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Integration of Standards, Ecodesign and Users in energy-using products "ISEU"

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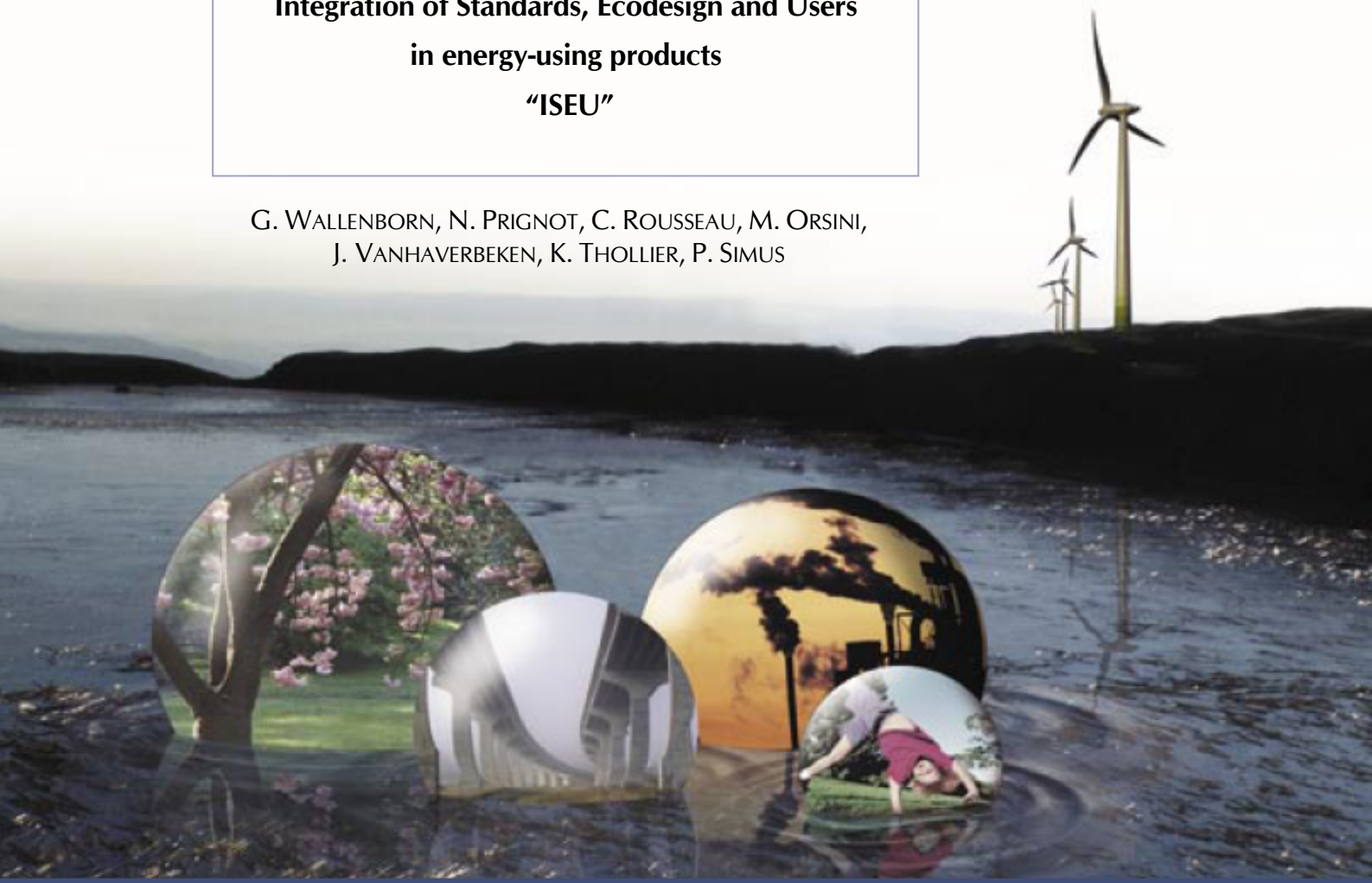

