The understanding And Use Of Design In The UK Industry: reflecting on the future of design and designing in industry and beyond

Ricardo J Hernandez*, Rachel Coopera, Jeyon Junga

aLancaster University, ImaginationLancaster, United Kingdom
*Corresponding author e-mail: rjhernandez@uniandes.edu.co

Abstract: During the last decades design has been expanded as a discipline and conquered new territories. This expansion has been the cause and also the consequence of an evolution in the way design is understood and used. Multiple reasons support this transformation, the emergence of new challenges of global scale in areas like sustainability, healthcare, and urban life amongst them. These global challenges require all disciplines embrace collaborative approaches. Design hasn’t been alien to this process; on the contrary very interesting perspectives have emerged. The purpose of this paper supported by recent research carried out in the UK is to open a space for discussion about the definitions of design found in academia in areas like sustainability in comparison with the definitions businesses give to design today. We believe having this discussion is very important for the future of design and designing in industry and beyond.

Keywords: future of design, sustainability, complex problems, global challenges, design definitions

1. Introduction

Design as a discipline has being expanding its influence beyond what we might consider as the traditional domains of for instance product development and aesthetics (Cautela, Deserti, Rizzo, & Zurlo, 2014). This expansion has created overlaps with other sciences and disciplines that are not a coincidence; on the contrary they have been a response to emerging complex problems in areas such as sustainability, health and wellbeing, urbanisation, and security (Manzini, 2014; Margolin, 1998; Morelli, 2015). Collaborative action from different fields has proved to be very important to achieve innovative, effective, and sustainable long-lasting solutions in those areas (Hofman & De Bruijn, 2010). Design has gained an important place in these collaborations, thanks partially to new understanding and applications exploiting the idea that design goes beyond styling activities, it is for example a mechanism to articulate people, ideas and processes within a system; a thinking process;
a human-centred approach; and a creative way to solve wicked problems (Bertola & Teixeira, 2003; Junginger, 2012; Verganti, 2006).

However, it is interesting to question how shared these various understandings and uses of design at the edges of the discipline are among businesses today. In the end, businesses are one of the most influential actors and key partners in the search for a more sustainable and joyful future, therefore knowing how design is perceived and used in industry is crucial for the future of design; especially for the roles it can play facing complex emerging challenges.

In this context, the purpose of this paper supported by recent research carried out in the UK, is to open a space of discussion about the definitions found in academia mainly within projects in areas like sustainability in comparison with the definitions and uses businesses give to design today. The shape of design as a discipline, even more than in other fields, has been defined by the work that spans the boundaries between research and practice. To recognise how far or close the perceptions of design are between academia and practitioners it is not only interesting but also it is vital to reflect on the future of design and designing in industry and beyond.

In the following sections we present first, a brief argument of how the emergence of global challenges in areas like sustainability has influenced the evolution and transformation of how design is understood and used mainly in the academic world, and secondly a set of selected results from two surveys recently carried out in the UK. With the first one we illustrate the perception of a group of design practitioners and design academics about the current areas of application of design and the evolution of the discipline. With the second one we present a broader view from a large group of UK businesses about their understanding and use of design, its importance for their companies and the commitment they have to it. Finally, we wrap up the ideas in an open discussion about the alignment between the definitions and uses given to design in academia and in industry in relation to the future of design and designing.

2. Global challenges and new understanding of design

Design has experienced a profound transformation from traditional definitions and uses strongly attached to product development and aesthetics to current perceptions where design is presented for example as a thinking process (Brown, 2008; Carlgren, Elmquist, & Rauth, 2014; Clark & Smith, 2008; von Stamm, 2011) or as an integrator of people, spaces, knowledge, and functions (Abbing & van Gessel, 2008; Borja de Mozota, 2003; Walsh, 1996). Global challenges in areas like sustainability, health and wellbeing, urbanisation, and security has been one of the forces driving the evolution of design beyond styling and aesthetics (Margolin, 1998). Recent studies and projects in some of these areas have shown the potential of design to develop innovative and efficient solutions that respond very well to social and environmental issues (Jegou & Manzini, 2008; Manzini, 2014; Ryan, 2013; Vezzoli & Manzini, 2008). In many of those projects it is possible to see how design is not longer only attached to the definition of product properties or aesthetic features; it is much more even if it is not always clearly defined.

