Creating Sustainable Innovation through Design for Behaviour Change

Summary Report

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Summary Report

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Summary Report

Executive Summary

Design is a significant driver of behavioural change, enabling, encouraging or discouraging particular practices from taking place. Already, approaches derived from the concept have enabled us to recycle, heat more efficiently, increase our exercise patterns and change the way we think about interaction, along with many more examples besides. Despite design's clear influence on human behaviour, the understanding of designing for behaviour change is still fragmented and limited frameworks exist for its effective implementation in professional and public contexts.

In response, this project has surveyed current approaches of design for behaviour change and their use by private and public stakeholders. The aim was to elicit the challenges for professional stakeholders in understanding, accessing and implementing behaviour change through design. The further aim was to develop a cross-sectional overview or 'map' of current approaches, their purpose and their application as a first step to facilitate easier access and understanding. The project focused on small and medium enterprises (SMEs), which constitute 99% of European businesses.

The project comprised of three parts: a cross-sectional literature review, a broad online survey and two follow-up focus groups with private and public stakeholders. The literature review provides a cross-sectional overview of current design for behaviour change approaches from key areas of ecological sustainability, health and well-being, safety and social design. It has surveyed current design for behaviour change approaches, how they are delineated from established behaviour change approaches in the social sciences, and how they have influenced examples in the four key areas included in the review. The online survey has complemented the literature review by finding out about current understandings and uses of design for behaviour change in the private and public sector. It has provided insights into which theories are being used by non-academic stakeholders, what obstacles there are to access and implementation, as well as additional examples. The focus groups have added to the findings of the online survey elaborating on the understanding of design for behaviour change and its ethical implications as well as on ways to address obstacles and challenges to its implementation.

An overview of the results of the investigation is presented in this summary report. It details the background of design for behaviour change and the methodological approach of the investigation. It then presents the findings of the theory review, divided into behavioural science approaches to behaviour change, design approaches and examples, which the review relates graphically. This is followed by the discussion of the understandings, access, obstacles and future potential elicited through the online survey and focus groups. The report concludes with reflections on the uptake of current design for behaviour change approaches by private and public stakeholders with a set of recommendations for the way forward.

The contribution of the project comprises firstly the broad overview of the diverse design for behaviour change approaches, their derivation, relation and application, supported by relevant examples within the different areas. Secondly, it offers insights into the understanding of design for behaviour change by SMEs and the perceived benefits and obstacles to its implementation. The findings highlight the currently still rather eclectic approach to design for behaviour change and the need for more systematic development, evidence based testing and more systematic and detailed representation of evidence based examples. In summary, the findings offer a first step towards better access to design for behaviour change approaches through the positioning, explanation and visual mapping of the diverse approaches, and in pointing out areas for development of research and examples to make design for behaviour change more accessible and useful to SMEs.

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1. Introduction

1.1 Funding scheme and response

The 'Creating Sustainable Innovation through Design for Behaviour Change' project was born in response to the 'Design in Innovation: Research Development Funding' call of the Arts and Humanities Research Council (AHRC) in August 2013 (AHRC 2013). The 'Design in Innovation' funding scheme is part of the AHRC's Delivery Plan (2011-15), which identified the discipline of design as a strategic priority. It responded to a scoping study (2012) by the AHRC in partnership with the Design Council, which investigated the role of Design Research in UK universities and its connections with businesses and policymakers. The Design Council report highlighted the importance of small and medium enterprises (SMEs) for design innovation as well as shortcomings in the accessibility of research knowledge in the context of innovation.

In line with the Design Council report, the 'Design in Innovation' call focused on the role of design in service innovation and in the innovation ecosystem as well as on evidence of its impact in these contexts. The scheme invited short, 6-months collaborative research development projects for research networks and workshops, including scoping studies or small research projects. Innovative and creative projects addressing new areas at the cross-section of design and innovation were favoured. The results from these projects will help the AHRC to scope further targeted calls for funding relating to design.

In response to the 'Design in Innovation' call, the project presented here focused on the role of design for behaviour change as a driver for sustainable innovation. Design has always been linked to change, and Herbert Simon's observation in 1969 that designers are "devising courses of action to change existing situations into preferred ones" summarises this aptly. However, since then the understanding of design has further developed and two changes have been significant as drivers for the present work. Firstly, situations are no longer viewed as neutral and object-centred. Instead, it is acknowledged that design inevitably has an impact on human behaviour and that this is dependent on many variables including context, motivation, etc. Secondly, there is recognition, both, that designers need to take responsibility for the ensuing actions, but also that usually there are many people involved in any one situation and therefore the question arises as to *whose* preference is to be addressed.

This becomes quite clear when working with a range of stakeholders – from industry, academy and government, private and public sectors, commercial, social, charitable and not-for-profit organisations – that views of what behaviour change means, and whose behaviour is to be changed diverge quite strongly. They include anything from what might be termed 'behaviour management' and micro-behaviours to large-scale ideas of ethical changes, from influencing customer buying behaviour to life style changes.

Within this array of views, we want to position design for behaviour change as an approach to ethical change that makes innovation sustainable not just for the individual, but for us as well as for future generations. Our project has therefore focused on how design for behaviour change can drive sustainable innovation, in particular for SMEs which constitute 99% of businesses in Europe (EC 2014).

1.2 Aims and objectives

The aim of this project was to develop a better understanding of design for behaviour change, of its access and implementation and of its role in driving sustainable innovation, with relevance to service providers in the key areas of ecological sustainability, health and well-being, safety and social design.

In order to address this aim, the project addressed the following objectives:

1) To bring together a significant inter-disciplinary and multi-institutional network of academic partners and non-academic stakeholders with an interest in sustainable innovation through design for behaviour change. To provide a holistic perspective and strategic capability through this network to carry the work forward beyond the duration of this funding application through public and private sector engagement and policy development.
2) To develop a holistic overview of design for behaviour change based on a) a desk-based survey of current literature, including examples and approaches to design for behaviour change, to identify current and potential approaches and applications; b) a broad online-survey among relevant public and private stakeholders to ascertain current understandings, needs and opportunities.
3) To explore and formulate effective strategies of collaboration and implementation to address the needs and opportunities for sustainable innovation in service and business communities through a number of face-to-face focus group events with academic and non-academic stakeholders.
4) To create a project resource and interactive platform to raise public awareness and create a public debate about sustainable innovation through design for behaviour change engaging a diverse set of audiences.

The contributions and benefits of the project include:

1) An overview of the subject, including current approaches and examples from within the four areas of design for behaviour change, their relationships and applications as well as benefits, challenges and obstacles to its implementation.
2) Better access to design for behaviour change approaches through the positioning, explanation and visual mapping of the diverse approaches, and in pointing out areas for development of research and examples.
3) A set of insights and recommendations for the development of the field of design for behaviour change and its role in promoting sustainable innovation.
4) Providing a community and contact point for people interested in design for behaviour change to enable ongoing development and promotion.

1.3 Approach

The core aim of the project was to provide a cross-sectional overview of design for behaviour change, of its understanding, access and implementation covering views from both academic and non-academic stakeholders as well as the four core subject areas. To achieve this aim, the main project activities were threefold: they comprised a broad cross-sectional literature review, a broad online survey and two follow-up focus groups with private and public stakeholders.

The literature review provides a broad cross-sectional overview of current design for behaviour change approaches from key areas of ecological sustainability, health and well-being, safety and social design. The online survey has elicited current understandings and uses of design for behaviour change and its role for sustainable innovation in the private and public sector. The focus groups have elaborated on the understanding of design for behaviour change and its ethical implications, as well as ways to address obstacles and challenges to its implementation.

To enable such a broad overview, the project brought together a team of 7 researchers and 4 advisors from 7 universities from key Design Departments in the UK and the Netherlands. The breadth and expertise allowed the team to cover the four core subject areas from different perspectives. In addition, participants from a broad base of private and public organisations were invited to engage with the project through the online survey and focus groups. In this way, knowledge gathered from academic research was complemented by an understanding of current professional knowledge and views of design for behaviour change.

1.4 Format and scope of the Summary Report

This report presents a summary of the findings of this project. The full final report will be published at the end of October and will be available from the project website: www.behaviourchange.eu

The summary report details the background of design for behaviour change and the methodological approach of the investigation.

It further presents an overview over the theoretical approaches and examples in the 'theory review', which is drawn from the literature review, online survey and focus group results. It is divided into behavioural science approaches, design approaches and examples of behaviour change, which the review relates through graphical illustrations.

This is followed by the 'access and implementation review', which discusses the understandings, access, challenges, obstacles and future potential of design for behaviour change. Results were elicited through the online survey and focus groups, and informed by the literature review.

The report concludes with reflections on the current role of design for behaviour change for sustainable innovation by private and public stakeholders. It offers a set of recommendations for the way forward to improving understanding and access to knowledge about design for behaviour change approaches and practices.

2. Design for Behaviour Change and its Background

Herbert Simon's early understanding of design acknowledged its capacity to create change in "*devising courses of action to change existing situations into preferred ones"* (1969, p.129). Today, it is widely recognised that design in its various guises of objects, services, interiors, architecture and environments can play an important role in influencing human behaviour (e.g. Brown and Wyatt 2010, Consolvo, McDonald and Landay 2009, Fry 2008, Lockton, Harrison and Stanton 2010: 382, Niedderer 2013), and that design can create both desirable as well as undesirable change. For example, the impact of cars has been profound with respect to social mobility, transforming cities and increasing resource demand. Computers have transformed the speed, social code and mediums used to communicate.

Design also has a history of attempting intentionally to create positive change. For example IDEO's 'Coasting bike platform' sought to address the fact that a large segment of the US adult population were not riding. Despite the population's fond memories of cycling, they were put off by the 'lycra-clad' bike brigade and complex bikes. The resulting 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, 2008a). Although change is only implicit in this case study and no explicit reference to behavioural change theory was acknowledged, IDEO's design process identified barriers to cycling in complexity, safety and sales. This can be considered as intentional change aligning to Simon's early understanding of design changing existing situations into preferred ones.

While it can be argued that designers have always attempted to utilise design to lead to "preferable outcomes", Jelsma (2006) posits that designers should take moral responsibility for the actions that take place as a result of humans interactions with artefacts, intentional or not: "Artefacts have a co-responsibility for the way action develops and for what results. If we waste energy or produce waste in routine actions such as in the household practices, that has to do with the way artefacts guide us" (Jelsma 2006, p.222). Importantly, design for behaviour change acknowledges this responsibility and, for this reason, draws on a range of explicit theories, approaches and tools which have been developed with an attempt to encourage pro-environmental and social actions and lifestyles from the user.

Design work leading to the development of design for behaviour change was initially conducted under the mantel of design psychology or behavioural design, a term first coined by Don Norman in the 1980s with respect to product design (Norman, 1988). Norman's 'psychology of everyday things' of the 1980s introduced to designers key concepts from ecological psychology and human factors research, such as affordances, constraint feedback and mapping, which have provided guiding principles to design of the intuitive use of artefacts. This work has been influential, despite not engaging in the specific language of behavioural change. Over time, models have progressed to be more explicit in influencing behaviour, such as emotion design (e.g. Desmet, Overbeeke and Tax 2001), persuasive technology (Fogg 2003) and Design with Intent (Lockton, Harrison and Stanton 2010).

With the emergence of the notion of behaviour change, a much more explicit discussion has also begun about the deliberate influence of design; of the areas in which it is, could or should be applied; whether its influence should be implicit or explicit, voluntary or prescriptive; of the ethical consequences of one or the other in various contexts; and also of the approaches that are available and emerging to offer guidance and support. This project has sought to provide an overview of the current positions on design for behaviour change, its foundations and relevant examples as well as current views on access, implementation and its ethical implications. A summary of the results is presented in the following.

3. Methodology

3.1 Overall approach

The core aim of the project was to provide an overview of design for behaviour change and its implementation across the four key areas - ecological sustainability, health and well-being, safety and social design. The project therefore sought to gather knowledge generated through academic research, such as theoretical models and examples that demonstrate their application, as well as knowledge about the access to, understanding and implementation of design for behaviour change by SMEs.

This has led to the threefold approach that included a cross-sectional review of predominantly academic literature, an online survey and two follow-up focus groups with private and public stakeholders. The three parts of the methodology have complemented each other and together they have allowed building up a broader picture, which is presented in this summary report. In the following, the purpose and conduct of the literature review, the online survey and the focus groups is explained before the integrated results are presented in sections 4 and 5.

3.2 Literature review

The aim of the literature review was to provide a broad cross-sectional overview of current design for behaviour change approaches from the key areas of ecological sustainability, health and well-being, safety and social design. This included current approaches to behavioural change from the social sciences and how these have informed relevant design approaches, as well as a collection of design examples from the four focus areas and which are related to the relevant design approaches.

The review covered the three areas as follows:

1. Key theories and models of behaviour change from the social sciences were reviewed including their areas of application to provide the foundations for the subsequent section.
2. Behaviour change approaches in design, covering established and emerging models and toolkits and their delineation from models in the behavioural sciences. The identified approaches were analysed thematically to map out the different perspectives, including common, dominant and emerging approaches as well as the absence of approaches.
3. A selection of examples from the four design areas - sustainability, design for health, social design and safety (including crime prevention) - which were identified as current key areas through a preliminary review of the literature prior to the project.

The approach to the three levels of the analysis follows Clark (2009), who has identified a common divide in approaches to behavioural change falling into those primarily addressing the individual and those addressing the context. This ‘agency structure’ divide in behavioural change theory provides a useful starting point for the review because design can be seen to interact at the level of both the individual (via human-artefact interactions) and broader social structures and systems (within which individuals act). Indeed, the ambition of designers may need to progress from product improvement and re-design to systems innovation if it is to address more complex ecological and social challenges. As an example, Brezet (1997) proposed that, for eco-design to achieve large-scale reductions in resource use, a move from product improvement and re-design to systems innovation would be required.

