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Problematizing the needs of residents in the development of smart grid services

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ABSTRACT

This paper reports from a pilot study conducted in an ongoing research project focusing on how users and their needs are being part of the development of smart grid services. The project aims to explore how development and use of services related to smart grids in homes might affect practices involving electricity consumption. The empirical material centers around an urban development project with a focus on social sustainability. So far only preliminary remarks can be made, and these points to that smart grid services are not in the center of attention, but rather taken for granted, and that the users are rather absent from the discussions. This indicates that the practices of which electricity consumption are part are not taken into consideration, but instead it is taken for granted that users shall adjust their needs based on information about electricity consumption patterns and prices.

Keywords

Smart grid services, residents, needs, social practice theory.

1. INTRODUCTION

The paper concerns work in progress from a project focusing on residents’ needs in the development of smart cities, smart homes, and more specifically services delivered via so called smart grids. In this context the term ‘smart’ refers to the use of information technologies in the electricity grid, something which supposedly adds smartness to the grid. Hence these services can be compared with other electronic services (e-services). The project aims to study the design and delivery of services to residents in their homes via smart grids. Much of the literature on smart grids is rather technically oriented, and there seems to be a strong belief in the possibilities of information technologies (IT) to solve current problems with high and unevenly distributed electricity consumption. Initiatives to introduce smart grids seem to come from governments and authorities rather than from those who are supposed to solve the problems – the electricity service providers and the residents expected to reconfigure their electricity consumption patterns through the use of smart grid services. Therefore we believe a critical approach is called for, both in terms of the expectations of IT in this context, and in terms of who needs these e-services. In our research we explore how development and use of services related to smart grids in homes might affect practices involving electricity consumption and in the longer run the development of a more sustainable everyday life. We are interested in studying how services might contribute to making electricity use more effective, and at the same time ask critical questions about the consequences of IT in this context.

The project focuses on exploring the practices involved in electricity consumption, and on the possibilities to form other, more sustainable practices. Central questions are: Which are the practices that electricity consumption in homes are part of, and how might these become more sustainable? How do residents’ needs of electricity emerge as a result of these practices? What are the practices of involving residents in the development of smart grid services? How is it possible for residents and other human and nonhuman actors – such as smart grid technologies – to contribute to reconfiguring more sustainable practices related to electricity consumption in homes?

The users are a central focus in the project, in what can be understood as the development of e-services, and here these users can be understood as residents in homes. In public sector e-services are used as a channel in various societal functions to provide citizen services while at the same time rationalize public organizations (Ebrahim & Irani, 2005; Gil-García & Pardo, 2005; Heeks, 2006). From being primarily a channel between public organizations (authorities, municipalities and county councils) and citizens, ideas are now being developed about e-services delivered to users in their homes via smart grids. These e-services may be of different kinds, intended for users to follow and affect their electricity consumption, to adhere to a more sustainable lifestyle, or to use the infrastructure supplied by smart grids for innovative service development (COM, 2009). The development of public e-services has been studied by information systems researchers for many years, and we see a clear trend towards discussions of demands driven, user centered development of e-services (Lindblad-Gidlund, 2008; Axelsson et al., 2010), something which usually requires the active participation of these users. To start from the needs of users and place those who will use the service in question in the center (instead of those who develop and/or deliver the service) is a success factor underscored as well on policy as on practical level (COM, 2010). Reaching this insight has taken many years and several more or less failed development projects (Axelsson & Melin, 2009). We mean that the knowledge that has grown in the area of public e-service development is applicable also in the e-service development that is going on now in the area of smart grids. We see clear parallels between these areas, and mean that the user perspective is equally central in both cases.

However, in the discussion of users’ needs it is important to remember that these needs are not self-evident, but configured by social, cultural, material and economic conditions (Pierce et al, 2013, Strengers, 2012, Shove & Walker, 2010). For instance, Shove and Walker (2010) describe how practices of bathing have changed, from a weekly bath a generation ago to daily showers today. They argue that this is the result of a complex transition of interconnected changes “in concepts of health, in investments in mains water supply, in beliefs and notions of propriety – all of which reinforce each other” (ibid.: 472). In this paper we use...
practice theory in order to re-conceptualize residents’ needs of electricity, something which will be developed below.

A central idea in smart grids is a closer and sometimes changed relation between electricity service providers and service consumers (Bill 2014:84, Katzeff & Ramström, 2014). The concept of “the active electricity consumer” is central (Katzeff & Ramström, 2014), indicating that consumers are expected to be more involved in and manage their electricity consumption through smart meters showing current household and device consumption and electricity prices, and hence to change their patterns of consumption and decrease their overall consumption. Katzeff and Ramström (2014) highlight three major elements of smart grids: feedback and visualization of electricity use, charging and dynamic pricing, and private production of electricity. A central idea is to provide consumers with information about their current consumption and current prices with the assumption that consumers based on this information will change their consumption patterns into more sustainable patterns (Strengers, 2012). There is also research on households’ use of smart grid services, focusing on how the mentioned smart meters and pricing information affect households’ activities in the longer run (Christensen et al, 2013a, 2013b, Strengers, 2011, Hargreaves et al, 2013). One result of such a study focusing on user practices in relation to smart grids was that there is a risk that smart grid services might – unintentionally – cause situations in which electricity use increases instead of decreases (Christensen et al, 2013a, 2013b). Another result was that some electricity consumption was part of practices that were seen as necessary and hence non-negotiable (Strengers, 2012). Also the relations between consumers and suppliers might change as a result of smart grid services; Nyborg and Rapke (2013) shows how an electricity producer changed its view of consumers – from viewing consumers as ‘loads’ to viewing them as humans.