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FINAL REPORT PHASE 1

SUMMARY

INTEGRATION OF STANDARDS, ECODESIGN AND USERS IN ENERGY-USING PRODUCTS

"ISEU"

SD/TA/07A

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Introduction

The main objective of the ISEU project is to understand household energy consumption in studying the relationships between users and energy-using objects. How far is it possible to change behaviours through objects? This question is posed at both theoretical and experimental levels. We are exploring the hypothesis that cultural changes towards sustainability can (partly) be brought forth through objects. We will assess at the end of the project the relevance and promises of this approach, led with original partnership and methodology. We aim at elaborating a set of recommendations for supporting the development of a sensible and temperate culture of energy.

Sustainable consumption policies are today mainly directed towards the rationalisation of products and behaviours. Some substances are prohibited, products are standardised according to 'best environmental practices', producers are obliged to mention minimal information on environmental impacts of their products. With reason, without doubt. Product policies can use a wide range of instruments: regulatory, economic, compulsory or voluntary information, voluntary agreement, advices to consumers… Nevertheless, information and advices are still more used than economic tools (e.g; taxes) that would internalise environmental costs. Environmental taxes raise some problems and concerns as social ones, among others. In the case of energy, for example, those who plead for increasing prices, generally agree that poorest people should not be penalised. Moreover, when reducing the question of sustainable consumption to products only, we can lose the whole picture.

Consumers are bombarded with contradictory claims: consuming is "good for you and for the economic growth", consuming is "bad for the planet". 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. Furthermore, rebound effects prevent to take fully advantage of efficiency energy gains.

Our research starts from an hypothesis different than a top-down rationalisation of behaviours and products: practices could be transformed through the interfaces between users and appliances. 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 thrifty way? Design generally encourages consumption and tends to be part of the problem: how to start from current practices and adopt a user-centred approach so that rationalities can emerge bottom-up? How could new interfaces empower user rather than making them impotent? How far should go the delegation of decision to objects?

Summing up, how could a culture of energy be produced by users, and not imposed? The industrial revolution has transformed households: the division of labour in households has changed. From unit of production, they became unit of consumption. Energy-using objects have changed life and increased energy consumption. Objects have a surprising ability to enter our lives and change our practices. Could this impressive feature be used in the perspective of sustainable consumption patterns? What are the current trends and possibilities towards a new culture of household energy to be brought forth through appliances?

Not just an acronym

ISEU stands for Integration of Standards, Ecodesign and Users in energy-using products. We wish it was not only an acronym.

Standards are coordinating documents between different parties. These parties establish ways of cooperating through the definition of common practices that can be objectively assessed. Objectively means here properly through objects. "Standards are unseen forces that ensure that things work properly", as stated by the European Commission. In this case, the interest of cooperating actors is to allow the production, circulation and acquisition of things or processes; in other terms, it is the creation of market. When we buy or rent a product and that it works properly,

