

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/283992617>

Climbing the Design Ladder: Step by Step

Article · January 2015

CITATIONS

15

READS

4,552

4 authors, including:



[Cara Wrigley](#)

The University of Sydney

139 PUBLICATIONS 1,400 CITATIONS

[SEE PROFILE](#)



[Judy H. Matthews](#)

Queensland University of Technology

104 PUBLICATIONS 775 CITATIONS

[SEE PROFILE](#)



[Sam Bucolo](#)

Queensland University of Technology

56 PUBLICATIONS 571 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Academy for Design Innovation Management | 2019 London [View project](#)



goDesign Workshop Program for Regional Secondary School Students [View project](#)

Climbing the Design Ladder: Step by step

Rohan Doherty
Queensland University of Technology
rohan.doherty@student.qut.edu.au

Cara Wrigley
Queensland University of Technology

Judy Matthews
Queensland University of Technology

Sam Bucolo
University of Technology, Sydney

DOHERTY, Rohan; WRIGLEY, Cara; MATTHEWS, Judy; BUCOLO, Sam. Climbing the Design Ladder: Step by Step. *Revista D.: Design, Educação, Sociedade e Sustentabilidade*, Porto Alegre, v.7 n.1, 2015.

Editora UniRitter Laureate International Universities
2015 © Todos os direitos reservados.

Climbing the Design Ladder: Step by step

Rohan Doherty
Queensland University of Technology

Cara Wrigley
Queensland University of Technology

Judy Matthews
Queensland University of Technology

Sam Bucolo
University of Technology, Sydney

Climbing the Design Ladder: Step by step

ABSTRACT

This research presents findings of a research project where the first author worked with a small to medium sized enterprise (SME) manufacturing company in order to integrate design at a strategic level within the company. This study aims to identify the changes experienced in the participating company while shifting the perspective of design from a product focus towards a strategic focus. Staff interviews at two points in time and a reflective journal were used as data sources within an action research methodology. A shift in the perspective of design was noted in three cultural changes within the firm over time: a focus on long term as well as short term outcomes, on indirect as well as direct value and on intangible as well as tangible benefits. These three components are proposed as 'cultural stepping stones' that describe how a company transitions from an exclusively product- focused utilisation of design, to a process-level application of design. Implications of this research are provided as considerations for businesses that are attempting to facilitate a similar transformation in the future.

Keywords: *Product Design, Design as Strategy, Design-led Innovation*

1 Introduction

The manufacturing sector has seen a steady decline over the past 30 years in western economies due to an inability to compete with manufacturers from developing nations in an increasingly overcrowded market. Within this sector, design has traditionally been used as a component of the research and development process to inform the aesthetics and usability of a product. Forward thinking firms are increasingly looking towards design to assist in strategic development and capturing new market value (NORMAN and VERGANTI, 2012). Design led innovation (DLI) is a theoretical process that enables a firm to employ design at this level by applying design thinking techniques within the context of the company's business model. However, transforming a company's utilisation of design from a traditional, product-focused activity to a 'whole firm' strategic focus is difficult, and requires a significant internal culture shift.

Few existing studies investigate the changes experienced at a cultural level as a company attempts to transform the way it understands, values and utilises design. This research hypothesises that a manufacturing business cannot integrate design at a strategic level while it considers design to be a solely stylistic or product-focused tool. Therefore, the research question addressed by this paper is: *What are the cultural changes required to shift a manufacturing firm's perception of design from an exclusively product focus towards a strategic focus?* By answering this research question, this paper aims to provide a pathway for other companies to make a similar transition in the future.

Research was conducted by a design innovation catalyst while facilitating a design led transformation within an Australian manufacturing small to medium sized enterprise (SME) over a period of 11 months. By examining the range of approaches used by the catalyst, this study aims to articulate the cultural progression experienced by the participating company as the perspective of design is shifted from a product focus towards a strategic focus. Through an Action Research methodology, staff interviews have been utilised in conjunction with a reflective journal to assess the cultural

changes during this project. Implications of this research are provided as considerations when attempting to shift the cultural perspective of design within a firm.

2 Literature Review

2.1 Organisational Culture

In the highly competitive and continuously evolving business environment, continuous improvement is critical to the success of any organisation. Specifically, the capacity for a firm to envision its future and execute the changes required to reach that vision will determine its success in the market (TODNEM, 2005). However, organisational change requires an accompanying cultural change in order to be successful and remain relevant for the company (CAMERON and FREEMAN, 1991; GRAY, DENSTEN and SARROS, 2003). Organisational culture is defined by Limerick, Cunington and Crowther (2002) as the shared beliefs, assumptions and values of the majority within an organisation. For many businesses, their core competitive advantages are intrinsically linked with their ability to continually innovate and effectively implement new products, processes and strategies (SOHAL and TERZIOVSKI, 2000). Although extensive research has been conducted on organisational and corporate culture, few studies examine culture within the context of SMEs.