The literature review has not aimed to cover all theories and all sectors but to offer a useful and robust guide to designing for behavioural change through an overview of its foundations, and a discussion of its strengths and weaknesses, both in the available material and in its application. The full version of the literature review will be published as part of the final full report on the project website: www.behaviourchange.eu while this present report offers a summary version of the review in section 4 'Theory Review' where it is integrated with relevant approaches and examples elicited from the online survey and focus groups.

3.3 Online survey

The online survey has complemented the literature review by finding out about current understandings and uses of design for behaviour change and its role for sustainable innovation in the private and public sector. Its aim was to provide insights into which theories and approaches are being used by non-academic stakeholders, what obstacles there are to access and implementation, as well as to gather additional, current examples.

The survey was conducted via SurveyMonkey and announced through the Design Council's Newsletter. It was open from 22 May-31 August 2014. During this time, the survey was completed by 131 respondents, of which 77 respondents completed the entire survey. Fifty-four respondents completed the survey partially. This offers a statistically significant number of responses. The survey had 23 questions in five sections:

1: About your organisation and you (Q1-8)
2: Innovation (Q9-12)
3: Facilitating behaviour change (Q13-19)
4: Access and barriers to knowledge (Q20-22)
5: Finishing off (Q23)

Of the 131 respondents, roughly one third were Micro businesses (Mi: 1-10 employees); Small and Medium size enterprises (SE: 11-49 employees, ME: 50-249 employees); and large organisations (LO: >250 employees). Furthermore, 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) 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.

3.4 Focus Groups

The aim of the focus groups was to form discussion with non-academic professionals to elicit key data concerning understanding, challenges and opportunities of adopting and implementing design for behaviour change strategies. Particularly, this focused on use by small to medium size enterprises (SMEs) and how the concept can help drive innovation.

Two focus groups were conducted: one on 10th July 2014 at the Royal College of Art (RCA) in London, and one on 16th July 2014 at the University of Warwick, Coventry. The participants were identified through the online survey. Twenty-three respondents identified their interest in the London Focus Group, and 7 in the Warwick focus group. Of these 14 and 7 participants respectively were invited, of which 10 attended the focus group at the RCA, and 6 at Warwick.

The participants were from a variety of private and public organisations and businesses (Table 1). The majority were from SMEs, although five participants from large organisations were also included, which were from the public sector (2), charities (1), professional bodies (1) and a commercial organisation (1). This provided a good spread of views from different sectors and across different size organisations, while keeping the focus on SMEs.

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

Table 1: Business background of focus group participants

Using an innovative combination of Krueger and Casey's focus group methodology (2000) and of co-creation/participatory design workshop methodologies (Sanders, Brandt and Binder 2010), the focus groups were designed to elicit deeper insights about the participant's understanding and use of behaviour change. The focus groups were each approximately 3 hours duration. They comprised a number of interactive sessions to enable participants to become immersed in the discussion and draw upon their experiences. The sessions included an introduction of the participants to each other, a brief design exercise, a session to elicit participant's understanding of design for behaviour change and the benefits, challenges and obstacles to its implementation, and a final session exploring ways forward.

Both focus groups were recorded and transcribed. They were analysed by Mackrill and Niedderer using thematic analysis to extract key themes and categories within the data (Strauss & Corbin, 1998). Mackrill used NVIVO 10 software, and Niedderer coded the data by hand. Both coded the transcripts using a mixture of inductive and deductive coding approaches. The two sets of analyses were triangulated to form the final analysis.

3.5 Dissemination and continuation

The project has used a number of different formats to publish and disseminate the project results. Results are published in the form of: a conference-paper presented at the NordDesign 2014 conference in Helsinki, Finland; this summary report presented at the final results workshop in September 2014; the final full project report which will be available from the project website www.behaviourchange.eu by 31 October 2014. Further outcomes, such as a journal article and a Wiki page will be published in due course.

The Wikipedia page will enable public engagement to build the definition and overview of design for behaviour change theories and practices. Ongoing information and public interaction is achieved through a project blog and a twitter address: @behaviourchangeu. Finally for further ongoing public engagement and discussion, a Special Interest Group (SIG) on Design for Behaviour Change has been formed as part of the Design Research Society SIG programme, which has a discussion list on LinkedIn.

4. Results of Theory Review

4.1 Introduction

Although the influence of design on human behaviour has been recognised for some time, design for behaviour change has only been recognised formally in the last decade and is still immature, without a coherent set of approaches or framework to guide access for interested stakeholders. This review explores the relatively new body of work with the explicit focus on designing for behaviour change whilst acknowledging that the scope of how design can be applied to change behaviour is broad and extremely multidisciplinary. More precisely, this review has surveyed existing approaches to design for behaviour change covering four key design areas, including ecological sustainability, health and well-being, safety, and social design. The aim of the review is to develop a relational overview or 'map' of design for behaviour change approaches and their relationships as a first step and guide towards a better understanding, access and evidence base of design for behaviour change across the different fields of its application and towards stimulating lasting behaviour change.

The theory review is presented in three sections: in the first section, the origins of behaviour change theories from the behavioural and social sciences are introduced; the second section, introduces behaviour change approaches in design, covering established and emerging models and toolkits, and their delineation from behavioural sciences; the third section, presents select examples of design for behavioural change from each key area.

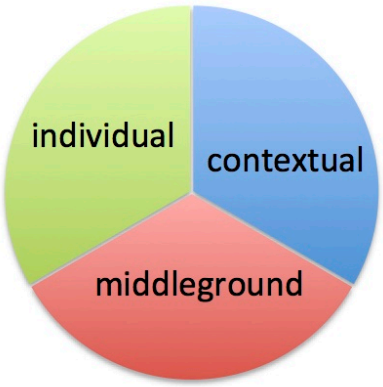

Figure 1: Agency divide

A significant divide in behaviour change theory can be seen to date back to Lewin's (1935) early understanding of behaviour, that a person's behaviour (*B*) is a function of his or her own personality, or other 'internal' factors (*P*) and the physical and social environment (*E*) $B = f(P, E)$. Clark (2009) divides this into those approaches that primarily address *cognition*, and those which address the *context* itself (2009), a division which Simon (1990) illustrated through the metaphor of a pair of scissors. Both 'blades' shape behaviour, but a model or technique will often concentrate on either individual cognition (mind, individualistic rational choice models) or context (environment, social structuralism theories). Importantly, there is a space that is a kind of 'middle ground' where models combine elements of individual and contextual agency to elicit change. This 'agency divide' (Fig.1) provides an initial framework to position the behaviour change strategies that we argue have been adopted and adapted in a design context.

4.2 Behaviour change models

Behavioural science is broadly the study of human behaviour, drawing on insights from economics, psychology and neuroscience. Darnton's (2008) review of behaviour change models and their uses outlines 60 social-psychological models of behaviour, distinguishing between models of behaviour and theories of change. This review presents a selection of models that focus on the individual, context, and middle ground.

4.2.1 Individualistic rational choice models

The individualistic rational choice model of behaviour change has been dominant in the behavioural sciences, and places agency with an individual to act. The model is founded on three broad principles: choice is rational; the individual is the appropriate choice of analysis; behaviours are self-interested (Jackson, 2005). Theories aligned to the rational choice model are outlined below.

Theory of planned behaviour

The Theory of Planned Behaviour (TPB) describes a group of cognitive theories which understand behaviour as an external expression of internal beliefs and attitudes. The TPB is one of the most widely cited and applied behaviour theories (e.g. Ajzen 1985, 1991; Ajzen and Madden 1986). Within TPB, intention is determined by appraisal (of the pros and cons, risks and benefits and alignment or divergence with social norms) of the intended behaviour (Munro et al 2007). Intention is itself an outcome of the combination of attitudes towards behaviour. That is, the positive or negative evaluation of the behaviour and its expected outcomes, and subjective norms, which are the social pressures exerted on an individual resulting from their perceptions of what others think they should do and their inclination to comply with these. The theory of reasoned action suggests that intention to act is the best predictor of behaviour. Widely used in health, the TPB is useful for predicting behaviour and for retrospective analysis of behaviour change (Armitage and Conner 2000, 2001; Taylor et al. 2007). It is suggested the TPB can predict 20-30% of the variance in behaviour brought about via interventions. The TPB is not considered useful for planning and designing interventions to prompt behaviour change (Hardeman et al 2002; Taylor et al. 2007; Webb et al. 2010). However, it may be useful in the design process for identifying particular influences on behaviour that could be targeted for change.

Health belief model

The health belief model (HBM) (Rosenstock 1966; Becker 1974; Sharma and Romas, 2012) argues that behaviour is determined by a number of beliefs about threats to individual well-being and the effectiveness and outcomes of particular actions or behaviours. This cognitive model is grounded in an assumption that a purposeful (even though speedy and possibly unconscious) appraisal of perceived threat or risk versus perceived benefits and barriers determines action or non-action. The model also acknowledges the impact of self-efficacy (Bandura 1997) as a determinant of action; i.e. the capacity/ capability to achieve the new behaviour. The HBM suggests that a variety of internal and external cues which affect the perception of threat may trigger actual behaviour change. Internal cues may include emotions, e.g. anxiety, or experiences, e.g. feeling unwell. External cues may include various environmental prompts. These internal or external cues affect the perception of threat and can trigger or maintain behaviour. Barriers can include physical or psychological discomfort arising from the new behaviour and the time taken to feel the benefit.

An individual is thought to be unlikely to make changes if the perceived threat is insignificant or they do not feel vulnerable to it. Similar non-response effects have been noted if the 'cost' is high but perceived benefits are low. e.g. if the remedy carries unpleasant side effects or disrupts habitual behaviours more than experienced by living with the problem. Perceived barriers are said to be the strongest predictor of the decision to act, or not.

Stages of Change (Transtheoretical model)

The Stages of Change (SoC) model, also known as the Transtheoretical model (Prochaska 1979; Prochaska and DiClemente 1983; Prochaska et al 1992), is also a cognitive model which posits that individuals contemplating a behaviour change go through a five step cycle of preparation. The five categories represent different milestones, or 'levels of motivational readiness' (Heimlich and Ardoin 2008), along a continuum of behaviour change; These stages are (i) pre-contemplation, (ii) contemplation, (iii) preparation, (iv) action, and (v) maintenance (Figure 2). Each stage represents different stages of motivation and readiness to make the change. Individuals may move back and forth between stages in a cyclical (not linear) manner. The transition between stages is determined by two key factors (i) self-efficacy (Bandura 1997) and (ii) decisional balance i.e. the outcome of individual appraisal of the pros and cons of a behaviour (Heimlich and Ardoin 2008; Armitage et al 2004).

Figure 2: Stages of Change Model

The rationale for using a staged model is that individuals at the same stage should face similar problems and barriers, and thus can be helped by the same type of intervention (Nisbet and Gick 2008). One criticism of the model has been the lack of clarity in defining its concepts in that it is unclear if individuals must move between all the stages for change to become sustainable, how individuals change, and why some change more than others (Littell and Girvin 2002).

Behavioural economics

Behavioural economics is a field of research that integrates psychological realism into economic theory to provide a better understanding of social and economic phenomena (Camerer, 1999). One of the assumptions of economic theory is that people behave with a rational self-interest, for example, if you show someone how many calories are in their food, then they will make healthier choices. Psychology systematically shows that this assumption is false and provides more realistic theories about human behaviour that can be incorporated into economics, for example, people often suffer from a lack of self-control, which means calorie information may not lead to better decisions. Behavioural economics unifies psychology and economics, providing a set of principles that can lead to the design of better products and services. Essentially the approach is about understanding and overcoming (or exploiting) cognitive biases through restructuring choice environments.

4.2.2 Context driven models

In contrast to the above approaches, social structuralist theories suggest that the person is not the appropriate level for analysis. Instead, behaviours in many instances can be viewed as consequences of societal norms and expectations that are held in place by the systems of provision and social structures that the individual lives within – contextual elements.

Choice Architecture Model

Closely related to Behavioural Economics, but more focused on systems change that leads to individual's decision, the 'nudge' approach, it is based on the potential effect of "defaults"; the selection made in the absence of alternatives. The design of a product or service can shape the choice architecture of a person's decision, while always allowing them to depart from it (Sunstein & Reisch, 2013). Defaults can therefore be very powerful – in many cases it's possible to design out the problem rather than changing any behaviour, like setting the default printer setting to double sided, thus setting or creating default behaviour.

Choice architecture illustrates one of the challenges to behaviour change raised in ethics - in particular in programs, implemented by government as they may impinge on people's rights, control or responsibility. The riposte is that most of these programs aim to make people better off, based on their own judgment, while providing the freedom to opt out if they choose. Ipsos Mori (2012) investigated public opinion on behaviour change campaigns related to smoking, unhealthy foods, savings, and living in an environmentally sustainable way. They found majority support for all types of intervention, decreasing with "force". Therefore choice architecture models in creating default behaviours may have an important role to play within design.

Christmas' change model

Christmas' model (Christmas, 2009) is structured around Nine Big Questions, designed to support and structure the process of gathering evidence, listening to viewpoints, and making judgments about behaviour change policies and interventions. In a sense this is similar to the SoC model in creating generative tools to interpret in order to develop behaviour change intervention through structural change. According to the model, behaviour change is typically best served by a mixture of 'tailored interventions', delivered over a long period of time and modified in response to measurement of impact.

The questions in the model are proposed to be as important as the answers:

1. Who changes what?
2. Why do people change their behaviour?
3. Why do people not change their behaviour?
4. Why do people do what they do to start with?
5. How does change happen in social networks?
6. How do people differ?
7. Who is best placed to promote change?
8. How can governments unlock change?
9. How can authorities give a push?

