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## TOWARDS INSTINCTIVE SUSTAINABLE PRODUCT USE

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Presented at the *2nd International Conference: Sustainability Creating the Culture*, 2-4<sup>th</sup> November 2005, Aberdeen Exhibition & Conference Centre, Aberdeen.

### ABSTRACT

An effective and holistic corporate social responsibility strategy should consider all stages of the product lifecycle; design and development, manufacturing, distribution, sales, use and disposal. However, there appears to be a lack of consideration on the part of manufacturers regarding the effects of product use, despite this stage having been identified as having a significant environmental and social impact (Environmental Change Unit, 1997, Sherwin and Bhamra, 1998) which is largely determined by the consumers' behaviour. Technological intervention and consumer education alone is not sufficient to reduce the impact of product use, instead a fundamental shift in behaviour is required (Fletcher et al., 2001, Velden, 2003), a shift which could be initiated by products.

This paper reports on the findings of a literature review conducted as part of a doctoral research project in the Department of Design and Technology at Loughborough University. The aim of this project is to identify ways of reducing unsustainable behaviours through improved product design.

### 1. INTRODUCTION

Activities in the field of sustainable design have, to date, predominantly focused on reducing the impact of manufacturing and disposal, a focus which is arguably driven, in part, by legislative demands. With the exception of safety and manufacturer liability, there appears to be a lack of consideration on the part of manufacturers and designers for the effects of product use. However, the environmental and social impacts associated with the use phase, which are for the most part caused by the consumers' behaviour, are significant. (Environmental Change Unit, 1997, Sherwin and Bhamra, 1998). Current solutions to limit socially and environmentally undesirable behaviours include educational and technological interventions, but arguably few product-led interventions. Research to date indicates that these initiatives have had a limited impact in changing consumer behaviour.

This paper reports on the findings of an eclectic literature review which draws together diverse, interdisciplinary and exploratory research in order to identify potentially viable product-led methodologies for automatically mitigating, controlling or blocking unsustainable or inappropriate behaviour by users. The moral and ethical acceptability of these approaches will be debated within the context of the growing need for viable ways to create a fundamental behavioural shift towards sustainability and the ineffectual nature of prior efforts to date.

## 2. METHODOLOGY

The literature review was split into five key tasks, these were;

- To investigate and define the elements of sustainable and unsustainable behaviour,
- To uncover the possible causes of sustainable and unsustainable behaviour,
- To understand the historical and contemporary relationship between consumers and products,
- To identify and evaluate product-led, technological or education based attempts to moderate consumer behaviour,
- To explore the current and potential roles for manufacturers, designers and consumers in working towards a more sustainable society.

This paper focuses on the fourth task - identifying and evaluating product-led, technological or education based attempts to moderate consumer behaviour. The absence of significant prior work in this area was both an opportunity and a hindrance. Although there was clearly a significant opportunity to contribute to knowledge, there were no established conventions to adhere to or defined research areas upon which to focus. This, coupled with the complex, interdisciplinary nature of the research, prompted the need for an eclectic and creative approach to gathering and processing relevant information. Walla's four-stage model depicts the process involved in generating new theories (Ayan, 1997, p. 40).

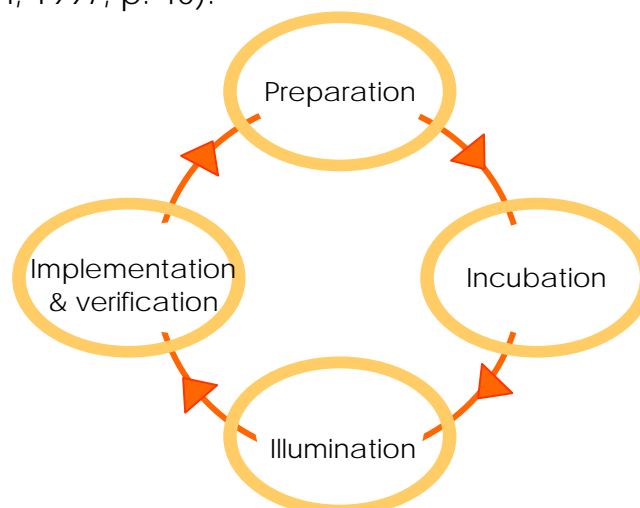


Figure1: Walla's Creativity Model

This model illustrates a reflective creativity process; the preparation stage involves the collection of relevant information; during incubation, commonly known as 'time-out' or 'downtime' the unconscious mind sorts through the information gathered, linking seemingly detached strands of thought together to form coherent theories. This phase, which can often be construed as time wasting, is nonetheless vital. "The importance of relaxation or distraction to encourage incubation ...is...well recognized" (Ayan, 1997, p. 43) in creative disciplines and forms an essential part of the creativity process. Illumination describes the moment when these emerging theories cross over from the unconscious to the conscious mind. Finally the implementation and verification stage involves the fine tuning, polishing and refining of concepts and theories. This was the approach used to conduct the literature review.

