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EDP InovCity Pilot Study Proposal: A Set-Top Box Interface

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Abstract

In this work I propose an additional test to be implemented in EDP's residential electricity use feedback trials, under InovCity's project scope. The proposed product to be tested consists of an interface between the smart meter and the television, through a set-top box. I provide a theoretical framework of the importance of feedback, an analysis of results from past studies involving smart metering, and a detailed description of my proposal. The results of a self-developed questionnaire related to the proposal and segmentation issues are also analyzed. Finally, general conclusions are drawn and potential future improvements and challenges are presented.

Keywords: *smart meter; consumption; feedback; television*

Index

1. Introduction

The growing evolution and development of the electric devices industry, has brought several products to the market over the years and, over time, these have been introduced in every regular household daily activities. LED televisions, Blu-Ray and DVD players, air conditioners, lamps, heaters or computers, are just a tiny sample of the wide range of products that can be found in a household.

The usage of such devices along with daily chores like cooking or bathing, imply great electrical power consumption.

Also, the emerging concern related to achieving energetic efficiency and the economic crisis' effects have brought to many the need to not only manage and control, but also reduce their electricity spending, as a way to cut costs.

Nevertheless, the main issue is that nowadays people are not actually aware of how much they are spending on electricity. Since they do not have access to their home appliances consumption information, they cannot control the spending of each. Hence, it becomes apparent the need of having information concerning the current consumptions of each appliance. This current consumption information would allow consumers to know each appliance's instantaneous spending in terms of energy units (kWh) and euros. As most people do not have access to this information yet, their decisions of using and purchasing electrical appliances become inefficient in terms of energy consumption.

To address this matter, many research projects have been conducted in the last years, mostly at an international scale, in order to test technologies and ways of allowing customers to have more information and better control over their electricity consumption. Most of the research projects involve the usage of smart meters, which are substitutes to the regular meters. These have significantly improved features, allowing for a diverse set of functionalities. Though, there are smart meters suited for other purposes, hence, due the aim of this report, whenever these are mentioned, it refers to electricity smart meters.

In the beginning of 2010, a pilot study involving smart metering was introduced in the city of Évora, Portugal, by EDP Distribuição. This project was named InovCity and its main goals are: creating an integrated net infrastructure through the implementation of smart meters; potentiate domestic micro production; creating the possibility of managing the household's energy consumption; achieving energetic efficiency; and creating an effective system of failure detection. Nevertheless, the project is still at an experimental stage and has not been in progress long enough, not being yet possible for EDP neither for consumers themselves to draw precise conclusions regarding their behavior changes and quantify the benefits arising from those changes.

Currently, InovCity's experiment involves testing several forms of providing feedback, such as text messages, enhanced billing, feedback through in-home displays, etc., along with the smart meters used, the energy boxes (EB), which are the core device that allow for these alternative forms of feedback.

The contribution of this report to this project will be proposing a new form of feedback that may lead to potential gains of energetic efficiency, and that can be implemented in the future as another pilot study under the scope of InovCity's project.

This proposal will focus on the interaction between the energy box and the television, by means of a set-top box[1]. The interface between theses equipment will allow consumers to have feedback and information regarding their electricity consumption displayed on their television's screen. The main advantages of this interface are: the easiness of accessing the information; providing the service to those who do not possess Internet (which is an alternative way to access this information); allowing a better reception of feedback and a better visualization of information; convenience and quickness in accessing the information; etc.

Throughout this report, a generic and detailed analysis of the proposed interface between the core product, the energy box, and the television, will be performed.

In the report's section 2, a theoretical analysis of feedback and its contribution to consumption reduction is discussed. Also, an overview of InovCity's project is presented, along with a review of the literature on smart meter interventions and key conclusions from past studies. Section 3 comprehends a more detailed explanation of the proposal, a discussion of its main advantages, disadvantages and contribution to the pilot, an analysis of the results of a developed questionnaire, and finally, a segmentation analysis. In section 4, some main conclusions concerning the proposal's feasibility and future steps are presented.