The model thus proposes an external agency approach. It makes clear that only after tackling all of the previous questions should one consider the last; whether and how to provide an additional push for change. Too often this is the *first* question that gets asked. Overall Christmas' model has been applied particularly to climate change and in particular the public response to such perceived changes and includes one-off behaviours that are relatively easy to target such as insulating lofts or installing new boilers However, the model could also be applied to other daily behaviours relating to diet, travel and domestic energy use that are harder to change.

4.2.3 Approaches that tread the middle ground

There are a number of models which propose to mediate the middle ground between individual agency and the contextual approach, overcoming the perceived limitations of each model.

Social practice theory (SPT)

Social Practice Theory focuses on everyday "practices". It is an approach to the study of human practices recognising that human habits and behaviours are themselves arrangements of various inter-connected and dynamic 'elements' that help shape practices as part of our everyday lives (Reckwitz, 2002). According to Shove (2010) three elements are implicated in the final practice: *Materials*, the physical objects that facilitate activities to be performed in specific ways; *Meanings,* symbols, images, interpretations or concepts associated with activities that determine how and when they might be performed; and, *Skills*, knowledge or competencies that permit, or lead to activities being under-taken in certain ways, to which Strengers (2010) adds *rules (what we must do)* as a fourth criterion. SPT acknowledges the socio-technical infrastructures within which practices occur.

Mindfulness

Mindfulness Theories (Ie, Nguyen, Langer 2014) focus on behaviour change of the individual through consciously considering social, cultural and environmental contexts to create awareness resulting in responsible choice and behaviour. Mindfulness theories from both Eastern and Western approaches focus on change through some kind of intervention to raise awareness of an individuals' situation, context and other variables. This intervention may vary according to the approach: Eastern approaches tend to focus on meditation to achieve insight and change while Western approaches tend to use a number of tools from psychology and education, such as questionnaires, to help individuals raise awareness of the constraints on them or their situation. The aim is to enable the perception of empowerment (internal locus control, Rotter 1990) as a precursor to enabling an individual to act and make choices for change. Langer (1989, 2010) has provided many examples of mindful change. Niedderer (2007, 2013, 2014) has adopted Langer's approach and suggests that – because a stimulus is required to raise mindful consciousness – design can be used as such a stimulus to instil mindful awareness, choice and behaviour.

Behavioural wheel

Michie, van Stralen and West (2011) developed a behaviour change wheel to help identify and develop behaviour change primarily for health reasons. From triangulating literature and interview data they propose a model formed of three key components. Firstly at the hub of the wheel, three conditions are proposed to elicit behaviour change; capability, opportunity and motivation for change. Then nine interventions exist which enable those interventions to occur including; education, persuasion, incentive, coercion, training, enablement, modelling, environmental restructuring and restrictions. On the outer sections there are policy characteristics which could enable the interventions to occur; environmental/social planning, communication/marketing, legislation, service provision, regulation, fiscal measures and guidelines. The wheel usefully characterizes the interventions and policies that may need to exist for affect behaviour change which now need to be fully validated using this systems based approach (Michie et al., 2011).

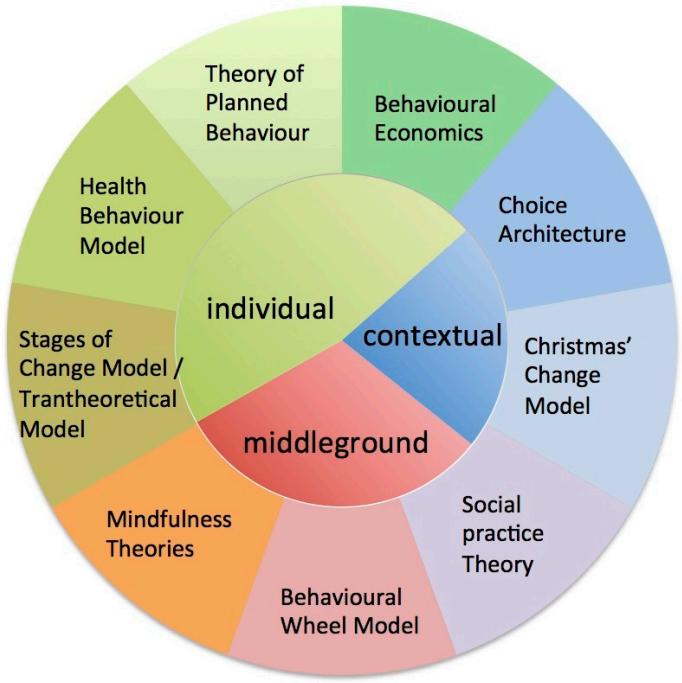

Figure 3: Agency divide between individual agency models, contextual models, and the middle ground with classification of theories given

Figure 3 highlights the range of change approaches across the individual-context divide. Warde's review of international behavioural change campaigns suggested a 'disproportionate focus' on the individual, with a recommendation to go beyond the individual to include mechanisms which intervene in the social and material contexts. A trend was identified that material forms of interventions are becoming more recognized, which is positive for design.

4.3 Design for behaviour change approaches

Design for behaviour change models seek to provide a general understanding of the way design can be used to influence behaviour, and their mechanisms. They tend to propose some conceptual approach and while usually referring to a certain subject area, such as health or sustainability, they may be transferable to other areas due to their generic nature. By contrast, toolkits tend to be more specific and practice-orientated – a guide of how to apply models to change certain behaviours in certain contexts. For the purpose of the review, both design models and 'toolkits' have been reviewed.

Approaches proposed by models and toolkits for influencing behaviour are either about trying to get people *to do* something, or trying to get people *not to do* something. Most possible ways to do that are either about changing how *easy* or *difficult* it is to do, or about making it so people *want* to do (or not to do) it. This means that design approaches typically use motivating behaviour or persuasion to increase the attraction for the individual user to do something (Niedderer 2013, Lockton et al 2010), or they use prescription or prevention measures by redesigning the environment to enable or decrease desirable or undesirable behaviour respectively (e.g. Lockton et al 2010, Tromp et al 2011). This offers four basic approaches, including:

- making the 'target' behaviour easier for a user to do
- making an undesired behaviour harder to do (which may be concomitant effects, but not necessarily)
- trying to get users to want to perform a particular behaviour
- trying to decrease users inclination to perform a particular behaviour.

Although a basic classification, it is also a simple and effective way of categorising different design approaches to assess a situation and match them to specified clients' needs.

The majority of design for behaviour change approaches identified by this review have appropriated psychological principles of behaviour change introduced in the previous section to influence targeted behaviours. Therefore, the common framing along an individual-context 'agency divide' used above for models of the behavioural sciences is also useful in identifying the mechanisms used in design models dealing with behavioural change (Figure 2). The examples below examine how designers have adopted behavioural science and social science theories to develop behavioural design models and 'toolkits'.

4.3.1 Design for Behaviour Change approaches targeting the individual

Persuasive Technology

Fogg's (2014) behavioural model for persuasive technology draws on theories from psychology and behavioural economics; it focuses on *motivation, ability,* and *triggers* (prompts) to encourage or discourage users to act in desired ways. The model has a matrix to guide designers on which tools to use depending on whether they wish to encourage or discourage one-off or on-going behaviours. Fogg's model is popular in the HCI community, but also beyond.

Behaviour Grid

Wendel's 'Behaviour Grid' (2013) is based on behavioural economics and also draws heavily on Fogg (2003). He describes the Behaviour Grid as 15 ways that behaviour can change. Like Fogg, Wendel (2014) contends that behaviour is systematic, and only occurs when three elements converge at the same moment: motivation, ability, a trigger. Therefore, to effect behaviour change, it is necessary to:

- Select the right target behaviour
- Make the target behaviour easy to do
- Ensure a trigger will prompt behaviour.

The premise is that, if successfully designed, the end user will make small changes in habits to embed the new pattern; and that a successful design enables the new habit to form speedily. Further, the process of design for behaviour change involves four phases which need to inform product development:

- Understand how the mind makes decisions and how this influences behaviour change
- Identify the right behaviours to change, depending on end user and product designer's goals
- Design around the behaviour
- Refine continuously following impact evaluation.

The Loughborough Model

The "Loughborough model" of design for behaviour change (Lilley, 2007, Lilley, 2009, Tang and Bhamra, 2008, Bhamra et al., 2008, Tang, 2010) aligns closely to behavioural economics, drawing on mechanisms such as feedback, constraints and affordances as well as persuasive technology. The majority of examples cited in the Loughborough model relate to providing feedback to energy and water users, especially concerning feedback devices for energy and water saving. It predominantly addresses product designers. Lilley (2009) posits that designs should respond to:

- The users level of compliance
- The gravity of the consequences of actions taken
- The context in which the interactions takes place.

It is acknowledged that it is difficult to know where to position interventions and this is a challenge for designers.

Design for healthy behaviour

Ludden and Hekkert (2014) have drawn on the Trans-theoretical Model (TTM) to derive a new framework to design for healthy behaviour. The framework reflects that designers need to consider the different stages which people go through to durably change their behaviour. For example, in the first two stages of the TTM, the pre-contemplation and contemplation stage, people built motivation to change. In these stages, people are not aware of a need to change and they are not yet ready to change. People are contemplating whether changing has more benefits than drawbacks for them, they are moving their 'decisional balance' (Prochaska & Velicer 1997). In these stages, a design intervention should probably have the form of a general, rather than a personal intervention because people will not yet be motivated to buy or even to start using a personal intervention. Interventions in these stages should have an emphasis on raising awareness of the importance of and the benefits of changing. An example of such an intervention aimed at early stages of change is the game 'Na-aapje' (literally translated as 'littlecopy-monkey') that was developed by the Dutch Voedingscentrum (Centre for Food). Na-aapje is a children's game that is designed to raise awareness with children that fruit and vegetables are healthy diet choices. The monkey in the game has to collect fruits and vegetables and the child scores high by collecting many fruits and vegetables.

Overall, approaches that use design to influence the individual were most dominant in the Design for Behaviour Change literature. Additional toolkits and models within this realm included Selvefors et al (2011) 'Design for Sustainable Consumption Behaviour', a user centred design approach combining consumption behaviour and behavioural intervention strategies to explore how knowledge within these domains can be used in an industry context to develop solutions that support behaviours to reduce resource consumption.

4.3.2 Design for Behavioural Change approaches that address context

Product-Impact Tool

The above design approaches are positioned heavily at influencing targeted behaviours. By contrast, Dorrestijn's Product-Impact Tool (2012) assesses the impact that technical products have on user behaviour. It was used to assess the Dutch RFID public transport e-payment mechanisms. The product-impact tool finds its basis in philosophy, most notably the work of Foucault on interrelations between humans and technology. The product impact model serves to structure the exploration of user guiding and changing effects, the human (user) is placed in the middle and four quadrants of influences are represented: the abstract, the cognitive, the environment and the physical. The tool is one of the few that also seeks to understand how technology (products and visions) have driven change through history. This broader impact of design driving change is not at the fore of the dominant design for behaviour change approaches, yet appears in progressive Design for Sustainability literature, e.g. Fry's De-futuring (1999) attempts to conceive of the agency and consequences of future

design solutions, while Manzini utilises future scenarios (2003) as thought provoking hypothesis for discussion (2003). This model is the only one of two that we could comfortable position within the contextual approach. In this context, it is noticeable that it did not draw on psychology but rather philosophy.

MindSpace

The MindSpace Model was one of the models used by private and public sector stakeholders. It presents a guidance and checklist of influences on behaviour for use in policy making. It was developed by the UK Cabinet Office to help inform policy design to achieve affective behaviour change. MindSpace presents the nine effects that influence our behaviour in mostly automatic (rather than deliberate) ways. Dolan et al (2012) position this in neuroscience terms as influencing 'System 1' of our brain that guides automatic, uncontrolled, effortless, associative, fast, unconscious and affective responses. This model is based on the Choice Architecture model, referencing Thaler and Sunstein (2008), and Ariel (2008), and therefore is also situated in the context section. It is not exactly a design model (more a straight behaviour change model), and therefore included somewhere inbetween those to spaces on the map (Fig.4).

4.3.3 Design for Behaviour Change approaches in the middleground

Mindful design

Niedderer (2007, 2013, 2014) has adopted Langer's theory of mindfulness (1989, 2011) to develop the concept of mindful design to encourage responsible user action and choice. Mindful design seeks to achieve responsible action through raising critical awareness of the different options rather than relying on a safe default situation, which is for example contrary to 'nudge' models based on choice architecture. It does so by changing the practical or symbolic function of a design to disrupt the user's consciousness to raise their awareness. A good example of this way of designing is the example of a certain traffic junction in Drachten, The Netherlands. A junction with a high incident rate, which was not improved by additional signage, the traffic planners finally decided to take away all signs. It is argued that this causes all traffic participants to actively think about how to navigate their environment and to take responsibility for managing the traffic system. The result was a clear improvement of the situation (Webster, 2007).

Socially responsible design

Tromp et al (2011) have developed a framework for socially responsible design from the point of the intended user experience, which is presented in the form of a map. In this map, they distinguish four categories of product influences: decisive, coercive, persuasive and seductive, which are used to encourage desirable and discourage undesirable behaviour. Decisive designs are based on constraining behaviour of the design, which does not allow certain undesired behaviours. It tends to be unconscious without offer of an alternative, for example, a tall building without a lift requires the user to exercise by walking up the stairs (Tromp et al 2011: 12). In contrast, coercive design is identified as "strong and explicit" in its influence, such as speed cameras, which offer drivers the choice of slowing down or keeping to the required speed and incurring a fine. Tromp et al. further distinguish between the two categories of persuasive and seductive design, which are characterised respectively as having an explicit and implicit weak influence. These offer guidance rather than reinforcement, such

as a healthy eating campaign (persuasive) or the effect of microwave ovens on social eating habits: because food can be prepared any time (seductive), fewer family meals are taken together (Tromp et al 2011:12).

