



Jégou, F. and Wallenborn, G.

**“Co-design of products enhancing energy-
responsible practices among users:
washing machines”** in xxxx, Sheffield:
Greenleaf Publishing, 2010

This paper has been presented at the Sustainability in Design: NOW conference Bangalore, India 29th September - 1st October 2010 and published in the book xxxx by Greenleaf publisher.

Abstract

How to design products that may influence users towards new and more sustainable behaviours? Beyond the eco-efficiency of domestic equipments, is it possible to think them so that they suggest to their users they should be used in a thirfty way? The pa-per presents a 6 months co-design session within ISEU (Integration of Standardisation, Ecode-sign and Users in energy using products) research project funded by the Belgian Science Policy. It describes the collaboration with families, the tools and interactions used to ensure their involvement, the participative design sessions to define together with design teams, innovative design strategies and related sets of new domestic equipments. In particular, it focuses on washing machines, one of

the four categories of appliances studied and explores possible redesign based on rethinking the default settings in order to induce more energy-responsible practices in households






Designing practices

In the search for more sustainable consumption patterns, “behaviour change” has become a motto. A usual way to deal with this aim is the idea to change first attitudes of consumers, so that a behaviour change will follow. There is however more and more research showing that practices are not changing so easily, especially when consumption is inconspicuous as it is the case of household energy consumption (Shove 2003, Jackson 2005). From the point of view of design much of the political agenda is on ecodesign. According to the directive 2005/32/EC “establishing a framework for the setting of ecodesign requirements for energy-using products” (EuP), ecodesign means: the integration of environmental aspects into product design with the aim of improving the environmental performance of the EuP through-out its whole life cycle”.

As our research has shown, the preparatory studies for implementing the ‘ecodesign directive’ are mainly based on technological considerations; uses and users are hardly considered (Wallenborn & al. 2009). Besides the necessary energy efficiency improvements, the question of sufficiency is never asked. Though efficiency and sufficiency are generally considered as opposite concepts and strategies, we think we have to make them complementary. Indeed we ought to combine acceptable additional efforts for the users (sufficiency) with improved usage process (efficiency) and explore how to ‘do nearly the same with less’.

Manzini (2009) pleads for a design that would overcome the pitfalls of eco-efficiency and those of the individual choice as a sustainable solution. But how could design start from households’ practices? How to design products that may influence users towards new and more sustainable practices? Beyond the eco-efficiency of domestic equipments, is it possible to think them so that they suggest to their





users they should be used in a thrifty way? Design generally pushes consumption and tends to be part of the problem: how to use the same design skills to enable households to shift their practices more in line with a sufficiency principle? How could new interfaces empower user rather than making them impotent?

What are they able to create as new device enhancing changes in user energy saving behaviour? This is the starting question of the present paper. We will present some results of the collaborative sessions with households, centred on 4 household appliance categories: lighting, heating regulation, washing machine, computer. These co-design sessions with users lasted 6 months and were conducted by Strategic Design Scenarios and Égérie Research, Belgium. Families were invited to collaborate and to participate to design sessions to define together with design teams, innovative design strategies and related sets of domestic appliances likely to induce energy-saving practices. The first part of the paper presents the collaborative work with the users, the tools and interactions used to ensure their involvement in the design process. The second part describes the results obtained at a methodological level proposing four design guidelines to engender energy-saving practices.

◀ Figure 1. The first 2 phase of the co-design with users consist in building trust with them and ensuring their willingness to explore their own way of living and interact with the design team.



