

Shedding Lights on Human Values: An Approach to Engage Families with Energy Conservation

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Abstract. Changing behaviour related to energy conservation is not an emotionally neutral task. People have to deal with individual and group interests, contextual constraints, eventually trading-off between their values and effective actions in terms of savings. This paper presents a set of dynamics and artefacts for families to raise and share their energy awareness, and transform it into sustainable behaviour. This method based on human values was applied with 7 families to identify critical factors that must be in play when promoting energy conservation within a social group. Preliminary results confirmed that bringing families' values into discussion and establishing shared commitments and responsibilities are promising approaches for technology design with the purpose to raise awareness collectively and promote effective changes in behaviour towards protecting the natural environment.

1 Introduction

The potential of technology to mediate our relationship with the environment and gather people sharing similar interests has been increasingly explored for tackling contemporary social issues [1], such as the urgent need to review the way we explore the planet's natural resources. In line with that, this study aims at investigating how technology can be used to raise people's awareness of climate change and the energy issues, and how to turn awareness into active engagement.

Even in the current scenario where technology has been omnipresent, information is still a gap that needs to be bridged to transform energy awareness into behaviour change [2, 3]. Beyond dealing with habits, to make different choices in every day life that eventually impact comfort, people must be motivated. Not knowing what to do with the information they get, lack of peer support, sense of guilt, feeling manipulated,

and resource constraints are examples of barriers that can prevent people to act in a more pro-environmental way [3, 4].

Climate change and behaviour are then considered “*complex subjects not emotionally neutral*” [5]. Promoting changes in behaviour cannot consider only users’ rational choices, mostly driven by money of indirect or intangible benefits to the environment. Even when benefits are evident, environmental concern per se is rarely the main motivation for people reconsider their behaviour. Saving money, promoting health, sense of justice, or being seen favourably by others are sometimes concurrent or coexisting motivations [6]. A study in the UK, for instance, found that being part of a collective effort was more important to participants than the effectiveness of the action on the environment [7].

Different domains in science such as psychology, anthropology, sociology, and philosophy have put effort into understanding the forces that drive people’s behaviour and decisions to be engaged with protecting the natural environment [8, 9]. Conceptualizing *human values* by referring to what people consider important, what guide their life [10] is one of these approaches. Considering the interplay between personal values and how people experience the world in their own context is crucial when targeting to promote a new way of thinking or acting [11], explaining then the raising interest around how values shape public engagement with a social issue [9].

In the HCI domain, the notion of human values has been applied for more than 15 years to inform technology design [12, 13]. The current scenario of technology shaping everyday behaviour, eventually mediating collective and individual interests, evidences the importance of keeping investigating methods and tools to elicit and inform design with the human values in play in different contexts.

This work-in-progress paper introduces a set of group dynamics and artefacts to identify families’ values related to energy usage and map possible changes in behaviour. The study is part of a strategy to design interactive systems to promote collective behaviour change towards energy conservation informed by human aspects.

The method and its artefacts are described in the next section, followed by discussions around applying it with families in the Netherlands and Switzerland. We conclude listing preliminary resulting features and addressing future works.

2 Dynamics and Artefacts

Based on findings from literature on individual and social aspects that potentiate engagement and changes in behaviour (i.e. [3, 6, 7]), this study assumes that people need to feel personally involved and empowered to act. A set of group dynamics for families and physical artefacts were then created intending to engage emotionally by strengthening commitment and the sense of responsibility [14].

To capture human-values based factors with potential to instigate awareness and engagement and to transform it into changes in behaviour, the dynamics follow these 5 steps: (1) Make sense and record present behaviours; (2) Identify key behavioural factors (awareness); (3) Promote engagement; (4) Instigate changes in behaviour; (5) Sustain changed behaviour.

