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Reflecting Contemporary Design Research

Abstract

In recent years, design research has been the object of growing attention in universities and academies around the world. The present paper addresses the heterogeneous character of design research and the current need for reflection on the various approaches and interests. For this purpose, the paper follows two steps. First, it proposes a categorisation of the field in the form of a position model. The paper's underlying assumption is that design research as a discipline exists in many different forms that cannot necessarily be brought together under one common academic research tradition. Therefore, it is necessary to attempt to define the field in order to initiate discussions about what constitutes the various research bases of design. Second, the paper discusses the implication for future design research should it become an interdisciplinary field involving many disciplines, mind-sets and methodological practices.

Keywords: Design, design research, design theory, design method, theory of science.

Introduction

Design research is a growing discipline in much the same way that design is a growing field, incorporating many sectors and applications. Design, including design research, engages in, among others things, practice-based approaches in the social sciences, the humanities and engineering. From this starting point, very different methodologies and understandings of 'design' and design 'research' have evolved, and it may be difficult to meet on common grounds, though not impossible. This was instantiated at, for example, the recent 50th Anniversary Design Research Society Conference (DRS 2016) in Brighton, where tracks in innovation, practice-based experiments, design history, etc. not only existed side by side, but also cross-fertilised each other.

The design discipline serves as the basis for debate and the development of new theories, methods and concepts. Based on a broader perspective, however, design research has no established approaches or shared scientific foundations, as research necessarily develops in a number of different branches with specific subject areas and methodological practices. This raises the need to map and identify the various approaches. So far, however, there have been few attempts at summarising or taking stock across the various branches. This paper is intended as a step in that direction.

In what follows, a proposal is offered in the form of a position model concerning a specification of the disciplines, positions and mind-sets that make up design research. The model is based on a view of design research as a pluralistic and cross-disciplinary field that relies on many different disciplines and incorporates multiple scientific and methodological practices. The position model is presented, and three layers are defined. The first layer describes some of the disciplines that define design research today. The next layer describes key positions within design research, while the third layer describes some of the scientific mind-sets that have affected design research in recent years. On the basis of the model, the paper summarises a series of approaches within design research in relation to the phases 'in which design takes place', 'design on the market place' and 'the design object'. Subsequently, the paper takes up the discussion of how to conceptualise design research today as a multi-, inter-, trans-, or meta-disciplinary field. Can we, on the basis of the many approaches, speak of a singular design research; how do we approach the discussion?

Approaching Design Research

Design has traditionally been associated with the arts and the technical professions. In recent years, however, training in design schools has become increasingly research-oriented. Moreover, in several universities, design has been the object of increased research attention within the fields of business, humanities and the social sciences.

Since the early 1990s, cross-disciplinary understandings of design research have been gaining ground; in addition to dealing with design processes, these views also address contexts for the development and analysis of design as well as the influence of design on society and culture. In the mid-1990s, these cross-disciplinary approaches to design research became sufficiently consolidated that design researchers Victor Margolin and Richard Buchanan felt it was time to summarise and take stock. They undertook this task in the influential anthologies *The Idea of Design* (1995) and *Discovering Design* (1995). This initiative was followed, among other things, by the Common Ground conference, which were first held in 2002 and, subsequently, every second year. The cross-disciplinary approach has also been promoted by the journals *Design Studies*, *Design Issues* and *The Design Journal*, which address a variety of disciplinary approaches to design research.

These publications have analysed various branches of design research. Notwithstanding, there have been no attempts at a coherent mapping of design research across approaches. One of the most influential attempts at summarising a categorisation was made in 1993/94 by Christopher Frayling in the paper *Research in Art and Design*. Therein, Frayling distinguishes between ‘research into (or about) design’, ‘research through (or by) design’ and ‘research for design’. In Frayling’s terminology, ‘research into design’ is research based on approaches to design research in established academic disciplines, an example being design studies within an art history framework. ‘Research through design’ refers to an experimental practice whereby means of design objects and methods lead the research process. ‘Research for design’ aims to develop new design models and represents a category of the development effort itself, including experiments and proposals and research-related reflection on experiments and proposals. Frayling does not explicitly mention the OECD terminology, but there are certain parallels between his categories and the OECD’s categories of basic research, applied research and clinical or practice-based research. The term *basic research*, as a category, includes the development of theory and concepts and matches Frayling’s ‘research into design’. Applied research is focused on the development of methods aimed at particular practical applications, matching Frayling’s ‘research through design’. Clinical research is aimed at converting theoretical knowledge into concrete applications and is closely related to Frayling’s ‘research for design’.