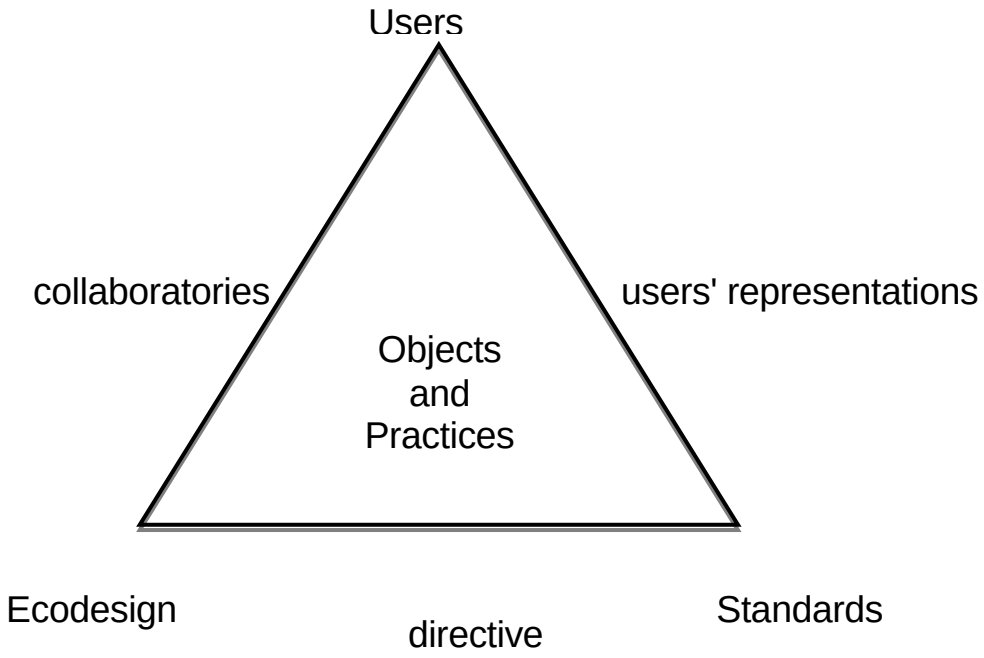
we deserve it to many different standards. Standards are developed on the basis of voluntary agreement between different actors, but they can turn into legal rules. The EU can refer to a standard when it has regulatory requirements, and even make it compulsory. Even when it does not acquire the force of law, a standard, once it is settled and accepted by a vast majority, becomes very difficult to overlook.

Ecodesign is the integration of environmental aspects in the design or re-design of products. Ecodesign assumes that the burden of a product upon the environment should be considered and reduced at all stages along the product life cycle. The term 'product' includes goods as well as services. Therefore, ecodesign is informed by LCA, but it is larger than the design of goods; it has indeed to consider links between objects and services. Ecodesign needs also to question the product itself in focusing on the function of the product and on the possible substitutions. More than a simple method, ecodesign is a way of caring of ecological issues, to attach new meanings and practices to the environment.

Users are rarely considered by designers and producers. Producers are much more interested in buyers and consumers. As we are concerned with domestic appliances, we define users as members of a household. The use phase of a product is generally the least known: figures are sparse and the diversity of practices is reduced to averages. Observations in households show above all a great variety of interactions between objects and family. People do not consume energy: they use objects that provide them services.

Energy-using Product is currently designed by 'EuP'. As we are not interested only in the production, but also in the consumption (the user's side), we would prefer now employ "Energy-using Practices" (with plural). The subject of our research is not only transformation of objects, but also the way uses are shaped by objects and how users appropriate these objects. The importance of interfaces, of default setting, for instance, shows that the household practices are as much significant and engaging as the products.

Integration: our proposition of integration can be schematised in a triangle figure, in which users, ecodesign and standards are the corners.



The triangle contains domestic energy-using objects and practices. This inner part represents thus the different possible interfaces between objects and users. The triangle is on a plan that divides

two worlds: on one side the household and on the other side the networks that allow objects entering, working and escaping the household. Objects and practices are related inside a household. They are however analysed with different theories.
Objects can be seen as networked resources. Networks are not only material; they displace and translate information, symbols, money, competencies, as well as worked resources. Standards are brought with objects. And standards are made through institutions so that technological expertise can be embodied in objects that circulate. Energy-using objects are also entering homes mainly through the market. Energy-using products carry symbols and images. From the network perspective, energy-using objects can only work with a series of associated consumptions, of which household energy consumption is only one example. For example, surfing on the Internet requires the use of large servers, washing necessitates detergent that can take an important part of the energy of a washing cycle.
Practices are not referring to "general activities" but to a singular activity happening in a given household. Practices are routines that involve and link heterogeneous elements: bodies, objects, knowledge, emotions, desires… From this perspective, objects can be seen as a kind of crystallisation of relations between members of a household. These relations can be cooperative or conflictive.
Both worlds of objects and practices are (almost) invisible to each other. Resources that go through the household are consumed, i.e. transformed and achieved, but the effects of this consumption outside the house are not easily perceptible. On another hand, practices are quite opaque to producers. This opacity prevents too intrusive inquiries into private lives. But it goes against the current trend to make more visible the links between consuming practices and environmental impacts.
Integration means to look not only at the corners of triangle but also at the relations between these entities. We have analysed the link between Ecodesign and Standards through the ecodesign directive: it appears that they are mainly aimed at increasing energy efficiency of objects. Users and standards are analysed through the different representations of users. A new experimental approach to define the relationship between Users and Ecodesign was used through a co-elaboration with users of energy using objects development scenarios (i.e. "collaboratories"). Our study is based on the selection of five case studies: domestic lighting, heating control, washing machines, personal computers, smart metering.