Taking as an example the work done in the area of sustainability, design has been a fundamental element in the discussion more or less from the beginning. Initially as a recipient of the criticism to the type of products and manufacturing processes society has produced and used during the last century, and more recently seen as a source of opportunities for change (Margolin, 1998). Design is at the centre of the idea that it is possible to satisfy our needs without destroying the possibility for future generations to do the same being socially and environmentally responsible. Different approaches to achieve a sustainable future have been built based on the premise that it is essential
to design better products, better services, but above all design better ways to satisfy our needs (Brezet & van Hemel, 1997; UNEP, 2009). Doing a quick exploration of those different design-oriented approaches in what we can call a new territory of design for sustainability shows the evolution of the understanding and uses of design motivated by development of these approaches.

Some of the first approximations developed in this area like eco-efficiency and eco-design appealed to design products reducing the amount of raw materials, eliminating hazardous substances or decreasing the among of energy used to manufacture and to operate those products, between other principles (Bhamra & Lofthouse, 2007; Brezet & van Hemel, 1997). Other similar approaches like cradle-to-cradle aim to eliminate the concept of waste trying to implement a design and production culture where all surplus of materials or even the products themselves after use become the raw materials for new products (Braungart & McDonough, 2002). Later came other perspectives like design for sustainable behaviour appealing to change the behaviour of the users embedding in the design of the product features that can provide feedback or motivate sustainable actions by the users (Lilley, 2009). Despite that most of these approaches are still linked to the traditional idea of production of physical objects, in some of them the role of design fixing features in the product from a functional or aesthetic point of view is starting to be replaced or complemented by the idea that design can influence the production of knowledge associated for example to how people use a product or how it should be ‘discarded’. Design started to be used in these approaches in non-traditional ways.

More recent developments have migrated from the product level to systemic perspectives in which the design of environmentally friendly products is not enough. In these approaches it is recognised that the challenges society is facing associated for example with loss of biodiversity, social inequalities, poverty, decrease and extinction of natural resources, and very uncertain scenarios of production and consumption, require systemic solutions in which products, services, information and infrastructure act together (Manzini, 2014; Ryan, 2013; UNEP, 2009). Design in these approaches has been used not only to define the products, but also the services, the interfaces between multiple actors in the system, and finally to design the complete systems (Hernandez-Pardo, Bhamra, & Bhamra, 2012; Manzini & Vezzoli, 2002, 2003; Mont, 2002). New areas of application have been strongly influenced by this transformation of design like service design, social innovation, or product-service systems. This shift from design-oriented approaches working at the product level to approaches working at systems level is one example of how the necessity to have better tools to face the type of challenges we are facing nowadays, in this case in the area of sustainability, have motivated an evolution in how design is defined and used, at least in academic and research environments.

Recently a comprehensive framework that summarises many of the approaches developed in the area of design for sustainability, beyond the ones discussed above, was presented by (Ceschin & Gazilusoy, 2016). In this framework it is possible to see the transformation explained before of how design has been understood and used during the last thirty years in this particular area, from approaches focused on the product level to approaches where design is used at a socio-technical system level. These multiple levels have required different definitions and understandings of design, implying also different contributions of design to achieve a sustainable way of living.

One of the questions that emerge after this brief exploration of the approaches developed in the area of design for sustainability and the evolution of the definitions and uses of design in this area, is how much these definitions and uses of design at the edge of the discipline are also shared by practitioners, by businesses. Beyond the important role of some design-oriented or design-conscious businesses like Google, IBM, Unilever, Renault, Apple, Nike and Philips in the transformation of
design (Muratovski, 2015; Rae, 2013); the reality is that these businesses are more the exception than the rule. They are design-driven companies that have been investing and believing in design for a long period of time but the majority of small and medium businesses are not necessarily in the same situation. For this reason it is very interesting to question beyond these design-driven organisations what is the broad understanding and uses of design in industry in relation to areas of global relevance but also in other more local applications.

In the following two sections we present the results of two surveys recently done exploring between other things the definitions and uses given to design first between design academics and design practitioners, and secondly between a large group of UK businesses from different sectors. The purpose to present these results is to provide some evidence to feed the discussion about the definitions and uses of design in academia in comparison with the understanding and use of design in industry, and how the differences and similarities might impact the future of design.

