Handle Energy Project: Social Interaction for Enhancing Energy Awareness

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Abstract
Energy is a component of all surroundings and is an essential invisible flow embedded in objects, buildings and electronic devices. Even if it connects individuals with the tangible word, people are seldom aware of the amount of energy they handle when using devices. The exploration of new interaction modes to evaluate energy consumption and related individual lifestyles is emerging as an opportunity for designing systems to enhance people's awareness of the energy they use. In this context the Handle Energy project aims at promoting the social aspect of the consumption cycle by encouraging individual involvement in the local and global scenario of energy saving. Our contribution describes the design of a pilot utility for enhancing neighbourhood awareness on energy, applied in a specific small smart grid area in the Southern Switzerland. The project in progress will be described on the basis of its goals, design criteria, social and context analysis, and method for a shared understanding of the new complex relationship that arises when designing new motivational modes of interaction.

Author Keywords
Social Computing; Energy conservation; Awareness; HCI; Persuasive technologies.

Introduction: a common platform

The efficient use of energy sources has become one of the most intensely researched and discussed ecological and socio-economical issue in Europe and in Switzerland [5, 12]. The emerging debates about future renewable energy settings are moving towards more widely distributed (and intelligent) systems in which consumers are part of the smart grid acting within a local and global infrastructure network [2]. In the green technology trend coupled with collaborative experiments [1, 3, 10, 11], three main aspects are considered in the design of new modes of interaction: 1) integrated information features for connecting and visualizing energy data; 2) a social (media) network system for increasing the feedback loop on green behavior and sustainable lifestyle patterns; 3) an open and dynamic interface aimed at enhancing the communication between involved parties.

Figure 1. A conceptual model of factors contributing to the development of energy awareness.

These related aspects favour the creation of a common ground for increasing energy awareness. However, inhabitants are seldom aware of the amount of energy they handle and, more critically, they remain almost completely unfamiliar with energy saving concepts and with the impact their daily habits have on the environment. This multi-domain investigation opens new opportunities and responsibilities at multiple levels: infrastructure technologies, information monitoring and tracking, adaptable visual interfaces, as well as more qualitative aspects such as people's acceptance of new systems, the proactive role of smart and social utilities in supporting a sustainable energy management.

Design Approach

While the design of collaborative solutions could influence the creation of new socio-technical systems [4, 9], an adaptation and correlation of local challenges to public perspectives could be critical [6]. Our network in the energy consumption systems is not only local and individual but also regional and global. In this scenario we started with a pragmatic approach by observing a small residential area. The project is at its beginning; our purpose is to combine a theory-driven design approach with a small-scale participatory method, involving a group of voluntary users. Understanding how to adapt quantitative energy indicators (basically time and power) to local needs, inhabitants' expectations and territorial tasks will be the first step for visualizing a dynamic scenario. Instead of designing a new home device we chose to focus on developing a media utility which deals with ubiquitous energy consumption. The goal of this design is to take advantage of extensive social and mobile applications to facilitate the relationship between people and energy data flow. Today, mobile media - and more and more game-based systems - are social attractors and

connectors, and offer the opportunity of actively triggering participation over time [8], also in the local/global energy strategies. The original contribution of our project is in the definition of an engaging mobile system based on social game mechanics and comparative dynamics of interaction to enhance people's awareness on energy saving.

Project overview

Handle Energy involves diverse research areas: interaction design, innovative technologies (energy monitoring, networked systems) and social inquiry on sustainability. The research consists in applying a comprehensive investigation of gathering challenges and opportunities from a variety of sources, both technical (from energy management tools, ambient displays, social media) as well as experiential (people's expectations and needs), and in correlating these findings in the design development. We aim at integrating the analytical perspectives with more personal and motivational systems. In this way individual energy consumption activity progressions (tracked by energy meters) will be compared with some meaningful parameters such as:

- Specific local tasks: for instance the 2000 Watt Society challenge [7]. Such a task provides a simple parameter for correlating the individual energy use with the regional strategy - which aims at reducing the per capita primary energy use of Switzerland by two thirds - and offers users a clear objective to achieve.
- Environment indicators: collections of green behaviors; activities measured in term of their embodied energy. This kind of contents could make an ecological and green attitude more visible and tangible.
- Neighborhood ranking: to improve social awareness people could be enabled to compare their individual consumption with that of others. The dynamics of this strategy could be based either on collaboration or on competition.

These parameters should be defined and adapted with respect to people and dynamic contexts in accordance with the local conditions of communities. In the initial user's monitoring phase, the project methodology consists in merging design criteria for developing an actual mobile system to be tested, adapted and validated on the basis of the individual's previous energy usage data. Such design serves to create an understanding of which type of comparison dynamics can benefit designers of other social interface systems.

Conclusion and future work

Can energy data be easily handled by people? As it is a constant flow that pervades the surroundings people live in (buildings, electrical features, home appliances and devices), it is an important liaison in the interaction between individuals, the tangible world of interfaces, and local energy administrators. Understanding how to integrate energy information into daily life patterns and how to render consumption habits more visible, represents a promising challenge to interaction designers in understanding how to motivate more sustainable ways of living. At the same time, making visible and enabling to share energy consumption means exploring new modes of interaction in social connected systems. In this approach the Handle Energy project consists in applying an innovative design methodology proper to develop a social mobile utility for enhancing energy awareness. The design process aims first at understanding residents' expectations and

latent needs, and then at defining parameters and feedback suited to address this knowledge to support energy saving. Thanks to the effort of Swiss districts in involving citizens in smart living practices, our ambition is to structure a practice-based network among different design areas. Our initial inquiry is focused on the observation of users' activities and latent needs for the understanding of how to design a system to feel energy as part of daily life. The contextual analysis and traditional human-centred design tools reveal a wide range of design opportunities. In contrast, a plan study on emerging energy management systems bears the risk of being too empirical, since it is closely related to the individual's experience in different local contexts. To be implemented, a system for handling energy should manage both local and global perspectives, and consider the reciprocal influence they have on each other. The models emerging when ideas are connected, shared and perceived can therefore become a common strategy to act together.

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