp. 1243–1252.

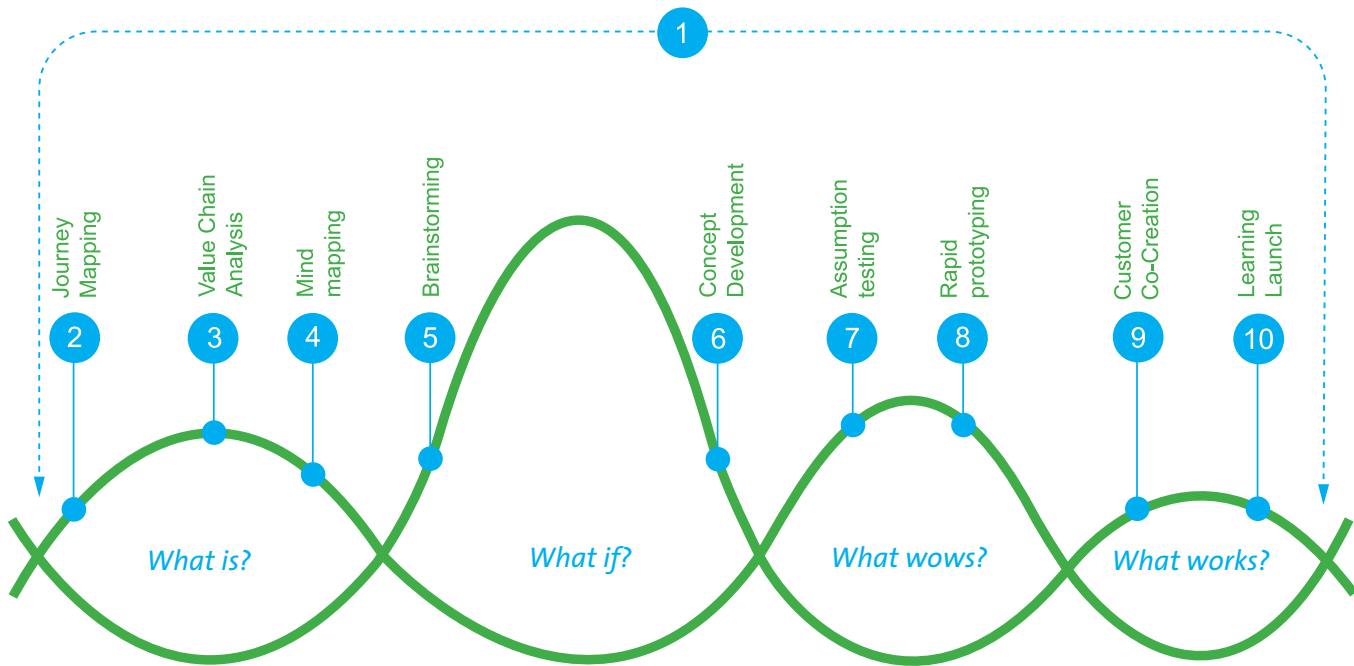


Figure 1: The Darden design thinking process

Phase	Tool	Description
Overarching	Visualisation:	Using imagery to envision possibilities and bring them to life
What is? Phase Explore current reality	Journey Mapping	Assessing the existing experience through the customer's eyes
	Value chain analysis	Assessing the current value chain that supports the customer's journey
	Mind mapping	Generating insights from exploration activities and using those to create design criteria
What if? Phase Envision a new future	Brainstorming	Generating new possibilities and new alternative business models
	Concept development	Assembling innovative elements into a coherent alternative solution that can be explored and evaluated
What Wows? Phase Makes some choices	Assumption testing	Isolating and testing the key assumptions that will drive the success or failure of a concept
	Rapid prototyping	Expressing a new concept in a tangible form for exploration, testing, and refinement
What Works? Phase Takes into the marketplace	Customer co-creation	Enrolling customers to participate in creating the solution that best meets their needs
	Learning launch	Creating an affordable experiment that lets customers experience the new solution over an extended period of time, to test key assumptions with market data

Table 1: The Darden design thinking phases and tools

school process model showing the four key phases and the tools recommended for use in each phase. Table 2 describes briefly the tools used in each phase.