In recent years, other design researchers have presented proposals for mapping the forms and subject fields of design research (e.g. Bayazit, 2004; Grand & Jonas, 2012; Galle, 2014). According to Bayazit (2004), subject areas are defined as: ‘construction as a human activity, how designers work, how they think, and how they carry out design activity’ (p. 16). The subject area of design research is defined as the interest in an end-result of a design effort: ‘how an artificial thing appears, and what it means’ (...), and in the systematic search for or acquisition of knowledge in relation to design and the design activity (Ibid). Grand and Jones (2012) define the subject areas of design research as a ‘trans-domain’ in the continuation of the ‘convergence of scientific and designerly approaches’ in knowledge generation, with respect to different outcomes and based on the hypothesis of a common designerly core (p. 3). According to Per Galle (2014), the field of design research can be divided into two main categories: 1) ‘usage oriented design theory’, including design theory about design processes, design products and premises for the development of design, and 2) ‘scientific and meta-theory-oriented design

theory’ about research and theory-based approaches to design – the theory that design research produces when it investigates its own knowledge and theory production (p. 66).

Frayling’s (1993/94) categories and the more recent studies contribute to the discussion regarding what constitutes the scientific basis and theoretical-methodological practices of design research, but they do not offer a general picture of specific areas and research positions. In what follows, a proposal for a mapping effort is presented. The presentation acknowledges the complexity of the field. The academic purpose of the model is not to pretend to offer an exhaustive cartography or to privilege certain positions over others but, rather, to point out essential landmarks in the complex terrain of design research, with a view to discussing the underlying research theory that forms the basis of the design discipline.

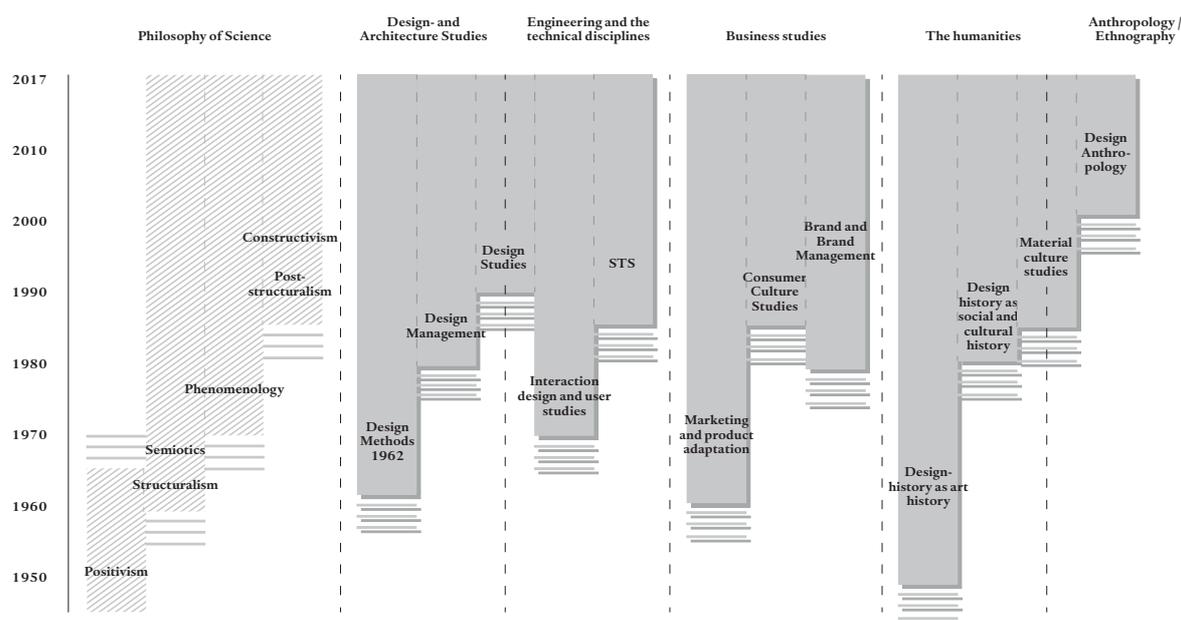


Figure 1: The position model is divided into two sections. The right section consists of a two-dimensional space; the first level concerns the disciplines that conduct design research; while the second level represents key positions within design research. The left part of the model describes some of the mindsets that have influenced design studies.

The Position Model

The model was originally developed for use in a post-graduate master’s programme offered by the Danish Centre for Design Research and The Royal Danish Academy of Fine Arts at the School of Architecture in Copenhagen. The master’s programme employs a cross-disciplinary approach and involves many disciplines and areas of expertise. The model was developed to take stock of the various disciplinary and scientific contexts reflected in the curriculum literature. The purpose of presenting the model in a paper is both to make it available as a model that can be used in other forms of education and to offer it as a basis for a discussion about what constitutes the scientific basis and research perspectives of the design discipline.