Ecodesigning the energy efficiency

Our research focus on the analysis of the implementation of the ecodesign directive. The directive 2005/32/EC "establishing a framework for the setting of ecodesign requirements for energy-using products" (which we call 'ecodesign directive') concerns all EuPs, such as electrical and electronic devices or heating equipment, with the notable exception of means of transport for persons or goods. The directive does not introduce directly binding requirements for specific products, but does define conditions and criteria for setting, through subsequent implementing measures, requirements regarding environmentally relevant product characteristics, in particular measures dealing mainly with energy efficiency of EuPs.
The way in which EuPs for households are taken into account is very interesting as it is the result of negotiations, partly public. The implementation of the directive will certainly lead to modification of the objects themselves, and thus to modifications of our energy consumption. The main argument in favour of the ecodesign approach is that the design phase or re-design of a product is the stage where the levers are most important to change the environmental profile of a product.
Each EuP category is analysed according the same "Methodology study for ecodesign of energy-using products" (MEEuP). The MEEuP study targets primarily the audience of policy makers, but also the manufacturers of concerned products, who will have to realize the final determined improvement potential. In this second target group, designers are considered the most crucial part of manufacturers. EuP manufacturers are thus not responsible for the environmental impacts of e.g.

a steel or aluminium plant, but they are responsible for the choice between these two materials and the optimization of their use. Identifying these two target groups leads to the necessary development of easy and understandable indicators, which is required by the directive. By placing the ecodesign directive in the global framework of integrated product policy, the ecodesign directive also stresses the need to integrate ecodesign throughout the design process, not making it a separate activity, but rather a discipline to be used alongside electronics, aesthetics, materials sciences etc.
While the methodology is based on a life-cycle approach and carries out an inventory of life cycle impacts of products, it is not strictly speaking a LCA, but shows some deviations. Indeed, a LCA would have compared the life cycle inventories of different improvement options in order to evaluate the best one. On the contrary, the MEEuP study chooses to carry out a life cycle inventory of one or more "typical", "average" products through a tool called Ecoreport, and then identifies the best improvement options of this "basecase scenario" through the use of life cycle costing. The reason for using life cycle cost stems for the ecodesign directive, in which the Annex II mentions that "concerning energy consumption in use, the level of energy efficiency or consumption will be set aiming at the life-cycle cost minimum to end-users".
Also, although all environmental impacts are calculated, the decisions are taken mainly based on energy consumption, while leaving out problems such as dangerous substances, waste production, etc. There are rationales for choosing energy consumption as a main indicator during both the production and the use phases, for energy consumption is highly correlated to CO2 emissions, acidifying emissions, VOC emissions, etc., indeed most of these emissions stem from the burning of energy sources. However, energy consumption does not give a good indication of environmental impacts from the waste phase. Dangerous substances such as lead, cadmium, brominated flame-retardants do not require a large amount of energy for their production, due to their small weight in the product; however, they pose health and environmental problems during the use and disposal phases. Even if the EuP studies mention these problems, they are somewhat left behind the energy consumption issue.
Choosing one indicator (energy consumption) above the others, as well as life cycle cost as an additional indicator, is not compliant with the ISO rules of LCA. However, it is in line with the requirements of the EuP directive… One can therefore say that the MEEuP methodology, though based on life cycle approach and life cycle inventories, sets a different frame for the study of energy-using products, mainly centred on energy.