Relating DT to business model

While DT can be used in many situations, its primary value is in the identification and development of new innovations for organisational gain or improvement. In order to propose innovations that fit the 'Business viability', 'Human desirability' and 'Technical feasibility' requirement of a successful DT initiative (Brown 2008), one needs to consider a full spectrum of activities and variables which may impact upon an organisation. DT and business design have been aligning in recent years, aided by the advent of methodologies such as Customer development (Blank & Dorf, 2012), lean-startup (Ries, 2011), Business model generation (Osterwalder & pigneur, 2010) and work from authors such as Martin (2009). We believe the business model to be useful for this role.

Al-Debei et.al (2008) define a business model as an abstract representation of an organization, be it conceptual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial

Business Canvas components	Description
Customer segments	The primary customers for whom the project will be developed
Value proposition	The key promise of value offered to the customers segments
Customer relationships	How you intend to build and maintain relationships with customers
Channels	How you intend to deliver value propositions to the customers
Revenue streams	The means of generating revenue from supplying value to customers

Table 2: The five 'customer-facing' components of the business model canvas

arrangements designed and developed by an organization presently and in the future, as well as all core products and/ or services the organization offers, or will offer, based on these arrangements that are needed to achieve its strategic goals and objectives. This definition fits our need for a non-complex gathering of key elements suitable for mapping and understanding new innovation proposals. For this study, the Business model canvas (BMC) as proposed by Osterwalder & Pigneur (2010) was selected as the means of collecting the key elements that could make up a innovation proposition. Five components have been selected as measurement tools as they represent the consumer facing elements of the canvas (Table 2).

Tracking process through assumptions

Next we need to monitor the individual's input to the DT process, and to do this we will track assumption modification. Because of its close connection to innovation, we draw from current insight theory, and in particular the constructs as delineated by Klein & Jarosz (2011)

As the designer collects and combines DT project data with his pre-existing knowledge and experience, he begins to construct mental frames - underlying structures of belief, perception and appreciation (Schön & Rein 1994) through which he sees and understands the project. Throughout every phase, and at multiple points he is faced with two options 1) stay within the existing frame 'to believe the story' he is being told, or 2) question the story and choose to reframe it and 'come up with a new story'. Recognising frames and deliberately choosing to question and reframe is imperative in the identification of new opportunities.

The term 'insight' is often used in design to describe a clear and sudden understanding of how to approach a problem. Insight is thought to arise when a solver breaks free of unwarranted assumptions, or forms novel, task-related connections between existing concepts or skill (Bowden et al 2005). Insight is defined by Klein as a 'discontinuous discovery, a nonobvious revision to a person's mental model of a dynamic system, resulting in a new set of beliefs that are more accurate, comprehensive, and useful' (Klein & Jarosz, 2011). Sharing obvious similarities with the concept of reframing, Klein also describes an insight as "an unexpected shift to a better story".

To explain how these shifts come about, Klein has developed the triple insight model (Figure 2) where he proposes that various factors contribute to insight when encountered, namely 'contradictions', 'connections' and 'creative desperation'. Klein states that these encounters act to either strengthen existing anchors, add new anchors to the 'story' or contradict existing anchors.

In this study we will use Klein's shifting of anchors through assumption modification as a means of tracking an individual's input across the DT project.