The model is divided into two sections (Figure 1). The section on the right consists of a two-dimensional space, while the first level of the space concerns disciplines that carry out design research. The disciplines from left to right represent design disciplines. They are anchored in the schools and academies of design and architecture: the technical disciplines, including engineering, material technology, computer science, software development, etc.; the mercantile disciplines, including marketing, consumer studies, etc.; the humanities, including

design studies from the perspective of art history and cultural studies of design, and anthropology/ethnography, including the material culture studies of design.

The second level of the model presents the key positions within design research. The positions are placed within the discipline where they have their main historical roots. The descriptions of the positions explain that they often involve several disciplines. The positions are labelled design methods, design studies, design management, interaction design and user studies, science and technology studies (STS), marketing and product adaptation, consumer culture studies, brand and brand management, design studies from the perspective of art history, culture studies, material culture studies and design anthropology.

The left level of the model describes some of the mind-sets—directions or paradigms within philosophy and the theory of science—that have influenced design studies in recent times, from positivism over semiotics and structuralism to phenomenology, post-structuralism and constructivism. The mind-sets are placed in descending order of influence on design studies. Thus, they specify a sort of chronology, with the awareness that they often co-exist as competing views and that their origin dates back further than the emergence of their influence on design studies.

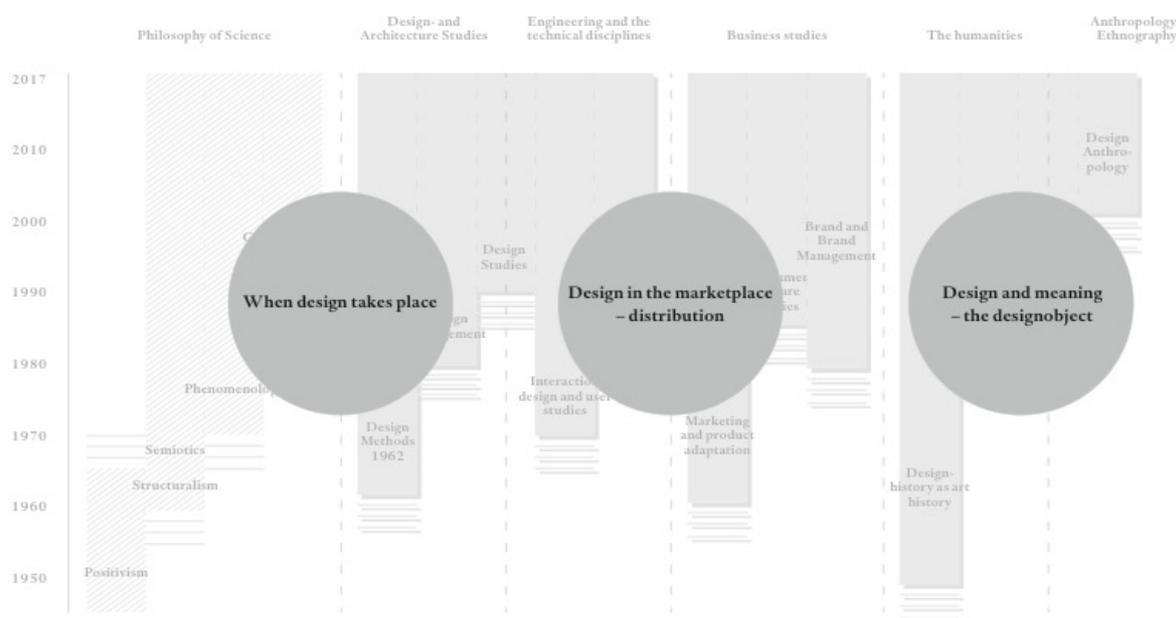


Figure 2: Subject fields of interest in research.

From left to right in the right section of the model, the columns represent research originating within design schools, academies and the technical sciences. These research forms are typically characterised by practice-based research and applied research (‘research for’ and ‘research through design’). The research focus is on the design process and what might broadly be called aspects concerning ‘when design takes place’.

The columns in the middle section represent research originating within the mercantile and business disciplines. The main subject field for research here involves conditions, methods and frameworks for design management and distribution/marketing, and the research forms are mostly basic and applied (‘research into’ and ‘research trough design’).

The columns in the right-hand section represent design studies within the humanities and are anchored in art history and modern culture studies. The subject field of research involves design objects/products, their function and interaction with consumers and their cultural contexts. The

research approaches are mostly characterised by basic research ('research into design'). The right-hand section also contains a rather new field of study, design anthropology, which is anchored mainly in anthropology studies, with strong interactions with method-oriented design studies. The columns are depicted with dotted lines to illustrate their openness and the fluid transitions between disciplines and positions.