[1] A set-top box is a device that enables a television set to become a user interface to the Internet and also enables a television set to receive and decode digital television (DTV) broadcasts.

2. Methodology

i. The impact of feedback and its mechanisms

According to several research findings related to electricity consumption, feedback has turned out to be an important tool in encouraging conservation, especially at a time where the emerging technologies allow for greater ease of feedback provision/reception. Reviewed studies by the Electrical Power Research Institute (EPRI) showed that overall conservation effects associated to feedback use, could range from being negative to 18% (EPRI, 2009).

EPRI has presented in a report a feedback delivery mechanism spectrum (see Figure 1), in which it uses the division of feedback introduced by Darby (2000). This division comprehends two major categories, indirect and direct. The indirect feedback, that is, the one provided after consumption occurs, comprehends four types: standard billing (e.g. monthly), enhanced billing (e.g. info and advices), estimated feedback (e.g. web-based energy audits + billing analysis) and daily/weekly feedback (e.g. by email, based on consumption measurements). The direct feedback, the one provided on real-time or near real-time, comprehends two types: real-time feedback (e.g. in-home displays) and real-time plus (e.g. appliance disaggregation). As the spectrum shows, there is a direct relationship between the implementation costs and the information availability, suggesting that direct feedback categories will be costlier than indirect ones, but more informative.

According to EPRI (2009), a great part of the early feedback research *"sought to describe the mechanisms by which feedback works to encourage conservation behavior.*"

An analysis suggested that feedback works through a three-step process: learning, habit formation, and internalization of behavior (van Raaij and Verhallen 1983) (see Figure 2).

In the learning phase, consumers become aware of their consumption patterns. If feedback is quickly provided, they learn how their actions impact on their consumption levels (EPRI, 2009). Consumers "*respond by making small changes in their behavior, initially to view the effects on the feedback they receive and over time as a way to maintain a lower consumption level*" (EPRI, 2009). In repeating these small behavior changes over time, they create habits (habit formation phase) so that, "*without being energy-conscious all the time, people are behaving in an energy-conserving way*" (van Houwelingen and van Raaij, 1989). In the internalization of behavior phase, as energy conservation becomes a formed habit, "*an individual's attitude will also change to reflect the adjustment in behavior*" (EPRI, 2009).

In an updated version of the initial study conducted by Darby in 2006, direct feedback was concluded to be more valuable and contributing to day-to-day electricity consumption behavior changes, since it made consequences of those behaviors more noticeable. According to past experiences, direct feedback consumption savings are in the 5–15% range, while indirect feedback savings go up to 10% (Darby, 2006). Also, the majority of the conducted studies support the idea that direct feedback is the most effective type.

ii. InovCity

EDP Distribuição introduced the pilot project InovCity in the beginning of 2010, in the city of Évora, Portugal. Besides having other already mentioned established goals, the study aimed at providing consumers the opportunity to perform a better control and management of their electricity consumption. To perform the experiment, a set of representative samples of consumers was selected by EDP's Corporate Marketing department. The segments were defined in accordance with past market studies (which EDP did not provide) and these define classes of consumers that are relatively homogeneous (see Figure 3). For instance, from consumers with low consumption, low power plans and possessing few electrical appliances and hence, to whom potential efficiency gains in consumption are lower, to consumers with higher consumption and power plans that will have a higher potential to attain efficiency gains and hence, to whom more expensive solutions can be directed, like displays or tablets.

The current experiment involves testing a set of equipment, being the smart meters used, the energy boxes (see Figure 4), the core device. The energy box main features are: allowing remote control access on the consumption installation (i.e. telecounting); providing consumers with a better control/management of their electricity consumption and spending by having access to current and historical consumption information; allowing a better detection for failures; allowing a better interaction between supplier and consumer, through the provision of feedback and advising; providing information regarding the household's hired power, theoretical power, aggregate consumption, etc., and graphical representation of daily, monthly or annual consumption.