Design with intent

Design with Intent (Lockton 2010) outlines a collection of multiple tools and techniques that enable, motivate or constrain the user to encourage desired actions. The toolkit takes a functional approach, which considers motivating (internal constraint) as well as enabling and constraining behaviour (external constraint through design), which is defined respectively as:

- **Motivating behaviour:** Motivating users to change behaviour by education, incentives and changing attitudes
- **Enabling behaviour:** Enabling 'desirable' behaviour by making it easier for the user than the alternatives
- **Constraining behaviour:** Constraining users to 'desirable' behaviour by making alternatives difficult or impossible.

Lockton et al. (2010) draws upon many different theories to support the structure of the toolkit including;

- Environmental and ecological psychology
- Poka-yoke manufacturing quality control
- Affordance techniques
- Heuristic and biases approaches
- Use of rhetoric (applied in pervasive technology)

The method creates a 'suggestion tool' inspiring design solutions by proposing techniques with examples that are applicable to particular target behaviours. Although not explicitly related to the behavioural wheel model, the Design with Intent toolkit appears closest to it in its coverage of the different positions, and has been positioned on our map accordingly.

Community based Social marketing and Design

Warde (2011) concludes that behavioural change "requires shifting the foci of initiatives away from individual consumer decisions and toward shaping and intervening in the shared behaviours of social groups." Clune's (2010) 'Design for Behaviour Change' model incorporated Mackenzie-Mohr's (2000) Community Based Social Marketing with design in an attempt to intervene in shared social practices. Mohrs model suggests that the behaviour expected to change should be specific and is best addressed at the level of local community, offering four steps:

- stage one: identifying barriers and benefits
- stage two: designing effective strategies based on effective tools
- stage three: piloting the strategy
- stage four: evaluating

To facilitate change, the effective strategies are based on psychological tools such as prompts, norms, incentives, commitments, communication and the removal of barriers. The strategies are largely aimed at reducing barriers or amplifying the benefits. Mohr's original model largely ignores the capacity of design to 'remove barriers' to particular practices. The inclusion of design redresses this, resulting in a model that could be utilized alongside the traditional design process for products and services that target specific behaviours.

Practice orientated Product Design

Social Practice Theory (SPT) acknowledges material artefacts (designed stuff) influencing the trajectory of everyday practices. Practice-orientated product design is an emerging area that is attempting to apply understanding of SPT to design, that would ultimately shift everyday practices over time (Kuijer, 2014; Scott et al., 2009). One example of this is re-introducing person-heating as an alternative to the dominant space heating paradigm.

Dimensions of Behaviour Change

Daae & Boks' (2014) Dimensions of Behaviour Change is a detailed method and card deck aiming to guide a designer through the process of specifying techniques for influencing behaviour.

4.3.4 Discussion

The most common current models of design for behaviour change appear to focus primarily on *individual* decision-making, lacking consideration of the *social* aspects of decisions, and the evolving social practices which affect how people interact with their environment (Kuijer and de Jong, 2011; Shove, 2010; Wilhite, 2013). In the context of design for sustainable behaviour, Hazas et al (2012) criticise the dominant models of individuals making "constant and active choices" about their behaviour around energy and resource use, without taking sufficient account of the contexts of everyday life, social and time commitments, and negotiating priorities within a family or household. Indeed, the more complex the action or problem (like the wicked problems of unsustainability), the further away it moves from individual agency, the more challenging it is to identify product level solutions.

Figure 4 illustrates the current dominance of behavioural economics, that has—at least politically—partly supplanted a previous focus on changing attitudes and beliefs as a precursor to behaviour change. As Stern (2000) and Guagnano et al (1995) showed in relation to recycling behaviour, contextual factors, often related to the built environment (such as the lack of presence of kerbside recycling bins) will often trump even deeply held 'pro-environment' attitudes in terms of influencing actual behaviour. This is certainly not to decry the value of increasing thoughtfulness (Grist, 2010; John et al, 2011), but simply highlighting that *context*—something with which designers are already very familiar—plays a powerful role in behaviour change.

A tension is revealed here, in that the agency inherent in design artefacts to create societal change over time is not explicit in the dominant design for behavioural change methods. The lack of focus is challenging in that all design creates change, yet design is traditionally bad at measuring the causal impact of design on change. The absence of valid reviews on the causal impact of design over time makes attempts to justify the relevance of design and behaviour change difficult. In lieu of concrete case studies highlighting the impact of design for behaviour change studies, the following section introduces a range of example that illustrates design for behaviour change across differing sectors, and the 'agency divide'.

Finally, it was interesting to see that stakeholders from private and public sectors used some design for behaviour change approaches, such as tools developed by Fogg (Persuasive technology) and by Lilley (Loughborough model) and the Design with Intent toolkit. However, generally, they appeared more familiar with behaviour change models from the behavioural sciences such as Nudge techniques, the Health-Belief Model, Theory of Planned Behaviour

and Stage-Based Change Models, some of which were developed into their own models such as the Mindspace model.

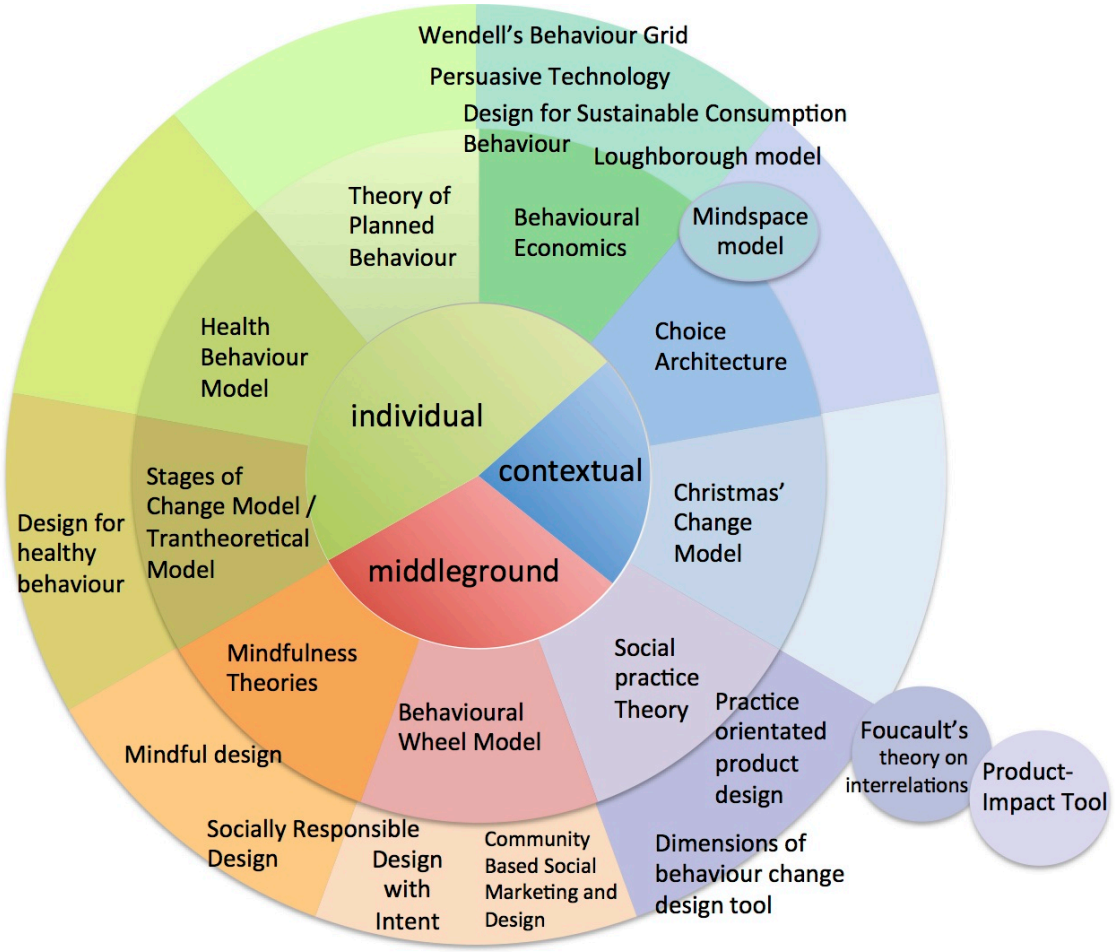

Figure 4: Categorisation of approaches in relation to behavioural theories.

4.4 Design for behaviour change examples

This section discusses a number of selected design for behaviour change examples. Examples have been organised by area of application, including sustainability, health and wellbeing, safety and social design, with reference to the agency divide being made throughout the discussion. This structure has been chosen because the case studies and examples are often anecdotal and not explicitly related to any models. The discussion seeks to draw out on the one hand the relationship of the examples with specific models, and on the other it discusses how examples have been interpreted through the application of such models. Taking each of these broad areas in turn, examples from the literature review, survey and focus groups are presented below, showing the scope of design for behaviour change application.

4.4.1 Sustainability

Design for ecological sustainability is a growing area with an increasing focus on efforts to reduce CO2 (see Crown, 2008) in the broad areas of energy, travel and food. With respect to energy, thermal comfort can be used as a simple case study to illustrate a range of potential

design for behaviour change options, as space and water heating are the dominant energy-using appliances in the UK.

A traditional behavioural change campaign based on the theory of planned behaviour might involve *slogans and posters* encouraging individuals to 'turn it down and turn it off' linked to an environmental message. Rather than using verbal persuasion, the Loughborough model visual and *sensory feedback mechanisms* that might for example raise an individual's energy awareness of heating and encourage reduced consumption. Energy feedback mechanisms have shown to reduce consumption by approximately 10%. Closely related, Fogg's triggers may result in a simple switch located in an appropriate location that makes the act of turning heating mechanisms off as convenient as possible. Lockton et al's *heuristic approach to thermostats* (2013) attempted to understand the mental models of users so that the thermostat settings could be redesigned to match the users' logic, and reduce wasteful consumption. *'Aircon off'* chose to ignore the users logic and turn heating and cooling off when a room is vacated for more than a set period of time.

The Practice Orientated Product design approach (Kuijer, 2014) has attempted to rethink thermal comfort practices, moving from space heating to personal heating, designing a range of novel solutions that *heat the person* directly to reduce the need for space heating. *The cool biz campaign* in Japan thought to achieve thermal comfort by challenging 'social norms'. The campaign encouraged relaxed dress codes at work, removing the need for a three-piece suit and necktie in a hot climate that enabled the thermostat settings to be raised to 28^{o}C in summer.

One of the survey respondents offered an example in this context, however, without highlighting any specific underpinning models. This was a "sandpit project involving pro environmental behaviour change in the workplace and small interventions linked to a large manufacturing plant in the UK. This created a 20% reduction in a factories annual energy costs".

Finally, architects may attempt to design away the problem of climate control by applying *passive architectural* design principles that eliminate the need for space heating, radically changing the context via what may traditionally be viewed as good design.

The above approaches highlight the breadth of possible means by which design can influence behaviour. What approach is selected will depend largely on the capacity available to intervene, and may in many cases include a combination of approaches.

4.4.2 Health and Wellbeing

Designers and computer scientists regularly endeavour to design interventions aimed at persuading people to adopt a healthier lifestyle and improving mental wellbeing (e.g., Toscos et al., 2006; Nelson, 2012). Well-known examples include the *Bayer blood sugar monitor* which seeks to encourage people to monitor their own blood sugar levels to stay healthier, or the smart watches and bans, such as the *Nike-band* which enable more general health monitoring. One of the examples put forward by respondents was "about an interactive toothbrush for children to help them learn how to brush their teeth as well as brush their teeth in a playful way."

Following the framework of design for healthy behaviour and the TTM, Ludden and Offringa (unpublished work) designed a sequence of products that aimed to help people to diminish

their intake of sugar-containing beverages. This series of products focuses on three stages: (I) raising awareness (a free *cooling sleeve* that depicts the amount of sugar that different beverages contain), (II) awareness and enabling (a free mobile application that helps people to keep track of the amount of sugar containing beverages that they consume) and (III) motivation (a water bottle containing an hour glass that reminds people to drink enough water instead of sugar containing beverages).

One of the survey respondents offers an example of behaviour change on an interpersonal level through *patient empowerment*, which clearly draws on ideas of mindfulness although these are not explicitly named. The example explains that

> *instead of Healthcare professionals trying to provide all the answers to patients problems, we train them to start by asking the patient what they have been doing recently to help their health. This changes the conversation direction from the start. Also, instead of trying to impose behaviour change on patients we train GPs to work with the patient to set their own goals and overcome problems and barriers themselves or with the support of GPs. This is a cultural shift on both sides of the conversation and has worked well in localise areas such as Ayreshire, Cambridge and Torquay when the local NHS, GPs and patients were all trained at the same time.*

At a contextual level, respondents offered the example of the design of public spaces for liveable cities that are safe, walkable and rideable and rely heavily on the context of the designed environment. For example the provision of *bike lanes* (preferably separate), bridges, priority traffic signals, traffic calmed streets and secure parking were central strategies to increased levels of cycling (Pucher and Buehler, 2007). This also included a project for "*rough sleepers* who live in London". It included the "commissioning of a hostel to address their multiple needs" and to change and improve health behaviours.

Finally, the creation of an outdoor gym for visitors to a UK National Trust property shows how the environment around us can be designed to promote activity when visiting an outdoor space (Figure 5).

Figure 5:
Outdoor gym produced by Design Company Boex using natural elements (Boex, 2014).

4.4.3 Social Design

Social design is concerned with the social interactions in people's everyday lives. Social behaviours are driven by a number of different factors, including social and cultural norms and emotions. Many of the example cross over into other areas such as safety or health.