In summary, the section to the left of the right section of the position model relates to questions concerning the creation of design or when design takes place (the process leading up to the end result). The middle section concerns the distribution of design in relation to the marketplace. The right-hand section concerns design objects and their context and are oriented towards the understanding of design and meaning (Figure 2). In what follows, therefore, the positions will be described in an outline form in order to create a basis for understanding the variety of contemporary design research. A more elaborate depiction of the positions has been presented elsewhere (Engholm, 2011). In conclusion, the description forms the basis for reflections on the scientific basis of design research.

When design takes place

Design methods, design management and design studies

Design methods are one of the oldest and most high-profile design research directions and are characterised by an emphasis on design processes. Historically, the interest in understanding the design process and developing scientifically-based methods for use in design can be traced, for example, to the De Stijl movement and the Bauhaus school in the early twentieth century, where the methodological basis for design work was discussed and developed from various points of view.

In the late 1950s, studies of design methods attracted growing interest, and in 1961, the first conference on design methods was held in London, organised by J. C. Jones and D. G. Thornley. Cross (1984), Lundequist (1992) and others mark the conference as the beginning of the design methods direction. Thus, in the position model, this point in time marks the establishment of this direction. The declared goal of the conference was to promote a broader understanding of the role of design in industrial society and to establish institutionalised practices for knowledge sharing within the field of design. In 1967, the Design Research Society was founded by participants from the design methods conference, among others, and in keeping with the conference theme, the society was concerned with the study of and research into the process of designing in all its many fields (Jones & Thornley 1963).

Within the design methods movement, several generations have been identified (see, e.g. Bayazit, 2004; Cross, 1984, 1993; Engholm, 2012; Lundequist, 1999). Through generations of methods, a shift can be observed, as attention moved from methods to the contexts and conditions for design development. Scientifically, this is reflected in a shift in the mindsets affecting methods research. First-generation methods emerged under the influence of positivism, which is reflected in the rational and empirical approaches to the process characterising the methods as well as in the perception of methods as a rational tool for managing complex tasks. The position model depicts second-generation methods as having been influenced by mindsets such as semiotics, structuralism and phenomenology. This is reflected in the recognition within methods of the arbitrary nature of meaning and the influence of context on the production of meaning, as expressed in the importance that this research direction attributes to the influence that users and society have on the design process. The position model indicates that third-generation methods were developed under the influence of the scientific emphasis of the time on contextual and situative aspects. In terms of methods, this is reflected in an interest in the designer's knowledge and in an acknowledgment of the situative character of the design process and the design task. In third-generation methods, theory is no

longer supposed to prescribe the components of an ideal design process but should instead provide the tools to describe the components of the process and to create awareness of the circumstances that determine the course of the process in its entirety (e.g. Lawson, 1980/2005).

Certain subject areas develop as part of the research activities that characterise design methods. This includes, for example, those aspects of *process studies* that concern design process management and design methods as a tool for strategic business development. In 1986, the Institute of Design (ID) at the Illinois Institute of Technology launched the newsletter *Design Processes Newsletter*, which, in addition to focusing on research approaches to industrial design processes, also deals with design management as an emerging discipline. As a practice discipline, design management has historical roots dating back to the early twentieth century when principles concerning corporate identity and corporate design were developed by companies such as AEG and Olivetti in a trend spearheaded by the designers Peter Behrens and Marcello Nizzoli.

Design management is depicted as an independent column in the position model, but the dotted lines around the column represent the loose boundaries with the other positions in the model. Design management has a primary link with design methods, which gives rise to many of the methods and practices on which it rests. In addition, design management draws on insights from the mercantile disciplines, organisation theory, branding theory, management theory, etc. (see, e.g. Cooper & Junginger, 2009; de Mozota, 1990, 2006; Junginger & Faust, 2016). The location of design management in connection with design methods studies can of course be discussed, and it shows the relative positioning of the different fields. However, the goal of the article is not to affix study areas to specific research fields, but to point to some tendencies in order to create an overview of positions within design research.

The third 'column' in the position model has been labelled *design studies*, a general term for a diverse and cross-disciplinary academic project that includes publications, conferences and journals. Design studies grew out of the Design Research Society, which was founded as an extension of the design methods conference in 1966. It was later consolidated through the journal *Design Studies*, which was launched in 1979 and was based in England, and through *Design Issues*, which was founded in 1984 and was based in the United States. Like design methods, the design studies direction has a particular focus on design processes and methods, but it has broader and closer links with design studies, which involve analyses of societal and cultural contexts for design, design history, material culture, participatory design, co-design and design anthropology as well as meta-theory issues concerning the development of a theory of science and a professional terminology for the field. Design studies capture research with approaches from design, architecture, technology, the humanities and the social sciences in a more or less pure or cross-disciplinary form (Jensen, 2001, p. 23).

