

Introduction

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This volume of writings on the disruptive potential of design is an important addition to the increasing focus on the role of design in business as well as in society more widely. Design is increasingly recognized for its ability to contribute to organizational performance and the creation and maintenance of sustainable competitive advantage. It is not only of fundamental importance in its traditional role of the creation of new products, buildings and artefacts, but increasingly is being used to transform old-style problem-solving processes or create new services, systems and business models. Through creating a sense of belonging, design can build attachment to a product, brand or organization. Design can encourage both employees and consumers alike to want to be part of an organization by increasing its ‘feel-good’ factor. It can also make an organization more effective, through workplace designs that makes interpersonal interactions more likely, or by making systems and processes more efficient.

We live in an era where design is changing – disrupting – the world around it. The quantity of writing on the topic of design has grown voluminously over recent years. This is both in terms of popular management books that focus on the subject, to practitioner-focused articles appearing in major publications such as *The Economist*, *Harvard Business Review*, *Business Week*, *Wall Street Journal* and *New York Times* as well as scholarly articles in respected academic journals (Christensen, 2006; Schmidt and Drueh, 2008). So it seems timely to look at the ways that design can transform our world. This was the motivation for this volume, and all the chapters offer insights into the way that design has the power to disrupt organizations, industries and even society.

Innovation has long been understood to be an important means of disrupting industries and society, ever since Schumpeter described the gale of creative destruction – *Schöpferische Zerstörung* – that followed the successful introduction of significant new products and services. The concept of disruptive innovation (Christensen and Raynor, 2003; Markides, 2006) has since entered mainstream management thinking (*The Economist*, 2015).

Disruptive innovations are those that create new markets and categories of customers, not only through the development of new technologies and product categories but also through the creation of new business models or the application of existing technologies in new, more simply designed and user-friendly ways. Disruptive innovations force established industry players to play catch-up, leading to competitive success for the disrupter, but also potential benefits for society as new sources of value are made available to consumers.

At the time that Schumpeter was writing about creative destruction, the concepts of design and design management were barely recognized as distinct disciplines. That has now changed and the power of designers to create new products, services, ways of working and benefits for society is increasingly understood (Bruce and Bessant, 2002). Recent developments have focused on a number of ways in which design plays a role in transforming, or shaping, organizational or societal change. These include:

- the development of new ways of doing business – business model innovation (Chesbrough, 2010; Osterwalder and Pigneur, 2010; also see in this volume Nussem, Wrigley and Matthews, Chapter 1; Garrett, Wrigley, Russell and Matthews, Chapter 2; Wynn, Chapter 8; Jenkins and Fife, Chapter 4)
- the creation of services, through the designing of experiences or through a better understanding of how design can shape the path that a customer takes on a service ‘journey’ (Achrol and Kotler, 2012; McColl-Kennedy et al., 2015; also see in this volume Andrawes, Moorthy and McMurray, Chapter 5; Gloppen, Lindquister and Daae, Chapter 6)
- the involvement of the user or consumer in a co- or open-design process (Buchanan, 2001; van Abel et al., 2014), thereby disrupting the design profession itself as well as other industries such as manufacturing because design blueprints that are now available online can be customized and manufactured locally (Kietzmann et al., 2015; Lipson and Kurman, 2013; also see Pisano, Pironti and Rieple, Chapter 3 and Aftab and Young, Chapter 7 in this volume)
- the disruption to belief systems, culture and behaviours that can be achieved through the intentional design of space to create interactions (Norman, 2004; also see Malinin, Williams and Leigh, Chapter 10 in this volume) or design of the workplace and its artefacts to create emotions and a sense of belonging, identification and motivation (Müller and Reichmann, 2015; see also Straker and Wrigley, Chapter 11 in this volume)

- the role that design thinking can play in transforming traditional management thinking (Brown, 2008; Brown and Katz, 2009; Martin, 2009); this abductive reasoning process is behind the ability of designers to deal with unpredictable futures, and helps to break down the cognitive biases (Liedtka, 2015) that lead managers to make poor decisions (see Soila-Wadman and Svengren Holm, Chapter 9 in this volume).