The scope and boundaries of this research were deliberately broad and drew references from a range of disciplines, sources and subject areas. The following diagram illustrates the subject areas incorporated as part of the review;

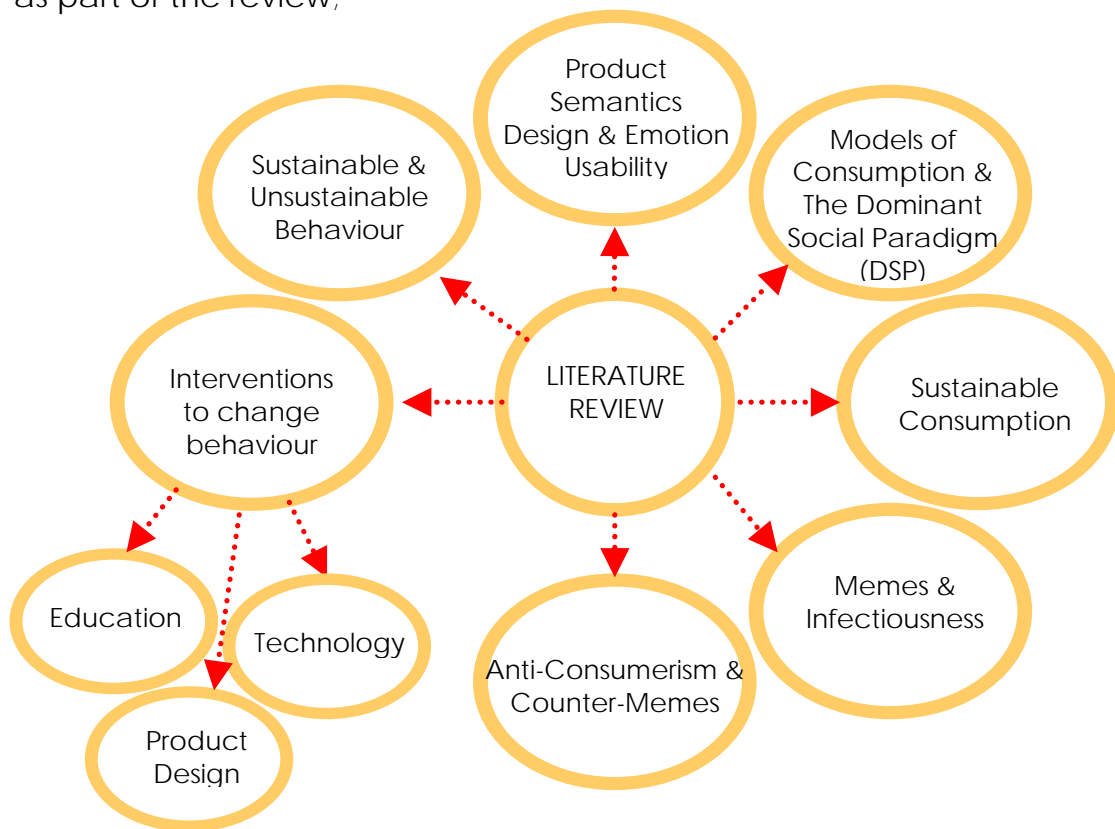


Figure 2: Research Areas

Through viewing this research as a whole it has been possible to link together separate strands of thought to form coherent theories, identify

viable design strategies and consider the research problem from a range of perspectives.

### **3. FINDINGS**

#### 3.1 Educational Intervention

During the last decade, the drive towards sustainability has become a key policy issue at all levels of government (UK Government, 1999) (HM Government, 2005). The three dominant methodologies favoured by government organisations and NGO's to encourage the general public to behave more sustainably appear to be;

- Linear Dissemination of Information,
- Incentives and Penalties,
- Guilt.