Since the late 1990s, a form of consensus seems to have evolved, which suggests that the long-term objective of design studies is to establish design research as a field of research that is not anchored strictly in the humanities, the social sciences, the natural or technical sciences or, for that matter, in a cross-disciplinary understanding; instead, it constitutes a new form of research and knowledge that is specific to design – a certain form of *design knowledge* (Cross, 1999, p. 5; Jensen, 2001, p. 25). Thus, an important question for design studies activities is what characterises the designer's particular competences. To a large extent, therefore, research has been aimed at finding the best way to strengthen and define the new role of design by developing design knowledge that is simultaneously its own object, method and objective (Cross, 1999, p. 5).

Interaction design and user studies and STS are characterised as having historical disciplinary roots both in design schools and in the technical sciences. With the awareness that the fields differ regarding their historical background and current status, the term *interaction design and user studies* is used to capture areas such as ergonomics, including studies in

ergonomics relating to the development of physical products (e.g. Granz, 1998; Pheasant, 1988; Tilley, 1993) and HCI (human-computer interaction). Among them, there are mainly cognitive psychologically-based research in human information processing and users' interactions with computer interfaces (e.g. Card, Moran, & Newell, 1983; Kim, 2015; Norman, 1986; Sears & Jacko, 2002) and usability studies comprising research in the efficiency, utility and satisfaction of primarily digital systems (e.g. Benz, 2015; Jacobsen & Jørgensen, 2000; Laurel, 1991; Mayer, 1999; Nielsen & Molich, 1990). A common feature of the fields is their historical roots in computer science and user studies in connection with the development of both physical and technological interfaces and technology-based environments. Among other influences, this research is inspired by and engaged in dialogue with the integration of users as characterising design methods research.

Among other technically-oriented disciplines, the research field of STS has been included in the position model because this approach, with its emphasis on technological innovation, society and culture, is relevant to the field of design. Moreover, it has gained influence in design schools and academies in recent years. It addresses socio-technological phenomena ranging from curiosities in the lab over everyday artefacts to complex socio-technical systems. The emphasis is on the interaction between people and technologies and on their mutual effects on each other. Thus, STS replaces the conventional view of technology as a set of neutral tools and, instead, views technologies as equal actors in a network of interactions. In relation to design research, STS has proven relevant, for example, in discussions of how material artefacts and technologies mediate our actions and perceptions of the world (Verbeek, 2005) and in analyses of the social factors that condition the involvement of users in, for example, participatory design (e.g. Bannon & Ehn, 2012) and co-design (e.g. Andersen, Halse, & Moll, 2011; Binder et al., 2011; Brandt & Gregory, 2008). The interest in STS has also led to an orientation to the related actor-network theory (ANT) in descriptive analyses of relations among objects, technologies, people and systems and in mapping the conditions for the creation of design. The ANT approach, whose main figures are Bruno Latour (1987, 2005), Michel Callon (1986) and John Law (1999), is described as a 'material-semiotic' method that focuses on relations between things and concepts from the assumption that many relations are both material and semiotic. ANT tries to explain how material-semiotic networks come together to act as a whole. The interest in STS within design studies may be seen as a general expression of an interest in the social-constructivist understanding of society and in the production and distribution of knowledge and artefacts. In the position model, STS is placed within the field of design schools and the technical sciences. However, as STS also relates to and draw on social science, humanities and anthropology studies, it could also be positioned within these areas. The cross-disciplinary character of many of the described research areas points to the problem of reductionism in mapping the field of design research.

Design in the marketplace: Marketing and product adaption, consumer culture studies and brand and brand management

Marketing-oriented design studies are mainly anchored in mercantile and business studies and focus on aspects concerning the management and distribution of design in the marketplace and in relation to consumers. Several of the research efforts in these areas do not consider themselves as examples of design research, but they have been included in the model because they have influenced design studies in a variety of ways. Moreover, the claim here is that they ought to play a role in a future design research field via studies of management, organisation, business development and marketing, which are all relevant disciplines in relation to design.

The position model identifies three columns representing approaches to mercantile studies that are relevant to design. The first column is labelled *marketing and product adaptations*. This is not an established direction as such, but it is used here as a general term

for research on product adaptations in relation to the marketplace and consumers. The emphasis is on research into consumer behaviour, and behavioural decision theories (BDT), consumer information processing theories (CIP) and other theories contributing to the establishment of a research practice for consumer studies. BDT developed in the 1950s under influence from experimental psychology and behaviourism and are characterised by controlled experiments aimed at uncovering consumer behaviour (e.g. Dichter, 1960, 1964; Kotler, 1965). In the early 1970s, these theories were replaced by cognitive approaches to consumer analysis, which were aimed at identifying principles and general value behaviour hierarchies (e.g. Bettman, 1979; Howard & Sheth, 1969). A common feature of both BDT and CIP is that they largely view consumption as the answer to basic needs (e.g. the need for food) and consumers as problem-solvers who act on the basis of perceived needs or possibilities (Pachauri, 2002). In this utility-maximising perspective, the point of consumer products is to address consumers' problems and meet their fundamental needs. The main purpose of such studies is to identify the psychological and cognitive processes that condition specific consumer choices; thus, the focus is mainly on consumers and less on the products that directly or indirectly affect consumer behaviour.