For example, Gamman and Thorpe (2012) painted a stripe or patch in front of a *cash machine* to deter thieves or intruders by showing that any trespasser is visibly breaking social norms, enabling action by others (e.g. person at cash machine, bystander, police) to re-establish that norm. Significantly, using mindful design principles, this example can be explained as working by making visible social expectations of personal (safe) space and related behaviours of keeping distance, drawing on social conventions and respect.

Current approaches to social design can at times take 'anti-social' forms in that they might be designed to reinforce or prevent certain existing behaviours rather than to question them. One example in this regard is the design of public seating. While traditional benches offer versatile use, modern designs often are designed to reinforce avoidance behaviour with regard to strangers. For that reason, recent public seating design often has seats separated by dividing arm rests or even with seats facing in opposite directions, or in an extreme cases are studded for spikes to avoid homeless persons to rest. Instead, however, such spaces can be designed to question and re-interpret our multitude of interaction with people around public benches (Niedderer 2014). One such example is the bench "Come a little bit closer', Nina Farkache by *Droog Design* (Ramakers 2001). The bench is designed such that the seating shells are movable so strangers typically sitting down at opposite ends can move closer to each other if the wish.

At a contextual level, respondents offered the example of spaces in *law courts* which were designed to de-stress and calm users. It was argued that this encourages more prosecution witnesses to appear and makes parties in civil and family cases more open to resolution of disputes which been found to reduce time in court by 10% and to reduce violence and aggression in court.

Finally, the example of the *traffic junction* in Drachten, and today many others in the UK and elsewhere are both an example of social design and of safety design. A UK example was mentioned by one of the survey respondents:

> *The removal of barriers along Kensington High Street, the removal of so-called safety apparatus and with the removal of this safety apparatus the road became safer.*

Both examples, refer to junctions with traffic safety issues, and where traffic planners decided to take away all signs to improve traffic behaviour. The design works because it causes individuals to take note of their social context, and by doing so it creates a safer traffic environment. Overall, it appears that many examples of social design respond to or can be explained by a mindful design pattern because they are reliant on social responsible action and reflection.

4.4.4 Safety

Perhaps one of the clearest examples where choice architecture is desirable is within the area of safety, where designed mechanisms are put in place so that it is very difficult or impossible to operate a device so that a person is injured. Rather than persuade an individual to use the device correctly, it simply does not work.

The UK construction industry has a sustained approach to improve the safety of its workers and reduce the number of accidents and deaths within it for many years (Hartley and Cheyne, 2010). Interventions and initiatives have tackled various aspects of risk, ranging through design, elimination, protective equipment and behaviour. However, the construction industry is still dangerous with typically between 70 to 80 deaths per year. In Hartley and Cheyne's study, a number of visual cues were identified repeatedly, including housekeeping, pedestrian walkways, safety signs, PPE usage and the behaviour of people already on site. Influences on behaviour were discussed through focus-groups involving those working on-site. 'First impressions' were thought to impact on risk-taking behaviour amongst the workers on the construction sites.

The findings relating to construction sites have potential implications for the management of safety within the construction industry in general in terms of establishing the importance of creating an impression of a high level of safety culture at all times. Based on the increased risk of injury and death within the industry, the UK Health and Safety Executive (HSE, 2012) developed the concept of 'safe by design'. This is the integration of hazard identification and risk assessment methods early in the design process to eliminate or minimise the risks of injury throughout the life of the building or structure being designed, including construction, use, maintenance and demolition. It encompasses all design including facilities, hardware, systems, equipment, products, tooling, materials, energy, controls, layout and configuration.

The 'safe design' approach begins in the conceptual and planning phases with an emphasis on making choices about design, materials used and methods of manufacture or construction to enhance the safety of the finished product.

4.5 Discussion

The review of theories, approaches and examples has shown that design for behaviour change is an evolving landscape of work that utilizes many theories and debates. More 'traditional' theories tend to be distinct and sit within either the individual or contextual spaces. Adding design to these traditional approaches and new domains of use perhaps start to lead to theories and approaches utilising the middle ground, which is a more system-based approach where individual and contextual are not mutually exclusive.

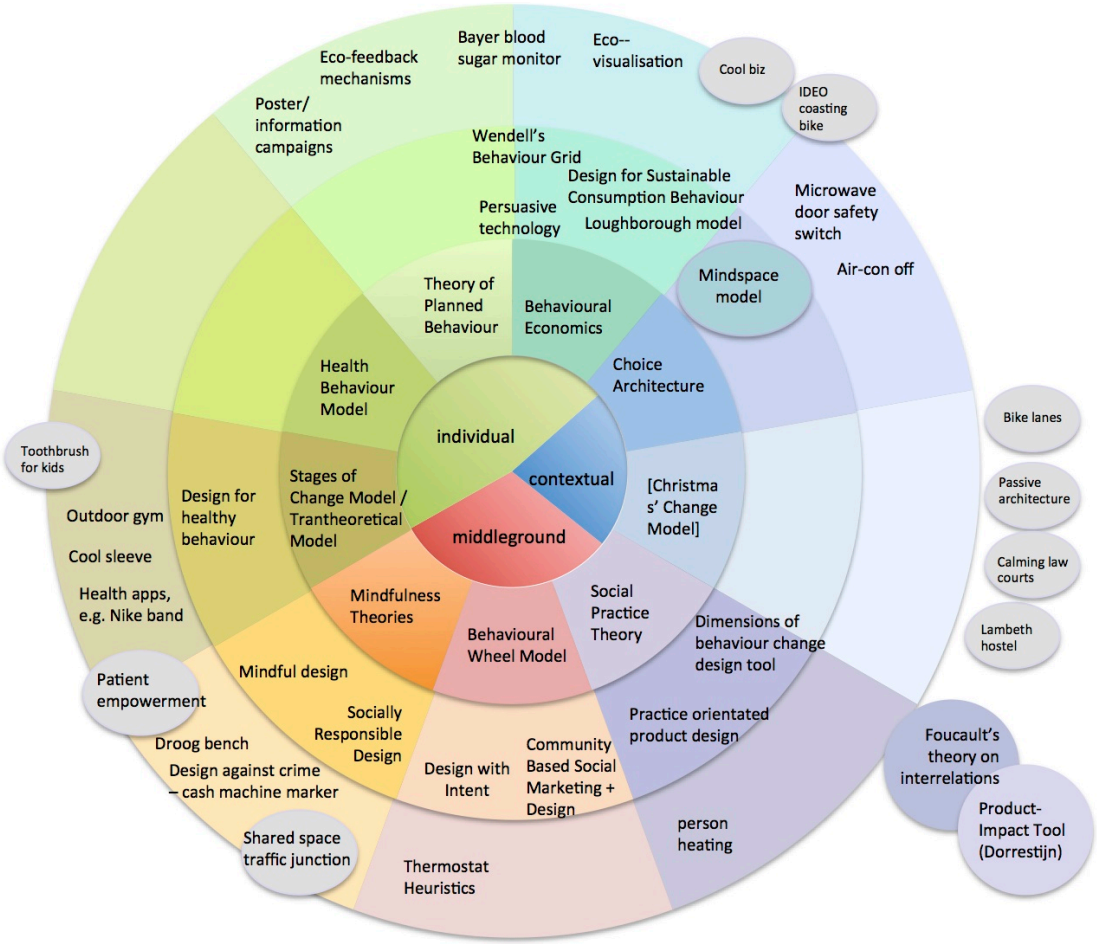

Figure 6: Design for behaviour change map with examples.

Figure 6 adds the examples to the visual map that has built up during throughout discussion. It demonstrates the split between strongly individual and contextual examples, although examples start to emerge in the middleground. As indicated in the beginning, not all examples were easy to place because of their implicit nature. Further, it was important to see that about the examples of theories and toolkits used by private and public stakeholders partly responded to Behaviour change models, some to design for behaviour change models, and some responded to other approaches, not yet included in this visualisation. Therefore, this map is an on-going and developing project, which we aim to build up more comprehensively over time to represent all the theories and examples that we have been able to collect this far, and will collect in the future.

5. Results of Innovation and Access Review

This section provides a summary of the findings elicited through the online survey and follow-up focus groups. Besides providing an insight into theories and examples used within professional practice that have been discussed above as part of the theory review, the survey and focus groups produced a rich set of insights concerning the understanding of design for behaviour change. These include the role of innovation, ethical issues as well as access and barriers to the implementation of design for behaviour change. These findings and insights are presented and discussed in the following.[1]

5.1 Demographics

The demographics have revealed some interesting trends. These relate to the level of engagement related to area of location as well as the balance of respondents in terms of size and type of organisation.

About two thirds of respondents of the online survey were from SMEs (63%), and half of those were from Micro-businesses, while 37% were from large organisations. (Figure 7) About 55% of respondents worked in private/commercial organisations, followed by 31% in the public and education sector. The remaining 14% included charities, social enterprises and professional bodies (Figure 8).

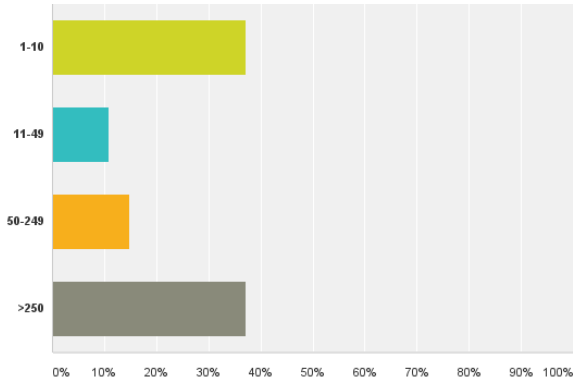

Figure 7: distribution of size of organisation

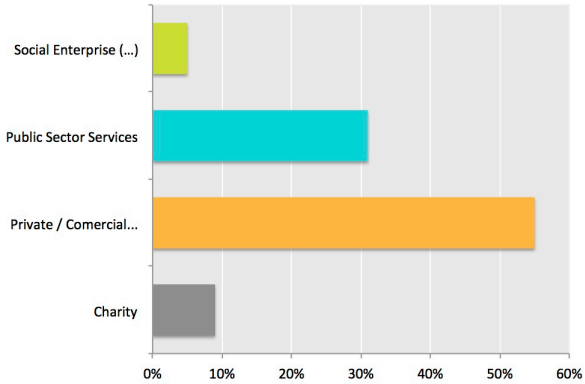

Figure 8: distribution of type

[1] In the following analysis, figures from the online survey are rounded to the nearest full digit.

Characteristically, over 70% of SMEs that responded were private/commercial companies. By contrast over 70% of Large Organisations (LOs) who responded were public sector organisations (including education institutes). This trend was mirrored in the focus groups, with 11 out of 16 participants (68%) being from SME's, and with 9 of 16 participants being from commercial businesses (56%), 8 of whom were from SMEs.

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, 27% of respondents were from overseas or international organisations covering North America, Europe, Asia and Australia. However, for the focus groups more than 50% of participants came from London, indicating a stronger interest and perhaps pressure to engage, both, to innovate and to deal with issues of behaviour change.

5.2 The role of innovation

There generally appears to be a consensus of what innovation means, with 87% of respondents agreeing somewhat or fully with the definition of "*innovation is the successful application of an idea, practice, or object perceived as new*". The term 'successful was however criticized and we suggest it is removed from the definition for future use.

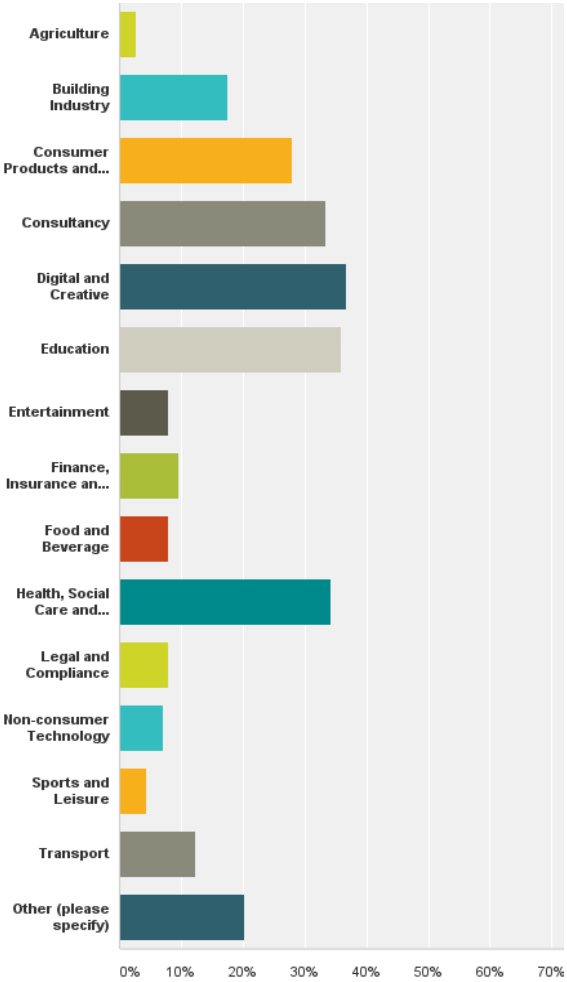

Figure 9: target sectors

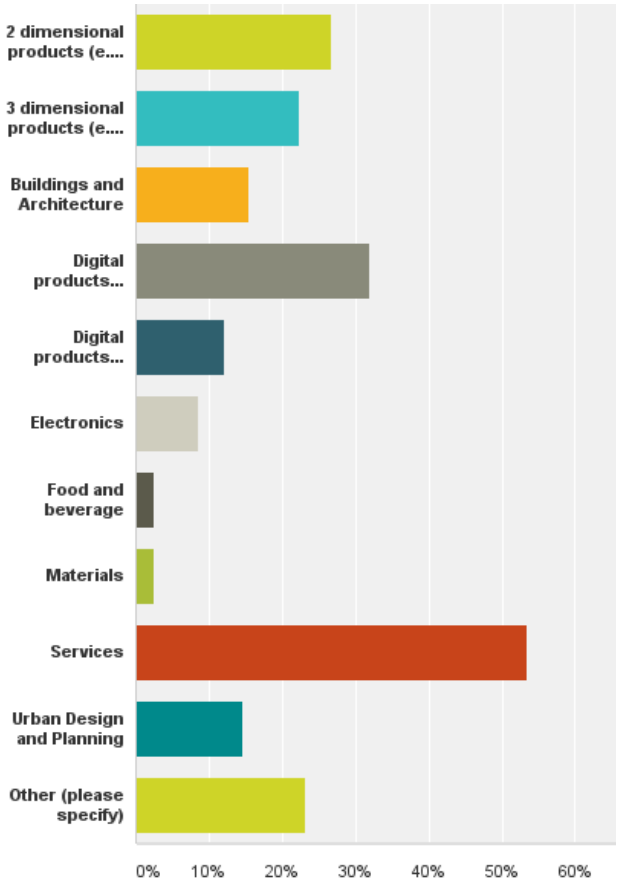

Figure 10: range of primary products

As to the area of application, the respondents' organisations targeted the full range of sectors and there is no significant difference between small and large organisations. The sectors featuring most strongly are: Health and Social Care, Digital and Creative, Consumer products, Consultancy and Education (Figure 9).