2. THEORETICAL FRAMEWORK

As indicated above the common view of understanding the electricity sector is to divide it into a supply side – technologies and technological systems – and a demand side – consumers who supposedly act as rational, self-interested and autonomous agents (Strengers, 2010). This view is based on psychological and economic theories (typically rational choice theory), and puts the responsibility for changing consumers’ electricity demands on change agents on the supply side, who act primarily with the help of economic incentives such as increased information to consumers and variable pricing. The critics of this view argue that consumers cannot be understood as individual agents making autonomous choices, but instead consumers’ needs, choices and behaviours should be understood as the result of their implication in historically, socially and materially situated and hence variable practices. The argument is that “human activities need to be understood as situated within social practices that are substantially more complex than behaviors driven by individual attitudes and choices” (Pierce et al, 2013: 4).

Based on this, a central theoretical point of departure is posthumanist social practice theory (Schatzki, 2001, Strengers, 2012) in which the central unit of analysis is no longer humans and their attitudes, behaviours and choices (Shove, 2010), but rather practices constituted by common understandings, social rules, practical knowledge, and materialities such as things and infrastructures (Strengers, 2010). Shove and Walker (2010) argue that these practices are constituted by a variety of material and human actors, implicated in existing systems of norms, technologies, traditions, and for that reason also hard to govern. This has far-reaching implications for agency and for how agency in the energy sector can be conceptualized (Strengers, 2010). Agency becomes less straightforward and more distributed among a number of actors, of which some are human and some are non-human. The change agents who attempt to manipulate households’ behaviours cannot be understood as single powerful agents with the ability to affect individuals’ attitudes, behaviours, and choices (the ABC-model, Shove, 2010), but should be understood rather as one of many actors – human and non-human – some of which are yet to be made visible and recognized as such. Furthermore, changing households’ electricity consumption becomes a wider issue than that of trying to affect the residents’ attitudes, behaviours and choices through cost incentives, and instead it becomes a question of trying to change the everyday practices of which electricity consumption patterns are part (Strengers, 2012).

James Pierce and his colleagues (Pierce et al, 2013) argue that there are three major implications for a social practice perspective; (1) decentering of the human and the computer, (2) time and place and the dynamic and contextual nature of practices, and (3) the transformation of practices through design, or practice as a unit of intervention. Strengers (2012) points to a number of ways in which focus and questions change with a practice approach compared to a focus on attitudes, behaviour and choice. For instance a question such as “Which behaviours should be encouraged and what demand should be shifted?” change to “How are needs and wants constructed? How can they be constructed differently?” (ibid.: 229).

3. RESEARCH APPROACH

This research study has a qualitative and interpretative approach (Walsham, 2006). The empirical context is a Swedish local urban development project with distinctive characteristics of a smart city, including solutions for smart grid services. The project was launched in late 2011, and is planned to be finished in 2017. We have studied the project during its early phases, including architect competition, exhibition, planning, exploitation, procurement, and local political decision. The project aims to build a new district and organize a home and urban construction expo in parallel. The project has a clear vision emphasizing the dimensions of social and ecologic sustainability (Granath & Axelsson, 2014).

3.1 Data collection and analysis

We are in the middle of the data collection phase now and we use the local urban development project as a point of departure in the data collection. So far, four interviews have been conducted with main actors in smart grid service development and implementation in relation to the local urban development project; the project manager for the urban development project, a project manager for a ‘dream apartment’ project at a local housing company, a specialist on smart grid issues at the Swedish Energy Agency, and an interview with two persons working with smart grid issues at the local energy firm. We have also arranged workshops with young people aiming to discuss their opinions and needs regarding smart grid services at home. The local urban development project was used as an inspiration for these discussions. The organization of the workshops followed the focus group approach described by Axelsson and Melin (2007).
We have also been analyzing documents concerning the urban development project, and policy documents about smart grids, such as Bill 2014:84 (Plan for Effect. Final Report from the Swedish Coordination Council and National Knowledge Platform for Smart Grids). Data from interviews and workshops have been analyzed in a qualitative way searching for patterns and categories which were then related to the theoretical framework introduced above.

4. PRELIMINARY ANALYSIS

The urban development project has a focus on social sustainability and the technical issues are not emphasized in information about the project, nor by the project leader. However, this does not mean that IT is absent or considered unimportant; the project is supposed to be a state of the art project, and in the vision document it is stated that one of the cornerstones is environment, energy and technical systems, including energy efficient houses, locally produced electricity and sustainable building materials. Another cornerstone is IT, which “with the help of various kinds of innovative and smart solutions will create the preconditions for decreased use of natural resources, increased accessibility, service and social presence” (Vision document). This is exemplified by systems for the measurement of electricity and water which might affect the use.