3. Exploring contemporary understanding of design by both design academics and design practitioners

An online survey was conducted to explore contemporary understanding of design and to what extent it is shared between design academics and design practitioners (Jung, 2015). A close reading of the design literature highlights differences between how design academics and design practitioners understand and practise design, implying a need to find a common understanding across different sectors in design (e.g. (Cross, 2006; Lawson, 2006; Nelson & Stolterman, 2003). The survey contained 60 key design concepts, which were developed through a review of the literature on design as a general subject of study and practice rather than specific design disciplines and expertise. Concepts were presented in three categories: skills and methods, abilities and attributes, and knowledge and understanding (Table 1). Respondents were asked to rate each concept in terms of its importance to their design practice based on a five-point Likert scale, where 0 signified that the concept was ‘not important at all’ and 5 represented concepts that were considered to be ‘significantly important’.

The survey was circulated through social media and appropriate design mailing lists, including members of the leading design schools in the universities and institutions in the UK, design associates in the Design Council UK, The Royal Designers for industry listed on the RSA Action and Research Centre website, and the members of the Design Business Association (DBA). Amongst 366 completed responses, there were similar proportions between the groups of respondents who were actually ‘doing’ design – designer/design consultant and design manager (n=181, 49.4%), and those who were more involved in ‘thinking’ about design – design educator, design researcher, and design student (n=173, 47.3%). While the largest group of respondents were from the UK, the survey also received international responses, drawn from various fields of design, with industrial design and graphic design making up approximately one-third of responses combined.

Table 1. Selection of key concepts in design

| Skills and methods     | Description                                           |
|------------------------|-------------------------------------------------------|
| Brainstorming          | Using brainstorming in the design process              |
| Market research        | Using market research to gain consumer insights        |
| Focus group            | Using focus groups to understand consumer perceptions  |
| Ethnography            | Using ethnography to do design research                |
| Games                  | Using games and being playful in design activity       |
| Computer skills        | The use of computer-aided design (CAD)                |
The understanding and use of design in the UK industry: reflecting on the future of design and designing in industry and beyond

| Attributes and capabilities |
|-----------------------------|
| Concept | Description |
| --- | --- |
| 16 Imagination | Being imaginative (imaginative drive) |
| 17 Creativity | Being creative (creative thinking) |
| 18 Innovation | Being innovative (innovative activity) |
| 19 Aesthetic sensibility | Developing an aesthetic sensibility |
| 20 Design expertise | Developing design expertise through professional practice |
| 21 Complexity | Ability to deal with complexity |
| 22 Visualisation | Ability to visualise in two- or three- dimensions |
| 23 Identity | Ability to identify and solve problems |
| 24 Goal-setting | Ability to set goals in design process |
| 25 Information | Ability to source, assimilate, and analyse information |
| 26 Reflection | Ability to reflect on what you are doing (reflective practitioner) |
| 27 Design teams | Ability to work within teams |
| 28 Design process | Managing the design process |
| 29 Stakeholders | Integrating different stakeholders' perspectives |
| 30 Identity | Designing identity - individual, institution, brand, and corporation |
| 31 Design experience | Creating design experience in the actual use of a product or service |
| 32 User-centeredness | Considering needs and interests of the user (user-centeredness) |
| 33 Tacit knowledge | Drawing on the past experience when designing (tacit knowledge) |
| 34 Form vs. function | Giving forms in relation to functions |
| 35 Usability | Increasing usability for users |
| 36 Meaning | Creating meanings of products and services for users |
| 37 Quality | Improving the quality of products and services through design |
| 38 Originality | Bringing originality by offering something really new and different |
| 39 Change | Generating change - environmental, social, economic and cultural - as a consequence of design intention |