##### 3.1.1 Linear Model

A linear model of information diffusion, the "one way flow...from science to policy and society" (Eden, 1998, p. 426), is built on the assumption that provision of information will increase consumers awareness of environmental problems and lead to positive action. "[T]he process of engagement is commonly seen in governmental circles as a problem of awareness" and the solution "lie[s] in the provision of information" (Barr, 2003, p. 227). The government have continued to seek consumer participation in the environmental debate through the use of strategies which inform consumers of the consequences of their behaviour (Shove, 2003, p. 3) demonstrated by the 2002 campaign 'Are you doing your bit?' (DEFRA, 2002). Education and awareness raising through linear information diffusion has, however, consistently failed to achieve significant sustained changes in consumer behaviour (Barr, 2003, p. 227, Corson, 1995, p. 212).

##### 3.1.2 Incentives and Penalties

Incentives and penalties, "activators that announce the availability of a rewarding or penalising consequence, respectively" (Geller, 1995, p. 182), are frequently used by government, who tax, fine and prosecute perpetrators of environmentally and socially irresponsible acts and offer financial incentives such as tax breaks and grants to incentivise pro-environmental behaviour. The rationale behind the so called 'carrot and stick' approach is rooted in behavioural psychology which argues that "we learn what to do...by experiencing positive (and negative) reinforcements (rewards or penalties) for our behaviours" (Jackson, 2004, p. 98).

### 3.1.3 Guilt

The underlying persuasive factor of many campaigns is guilt. Guilt for one's lifestyle in comparison to others less fortunate, which is arguably the basis of many charitable organisation's marketing; guilt for the burden current lifestyles place on future generations (a potent incarnation of this persuasive message is rooted in consumer's fears for their children's futures) and guilt for the excesses of modern society (a factor utilised not only by environmentalists but also health campaigners). It was thought that "guilt... or being worried about the future well-being of his/her children may cause the consumer to behave in an ecologically responsible manner" (Moisander, 1997). There is now, however, an increasing recognition on the part of governmental agencies that guilt is not a sufficient motivator and subsequently policy makers are beginning to realise the limitations inherent in this approach (UNEP, 2003).

The effectiveness of educational intervention in creating sustained behavioural change is debatable. Proponents for educational initiatives cite the importance of education and information in equipping individuals to make informed decisions, in raising 'ecological literacy' and promoting environmentally responsible behaviour. (Orr, 1992 in: Corson, 1995, p.45, Smith, 1994 in: Corson, 1995, p. 47). Critics, however, argue that despite nation-wide environmental campaigns, educational intervention is not effectively influencing consumer behaviour towards sustainability. Sustainable consumption and the interrelated behavioural issues are complex subjects, making it difficult to separate out succinct issues to address with consumers. It is, therefore, crucial that the information presented is clear, substantiated, presented in an appropriate level to ensure understanding, and above all relevant to the individual concerned. The failure of past educational interventions can be characterised by a persistent focus on macro concepts (such as global warming for e.g.) which many consumers cannot relate to emotionally or practically. This lack of understanding is often subsequently compounded by the complex 'scientific' language and presentation of information leading to a lack of action on the part of individuals who do not have a sufficient understanding of how to contribute to reducing these impacts and in any case often feel powerless to make a difference (ESRC Global Environmental Change Programme, 2000, p. 6). The failure of informative campaigns in tackling global environmental concerns could also be attributed to consumer's lack of ability to 'feel' the wider environmental or social impact of their decisions or behaviours. Economically, many consumers could, in all probability, relate their behaviour to increasing Gross Domestic Product (GDP) and economic prosperity but they would not necessarily understand the impact of their behaviour in relation to environmental and social impacts at a global scale. Few individuals possess the insight and awareness to effectively link global issues to

their own behaviour, therefore fail to realise the critical importance of lifestyle and behavioural change, which is why campaigns focused on these macro issues consequently tend to produce apathy not action (Barr, 2003, p. 227).