Many authors have explored the cultural characteristics of successful firms. For example, Wang and Ahmed (2003) stated that a traditional hierarchical leadership culture can often be counterproductive to organisational learning, and that a collaborative team culture in which all members of the organisation can positively contribute is more effective. Barney (1986) proposed three conditions of a firm's culture that must be met in order to provide sustained competitive advantages. First, the culture must enable the firm to operate in ways that add financial value to the company. Second, the culture must be unique in comparison to other firms. And third, the culture must be difficult for competing firms to imitate. Adding to this, a collaborative and innovation-oriented culture is necessary in order for a firm

to improve competitiveness through innovative development (DESHPANDÉ, FARLEY and WEBSTER, 1993). An innovative culture is defined by Kenny and Reedy (2006) as one in which continuous improvement is considered customary throughout the company, and a strong link has been identified between organisational performance and the duration and extent of continuous improvement involvement (TERZIOVSKI and SOHAL, 2000). A successful innovative culture has four components, as stated by Kenny and Reedy (2006): management is not risk averse; whole firm participation is encouraged; creativity is stimulated; and responsibility for innovation is shared. An innovation-oriented culture acknowledges that innovation is not the sole responsibility of a group within the company - for example, employees in R&D - but rather a shared and ongoing process (KENNY and REEDY, 2006). An effective organisational culture, as identified by Denison and Mishra (1995), has four core traits: involvement, consistency, adaptability and a sense of mission. These cultural traits reflected the findings of Schein (1985), who stated that a culture is developed within a firm as employees overcome challenges of external adaptation and internal integration. Table 1 summarises the cultural characteristics of ‘sustainably competitive cultures’, ‘innovative cultures’ and ‘effective cultures’, as discussed in literature.

Competitive Culture (BARNEY, 1986)	Innovative Culture (KENNY and REEDY, 2006)	Effective Culture (DENNISON and MISHRA, 1995)
Adds financial value to the company	Management is not risk averse	Involvement
Unique	Participation is encouraged	Consistency
Difficult to imitate	Creativity is stimulated	Adaptability
	Responsibility for innovation is shared	Sense of Mission

TABLE 1
Characteristics of
Organisational Cultures

2.2 Danish Design Ladder

The Danish Design Ladder is a model that was developed by the Danish Design Council as a way to categorise the different levels of influence or ‘integration’ design can have within a business (KRETZSCHMAR, 2003). This model is highly relevant to the research presented in this study as it provides a foundational reference point from which changes in the participating company can be gauged by measuring the extent to which design is present within the firm. As explained by Bucolo and Matthews (2011a), design intervention programs, such as design-led innovation, aim to “enable companies to shift their perspective on the value of design and therefore move up the ladder over time, from negligible attention to design, to design being critical to the company’s success” (p. 4). In this way, the Danish Design Ladder framework allows independent companies to be compared on a simple yet reasonably undisputed scale in terms of their perspective and application of design. Research by Kretzschmar (2003) has indicated that a correlation exists between high company performance and a higher ranking on the design ladder.

There are four steps to the Danish Design Ladder: No Design, Design as Styling, Design as Process and Design as Strategy. These four steps are illustrated in Figure 1, and discussed in detail below.

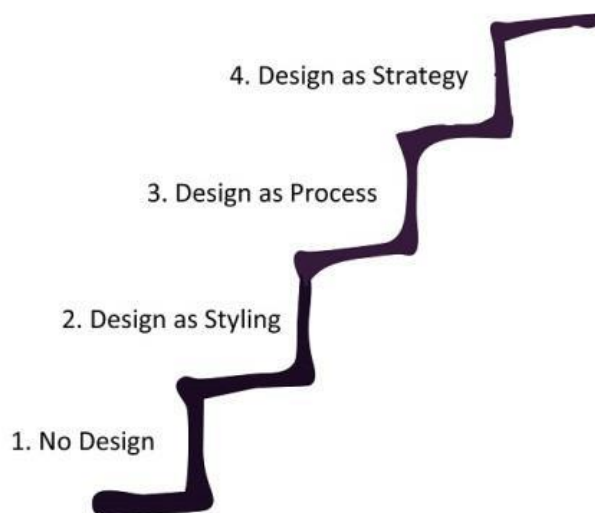


FIGURE 1
Danish Design Ladder
(Kretzschmar, 2003)

At the first step of the Danish Design Ladder, design plays a negligible role in the company; user or stakeholder perspectives do not influence the product development process. The second step, 'Design as Styling', sees a company utilise design as a means to develop the form, usability and aesthetics of a product. At this level, design outcomes can be easily measured as they are generally evident in new products or product features. The third step, 'Design as Process', is achieved when companies are able to apply design as a methodology, rather than a tool, within projects. The design process can be adapted to the task and involves a strong consideration of stakeholder requirements. At the final step of the ladder, 'Design as Strategy', design plays a pivotal role in the strategic development and management of the company. Upper management is intrinsically involved in the design process in order to create value for all aspects and stakeholders of the company.