| Knowledge and Understanding |
|-----------------------------|
| Concept | Description |
| --- | --- |
| 40 Design discipline | Defining design as a discipline (vs. art, science, social science, etc.) |
| 41 Design discipline - specific knowledge | Developing discipline-specific knowledge and skills – e.g. architecture, graphic design, fashion design, etc. |
| 42 Design history | Understanding design history |
| 43 Design knowledge | Understanding how design knowledge is gained |
| 44 Design practice | Understanding practices and processes in design |
| 45 Design education | Obtaining design knowledge through design education |
| 46 Learning by doing | Obtaining design knowledge through Learning by doing |
| 47 Materials | Knowledge of materials |
| 48 Bauhaus | Understanding Bauhaus as modernist principles of design education |
| 49 Semiotics | Understanding semiotics |
| 50 Product semantics | Understanding product semantics |
| 51 Modernism | Understanding modernism |
| 52 Postmodernism | Understanding postmodernism |
| 53 Aesthetics | Understanding aesthetics |
| 54 Structuralism | Understanding structuralism |
| 55 Functionalism | Understanding functionalism (form vs. function) |
| 56 Consumerism | Understanding consumerism (production and consumption) |
| 57 Client-designer relationship | Understanding the client-designer relationship |
| 58 Constraints | Understanding the function of constraints to inform design strategy |
| 59 Context | Understanding the context in which design practice operates – e.g. development of technology, globalisation, etc. |
| 60 System | Understanding how design operates in a wider social, cultural, and economic systems |
The category of attributes and capabilities resulted in the highest average mean value, when compared to the other two: skills and methods, and knowledge and understanding, for both design academics and practitioners. Respondents tended to put more emphasis on demonstrating designers’ attributes and capabilities than employing design skills and methods or acquiring design knowledge and understanding. More specifically, the ability to identify and solve problems was revealed to be the most important concept for the respondents as a whole. Employing communication skills was the second most important, followed by being and thinking creative. However an independent t-test indicated that there was a significant difference\(^1\) between design academics and design practitioners for 17 concepts (see Figure 1). Academics considered some design skills and methods more important, including ethnography, being playful, craft skills, divergent and convergent thinking skills, and conducting research in a variety of modes. Practitioners on the other hand placed more value on some attributes and capabilities such as developing an aesthetic sensibility and expertise, understanding design process, and designing identity. Academics also highly emphasised understanding the context and systems in which design operates, while practitioners placed more stress on understanding functionalism, consumerism, and client-designer relationship.

![Graph comparing academics and practitioners](image)

**Figure 1. Comparing academics and practitioners**

To compare views amongst respondents with different expertise, they were grouped into four areas: design academia (academic and research), 2D design (graphic design, communication, brand identity and corporate identity), 3D design (industrial design, interior, environmental design, architecture and interaction design) and abstract design (sustainable design, service design, design management and  

\(^1\) A test of statistical significance allows estimating the level of confidence. If the result reveals statistical significance, it gives the researcher confidence in making generalisation about the population based on the findings from the sample.
marketing). The results of ANOVA test suggested that their views vary significantly for 15 concepts (see Figure 2). In particular, the group of 2D design highly valued aesthetic sensibility, designing identity and understanding semiotics. Whereas the group of 3D design put more emphasis on skills and knowledge required in the process of visualization and making tangibles (e.g. computer skills, drawing skills, craft skills, knowledge of materials and understanding form-function relationship). The abstract design group demonstrated greater involvement with theorising and conceptualising design practice through conducting ethnographical research. They are also concerned greatly with understanding how design operated within wider systems, how to generate change as a consequence of design intention and how to create meanings of products and services for users.

Figure 2. Comparing expertise in design

To summarise, the survey results indicated a shared view on the importance of developing design-specific attributes and capabilities, including the ability to identify and solve problems, communicate effectively with people and between designers and clients, and create something new and meaningful through creative thinking. However, academics placed more emphasis on some thinking skills to create and develop ideas as well as research skills and methods to better understand the context. Practitioners concerned more about how to develop aesthetic sensibility and their expertise through professional practice. They also highly valued managing the design process effectively and designing identity for individuals and organisations. An academic field of design and design research showed similar understanding with some of more newly emerging practices in design such as sustainability, service design and design management, both concerning about understanding of systems, generating change through design interventions and creating meaning for products and services. These results contrast with more traditional 2D and 3D design practices which put more stress on specific design skills and knowledge to create, communicate and develop their ideas, including drawing skills, computer skills, craft skills, giving form in relation to function and knowledge of materials.
4. Understanding and uses of design in the UK industry

Aiming to present a broader perspective about the definitions and uses of design in the UK industry, in this section we present a set of selected results from a national survey carried out from March 2015 to October 2015. In this survey done in collaboration with Innovate UK different types of companies were invited to participate. In the end more than 300 surveys were received back and from them 160 were considered for the analysis. Between the participants there were companies from business services; software, IT and telecommunications; energy and environment, but mainly from high tech manufacturing and other types of manufacturing industries. A common element between all the participants despite the sector to which they came from was their high engagement in R&D judged by their own answers. In terms of sizes the majority were small and medium companies with a number of employees ranging from 1 to 200, with a small percentage (13%) of large firms with more than 200 employees.