Changes to the way that products are designed and created have led to disruptions to organizational value- and supply-chains, particularly in the manufacturing industries (Anderson, 2013; d'Aveni, 2015; de Jong and de Bruijn, 2013; Petric and Simpson, 2013). Instead of products being made in distant countries in mass-production facilities, digital technologies such as 3D printers allow consumers to access digitized designs, and even create and produce their own products locally and in small quantities (see Pisano, Pironti and Rieple, Chapter 3 in this volume). Designers have an important role to play in this process in creating digitized online templates that are both usable and customizable, and in providing consultancy and/or product design advice that can be made available to individual 'producer-consumers' (see Jenkins and Fife, Chapter 4 in this volume). Little research has been undertaken as yet on the transformational effects of such technologies on different manufacturing sectors. Although designers have been able to develop new competences and ways of working (Edvardsson et al., 2011) that build on their expertise in user-centred design and collaborative processes of co-design (Prahalad and Ramaswamy, 2004), the specific design competences required in consumer versus business-to-business sectors is not well understood (see Mortati and Villari, Chapter 12 in this volume).

Another example of a disrupted business model in which designers have played a transformational role is the bicycle and car sharing schemes in cities such as London and Paris; taxi substitutes such as Uber in San Francisco and New York, and other forms of asset utilization that do not require ownership but simply short-term access to the asset's benefits. Such business models depend on the complementary service systems that have to be put in place, and in which design plays a critical role (see Garrett, Wrigley, Russell and Matthews, Chapter 2 in this volume). Without creating a blueprint of the customer's behaviour and the 'journey' or the path that a customer takes from the start of the service to the end of their involvement with the service provider (Achrol and Kotler, 2012; see Gloppen, Lindquister and Daae, Chapter 6 in this volume) and the contingent needs at each stage of the process (McColl-Kennedy et al., 2015; Shostack, 1982), such systems simply would not work. A blueprint focuses

not only on the moment when the customer encounters service personnel but also includes what is behind the 'line of visibility' where others support service delivery.

Service systems are another area where design is involved in disrupting established ways of doing business (Kimbell, 2011; Meroni and Sangiorgi, 2011). There has been a radical shift towards product service systems, where the provision of the physical product is simply one part of the customer's value system (see in this volume Andrawes, Moorthy and McMurray, Chapter 5; Gloppen, Lindquister and Daae, Chapter 6). For example, IBM long ago ceased to be simply a supplier of computers; today profits mostly come from services and increasingly from 'full-fledged business solutions' rather than hardware that now accounts for only approximately 10 per cent of its revenues (IBM, 2014). The need to involve consumers in the design process and co-create shared value (Achrol and Kotler, 2012) is therefore becoming more important, and also more difficult as the world becomes more connected (DeFillippi et al., 2007; Kowalkowski et al., 2012).

One of the complications faced by such businesses is the need to address the locations of many of their customers. The role of the designer in an increasingly digitized and internationally connected world is changing fast, as products become at the same time more global and more customizable (Caniato et al., 2015; Simpson et al., 2014). Within international supply chains the role of the designer becomes that of a 'bridger' of different cultures (Morillo et al., 2015; also see Wynn, Chapter 8 in this volume) engaging diverse consumers in brand experiences that are created and managed by companies in different product fields and in different countries. The democratization of product and service creation broadens the opportunities for generating experiences and meanings from the elite few to the many, and from one country to the many. Yet if anarchy is not to follow, someone still has to curate or shape the interpretation of meanings attached to products, places and other artefacts. Here, designers have an important role to play in creating genres and providing associative benefits (Ciappei and Simoni, 2005; Cova and Cova, 2002) for consumers who may be located anywhere in the world (see Aftab and Young, Chapter 7 in this volume).

Designers' ability to understand and respond to beliefs, values and behaviours are some of their key strengths (Köppen et al., 2011). They also often have a disrespect for established norms and conventions (Chang et al., 2013; Rieple, 2004; Tötterman, 2008). These attributes allow them to target aspects that are amenable to change. In this respect, they are important creators of culture. As Verganti describes it, Alessi's Model 9093 of a kettle 'showed its greatest originality in broadening people's expectations of what a kettle was and did and, indeed, the nature of the breakfast experience' (Verganti, 2006, p. 116).