Two workshops, limited to 120 min each, cover these 5 steps. The first one introduces challenges and artefacts to map human values versus energy savings issues, while the second one targets on reflections and design of further solutions. The workshops should happen with an interval of several days between them, giving participants time to act in their household and reflect upon results. The audience targeted are families with a minimum of two children above the age of 6, ideally above 12 years old in order to be more engaged with the group discussions.

2.1 Workshop 1: Mapping Values X Energy Saving Issues

The workshop 1 (WS1) was designed to map the current energy usage situation in the households relating values and feelings. Reflection questions targeted in the WS1:

- What core values does your family unit embrace?
- How do these core values relate to the energy issue?
- Can you identify in detail the actual usage of energy in your family's home?
- How do you feel about the actual energy usage in your family's home? Good? Bad? Satisfactory?
- Can you reconcile this usage with your family values?
- How can you improve the situation in practical terms?
- Can you assume personal responsibility to practical change?

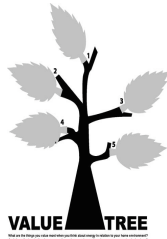


Fig. 1. The utility toolkit

A set of physical artefacts was designed to support the workshop activities. They compose the *Utility Toolkit* [15], Fig. 1, containing the Value Tree, Mood Tokens, an Energy Diary, Utility Labels and Personal Utility Stickers. The toolkit was conceived to be taken home by participants, extending the activities to the domestic environment. It can also be downloaded from [15].

The participant families are invited to follow this sequence of activities that starts in the workshop and continues at home: (1) Visualising the house routines (warming-up); (2) Identifying human values; (3) House mapping; (4) Mapping feelings; and (5) Homework: applying the Utility Labels. Between the activities, the participants present the results to be discussed by peer families.

- (1) **Visualising the house routines.** The WS1 starts with families' members being asked to describe a typical day in their lives, focusing on their behavioural patterns in the house and the energy that might be used during these activities. Lego, paper, magazines, etc. can be used to support the visualisation, which is reported by every family member.
- (2) **Identifying human values.** The families are asked to come up with at least five personal values regarding the environment and energy usage. Some examples of values can help participants, e.g. *health*, "*connectedness*", *nature*, *family*, etc. First the family members define five values individually. Then, they form groups of two, which in turn define five values shared by both. In the case of a large family, all values need to be refined, step-by-step, until there are five values left agreed by the whole family. The family ranks and visualise these values by using the *Value Tree*, as illustrated in Fig. 2 (a) and (b). This exercise aims at linking personal emotions and commitment related to the environment and energy usage, creating also a shared understanding within the family.



(a) The downloadable Value Tree



(b) The Value Tree in use

Fig. 2. (a) The downloadable value tree (b) The value tree in use

- (3) **House mapping.** Families' members are then invited to draw a map of the layout of their house. Each member starts with the room where he/she feels most comfortable. Everybody should draw a different room. During this exercise they try to consider all their appliances, energy points and their varying use of energy. The family members then combine their maps and add the rooms that have been omitted, such as washing room, pantry, corridor, etc. It results in a floor plan of the entire house, which does not need to be precise in terms of scale neither beautiful.
- (4) **Mapping feelings.** Now the family members are asked to map their feelings about their energy usage in the house on top of their drawn map/floor plan. The *Mood Tokens* (Fig. 3a) are applied to represent the feelings ranging from very good (happy) to very bad (unhappy). A question mark is provided in case they cannot reach consensus. The families 'walk through' all the rooms and decide together where the Mood Tokens need to be placed (Fig. 3b). Once the entire house is mapped, the zero-measurement state is captured in a picture. This will be the reference for future activities towards implementing/evaluating changes.