One of the most important questions in the survey and probably the most relevant for the discussion proposed in this paper about the evolution and transformation of the understanding and uses of design was precisely about it. The participants were asked about the definitions and uses their companies give to design beyond their personal understanding. For this question instead of leaving a blank space for the participants to give an answer, a list of fifteen statements representing a broad view of design definitions and uses was provided. These statements included traditional views of design as ‘a styling activity’ or ‘a differentiator’; but also newest perspectives like design as ‘an interface with the user’s needs’ or ‘a problem-solving process’. In Figure 3 the results of this question are presented.

Interestingly there are not many disagreements with the statements proposed, indeed in the column ‘Agree’ it is possible to see that there is a high level of agreement with almost of the fifteen definitions. However it is also possible to see that there are some statements to which the companies agreed more than the others. The top five definitions of what is design according to this ‘Agree’ column in a decreasing order were: ‘a creative process’, ‘a means to improve consumers experience’, ‘a problem solving process’, ‘an interface with user’s needs’ and ‘a styling activity’. In this top five is remarkable that the most traditional way to understand and use design as ‘a styling activity’ doesn’t appear in the first place, instead other less traditional and more recent definitions of design occupy the first positions.

When we move the attention to the “Strongly Agree’ column, something similar happens but it is possible to see much clearer the differences of opinion. In this case the top five definitions of design to which companies are ‘Strongly agree’ are: ‘an interface with user’s needs’, ‘a differentiator’, ‘a creative process’, ‘a tangible outcome’ and ‘a means to improve customers experience’. The immediate coincidence between the two assessments is that design as ‘a creative process’, ‘a means to improve customers experience’, and ‘an interface with user’s needs’ are the three definitions of design to which companies agree the most. A more difficult result to interpret is the fact that design as ‘a styling activity’ that was in the fifth position in the ‘Agree’ column not only doesn’t appear in the top five of the column ‘Strongly agree’, it falls to the thirteen position in the ranking with only 14% of agreement.
The understanding and use of design in the UK industry: reflecting on the future of design and designing in industry and beyond

Companies were also asked to do a self-assessment of their position in the Design Ladder developed by the Danish Design Centre in the earlier 2000s. This assessment was requested as evidence of the level of maturity in the understanding and use of design for the present moment of the company but also for the moment the company was three years ago, see Figure 4. An interesting result in this question was a similar percentage of decrease between the companies who affirmed they didn’t use design three years ago (26%) and the ones who said they are not using design now (10%), and the percentage of increase between the companies who affirmed to use design as a strategy three years ago (17%) against the companies who said they were using design as a strategy now (31%).

|                | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly Agree | Don’t know |
|----------------|-------------------|----------|----------------------------|-------|----------------|------------|
| means to build strategy |                   |          |                            |       |                |            |
| problem-solving     |                   |          |                            |       |                |            |
| focusing on people  |                   |          |                            |       |                |            |
| Styling             |                   |          |                            |       |                |            |
| creation of artefacts|                   |          |                            |       |                |            |
| making sense        |                   |          |                            |       |                |            |
| creative process    |                   |          |                            |       |                |            |
| new markets         |                   |          |                            |       |                |            |
| interface with user’s needs | |          |                            |       |                |            |
| Differntiator       |                   |          |                            |       |                |            |
| decision making process |               |          |                            |       |                |            |
| means to improve consumers experience | |          |                            |       |                |            |
| tangible outcome    |                   |          |                            |       |                |            |
| means to reduce costs |                 |          |                            |       |                |            |
| means to reduce risks |                 |          |                            |       |                |            |