The Danish Design Ladder is not without limitations, however. For instance, the model is generic and not industry-specific. Furthermore, it is not a framework for integrating design; the model only measures integration outcomes at an operational level. Currently, there is a substantial quantity of literature that examines and identifies the benefits of integrating design into a company; however there is not a great deal of literature which focuses on the journey to integration which is undertaken as a company progresses up the Danish Design Ladder. Bucolo and Matthews (2011a) recognise that the utilisation of awareness activities, in conjunction with direct company interventions, is a typical way of assisting a firm to shift up the ladder to a higher level of design integration.

2.3 Design Led Innovation

As an integrative business process, design-led innovation (DLI) assists companies to develop a sustainable competitive advantage by realising the strategic value design can provide in a business environment (BUCOLO and MATTHEWS, 2010). By employing and integrating design at a holistic business level, a company can be considered 'design-led' or 'design integrated' (BUCOLO and MATTHEWS, 2010). DLI is a relatively new field of knowledge that has grown from a need to reposition and redefine the way design is

valued and implemented in business.

The fundamental principles of design have remained constant, despite the continuous evolution of its application in industry and business (NORMAN and VERGANTI, 2011). This consistency underlines Bucolo and Matthews' (2011a) design-led innovation framework, which has been developed by building upon Beckman and Barry's (2009) design thinking framework. Essentially, the core principles that operate within the design thinking process, such as cyclical iterations, prototypes and solutions, are still active in a DLI process. In DLI however, design is not driven exclusively by user needs or technology (VERGANTI, 2008). Instead, these core design principles have been extrapolated to strategy-level business applications, allowing a business's vision and value proposition to inform design decisions.

The conceptual Design-led Innovation Framework (Figure 2) illustrates an iterative process that can assist companies to explore, capture and realise the strategic value that design can bring to a business (BUCOLO & MATTHEWS, 2011a). Key to this framework is the relationship between operational and strategic activities within a business, and the internal and external focus of these activities. These four elements make up the axes of the framework. The underlying opportunity or value proposition is positioned at the centre of these axes, and is used as the fundamental unifying theme to bring together all sections of a business (BUCOLO and MATTHEWS, 2011a).

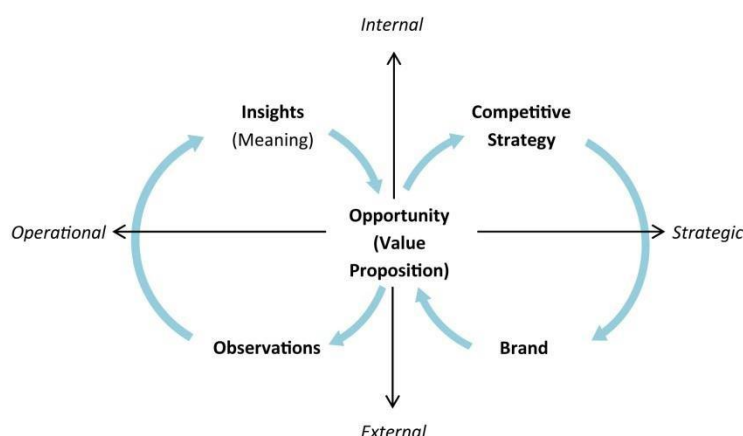


FIGURE 2
Design-led Innovation
Conceptual Framework
(BUCOLO & MATTHEWS,
2011a).

The design innovation catalyst, first proposed in literature by Wrigley and Bucolo (2012), is built upon Norman's (2010) Transitional Engineer concept and aims to answer the questions of who would work in the translational space between research and practice in order to facilitate a design led innovation process within a company. The design innovation catalyst is an emerging role within a growing body of literature that challenges the responsibilities of a designer within a company. Wrigley (2013) defines the role of the design innovation catalyst as a practitioner who "translates and facilitates design observation, insight, meaning and strategy, into all facets of the organisation" (p. 4). Additionally, the catalyst disrupts and challenges the internal and external innovation strategies of the firm from a position within the company. Although the catalyst retains an external or holistic view of the firm, it is necessary for the catalyst to be completely embedded within the operations of the firm in order to accurately understand, from a first person perspective, the cultural characteristics of the business.