Buildings and the workplace environments they contain both enable and constrain strategic action. An under-researched area, workplace design has the potential to transform buildings into centres of creativity and innovation or be the means of regulating behaviours into predictable forms (Barry and Meisiek, 2010; Haner, 2005; Levin, 2005). Design can provide a sense of identity by using physical artefacts and decorative styles that provide a sense of an organization's mission, value and culture (Becker and Steele, 1990; Brown, 2008). This implies that changing organizational artefacts or style might help to create a new culture, although there is too little research on this important topic. Design can also facilitate the achievement of tasks through the creation of individual and group workspaces. Different types of space enable energy flow through collaboration, teamwork and the reduction of physical and perceived boundaries between groups and individuals, thereby encouraging problem solving and innovation (Sutherland, 2013; also see Malinin, Williams and Leigh, Chapter 10 in this volume). As creativity and employee task motivation are dependent on interchange with others, designs that encourage contact with others can enhance knowledge exchanges. This can also be helped by the use of design elements such as colour and lighting that create conditions that encourage the use of collaborative or informal spaces.

Part of this designing process is the construction of emotions, or more accurately the construction of a physical environment in which certain emotions are more or less likely. Emotions are important shapers of behaviour (Fehrman and Fehrman, 2000; Kanfer et al., 2002; also see Straker and Wrigley, Chapter 11 in this volume). The more intense the emotional experience is, the lower our ability to consciously evaluate the situation (Van Gorp and Adams, 2012). Designers have known this for many years: a saturated red will almost always create arousal, probably because of its evolutionary associations with blood (Fehrman and Fehrman, 2000), and commands attention, even in a crowded environment. The physical characteristics of an object can suggest meaning through creating associations with experience (Norman, 2004). As we unconsciously perceive emotion in the form and content of things, product personalities are based on the same aesthetic and interactive cues that characterize human personality traits (Gagliardi, 2006; Van Gorp and Adams, 2012). These are communicated through design elements such as proportion, angularity, colour, contrast and size. The same is true of sounds; the emission of sounds at a particular frequency or volume almost always stimulates anger or anxiety. Attention selects the information that will become part of our mental models of reality and anything that creates high arousal will be elevated to the front of the mind.

What is missing is a formalized understanding of the links between

design elements and organizational behaviours (de Vaujany and Mitev, 2013; Müller and Reichmann, 2015). Certain visual artefacts will create emotional responses that increase the likelihood the user will respond in a particular way. For example, employees who report more positive emotions tend to perform more socially desired behaviour (Norman, 2004). This knowledge is common in the design, architecture and facilities management communities (Levin, 2005; McDougall et al., 2002), but less so within wider organization theory. Employees who report more positive emotions tend to be more socially integrated and more engaged in the organization and less likely to indulge in cynicism and workplace deviance (Avey et al., 2008). Therefore, designs that create positive affect may influence employees' acceptance of change and vice versa (Abrahamson, 2000; Stanley et al., 2005; also see Soila-Wadman and Svengren Holm, Chapter 9 in this volume). Someone who is in distress is less likely to be able to come up with creative solutions to problems; people are better at problem solving and creative thinking when they feel good. Design is likely to be particularly important during transitional periods when the possibility of a new practice emerges and is recognized as an opportunity for change by some social groups (Boxenbaum and Battilana, 2005; Furnari, 2014; Lounsbury and Crumley, 2007; also see Malinin, Williams and Leigh, Chapter 10 in this volume). Without disruption, creative teams risk falling into groupthink (Janis, 1982) and disruption without empowerment can lead to stasis. It is during the early stages of a transitional space that shared meanings and symbols are ascribed to practices and through symbols that the meaning of practices is translated and travels (Thornton et al., 2012; Zilber, 2008).