Some of the above-mentioned information can be seen directly in the energy box display, but part of it, namely the graphs, can only be seen with the aid of a display unit. Consumers can also access all their information in an EDP's Internet website service (EDP online).

By replacing the consumers' usual meters by energy boxes, EDP was able to computerize the low voltage electricity network. Such measure allowed EDP to, not only remotely collect information, but also accompany each household's situation.

In addition to the energy boxes, the project also involves testing a range of displays and specific software, which goals are to provide real-time or direct feedback, to consumers. Still, these displays/software are not being tested in all segments, since EDP is also providing indirect feedback to segments 1D and 5D (see Figure 5).

The displays' features differ from each other. While some present more basic information, others for instance, allow to view graphical representation of consumption. The display units being tested are: the Onzo display; the Geo display; the Phillips C-Side tablet; and an Archos tablet along with the ISA software (see Figure 6). Actually, the ISA software does not require this specific tablet, since it can be accessed in a desktop, laptop, PDA or other compatible tablet. As it can be seen in the project's segmentation, there are segments that are only provided the software alone.

An analysis of each of these equipment's features (except the ISA software) was performed, in order to assess their usefulness and contribution to the feedback provision. Results are presented in figure 7.

iii. Review of the literature on smart meter interventions

Although being, probably, the most common delivery mechanism for real-time feedback, providing feedback through a display unit is a procedure receiving much importance nowadays (EPRI, 2009).

As InovCity has a larger number of segmented consumers under real-time feedback provision, the following analysis will focus on those experiences testing the same types of feedback.

The table below presents the overall results of some past studies related to this matter (EPRI, 2009). Most of these were conducted in the USA and Canada in North America (11), being that the other one concerns an experience developed in the UK.

Table 1. Summary of Recent Smart Meter Interventions

Reference	Location	Duration (months)	Sample Size	Feedback Type	Conservation Effect
Allen and Janda, 2006	OH, USA	3	10	5	0%
Hutton et al., 1986	BC & QC, Canada	12	75	5	1%
Hydro One, 2008	ON, Canada	5	234	5	4%
McClelland and Cook, 1979	NC, USA	11	25	5	12%
Moutain 2006	ON, Canada	13	382	5	6.5%
Moutain 2007	BC, Canada	18	43	5	3%
Moutain 2007	NF, Canada	18	58	5	18%
Parker et al., 2008	FL, USA	12	17	5	7%
Loren Kirkeide, Principal Analyst – SES, Salt River Project, personal communication, February 18, 2009	AZ, USA	6 (each)	2005/2006 Study: 272 (summer), 191 (winter); 2003/2004 Study: 422 (summer), 202 (winter)	5	2005/2006 Study: 12% 2003/2004 Study: 13%
Seligman et al., 1978	NJ, USA	1	20	5	16%
Sexton et al., 1987	CA, USA	10	51	5	-5,50%
Wood and Newborough 2003	UK	2	20	5–6	15%

Though, some of these studies were conducted for short periods of time. In this sense, it is generally accepted that, in order to draw accurate insights and ensure data credibility, the experiences should last for a longer period of time.

According to past studies conclusions, there is a set of criteria that enumerates the key features of effective feedback (Fischer 2007, IPSOS Mori 2007, Abrahamse et al., 2005). Hence, feedback is believed to have greater effectiveness if: it is provided frequently, as soon after the consumption behavior as possible; it is clear and simply presented; if it is customized to the household; it is provided to a meaningful standard of comparison; it is provided over an extended period of time; and if it is interactive. Although InovCity's current experiment already checks for some of these criteria, as for instance, allowing consumers to verify instantaneous changes in their consumption, there is still much potential for improvement.