Figure 4. Design Maturity

| Design Maturity | 0% | 100% |
|-----------------|----|------|
| Non-design: Design is a negligible part of the product development process and usually performed by other professionals than the designer. |     |      |
| Design as styling: Design is seen solely as relating to the final physical form of a product. This can be the work of the designer, but is usually created by other personnel. |     |      |
| Design as process: Design is not a result but a method integrated early into the development process. The production outcome requires contributions from a range of specialists. |     |      |
| Design as strategy: The designer works closely alongside the company’s owners/management on complete or partial renewal of the total business concept. |     |      |

S2831
The two intermediate categories of ‘design as styling’ and ‘design as process’ didn’t show a significant change in terms of the percentages of companies in these levels now and three years ago. What this trend is possibly showing is that companies that three years ago were not using design moved to the next levels and some of them probably stopped there, while others went up to the top of the ladder with other companies that were in the intermediary categories. In other words, it shows that during the last three years there has been a tendency of using more design and using it less for styling and more as a core part of the business integrated into the strategy and vision of the companies. Additionally, it is indicating that the idea of design performed by non-designers is maybe changing for a more professional use of design. These two results support well the previous findings about the adoption of new perspectives, understanding, and uses of design among the companies included in this survey.

| Competitive Advantage                                                                 | Of no importance | Of minor importance | Quite important | Very important | Crucial |
|--------------------------------------------------------------------------------------|------------------|---------------------|-----------------|----------------|--------|
| The pricing of our products & services                                               |                  |                     |                 |                |        |
| The quality of our products & services                                               |                  |                     |                 |                |        |
| The specific skills of our workforce                                                 |                  |                     |                 |                |        |
| Our location, or locations                                                            |                  |                     |                 |                |        |
| Protected intellectual property                                                       |                  |                     |                 |                |        |
| Our capabilities in R&D                                                               |                  |                     |                 |                |        |
| Our capabilities in design                                                            |                  |                     |                 |                |        |
| Our relationships with clients                                                        |                  |                     |                 |                |        |
| Our relationships with suppliers                                                      |                  |                     |                 |                |        |
| Our manufacturing capabilities                                                       |                  |                     |                 |                |        |
| Our marketing capabilities                                                            |                  |                     |                 |                |        |
| Our sales capabilities                                                                |                  |                     |                 |                |        |
| Our distribution channels                                                             |                  |                     |                 |                |        |
| Our after sales services                                                              |                  |                     |                 |                |        |

*Figure 5. Assets contributing to build a competitive advantage*
Finally, another question in this survey that reflected partially how the businesses involved in the study understand design was the one used to explore the assets companies think contribute the most to build a competitive advantage in their organizations (see Figure 5). In this case companies were asked to rank the importance of a set of fourteen common assets and capabilities as possible sources of competitive advantage. The most remarkable result in this question was that evaluated by the column of ‘Very Important’ assets, ‘capabilities in design’ was ranked in the fourth position with 41% of positive responses just behind ‘quality of our products and services (47%)’, ‘relationship with clients (43%)’, and ‘after sales services (42%)’; and more important overcoming other important assets like ‘capabilities in R&D’, ‘marketing capabilities’ and ‘manufacturing capabilities’. If the ranking is analyzed by the last column of ‘Crucial’ assets the situation is similar. In this case ‘capabilities in design’ occupies the sixth position, again overcoming other important assets like ‘marketing capabilities’ and ‘manufacturing capabilities’ and even in a higher position than ‘after sales services’ that was the third ‘very important’ source of competitive advantage.

These answers that put ‘capabilities in design’ among the main sources of competitive advantage are clear evidence of the transformation of how companies understand and use design. Even without knowing the specific reasons why they positioned design at the top of the assets they believe can contribute to build a competitive advantage, the fact that they did it shows they value design beyond aesthetics and styling.

5. Discussion and conclusions

Design has evolved and transformed significantly as a discipline during the last decades. There is evidence that this transformation has complemented traditional understanding and uses of design linked to aesthetics and styling with new perspectives in which design is presented for instance as a thinking and a strategic process. There are multiple reasons for this transformation; between them in this paper we argue that the emergence of global challenges in areas like sustainability, health and wellbeing, and urban life, has been a major force in that transformation.

