Design for Sustainable Behaviour

Dan Lockton

School of Engineering & Design,
Brunel University, London, UK

Supervisors:
Professor David Harrison
Professor Neville Stanton

Lockton, D., Harrison, D.J., Stanton, N.A. (2008) 'Making the user more efficient: Design for sustainable behaviour'. International Journal of Sustainable Engineering Vol.1 No. 1, pp. 3-8, March 2008

Lockton, D., Harrison, D.J., Stanton, N.A. 'Design With Intent: Persuasive Technology in a Wider Context'. in H. Oinas-Kukkonen et al. (Eds.): Persuasive 2008, Lecture Notes in Computer Science 5033, pp. 274-278, 2008

Brunel UNIVERSITY WEST LONDON

Summary

Design can be used to guide and change users' behaviour.

By applying techniques from a variety of fields, it's possible to design systems 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 and services** in this area, and then run user trials with prototypes, to determine which approaches are actually most effective at changing users' behaviour, and reducing energy or other resource use.

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, or shift the emphasis to a service approach, which imply **changing users' behaviour**. Political responses, in the form of economic, legal and educational measures, often aim to address this issue, but techniques developed in a number of areas of interaction design, engineering, computer science and architecture also have potential to assist in **persuading** or **guiding** users to engage with systems 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: an introduction

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 – **choice architecture of supermarket shelves**, **default cycles on washing machines**, **avoiding assembly errors** in manufacturing, **making it safer for pedestrians to cross the street** – the Dwl techniques can 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 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 – a forcing function or interlock – also has significant 'persuasive' potential, but in a different way.

dan@danlockton.co.uk

The Design with Intent Method currently under development, being tested in workshop sessions with industrial design students, and with design consultancies, comprises a 'suggestion tool' for persuasion/guidance techniques applicable to different design problems, expressed as intended target behaviours, (along similar lines to aspects of TRIZ methodology, although much quicker to use).

A designer working on achieving a particular target behaviour should be able to use the Dwl Method to structure thinking about the 'problem', and the method will suggest a number of behaviour change techniques, physical (system design) and psychological (taking account of cognitive biases and heuristics), relevant to achieving the intended target behaviour. It's intended that iterative testing and refinement of the method with designers will help inform its development to a stage where it becomes a useful interaction design tool.

An additional aspect to be tested is the extent to which users' mental models of the interaction, and what they are trying to achieve (vs. what the device is guiding them to do) can be incorporated into the design process. An attempt to integrate this, using Cognitive Work Analysis, is currently being investigated.

Prototyping & testing

The second stage of the project will involve a series of user trials comparing prototypes (modified consumer products) developed using the Dwl Method using different persuasive and guidance techniques, to determine which approaches are most successful as helping users to self-manage their resource use.

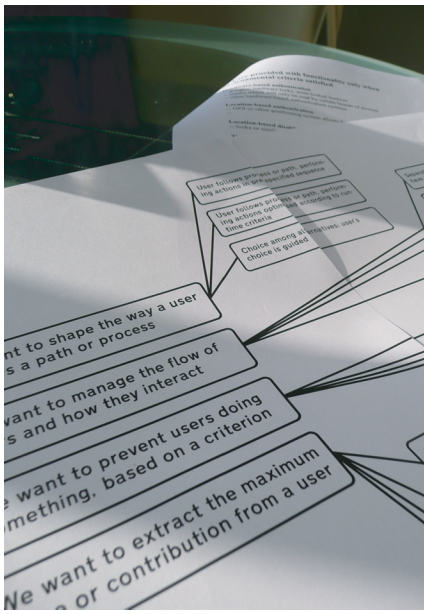
Returning to the simple kettle example, a trial might compare prototypes including a clear 'persuasive' visual/audio feedback of fill level (prominent 'x cups of water' display) or financial implications of the energy use ('Boiling this amount of water will cost you *x*') and a kettle with a requirement 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, including higher-level system change (e.g. plumbed-in drinkable hot water). Analysing the results of user trials such as these, and comparing with the energy profile of a conventional kettle in conventional use, 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 systems, 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 Dwl Method — however it evolves — will prove useful to designers working in the field of persuasion and behaviour change in society in general.



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 researched the idea of 'architectures of control', a precursor to Dwl.

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.