3. Proposal

iv. Overview

Lately, much emphasis has been given to types of real-time/direct feedback provided by stand-alone devices or metering communication systems (EPRI, 2009). The developed improvement proposal to EDP InovCity's project in this report also follows this trend.

This improvement involves an interface between the energy box and a television, by means of a set-top box. This is, the set-top box would wirelessly receive encoded info from the energy box, proceed to its decoding and afterwards, through a wired connection with the television (i.e. HDMI or scart cable), it would display the information on the television's screen (see Figure 8). To prevent feedback clustering, the information would be displayed in different parts or "pages". Through the remote control, the consumer is able to move to the next or previous "page", in order to make the consultation of information easier.

v. Advantages, disadvantages and contribution

Many argue that the Internet will surpass the television, nonetheless, some of the latest technology improvements disprove so. The emergence of services/products like digital and fiber-optic broadband television, or smart platforms like Google TV, suggest otherwise.

Hence, this interface would bring several advantages to consumers, such as: quickness and convenience in accessing the service; providing a low complexity/difficulty degree in accessing the provided feedback, since consumers would only have to turn on the television and look at the displayed information in the screen, not having to accede any menus, do any login, etc.; a better visualization and comprehension of the feedback, since the television possesses a significantly bigger screen than the energy box, allowing for better displaying of information, like advice messages; displaying information that can only be accessed in display units (i.e. consumption graphs) like computers or tablets; and allowing those who do not own any display units other than television, the reception of a direct feedback type. This latter would actually be a major potential benefit to EDP, since it would be able to reach those costumers that do not have Internet at their homes and/or do not afford or are not interested in buying other display units, such as a tablet. Furthermore, the television is a good that the majority of the population possesses and, in general, people are familiarized with its use.

Figure 9 comprehends a set of images making an allusive example of how EDP's feedback would be displayed in the television screen, using the proposed interface. It is important that the information seen is clear and relevant. Information concerning current and aggregate consumption, the hired power plan, text advices and consumption's graphical representation over a given period of time (daily, weekly, monthly, etc.), are among the most relevant.

Nevertheless, there are potential disadvantages associated with this proposal. The main shortcomings are: potential high costs in providing a similar service in a wider (i.e. national) scale; the installation of an additional product in households, since many already have near to televisions, DVD players, sound systems, a digital broadband television box, etc.; and resistance from the population, especially from the elderly, who sometimes tend to evidence a mentality of resistance to change.

It is important to mention though, that this proposed interface with the television is not intended to replace the access to feedback via Internet or to replace, for instance, the tablets being tested by EDP. This interface would be a complement to the already established service, allowing the people who for any reason do not have access to Internet or tablets, to enjoy the same service of those who have it.

Considering the categorization of feedback shown in Figure 1, the proposed improvement would provide consumers with the fifth type of feedback, this is, real-time feedback.

vi. Analysis of a conducted inquiry and segmentation

The proposal's target and segmentation are still uncertain, so determining the segments to which the product is intended would be a great help to determine its potential viability. In this sense, an online questionnaire was developed to assess the population's openness to the idea and service (see Figure 10). Below, the details and main results of this questionnaire are discussed.

The questionnaire aimed for those persons that are account holders of electricity and that have a hired power plan equal or greater than 5,75 kVA. According to these two criteria, a convenience sample of one hundred and two persons was collected. Though, due to a restrain of the online survey platform (www.surveymonkey.com), only one hundred answers were recorded in the database. The results from this inquiry should be perceived as a pilot study. In a future stage, a randomly selected sample from the population of interest should be inquired.

The first question addressed the already mentioned core problem of these days. By not having real-time access to their electricity consumption, most people do not know exactly how much they are spending. Hence, when confronted with the possibility of having this service, from all respondents, 98% answered favorably and from this overall percentage, 76% expressed a great interest in possessing the service.