As an example to illustrate this point we presented a brief exploration of different design-oriented approaches developed in the area of sustainability in which the definitions and applications of design have been pushed to the boundaries of the discipline. This exploration mainly concerning projects and approaches developed in academia and research unsurprisingly showed a positive inclination in those environments towards new definitions and uses of design to respond to challenging and uncertain situations. This positive inclination in academia was supported by the results of the first survey presented in section 3 in which design academics showed a higher valuation of thinking and research skills rather than aesthetic sensibility and expertise, which were very important design skills for practitioners. This result is relevant because the transformation of design has been mainly sustained by the idea of design being less a making and a styling discipline and more a thinking and research process.

In section 4, from the survey carried out with the group of 160 companies there were two major conclusions. First, it is clear that it is well established in businesses that design can have different understanding and meanings and it is very likely that in each company design is understood and used from more than one single perspective at the same time. Secondly, it is also clear that the definitions upon which companies most agree there are traditional views of design but also new interpretations and uses. In some sense it seems companies have been adopting the understanding and applications of design commonly found in research projects but probably at a less accelerated rate than in academic environments. Moreover, it seems that the styling and differentiation functions of design
are still recognized as an important part of what is design, but currently there are other new perspectives, aligned with what it is thought in academia and research, that are more important or represent better what companies think about design.

In terms of how this evidence can affect the future of design, there are two main points we would like to propose for further discussion. The first one is the fact that despite the fact that it is clear that amongst academics and researchers new definitions and uses of design are easier received and understood than in industry; companies and practitioners are now also open to these new perspectives of design. Following the trend of design-driven organisations there are others companies that value design beyond it’s styling potential and recognise it as an important capability to have and to nurture. Due to the conditions and differences between academia and industry it is reasonable to find some delay in the adoption, but there is a very interesting evidence of a transformation taking place. A second point for this discussion relates to the differences between sectors in industry and practice and how those differences can affect design education in the future. From both surveys it was clear than people and companies in traditional areas like industrial design, graphic design and manufacturing comply better with traditional definitions and uses of design, while practitioners and companies working in less traditional industries involving for example services design and technology development are probably more open to work in explorative areas of design. Both traditional and new areas of design are important and for both are required for well-educated and trained designers, a big challenge for the future of design education will be to find the right balance between traditional and non-traditional skills to serve the professional market but also a balance with the expansion of the discipline.

References

Abbing, E. R., & van Gessel, C. (2008). Brand-Driven Innovation. Design Management Review, 19(3), 51–58. http://doi.org/10.1111/j.1948-7169.2008.tb00129.x

Bertola, P., & Teixeira, J. . (2003). Design as a knowledge agent. Design Studies, 24(2), 181–194. http://doi.org/10.1016/S0142-694X(02)00036-4

Bhamra, T., & Lofthouse, V. (2007). Design for sustainability: A practical approach. (R. Cooper, Ed.). Gower Publishing Limited.

Borja de Mozota, B. (2003). Design and Innovation: coordination through design. In Design Management.

Braungart, M., & McDonough, W. (2002). Cradle to Cradle: Remaking the way we make things. New York: North Point Press.

Brezet, J. C., & van Hemel, C. (1997). Ecodesign: A Promising Approach to Sustainable Production and Consumption. Paris.

Brown, T. (2008). Design Thinking. Harvard Business Review, 86(6), 84–92.

Carlgren, L., Elmquist, M., & Rauth, I. (2014). Design thinking: Exploring values and effects from an innovation capability perspective. Design Journal, 17(3), 403–424. http://doi.org/10.2752/175630614X13982745783000

Cautela, C., Deserti, A., Rizzo, F., & Zurlo, F. (2014). Design and Innovation: How Many Ways? Design Issues, 30(1), 3–6. http://doi.org/10.1162/DES1

Ceschin, F., & Gaziulusoy, I. (2016). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118–163. http://doi.org/10.1016/j.destud.2016.09.002

Clark, K., & Smith, R. (2008). Unleashing the Power of Design Thinking. Design Management Review, 19(3), 8–15. http://doi.org/10.1111/j.1948-7169.2008.tb00123.x
Cross, N. (2006). *Designerly ways of knowing*. London: Springer.

Hernandez-Pardo, R. J., Bhamra, T., & Bhamra, R. (2012). Sustainable Product Service Systems in Small and Medium Enterprises (SMEs): Opportunities in the Leather Manufacturing Industry. *Sustainability, 4*(2), 175–192. http://doi.org/10.3390/su4020175

Hofman, P., & De Bruijn, T. (2010). The Emergence of Sustainable Innovations: Key Factors and Regional Support Structures. In *Facilitating sustainable innovation through collaboration: a multi-stakeholder perspective* (pp. 115–133). Springer.

