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http://www.ijdesign.org/ojs/index.php/IJDesign/article/view/2260

PUBLISHER

National Taiwan University of Science and Technology / © The Authors

VERSION

VoR (Version of Record)

PUBLISHER STATEMENT

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REPOSITORY RECORD

Niedderer, Kristina, Geke Ludden, Stephen Clune, Dan Lockton, Jamie Mackrill, Andrew Morris, Rebecca Cain, et al.. 2019. “Design for Behaviour Change as a Driver for Sustainable Innovation: Challenges and Opportunities for Implementation in the Private and Public Sectors”. figshare. https://hdl.handle.net/2134/22536.

Design for Behaviour Change as a Driver for Sustainable Innovation: *Challenges and Opportunities for Implementation in the Private and Public Sectors*

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Over the last decade, design for behaviour change has become increasingly recognised as a strategy for enabling social change. Despite this, we are far from understanding its implementation, especially through the private and public sectors. This study has surveyed private and public sector stakeholders with regard to their current knowledge of, and approach to, design for behaviour change. The aim was to identify the challenges for professional stakeholders in understanding, accessing and implementing design for behaviour change. Underpinned by a literature review of design for behaviour change theories and approaches, an online survey and two focus groups with private and public sector stakeholders were conducted with particular focus on small and medium size enterprises (SMEs). The results identified that there is a significant disconnect between available theoretical knowledge of design for behaviour change and its practical implementation. Reasons for this include a lack of awareness and common language, of evidence based examples, and of evaluation methods and inter-sector collaborations. In response, a set of recommendations has been developed to propose ways forward for the wider understanding and application of design for behaviour change.

Keywords – Design for Behaviour Change, SMEs, Sustainable Innovation, Online Survey, Focus Group.

Relevance to Design Practice – The results of this research project can offer guidance for behaviour change inspired innovation projects in the private and public sectors. This project also offers concrete directions for future research efforts to make design for behaviour change tools and theory more accessible to design practice.

Citation: Niedderer, K., Ludden, G., Clune, S. J., Lockton, D., Mackrill, J., Morris, A., Cain, R., Gardiner, E., Evans, M., Gutteridge, R., & Hekkert, P. P. (2016). Design for behaviour change as a driver for sustainable innovation: Challenges and opportunities for implementation in the private and public sectors. *International Journal of Design, 10*(2), 67-85.

Introduction: *Design and the Need for Responsible Change*

Design for behaviour change (DfBC) is seen as a potent way to tackle some of the biggest problems in the world around us. Already, individual examples appear to have much impact, enabling us to recycle (Braungart & McDonough, 2010; European Commission [EC], 2016a; European Environmental Agency, 2014), to use energy more efficiently (Darby, 2006; Stephenson et al., 2010; Wood & Newborough, 2003), to cross roads safely (Karndacharuk et al., 2014), to increase our exercise patterns (Bravata et al., 2007; Fanning et al., 2012; Heath et al., 2006) and to change the way we think about social interaction (Niedderer, 2007).

However, despite design's ability to influence human behaviour, overall the field of DfBC is still insufficiently understood. It is fragmented, and limited frameworks exist for its effective implementation in professional and public contexts. Inspiring as some of the successful examples of DfBC may be, they are not transparent, and therefore have not led to a coherent understanding of how DfBC methods can be used to lead to effective solutions. Such an understanding is important to help designers influence management and improve the influence of design, since design can affect behaviour change both intentionally and unintentionally. Indeed, unintentional changes of behaviour through design and their consequences are very common. Designs

Received May 15, 2015; **Accepted** May 7, 2016; **Published** August 31, 2016.

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Geke Ludden is an Assistant Professor at the University of Twente, Department of Design. She received her Ph.D. from Delft University of Technology for work on multisensory design and product experience. Her current interests center around the theoretically-informed development and evaluation of products and services that support healthy behaviour or that otherwise contribute to people's wellbeing. As a project leader in several design for behaviour change projects, she has experience in developing such services in collaboration with industrial parties. Ludden is a member of the board of The Design & Emotion Society and connects with this international network of designers and researchers. She has published in several journals including *Design Issues*, *The International Journal of Design*, and the *Journal of Medical Internet Research*.

Stephen Clune is a sustainable designer, researcher and educator with over a decade of experience in sustainable design. He has joined Imagination Lancaster at Lancaster University as a senior lecturer in sustainable design. Clune previously worked at the Centre for Design, RMIT University, where he worked on applied sustainability research projects across a broad range of scales. This included investigating the role of packaging in preventing food waste, and facilitating workshops on climate adaptive landscape solutions in regional Australia. Clune's core research interest focuses on how design and design thinking can assist in the move towards a sustainable society, with a particular interest in design as a facilitator of change. His work draws on a diverse range of tools from social practice theory, behavioural change and Life Cycle Analysis.

Dan Lockton is a Senior Associate at the Helen Hamlyn Centre for Design, Royal College of Art. He specialises in links between design, behaviour, and the public understanding of everyday systems, particularly around social and environmental impacts of technology. Lockton is working on SusLab, a European project on domestic energy use, and Creative Citizens, a UK project on co-designing technology with community groups, and regularly does industrial consultancy. He was previously a research fellow at WMG, University of Warwick, and a research assistant at Brunel University, working with startup CarbonCulture on reducing CO2 emissions at the Department of Energy & Climate Change. Lockton has a Masters in Technology Policy from the University of Cambridge and a Ph.D. on 'Design with Intent' from Brunel, which developed a multidisciplinary toolkit for the emerging field of 'design for behaviour change'.

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Andrew Morris is Professor of Human Factors in Transport Safety and leads the Behavioural Safety and Injury Prevention Research Group at Loughborough University. He graduated from York University in 1988 and holds post-graduate qualifications from the University of Birmingham including a Master's degree in Ergonomics and a Ph.D. degree in Mechanical Engineering. Andrew is also Director of Internationalisation for the Loughborough Design School and holds a position as a Visiting Professor at Hasselt University in Belgium, Andrew was awarded US Government Special Award of Appreciation in recognition of outstanding leadership and special contributions in the field of motor vehicle safety (June 2009).

Rebecca Cain is Associate Professor and leader of the Experiential Engineering research group in the Warwick Manufacturing Group (WMG) at the University of Warwick. Her expertise is in methods to involve users in co-design processes for future products, environments and services, and the application of these methods to create a positive outcome in people. She works across the automotive, healthcare, energy and rail sectors and has led projects funded by UK Research Councils (EPSRC, AHRC), Innovate UK and industry contacts. She has previously held an EPSRC Challenging Engineering award and is the lead convenor of the Design Research Society's Special Interest Group for Health, Wellbeing and Happiness.

are created with a particular, often narrow focus, which one might regard as the supportive function of design to enhance human abilities within existing behaviours, e.g., to enhance travel or communication over distance. In such cases, there tends to be no explicit intention to change behaviour, and no foresight as to what the consequences or 'side effects' might be. Inadvertently, however, they can create large-scale behavioural change with both positive and negative consequences. For example, on the one hand, cars have had a profoundly positive impact in enhancing personal mobility; while on the other hand they have also reduced the quality of life in cities and led to increasing resource demand and pollution. Similarly, mobile phones and computers have transformed the speed, social code, and mediums used to communicate. While the increased ability to communicate is generally seen as positive, it is acknowledged that they may also: increase stress levels with a wide range of health impacts (Ilstedt Hjelm, 2003); cause a nuisance (e.g., talking on your mobile phone in public); and present a safety hazard (e.g., texting while driving, Srivastava, 2005).

It is in this context that Jelsma (2006) has suggested that designers need to take moral responsibility for the actions which take place as a result of human interactions with artefacts. The field of DfBC acknowledges this responsibility, building on those areas where design has a history of intentionally attempting to

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Martyn Evans is Professor of Design in Manchester School of Art at Manchester Metropolitan University, Manchester, UK. As a trained product designer, his research interests explore the strategic approaches designers use to consider the future, in particular the ability of designers to envision potential social, cultural, technological and economic futures. Martyn has led a number of funded research projects, both in the UK and in Europe. He is currently an Expert Advisor to the European Commission funded 'Design for Europe' project, Principal Investigator for the AHRC funded 'Design Routes' project and Co-Investigator on the AHRC/ESRC funded 'Design Ecologies' project.