2.3 Participating Company Background

The company involved in this research is a window fixture manufacturer of approximately 160 employees across several locations in Australia and New Zealand. The company is structured in a similar fashion to most design and manufacturing businesses, consisting of a board of directors who direct the upper management, followed by middle management or supervisors and then floor staff. Until the initiation of this research engagement, the participating company's innovation strategy could be considered 'sales-led'. This meant that sales staff, being the only customer-facing employees in the company, would dictate the direction of product developments, in response to informal requests from individual customers. This strategy meant that few resources were dedicated to analysing the implications of these developments to the company itself, and to other customers. In turn, this reactive response caused product lines to balloon and inventory obsolescence became a pressing and ongoing issue within the firm. The participating company had not been exposed to design-led innovation strategies prior to the research engagement - design was typically used as a product level tool to develop the features, usability and aesthetics of

products.

3 Methodology

3.1 Research Design

The first author of this paper was embedded within the participating company as a design innovation catalyst in order to facilitate and demonstrate the uptake of design-led innovation processes. An action research framework has provided the core methodology for this research engagement. Action research combines change and learning within one process, making it highly applicable to the aims of this research. It is an iterative and cyclical process that assists in bridging the gap between practice and theory by building on the natural process of planning, acting and critically reflecting on the results of the action (DICK, 2002). Figure 3 illustrates this cycle. Reflection in the action research process is regular, systematic and critical, which assists in achieving a rigorous foundation for data collection. In the case of this research, an action research methodology has allowed the researcher to facilitate the implementation of DLI theory within the participating company and concurrently reflect upon the challenges and outcomes encountered.

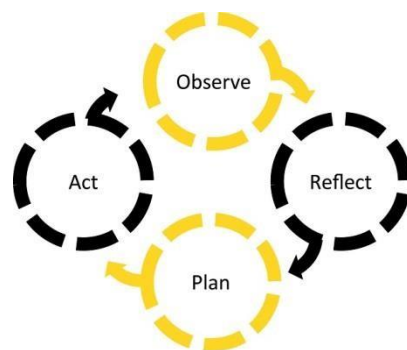


FIGURE 3
Action Research
Process (DICK, 2002)

3.1 Data Collection

Within the Action Research methodology, two types of data collection methods have been utilised: semi-structured interviews with employees and an ongoing reflective journal.

Semi-structured Interviews - Interviews were conducted with employees at two points throughout the research engagement: after three months and again at nine months. The first round of semi-structured interviews involved 14 participants from various departments within the company. The main objective of the first round of interviews was to establish an understanding of employee's initial perceptions of design, prior to extensive exposure to DLI processes. The second round of interviews was conducted with eight of the original 14 participants. These participants were more heavily involved with the work of the catalyst. The discussions conducted in this interview round were focused on identifying changes in perceptions of design and DLI, as well as reflecting on how these changes came about.

Reflective Journal - A significant component of the action research methodology is the reflection that takes place after observing the effects of a newly trialled design tool, approach or process. For this reason, a reflective journal was utilised by the researcher to harness these reflections as a data collection method. Plack, et al., (2005) recognised that "reflection gives meaning to experience; it turns experience into practice, links past and present experiences, and prepares the individual for future practice" (p. 199). The reflective journal provided a medium for recording and reflecting upon employee reactions to presentations, workshops, conversations and activities relating to the work of the catalyst and DLI. Figure 4 graphically represents the timeline of the data collection methods. As can be seen, the reflective journal was employed for the entire duration of the researcher's embedment within the company.

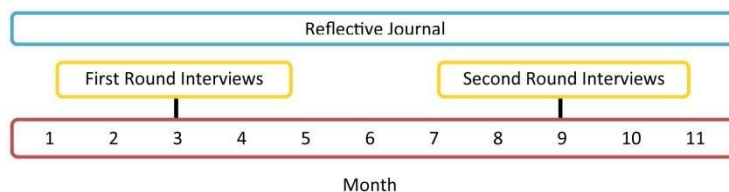


FIGURE 4
Data Collection
Timeline

Table 2 provides an overview of some the tools and approaches used throughout the project, which the data collection methods reflected upon.

3.1 Participants

Fourteen participants from all departments of the participating company were selected for the first round of semi structured interviews and were grouped as Upper Management, Quality Control, Administration, Purchasing, Sales, Marketing, Research and Development, and Manufacturing. Most participants in each group were from managerial or supervisory roles within their departments. Eight of these original participants were interviewed in the second round. These eight were chosen due to their higher levels of involvement in the design-led project and were also representative of all the departments in the company.