Collaborative design with users

The co-design sessions with users has been developed during 6 months in four phases starting with online discussion with 16 families, discussing their energy consumption patterns, exchanging pictures of their living contexts and progressively building trust. This first phase aimed at selecting 'friendly users' which value is less in their testing capabilities and market representativeness than in their willingness to design a supportive environment toward new and more sustainable way of living (Snyder 2003, Sanders & Stapper 2008, Jégou 2009). The second phase of immersions at their homes, in households' life, allow empathy with the users (Evans, Burns and Barrett, 2002). The third phase has invited the families to work together with design teams at Strategic Design Scenarios offices and to co-design new product concepts. Finally the fourth phase consists in delivering to the families, mock-ups of the products they co-designed, makes them familiarise with these new equipments in their homes, and asks them to describe why they think these new appliances are likely to improve their energy-consumption practices in front of a video camera. The short video clips of users presenting their involvement in a design process, the results they obtained and the behaviours changes they expect will feed the following of the ISEU research project, in particular to stimulate qualitative discussions with larger samples of users as well as designers and producers of domestic appliance. Only the third and fourth steps of the co-design process will be presented here.

2.1. Playing design games

The third phase of the participative design with the families consists in proposing them to take part to some of the design projects they contribute to trigger in the previous phases. The proposed context is completely different: families were no more in their domestic environment. Two families were invited for an evening in a design

◀ Figure 2. 'Exploration' type design exercise focusing washing programmes elaborated through peer-to-peer exchanges and social conversation and aiming at mapping effective family requirements.

consultancy at Strategic Design Scenarios offices. Learning from the previous steps is shared with them and 2 design exercises are proposed lasting about one hour each.

The discussions around the lessons learn in the 2 previous phases raised a series of contradictory indications:

On the one hand, confrontations of conversations with observations of users reveal fuzzy perceptions and contradictory affirmations. For instance they are not interested by smaller washing machines although they declare to make a strong segmentation of laundry (i.e. colour, type of textile, level of dirt...). At the same time they ensure they fill completely each of their loading (they can hardly put their hand between the top of the laundry and the inside of the machine) which is unlikely to be compatible. In the same way, when asked the simple question: "what is generally the most dirty in your laundry?" families encountered tends to give the most heterogeneous answers (i.e. bed linen opposed to sport clothes or bath towels or underwear...).

On the other hand, there is a clear trend towards a lighter washing. They react very enthusiastically towards a refreshing option, probably consciously or unconsciously acknowledging that they are often washing laundry that is not anymore clean but certainly couldn't at all be considered dirty. They also seems surprisingly open to entirely different washing machine as for instance machines that would wash more ecologically but slowly here also certainly considering that most of the time they don't need the laundry ready in one hour time.

As lessons learn on washing machines through the second step of the research, no major design demand seems to emerge but a range of rigid and conservative attitudes deeply rooted in the personal history and social relationships of the families encountered. Only the apparent trend towards lighter methods of washing seemed to indicate some kind of openness. We therefore decided to explore two directions in the following next step of co-design with the users.

The first one consists in shifting the washing from the private sphere where it seems to be stuck in mysterious beliefs and rigid practices to the collective sphere. Since social control seems to be very strong – what will the other think of me if I don't comply to the laun-

dry washing standards... – it would be interesting to explore what if washing programmes would be the result of strategic conversation and peer-to-peer dynamic exchanges of experiences? The hypothesis of the new washing machine would be based on a series of detachable 'usb-buttons' that could be plugged directly on the family personal computer to download washing programmes. These programmes would come from forums of users as from wash machine producers. Programmes would be elaborated through peer-to-peer and social computing process. They would be customised easily on the computer and then uploaded on the usb-buttons and plugged back on the washing machine.

The first design exercise is a type of exploration: the aim is to investigate a domestic function with new eyes and trying as much as possible to get rid of the current practices.

A rough mock-up of the façade of a washing machine is provided to the 2 participating families. On the upper part of the machine, the series of buttons are blank and can be detached. The moderator shows a computer and explain that the washing machine is sold with only a basic programme allowing a standard washing functionality and that other programmes can be downloaded from the Internet. 3 additional programme buttons are included with the washing machine and more if necessary could be obtained paying an extra price. The participants are invited to review different website on the computer and download 3 or more programme to customise their washing machine as they would do adding more software on a new computer.

