Design for Sustainable Behaviour

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PhD dates:
9. 2007 – 9. 2010

Summary

By applying techniques from **Persuasive Technology** and other fields, it is possible to design products which **help users to reduce the environmental impact** of using them: effectively, **making users more efficient** by designing for behaviour change.

This project aims to develop and test a method for assisting designers to create behaviour-changing products in this area, and then run user trials with a series of prototypes developed using this method, to determine which approaches and techniques are actually most effective at changing users' behaviour, and reducing energy or other resource use.

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Introduction

For many consumer products, the **use phase** is the most significant in terms of environmental impact, primarily energy use. Technological responses to mitigate this impact form a substantial proportion of work in ecodesign and engineering fields: increased efficiency of operation and reduction of waste generated are important goals.

But it may also be equally – and independently – worthwhile to reduce or otherwise alter the manner or period of products' use, which implies **changing users' behaviour**. Political responses, in the form of educational, economic and legal measures, often aim to address this issue, but techniques developed in the **Persuasive Technology** field (and a number of other areas of interaction design, engineering, computer science and architecture) also have potential to assist in **persuading** or **guiding** users to operate products in a more sustainable manner. It is an aim of this project to explore, characterise and test some of these techniques.

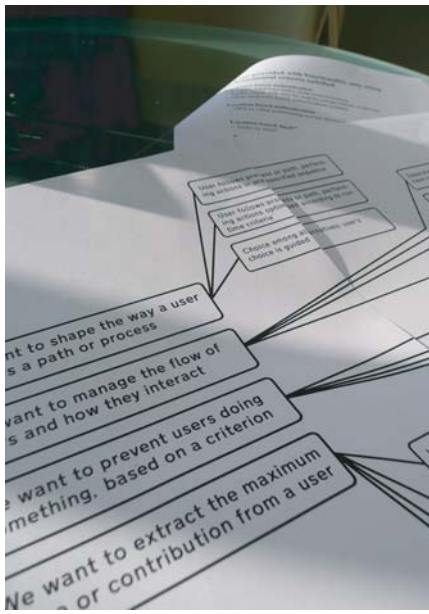
The 'Design with Intent' Method

As reviewed in 'Design with Intent: Persuasive Technology in a Wider Context', a paper to be presented at Persuasive 2008, the variety of approaches to designing behaviour change, from different fields and disciplines, might loosely be described as **Design with Intent**, that is, strategic design intended to result in certain user behaviour.

While applied in very different contexts, ranging from avoiding assembly errors in manufacturing to routing pedestrians through a shopping centre, the DwI techniques, including many persuasive technology approaches, can often be abstracted to a set of possible 'tools' (both physical and psychological) which can then be applied to other situations where a certain **target behaviour** is desired on the part of the user. For example, if the target behaviour is for a user to reduce the volume of unnecessary extra water boiled in an electric kettle, just-in-time feedback on the cost of electricity for the operation – the *kairos* approach – may be successful in causing the user to change his or her behaviour. Equally, though, a

physical behaviour-shaping constraint such as requiring the user to pre-select the amount of water required before filling the kettle – manipulating affordances by using a forcing function or interlock – also has significant 'persuasive' potential, but in a different way (this is a highly simplified example).

The Design with Intent Method currently under development, being tested in workshop sessions with undergraduate industrial design students, comprises a system for suggesting DwI persuasion/guidance techniques applicable to different design problems, expressed as intended target behaviours, (along similar lines to aspects of TRIZ methodology, although much less complex and comprehensive). A designer working on achieving a particular target behaviour should be able to use the DwI Method to structure thinking about the 'problem', and the method will suggest a number of behaviour change techniques, physical and psychological, relevant to achieving the intended target behaviour.



Prototyping & testing

The second stage of the project involves a series of user trials comparing prototypes (modified consumer products) developed using the DwI Method using different persuasive and guidance techniques, to determine which approaches are most successful as helping users to self-manage their resource use. A number of the examples from the persuasive technology literature, such as the **STATIC!** projects, the **WaterBot** project, the **iParrot**, **PowerHouse** and **PowerAgent** are extremely relevant here, and indicative of some of the possible techniques.

Returning to the simple kettle example, a trial might compare prototypes including a clear 'persuasive' visual/audio feedback of fill level (prominent '*x* cups of water' display) or financial implications of the energy use ('Boiling this amount of water will cost you *x*') and a kettle with a requirement to pre-select the water fill-level before filling (hence forcing the user to think about what he or she is doing), along with a number of other strategies. Analysing the results of user trials of a range of prototypes such as these, and comparing with the energy usage of a conventional kettle, would allow actual energy savings to be quantified, and the limits of efficacy due to human factors (e.g. user frustration or misunderstanding) to be established.

Contribution to knowledge

The project will address these questions, reformulated as appropriate: How can users' behaviour be changed, through redesign of products, to reduce environmental impact? How significant are the impact reductions, and what technology and human factors issues affect the implementations? It's hoped that the process of investigating and answering these questions, will constitute an original, distinct and useful contribution to knowledge, and that the DwI Method will prove useful to designers working in the field of persuasion and behaviour change in general.

The chance to learn from others working and experienced in persuasive technology, and discuss and share ideas, is the main motivation behind submitting to Persuasive 2008 and applying for the doctoral consortium. Sustainable design through changing users' behaviour seems to be an area where persuasive technology could be especially successful.

About us

Dan Lockton has worked as a product designer and engineer for Sinclair Research and other clients. He has a BSc (Hons) Industrial Design Engineering from Brunel, and a Cambridge-MIT Institute MPhil in Technology Policy, where he developed the idea of 'architectures of control', a precursor to DwI.

Professor David Harrison heads Brunel's Cleaner Electronics Research Group, and leads a variety of sustainable design research, including conductive lithographics, active dissassembly using smart materials, and eco-innovation tools.

Professor Neville Stanton is a director of Brunel's Human Centred Design Institute, and a widely referenced expert in ergonomics, human factors and augmented cognition systems.