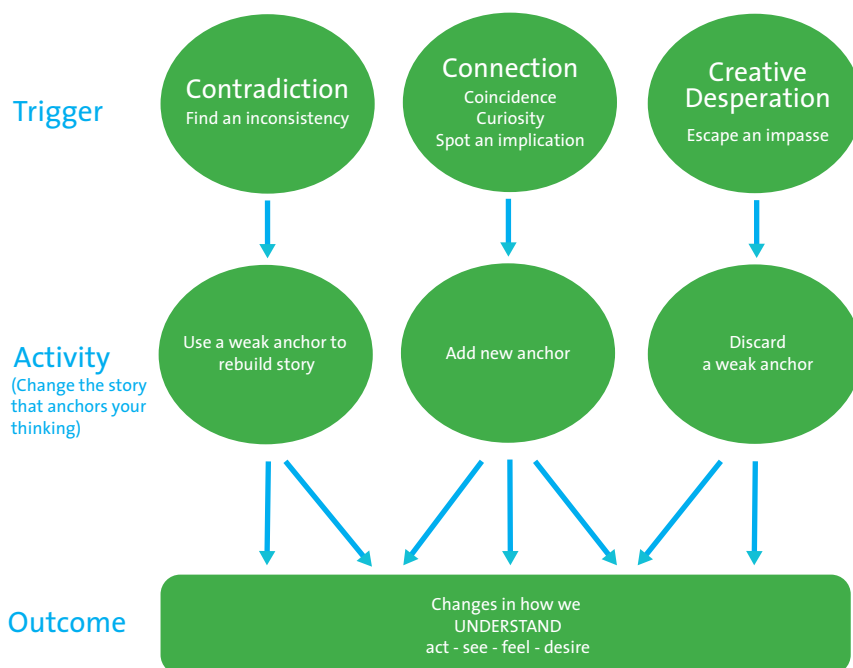


Figure 2: Kleins triple path model of insight

Section summary

In conducting this study, we set out to learn how DT is actually operationalised under real project pressures. We sought to investigate the external drivers that influence and sometimes override the DT process, in what circumstances design thinking is heeded or rejected and how this dynamic influences the strategic priorities of the innovation project. As a first step, we have selected Darden DT model as suitable for this study, secondly, we have established dimensions by which innovation can occur through adopting elements of the BMC, allowing us to measure any re-orientations which impact the overall strategic direction. Thirdly, we have considered the role of the individual in shaping the process by tracing their assumptions. We then assembled a set of 18 quasi-naturalistic projects to see these 3 elements interact to shape the process.

Methodology:

Study cases & participants

This research is conducted on the back of a 12-week MSc. module 'The applied innovation lab'. Each participant was required to work with a real organisation to develop new innovative initiatives utilising a design thinking methodology. Participants were given the choice of working with their current employers or a new organisation of their choosing. 7 from 18 participants worked with their current employers, 10 participants worked with new organisations and 1 case was discarded due to an incomplete survey. All of the participants were experienced in the design thinking methodology having undertaken a generic 12 week "dry run" module the previous semester. 10 of the 17 participants filled management roles in their most recent period of employment which ranged from small indigenous organisations to a number of multinational organisations, including; Intel, Hewlett Packard, Tomra, SAP, Veolia, & Icon Healthcare.

Method

All participants followed the four phase structure of the Darden DT process. On completion of each phase the participants presented back the work they had completed, received project guidance and were briefed on the next stage of the process. Immediately on concluding the

project the participants completed a survey which included a number of open ended questions. The survey was designed to gather data concerning the project assumptions as the idea progressed through the various phases of the DT process. Each case was documented by three data sets:

Data set 1 - Key assumptions held by the designer prior to starting the process, but in the knowledge of their partner organisation

Data set 2 - Key assumptions held by the designer on completing the process, reflected in the final innovation proposal.

Data set 3 - Points of the process where key assumptions were modified. Participants connected any modification to a source tool (be it DT or an alternative tool) and described the nature of the assumption shift.

Because of our small sample size one concern is whether this study group is representative. Exploratory studies such as this will normally constitute a trade-off in study rigour with the need for new learning. In this study we believe this trade-off is necessary to establish constructs for future, more rigorous investigations. We encourage more exploratory studies similar to this in order to more quickly establish future avenues for design thinking research.

Data coding

Once the survey was completed, all 17 cases were coded independently by the two authors. Coding was organised by three stages of analysis. Firstly, we conducted micro analysis where we coded each business element independently. We compared the participants starting assumptions against their outcome assumptions and categorised each element by one of two options; change occurred (1), no change occurred (0).

Secondly, we conducted macro analysis by measuring change at project level, assigning each study case to one of two groups; change occurred (1), no change occurred (0). In order to achieve this we combined the micro analysis results for each case and reviewed as a complete project set. Where we observed changes in 2 or more of the business elements we recorded a strategic level change. While change in one BM element is relatively common, change across two or

	Change 1	Change 2	Change 3
Tool impact on an existing assumption	Strengthened a weak assumption (strengthened x assumption with y assumption)	Contradicted and replaced a weak assumption (replaced x assumption with y assumption)	Added a new assumption (expanded on x assumption with y assumption)
Consequence for innovation project	Increased confidence in the existing mental model shaping the overall project	New mental model transforming the overall direction of the project	Extended and refined the mental model clarifying project elements

more elements is less so, and we believe can be considered unplanned. For this reason we consider such an approach as an emergent strategy and identify it as *'getting the right design'*. Where we observed no change above one business element we recorded no strategic level change. We consider this approach as a deliberate strategy and describe it as *'getting the design right'*.

Thirdly, we compared these patterns against the DT tools that were reported by participants to have influenced any change in assumptions. To do this we explored 3 relationships, including; 1) impact by tool, 2) impact by process phase, and 3) impact of participant position relevant to organisation. From this we distinguish how Design Thinking tools both contribute to an innovation process and are susceptible to other external factors. We draw on Table 3 to assess the nature of assumption change affected by DT tool.

