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Developing an Online Social Media System to Influence Pro-environmental Behaviour based on User Values

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Introduction: Reducing our carbon footprint is an urgent global issue. A number of persuasive technologies [3] have been developed with the aim of reducing energy demand by influencing energy consumption behaviour (e.g. [4]). We refer to energy consumption behaviour as any way which an individual acts that directly or indirectly has consequences on their or others' carbon footprint. Systems that influence a change in behaviour are “computerized software or information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception” [5]. Despite promising results, important drivers underpinning energy use are rarely taken into account during the system design. This paper presents research on social-media systems that investigates how such systems might influence users' energy consumption behaviour based on an understanding of people's values, everyday life and their decision-making.

Methodology: Systems that influence users' energy consumption behaviour can vary greatly in their design but are often based on popular theories of behaviour change (e.g. [6]). Selecting ways of influencing a change in behaviour is context-dependent. It is therefore important to take into account theories and methods from the medium of social media, the domain of energy consumption behaviour as well as strategies of influence from psychology. These theories and methods can aid designers in understanding what is necessary information to collect from the user, what assumptions can be made about the user based upon this information, and how to personalise and make relevant their chosen attempts to influence the user's behaviour. Hence our research considers which information and knowledge about the user can be constructed and used to tailor personalised and relevant strategies of influence. In this research we conducted a series of three qualitative investigative studies. These were a photo diary study and two follow-up focus groups that utilised participatory design methodology in order to iteratively design a social media system that influences a change in energy use behaviour. The photo-study is reported in [1], the focus group studies involved a subset of six of the participants from the photo-study (two male and four female, with ages ranging from 25-65). These six participants were all involved in both focus groups. The first focus group used the photo material from the photo-study and was aimed at identifying personal and common values of the group. The second focus group used the identified values from the first focus group and was aimed at identifying strategies for maintaining and achieving those values.

Design Outcomes: Based on results and building on our previous work into value-based user modelling [2] we derived a set of conceptual-level design components. The core components are: a *Knowledge Base* that stores information about all users and energy use; a *User Model* to model the relationships between important drivers of energy use for individual users and communities; and an *Application Controller* that controls the core social media system functionality. In addition to these components, a *Community Builder*, *Presenter*, and *Negotiator* are responsible for specific ways of influencing users. These components decide, based on user information, (i) how to connect individual users into a community of users, (ii) how to facilitate information and knowledge creation and sharing between individuals and communities of users, and, (iii) how to frame messages sent and received between users so that they are tailored to a user's preferences.

Conclusions: This paper gives an overview of our research to investigate personalised social media systems to influence energy reduction behaviours through an understanding of user values. This research has theoretical contributions on the social psychology of values and influence, empirical contributions through studies to inform design, and systems design contributions through the conceptual-level design of a social media influence system. The goal of this system is to influence people's behaviour through personalised social media using individual and community data, information and knowledge to deliver social influence strategies. The conceptual-level design of this system is now being used to develop a prototype system. This prototype will be used in further empirical studies to both evaluate and further investigate how people's values influence their behaviour and in this case to understand how such a system might effect their energy consumption behaviours.

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