In the late 1980s and early 1990s, behaviourist and rational approaches came under pressure from new types of studies with new theoretical points of departure. These new approaches have been referred to under the collective term *consumer culture theory* (CCT) (see, e.g. Arnould & Thompson, 2005). In the position model, these approaches are visualised as an independent column, which marks a shift in terms of academic understanding and the theory of science in relation to earlier consumer studies. CCT addresses cultural aspects of consumption, with an emphasis on consumer behaviour and the meaning the production of consumer objects. Instead of looking for psycho-rational arguments and systems of consumption, CCT seeks to define consumer subjects based on consumers' relative and context-dependent reality. The attention is focused on what might be called the general life of a consumer or the specific consumer culture (e.g. Østergård & Jantzen, 2000; Volker, Bartl, & Biel, 2011). The emphasis is on consumers' creation of subjective meaning in consumer situations as well as on their contribution to the community discourse of which they are part. There is also a growing emphasis on *relations*, both between consumers and products and among consumers.

The two columns describe an academic development in consumer behaviour studies from experimental and cognitive psychology to consumer research based on the humanities and ethnography. In line with developments in design methods research, therefore, consumer studies have assumed a shift in objectives, away from the goal of developing general, universal principles of consumer behaviour and towards the recognition of the dynamic and situative character of consumption. In the new studies, the consumer's values are viewed as dynamic and variable (e.g. Holbrook, 1999). The new consumer is deemed unmanageable (Gabriel & Lang, 1995; Jessen & Langer, 2012), and consequently, entirely new approaches are required to grasp the relationship between consumer values and product characteristics.

The third column in business-oriented studies is labelled *branding and brand management*. Here, the research topic has to do with the efforts of companies and organisations to brand products for specific markets and to brand companies to achieve a match between products and company. In line with design management, these studies have their historical roots in practices relating to the development of corporate identity, but since the 1980s, brand management has developed as an independent business discipline (see, e.g. Heding, Knudtzen, & Bjerre, 2009).

With regard to the relevance of business-oriented marketing studies for design studies, the boundaries between design management and brand management have historically been loose; since the 1980s, brand management has grown in influence, thanks to its associations with more established mercantile research disciplines such as management, organisation and marketing theories. Design is often viewed as a subordinate discipline in relation to branding,

whose primary purpose is to serve as a means of differentiating a company's products and corporate identity. However, there is no doubt that brand management could learn from design management by implementing design methods as part of companies' business and brand development efforts. Conversely, design management could learn from brand management by incorporating insights and methods relating to management and business and organisational development in design development (see also Cooper, Junginger, & Lockwood, 2013; Johansen & Holm, 2006).

There are similarly loose boundaries between the interest in production communication within business studies and the humanities and the attribution of meaning that products give rise to on the consumer level. Even if consumers and branding studies do not have design as their primary area of interest, this research is nevertheless interesting in a design context because it contributes knowledge about design management processes, the distribution of design in the marketplace and consumption contexts.

Design and meaning

Design research in the humanities, which is represented by the columns in the rightmost side of the right section of the position model, is characterised by a focus on design history and analyses and interpretations of contemporary design objects or phenomena. It is carried out within the fields of art history and culture studies in universities and museums and is focused on design and material culture. Several historiographic outlines have been published that describe developments in design history research (see, e.g. Dilnot, 1984; Fallan, 2010; Jensen, 2001; Margolin, 1989). Several summaries point to Nicolaus Pevsner's book *Pioneers of the Modern Movement* from 1936 (later renamed *Pioneers of Modern Design*) as the first publication on design history. It is characterised as being anchored in art history and, consequently, bases its analyses on methods from art history, including, for example, stylistic categorisations and normative, 'canonising' interpretations of objects or 'works'. In the position model, design history in the framework of art history is represented by an independent column that begins with Pevner's publication, which is still viable today, as several design history treatises are based on methods from art history with regard to the presentation of works and objects.

Several analyses of design historiography point to the establishment of the Design History Society in 1977 and the launch of the *Journal of Design History* in 1988 as key events leading to the consolidation of design history as a discipline in its own right (e.g. Fallan, 2010; Walker, 1989). The Danish design researcher Hans-Christian Jensen (2001) proposes a genealogy for design history research, whereby first-generation design history research begins with the establishment of the Design History Society. First-generation design history is characterised by a broader field of study than the traditional design studies framed within art history. In these studies, the object field of analysis is expanded by focusing on cultural and social contexts for design development and consumption (Forty, 1987; Heskett, 1980, 2002, 2005; Walker, 1989). In the position model, first-generation design history is labelled *design history as social and cultural history* with reference to the academic framework of the studies.

