“EmPowering Change”: An Energy Analytics Dashboard Intervention Study

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Abstract

This research-in-progress proposes a design artifact (Gregor and Hevner 2013) to help change consumer behavior regarding electric power consumption behavior. Studies suggest that there is a difficulty in using real-time energy use updates to effectively change users’ electricity consumption behaviors (Amel et al., 2013). The study uses design science research (DSR) methodology (Hevner et al. 2004) to design, implement and evaluate the ability of an energy analytics dashboard at a major southeastern university in USA to influence users to reduce electricity production. This methodology was adopted in order to increase the effectiveness of the dashboard to influencing users’ electricity consumption. The interactive dashboard uses real-time data from MAMAC sensors (mamacsys.com) throughout the business school building to operate an R Shiny web application operating on a local network. Sustainability is a goal of the organization and the dashboard aims to change user behavior to reduce energy consumption in the building and continue to do so at increasing rates of success (Oinas-Kukkonen, 2013). The design improvement sought in this application is its ability to influence users to reduce electricity through real-time updates on building energy consumption and production (Zhou & Yang).

The DSR methodology allows for continuous improvement of the artifact through a cycle of testing and subsequently evaluating a model until a design goal is reached (Cole et al. 2005). DSR employs aspects of behavioral science on the users of the technology in order to evaluate the utility of the technology, and subsequently using this evaluation to improve the technology design as per user indication through direct evaluations or observation of how the user interacts with the technology (Gregor & Hevner, 2013). This process can be repeated as necessary, though inherently it is a non-exhaustive process that can be carried on indefinitely for constant design revision and improvement. Because DSR is influenced by the behavioral sciences this methodology instills a scientific organization towards design processes that may otherwise be less structured and orderly. In DSR technological ‘artifacts’ are viewed as operating as part of a larger system with users and organizational goals.

A pre-use survey has been used to collect data for the initial application and is currently being analyzed. This will serve to gather evaluation data for the first iteration of the DSR ‘artifact.’ A post-use survey has been designed and will be implemented after the first improvements to the application are made and users have enough time to interact with it, with the intention of using this data to influence design changes for the next iteration. These surveys are designed to evaluate behaviors, such as asking how often users observe lights being left on in vacant rooms within the building, as well as evaluating user attitudes towards sustainability and self-perception of sustainability compliance. Pre and post-use surveys will be used to measure change in user behaviors and attitudes towards sustainability. Measuring a change in user attitudes can serve as an indicator of behavioral change regarding energy consumption that has taken place both in and outside the building, whereas measuring observed behaviors can give insight into real effects of user consumption (McKerracher & Torriti, 2013). In addition, any notable change user behaviors within the building will present itself in the data being measured by the MAMAC devices as an increase or decrease in the building’s energy consumption.

Keywords