Fourthly, we took two study cases whose process represent the two polar ends of the strategic approaches. Here, both participants were managers within the organisation (insiders) on which the project was based. This means they both face comparable pressures and responsibilities in completing such a project and equally, both start with a comprehensive knowledge set related to the project.

Results

In table 4 we contrast insiders against outsiders by rate of business model assumption change. We found an 80% average rate of change across all five BMC components for projects coordinated by outsiders compared to a 34% average change rate for insiders. Of the five components measured, *'value proposition'*, *'customer segment'* and *'customer relations'* all experienced a 90% change from the starting assumptions to the final project proposal for

'outsiders'. In comparison, insider projects measured 57%, 29% and 29% respectively for the same components. Revenue stream assumptions saw a 70% change for Outsiders compared to 14% change for insiders. The rate of change for the 'channels' component was closer, 60% for outsiders and 43% for insiders.

Business model components	OUTSIDERS Change	INSIDERS Change
Value proposition	90%	57%
Customer segment	90%	29%
Channel	60%	43%
Revenue streams	70%	14%
Customer relationships	90%	29%
Total change across all components	80%	34%

Next we contrast the nature of insider assumption changes against outsider assumption changes (Table 5). We found 60% of outsiders total assumptions changed because of design thinking tools, this compares with 43% change for insiders. Addition of new assumptions accounts for 53% of all insider changes whereas, strengthening of additional assumptions accounted for 47% of outsider changes, the largest type of change.

Emerging themes & discussion

From the above results we have identified a number of key themes with implications for the operationalisation of DT. These findings are very much preliminary and require further study to establish their validity however, we believe they deserve attention. 2 patterns observed show significant consequences for the DT process:

- Designer position relative to organisation (insider/outsider)
- Level of DT tool and phase integration (restricted phase influence/holistic phase influence)

We discuss both in this section and deliberate on possible causes. We try to enhance this

Table 3: Categories of assumption change to be assigned to source tool

Table 4: Total business model assumption shifts Insiders & Outsiders

	Strengthened	Contradicted	Added	Total involvement
Rate of change for OUTSIDERS	18% (n = 11)	28% (n = 17)	53% (n = 32)	60% (n = 60)
Rate of change for INSIDERS	47% (n = 20)	21% (n=9)	33% (n = 14)	43% (n = 43)

Table 5. Nature of assumption change of Outsiders and Insiders

discussion by 'spotlighting' two opposing cases, one representing 'getting the right design' focus, the other 'getting the design right'. We conclude this paper with key contributions and recommend further research.

Designer position relative to organisation (Insiders vs outsiders)

Our results identified notable differences between how 'insiders' and 'outsiders' are influenced and projects are shaped by DT. We recorded a significant difference between outsiders and insiders in terms of the quantity of assumption changes, the nature of assumption changes and the focus of assumption changes.

In terms of quantity, outsiders changed their starting assumptions almost 3 times more than insiders. There are a number of possible explanations for this. Firstly, outsiders were clearly less knowledgeable on the project at the outset. It is likely that they had a bigger learning curve and early assumptions were established on a weaker knowledge base, therefore more susceptible to change. Secondly, this may be explained by a 'theory preserving' bias (Chinn and Brewer, 1993) sometimes described as a "knowledge shield". Chris Argyris (2004) talks about productive and defensive mindsets. A productive mindset seeks valid knowledge that is testable. A defensive mindset is self protective and self deceptive - seeking information that will protect them and shutting down truth when its seen as threatening to existing assumptions. It is possible that this explains a degree of organisational inertia facing insiders. This is supported by findings for the nature of assumption changes, which saw insiders mostly strengthen existing assumptions by design thinking tools, whereas outsiders main source of assumption change had been the addition of new assumptions. While a strengthening effect is possible, we believe there are occasions

where it may have resulted from a bias. That said, some insiders were clearly able to mitigate against any biased tendencies. One insider reports: As i work for the company and had prior knowledge of the customer requirements, i had made many assumptions. [but] These were disapproved by the customers when shown prototypes and radically changed the design.