Robin Gutteridge is Reader in Applied Social Psychology and Innovation at the University of Wolverhampton. Her work for the Faculty of Education Health and Wellbeing involves building effective enterprise and knowledge exchange partnerships between the University, industry, employers, service users and careers in the health and care sectors. Originally a physiotherapist, Robin is a Chartered Psychologist, practicing as a clinical supervisor, counsellor and psychosexual therapist. Her research interests encompass a range of topics related to health, wellbeing, and organisational development. She is particularly interested in the way people use their social relationships as a resource for coping.

Paul Hekkert is full professor of form theory at Delft University of Technology. Paul conducts research on the ways products impact human experience and behavior, and leads the international project UMA (Unified Model of Aesthetics). He is co-editor of Product Experience (2008) and published Vision in Design: A Guidebook for Innovators (2011), a book that describes an approach to design and innovation. Paul is co-founder and chairman of the Design and Emotion society, member of the Dutch Creative Council and scientific figurehead of the Dutch Top Sector for the Creative Industries.

create positive change. For example the Kambrook Axis kettle designed through the Ecoredesign initiative at RMIT (1996) used insulation and a temperature indicator to alter the 'double boil syndrome'. The gauge indicates to the user that the kettle is hot and should not be reboiled, reducing energy consumption by subtly shifting behaviour. Similarly, IDEO's 'Coasting bike platform' can be seen as an example of Design for Behavioural Change, which addresses the fact that a large segment of the US adult population were no longer cycling. Despite the population's fond memories of riding, they were put off by the 'lycra-clad' bike brigade and the complexity of modern bikes. The resulting new design took cycling back to basics, focusing on the simplicity of cycling to encourage a large part of the population to take to cycling again (Moggridge, 2008). No explicit reference to models of behavioural change was acknowledged in both the above examples, however IDEO's design process clearly identified barriers to cycling in complexity, safety and sales, which were addressed through the design to facilitate behavioural change.

This is a common pattern. While design research is drawing on insights about behavioural change from psychology and other disciplines to explicitly shift behaviour (e.g., Fogg, 2003, Lockton, Harrison, & Stanton, 2010), the majority of professional design for behavioural change case examples lack an explanation of what principles (i.e., theory, tools–if any) are used by organisations in conceptualising their designs (Niedderer et al., 2014b). Even fewer studies measure the impact of the design on behaviour. Volkswagen's (2009) far from scholarly 'fun theory' series is one of the few examples that quantify the results of design shifting behaviour. Examples given are the 'World's Deepest Bin' that encourages up to 41kg more rubbish to be collected per day, or a piano staircase that encouraged 66% more people to take the stairs, rather than an escalator.

This lack of case studies that illustrate the approach or principles taken, or that quantify the results of implementation, presents a key rationale for this article. The research presented in this article seeks to better understand the theories and tools that are emerging from the field of DfBC, and ascertain how they have been, or may be, adopted and implemented by organisations in the private and public sector to engender sustainable innovation and change. The article begins with a theoretical overview of how innovation and design for behaviour change relate, and what the current approaches in DfBC are. A broad online survey was conducted to ascertain current understandings, needs, and opportunities among relevant public and private stakeholders. Further, to explore and formulate effective strategies of collaboration and implementation, two face-to-face focus groups were held in the UK with academic and non-academic stakeholders. Based on the outcomes of both the online survey and the focus groups, the article discusses current professional understandings and implementation of design for behavioural change practices in relation to existing theories and models. In line with the chosen approach, the article solely discusses examples mentioned by the focus group participants, and it focuses on the adoption and implementation of design for behaviour change approaches as a whole–rather than on building evidence for a particular approach. From the discussion, a set of recommendations is drawn in the conclusion and presented to offer a way forward for implementation in professional context and for future research.

Design Innovation as a Driver for Sustainable Change

The UK as well as many other countries in the world are facing major environmental, health, social, and economic challenges today that require significant action, including climate change, aging, obesity, and social security. Governments are setting targets for change, such as an 80% reduction in greenhouse gas emissions by 2050 (Crown, 2008), or the reduction of obesity rates (currently 61.3%) of adults in England (Change4Life website, 2014). In order to achieve set targets, action is required in form of sustainable innovation to promote change. Following Chick (2012), with sustainable innovation, we refer here to the progressive development of policies, services, and products that are able to address today's economic, ecological, health, and social challenges.

With sustainable innovation becoming a greater priority, there is an urgent need for a diverse range of sectors and stakeholders, including business and service providers, to address these challenges (e.g., Cooke & Willis, 1999; McElroy, 2003). However, sustainability and innovation are still regularly perceived as not compatible (Nidumolu, Prahalad, & Rangaswami, 2009). While there has been some progress in the pace of sustainable innovation, it is not occurring rapidly enough to address the major sustainability concerns (Crocker & Lehman, 2013), with economic growth and risk management still being dominant paradigms. This appears to be due to a number of constraints and drivers which underlay innovation such as economic growth and risk management, stage-gating processes, and various other considerations that usually accumulate around the viability of a business (Cooper, 1994; Jerrard, Barnes, & Reid, 2008).

Such perceptions of incompatibility are not a problem of innovation itself, which can be defined as "the application of an idea, practice, or object perceived as new" as has been confirmed through the response of the online survey (Niedderer et al., 2014a). Rather, the problem seems to be rooted in the perception of ecological and social sustainability being adverse to innovation. Such beliefs seem to persist even though research and some important reports have already demonstrated that sustainability can be used to increase business viability (e.g., Nidumolu et al., 2009; Stern, 2006).

In order to address this reluctance to see innovation and sustainability as complementary, further action is needed. Because of the ubiquity of design in all areas of life and its ability and responsibility to facilitate change (Jelsma, 2006), design can and should play a key role as a strategic tool in promoting sustainable

change and innovation and in joining the two. Innovation and design therefore have an intrinsic relationship (Bruce & Bessant, 2002) that needs to be activated to facilitate sustainable change.

The responsibility for change pertains to both the producers of design and its users. Concerning the former, it is essential that those producing design are aware of their own processes and responsibilities as well as of those for whom they produce. Concerning the latter, in order for sustainable innovation to be adopted by the intended users, design for behaviour change needs to facilitate a shift in the everyday behaviour of the population (Crocker & Lehman, 2013). This can be achieved through a number of mechanisms, e.g., motivation, education, prescription (Lockton et al., 2010; Tromp et al., 2011). There are increasing initiatives, in terms of research, networks, and publications, which seek to promote sustainable behaviour and innovation through design. We provide an overview of these in the following before reporting on, and contrasting them with, the understanding of design for behaviour change and innovation by professional stakeholders.

An Overview of Design for Behaviour Change Approaches

Design for behaviour change is concerned with how design can shape or influence human behaviour and sustainable innovation (Lockton et al., 2010; Niedderer et al., 2014b). Key areas of its application include sustainability, health and wellbeing, safety and crime prevention as well as social contexts. To understand better the influence artefacts can have on people's interactions with them and resulting behaviours, many designers draw on various theories and guidance for behavioural change (Niedderer et al., 2014b). This review of DfBC is seeking to provide an overview of the emerging approaches available to help contextualise the discussion of the survey and focus groups in the remainder of the paper. To review existing approaches effectively, it is important to choose a 'lens' by which to interrogate the approaches under review. For the purpose of this review, we are adopting two complementary lenses.