The second question was related to the proposed improvement, and a 73,2% responded they would be interested in having such service available in their televisions screen. In the third question, the respondents were asked how frequently they would access the service. Results showed that 13,3% would do it on a daily basis, 37,8% on a weekly basis, 46,9% without a predefined frequency and only 2% would have no interest in accessing it.

The fourth question aimed to understand which information consumers valued the most. Consumers could select more than one choice and in this matter, having access to consumption graphs ranked first in terms of preference with a total percentage of 66,3%. The possibility of having comparisons between consumptions retrieved a result of 52% and the possibility of having personal messaging/advising from EDP, 26,5%. Only 2% would have no interest in having the above-mentioned information.

The three remaining questions, concerned the respondents' receptiveness to the possibility of having potential financial burden with the proposed service, if they would subscribe it. This potential spending is exclusively related to the acquisition of the set-top box, since the service itself is free of charge. First, the respondents were confronted with their willingness to pay a monthly fee to have the service at home. As mentioned before, the service is free. Nonetheless the set-top box has an acquisition cost. Hence, this monthly fee would be a kind of monthly rent for the set-top box, assuming EDP would provide it on a renting basis. In this setting, most respondents showed no will to pay a monthly fee, accounting for 49% of total answers. Still, 38,8% answered they would be willing to pay between 1 and 3 euros, 11,2% between 3 and 6 euros and 1% between 6 and 10 euros.

In the sixth question an alternative payment method was surveyed. This concerned an initial one-time payment for the set-top box, instead of a monthly charge. Though 31,6% would still not pay to have this service, 39,8% considered paying up to 10 euros as a reasonable. Also, 11,2% would be willing to pay up to 15 euros, 13,3% up to 20 euros and 4,1% more than 20 euros (these last can be seen in question seven).

Considering segmentation, primarily, the project's main target would be both EDP residential subscribers and some small business owners possessing an electricity power plan from 5,75 kVA to 41,4 kVA, that is, EDP's segments 4D, 5D, 32D, 61D and 62D. These small business owners can be, for instance, coffee shop owners that seek to reduce or better manage their establishment's electricity spending.

These consumers with a power plan ranging between a power of 5,75 kVA and 41,4 kVA were selected, because these are the ones that show a higher potential for reduction in consumption. It would make no sense to target those consumers with power plans below 5,75 kVA, since these already present fairly low electricity spending, hence not possessing a relevant potential for reduction in consumption. Neither would it make sense to target those with power plans higher than 41,4 kVA, since these are mainly consumers or entities from sectors or businesses that require the high spending of electricity they usually spend (factories; offices; restaurants; etc).

Also, it is important to determine how the set-top boxes would be made available to the consumers. A regular set-top box can range between 45 to 270 euros[2]. Still, many consumers would not be willing to spend more than 10 euros, as the survey showed.

In the next section, some general comments considering the product's implementation and operationalization are made.

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[2] These values were defined in accordance to online research, mainly in the website http://www.dinodirect.com

4. Conclusion

In the sense of preserving energy and achieving energetic efficiency, many efforts are being made, in a global scale. More and more, interventions involving smart metering are taking place, testing new and innovative services and products, as a way of coping with the advancements of technology and peoples' needs. The success of these interventions has been highly related and dependent on the feedback transmission mechanisms used and the kind of feedback itself. Besides allowing for a better control and management of the household's expenditure, it helps shaping and changing consumers behaviors to become more sustainable.

Considering the proposed interface between the smart meter and the television, it is still uncertain whether people would positively respond to the possibility of possessing such service. There is hence a great need of sensitizing people to the interventions' main purposes so that they become more receptive and willing to engage on these. In order to clearly understand the goals and importance of such projects, people need to be accompanied during the processes and instructed to know how to operate with the technologies being tested. If not acquainted with the processes or methods, consumers will not understand the potential gains associated to it, leading them to easily demotivate and withdraw from the process. Also, in future experiments, trial periods should be implemented so that the consumers can actually have the "real experience". This is, by having free experiences before purchasing or subscribing any service/product, consumers can observe the effects on consumption and so, probably become much more willing to spend part of their income in smart metering related products and services.