In terms of focus, the value proposition was the key business element to change for both groups. This was expected as it is the starting point of an innovation concept. We do note however, insiders had their lowest levels of change along dimensions of revenue stream, customer segments and relationships. This may suggest greater reluctance to change from their current customer bases and models of capturing value, restricting opportunities for innovation. This is supported by some of the participant reports, with one insider noting: "In some ways my pre-existing knowledge was an issue. I felt as though I was too close to the company and would instinctively rule out ideas based on what I knew the company would do or not do"

Level of DT tool and phase integration (restricted phase influence/holistic phase influence)

After analysing the general data, we identified a number of interesting cases for further analysis. In choosing two cases we noted, for outsiders this was mostly

a hypothetical project, for insiders this was a real project. We realise outsiders may be comfortable in this knowledge and therefore results may not reflect the pressures of reality. We recognise this is a key vulnerability of the study and in an effort to limit weaknesses we turn our attention to the 'insider' case studies.

In particular, we draw on two inside cases in an effort to further explore patterns highlighted by our data. We have selected 2 cases that we believe determine reality, as both participants hold management positions in their organisations, are directly funded by their organisation and used the process to conduct innovation exercises that would otherwise have been undertaken. On completing the process, both have reported immediate plans by their organisation to implement the design at significant resource and financial commitment.

For this particular study we focus on two participants who arrived at different outcomes even though they were characteristically similar. Manager A emphasises a 'getting the design right focus'.

Manager B emphasises a 'getting the right design focus'. Manager A's assumptions across the 5 business model components shifted 20% from the beginning of the project to the conclusion whereas, Manager B's assumptions shifted 80% (Table 6). So what has brought about this difference?

In table 7 below we contrast how the two participants integrated DT tools into their projects. Across the four DT phases, the assumptions of Manager-A were most influenced in the back-end of the process. All of the DT tools Manager A credited with aiding the process appeared in the phases

Business model components	Manager-A Assumption Change	Manager-B Assumption Change
Value proposition	1	1
Customer segment	0	0
Channel	0	1
Revenue streams	0	1
Customer relationships	0	1
	20%	80%

Table 6: Business model component change of Manager A & Manager B

Phase	Modifying DT tool	Manager-A Latter process influence	Manager-B Distributed influence
Overarching	Visualisation	-	-
What is? Phase Explore current reality	Journey Mapping	-	Strengthened
	Value chain analysis	-	Strengthened
	Mind mapping	-	-
What if? Phase Envision a new future	Brainstorming	-	Added
	Concept development	-	Added
What Wows? Phase Makes some choices	Assumption testing	Strengthened	Contradicted
	Rapid prototyping	Strengthened	Strengthened
What Works? Phase Takes into the marketplace	Customer co-creation	Added	-
	Learning launch	-	-

Table 7: Process influence on Manager-A & Manager-B

'what wows?' and 'what works?'. These phases are associated with making choices and taking a solution to the marketplace for refinement. Manager B in contrast, was influenced by tools spread evenly across the front 3 phases of the DT process - phases associated with exploration, envisioning futures and synthesising ideas.

We note Manager B's holistic use of DT aligns with his high rate of assumption change (80%). Inversely, manager A's limited use of DT aligns with a low rate of assumption change (20%). While we cannot determine if there is a causal correlation, it certainly begs some questions for future studies and may re-confirm the possibility of a cognitive bias at play. From these tentative findings, we posit that the level of DT tool integration directly impacts the strategic emphasis of its process.

Conclusion

In conducting this short exploratory study we have contributed new insight on the control factors of Design thinking. We identify that a designers position relative to an organisation impacts the DT process focus because of probable bias affecting organisation insiders. We posit, that a discount version of design thinking may be appropriate for some organisations with well-defined briefs founded on a depth of experience. Here, design thinking as '*getting the design right*' still brings value to the process. However,

it is difficult to distinguish if this is on the back of good judgement or the result of bias - the later can be a dangerous gamble. In this case a DT process may have been executed, but its effects are diluted unless findings are allowed to inform assumptions. We recommend further micro analysis of the design thinking process under realistic organisational pressures in order to help explore this observation further.

Over a period of 12 weeks we have seen 18 designers navigate a design thinking process with rigor and creativity. Of the 18 projects presented in this research, we can confirm that many are currently in, or being considered for development. As experienced design practitioners and design educators, we can vouch for the quality and the potential of the outcomes presented and indeed the participants. There is no doubt in our their minds that the new tools and skills that these designers will bring to their respective organisations will have an extremely positive effect on future business performance. However, if we hope to continue improving how design is applied so that it delivers on its promise of innovation, we must continue to challenge it under unique stresses. Although any findings from this short study must be seen as preliminary, we wanted to give an overview of what we believe to be an interesting and promising line of study.