Second-generation design history emerged in the late 1980s and is characterised by its inspiration from anthropology, ethnography and modern material culture studies. A key individual here is the anthropologist Daniel Miller (1987), whose book *Material Culture and Mass Consumption* makes him a leading figure in the articulation of ethnographic and anthropological research on material objects and consumption as salient features in the cultural exchanges of modern Western societies (see also Miller, 2008, 2010). One of the common characteristics of the new design studies is the holistic perspective applied to the investigation of the cultural circuit of production, distribution and consumption within an aesthetic or cultural field. Another common feature is the interest in everyday life. Scott Lash and Celia Lury's (2007) book *Global Culture Industry: The Mediation of Things* is another example of the

material culture lens that enables a holistic view of the development of cultural objects, from production and distribution to marketing and consumption. Empirically, a ‘follow the objects’ approach was introduced with inspiration from anthropology and material culture and was used in an analysis of seven different cultural objects, including the film *Toy Story* and the brands Nike and Swatch, which were followed on their journey through networks in the global marketplace and a variety of consumer contexts.

Humanities-based design studies reflect a development from a relatively narrow concept of design, focused on the ‘inherent’ (artistic) characteristics of design objects and their form, materials and production methods, to an expanded perception of design as part of the cultural and material culture whereby the subject field of research has been expanded to include the complex contexts for production and consumption into which design objects enter.

In the position model, humanities-based studies are covered under the label *design and meaning* (Figure 2). Several design studies are characterised by combining the study of meaning with other research areas, such as marketing studies, where semiotics and the study of meaning play a role in consumer studies or design semantics, exploring the impact of context on the meaning of design objects. Design semantics was introduced and developed by Klaus Krippendorff, who combines insights from engineering and systems sciences, communication, interaction design, cognition theory, social sciences and semantics, among other areas, in a study of meaning related to design that explores how people attribute meaning to objects and artefacts and, consequently, how they interact with them. Here, the focus is on the cognitive and social context in which the use of objects is embedded (Krippendorff, 1995, 2006).

Within the newly emerged field of design anthropology, we also see an interest in the social dimensions and cultural interpretations of design, here with a focus on design as a social process and on collaborative and interdisciplinary approaches to material engagement through practices of future making. Design anthropology has developed in close interaction with design methods studies as well as with an anchoring in participatory design and co-design. The participatory design approach developed from the Scandinavian cooperative design tradition in the 1980s, a movement which began to focus on collaborations between labour movements and academia in supporting stakeholder involvement in the design of work environments, e.g. computer supported workplaces (e.g. Ehn, 2008; Ehn & Kyng, 1987). Co-design has evolved as part of the so-called ‘ethnographic turn’ in design methods, and today, the term generally refers to the creativity of designers and people not trained in design, working together in the design development process (Sanders & Stappers, 2008). Within the field of design anthropology, the focus is on opening the lines of inquiry during collaborative forms of design developments within interdisciplinary or inter-organisational processes and co-analytic activities (e.g. Gatt & Ingold, 2013; Gunn & Donovan, 2012; Gunn & Smith, 2013).

In line with the other positions, a scientific shift in influence within both humanistic and anthropological studies can be observed as moving away from positivism and structuralism and toward phenomenology, post-structuralism, social constructivism and other mind-sets that have come to influence design, including feminism, post-colonialism, perception theory, cognition theory and ANT. In humanistic-based design research, changes in scientific approaches have engendered a shift from design objects to design contexts and an analytical shift in attention from the *what* of design to the *how* of design, from the object itself to the way in which it is treated and addressed. In design anthropology, the interest in the social and cultural dimensions of design similarly reflects a growing focus on eliciting the meaning of design objects and how design can be a site for cultural production and change in society.

Design research – Singular or plural?

As illustrated in the position model, there are multiple approaches to and perceptions of what design research is and what it can be used for. The various approaches each claim their own justification and unique methodology. Positions anchored in design schools and the technical sciences share an interest in design processes and methods. Mercantile studies focus on management and market contexts for the distribution of design, while humanities-based studies focus on the historical and cultural conditions for the creation and acquisition of design.

Nevertheless, can we say that any specific position constitutes the core area of design research? Representatives of the design methods movement view design research as the study of design processes and thus consider the approaches and subject areas from other disciplines to be secondary. The field of design studies similarly requires design research to be more or less directly relevant to and founded on practice. It makes particularly good sense for a practice-based discipline to aim research at the design process and its practice of giving shape, generating proposals and conducting development work. However, the context for design today is so cross-disciplinary that it is difficult to define exactly how far one should venture into the terrain of other disciplines. Richard Buchanan (2001) has thus described a ‘central dilemma of the new design research’: “What is the nature of a discipline that brings together knowledge from so many other disciplines and integrates it for the creation of successful products (...)?” (p. 17).

