

SAME, SAME BUT DIFFERENT: ACADEMIC AND COMMERCIAL PERSPECTIVES ON APP-BASED ENERGY BEHAVIOUR CHANGE

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1. Introduction

Digitalised individual information feedback has emerged in the last ten years in the energy sector. Typically embedded in existing services and enabled with ICT capacity, the digital tools allow for high resolution of energy consumption data. Thus previously intangible behavioural impacts by consumer can be quantified cheaply and ubiquitously [1]. This has sparked high interest in both research, particularly environmental psychology for behaviour change [2], and commercial practice.

In the last five years, several EUⁱ research grants supported smart phone app development for energy reduction resulting in many research teams providing consumers with engaging and (almost) real-time feedback. In parallel, the commercial sector also jumped on this opportunity, and in 2019 more than 2000 apps supporting sustainable energy behaviour change could be found in the US Apple Store [3].

With so much activity happening within and outside of academia, this work looks to better understand the different design principles and theories of behaviour change used in both

ⁱ See for example the H2020 research and innovation programme grants funding energy savings apps: <http://www.beneffice.eu/Related-Projects>

settings. While environmental psychology focuses on implementing specific techniques to address relevant barriers and drivers to change behaviour such as goal setting, social comparison or information feedback [4], design science in commercial practice takes a more context-embedded and problem-oriented approach to behaviour change [5]. The comparison between these fields has not previously been done and could elicit relevant lessons to be shared between disciplines.

2. Background

From the field of behavioural psychology, there are multiple long-standing theories attempting to explain the mechanisms to change energy behaviour, however information feedback is often used as an intervention strategy to bridge the gap between behaviour and impact [6].

Despite the history of information feedback, many challenges remain such as bias from self-reported behaviour, low participation rates and high attrition, energy saliency, and cost-effectiveness of interventions [7]. Herein, the digitalisation of energy consumption data allows relevant temporal and spatial behavioural aspects to be included, compared to former non-digital information feedback.

While seemingly promising, apps for energy behaviour change have limitations. Johnson et al. [2] remark the positive effect differs depending on the context where an app is used, for example if the focus is placed on actual behaviour change vs. improving energy literacy. Further Beck et al. [3] critique behaviour change apps to underuse the potential of verified behaviour change techniques in combination with typical gamified approaches (gamification). Thus the variations in app-based intervention design needs further investigation.

3. Methodology

While there are many new digital energy innovations, this study focuses on smart phone app-based approaches related to direct (e.g. electricity) and indirect (e.g. food) energy savings. Two sources of data are used to compare design approaches: a literature review on research-based apps developed since 2015 and semi-structured interviews with commercial app developers.

The literature review focuses on the scientific and non-scientific (e.g. on websites) publications on studies of research-based energy savings apps to establish the theoretical approach, design elements and impact. From a systematic review of EU funding for research projects on digital tools for energy behaviour change since 2010, 39 projects were identified, whereby 19 were chosen for evaluation based on use of the digital tool in an intervention context, similar target audiences, and focus on energy reduction.

The semi-structured interviews were held with six European commercial app developers concerning their app design, theory of change to elicit energy savings, challenges faced, impact measured and any academic collaborations. The developed apps focus on energy savings

through making alternative food and mobility choices, and reducing household electricity savings.

The approaches and design principles collected in the literature review and interviews are contrasted with a modified version of a well-established framework of intervention techniques in psychology which covers both antecedent and consequence approaches to behaviour change [8]. In this paper, the framework will be further developed to account for digital relevance and relation to gamification. The results will outline which design principles address existing intervention challenges, potential overlap or need for more knowledge transfer, and expand on theories for behaviour change.

4. Preliminary Results and Conclusion

While the study is ongoing and planned to be completed by April 2020, some preliminary results contrasting the academic and commercial app approaches can be highlighted here. As one advantage of digital tools is the ability to experiment and adjust repeatedly, the commercial app designers continuously try various tools following design science to find an optimised approach. This differs to research-driven environmental psychology behaviour interventions that often test a specific theory and report on results much later, whereas an app may have experienced many revisions in the same time period.

Secondly, commercial app designers place less emphasis on automatic data collection, such as through a smart meter, as this data is complicated to attain. This opens up the possibility to track even more behaviours where there is currently no digital measurement approach. In contrast, academics take advantage of automatic data collection in order to remove bias in reporting the impact of an intervention. This, however, often limits the focus to household electricity use.

While we continue to learn about how apps can be effective for behaviour change, there are emerging issues around the longevity and saturation of apps, as well as data privacy. Additionally, there is a fundamental difference in the motivations of commercial app developers, who need to have a viable business structure, as well as a behavioural impact. On the other hand, an app designed in a research project is often abandoned after the project ends, and thus misses the potential for cost-effective repetition. It appears that there is the need for more knowledge transfer between disciplines. The differences and advantages of the two fields are relevant for policy and funding bodies interested in impacting individual behaviour.

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