The interested constructors competed for participating in the project. Their contributions were graded on 30 weighted variables, and among these were smart grids which only constituted 4 points, so this was not a significant issue. The project also does not require that the constructors introduce smart grid services, but only provides the prerequisites, via the local energy firm. The two persons at the local energy firm told me that there is currently no big focus on smart grid issues. They discussed the definition of smart and argued that what is smart is being developed in discussions with customers, and for them these customers are primarily contractors rather than residents in homes. Also, these contractors did not express a wish or a need to include smart grid services in their buildings. One of the respondents discussed how the need for smart grids is constructed, and talked about how companies in the IT industry drives this development. Since the contractors did not express a need for smart grids the local energy firm tries to build electricity infrastructures that enable future development of smart grid solutions.

One of the central local housing companies currently develops a conceptual apartment called the ‘dream apartment’ for the urban development project. This concept does not specifically focus on smart grid services, but instead the focus is on using the apartment space as efficient as possible, based on an idea of a household with a variable number of family members. However, smart grid services will nevertheless be part of the apartment, but the ideas for how this will be done are not yet finalized. The project has conducted a series of focus group interviews with tenants, and the issues concerned housing in general, focusing on what the tenants would want from an apartment. However, the ideas about smart home and smart grid services did not come from the tenants participating in the focus groups, but instead, the project manager argued, these services are included only because the ‘dream apartment’ is part of the urban development project.

The focus groups with young people – who can be understood as young residents – served to explore different aspects of and practices related to smart grids appeared. Here different issues came up, such as the wish to live in a home that is technologically sophisticated, along with economic incentives, comfort and environmental interests. It was discussed how electricity is rather cheap in Sweden, and how this decreases the interest in practices that might contribute to saving electricity. Another issue that was discussed was who might benefit from smart grid services, and that there might be security and integrity issues to take into consideration.

5. DISCUSSION

As stated above, this was only a pilot study and we cannot draw any final conclusions so far. Nevertheless some preliminary comments can be made. From the above it seems as though the issue of smart grid services is not a big issue in the urban development project. Smart grids are there, but they are not in the center of attention. The specialist on smart grid issues at the Swedish Energy Agency talked about how smart grids is about putting a layer of IT onto the existing electricity grid, but he also meant that this development is in its early stages in Sweden. He furthermore underscored that smart grid issues are no longer in focus, but instead focus has moved to sustainability in a broader sense, in which smart grids are included. He talked about this as a paradigmatic shift. If this is the case, this might explain why smart grids are not in focus in the urban development project.

From an information systems point of view, this is interesting, and could be understood as a transition in which IT is increasingly becoming an infrastructural issue (Edwards et al, 2009). As other infrastructures IT then tends to sink into the background, become invisible and taken for granted (Star & Ruhleder, 1994), something which might have both advantages and disadvantages. It might be good for the users who do not have to learn or know about IT – in this case smart grid services – in order to use them. It might also be problematic because these technologies become invisible and taken for granted – they might no longer generate as much interest, and taking these technologies for granted might also open up for technological optimism and determinism. In other words there is a risk that it is taken for granted that smart grid services will generate specific and positive outcomes, without these ideas being questioned or more thoroughly scrutinized.

This view on smart grids can be sensed in the respondents’ answers, in the documents surrounding the local urban development project, and also in the fact that the users of smart grid services are rather absent from the project. Instead it is the local energy firm which negotiates smart grid services with contractors. It was only the local housing company developing the ‘dream apartment’ that involved users (the tenants), but these did not ask for any smart grid services. Hence the general and implicit idea in the urban development project seems to be that individuals’ attitudes, behavior and choices can be manipulated via smart grid technologies such as smart meters – that is, the ABC-model discussed and criticized by Shove (2010) and Strengers (2012). As discussed this model does not take into consideration the daily life and practices of residents, but instead it is assumed that these technologies shall lead to specific changes, without trying to find out the possible and sometimes unexpected results, as consumers make their own interpretations and integrate the technologies into their daily lives.
So, which needs do residents experience of smart grid services? Some suggestions were given by the young people in the focus groups, who discussed a variety of aspects of and practices related to smart grids, such as wanting to live in a technologically sophisticated home, decreasing costs, increasing comfort and caring for the environment. However, these are only suggestions, and so far we have no answer for this question, as this is a question for the overall research project. From the perspective of placing the residents in the center of the development of smart grid solutions these should be more involved than they currently are in the urban development project. Still, from the perspective of sustainability and the wish to contribute to reduce electricity consumption, it is not certain that it is enough to involve the residents in these processes. Departing from social practice and so far we have no answer for this question, as this is a question that cannot be answered without paying attention to the wider social, cultural, material and economic structures that contribute to constituting such needs.

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REFERENCES