The first lens is a 'horizontal' lens, which we call the 'agency divide' (or 'agency continuum') and which interrogates the breadth of available approaches according to their strategies. This 'agency lens' groups the various approaches according to the two broad categories in the 'cognition-context spectrum' (Clark, 2010). Clark proposes the division of approaches into those that primarily address the cognition of the individual, and those which address the context outside the individual. In addition, several theories can be seen to straddle the divide, occupying the 'middle ground' in the sense that they take account of both context and cognition, providing a continuum between the two extremes. Similar framings from the design literature have been described as the 'distribution of control' (Daae & Boks, 2014) or 'axis of influence' (Lilley, 2007). That said, arguably all approaches could be said to belong to the middle ground with design providing the context that seeks to effect the change in the individual. However, the division is still useful to distinguish approaches that seek to change individual's behaviour (in the sense of cognition/attitude), while others seek to influence behaviour (in the sense of action) mainly through external parameters, such as policy or the built environment.

The second lens is a 'vertical' lens, which distinguishes the conceptual level at which the approach operates. In this regard, three broad levels are commonly recognised: theoretical level knowledge (e.g., concepts, middle-range theories, grand theories), intermediate level knowledge (e.g., design methods, guidance, and tools), and practical knowledge (e.g., artefacts, direct experiences), (Fawcett, 1999; Löwgren, 2013). The 'knowledge lens' is used to distinguish the different levels of approaches with regard to their level of knowledge and application, whereas the focus in this section is on the theoretical and intermediate level knowledge.

A brief overview of DfBC approaches is presented in the first instance, with selected theories and toolkits grouped according to the agency divide (Table 1). The overview table and background literature were generated by synthesising independent literature reviews on existing approaches to DfBC from five key design areas of expertise in ecological sustainability, safety, health, well-being and social design. The overview is drawn from a previous comprehensive discussion of the agency framework, theoretical approaches and their classification by Niedderer et al. (2014b, 2014c). The overview is followed by a representation of the selected approaches in a scatter diagramme, which combines the two lenses (agency lens, knowledge lens) and uses subject affiliation as a third lens.

The grouping of different approaches according to the agency divide (Table 1) enables a number of observations to be made. These observations become even clearer when represented in the scatter diagramme (Figure 1) by offering a structured way for understanding the different approaches by grouping them according to the different lenses.

While there are as yet no clear 'natural' groupings because of the recent emergence of DfBC approaches, the different lenses in the scatter diagramme reveal that some distinct patterns are starting to emerge:

Firstly, the overview illustrates that the majority of current DfBC theories and toolkits are addressing the individual. The middle ground approaches which seek to unite both areas of agency have become stronger in recent years. By contrast, theories and toolkits that consider how design informs and shifts the environmental context are considered far less.

Secondly, the overview reveals that on a subject level, the largest number of approaches is devoted to ecological sustainability, with several relating to health, and rather fewer relating to social context or safety. Also, a number of approaches are 'general' and not specifically dedicated to any of the subjects, but rather to the affective aspect of the human-product interaction, which can be used in various contexts. Furthermore,

Table 1. Design for behaviour change approaches by agency divide.

Agency	*Design for behaviour change models*
Individual–Cognitive	• Persuasive technology (Fogg, 2003) is concerned with how the performance of target behaviour or social response can be influenced or changed through the use of computing technologies, and more recently design (Hermsen et al., 2014) . • The Loughborough model (e.g., Bhamra, Lilley, & Tang 2008; Lilley 2009) uses mechanisms such as feedback, constraints, and affordances to promote individual's sustainable behaviours. • The design for healthy behaviour framework addresses the different stages of decision-making required to durably change people's health behaviour through design interventions (Ludden & Hekkert, 2014). • Modes of Transitions, another transitions-based model has been developed by Kursat Ozenc (2014). • The Designing moralized products model sees products as 'drivers of routine action'. It incorporates user logic (cognitive models) and responding 'scripts' into the design process to direct and encourage the desired interaction with products (Jelsma, 2006). • Anderson's 'Mental Notes' (n.d.) is a card-based reference and brainstorming tool for web-designers. It offers 50+ insights from psychology about stimulating behaviour change through positive and pleasurable interactions with objects or environments (Anderson, 2011). • 'Evil by Design' approaches seductive design from the opposite end. It reveals how people's susceptibility to persuasive techniques can be abused by companies (Nodder, 2013). • Design for Sustainable Consumption Behaviour develops behavioural solutions to reduce resource consumption in an industry context (Selvefors, Pedersen, & Rahe, 2011). • User-centered design for sustainable behaviour seeks to encourage industry to design products leading to more environmentally friendly user behaviours (Wever, van Kuijk, & Boks, 2008). • The Behaviour Grid map s 15 ways in which behaviour can change based on a combination of the three elements of motivation, ability, and trigger (Wendel, 2014). • The Brains, Behavior and Design Toolkit proposes a set of behavioural tendencies, such as Loss Aversion or Affective Forecasting Error, to be addressed through design (Pfarr & Gregory, 2010).
Middle–ground	• Mindful design seeks to encourage responsible user action and choice through raising critical awareness of the different options available in any one situation. (Niedderer, 2007, 2013, 2014). • Socially responsible design takes the point of the intended user experience, to encourage desirable and discourage undesirable behaviour (Tromp et al., 2011). • The Design with Intent toolkit combines multiple tools and techniques for enabling, motivating or constraining action to encourage desirable behaviour (Lockton et al., 2010), drawing on both cognition and context (Lockton, Harrison, Cain, Stanton, & Jennings, 2013). • The Community Based Social Marketing with Design model draws on prompts, norms, incentives, and the removal of barriers etc. to facilitate change (Clune, 2010). • Practice orientated product design presupposes that material artefacts influence the trajectory of everyday practices and uses this premise strategically to shift everyday practices over time (Kuijer, 2014; Scott, Quist, & Bakker, 2009). • The Dimensions of Behaviour Change Tool takes the format of a card deck to aid designers in specifying techniques for influencing environmental behaviour. (Daae & Boks, 2014). • MINDSPACE Model: aimed at informing policy design for affective behaviour change, this guide offers a checklist of behaviour influences for consideration (Dolan et al, 2009, 2012).
Context	• The Product-Impact Tool has been designed for evaluation of the impact of technical products on user behaviour, such as the Dutch RFID public transport e-payment system. (Dorrestijn, 2012). • Architectural design against crime aims to prevent crime through the revisualization of the environment and its management with regard to human behaviour (Crowe, 2000).

several approaches have emerged from existing design methods approaches such as user-centred design, experience design, or are practical syntheses.

Thirdly, the diagramme distinguishes theories from practically oriented guidelines and toolkits in relation to different knowledge levels, such as theories which benefit more general understanding, as well as guidelines and toolkits which promote application more directly. There were fewer DfBC theories (high level knowledge) than guidelines and toolkits (intermediate level knowledge) since the latter tend to be directed more strongly towards application and therefore need to be more specific and varied. The difference however is marginal being indicative of the still emerging field.

Finally, all the approaches identified are fairly new, dating from 2000 onwards, but mostly after 2008, and the majority can be seen to address the individual (user) although more holistic approaches in the middle ground are emerging more recently.