Tool/ Approach	Month	Description and Aim
Business Model Canvas	1	An activity run with the R&D department to understand the existing perceptions of the company's vision, market position and general trends in the industry.
Golden Circles Workshop	2	Invited participants to ask 'why?' By questioning aspects about how the business operates and various procedures, assumptions were broken down and the possibilities of alternative ways of doing things became more apparent.
Staff Interviews and Feedback	3	Individual interviews with 14 staff explored the perceived values of the company and they ways in which they differ to the ideal values. Identifying these incongruences assisted in justifying later tools.
Persona and Narrative Creation	4	These traditional user-centred design tools were facilitated in order to improve the general understanding of end users of the company's products.
Customer Assumptions Focus Group	6	Used to generate a group discussion around assumptions of what is important to customers and how these needs are fulfilled. These key points were then utilised as a conversation starter for customers.
Customer Insight Generation	8	Findings from customer discussions were presented to staff in order to generate conversation around how these insights can be used to benefit the company.
Value Proposition Canvas	9	An exploration tool which prompts new directions for a business's value proposition. The aim was to identify new and alternative value propositions for BlindCo which could be used as part of a new three-year sales strategy.

TABLE 2

Tools and Approaches Overview

Staff Interviews	9	Individual interviews with 8 staff encouraged reflection on their experiences with each of the prior tools and approaches in order to to reveal changes in thinking and encourage learning.
------------------	---	---

3.2 Data Analysis

A thematic analysis was conducted on the two rounds of data from semi-structured interviews, focus group and the reflective journal in order to identify common and recurring themes. A thematic analysis (MILES and HUBERMAN, 1994) is appropriate for the aims of this research as it does not pre-define the subject of the identified themes, but rather is directed by the requirements of the research and the input of the researcher (GAVIN, 2008).

Through the comparison of data from the early round of interviews and data from second round of interviews, key differences and changes in the perception of design were identified after exposing the participating company to DLI processes over the course of 11 months. In particular, three distinct themes emerged from the thematic analysis which describe the cultural changes in perception of design that were experienced by the participating company. They are: Outcome Focus, Value Type and Tangibility.

4 Findings

A clear shift in perspective of design was identified within the participating company as a result of the research engagement. This shift was manifested through three separate, yet related changes in the cultural understanding of design outcomes. These cultural understandings are: the outcome focus of design, the value type of these outcomes and the tangibility of these outcomes. At the beginning of the engagement, employees placed a higher level of importance on product-level design, rather than strategic-level design, as they perceived it to be able to provide 'direct' value to the firm through tangible outcomes within a tight timeframe. In contrast, strategic-level design activities were perceived to produce long term, indirect and intangible outcomes, and consequently were not initially viewed as relevant

to everyday work. Table 3 describes the initial outlook of the participating company regarding the characteristics of product-level design and strategy-level design. Of course, not all employees maintained such a black-and-white perspective of these characteristics; however this was the common perception that emerged from the results of this research.

	Product Design	Strategic Design
Outcome Focus	Short Term	Long Term
Value Type	Direct	Indirect
Tangibility	Tangible	Intangible

TABLE 3
Preliminary
Understandings of
Design Outcomes

By the end of the design-led engagement, the applications, benefits and value of design were viewed from a new perspective within the firm. The department to which each participant belonged is referenced after each quote to contextualise the statement.

Participants no longer saw design as an activity which only applies to physical products: *“If you talk about design and only talk about product design, then I think you’ve lost it a little bit”* (Upper Management).

The findings of this research describe the transition in thinking that was experienced throughout the research engagement towards understanding, valuing and utilising the strategic potential of design, beyond the well developed product development focus.

4.1 Short term vs Long Term Focus

A strong cultural trait identified within the firm was a tendency to value work with immediate and noticeable results over projects which have a longer term or strategic focus. For example, in response to a question about the ideal outcomes of the catalyst position, one participant noted in the first round of interviews: *“I’m looking at more direct value, rather than indirect; short term focus rather than long term focus. So let’s hope at the end of the year, we have a process that’s finished, complete and tangible”* (Upper Management). Although there were expectations that the work of the researcher as a catalyst would benefit the firm, these expectations were

initially at a product-focused level and did not take into account strategic or business-level applications of design.

The introduction and facilitation of tools such as the Business Model Canvas and activities such as persona and narrative creation demonstrated a new potential for design principles to contribute to other areas of the business. However, shifting the cultural mindset of the firm away from a short term focus was hindered by a lack of understanding as to what a potential outcome would look like. *“At this stage probably not everybody realises what the outcomes can be”* (Sales). The use of case studies and clarifying the design-led process went some way towards enabling employees to envision and better appreciate long term outcomes. *“It’s looking at that vision. And while you haven’t actually said, these are my recommendations, you’ve asked the questions to stimulate people to get them thinking in that direction”* (Sales).