The current proposed interface's structure allows consumers to receive a real-time feedback type (type 5). Nevertheless, future improvements can be made and additional features can be added. If the improvement is successful, in a mature phase and with further research, local control can be developed (type 6). This is, developing a way of allowing consumers to see in their television screen the consumption per appliance. Still, in the end, two questions remain to be answered. Will consumers subscribe the service if that implies any kind of payment (monthly fee or initial payment)? In case yes, should EDP rent the set-top box to the consumer, provide it free of charge or should the consumer buy it on its own?

Hence, it is concluded that the optimal way for EDP to provide consumers with the equipment is still uncertain. Further market research and strategy analysis have to be developed to help assessing it.

Many past studies involving smart metering have already showed evidence of the great potential for reduction in electricity consumption. The challenge for the future will be more and more developing initiatives, services and equipment that, not only allow to make considerable energy savings, but also are able to provide consumers with the right type of feedback and relevant information, as well as delivering this feedback in a comfortable and practical manner.

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6. Figures

Figure 1 – EPRI's Feedback Delivery Mechanism Spectrum

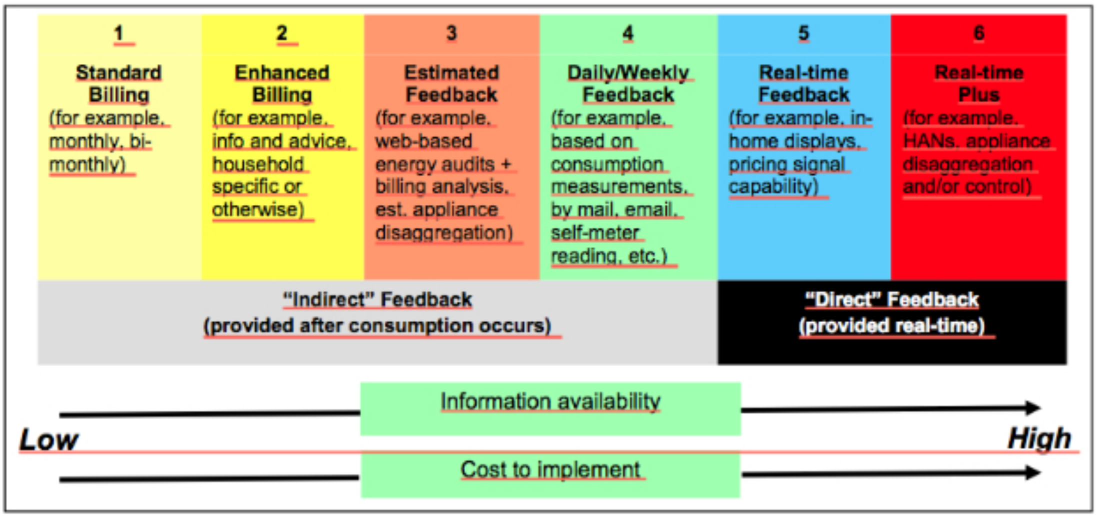

Figure 2 – Feedback Process (van Raaij and Verhallen)

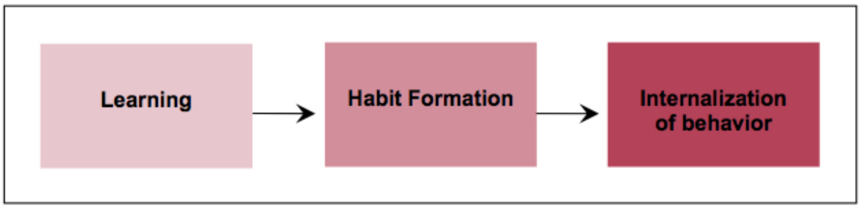

Figure 3 – InovCity's project segmentation (with sample sizes per segment)