This overview provides the frame to the empirical research on DfBC practice discussed in the following. While there has been a substantial development in scholarly work around DfBC, it

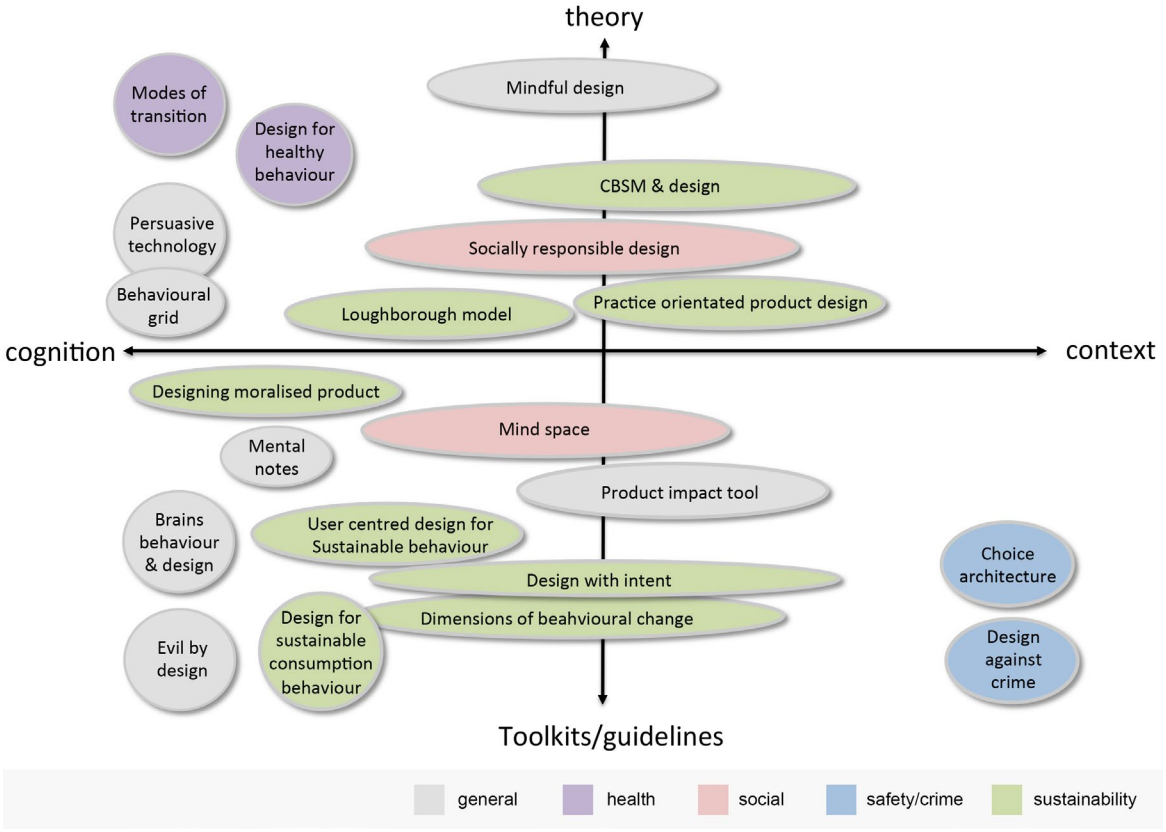


Figure 1. Overview of theories and models by agency divide, knowledge level and subject approach.

was unclear if and how it is being applied by the design and SME community for innovation, which led to the investigation reported on in the following section.

Methodology

Following the literature review that identified the above DfBC approaches, an online survey was completed to gain a broad understanding of industries position within the public and private sector in the UK, followed by the completion of two focus groups to gain in depth insight into the current understanding of design for behavioural change from self declared practitioners. Given that SME's account for 99% of European businesses (EC, 2016b), the research has taken a focus on SMEs, although the view of representatives from large organisations have also been included at times for comparison. The methodological approach to the survey and focus groups is described in the following. The results are thematically presented in the next section.

Online Survey: *Understanding Professional Stakeholders*

The online survey was utilised to gain initial insight from professional stakeholders from the public and private sectors, and with a particular focus on SMEs, on their understanding and use of design for behaviour change. The online survey was aiming to: 1. Gain an understanding of the relationship of innovation and behaviour change; 2. Gain insights into which theories and approaches on DfBC are being used by non-academic stakeholders; 3. find out what obstacles there are to accessing and implementing the theories and tools, and gather current examples of the use of theory and tools on DfBC by non-academic stakeholders. Additional information on the nature and demography of the respondent organisation was also gathered. The survey had 22 questions with multiple-choice answers in four sections and ended with a final question about whether the respondent would like to take part in one of the focus groups. Table 2 shows examples of questions for each of the four sections.

Table 2. Examples of questions asked in the online survey per section.

Section	*Example questions*
1 About your organisation and you (Q1-8)	What is your organisation's primary product or service?
2 Innovation (Q9-12)	What types of innovation are common in your organisation? How does your organisation facilitate innovation?
3 Facilitating behaviour change (Q13-19)	Does your organisation use any DfBC guidelines, toolkits or practices? Who is your organisation most trying to influence when designing for behaviour change?
4 Access and barriers to knowledge (Q20-22)	How do you find, generate or access relevant information on designing for behaviour change?

The online survey was conducted via SurveyMonkey and announced through an industry newsletter, which reaches a UK and international audience of around 32,000 subscribers. The survey was open from 22 May to 31 August 2014. During this time, the survey was completed by 131 respondents, of which roughly one third were Micro businesses (MI: 1-10 employees); Small and Medium size Enterprises (SE: 11-49, ME: 50-249 employees); and Large Organisations (LO: > 250 employees). 55% of respondents worked in private/commercial organisations, followed by 31% in the public and education sector. Charities were represented with 7%, and social enterprises (including non-for-profit and community interest companies) with 5%. Two percent were from other organisations such as professional bodies. The survey thus provided an even spread of target group(s) for comparison, both in terms of size as well as the nature of the organisations.

The survey respondents' organisations represented the full range of sectors. The sectors featuring most strongly were: Health and Social Care, Digital and Creative, Consumer products, Consultancy and Education. Organisations' primary product focus included mostly services (53%), followed by digital and creative products (32%) and 2D products (27%). SMEs' share as providers of services is comparatively larger than those of LOs, which score comparatively higher in the resource intensive areas such as material development and production.

In terms of location, 46% of organisations responding to the survey were located in London, with an equal 46% being situated across the rest of the UK, including Scotland, Wales and the South West. In addition, there were a number of overseas organisations from North America, Europe, Asia and Australia, indicating a significant international interest in DfBC.

While the response rate was low compared to the number of recipients of the newsletter, the survey did not require a high response rate because of its inductive nature. The main aim was to elicit a snapshot of the current understanding of design professionals of design for behaviour change, its theoretical underpinnings and applications. In this context, the low response rate can be seen as indicative of the point the paper makes, i.e., that DfBC is not yet a widely recognised issue.

The results of the survey were analysed using descriptive statistics (as provided through the survey software) for the quantitative element by using filters to compare responses from Micro businesses, SMEs, and large organisations, as well as the private and public sector. Qualitative responses were analysed thematically to allow interpretation of the results in the broader context.

Focus Groups

The aim of the focus groups was to find out what the issues are for private and public organisations concerning understanding, finding, adopting and implementing DfBC strategies, and how they can help drive innovation. For the focus groups, a combination of Krueger and Casey's focus group methodology (2000) was used and extended to include aspects of participatory design workshop methodologies (Sanders, Brandt, & Binder, 2010). The purpose of this was to include a range of design exercises to allow participants to draw on their experiences as designers and to assist in moving to a solution space, rather than seek only the opinions and perceptions of participants (the traditional role of a focus groups). The focus groups were designed to elicit deeper insights about the participant's understanding and use of design for behaviour change. The preliminary results of the online survey were used to create a semi-structured framework to guide discussion and prompts during the sessions (Table 3).

Table 3. Business background of focus group participants.

Business type	*Number of participant from business type*	
	FG1	*FG2*
Private/commercial organisation	5	4
Social enterprise	1	-
Charity	3	-
Public Sector	1	1
Professional body/ chartered society	-	1

Two focus groups were held with a total of 16 participants: 10 attended the focus group 1 (FG1) at University 1 (London), with six attending the second focus group (FG2) held at University 2 (central England). The majority (n = 11) of participants were from SMEs, with five participants from large organisations from the public sector (n = 2), charities (n = 1), professional bodies (n = 1) and a commercial organisation (n = 1).

The focus groups were each conducted in three interactive sections with sub-tasks within them, to enable participants to become immersed in the discussion and draw upon their experiences. These sections were: 1. Introducing participants to each other. 2. Eliciting participant's understanding of design for behaviour change, the benefits, challenges and obstacles to its implementation (including a brief design exercise), and 3. Exploring ways forward. The focus groups were approximately three hours long. The three sections of the focus groups were facilitated by different members of the project team.