Finally, perhaps one of the most interesting new ways in which design is being used to challenge established patterns of thinking is the application of design thinking and capabilities to organizational decision making (see in this volume Jenkins and Fife, Chapter 4; Mortati and Villari, Chapter 12). As Weick (2012) argues, the traditional business tools of logic and rationality don't suit well the complex and unpredictable world of today. While design is discipline specific, design thinking transcends disciplinary boundaries. The recognition of the important role of psychological factors, many of them unhelpful, in traditional decision-making processes (Jolls et al., 1998; Thaler and Sunstein, 2003; Thaler et al., 2014; Tversky and Kahneman, 1974) have led to initiatives such as governments' 'nudge units' (gov.uk, 2015; sbst.gov, 2015) but also to recommendations that organizations adopt design thinking principles to improve decision making (Liedtka, 2015). Design-led innovation uses a set of tools and approaches that enables design thinking to be embedded within a business (Bucolo and Wrigley, 2013; also see Nusem, Wrigley and Matthews,

Chapter 1 in this volume). Designers take on problems from multiple angles and through an empathetic and abductive approach produce solutions that push the boundaries of what is currently 'known' to be feasible (Brown, 2008; Dell'Era and Verganti, 2010; Liedtka, 2015; Martin, 2009; also see Berthold, Chillias and Townley, Chapter 13 in this volume). Design thinking helps managers to think about problems as systems, rather than as individual parts.

The enthusiastic take-up of the abductive thinking typical of designers by 'nudge units' suggests that it has particular relevance for public organizations, who have an increasing need to be flexible and adaptable to local needs. This applies equally in less developed countries or even, arguably, in some contexts in developed countries where successful change has proved challenging to achieve and where resources are in short supply – the UK's National Health Service (NHS) being one well-cited example (McCann et al., 2015). However, design thinking has its challenges as it introduces ambiguity and uncertainty into organizations that are used to metrics and prediction, and need at least some measure of stability as a normal rule. Design thinking is about exploration and learning and its value is also therefore challenging to measure in traditional ways, especially as innovation is notoriously unpredictable.

To summarize, design, design management and design thinking – in all their various guises – are important elements in the creation of disruptive innovations as the chapters in this volume attest.

CHAPTERS IN THIS VOLUME

This volume provides a diverse array of perspectives on how design is impacting business innovation and industry transformation. The 13 chapters have been organized into five topical parts: Business Models, Service Design, International and Multinational Design Interventions, Aesthetics and Psycho-Spatial Dynamics and Design Capabilities. Theoretically, many of the chapters draw upon design thinking as an underlying perspective for understanding the specific design practices and applications summarized. Additionally, many of the chapters focus upon design as a user-centred, empathic and participative practice that allows diverse stakeholders to creatively contribute. Lastly, these chapters primarily seek to integrate design-based values and perspectives with the business and organizational values and practices of their client organizations.

Part I: Business Models

In Chapter 1 doctoral student Erez Nusem and Dr Cara Wrigley (both at Queensland University of Technology (QUT) School of Design) and Dr Judy Matthews (QUT Business School) have collaborated on an ambitious study of a comprehensive design intervention to transform business model thinking on how to serve the needs of an ageing population. The authors employed a wide array of business analytic and design thinking tools to inform their business model engagements with the primary stakeholders in aged care in eastern Australia and conclude their study with a comprehensive design innovation framework for design interventions more generally.

Chapter 2 features a multidisciplinary team of QUT scholars (Alex Garrett, Dr Cara Wrigley, Dr Nick Russell and Dr Judy Matthews) who compare three companies (Zipcar, Uber and Getaround) with distinctive business models for personal mobility and transportation. Their analysis emphasizes customer emotions, channels for engagement and community mobilization as key differentiators in the evolving business models of each company.

Dr Paola Pisano and Dr Marco Pironti (both at the University of Torino) and Professor Alison Rieple (University of Westminster) examine in Chapter 3 the changing roles of the designer in three new business models based around 3D printing technologies. Business model 1 is illustrated by the case of Quirky and focuses on the role of the design *orchestrator*; business model 2 is illustrated by the case of i.materialise and emphasizes the role of the design *adjuster*; and business model 3 is illustrated by the case of networks of fabrication labs and focuses on the role of the design *enabler*. This chapter also illustrates the powerful and far-reaching impact of 3D printing on manufacturing industries' value chains and business models worldwide.

Strategic design consultants Julian Jenkins and Tim Fife conclude Part I with an examination of how their design consultancy (Second Road) enables their client organizations to integrate strategic with design-based business model transformations in Chapter 4. They illustrate their practice through two models of intervention: customer insight-led innovation and futures-led innovation. In both design interventions these senior design consultants discuss the challenges confronting client organizations coming to terms with the need for disruptive innovation and the role of strategic design consultants in helping business leaders to confront these challenges.