Representation of users

Representation of users can be understood in two senses, both having an eventual impact on the construction of the appliances: mental representation of users that different actors can have (e.g. designers); or political representation through organisations. These representations are part of the process of negotiating a new energy-using product. While these representations are an important stake, we can conclude that for the moment they are relatively poor. It seems that producers can only represent users through an average behaviour.
In the directive, the figure of the user is present, but in a relatively diffuse way. In particular they are more considered at the buying step: the directive endows them of the capacity to choose if well informed. User's behaviour is not questioned in the directive, even implicitly.
That is also reflected in the preparatory studies where consumers are reduced to "average use pattern". The user is generally regarded as non-modifiable: he is attributed immutable behaviour, impossible to change. MEEuP prevents to envisage that behaviours can be modified by appliances. The diversity of profiles and practices are neither take into account, nor their evolution during the life. Average behaviour neglects also interesting phenomena as complex interferences resulting from the use of the same appliance by different persons of a household.
Our case studies show that there is a huge diversity of practices and possible strategies: each EuP has its own characteristics, and own ecodesign requirements. It entails that standards are often far

from real situations. The diversity of users is generally not taken into account: the variability in the objects is not in congruence with the variability of uses. The different exhibited examples show that when one considers energy efficiency without uses and users, one can be led towards solutions that are not optimum for saving energy. The attention given to technological solutions without integrating the diversity of uses, namely in forgetting the users, is probably not well adapted to the challenge of reducing energy consumption. It has also great implications for communicating with users, e.g. for policy campaigns. For the case of lighting, it will be very interesting to follow the implementation of the incandescent bulbs ban. How will users adapt or resist to the change? The case is peculiar since it requires not only a change of behaviour (as for instance in the compulsory use of security belt), but also an adaptation of objects (e.g. luminaires).

Collaboratories

In order to establish contrasts with the representation of users in the preparatory studies of the ecodesign directive, we have asked designers[1] to develop "collaboratories". The aim of this part of our research was to imagine new devices co-elaborated with users in order to reduce their energy consumption. The main objective of co-elaborated scenarios is to explore the possibilities to induce behaviour more in line with sustainable use of energy by changing the design of household appliances in general and the five selected categories of appliances in particular. We have called these co-elaborated scenarios "collaboratories".

The idea of collaboratories belongs to an experimental approach. It is for us very important to explore what it is possible to do with appliances in order to make an assessment of the results of the ecodesign directive. In order to follow the construction of new constraints for technology, we needed to open the range of possible ways of conceiving interfaces between users and appliances.

A sufficiency policy?

The problem of energy consumption by households is today mainly addressed through the improving of energy efficiency. This has been shown in the analysis of the EuP directive implementation, but could also be seen through other EU and national policies. This directive originally aimed at dealing with the different environmental problems posed by energy-using products. Eventually, the main criteria for improving the performance of an EuP is to reduce the life cycle cost of an average base case. Our critique of this approach is twofold: technological objects are not isolated; users and practices cannot be correctly approached by 'average' representations. Our main conclusion is thus that there is a perversion of initial valuable policy aims when the only considered means are the energy efficiency and technological standardisation. In this perspective, the question of rebound effect is not efficiently tackled.

Furthermore we found that rationalities of energy consumption are diverse and distributed through home sectors, but these rationalities held by households are seldom studied. On another hand, the analysis of energy-using products often neglect the use phase and elaborates computation from a collection of heterogeneous data. If EuPs are black boxes for users, users practices are black boxes for manufacturers.

Intelligences inside objects are currently intelligences of engineers and economists: would it be possible to put inside other intelligences? How could we imagine devices that do not radically dissociate technical acts and human intelligence? Productive or technical intelligence is currently dominating. How could we develop energy-using practices that are properly human and intelligent? What are the examples of users adopting an environmental perspective that could be

[1] François Jégou (SDS, Strategic design and sustainable development research Agency) and Joëlle Liberman (Egérie Research).

fruitful for our research? How object/user interfaces could embody elements of a "new culture of energy"?
An objective of the research in its second phase (2009-10) is to get in-depth understanding of users' practices, and notably to analyse what householders learn when they use a 'smart' meter. These practices are to be understood not only in relation to the appliances, but also in relation to the functions that these appliances fulfil, if one wants to grasp users' roles.