One way of approaching this question is to define a ‘core’ of design research. In line with design methods, Per Galle (2010) offers a possible answer to this question by defining process- and product-oriented theory as the core of the design discipline and as the unique, ‘private’ subject field of design research, while context-oriented design theory can offer relevant approaches from design researchers as well as researchers from other fields.

Another approach is to focus on and discuss the various positions in design research and to acknowledge that design can be approached from many directions: from practice, social sciences, humanities and engineering. No single discourse or approach has privilege, in the same way that no single discourse or kind of institution can lay claim on what ‘design’ is. Instead, the positions in the common field of ‘design’ should be stated and reflected; thus, we need to clarify, map and specify common frames of reference and terminologies, that may serve as the basis for discussions within the individual positions, while also facilitating dialogue across disciplinary boundaries and positions.

To that end, it is essential to develop an awareness of the disciplines and approaches in which design research is historically rooted as well as of the main and auxiliary disciplines that define this field. Here, the position model may serve as a tool for developing an overview of current research fields and approaches and the boundaries between positions, although the distinct columns of the model obviously do not reflect the loose boundaries that characterise the real-life situation. Since the 1960s, we have seen a development in mind-set from positivism to constructivism, which has led to an increased focus on the influence of context and subject on knowledge production and design development. At the same time, developments within the positions in the model also describe trends that go across research fields, including, for example, the growing emphasis on contextualisation that has led to an analytical shift away from processes and objects towards contexts for development, use and consumption. In the end, a ‘general design theory’ (Friedman, 2005, p. 7) needs to be heterogeneous.

Thus, a productive approach to design research can be to ask how it operates with or across disciplines. When disciplines meet and mix, and when different perspectives, methods and disciplines cross paths, we often use the term cross-disciplinary. The literature often draws a general distinction between two forms of cross-disciplinary research: ‘*multidisciplinary*’ research, which is research that involves participants from a variety of disciplinary

backgrounds, and *'interdisciplinary'* research, which involves shared subject or research topics as well as some degree of synthesis, integration or merging of the methods, theories and concepts from the various disciplines (Bleviss & Stolterman, 2008). Additional terms are *'transdisciplinarity'* and *'metadisciplinarity'*. Transdisciplinarity can be defined as an approach that is not focused on methods or areas of expertise but rather on the broader purpose of transcending disciplines, common methods and associated knowledge domains as a basis for exploring issues or tasks. Tasks are addressed through the integration of skills; this serves to mobilise theoretical perspectives and methods, but in contrast to multi-disciplinary or interdisciplinary projects, this approach does not necessarily involve disciplinary preservation or the development of new disciplines. Meta-disciplinarity takes a perspective from above all disciplines.

In design research, it makes sense to use both of the terms *'interdisciplinary'* and *'transdisciplinary'*, since they involve disciplines with similar subject areas and fields of interest, including consensus-building efforts involving a variety of disciplines. Design research is characterised by both integrating and creating collaboration between the methods and theories of multiple disciplines, often including disciplines that may seem only remotely related when seen through the lens of classic academic history, such as the natural sciences, social sciences and humanities. At this point, design research is still developing within a variety of disciplines and with a variety of practices, but we are also seeing the beginnings of a dialogue that reaches across disciplinary approaches.

Epilogue

In a future development of the model, further positions might also be added; for example, areas such as innovation, service design, design for sustainability and critical design are not addressed in this context but would have obvious relevance in the model. Similarly, the paper has mainly focused on British and American design research. Future developments of the model should also include approaches and references from other regions. Moreover, the paper has only touched indirectly on specific disciplines associated with research such as graphic design, industrial design, furniture design, etc. Similarly, it only offers a limited treatment of philosophical or epistemological topics regarding the ways of perceiving and interacting with the world in relation to design – topics that could also be exemplified or elaborated.

Further, one can discuss the value and feasibility of splitting design research into categories when much of it (as stated earlier) is inter- and even trans-disciplinary. The position model in Figure 2 could also be criticised for mirroring a traditional production-distribution-consumption process, thereby excluding aspects of design studies that do not fit into this framework, e.g. design for mass customisation, design for sustainability, systemic design or critical design. In a future model, critical design could represent a third axis, as the whole discourse on user participation, diffuse design, new/production/consumption models represents a critical and alternative approach to the areas charted in the model.

Much can be done; the anticipation is that the present position model can help chart the domain of design research by offering, if not a complete cartography (for this purpose the model is still too rudimentary), then a set of important landmarks that can be employed, not in stating a *'core'* of design research, but in reflecting its scope, methodologies and movements in and across disciplines.

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