### 3.2 Technological Intervention

Technological innovation on the part of manufacturers has been beneficial in reducing the environmental impact of domestic products during the use stage. Philips for example reduced the energy consumption of their standard monitors. The Philips energy saving monitor has amongst the lowest energy consumption in the market (Philips, 1999). However, the success of many of these innovations to reduce social or environmental impacts is dependent on customer compliance in using the features employed and selecting the optimised settings. The Philips monitor may have been designed with a reduced energy footprint yet if an irresponsible user leaves the monitor on day and night this efficiency is reduced. Take as a further example a washing machine with an AA energy rated 40° wash. The AA rating refers to the optimal energy saving wash cycle, yet the use of this setting is optional, the user can still opt for a 90° quick wash cycle. The user has effectively sidestepped the manufacturers intention towards energy saving. In the same vein a driver could choose not to fasten their seatbelt and, short of designing a car which would not start unless seatbelts were fastened, the manufacturer has no further recourse. Unintended user behaviour, known as the 'rebound effect', challenges the potential success of technological intervention in reducing the impacts of product use. The rebound effect occurs when the unintended use of the product leads to unexpected and often negative environmental, economic or social consequences. Velden cites the example of energy efficient light bulbs; "people use them in places where they can leave them on for 24 hours a day, 'because they use so little energy'" (Velden, 2003). It seems that technological innovation, despite its potential in enabling more environmentally and socially considered behaviour, is not sufficient when confronted with actual use behaviour and the resulting rebound effect.

There is however, some credence in adopting a proactive design strategy by integrating an analysis phase into the design process to identify potential 'feedback' associated with the use of a product "to foresee these mechanisms and to find responses by clever designs" (Jelsma and Knot, 2002, p. 123). This user centred approach may, in some cases, enable the designers to build in anti-feedback measures, thereby preventing unsustainable behaviour. Unilever took this approach when designing washing detergents. They recognised the environmental significance of the use phase of their washing detergents yet their findings indicated that "most of the potential impact [was] outside [their] direct control" (Unilever, 2001). Research

indicated that when using washing powder users tended to use more than was needed to ensure a good result. The Unilever powder tablet was explicitly designed to counteract this rebound effect. By limiting the resources used to the prescribed quantity, in the form of a tablet, consumers are prevented from using excessive amounts of powder, thus increasing the efficiency of the wash, reducing resource use and “enabl[ing] consumers to wash more sustainably” (Unilever, 2001).

### 3.3 Product-led Interventions

In terms of product-led interventions analysis of the literature revealed the following strategies;

- Scripts and Behaviour Steering - products or systems that contain ‘scripts’ or prescriptions for use to encode the designers use intention,
- Eco-Feedback - those which inform users of their impact in an attempt to persuade them to modify their behaviour,
- ‘Intelligent’ Products and Systems - those that circumvent rebound effects by ceding decision making to an ‘intelligent’ product which mitigates controls or blocks inappropriate user behaviour.

The following section will discuss and provide examples of each strategy.

#### 3.3.1 Scripts and Behaviour Steering

The limitations of providing information to encourage behavioural change has been well documented in the preceding sections, signalling the need for a “move from the descriptive to the inscriptive” in order to create products which influence user behaviour (Jelsma, 1999). The use of ‘scripts’ or ‘prescriptions of use’ can enable “man-made technologies, as nonhuman actors, [to] prescribe the behaviour of their human users” (Akrich 1992 in; Jelsma, 1999). A script can be described as “the ‘built in manual’ of artefacts” (Verbeek and Kockelkoren, 1997, p. 108) “a product layout guiding the behaviour of the user...to comply with values and intentions inscribed into the product by its designer” (Jelsma and Knot, 2002, p. 120). Materials, for example, have inherent associations with specific qualities which in some cases may influence user behaviour. Wood for example “may evoke images of craftsmanship” (Crilly et al., 2004, p. 17) thereby implying a sense of heritage which may in turn increase the product lifespan, as consumers would value the product and therefore wish to retain it. Imbuing a product with personal value often leads to better care and respect for that object as “things with an attached value are often more respectfully handled than ‘valueless’ things” (Lindén and Thelander, 1997). Inherent perceived value of an item can also ensure it is retained, Esslinger “believes that people will keep the product



longer and take care of it if it has built in ...emotional value" (in: Demirbilek and Sener 2003, p. 1351). A product made from a polymer, however, may be "regarded as [a] 'cheap plastic imitation" (Crilly et al., 2004, p. 17) and therefore disposable. A plastic coffee cup for example embodies the script "throw me away after use" (Verbeek and Kockelkoren, 1997, p. 108).