Participants are invited to browse:

- the page of the washing machine producer website with some preset programme to download;
- another page of the same website with the possibility to customise the previous preset buttons;
- a webpage called "my previous machine" where users may enter the model of their previous machine and the new one is directly adjusted to the same settings;
- a webpage of a ecological consumer association recommending a programme to get the most ecological compromise;



- a user forum webpage offering the top 3 programmes agreed by the users called respectively: “25° - 25mn for the planet” as most sustainable option; “all together without sorting the laundry” for more easy use; “best use of night electrical rates” to pay less;
- a webpage of clothes and textiles producers are advising best washing programmes according to specific clothes and fabrics.

When ready, the participants were encouraged to try they new machine: a deck of cards representing dif-ferent pieces of laundry were given to them and they were asked to ‘wash’ it making use of the different programmes they had created.

Families like the idea of a customising option for the washing machine programmes but when investigat-ing more in-depth what kind of customisation they would do through the design exercise, they tend to stick to their habits, avoid touchy discussion between them and set their new machine exactly as the pre-vious one was... This rather disappointing results show that a more powerful and disruptive setting is necessary to kick average users out of their routines. The attractiveness of new applications and exchange of good practices through social conversations is not appealing enough in case of a washing machine. More than accessing an open source environment the key issue here seems to be to create a reason why questioning previous routines.

The second direction to be explored within the third step of the re-search is focused on a shift of the func-tionalities of the washing machine towards ‘soft washing options’. The intention is to build on the rational assumption that western societies have gone far beyond the threshold of basic hygiene. Although personal perceptions around what is clean or not are very touchy and not at all an option for discussion, there seems to be a growing space for refreshing instead or complementary to deep washing. A new concept of washing would be build on short ‘soft washing’ option and deep washing would be achieved through a prolongation over a longer period of time of the ‘soft washing’ option.

The interface of the washing machine would be design to clearly show the inter-relations between the different dimensions of the washing and energy use i.e. showing that choosing a shorter wash-

◀ Figure 3. ‘Performance’ type design exercise focusing a slow washing machine hypoth-esis and aiming at investigating conditions of acceptance of potentially promising strategies in rational use of energy.


ing cycle means directly using more energy.

The second example of design exercise is a kind of performance: it starts from a given strategy engaging in new energy-saving practices, and the aim is to explore both its efficiency and its attractiveness for the users.

As an introduction to the new concept of 'soft washing machine', a simulated commercial was presented to the participants. A typical advertising-type housewife through edited bits of interviews explains the usages and advantages of such a washing machine and anticipating some of the users questions: "this machine is not like the others: it washes the laundry slowly, consuming much less detergent and energy"; "my grand-mother was leaving her laundry in a bucket with some soap for a whole day. Then the dirt was coming out easily even with cold water. Here it's the same principle: the laundry stay in water with very little detergent for a full night and it is clean the newt day"; "it's very silent: one agitation every quarter of hour... Our daughter sleeps in the room next door"; "You know with cold water and the motor really working only for spinning, for the same quantity of laundry, it consume 8 time less: my husband test it with a meter plug"; "at ambient temperature, you can mix all colours. The clothes get less damaged than in a traditional washing machine"; "there is also the possibility to get the laundry done quicker but obviously the consumption is the same a another machine"; "it make my life easier: I just fill it in the evening or in the morning before going to work and I don't bother if it takes long time..."