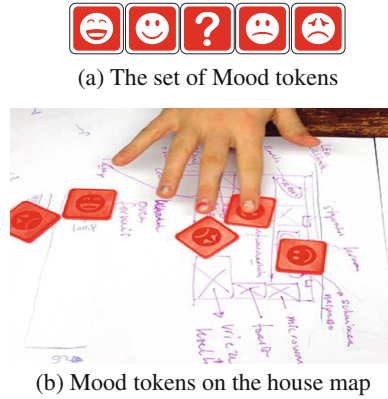


Fig. 3. (a) The set of mood tokens (b) Mood tokens on the house map

(5) **Applying the utility labels.** Once the ‘unhappy spots’ are identified with the Mood Tokens, the participants are ready to start the behavioural changes. Every ‘weak spot’ is then marked with a *Utility Label* (Fig. 4). There is one for energy, water, gas, and food, expanding the meaning of energy conservation beyond appliances usage.

Every family member is given his or her own *Utility Stickers* and can claim responsibility for a specific area of energy use. For example, one can be in charge of all the sockets verifying if there are no unnecessary phone or other chargers left in it. Another member looks after the waste disposal, and another checks the thermostat.

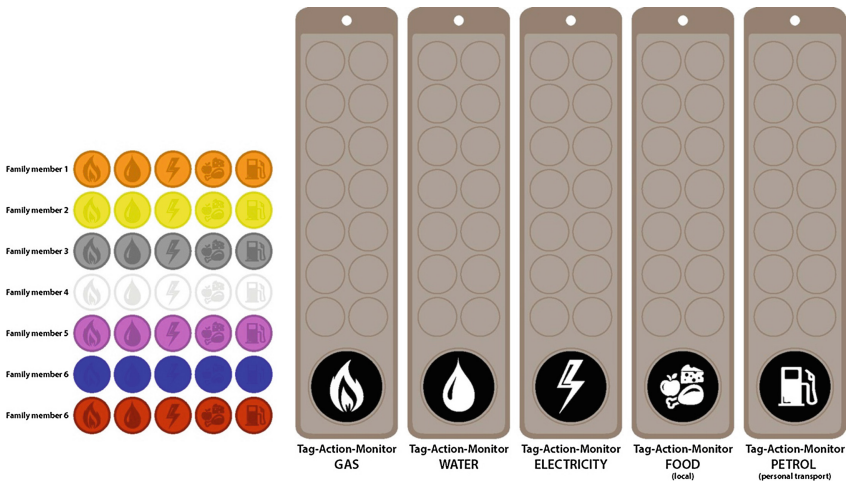


Fig. 4. The utility labels

The family discusses together, ideally in daily basis, additional possible improvements, which changes have been made, and who was responsible for these changes. If a change is deemed successful, the person responsible is allowed to place a sticker on the Utility Label in question.

The family records in a diary either the proposed changes and/or the effect of the changes on the household dynamics and the family's values. Regularly, the number of points and the stickers gained by each are added up and a 'Energy Champion' can be somehow rewarded, as established by the families themselves.

2.2 Workshop 2: Reflection on the Results

Workshop 2 (WS2) aims at instigating reflections on results and eventual changes in the household triggered by the WS1. Reflection questions expected to be answered during this workshop are:

- What strategies and behaviour have you put in place in order to make the energy usage changes that were made durable?
- Which tools can you think of, that would support you more effectively in the implementation and monitoring of the changes in energy usage?
- Could you describe your role in this energy experiment?
- Could you think of ways to motivate friends and family to do the same?
- Could you give some examples of things that will motivate you to make the changes?

The WS2 is composed by this sequence of activities:

- (1) **Value tree revaluation.** The Values Tree and the map with mood tokens resulting from WS1 are brought back for revaluation. Participants then discuss the process validity, the representation, consequent changes in behaviour, and the eventual need to reorder their values. Other families may suggest more improvements to the new plan of balancing value and energy use.
- (2) **Reflection on using the toolkit.** WS2 reflection questions may be applied to guide a discussion among all participants. Families' members evaluate the past days (or weeks), how they made the changes, and how it has influenced the household. They can use photos of their houses and positioning of their tokens to guide their own evaluation.
- (3) **Energy tool.** The families work on a design sketch for a specific energy solution in their home. This small invention can either be the installation of energy monitors, a personalized charting system to track the energy usage responsibilities of each family member, or even a small visualisation of each utility in the house. This solution is shared with other families expecting to receive their feedback.
- (4) **Follow up.** For making the changes sustainable, the families are instructed to follow up their activities by using the Utility Toolkit. To motivate the family, new (game) mechanics can be introduced such as a daily "tombola" with a sustainable solution to be implemented, or the introduction of a challenge such as 'sweater-week' (when the heating is turned down, and people need to wear an extra sweater).

3 Execution

The workshops happened in a 2 months time (Jan–Feb 2014) engaging 3 families in Netherlands and 4 families in Switzerland, involving a total of 28 people. Parents age ranged from 37 to 52 years old, and children from 6–18 years old. It was essential that the families carried out the workshop process all together, as a unit.

The general feedback from the families was that the activities were effective in raising their awareness on energy usage, leading to changes in their behaviour. Some positive aspects reported by participants are summarized below according to the 5 steps to raise awareness and transform it into behaviour change.

- (1) **Identifying values to make sense of current behaviour.** Defining and prioritising the families' core values was crucial to create an emotional and ethical basis. The values were often discussed not only in the workshops but also on a daily basis at home. Five out of the seven participant families decided to display the Value Tree as a reminder of their defined values. Value prioritisation was even changed by certain families in the course of the workshop period. *"I now like to think and share what is good for the family. It would be good to do this in other aspects of family life"*, said a mother in Zurich. *"Most important thing was for me to discuss about values with our teenaged son. We never do this normally"* father, Zurich.
- (2) **House mapping to identify key behavioural factors.** This activity was perceived as decisive for raising awareness of the energy usage both in individual and familiar aspects. There was general consensus on the feeling of individual and group responsibility and engagement to change their behaviour. *"We've made the energy theme a topic of regular conversation. We've created some standards together that we can address together when somebody is being negligent. In that respect, energy has now become something that we can talk about without conflict"*, reported a father in Amsterdam.
- (3) **Promoting engagement.** Keeping the discussion around energy was also reported as being a key factor in sustaining awareness and action. *"We have made it a tradition and ritual to sit together every evening to discuss the subject. In this way, we motivate each other's good behaviour. And particularly to stay active. We discuss our day, our energy behaviour, and what we still can do. This motivates us"* daughter, Amsterdam.
- (4) **Instigating changes in behaviour.** The families reported the motivating effect of assigning individual and joint responsibilities to instigate changes. The peer pressure for daily discussions makes this force even stronger. *"The family sets its own goals and dates. This motivates us"*, father from Zurich. However, in line with stated in literature, the lack of information on how effectively change behaviour emerged: *"I'd like to read other people's journals for behavioural stimulation, for comparison and new ideas."* Mother, Amsterdam. *"I also like to be updated with tips and tricks to save energy. I guess this project will result in new kinds of behaviour that should be shared with the rest of the participants - and the world!"* said a father in Amsterdam.

- (5) **Sustaining changes in behaviour.** The participants indicated the need to receive ongoing comparative information on their progress by monitoring consumption. Not only would such data foster engagement, but would also provide context and confirmation for their efforts. *“We talk about changes in our behaviour without really knowing what the actual effect is. We think we are doing better than before, but we have no objective standards or measurements to know exactly how much we did better or worse than (A) before (in our own household) (B) our neighbours (who have the same type of home) (C) the national average. Basically, we want to know what we are achieving”*, father from Amsterdam.

4 Preliminary Results and Conclusions

This paper presented a set of dynamics and artefacts for families to raise their energy awareness and transform it into behaviour change towards saving energy in domestic environment. The method proposed was designed shedding lights on human values by bringing them into discussion among the families, and considering them when mapping possibilities of savings.