Through the inscription of "values, incentives and rules" (Jelsma and Knot, 2002, p. 124) desirable behaviours are enabled and undesirable ones constrained or blocked. Norman describes these two factors as 'affordances' and 'constraints', affordances inform the user how the product could be used, constraints place limitations on what actions can be performed (Crilly et al., 2004). Research into how scripts can facilitate sustainable use appears to be minimal. Jelsma and Knot's previous studies which involved "redesigning the scripts of house-hold appliances [to] invite users to engage in more eco-efficient practices" (Jelsma, 1999) are a notable exception. In addition, it could be argued that car manufacturers have endeavoured to address social concerns through technological intervention. Take for example the red light on a car dashboard which flashes when the user has omitted to fasten their seatbelt before starting the car. Latour argues that the red light acts as a 'prompt' and that the manufacturer is attempting to 'moralise' the technology (Latour, 1992, Jelsma, 1999) ensuring that the user abides by the rules and moral code of society with adequate regard for their own safety and that of other road users (Latour, 1992, p. 226).

### 3.3.2 Eco-Feedback

Eco-Feedback, grounded in Feedback Intervention Theory (FIT) (Kluger and DeNisi, 1996), is based on the notion that providing adequate information to users in an appropriate format encourages pro-environmental behaviour (energy efficiency for e.g.) by directing attention to a specific goal. The Kambrook kettle is a good example of how the eco-feedback methodology can be integrated into a standard household product. The Kambrook designers sought to improve the environmental performance of the product by considering the impact throughout the life cycle. A Life Cycle Analysis (LCA) study on a previous Kambrook kettle indicated that the 'product use' stage of the life cycle was by far the most environmentally damaging mainly owing to the energy used for heating and re-heating water. The designers research revealed that "a typical kettle-user boils the kettle and then returns to use the water, and normally this involves reboiling" (RMIT, 2003). These findings led the designers to analyse the new kettle using various scenarios which took into account this usage pattern and eco-feedback features were added to counteract these rebound effects, "the Kambrook designers added a thermostat and a temperature indicator on the handle to show when the water was still hot enough to use" (Sherwin et al., 2000, p. 4) thereby providing the

user with adequate feedback via the thermostat and temperature indicator to enable behavioural change to occur. A recent informal discussion with Gertsakis (2005) a former member of staff at RMIT, revealed the liability of this research, namely the lack of consumer testing in the early prototype stage. The product however did go into production though at this point no consumer feedback has been released by Kambrook MEC who have now ceased to trade.

Eco-Feedback, in theory, seems plausible and is regarded by some to be a viable methodology in effecting behavioural change, however; existing research into the effectiveness of eco-feedback techniques is narrow and there are currently few viable case studies of comprehensive testing in a real world context. Criticisms levelled at eco-feedback strategies are similar to those directed at education-led interventions; information does not necessarily lead to action as feedback mechanisms delegate responsibility for change to the user therefore "the consumer himself has to...link [the feedback] to his own behaviour and change" (Velden, 2003). Change in behaviour, as reflected in the literature requires an incentive, and often environmental benefit is not a sufficient motivator on its own.

### 3.3.3 'Intelligent' Products and Systems

'Intelligent' products and systems seemingly address the limitations of the previous strategy by circumventing the users decision making function and arguably decreasing the potential for irresponsible environmental or social behaviour. Honda's integrated motor assist (IMA) is an interesting example of an 'intelligent' system (Honda, 2004). The IMA system automatically turns the engine off and on at traffic lights to save energy and reduce emissions. The IMA features are activated by in-built technology, the driver is not aware of the actions taken, nor is he/she consciously choosing that behaviour. The benefits of this system are twofold; Honda is able to report on increased performance coupled with a reduction in operating emissions, which is not reliant on user compliance, whilst passing the benefits on to the customer in the form of cost savings. In their promotional literature Honda make it clear that the action taken is controlled by the car and sell the improvements as helping to "save money" "without you noticing a thing" (Honda, 2004).

A further example of 'intelligent' product design is illustrated by the work of Taylor who, having acknowledged that "usage patterns are inherently influenced by the design of mobile phones" (Bautsch et al., 2001) redesigned a mobile phone to "encourage people to exercise polite mobile phone manners" (Taylor, 2000). Taylor's 'intelligent' prototype designs are in the most part designed to automatically mitigate, control or block unsustainable or inappropriate behaviour by users. The exception to this approach is the solution to "too-loud

talking” which provides ‘eco-feedback’ as a means of encouraging the user to lower the volume of their voice. Taylor has, through design features, embodied the phone with a sense of self and a sense of indignation regarding the user’s behaviour. It reprimands the owner by ‘shouting back’, it panics when left unanswered and scrambles messages and caller ID’s to discourage use in inappropriate places. Unfortunately, further discussion with Taylor (2005) has confirmed that no record exists of the research upon which she based the need for these designs neither are there reports and papers discussing this project.