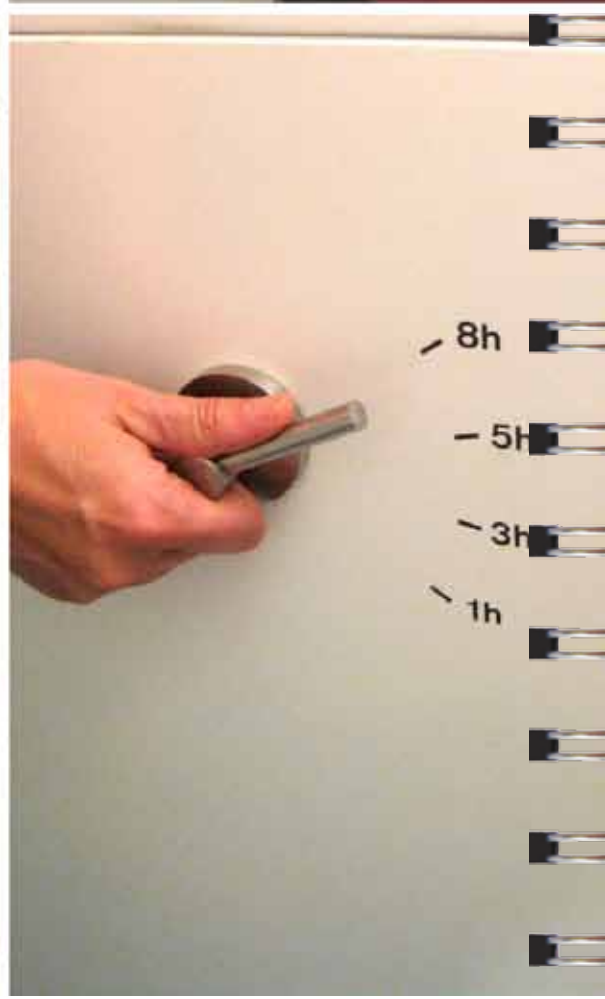
After this introductory presentation, the moderator shows the interface of the washing machine simulated on a computer screen: 3 washing options (refreshing, light and normal); duration of cycle can be adjusted between 8, 4, 2 and 1 hour and corresponding to the duration chosen, the consumption impact raises from green to yellow and to red. Temperature is also indicated with some spinning options.

Participants are asked to use the machine in the same way as the previous exercise: they get a bulk of laundry peaces and they have to sort it and choose between various setting of the machine.



The results of this simulation exercise show first a surprising adaptation of the participants habits as if – and thus confirming also the first exercise conclusions – a sufficiently new and discontinuous situation allows to revisit routines. The new machine is described as less time to manage the laundry and more time to wash. In other words, less of the user time and more of the machine time. The different washing are used spontaneously as long cycle for 'normal' washing and short cycle for 'refreshing'. The families agree they would change the weekly rhythm from concentrated on the weekend to every two days. Sort-ing will be reduced to differentiate more or less dirty. The management of the laundry is then simpler and presents less risks of damaging the clothes so that the task could be more shared between the members of the family.

The results of both exercises are real design activities, not in the sense of shaping the external form fac-tors of a product but of tracking emergence of new meaning of products and scenarios of interaction with users. They go much beyond classical testing of given products. Users are not designing products alone: it is more a matter of collaboration between professional of innovation (the design team) and professional of usage (the families), both keeping their particular interests and bringing their respective skills to the definition of new propositions.



Translating sufficiency into design guidelines to engender new practices.

For each of the 4 categories of domestic appliances focused by the ISEU project an original interpretation of the current situation emerged from the early investigations with the families, showing why according to them the current appliances proposed on the market were not facilitating energy-saving practices or, worst, were favouring energy overconsumption. For each category of equipment, a new design attitude has been identified between the users and the design teams that brought, on the one hand, to a series of emblematic concepts of new products and, on the other hand, to four design guidelines to favour energy-saving behaviours with a general value going beyond the product category they emerged from. For each product category, the sufficiency principle has been translated into more concrete principles.

- “Subtractive principle and lighting environment” allows imagination of new light switches and light distribution in the living environment to minimise the number of lights on;
- “Semi-manual interface principle and thermal regulation” reduces user cognitive overload in the fine thermal regulation with systems set to peoples’ habits at home while facilitating users manual regulation;
- “Resetting default principle and clothing care” allows to prompt low energy-intensive washing processes and to push evolution of users habits;
- “Eco-conscious artefacts and smart energy meters” facilitates interaction of users with energy metering enabling them to streamline household practices.

We will develop here more in depth the third principle and the re-

◀ Figure 4. Dominique D. is presenting a ‘slow washing machine’ where the normal washing cycle is 8 hours long, allowing a very low energy intensive washing at room temperature, with less detergent and slow agitation.



sulting products going ahead with the case on washing machines.