The focus groups were encouraged to have an open, flowing discussion both within the group and between participants and researchers. Both focus groups were recorded and transcribed verbatim. Detailed discussion notes were also taken by project members and were included in the analysis to help contextualise the narrative of the transcripts. The results were thematically analysed using NVIVO 10 software with a mixture of inductive and deductive coding approaches to extract key themes and categories within the data (Strauss & Corbin, 1998). Deductive coding was carried out using the focus group outline to form the main themes of the analysis with inductive coding drawing out nuances held within these themes. The two sets of analyses were triangulated to form the final results.

Results and Discussion

The results of the online survey and focus groups are presented in relation to the following key emergent themes:

- Awareness, and understanding of design for behaviour change
- DfBC toolkits and guides that are used
- What DfBC is used for and its relation to innovation
- Benefits and barriers to implementing design for behaviour change

Within each theme, the results of the survey are presented first, followed by insight gained from the focus groups. A summary discussion on possible ways forward for DfBC concludes the section.

Awareness and Understanding of Design for Behaviour Change

The online survey identified that there was a strong universal awareness of DfBC among the respondents, with 93% of respondents having some awareness (very aware, aware, and a little, see Figure 2). The extent to which DfBC informed innovation was predictably lower (86%) and diminishes further when questioned on specific implementation practices: only 57% of respondents reported that their work was based on specific principles or practices of design for behaviour change.

What became apparent from the examples suggested by participants in the survey was the diverse variability in the understanding of DfBC. This variability was probed further through the focus groups, and responses elicited a number of different interpretations of behaviour change.

There was a perception that the concept of DfBC varied between the two parameters of 'design' and 'behaviour change'. Some felt that, as a designer, there is a need to understand "physiological and psychological drivers behind behaviours so that you can accommodate that, you can design for what people need (FG1)" while others reflected more on design as the change agent:

> For me it's changing behaviours through design. I guess my definition of design is quite broad so it might be design of a service, the design of product, graphic design, or just using design methodology. (FG1)

There was also variation in the aspiration attributed to design for behaviour change. While some regarded "behaviour change [as] quite a high level requirement for individual people (FG2)", others saw it more as a practice that "us[es] design principles to develop some sort of initiative project intervention that seeks to change a behaviour". Yet other participants distanced themselves from behaviour change altogether:

> In terms of the behaviour I would like to kind of probably scrub out the word behaviour,.. I'm quite interested in design for change. Behaviour for me feels incredibly prescriptive, … individualistic, … I also think that there's been a whole shift change in terms of language. (FG1)

The most extreme positions diverged in their understanding of the ethical role of design for behaviour change, reaching from the understanding of DfBC as a tool for simply improving business success to DfBC as an ethical practice. The aspect of ethical judgment further generated debate. For example, the aspect of free choice versus prescription, which regularly enters into the debate about behaviour change, also emerged here, questioning the ethical and commercial implication of who decides what is desirable and for whom:

> I think for me the key word … is change and to understand where you're at and where you want to go, so before you can start to implement any new products or service, you need to understand what you're aiming for, and I guess I want to introduce a commercial level in there as well, so whether that's about selling more product or in the case of an energy company, selling less of our core product, which behavioural change is huge… (FG2)

In summary, the discussion about the understanding of DfBC highlighted its challenging nature whose complexities are at times difficult to pinpoint, in particular the link between effective change and design. It can be difficult to determine what behaviour a designer or company might want to change. This might depend on the commercial needs of a company: while for some behaviour change may offer a new revenue stream, for others it might question commercial viability, highlighting again the tensions between innovation and sustainability. Overall, the views of what behaviour change was ranged from catering to existing customer (buyer) behaviours, to behaviour management within specific situations, to what one might call 'ethical' behaviour change in a small way, to large scale behaviour interventions with a clear ethical agenda.

How Design for Behaviour Change Theories and Toolkits are Utilised

In response to questions about specific DfBC guidance, the online survey identified that stakeholders from private and public sectors used some design for behaviour change approaches, such as tools developed by Fogg (Persuasive technology–no date specified by respondent) and Lilley (Loughborough model–no date specified by respondent), and the Design with Intent toolkit (Lockton et al., 2010). The survey did not elicit how respondents had found out about individual theories they new or were using. However, the focus groups indicated that a number of ways through which

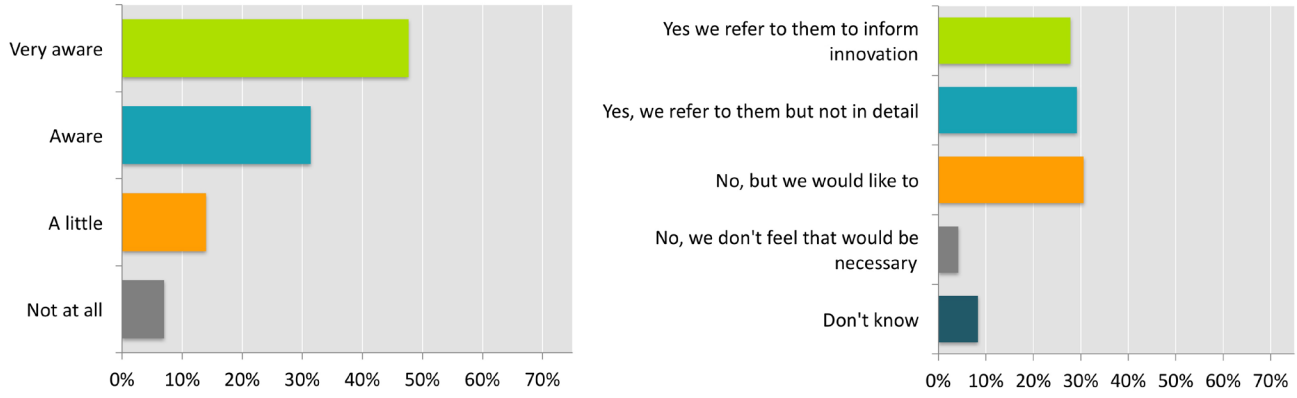


Figure 2. Awareness (left) **and use** (right) **of design for behaviour change** (all respondents).

design professionals had become aware of them, which included university study, working with design researchers or participating in design research workshops. Design for behaviour change cases mentioned by participants included diverse examples such as '[an] interactive toothbrush for children to help them learn how to brush their teeth as well as brush their teeth in a playful way' (FG2) and the aim 'to deliver behavioural change that will allow those carbon-friendly products to have a sustainable commercial life.' (FG2)

Generally, stakeholders appeared more familiar with (popular) literature from the behavioural sciences such as Nudge (Thaler & Sunstein, 2008), Health-Belief Model, Theory of Planned Behaviour and Stage-Based Change Models (e.g., Ajzen, 1985), than with design literature. Some of the models were developed into practitioners' own models, such as the MINDSPACE model (Dolan et al., 2012). The emphasis on practical design guides and scientific theories raises the question why there is a lack of reference to DfBC theories, and whether the reason for this might be simply that they have not yet been promoted outside the academy, or whether there is some reluctance.

As indicated in the previous section, some preferred simply thinking about 'change' rather than 'behaviour' change. The methods and guides utilized to design for change accordingly were more generic drawing on iterative design processes and approaches such as co-production, user-centred design, double diamond design process and ethnographic research. For example, in the London borough of Lambeth, co-production was seen as an effective approach to enable cleaner and safer streets. Involving the community in co-production process increased the sense of ownership of the area that might lead to increased pride.