Jegou, F., & Manzini, E. (2008). *Collaborative services: social innovation and design for sustainability*. Creative Commons.

Jung, J. (2015). *Investigating the Identity of Design through Defining Its Disciplinary Core*. Lancaster University.

Junginger, S. (2012). The Chile Miner Rescue: A Human-centred Design Reflection. *The Design Journal, 15*(2), 169–183. http://doi.org/10.2752/175630612X13258652805059

Lawson, B. (2006). *How designers think: The design process demystified*. Routledge.

Lilley, D. (2009). Design for sustainable behaviour: strategies and perceptions. *Design Studies, 30*(6), 704–720. http://doi.org/10.1016/j.destud.2009.05.001

Manzini, E. (2014). Making Things Happen: Social Innovation and Design. *Design Issues, 30*(1), 57–66. http://doi.org/10.1162/DESI_a_00248

Manzini, E., & Vezzoli, C. (2002). *Product Service Systems and Sustainability*. Paris. Retrieved from http://www.unep.org/resourceefficiency/Portals/24147/scp/design/pdf/pss-imp-7.pdf

Manzini, E., & Vezzoli, C. (2003). A strategic design approach to develop sustainable product service systems: examples taken from the “environmentally friendly innovation” Italian prize. *Journal of Cleaner Production, 11*(8), 851–857. http://doi.org/10.1016/S0959-6526(02)00153-1

Margolin, V. (1998). Design for a Sustainable World. *Design Issues, 14*(2), 83–92. http://doi.org/10.2307/1511853

Mont, O. (2002). Drivers and barriers for shifting towards more service-oriented businesses: Analysis of the PSS field and contributions from Sweden. *The Journal of Sustainable Product Design, 2*, 89–103.

Morelli, N. (2015). Challenges in Designing and Scaling up Community Services. *The Design Journal, 18*(2), 269–290. http://doi.org/10.2752/175630615X14212498964394

Muratovski, G. (2015). Paradigm Shift: Report on the New Role of Design in Business and Society. *She Ji: The Journal of Design, Economics, and Innovation, 1*(2), 118–139. http://doi.org/10.1016/j.sheji.2015.11.002

Nelson, H., & Stolterman, E. (2003). *The design way: Intentional change in an unpredictable world: Foundations and fundaments of design competence*. Educational Technology.

Rae, J. (2013). What Is the Real Value of Design? *Design Management Review, 24*(4), 30–37. http://doi.org/10.1111/drev.10261

Ryan, C. (2013). Critical Agendas: Designing for Sustainability from Products to Systems. In *The Handbook of Design for Sustainability* (pp. 408–427).

UNEP. (2009). *Design for Sustainability D4S: A step by step approach*.

Verganti, R. (2006). Innovating Through DESIGN. *Harvard Business Review, 84*(12), 114–122. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=23081453&site=ehost-live

Vezzoli, C., & Manzini, E. (2008). *Design for environmental sustainability*. London: Springer.

von Stamm, B. (2011). The Role of Design in Innovation: A Status Report. In R. Cooper, S. Junginger, & T. Lockwood (Eds.), *The Handbook of Design Management*. 

S2835
Walsh, V. (1996). Design, innovation and the boundaries of the firm. Research Policy, 25(4), 509–529. http://doi.org/10.1016/0048-7333(95)00847-0

About the Authors:

**Ricardo J Hernandez** currently works as consultant in topics including design, innovation and sustainability; prior to this he was Research Associate and Lecturer in Design and Innovation at ImaginationLancaster within Lancaster University. His research interests cover sustainable design, design thinking, and innovation processes.

**Rachel Cooper OBE** is Distinguished Professor of Design Management and Policy at Lancaster University. Professor Cooper’s research interests cover: design thinking; design management; design policy; and across all sectors of industry, a specific interest in design for wellbeing and socially responsible design.

**Jeyon Jung** is a Senior Research Associate in ImaginationLancaster at Lancaster University. Broadly, her research explores the strategic use of design in different contexts. Currently, she has particular interest in the relationship between place, culture and designed products and how design can be applied to enhance and sustain this relationship.