The laundry is a highly irrational and sensitive practice, and complicated by advertising strategies dramatizing dirt linen and contamination risks, stoking a sense of guilt to face the need for hygiene, and exacerbating the mysteries of the alchemy of laundry. The behaviours of the users appear to be even more unique, intimate, inflexible and radical. This situation is exacerbated by the fact that laundry does not incite to experimentation: the risk of spoiling clothes, for instance in mixing improperly some textiles or certain colour is far too important to allow housekeepers to experiment. Therefore users adopt the behaviour of low risk. They repeat what has been working and avoid situations that have caused problems in the past. They swear blindly the merits of their way of doing, so without any evidences of its superiority or having any way to test other ways of doing.

For these reasons we have explored the redefinition of what is considered the default use. This principle is based designing systems that provide basic performance, both efficient and sufficient, while occasionally allowing a more intensive and expensive washing mode. Resetting default should allow to prompt low energy-intensive washing processes and to push users to question their habits.

3.1 Slow washing

The supply of washing machines on the market offers a multitude of programs and settings that extends from accelerated washing cycle to soft treatment for delicate textiles. Washing considered as 'normal' is more or less the average of these possibilities. An average washing cycle is a bit less than one hour. Whereas standard assessment of washing machines is still based on a temperature of 60°, the average usage is regularly decreasing and is estimated for instance in Belgium around 45°.

The principle of redefining the default washing machine involves a reinterpretation of how to wash clothes with a machine and hence the meaning of programs.


The laundry is the result of a combination of 4 factors: the agitation of the machine, detergent, water temperature and cycle time.

◀ Figure 5. Joëlle H. is presenting OneWash, a washing machine with an interface mimicking the interface of a copy machine putting forward a large green button – in that case, for an ecological optimised programme – but still leaving the possibility to adjust the presets.

While the progress in a society of consumption has always been to ensure a rapid and efficient cycle, the environmental concerns lead conversely to consider a very long cycle requiring for the same wash a small agitation, less detergent and water at room temperature. This method of wash-ing is already available almost on all washing machines on the market, in the form of programs for gentle washing delicate fabrics. It is very possible without major structural adjustments of the machine to offer a basic programme that would limit the consumption of energy in extending the wash time for 6-8 hours. If this solution seems completely the opposite of market trends, it does not imply a significant change in the practices of households who already launch a machine in the morning to retrieve clothes the evening, or conversely launching at night for the next day. The machine keeps its capacity to do the same job in less than an hour but with a considerably higher energy. The machine default would be set to this slow wash-ing, leaving the choice to the user to accelerate it and consuming more

3.2 Programmable washing machine

Competition between manufacturers of machines and abuse of marketing differentiation between the models led to a sophisticated interfaces washing machines making it difficult to keep control on the basic dimensions of washing and a plethora of programmes with only a few used really. At the opposite, the redefinition of default settings of a washing machine could offer an simplification of the interface that would suggest only one mode of light washing optimized to suit the widest range of textiles, a short cycle of low temperature more economic and ecological. This basic programme would be offered by the manufacturer as the optimum way to balance cleanliness, low consumption and ease of use. The machine is ready for use without the need for special settings as is the case for a camera that makes a default photo or a copy machine when you push on the large green button prompted by the interface design. If desired, and after a first test, the user can modify this basic programme of the washing machine as she or he likes: speeding up or slowing down, raising or lowering the temperature, adjusting the spin and rinse. After the next washing cycle, the washing



machine will set back to the default programme. This machine suggest thus to the user to explore anew her or his own washing habits from a basic configuration and eventually to acknowledge without taking risks for its or her clothes that a let intensive washing is acceptable. On a daily basis, the normal research for simple and quick solutions in doing household chores prompts users to simply 'push on the green button' and go for the ecological preset rather than taking time adjusting spe-cific settings.