> Lambeth […] is basically a street makeover project. So there are a couple of council guys that work with the community to do anything that the community wants to do to improve the appearance of their street. […] It can be planting and making planters, it can be painting walls, making it look more colourful and exciting and we just recently did an evaluation of that, which proved that it reduced littering because the environment is better. It built the strength and the cohesion of that community; a lot of those 'Freshview' projects are now being delivered without the council at all. They're just totally taken on by the community. Wellbeing has improved, perceptions around safety have improved. So there's all sorts of knock on benefits that I think are fundamentally linked to behaviour change. (FG1) (See also: Lambeth Council, 2014)

This approach contrasts 'individual' behavioural change approaches designed to prompt individuals to reduce specific actions such as littering, through engaging in the context of the physical and social environment. This approach indicates that design can initiate further reaching motivation for change through shifting the broader environmental and social context, in turn influencing individuals' behaviour.

Reflecting on why design for behaviour change is not yet widely known and used, some reasons may be that design research is still a young field and that there is greater reliance on established approaches such as the social sciences. Also, there is a difference between understanding behaviour change e.g., through social science models, and understanding how design can be used to contribute to this. The survey and focus groups indicated that there was a need for the latter, but also some reservations and a preference for thinking more generally about 'change.

One further aspect, which links back to our earlier argument about innovation, might be a lack of knowledge of design and perhaps an ensuing lack of regard for design outside of the design profession. These two aspects might explain why designers are often not involved at the higher levels of decision making in companies, i.e., at management level, and why smaller companies are more engaged. This was supported by responses of participants from larger organisations who felt disempowered and therefore not able to drive the behaviour change agenda in their organisation.

What Design for Behaviour Change is Used for and its Relationship with Innovation

The survey first asked about innovation generically and then looked at it in relation to behaviour change. The results indicated that innovation was well understood and used with regard to service, process and product innovation, and that innovation is driven by designers, and to a lesser extent by engineers and market research, followed by various other measures.

Looking at their target areas, organisations using design for behaviour change innovations seek most strongly to influence health and well-being, followed by social sustainability, ecological sustainability and economic sustainability, while mobility, safety and crime prevention appear of least concern (Figure 3). Compared with the reasons for innovation more generally, this showed that those with a concern for behaviour change appear to recognise ethical concerns such as sustainability more strongly than those not concerned with design for behaviour change.

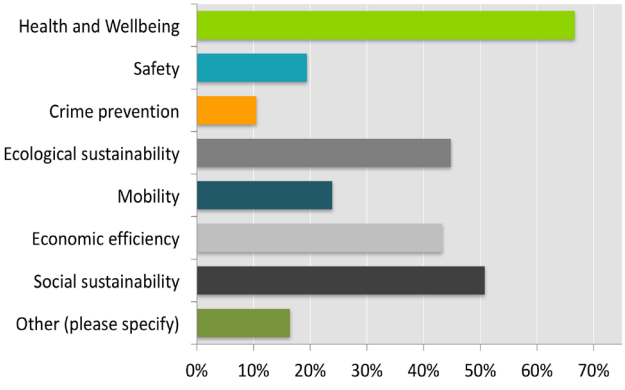


Figure 3. Areas of concern of design for behaviour change innovation.

In terms of target audiences and aims of behaviour change, responses were unsurprising, indicating that long-term change (78%) ranks first and one-time change last (14%). Influencing customers (68%) and the public (58%) are a priority over own employees (29%) with a focus on the public being largely related to the public status of organisations.

A number of examples of DfBC were put forward through both the survey and focus groups, covering a wide range of applications from tooth brushing for children, to designing for mental health, to policy decisions for pensions and financial debt. Significant for their engagement in this area, 19 of the 35 examples in the survey were put forward by Micro businesses. An overview of examples is presented in Table 4. Examples were usually presented in a brief, anecdotal fashion and an explicit connection was rarely made between any underlying theoretical models that may have been applied, although some were mentioned elsewhere in the survey. One reason for this might be that such documentation is often there to show the successes of the schemes, rather than to reveal the theoretical and methodological underpinnings, although it might be useful to recognise that this can help convince potential clients and/or management of an organisation of the soundness and reliability of the approach.

Benefits and Barriers to Implementing Design for Behaviour Change

The two emergent themes with respect to the barriers and benefits of implementing DfBC relate to company engagement, and access to information. In terms of engagement, the survey revealed that the greatest obstacles to accessing or applying design for behaviour change are: a lack of time (49%) and of evidence available (31%). Both are closely related, because the perception of a 'lack of time' can be interpreted as being indicative of a lack of priority, perhaps due to a lack of recognition of the clear benefits of design for behaviour change. Indeed, both the survey and focus groups identified a lack of awareness, interest and belief for larger companies, as well as a lack of clients' inclination, especially for smaller organisations.

The discussions of the focus groups explored in more detail the need for making a business case for behavioural change, and found that associated benefits vary depending on the stakeholder. For example, for energy providers 'getting people to use less product is a lot quicker and cheaper than building a power station (FG2)', whereas for businesses reliant on product sales the reverse may be true, as a FG participant described: 'one of the major weaknesses, challenges [is] getting profit for behaviour change, and that's where it doesn't play to businesses' strength (FG2)'. Both the survey and focus groups suggested that there is an urgent need for more explicit information and debate about the aims and benefits of DfBC to raise its level of recognition and importance. Strengthening the evidence base on the impact of DfBC therefore has to be a priority. Quantification of the benefits of DfBC also appear critical, however clear evaluation metrics for DfBC at present were identified in the focus groups as limited.

In order to improve engagement, a key part of the project was to develop an understanding of how information on DfBC is accessed and what the barriers or obstacles to access and implementation are. The survey revealed that information on DfBC is mostly accessed or generated through publicly available academic research (65%), complemented by in-house research and publicly accessible non-academic research, with 57% each as well as business networks and social media (53%). External consultancy is only used by 21% of organisations. Notably, Micro businesses use publicly accessible non-academic research and in-house research more than publicly accessible academic research, while the trend reverses with Medium and Large organisations, which utilise comparatively more academic research. Difficulty in accessing relevant research (36%) indicates that academic research is harder to find, read, and often has to be paid for, and is therefore harder to access for Micro and Small businesses who have limited resources in terms of staff time and expertise. Within the focus groups, it was proposed that it would be desirable to establish processes for academia and industry to work, and learn from each other as a dissemination strategy.

Design for Behaviour Change: *The Way Forward*

The survey clearly indicated the importance of design in driving innovation. Furthermore, the results showed that smaller organisations appeared better informed of DfBC than larger ones, and of valuing it more, even though they reported most difficulties in accessing information.

Table 4. Case examples of design for behavioural change identified in the survey.

Environment	• Design of public spaces in law courts to de-stress and calm users; • Creation and development of accessible and inclusive built environments for the elderly, and those with a disability; • Designing built environments to influence the behaviour of people with dementia, autism, learning difficulties, brain injury.
Health	• Tooth brushing for children; • Healthier eating; • Help women to stop smoking; • Health management related to: physical activity, diabetes management, medication adherence, mental health (anxiety/depression) management, and adherence for schizophrenia treatments, weight loss, Health/Wellness coaching; • Training GPs to work with the patient to set their own plans.
Lifestyle	• Engage in a more active, less consumptive yet abundant life through Smart Pad Living; • Sustainable graphic communication is about making caring connections—helping people make good relationships, bringing benefit to a connected world.
Policy	• Auto enrolment in pensions; • Traffic light food labelling; • Better design of credit products to stop consumers getting into debt.

In terms of what might help with accessing and implementing DfBC (Table 5), the majority of survey respondents felt that clear evidence of the benefits and open access to academic journals would be helpful, as well as easier access to information, e.g., through networks and workshops. Rated as almost as important was the availability of more relevant examples and guidance that is more specific to individuals' areas of interest. Technical language and awareness raising were seen as least important for improving accessibility.

Table 5. Supportive measures for accessing and implementing design for behaviour change.

Answer choices	*Responses*
Clear evidence of benefits	57.14%
Free open access academic journals	57.14%
Easier access to information, e.g., through networks and workshops	55.84%
More relevant examples	51.95%
Guidance that is more specific to your area of interest	50.65%
More awareness, e.g., through social media or SME specific journals	35.06%
Less technical language of available research	23.38%
Other	16.88%
Total Reponses	

The focus groups echoed the survey results, with easier and open access to information being one of the key suggestions. The request was for information to be pushed out "rather than having a whole system where you have to go and find things (FG2)" and help with questions such as "in what circumstances is it good or bad to be explicit about the activity you're doing has been behavioural change? (FG2)", which re-iterated the ethical dimension of design for (behaviour) change.