Along the 5 steps from understanding patterns of behaviours to sustain behaviour changes, participants pointed out gaps and benefits of applying these dynamics. Creating shared awareness based on the values, and dealing with daily responsibilities and commitments to change their direct environment were pointed out by participants as positive factors, providing them a sense of empowerment and motivation to be engaged. The need for information, specially related to monitoring consumption, though, was evidenced as a gap to instigate and sustain behaviour change. Further research is needed into the practical use of energy usage monitoring devices complementing this approach, as well as to keep tracking the sustainability of changes in longer term.

Available for download with instructions to apply it [14], the Utility Toolkit is expected to be applied in different contexts, promoting direct contact across further communities to inspire and motivate changes on a wider social level. As examples, participants recommended it to be applied in schools and leisure centres.

This study with families represents a starting point for this research that has as a main goal the deployment of a collective awareness platform [1]. Results of this study have now been translated into software requirements aiming to design an online solution to empower and engage people within this climate change and energy issues. Providing an online space for negotiation among members in a community, sharing personal and contextualised energy saving hints, values identification, public commitment and bridging awareness with daily monitored behaviour at home are some of the features evidenced in this study that have been developed. As stated in [16], other user-centric studies have complemented the sociotechnical development.

Acknowledgments. This research is part of the project [DecarboNet](#), funded by the FP7 program of the European Union, grant agreement 610829.

References

1. Amiani, M., et al.: Collective awareness platform for sustainability and social innovation: an introduction (2014) <http://caps2020.eu>
2. Abrahamse, W., et al.: A review of intervention studies aimed at household energy conservation. *J. Environ. Psychol.* **25**(3), 273–291 (2005)
3. Piccolo, L., et al.: Motivating online engagement and debates on energy consumption. In: *ACM Web Science 2014*, pp. 109–118. ACM (2014)
4. Moser, S.C., Dilling, L. (eds.): *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*. Cambridge University Press, Cambridge (2007)
5. House of commons, science and technology committee. *communicating climate change. Eighth Report of Session 2013–2014*
6. Umpfenbach, K., et al: Influences on consumer behaviour. Policy implications beyond nudging. Final report. Ecologic Institute, Berlin (2014)
7. Motivations for pro-environmental behaviour, RESOLVE. Department for Environment, Food and Rural Affairs, Defra, London (2010)
8. Blunck, H., et al.: Computational environmental ethnography: combining collective sensing and ethnographic inquiries to advance means for reducing environmental footprints. In: *Proceedings of e-Energy 2013*, pp. 87–98. ACM (2013)
9. Corner, A., Markowitz, E., Pidgeon, N.: Public engagement with climate change: the role of human values. *WIREs Clim Change* **5**, 411–422 (2014)
10. Schwartz, S.H., Bilsky, W.: Toward a universal psychological structure of human values. *J. Pers. Soc. Psychol.* **53**, 550–562 (1987)
11. Parkhill, K.A. et al.: *Transforming the UK energy system: public values, attitudes and acceptability*. Synthesis report, UKERC, London (2013)
12. Hornung, H., Piccolo, L., Arpetti, A.: Human values: a gap between academia and industry. In: *Proceedings XIII Brazilian Symposium on Human Factors in Computer Systems*, pp. 449–445 (2014)
13. Friedman, B.: Value sensitive design. In: Schular, D. (ed.) *Liberating Voices: A Pattern Language for Communication Revolution*, pp. 366–368. The MIT Press, Cambridge, MA (2008)
14. Huizenga, J., Alani, H., Heerschop, S.: D1.2: social requirements specification. Technical report <http://goo.gl/MHMvSs> (2014)
15. WAAG society. utility toolkit. <http://www.decarbonet.eu/2014/10/10/utility-toolkit/>
16. Piccolo, L.S.G., Smith, C.: Designing to raise collective awareness and leverage energy savings. In: *Proceedings of British HCI (2015, in press)*