Conclusion: users as experimenters

The conclusions of the specific co-design sessions within the ISEU research project gave rise to 2 levels of benefits:

- the user-centred approach starting from household activities generated very interesting results without any technological improvement of the eco-efficiency of the domestic appliances: only resetting usage patterns by a redesign of existing components 'from the shelf' shows promising propositions in streamlining energy consumption practices of households;
- the very process of the co-design sessions, the progressive training of the families, their involvement in the design of their own future environment brought the research team to consider all the interaction process and the material developed to be used during the sessions between users and designers as a sort of training toolkit to question people domestic practices, to take a distance from them and enable the families to re-invent progressively their daily ways of living.

Beyond concrete propositions for new energy-saving practices, our research has also shown interesting lessons we can learn from the interaction with households.

Our ethnographic approach has revealed that households are much more creative in the way they save energy than the usual representations conveyed by the "rational use of energy" flyers for instance. All the process, particularly the collaborative sessions, shows how much our interaction with washing machines is often fuzzy and conservative. When users are given the possibility to imagine other ways of interacting with their machines, following a sufficiency principle, they reveal that our houses have embodied standard appliances and systems that do not fit desirable practices anymore.

To observe the willingness of families to play and imagine new devices, we had however to move away from the idea of ready-made products. After the first interview it appeared indeed that the

propositions presented as products or services led respondents to a hedonistic situation, like “Would I buy or not?” rather than a change of attitude motivated by a desire to save energy such as: “Is this a good research di-rection that I can apply?”. If there is a reason functioning in this approach, it is not the one of the rational individual seeking to maximize its welfare within a given budget. The co-design sessions showed that participating families are much more in a playful and explorative situation than a pure economic calculation. Families who were ready to play the game, reveal the current system’s constraints when asked to turn to energy-saving practices. Experimental situations are transitory, they always end up in final results, in “products”. But the process itself is as well interesting as the result. We think that transition towards a sustainable society will require much more transitory experimental situations.





Bibliography:

Evans, S., Burns, A. & Barrett, R. (2002). Empathic Design Tutor. Cranfield University Press.

Jackson, T. (2005). Motivating Sustainable Consumption. A review of evidence on consumer behaviour and behavioural change. A report to the Sustainable Development Research Network: <http://www.comminit.com/en/node/219688>

Jégou, F. (2009). Co-design approaches for early phases of augmented environments in Designing User Friendly Augmented Work Environments. From Meeting Rooms to Digital Collaborative Spaces, Edited by Saadi Lahlou. London: Springer Verlag.

Manzini, E. (2009). New design knowledge. Design Studies 30, 4-12.
Pantzar, M., (1997). Domestication of Everyday Life Technology: Dynamic Views on the Social Histories of Artifacts. Design Issues 13, 52-65.

Røpke, I. (2009), Theories of practice — New inspiration for ecological economic studies on consumption. Ecological Economics 68, 2490-2497.

Sanders, E., Stappers, P. J., 2008. Co-creation and the new landscapes of design in CoDesign, Taylor & Francis.

Shove, E. (2003). Comfort, Cleanliness and Convenience. Routledge.

Shove, E., Watson M., Hand M. & Ingram J. (2007). The Design of Everyday Life, Oxford : Berg.

Verbeek, P.-P. & Slob, A., eds., (2006), User Behavior and Technology Development, Dordrecht : Springer.

Wallenborn, G., Prignot, N., Rousseau, C., Orsini, M., Vanhaverbeken, J., Thollier, K. & Simus, P. (2009), Integration of standards, ecodesign and users in energy-using products. Final report phase 1. Brussels : Belgian Science Policy Office.





Strategic Design Scenarios

www.StrategicDesignScenarios.net

contact: Francois.Jegou@StrategicDesignScenarios.net

WASH T° SPIN CONSUMPTION

WASH	T°	SPIN	CONSUMPTION
NORMAL	60°	1200	MAX
	40°	1000	MED
	30°	800	ECO

Light indicator: 3 bars illuminated (top 2 dark, bottom 1 light)