In terms of primary products, the survey revealed that services provided the largest share with 53%, followed by digital and creative products (32%) and 2D products (27%), (Figure 10). Characteristically, the 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. Service Innovations are also the most important type of innovation (70%), ahead of process and product innovation with 64% and 60% respectively.

According to respondents, both in-house and external innovation activities are clearly led by designers (78% and 48% respectively), followed by engineers (36%, 31%) and market research (30%, 33%) and diverse other measures (28%, 29%) including teamwork.

When asked why innovation is important, improving services and products appeared most important overall (as indicated by 80% of respondents) followed by the aim to meet demands from clients and/or the public (68%) and of being a market leader (59%), (Figure 11). Interestingly, compliance with legal obligations were perceived as least important, indicated by only 21% of respondents overall, whereby legislation is slightly more important for large organisations (31%). This raises the question as to how governments and policy makers can influence SMEs to facilitate responsible behaviour change innovation. It appears likely to be more successful through co-operation and providing business opportunities than through any regulations. Most importantly, together with legal concerns (21%), ecological issues are least considered as a driver for innovation (39%), with social sustainability being somewhat higher on the agenda (52%). This might be interpreted as a lack of concern for those issues that drive ethical innovations and raises the question how ethical innovation can be put higher on the innovation agenda.

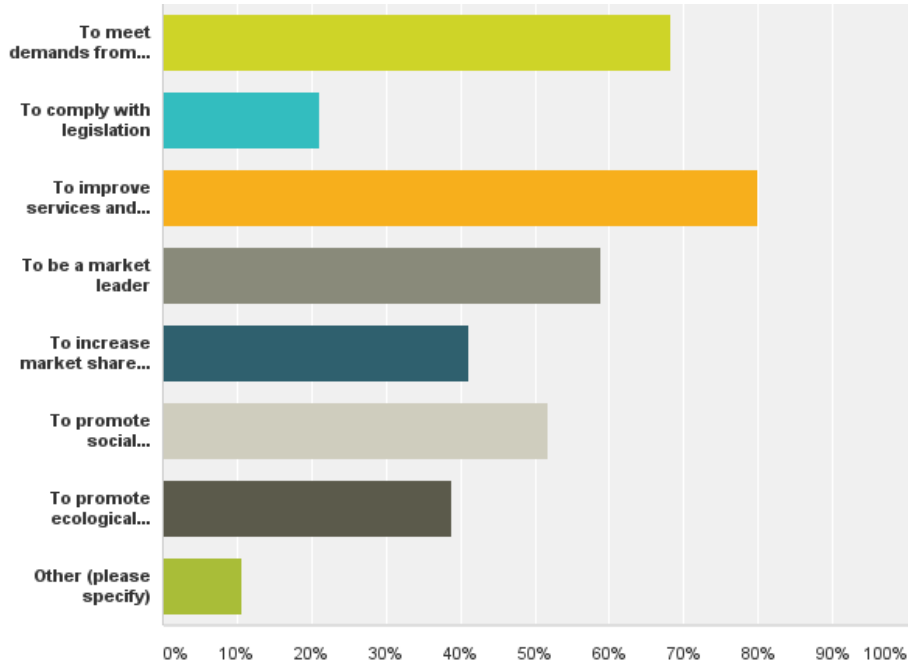

Figure 11: Reasons for innovations

5.3 Awareness, role and understanding of design for behaviour change

When turning from innovation to behaviour change, there was a strong overall awareness of design for behaviour change among the respondents, with 93% of respondents having some awareness. Of these, 48% were 'very aware', 31% 'aware' and 14% 'a little' aware. 7% said they were not aware (Figure 12). While this figure of overall awareness of the respondents is encouraging, this cannot be seen as representative of the non-respondent population, because of the self-selection process of those aware of and interested in the topic. Therefore awareness in the overall target population is likely to be significantly lower.

Compared to the awareness of design for behaviour change, its implementation was predictably lower: while still 86% of respondents felt that their organisations used at least some principles or practices, the proportion of those who used it 'a lot' was only 28%, while 29% would use them 'somewhat' and 27% would use them 'a little', with 16% not at all.

When questioning respondents about their specific implementation practices, however, the percentage of engagement drastically diminished from a perception of general use of 86% (above) to 57%, with 28% referring explicitly to (design for) behaviour change guidelines, toolkits or practices, 29% referring to them but not in detail and, most importantly, 31% not referring to any guidelines but would like to. 4% didn't feel that this was necessary and a further 8% did not know whether or not their organisations use any guidance (Figure 13). In particular the number of Micro businesses that would like to use such guidance with 43% is comparatively higher than that of Small, Medium and Large organisations (4-25%). 35 respondents also volunteered examples of their practice or of theories used, which are discussed in the context of the theory review in section 4 above.

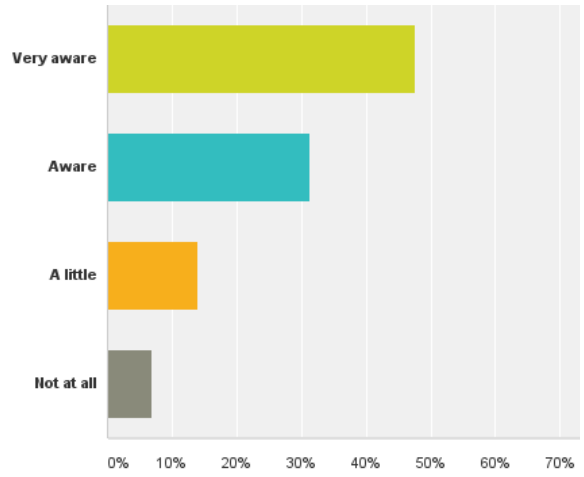

Figure 12: Awareness of design for behaviour change

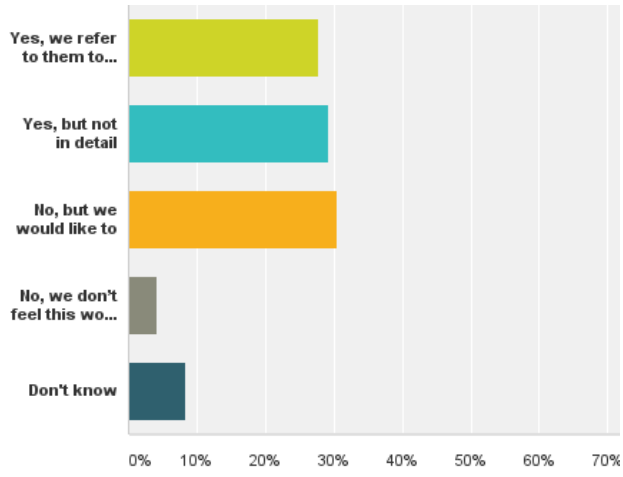

Figure 13: Use of DfBC approaches

When questioning how behaviour change was used, and who or what organisations are seeking to influence, it emerged that respondents' organisations most strongly seek to influence customers (68%), followed by the public (58%), with own employees being considered least (29%). Influencing policy and the government were also mentioned. Thereby, SMEs were most focused on influencing customers, while large organisations were more strongly trying to influence the public, which was most likely correlated to the high percentage of public sector organisations among LOs. Among the changes sought, long-term change is the most considered (78%), followed by other behaviour related issues including values and attitudes, decision making, removal of behavioural barriers, and opportunities for new practices or alternative behaviours. One-time change ranks last (14%).

Further, organisations that are using design for behaviour change innovations seek to influence health and well-being (66%), followed by social sustainability (51%), ecological sustainability (45%) and economic sustainability (43%), while mobility (24%), safety (19%) and crime prevention (10%) appear of least concern. This significantly shows that those with a concern for behaviour change also largely recognise ethical concerns more strongly than those not concerned with design for behaviour change (Figure 14).

The variability in the meaning of design for behaviour change was exemplified through the focus groups. When asked about their understanding or definition of design for behaviour change, many of the participants' answers converged on the idea that design for behaviour change is "*an approach for changing the behaviour of people*" and that it utilises psychological theory suggesting knowledge was focused on behaviour change rather than a design stance to elicit behaviour change. Beyond that, answers covered a breadth of meanings and raised questions as to what exactly behaviour change means and for whom, reaching from "*understanding … underlying wants and needs, and emerging new behaviours*" of customers to "*promot[ing] emotional wellbeing in people's interaction*" with their environment.

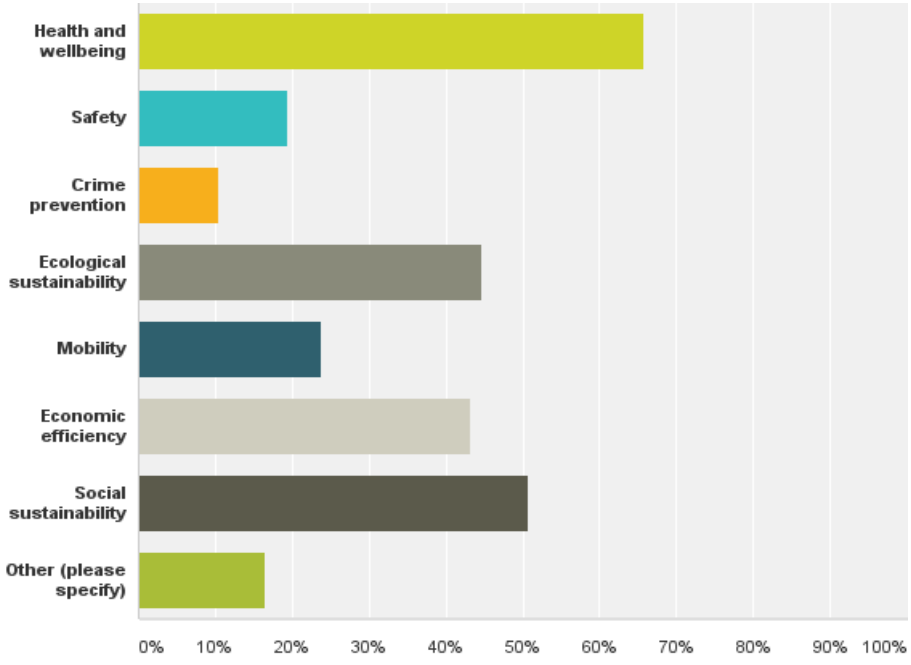

Figure 14: Areas of concern of design for behaviour change

There was also variation in the approach to design for behaviour change. While some regarded "*behaviour change [as] quite a high level requirement for individual people*", 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)*

It was apparent that, apart from a few comments, the design element and link between effective change and design did not appear to be as clear to participants as might have been

expected. The array of definitions and understandings of design for behaviour change without a uniform answer pointed to its challenging nature whose complexities are at times difficult to pinpoint. 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)

> *I guess I'm interested in one level in why now. Why have we seen this kind of ascendency of design for behaviour change… I work for big companies and all of a sudden it's become legitimate for them to try to do behaviour change on the back of, for example, sustainability or health… whereas… about ten years ago… it was all about choice… Aligned with that I think there's a whole debate in relation to values and ethics and change in why, who... I think that there's also a piece that it's a wonderful money machine at the moment*. (FG1)

These two quotes highlight the dilemma that on the one hand it is difficult to determine what behaviour a designer or company might want to change. On the other hand, this might be dependent on commercial needs of the company: while for some behaviour change may offer a new revenue stream, for others it might question commercial viability, dependent on how it is interpreted. 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.

5.4 Benefits and challenges of design for behaviour change

During the focus groups, participants further reflected on the benefits of behaviour change as well as its challenges and obstacles. More consistent themes were revealed when looking at the benefits, which were identified as referring to the *designer*, the *recipient/user*, and *wider social benefits* respectively.

5.4.1 Benefits

Considering the benefit for the designer, the discussion revealed direct commercial gain as a driver: "*you can make lots of money from it*" as well as more indirect benefits in form of reputation. For example, the reputation of a company could be enhanced by use of the concept particularly if it is seen as acting for social good:

> *The idea behind brand is you are the company that's designing stuff for social good, using technology or design or whatever, it might be for social good, so you get perceived to be a cool company*. (FG2)

The idea of reputation or brand as a potential benefit raised the question of the perceived level of sincerity and face value attributed to the use of design for behaviour change, and what the benefits might be for the recipients or users.