In summary, some promising design strategies have emerged from this research, the examples provided above illustrate the varying levels of intervention on the part of the product and the division of responsibility between product and user. However, the motivation and research basis for these strategies is in some cases difficult to ascertain, additionally some have yet to be robustly tested with users to produce conclusive results as to their effectiveness in influencing consumer behaviour. Although largely experimental and untested, with the exception of Honda’s IMA (though the results of any consumer testing have yet to be widely circulated) these innovations nonetheless illustrate the potential design has in changing user behaviour.

#### **4. MORAL AND ETHICAL DEBATE**

The extent to which decision making is left to the initiative of users or delegated to ‘intelligent’ systems or products is largely determined by the designer (Akrich, 1992, p.216). This raises a difficult ethical dilemma for designers in terms of the moral acceptability of creating products that surreptitiously control our behaviour. Velden and Jelsma both question the long term effectiveness of using technology to drive behavioural change (Velden, 2003, Jelsma, 1999). “Bringing in ‘a few mundane artifacts’, cleverly designed to do their job, might do wonders for the environment [but] will humans feel forced and manipulated by technology...?” (Jelsma, 1999). Whilst acknowledging the benefits of ‘intelligent’ products, in optimising environmentally sound use, Velden points out that this restricts the user’s recognition of sustainability issues affected by use, and in some respects offers no incentive to users for taking responsibility for their actions. The cause and effect learning mechanism is effectively short-circuited by technology. The questions raised here are; are designers encouraging people to take responsibility for their actions? Or are they widening the divide between the product and the commodity it provides? Albert Borgmann, as discussed in Verbeek & Kockelkorn (1997, pp. 112-114) describes technological products as devices which have two distinct elements; ‘machinery’ – the physical object and ‘commodity’ - the result it produces when it functions. Borgmann argues that the trend towards ‘hidden’ mechanisms within products and the increasing

reliance on products to fulfil tasks thereby 'disemburdening' users of control has resulted in users becoming detached from the product and only responsive to the commodity. Is the next evolution that products appropriate consumer's moral obligations to society and the environment? That one of the 'commodities' produced is environmental and social responsibility?

The effects of insatiable consumption have long been recognised. Educational and technological interventions have failed to address the growing need for viable ways to create a fundamental shift in behaviour. Arguably it seems that the mass majority cannot be convinced to willingly prioritise the wider global community's concerns over their individual desires. The question then becomes; in pursuit of sustainability, what lengths should we be going to? Is, silently manipulating people through the products they use everyday - 'sustainability by stealth' - morally and ethically acceptable? It could be argued that this strategy is indeed necessary, given the urgency of the problem, the dominant social paradigm in which we are operating, the limited success of methodologies utilised to date and the reported inability on the part of consumers to convert concern into action.

## **5. CONCLUSIONS**

This research proposes an effective short term strategy to achieve more sustainable behaviour, within the current dominant social paradigm, by using products as a catalyst. Products hold a central role in our lives, they play a significant role in creating, defining and maintaining consumers sense of identity (Shove and Warde, 1998, p. 5, Dittmar, 1992) and in transmitting ones wealth, social standing and status to others (Shove and Warde, 1998, p. 2, Campbell, 1994, p. 506, Jenkins, 1992, p.77). In conjunction with persuasive and persistent advertising, products already subconsciously influence our behaviour, beliefs and aspirations. Prior attempts to influence behaviour through education and awareness raising have had little success in delivering sustained changes in consumer behaviour. Product-led interventions overcome some of the limitations of previous strategies as they are not reliant on customer compliance, do not require customers to be committed to sustainability or require consumers to fundamentally change or compromise their way of life in order to limit or reduce the impact of product use. In effect, this strategy aims to use the cogs that keep the consumption cycle turning to effect a new way of behaving that is conducive to social stability and equality, helps to reduce environmental impacts and encourages product stewardship, yet it is not reliant on the mass consumer to do so. Through identifying 'disablers' and 'enablers' and integrating these into the product design, positive patterns of behaviour could emerge and negative patterns could reduce respectively. Through repetitive use of these products these behaviours could become ingrained and instinctive.

Equally, these pro-environmental behaviours can in turn influence the design of the product, thereby creating a positive loop.