Part II: Service Design

In Chapter 5 Ledia Andrawes, Anitha Moorthy (designers with ThinkPlace Foundation) and Professor Adela McMurray (RMIT University) describe

a design thinking-based intervention in a programme for Innovations for Maternal Newborn and Child Health (Innovations for MNCH) in rural Ghana. A key outcome from their intervention was to transform the nurse participants in the MNCH programme from passive programme beneficiaries to proactive co-creators of solutions addressing their user needs and frustrations with the status quo.

Judith Gloppen (the Norwegian Design Council), Berit Lindquister (the Oslo School of Architecture and Design) and Hans-Peter Daae (Norway Post) describe the use of the customer journey design tool in a service design intervention to transform Norway Post towards being a more customer-oriented service organization in Chapter 6. Their intervention details five perspectives on the customer journey (process steps perceived by service provider; process steps and touchpoints perceived by the customer; temporal dimension of steps and touchpoints; emotional dimension of steps and touchpoints; perceptions of the customer's customer on these four perspectives). The authors conclude that all five perspectives need to be integrated to provide a holistic perspective for redesigning services to transform their company.

Part III: International and Multinational Design Interventions

Dr Mersha Aftab and Professor Robert Young (Northumbria University) describe an action research intervention in Chapter 7 that includes the design and implementation of an empathic approach for using the Delphi technique to produce the data and dialogue required for more collaborative innovation practices within a multinational company. Their intervention case study illustrates how design innovation can amplify the empathic reach of planning tools for its participating stakeholders.

In Chapter 8 Les Wynn (University of Hertfordshire and HCL Technologies) discusses how HCL Technologies, a large Indian outsourced services provider, has shifted from a commodity-based to a value-based model using design and a refocus on the end user experience. This chapter also provides a wider window on the distinctive personalities and perspectives of Indian designers and how HCL has employed design thinking to be a cultural catalyst to mobilize their design staff to adopt a more user experience-based perspective on value creation.

Part IV: Aesthetics and Psycho-spatial Dynamics

In Chapter 9 Dr Marja Soila-Wadman and Professor Lisbeth Svengren Holm (both at the University of Gothenburg) provide an ethnographic study of how a Swedish trade union responded to an intervention that

drew upon artistic interventions to increase union members' creative skills. Design thinking interventions were subsequently employed to help artist trainers and trade union clients address their divergent values and work practices and co-create a more synergistic engagement that respected these differences.

In Chapter 10 Dr Laura H. Malinin (Colorado State University), Dr Alison Williams (University College Dublin) and Professor Katharine Leigh (Colorado State University) examine the role of workplace design in supporting workplace creativity. They employ their own theoretical framework 'The Disruption-Empowerment Model of Creativity and Performance' to examine how workplace creativity is fostered through an in-depth case study of the SPIRES network, Supporting People who Investigate Research Environments and Spaces.

Part V: Design Capabilities

In Chapter 11 Dr Karla Straker and Dr Cara Wrigley (both at QUT) examine the role of customer emotion in innovation by a comparison of two successful high tech companies (Apple and Samsung). They compare each firm in terms of three categories of innovation (configuration innovation, offering innovation and experience innovation) and conclude that a stronger engagement with customer emotions is needed in all three categories of innovation. This is a design capability that differentiates Apple from many of its rivals, including Samsung.

In Chapter 12 Dr Marzia Mortati and Dr Beatrice Villari (both at Politecnico di Milano) report their findings from a field study of European manufacturers' innovation practices and the design capabilities found within their diverse European innovation settings. They identify five types of design capability: design beginner; design adaptor; design expert; design explorer; and design enabler. Each capability type is identified for its appropriateness to specific contextual conditions facing the firm.

Dr Henning Berthold, Dr Shiona Chillas and Professor Barbara Townley (all at the University of Saint Andrews) conclude our volume in Chapter 13 with findings from a Scottish innovation initiative (Sandpit) to engage a community of research scholars to explore how to inject innovation into contemporary science. They report the influence of design thinking-based workshop practices as an exploratory process for the generation of new knowledge and as a mechanism for transforming this new knowledge into artefacts that are responsive to user demands and needs.

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