When focusing on the benefits for recipients or users, design for behaviour change was seen both as having benefits as a "customer focused" approach as well as an efficient way to deliver change offering "*ease, convenience… empowerment*". This included subjective

benefits, such as "*feeling good about yourself*" after using a step counter or other health product. One participant summarised it as follows:

> *Personal affirmation, something that is endorsing your behaviour or the sense that you're doing the right thing…as a more worthy person*. (FG2)

Beyond individual benefits for designers/companies or recipients/users, also several broader benefits were mentioned that included affects and effects on society more generally:

> *Behavioural change can be quite cheap, quite cost effective if you get it right and a quick way of delivering change. I think about energy, actually getting people to use less product is a lot quicker and cheaper than building a power station.* (FG2)

An additional advantage that was mentioned was the notion that design for behaviour change could increase reflectiveness:

> *..in terms of benefits … design for behaviour change can be quite thought provoking.* (FG1)

Many of the benefits, although grouped, often transcended a single group benefit (e.g. the customer). One participant summarized this succinctly:

> *[benefits are] profit and commerciality and delivering sustainable business, which actually has societal good in it.* (FG2)

Overall, the discussion revealed that there were multiple benefits and beneficiaries and that benefits varied depending on the context in which design for behaviour change was applied.

5.4.2 Challenges

While potentially beneficial, the implementation of design for behaviour change also faces significant challenges. Even though it was thought that behaviour change could have financial benefits and build reputation, when discussing challenges, key challenges named were investment, both, financial investment and conceptual buy-in from business stakeholders:

> *[A challenge] is actually saying how we make money out of finding solutions to achieve social good, or environmental good in society*. (FG1)

> *it's [DfBC] a bit fluffy, so actually that makes it quite hard to get funding for these kinds of things within business in particular and backing, because actually it's not demonstrated itself yet unless you've got somebody at the top who's a real believer in that kind of thing* (FG2)

> *So you've got to make sure that you've got the right people who are actually wanting to sign up to these projects and do these different things because you can have great ideas but not going any place because they're not getting the sort of sponsorship that it needs* (FG1)

> *Using psychology or either using the sort of framing terms of psychology in terms of room design can get a very quick negative reaction from developers, from quite a large proportion of the population* (FG1)

This lack of investment was thought to arise from the absence of clearly defined benefits – or, more precisely, from benefits that may lie outside of any immediate financial gain, as well as from a lack of available evidence, which individuals could use to cite in support (as will be discussed later). A further reason may be ethical sensitivities, a discussion point, which developed within both focus groups:

> *There's a lot of behaviour change stuff that's happening which may be beneficial to the people doing it but not to the people that it's targeted to get their behaviour to change*. (FG1)

> *Perception of what is reasonable under the policy legislation changes*. (FG1)

> *There's almost an assumption…that we're driving behavioural change for good, and I'm not sure that all businesses do that*. (FG2)

> *There's a growing literature that's pointing towards "good business behaviour" in terms of ethical business behaviour and effect on the bottom line in year X but also in terms of the sustainability of that bottom line which is why of course [there is] corporate social responsibility.* (FG1)

The concern with ethics was particularly complex, and will need further debate to come to any conclusions. For the time being, it raised questions about the ethical position of the designer or company, about who decides what are 'desirable' goals, and what means should be used to achieve them. It thus highlighted the challenge for designers and their relationship with those they design for:

> *When I think of behaviour change, I think of a boulder. It's easier to push a boulder down a hill than it is to push a boulder up a hill, and if what I want to do is to get somebody to a better place, stop them smoking, stop them drinking, get them to use less carbon, whatever I perceive is the better place, so I've got an issue between my set of values and choices and my audience's set of values and choices, so I have to decide whether my audience is below me and I've got to push the rock on them or they're above me and I push the rock up the hill to get there*. (FG2)

It also raised the issue of currency and future proofing:

> *I also think that there is a challenge with keeping it current and keeping it up to date and making sure that we're on top of things and that maybe a behavioural change that related ten years ago doesn't relate now* (FG1)

Overall, the perception was that if design for behaviour change is to be used to drive innovation, a developing a consistent understanding of how to use it together with the development of ethical and legislative sensitivity is necessary for it to be understood and accepted more widely. In particular, sensitivities may depend on the approach taken to behaviour change: for example, approaches based on motivation are generally more easily accepted, but may not lead to certain change, while prescriptive approaches may achieve change but using them may have ethical ramifications to be considered.

5.5 Access and barriers to design for behaviour change

A key part of the project was to develop an understanding of how information on design for behaviour change is accessed and what the barriers to access and implementation are. This revealed that information in support of design for behaviour change overall currently 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 (Figure 15).

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. This might indicate that academic research is harder to find, read, and often has to be paid for, and are therefore harder to access for Micro and Small businesses who have limited resources in terms of staff time and expertise.

The survey revealed that the greatest obstacles to accessing or applying design for behaviour change are: a lack of time (49%), difficulty in accessing relevant research (36%), and the lack of evidence available (31%). Other obstacles included cost as well as a lack of awareness, interest and belief, especially by larger companies, as well as clients' inclination, especially for the smaller organisations (Figure 16). The perception of 'lack of time' appears

to indicate also a lack of priority, perhaps due to a lack of recognition of clear benefits of design for behaviour change. This suggests that there is a need for more explicit information and, debate about its aims and benefits to raise its level of priority.

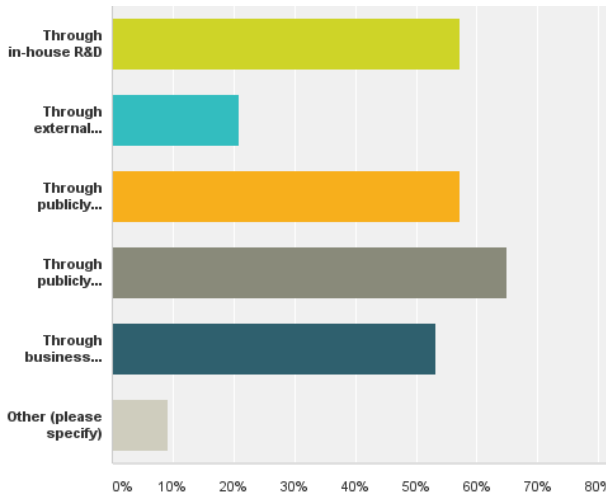

Figure 15: access to design for behaviour change

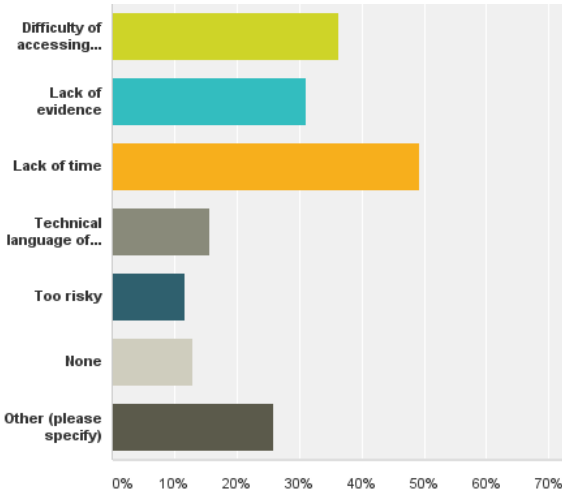

Fig 16: barriers to access

The focus groups further elaborated on these findings, in particular the lack of metrics and evidence along with people's perceptions:

> *We also think that there's a lack of sort of measures and metrics for figuring out what works and what doesn't* (FG1).

The challenge for businesses in understanding how effective a strategy has been is not only in measuring the results, but in potential negative outcome being laid open, which they fear could be harmful to their business, while others recognise the potential for improvement:

> *Obstacles are the fact that people don't really want to know what the result of their design is* (FG1)

> *In buildings there's very little post-occupancy evaluation. Where I work we're probably one of the few places that is really into it and really interested in it but it's not from a place of profit it's because we're interested in doing better buildings* (FG1)

This lack of metrics provides a challenge, and opportunity, for both academic and non-academic professionals. Due to the diverse context that design for behaviour change spans, creating metrics and approaches of evaluations will take time. This was understood and appreciated by participants:

> *Understanding behaviours is still a relatively new science, and it's incredibly complicated so do you know when you press that button, you get that result?* (FG1)

The development of metrics will require research to investigate not only design for behaviour change as a concept but also how business applies it in practice:

> *[There] is a lack of research and empirical evidence data to back up outcomes, case studies that you might be able to refer to easily to influence approaches* (FG1)

These findings concerning access and obstacles for implementation highlight the need and call for evidence based examples and evaluation frameworks to eliminate any risk, but also the fear of exposure.

5.6 The way forward: participants' suggestions

In terms of what might help with accessing and implementing design for behaviour change (Table 3), 57% of respondents felt that clear evidence of the benefits and open access to academic journals would help accessing and implementing design for behaviour change, as well as easier access to information, e.g. through networks and workshops (56%). Rated as almost as important was the availability of more relevant examples (52%) and guidance that is more specific to individuals' areas of interest (51%). Technical language (23%) and awareness raising (35%) were seen as least important for improving accessibility. In line with the findings to Q21, Micro-businesses felt that access was the greatest issue and would be of most help, while for large organisations evidence was most importance.

Table 3: Supportive measures for accessing and implementing design for behaviour change

Answer Choices	Responses	
Clear evidence of benefits	**57.14%**	44
Easier access to information, e.g through networks and workshops	**55.84%**	43
Free (open access) academic journals	**57.14%**	44
Guidance that is more specific to your areas of interest	**50.65%**	39
Less technical language of available research	**23.38%**	18
More awareness, e.g. through social media or SME specific journals	**35.06%**	27
More relevant examples	**51.95%**	40
Other (please specify)	**16.88%**	13
Total Respondents: 77		

The focus groups elicited important further detail on the 'way forward' and what might be helpful to professionals seeking to engage with design for behaviour change practices.

Easier and open access to information was one of the key suggestions, with the request for information to be pushed out "*rather than having a whole system where you have to go and find things* (FG2)" and to 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)". The request for information arose directly from the difficulty, in particular for small companies, of accessing academic journals. It was further underpinned by the need to be able to (understand how to) evaluate design for behaviour change projects, or have examples of evaluations as guidance, as a means of building confidence in the concept of design for behaviour change, along with understanding why it may fail:

> *One practical thing to have would be access to more examples which were well evidenced, not because we want to replicate them but as practitioners we need to try and start with something so we need to give something a go if they've written about something, so we need some ideas of stuff we could try* (FG2).

In addition to applied evidence and examples, stronger links between academia and industry were suggested as helpful. Indeed, there was a strong call to make working with academia more accessible and approachable, for example partnership programmes, and alignment of goals with a focus on practical as well as theoretical benefits:

> *I suppose one thing that I find is there are a lot of these schemes about for being able to tap into universities and things like that. But as a single person business often they don't feel like they're accessible to me. There are so many hoops that I have to go through to qualify for it or it's going to cost 50 grand and I've got to match fund it or something like that. So some way of being able to actually access the academics, the support that's available from universities and things like that would be really useful* (FG2)

A further need identified was for cross-disciplinary working and knowledge to inform one's own work more broadly by covering the different aspects of behaviour change, including "*technologies, services, other people* (FG1)". One way suggested was to have a practitioner based information resource:

> *What would be really useful would be a sort of practitioners' journal, like a proper practitioners' journal where you can publish your stuff where it's written in a sort of quite open language not written for academics, it's written for other practitioners* (FG1).

This indicates that current language is an obstacle and provides weight to the notion that the field needs to be developed and distilled into a consistent and coherent format. Additionally, an alternative approach of a conference was discussed but the time input and lack of focus made a conference less desirable compared to an accessible journal. Indeed, this was preferred to the development of bespoke practitioner toolkits:

> *That for me the whole reason for a journal that we were talking about is there's debate, … there's different perspectives, … for me I certainly don't want a 'what works', five key points, here's the toolbox and you go and do it. Please don't do that* (FG1).

> *I think what I find most useful is clear information, scientifically established information on people's changing needs in terms of living, daily living, that's for the general public, quite apart from the specialist requirements* (FG1).

In this sense, it was thought that a journal might offer a platform and resource for practitioners to gather information from one single place but also enable collaboration between academia and industry through joint publications. Participants were particularly keen to encourage academics to publish in such a journal. In the context of the journal idea, there was also a call for sharing resources. Due to the diverse range of applications of design for behaviour change, participants felt that they cannot know everything and that sharing of resources would be a good thing, despite the fact business growth requires competitive advantages:

> *A wide range of networks representing different types of users that could share experience and, of course, case studies are always useful. People can identify with them* (FG1).

The use of resource sharing goes further as it supports an evidence base of examples that demonstrate successful results. It was felt that such a basis would help persuade stakeholders (colleagues, managers, investors) to adopt design for behaviour change practices and strategies. The need for accessibility of such evidence through visually quick and persuasive information was highlighted:

> *[what I] would love is one-page visual example case studies, so basically see the slides you had up, I'd love that with just a line that says what was the results (*FG1)

> *Have an evidence-base to influence good design, you can then say, well this works because of this and the weight gets taken off of perhaps a perceived aesthetic value or a cultural value and loosens up all of that* (FG1).

Overall, it was felt that transferring the many theoretical understandings into a format of applied use, utilising a shared information resource (e.g. journal), would be the way forward. In addition, creating evaluation protocols could help build and support an evidence base.

5.7 Summary

The results of the online survey and focus groups complemented the literature review and importantly added further insights about the understanding and use of design for behaviour change by professionals from private and public organisations. The focus groups, in particular, gave insight into difficulties encountered in accessing and implementing design for behaviour change, and in finding a way forward to address these difficulties.

Design for behaviour change was applied across a variety of sectors and the approaches to using the concept ranged from using bespoke toolkits through to utilising knowledge gained through academic qualifications as well as personal experience. Benefits of the approach included facilitating a reflective approach that considers wider social and environmental issues along with a focus on the customer/user as a driver for innovation. Some of the main challenges and obstacles in implementing design for behaviour change relate to both, the lack of relevant and easily accessible examples and evidence, and the lack of a coherent approach and language of design for behaviour change. This translates into problems with implementation within industry through a lack of conceptual and financial buy-in.