The way forward for design for behaviour change as emerged from the engagement with professional, non-academic stakeholders can be summ Earised in terms of two aspects: practical actions as well the need for further discussion in particular of the ethical issues raised by the design for behaviour change stance. The identified practical actions include:

- The production of explicit, evidence based examples. This included the call for easy to use and replicable evaluation metrics to assist in developing case studies. For further details, see Niedderer et al., 2014c.
- A consistent use of terms and language between and within contexts;
- A practitioner based publication, e.g., a practitioner journal;
- Easy processes for academia and industry to work together and to learn from each other.

The questions about the ethical stance of design for behaviour change, which were raised for further discussion, concerned issues such as:

- Who owns and administers behaviour change;
- Whose or what ethical stance or values should be adhered to;
- Whether it should be a prescribed or voluntary process;
- Whether it should be an individual's responsibility (and possibly gain) or a social issue;
- Who the beneficiary/beneficiaries should be or who might take responsibility for their potentially positive and negative effects.

Conclusion

This research has explored and juxtaposed the understanding of design for behaviour change from an academic position with that from professional stakeholders through a literature review, an online survey and two focus groups. The literature review, which has been reported in outline here, has used two different lenses to analyse the literature, the 'agency lens and the 'knowledge lens'. The analysis through the agency lens has shown that there is a weighting towards individual-cognitive models of behaviour change, with very few models addressing the contextual aspect. The latter approach was highlighted through the discussion and examples from stakeholders as potentially beneficial and less controversial in terms of an ethical stance, at least where it is based on a participatory approach. The analysis through the knowledge lens, together with the information from the survey and focus groups, has shown that while designers use behaviour change theories from social sciences, they are more likely to use middle intermediate level knowledge approaches from design in form of guidelines and toolkits (rather than design theories). The reason for this is not entirely clear: it may be that design theories are more recent than many of the social science theories and therefore have not yet permeated the market; or it may be a result of the accessibility (e.g., in popular book format, such as the Nudge Theory) and their promotion in professional circles. Together, the review, survey and focus groups have produced a rich set of insights concerning the understanding and use of DfBC. The papers' five major conclusions are that:

- Professional stakeholders in the focus group indicated a rich and varied understanding of DfBC that considers both the individual, environmental and social contexts, which can be used to expand the literature on DfBC to capture the environmental and social context.
- Although the small sample of stakeholders that was part of this study has shown a strong willingness to adopt DfBC theories and tools for the purpose of sustainable innovation, there is clearly much work to do in drawing in a larger part of the professional community.
- Evidence based examples of DfBC, connecting theory and practice, are required to enable professional stakeholders to make a business case for DfBC.
- There is a keen interest by professional stakeholders to be involved in academic research of this kind, and easier and quicker measures for collaborations are required. For example, some stakeholders felt that there was too much 'red tape', that it was difficult and time consuming to set up partnerships, or that such partnerships where not available for Micro businesses. In order to achieve this, clearer and more flexible pathways are needed that recognise the fast moving pace of industry.

- Such examples should be prioritised in open access sources to increase the chance of utilisation, in particular by SME's. This should include an accessible language and presentation of theory and results as well as their public dissemination.

Based on these findings, we suggest that a priority of future research should be to identify, facilitate, and generate evidence-based examples of DfBC. Such activities could help to support the integration of evidence-based knowledge across the three knowledge levels: theory, intermediate knowledge, and practical application. This should lead to a holistic and accessible approach that professionals can adopt in their practice. In an academic context, this would contribute to a re-thinking and expanding of the current theoretical landscape to firmly include intermediate and applied levels of knowledge with theory. In a professional context, such examples may be developed jointly by academic and professional stakeholders to promote sustainable innovation.

Acknowledgements

The research presented in this paper has been conducted as part of the 'Creating Sustainable Innovation through Design for Behaviour Change' project funded by the Arts and Humanities Research Council, UK, in 2014. The complete findings have been published in the full project report, which can be downloaded here: http://hdl.handle.net/2436/336632 All project information, and further developments can be accessed through the project website: http://www.behaviourchange.eu

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Appendix 1

AHRC Sustainable Innovation Draft Questionnaire
(launched 30 April 2014)

COVER PAGE

Creating Sustainable Innovation through Design for Behaviour Change

PROJECT The project seeks to develop a better understanding of how Public and Private Sector Organisations access information on, and implement sustainable innovation through design for behaviour change. The aim is to improve how design research is made available for the benefit of promoting sustainable innovation.

SURVEY We invite you to participate in the project by completing this brief 10 minute survey. Your participation will help promote sustainable innovation through improving knowledge exchange between academy and industry, public and private sectors. We will ask you briefly about your organization, its position on innovation and behaviour change, and how you access relevant research.

BENEFIT Participants of the survey are entitled to a copy of the final research report with the findings from the survey and the project as a whole. Participants of the survey can also volunteer to participate in one of the two follow-up focus groups which will discuss in more detail the opportunities and challenges for sustainable innovation through design for behaviour change.

WHO WE ARE This prestigious Arts and Humanities Research Council funded project is conducted by a team of design researchers and behavioural scientists from the Universities of Wolverhampton, Warwick, Lancaster, Loughborough, Twente, Delft, and the Royal College of Art.

PROJECT WEBSITE http://www.behaviourchange.eu

CONSENT
By continuing with this survey you agree for the information provided by you in this survey to be used for the purposes and publications of this research. Your data will be dealt with confidentially and any information provided will be anonymous. Your contact details will not be forwarded to any third parties, or used in any other way.

1. Tell us about your organisation and you

- What type of organisation do you work for? [single answer]
  - Charity
  - Private / Commercial Organisation
  - Public Sector Services
  - Social Enterprise / Community Interest Company
  - Other (please specify) [open textbox]
- How many employees does your organisation have? [single answer]
  - 1-10
  - 11-49
  - 50-249
  - > 250
- What is your organisation's annual turnover? [single answer]
  - £0-100,000
  - £100,000-500,000
  - £500,000-1,000,000
  - > £1,000,000
  - Don't know
- What is your job role within your organisation? [single answer]
  - Director/Owner/CEO
  - Marketing and Sales
  - Production
  - Research and Development
  - Other (please specify) [open textbox]
- What is your organisation's primary product or service? [tick all that apply]
  - Agriculture
  - Building Industry
  - Consumer Products and Retail
  - Consultancy
  - Education
  - Entertainment
  - Finance, Insurance and Banking
  - Food and Beverage
  - Health, Social Care and Wellbeing
  - Legal and Compliance
  - Non-consumer Technology
  - Sports and Leisure
  - Transport
  - Other (please specify) [open textbox]
- What medium does your organisation predominately engage with? [tick all that apply]
  - 2 dimensional products (e.g., printed materials, interfaces)
  - 3 dimensional products (e.g., furniture, tableware, tools, parts, packaging)
  - Buildings and Architecture
  - Digital products (software)
  - Digital products (hardware)
  - Electronics
  - Food and beverage
  - Materials
  - Services
  - Urban Design and Planning
  - Other (please specify) [open textbox]

- Where is your organisation located in the UK: [single answer]
  - London
  - Midlands-East
  - Midlands-West
  - North-East
  - North-West
  - Northern Ireland
  - Scotland – Lowlands
  - Scotland – Highlands
  - South
  - South-East
  - South-West
  - Wales
  - Other (Please specify) [open textbox]
- Is your organisation national only? [single answer]
  - Yes
  - No

    If no: what other countries are you active in? [open textbox]

2. Innovation

- One definition of innovation is the successful application of an idea, practice, or ob ject perceived as new. To what extent do you agree with this definition? [single answer]
  - Fully agree
  - Somewhat agree
  - Somewhat disagree
  - Fully disagree