The cultural progression that was experienced within the company in regards to the outcome focus of design was evident in the way employees began to value long term projects: *“It’s the big picture way of looking at things, we just don’t have time. But for me it’s like, well you don’t have time because nobody ever looked at it. It’s kind of like the chicken and the egg”* (R&D). As a result of the research engagement, an appreciation was developed for long term design outcomes which required a holistic or ‘big picture’ perspective of the company.

4.2 Direct vs Indirect Value

Within the participating company, it was found that there existed a general aversion towards design activities, projects or theories that were perceived to provide ‘indirect value’. Instead, employees tended to prefer work that would produce more immediate and beneficial results. One participant attributed this aversion to an innate difficulty to effectively measure the benefits of such influences: *“How can I impact the business if I start thinking differently? When can I start expecting sales figures to go up and salary? It’s difficult to measure, difficult to track”* (R&D). One participant suggested that the existing culture of the firm embodied a selfish trait, and that this was the reason some employees did not acknowledge potential in

perceived 'indirect value' activities: *"There's a 'what's in it for me' attitude.*

If there's no benefit for them, they're not going to want to change as quickly." (Quality Control). This explanation was supported by the following quote by another participant: *"That sounds awesome but how will that affect us directly. How can we implement that into what we are doing?"* (R&D).

In comparison to the traditional modes of design outputs that the company was familiar with, the new possibilities presented and demonstrated by the research were more ambiguous as to what the outcome would be. Regardless, tools which drew a clear relevance to the immediate task at hand were used as an effective way to develop an appreciation of indirect value outcomes. For example, insights from direct customer interviews were relevant to day-to-day tasks within the company, and also created value for the overall strategic direction of the firm. In this way, a new appreciation for indirect value outcomes of design could be fostered. The following quote from one participant represents the new perspective of indirect design outcomes at the end of the research engagement: *"It [design] is the next step, about creating value that is not based on product or service, it's based on maybe a better process of dealing with us, or giving them the edge in terms of product, promotion, or channel to market"* (Upper Management).

4.3 Tangible vs Intangible

The idea of 'tangibility' was found to influence many staff member's notion of importance in regards to tools, approaches and workshops that were trialled by the researcher. Tools that had no tangible outcome, such as business level development, were often considered irrelevant to everyday work. For example, in response to a question about the perceived benefit of strategic development, one participant stated: *"It's an under-resourced role, but it's never been focused on or seen as important, because it has a bit of an intangible output to it. There is no physical product"* (R&D). Participants acknowledged the potential benefits of tools with intangible outcomes, such as articulating and understanding the customer value chain,

however it was seen as less important than the immediate task at hand: *“...the big picture stuff is gold. It’s [we need you to be] getting back to direct value, safety, whatever it may be, to support some of the things we are doing now”* (Upper Management). This view was reiterated by another participant who did not see the intangible work of the catalyst as directly valuable to their work or the company: *“So you’ll have to deliver some side things to make it worthwhile”* (R&D).

Creating an understanding and encouraging the utilisation of the intangible outcomes of design was found to contribute significantly towards shifting the overall perception of design within the participating company. This new understanding was principally achieved by creating engagement in activities that did not produce a ‘tangible’ outcome, such as the ‘Why?’ workshop and the Value Proposition Canvas tool.

5 Discussion

5.1 Moving up the Design Ladder

From the exposure to activities and processes within the DLI process, the role of design within the participating company became seen as a way to create value for customers and the business. Further to this, customers became seen as a valuable resource to inform design and insights gained from the customers were used to set new strategic directions and led to improved company performance. To extend this new focus on customer insights, a Marketing manager was employed to implement and drive the company’s customer focused approach. In addition, the design innovation catalyst was invited to extend his involvement with company’s deeper and more extensive use of ‘designerly’ principles and practices, outside of product development.

In the context of the participating company, one outcome was a significant shift in thinking considering the outlook of design at the start of the engagement was as an aesthetics and functionality development tool, with customers having little to no input into research and development activities. This initial perspective is comparable to the product focus of industrial

design as described by Gemser and Leenders (2001). The results of this research suggest that the primary shift in perspective experienced within the participating company lies in the perceived tangibility of the design outputs. For example, as a product-focused tool, design outputs are typically physical, visible or at least realisable in the short term as a new function, feature or component. Boothroyd (1994) identified this perspective as a traditional outdated approach to design in manufacturing, where problems are dealt with as they arise.