One possible way forward, and a challenge for academia, is to create a shared language of design for behaviour change and present this on a platform that is accessible to practitioners. An open access practitioner journal was proposed and supported. Success in this will also depend on stronger links between academia and industry in an effort to achieve an evidence base and shared language. The way forward for design for behaviour change as emerged from this project can be summarised as a need for:

- Development of consistent use of terms and language between and within contexts
- Development of a practitioner based publication resource
- Development of easy processes for academia and industry to work together and to learn from each other
- Development of evaluation metrics and approaches
- Development of explicit, evidence based examples.

6. Conclusion

6.1 Summary

This project has taken a three-fold approach, including a literature review, an online survey and two follow-up focus groups. The findings have been presented in this report as a theory review and a review of access and innovation.

The theory review has generated a broad cross-sectional overview of existing theories and approaches, covering theories from behaviour change, from the emerging design for behaviour change literature, and examples of their application in diverse practical contexts. The theory review has drawn on the literature review as well as on the online survey and the focus groups. It has revealed the extent of existing literature and examples, including the influences on and development and application of design for behaviour change approaches. It has also revealed the gaps and overlaps within literature and examples through the mapping of approaches according to the 'agency divide'. It has mapped overlaps between different approaches as well as the separation between different areas of design, some of which are developed further than others in terms of adopting design for behaviour change.

The innovation and access review has drawn mainly on the online survey and focus groups. It has generated important insights into perceptions of the understanding and values of design for behaviour change among private and public service stakeholders as we all as about availability and access to information about design for behaviour change.

Most importantly, overall, the project has elicited possible ways of how to take design for behaviour change forward to strengthen its role in driving sustainable innovation.

6.2 Key insights: understanding and ethics

The review has generated an important understanding of design for behaviour change in terms of the approaches that are used and how and where they might be applied. It also has shown some important synergies between academic research and its adoption in professional and policy contexts. For example, MINDSPACE (see Dolan et al. 2012), a set of guidelines used by the government, builds on behaviour change models of choice architecture. However, there are not many such clear examples of synergies where academic research has generated clear guidelines. Rather, most design examples and professional are not referenced to the models that underpin them (if any) indicating that there is a clear gap that is to be closed. This appears partly to arise from an aversion against prescriptive and simplistic guidelines, partly from difficulties of access, and partly from a need for more support, especially concerning the effective assessment of work done.

More importantly, beyond the concern for individual approaches and implementation, there was a concern about the need for a shared understanding and values. The project results have indicated that there is a breadth of understanding in terms of values across different areas of application. The discussion centres on the judgment of whom behaviour change is for, by whom it is implemented, and who will benefit from it. The examples put forward reached from changing customer behaviour to increase sales to large scale global changes, such as reducing carbon emissions. There were many strong examples and some implicit consensus by participants and authors that design for behaviour change in its fullest extent is an approach to ethical change that makes innovation sustainable not just for the individual,

but for us as well as for future generations. Therefore, behaviour change has to reach everyone, including customers, companies, stakeholders and society as a whole. Already in 2006, Stern (2006) has explained in his review "the economics of climate change' that "tackling climate change is the pro-growth strategy for the longer term". Thus longer term thinking will be of great importance.

The main obstacle for adopting design for behaviour change is perhaps the potentially negative financial impact or risk, an obstacle, which might arise from the lack of clarity and therefore appreciation of its benefits as well as the lack of evidence base. This is an issue that will be important to address in order to further the implementation of design for behaviour change.

6.3 Key insights: access and implementation

In terms of access and implementation of design for behaviour change, two key issues were mentioned, which are intertwined with the understanding of its value. The first was the issue of language, and the perception that a clearer, shared language would help communicate the benefits of design for behaviour change to decision makers and thus promote its implementation.

The second was the need to avoid any risks. It was strongly felt by participants that there was a lack of evidence and relevant examples. It was felt that good examples would provide insight into how design for behaviour change might work, and allow designers to learn from the examples to adapt and transfer such examples into their own context of work. Equally important was the need for examples as evidence, or indeed post-evaluation of existing projects to understand the success of any intervention.

In this context, collaboration was perceived as a way to achieve both shared language and evidence-based evaluation. Therefore, easier access for public and private service providers to working with academics was seen as desirable, as was collaboration in terms of undertaking evaluations of design for behaviour change projects.

6.4 The Way forward: recommendations

Through the conceptual and visual mapping of design for behaviour change approaches, the project has taken a first step towards providing some foundations for a coherent understanding of design for behaviour change. Together with the involvement of private and public stakeholders, this has generated a clear understanding of tendencies as well as gaps that future work has to address. These include:

- A lack of information and in-depth understanding, which stifles its wider adoption;
- A lack of shared language to communicate between the various stakeholders;
- The need for a more extensive debate about ethical questions by whom and for whom design for behaviour change is driven;
- A lack of evidence in form of case studies and examples to guide work in this area and help to convince decision makers in the light of real and perceived risks;
- A need for agreed methods of evaluation to enable building up a library of case studies and examples.

In answer to these gaps, the discussions have generated a number of suggestions of what needs to be addressed, and how to address the identified issues. Key suggestions correspond directly to the above identified issues. Pointing to 'the way forward' they call for:

- The development of the consistent use of terms and language between and within contexts through closer collaboration and knowledge sharing;
- The development of a practitioner based publication resource, such as an open source practitioner based journal to collect information and make it available in one easily accessible place;
- The development of easier processes for academia and industry to collaborate and learn from each other;
- The development of shared evaluation standards and approaches;
- The development of explicit, evidence based examples.

This project has been the first starting point to create a platform or hub for advancing design for behaviour change. To carry forward and address the identified issues in the future, we have established a Special Interest Group under the auspices of the Design Research Society. The Design for Behaviour Change SIG has its own discussion group, which you can visit and join to start collaboration and to share information:

http://www.linkedin.com/groups/Design-Behaviour-Change-Special-Interest-8137299

You can also follow us on twitter:

@behaviourchangeu

or you can contact us directly on:

info@behaviourchange.eu

We look forward to hearing from you and to work together on some all changing collaborations!

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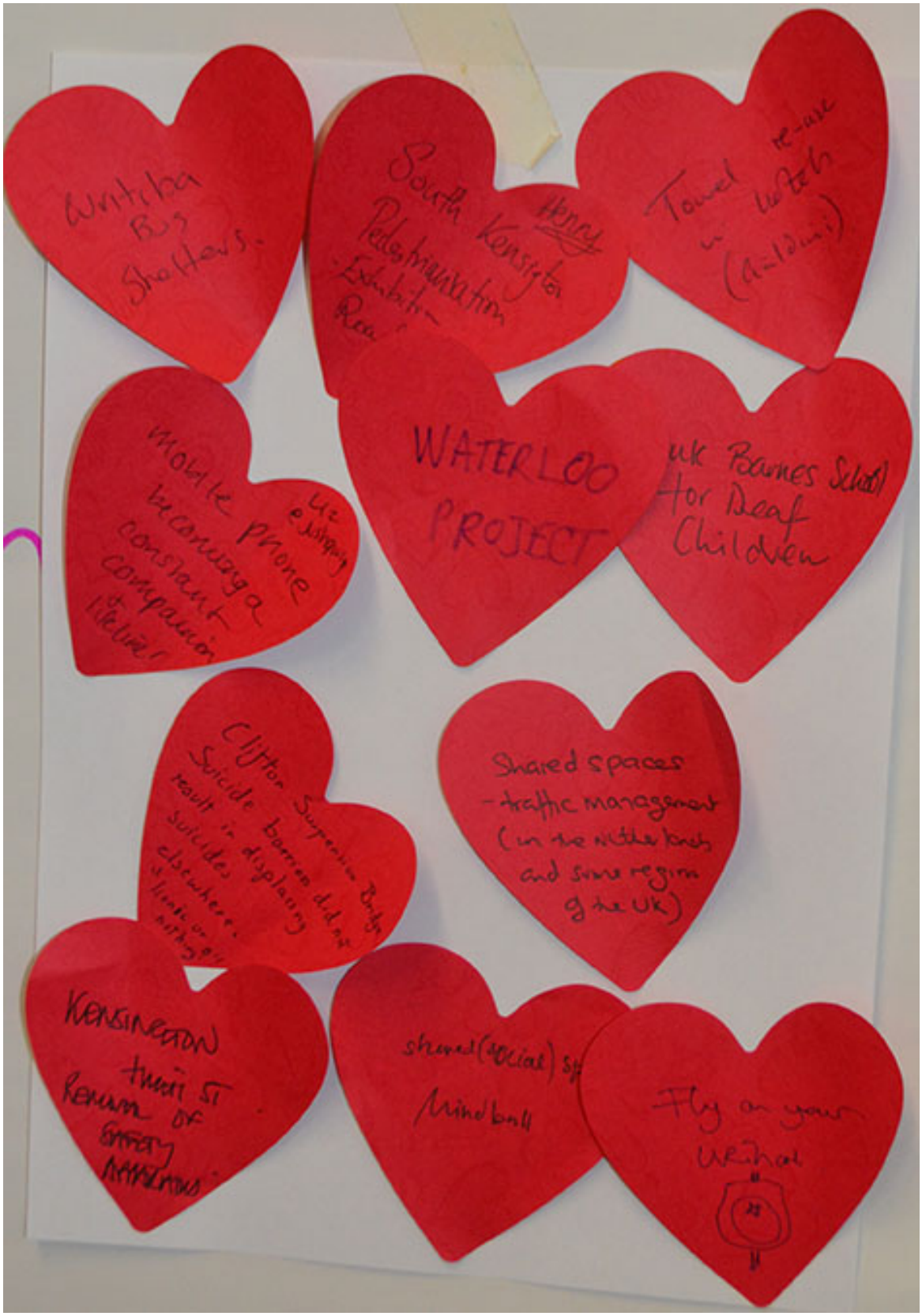

Figure 17: Design from behaviour change examples from Focus Group 1.

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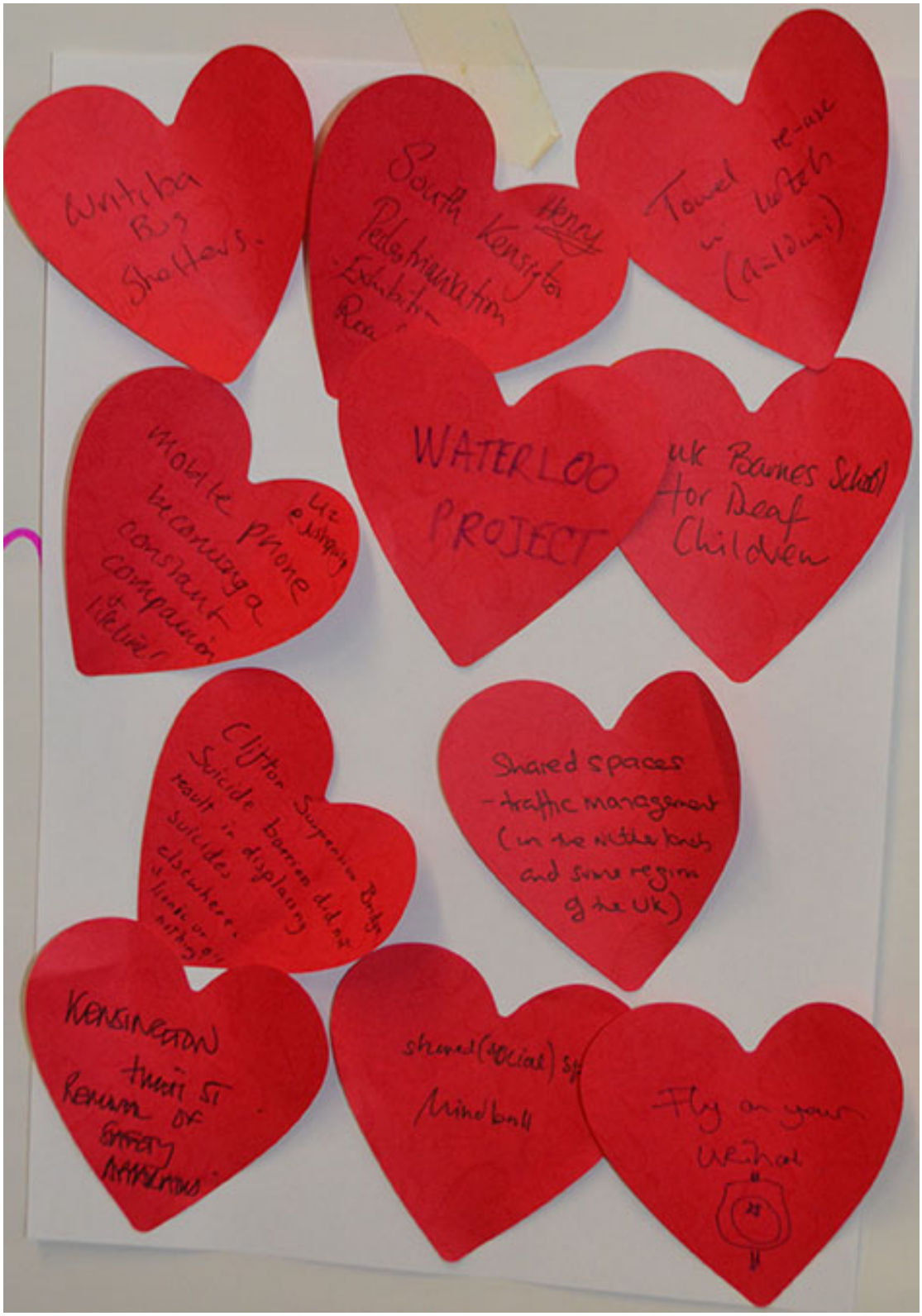

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