  If you disagree: what is the understanding of innovation in your organization, if any? [open textbox]
- What types of innovation are common in your organisation? [tick all that apply]
  - Service innovation
  - Process innovation
  - Product innovation
  - None
  - Other (please specify) [open textbox]
- Why is innovation important to your organisation? [tick up to three]
  - To meet demands from clients and/or public
  - To comply with legislation
  - To improve services and/or products
  - To be a market leader
  - To increase market share and/or profitability
  - To promote social sustainability
  - To promote ecological sustainability
  - Other (please specify) [open textbox]
- How does your organisation facilitate innovation? [tick all that apply]
  - Through using external consultants
  - Designers
  - Engineers
  - Economists
  - Market research and trend forecasting
  - Psychologists
  - Trend forecasters
  - Other(s) (please specify) [open textbox]
  - Through in-house research & development involving…
  - Designers
  - Engineers
  - Economists
  - Market research and trend forecasting
  - Psychologists
  - Trend forecasters
  - Other(s) (please specify) [open textbox]

3. Facilitating Behaviour Change

Behaviour change, as an approach for engendering desirable human practices, is becoming increasingly important as a means to address current social, economic and ecological challenges. For example, behavioural change is used to reduce waste or energy consumption or change health behaviours. Innovation has an important role in facilitating behaviour change, e.g., through designing products and services that promote sustainable practices and life styles.

- To what extent are you aware of design for behaviour change? [Likert scale]
  - Very aware
  - Aware
  - A little
  - Not at all [logic: go to section 4]
- To what extent do design for behaviour change principles or practices inform innovation in your organisation? [Likert scale]
  - A lot
  - Somewhat
  - A little
  - Not at all [logic: go to section 4]
- Does your organisation use any design for behaviour change guidelines, toolkits or practices? [single answer]
  - Yes, we refer to them to inform innovation
  - Yes, but not in detail
  - No, but we would like to
  - No, we don't feel this would be necessary

  If yes, please name and describe any guidelines or practices you use. [open textbox]

- Who is your organisation most trying to influence when designing for behaviour change? [single answer]
  - Own employees
  - Customers
  - Public
  - Other (please specify) [open textbox]
- What are you most hoping to influence or achieve when designing for behaviour change? [tick all that apply]
  - Values and attitudes
  - Decision making
  - One time change
  - Long-term change
  - Removal of behavioural barriers
  - Opportunities for new practices or alternate behaviours
  - Other (please specify) [open textbox]
- What outcomes or area of application are you most trying to influence? [tick all that apply]
  - Health and wellbeing
  - Safety
  - Crime prevention
  - Mobility
  - Sustainability
  - Economic efficiency
  - Social Integration
  - Other (please specify) [open textbox]
- If you / your company are actively involved in designing for behavioural change… Can you give an example, including the results or effectiveness of any behaviour change work your organisation has implemented and how this was evaluated? [open text box]

4. Access and barriers to knowledge

- How do you find, generate or access relevant information on designing for behaviour change? [tick all that apply]
  - Through in-house R&D
  - Through external consultancy
  - Through publicly available non-academic research
  - Through publicly available academic research
  - Through business networks and social media
  - Other (please specify) [open textbox]
- What difficulties does your organization encounter in accessing or implementing design for behaviour change? [tick all that apply]
  - Difficulty of accessing relevant research
  - Lack of evidence
  - Lack of time
  - Technical language of available research
  - Too risky
  - None
  - Other (please specify) [open textbox]
- What would make it easier for your organization to access and implement design for behaviour change? [tick all that apply]
  - Clear evidence of benefits
  - Easier access to information, e.g., through networks and workshops
  - Free (open access) academic journals
  - Guidance that is more specific to your areas of interest
  - Less technical language of available research
  - More awareness, e.g., through social media or SME specific journals
  - More relevant examples
  - Other (please specify) [open textbox]

5. Finishing off

Thank you for your time in completing this survey. Your input will be much appreciated.

If you would like to receive an electronic copy of the final report with the outcomes of the survey, please enter your email address here: [textbox]

(Your email will not be used for any other purposes, and will be dissociated from your survey answers)

If you are interested in participating in one of the half-day follow-up Focus Groups, please indicate in which of the two events you would be interested:

- 10 July 2014, Royal College of Art, London
- 16 July 2014, Warwick University, Coventry

(A remuneration fee for participants will be available.)

Thank you once again for your participation. If you have any feedback or questions, please email:
Kristina Niedderer <k.niedderer@wlv.ac.uk>

Appendix 2

Appendix 2a. Final coding framework developed from the two focus groups with frequency of comments related to each theme.

Theme	*Sub Theme*	*Frequency*
Getting to know each others concerns with the application of Design for Behaviour Change	**Case study examples -** application of Design for Behaviour Change principles by practitioners (implicit or explicit)	25
	Design Principles and Techniques used - descriptions of methods used by practitioners to inform design intervention for behaviour change	17
Your take on Design for Behaviour Change	**Design for Behaviour Change benefits -** descriptions of perceived benefits of Design for Behaviour Change by practioners	34
	Design for Behaviour Change challenges - descriptions of challenge in applying Design for Behaviour Change theory and practice within organisations	33
	Design for Behaviour Change obstacles - descriptions of specific obstacles that practioners experienced in application of Design for Behaviour Change methods.	24
What is the way forward?	**What do you want to do that you can't? -** descriptions of activities that would improve practitioner skills and knowledge in the area	8
	What is the way forward? - desires for and approaches for possible improvement in the area	10

Appendix 2b. Full coding schedule developed from the two focus groups held with detailed coding frequency.

Theme	*Sub Theme*	*Category*	
Getting to know each others concerns with the application of Design for Behaviour Change	**Case study examples -** application of Design for Behaviour Change principles by practitioners (implicit or explicit)	Adoption of positive behaviours	4
		Crowd sourcing and charitable giving	3
		Environment design	4
		Health (all types occupational, physical etc.)	3
		Misc. comments	2
		Product innovation	1
		Service design	6
		Social design	1
		Waste management	1
	Design Principles and Techniques used - descriptions of methods used by practitioners to inform design intervention for behaviour change	Co-production	1
		Double diamond	1
		Ethnography	3
		General iterative approach	2
		Government toolkits	1
		Habit testing	1
		Nudge theory	2
		Philosophical approach	1
		Psychology principles	1
		User centred design	4
Your take on Design for Behaviour Change	**Design for Behaviour Change benefits -** descriptions of perceived benefits of Design for Behaviour Change by practioners	Increase in (design) knowledge + thinking	7
		Health	5
		Corporate benefits (brand identify etc)	4
		Innovation	4
		Customer focus	3
		General benefits	3
		Increase in design usage	3
		Monetary	3
		Efficiency	2
	Design for Behaviour Change challenges - descriptions of challenge in applying Design for Behaviour Change theory and practice within organisations	Buy-in (legitimacy)	3
		Change management	1
		Demographic challenges	3
		Ethical + legislation sensitivities	6
		Future proof	3
		Intangible	2
		Investment and cost	8
		Presenting information	1
		Scale of change	5
		Time	1
	Design for Behaviour Change obstacles - descriptions of specific obstacles that practioners experienced in application of Design for Behaviour Change methods.	Definition	1
		Examples	4
		Lack of evidence	3
		Lack of metrics	8
		Language	3
		Peoples perceptions	5
What is the way forward?	**What do you want to do that you can't? -** descriptions of activities that would improve practitioner skills and knowledge in the area	Access to academic journals	3
		Access to general DfBC information	2
		Evaluation of DfBC	1
		Problem of Design as a concept	1
		Understanding why it fails	1
	What is the way forward? - desires for and approaches for possible improvement in the area	Building a framework to explore DfBC	1
		General guidance about DfBC use	1
		Promote information on DfBC	2
		Understanding what element of behaviour is targeted	3
		Evidence	3