It is proposed, in the context of an Australian manufacturing SME with a strong focus on traditional applications of design in the product realm, that there are several smaller steps on the Danish Design Ladder (Kretzschmar, 2003) between 'Design as Styling', 'Design as Process' and 'Design as Strategy' that have been realised through this research. These smaller steps are presented as cultural stepping stones: the mutual awareness milestones that need to be met before a company can successfully begin to progress from a product or 'styling' level of design integration. As shown in Figure 5, the four levels of design integration, as recognised by Kretzschmar (2003), are related to the operational applications of design. It is proposed from the research presented in this thesis that a scale of the cultural awareness of design exists parallel to the operational elements of the original Danish Design Ladder (Figure 1). It is in this new meta-level of the ladder in which the cultural stepping stones come into influence.

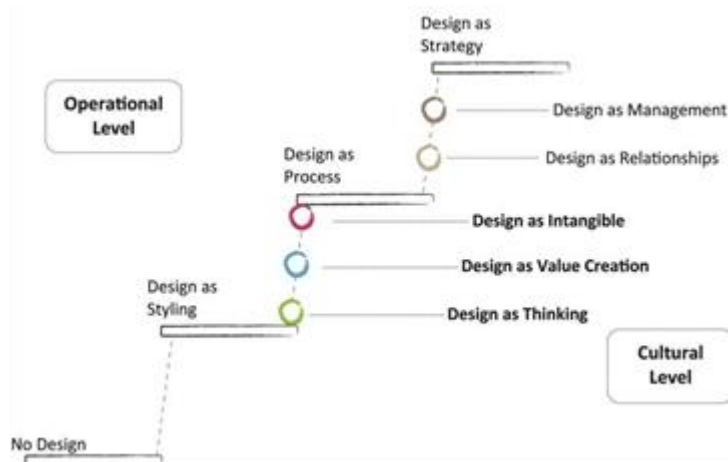


FIGURE 3
Cultural Stepping
Stones applied to the
Danish Design Ladder

As shown in Figure 5, three cultural stepping stones have been proposed between the design integration levels of Styling and Process. These stepping stones are: 'Design as Thinking', 'Design as Value Creation' and 'Design as Intangible'. Additionally, projected stepping stones have been proposed between 'Design as Process' and 'Design as Strategy'. It is possible that cultural transformations are required to progress from level of negligible design influence; however given the starting point of the participating company, this lies outside the scope of this research. Each of the stepping stones presented in Figure 5 can be considered as the cultural imperatives of a manufacturing company that are needed to climb Kretzschmar's (2003) Design Ladder. Unlike the operational integration levels of design presented in the original Danish Design Ladder (Kretzschmar, 2003), the cultural elements of the proposed model are cumulative: a company must acquire, embed, and maintain each stepping stone in order to progress to the next operational level of design integration. However, it is important to note that since these stages are cultural imperatives, reaching a stepping stone does not necessarily equate to observable operational changes within the business. Each stepping stone is discussed in detail below.

Design as Thinking - The first proposed cultural stepping stone that was achieved by the participating company is 'Design as Thinking'. At this stepping stone, design is perceived by the company to be a unique way to approach and solve problems. Through this 'designerly' way of thinking, employees begin to incorporate design principles, such as collaboration, experimentation and optimism, into the way they approach and solve problems (BROWN, 2008).

Design as Value Creation - At the second proposed cultural stepping stone, the company culture recognises that design is a method of creating value, rather than a tool for inventing solutions. At this level of understanding, the cultural perception removes itself from the traditional tendency to expect an immediate and measurable outcome from the application of design processes. Instead, design is now acknowledged to create value for a particular stakeholder - customers, suppliers, the company itself - though short term outputs or long term outcomes. Cockton (2005) describes a value-centred design approach as a shift in perspective from the product, via the

user, to the context of use.

Design as Intangible - Building from the first and second cultural stepping stones, a company's culture can reach the third proposed level once it acknowledges that design outcomes can be intangible. In contrast to traditional design outcomes in the manufacturing industry, applying design at a holistic level with a business can produce outcomes that are not immediately observable (LOJACONO and ZACCAI, 2012). Once a company's culture reaches this level of design awareness in conjunction with the two preceding cultural stepping stones, the shift in perception of design can be observed at an operational level through new applications of design principles within procedural elements of the firm - the 'Process' level of the Danish Design Ladder has been achieved.