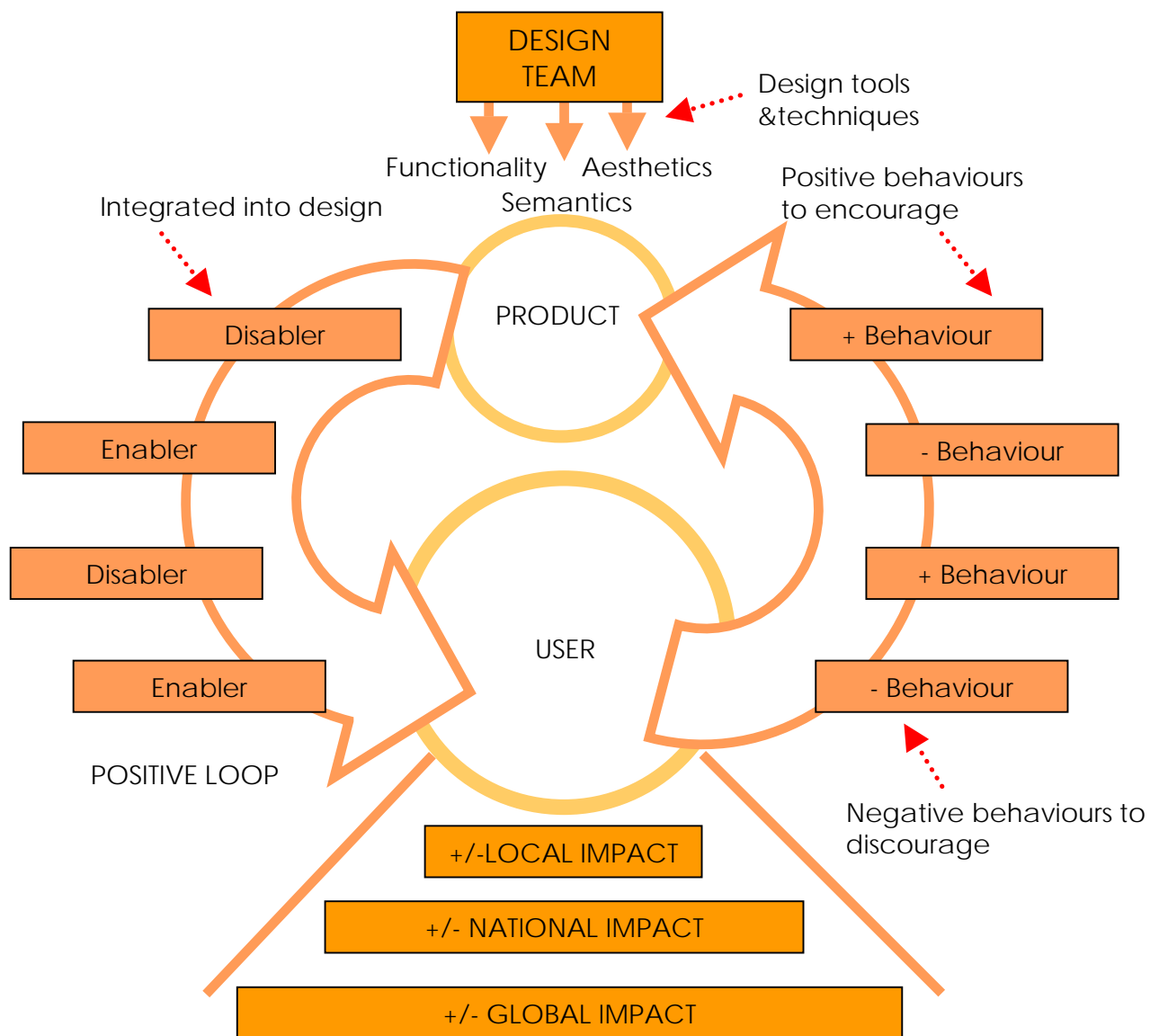


Figure 3: Product-led Intervention Model

There remains however fundamental criticism which could be levelled at this research; namely that although designing products for instinctive use may have some benefit in reducing environmental and social impacts of use, it will not necessarily halt the relentless pace of consumption in the western, and increasingly eastern, world. This research does not propose a solution to address the longer term goals of reducing consumption levels and working towards sufficiency, although it acknowledges the pressing urgency to do so, instead it offers a potential path of action which could begin to reduce the impacts of current consumption practices.

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