Additional Projected Stepping Stones: Towards Design as Strategy -

Although the participating company has not yet reached the fourth level of design integration by applying design at a strategic level, the potential for design to provide strategic value to the business has become apparent to employees. From the findings of this study, projected cultural stepping stones have been formed and proposed. It is important to note that these stepping stones are indicative and are proposed as avenues for future research. The first projected stepping stone is 'Design as Relationships'. At this step, the company recognises design as a way to create value through meaningful relationships with stakeholders in the business's value chain. In the case of the participating company, the notion that design could assist customer rapport in a way that provides value to both sides of the relationship was beginning to be realised within the firm towards the end of the engagement. The second projected stepping stone is 'Design as Management'. Once the culture of a company understands the value design can provide from a managerial level, it is well on its way towards integrating design at a strategic level and becoming holistically design-led. These projected stepping stones draw from Best, Koostra and Murphy's (2010) extension of the design ladder model, which considers expertise and management capabilities as specific requirements for integrating design practices. As illustrated in Figure 5, it is possible that there exist other cultural stepping stones at later stages of the design ladder which will not

be evident until specific research is conducted on a company that completes this transformation.

5.2 Reaching Cultural Stepping Stones

Achieving these cultural changes and reaching these stepping stones has required the use of a range of design tools and approaches in conjunction with the structure provided by the DLI Conceptual Framework (Bucolo and Matthews, 2011a). Table 4 provides examples of the tools and approaches that assisted in reaching the three cultural stepping stones in addition to a summary of the cultural changes experienced in the participating company.

Cultural Stepping Stone	Assistive Tools and Approaches used to reach Stepping Stone	New Cultural Perspectives of Design
Design as Thinking	<ul style="list-style-type: none"> • Business Model Canvas • Persona Creation • Narrative Creation 	<p>Considerations are made towards applying a process for long term development within the company.</p> <p>Recognition that a design process can be used beyond exclusively product-focused applications</p>
Design as Value Creation	<ul style="list-style-type: none"> • Interviews and Feedback • Customer Assumptions • Customer Insight Generation 	<p>Design can provide value to all stakeholders of a business. 'Indirect value' is still valuable.</p>
Design as Intangible	<ul style="list-style-type: none"> • Golden Circle Workshop • Value Proposition Canvas 	<p>Recognition that design outcomes can be intangible</p>

TABLE 3
Tools and Approaches to reach Cultural Stepping Stones

5.3 Implications and Summary

The findings presented in this paper suggest that experiential knowledge and beneficial responses can be generated in an SME through design tools and activities as part of a long term and planned development framework. However, for future manufacturing companies attempting to incite change through the application of design tools and approaches, the company's core culture needs to be recognised as an integral part of the change process.

The cultural development outcomes of this research suggest that allocating resources towards understanding and developing the company's culture is highly necessary in order to transition away from traditional modes of operation.

This study was based on the hypothesis that design cannot be integrated at a strategic level while it is considered an exclusively stylistic or product focused-tool. Although the participating company did not reach a level of strategic design integration as a result of this research, their progression up the Danish Design Ladder model would suggest that the identified cultural changes are a prerequisite of this shift. Additionally, two projected stepping stones have been proposed which the company is continuing to work towards. Future research should examine and validate these projected stepping stones by continuing to work with the participating company or with another company at a similar stage of the journey towards becoming design-led.

REFERÊNCIAS

BARNEY, J. B. (1986). Organizational culture: can it be a source of sustained competitive advantage?. *Academy Of Management Review*, 11(3), 656- 665.

BEST, K., KOOTSTRA, G., & MURPHY, D. (2010). Design Management and Business in Europe: A Closer Look. *Design Management Review*, 21(2), 26-35.

BOOTHROYD, G. (1994). Product design for manufacture and assembly. *Computer-Aided Design*, 26(7), 505-520.

BROWN, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84.

BUCOLO, S., & MATTHEWS, J. (2010). Using a design led disruptive innovation approach to develop new services: practising innovation in times of discontinuity. In Proceedings of the 11th International CINet Conference: Practicing Innovation in the Times of Discontinuity (pp. 176-187). CINet.

BUCOLO, S., & MATTHEWS, J. (2011). A conceptual model to link deep customer insights to both growth opportunities and organisational strategy in SME's as part of a design led transformation journey. Design Management Toward A New Era of Innovation.

CAMERON, K. S., FREEMAN, S. J., & MISHRA, A. K. (1991). Best practices in white-collar downsizing: Managing contradictions. *The Executive*, 5(3), 57-73.

CHESBROUGH, H., & SCHWARTZ, K. (2007). Innovating Business Models with Co-development Partnerships. *Research Technology Management*, 50(1). COCKTON, G. (2005, April). A development framework for value-centred design. In CHI'05 extended abstracts on Human factors in computing systems (pp. 1292-1295). ACM.