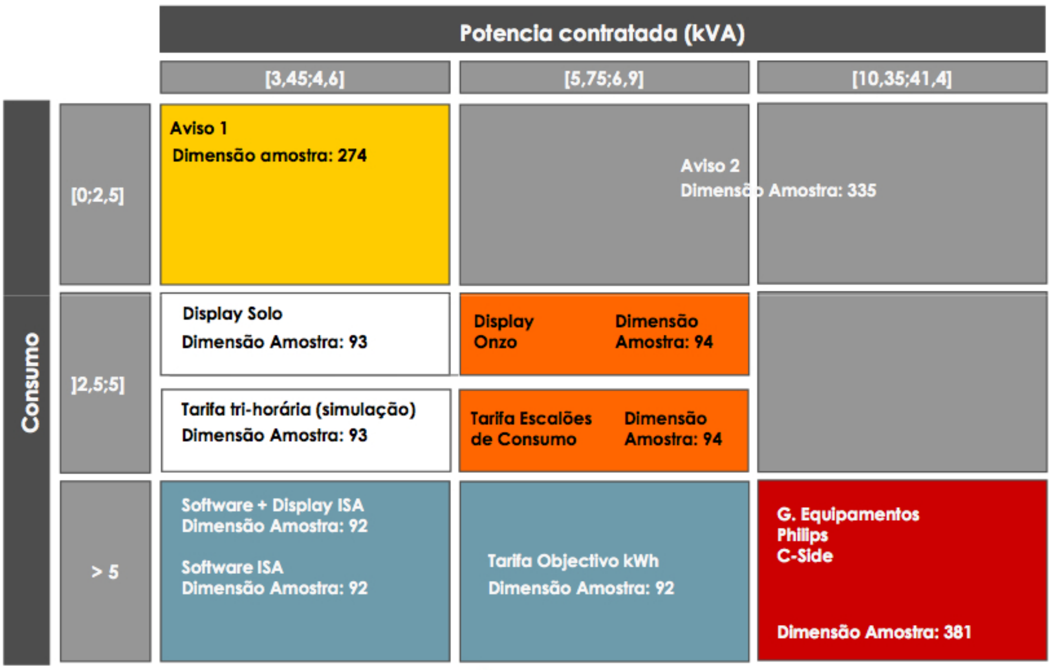

Figure 4 – Images of an Energy Box (the smart meter tested in InovCity)

Figure 5 – InovCity's project segmentation (with equipment per segment)

	3,45-4,6 (kVA Potencia)	5,75-6,9 (kVA Potencia)	10,35-41,4 (kVA Potencia)
0-2500 (kwh Consumo)	AVISO 1 (183) – 9,0% 1D	AVISO 2 (222) – 9,0%	5D
2500-5000 (kwh Consumo)	DISPLAY GEO (85) – 4,0% DISPLAY ONZO (43) – 5,7% TARIFA TRI-HORÁRIA (85) – 4,0% 2D	DISPLAY ONZO (48) – 5,5% SOFTWARE ISA (87) – 4,0% TARIFA ESCALÕES CONSUMO (87) – 4,0% 4D	
5000+ (kwh Consumo)	SOFTWARE ISA (75) -8,5% TARIFA TRI-HORÁRIA (75) -8,5% 31D	SOFTWARE + DISPLAY ISA (100) -6,7% PHILIPS+C-SIDE (100)-6,7% TARIFA OBJECTIVO KWH (100) -6,7% 32D	PHILIPS+C-SIDE (86) -4,0% <= 10000 Kwh 61D PHILIPS +C-SIDE (136) -9,0% > 10000 Kwh 62D

Figure 6 – Direct feedback-providing equipment provided by InovCity experiment

(Above, from left to right: Onzo display, Phillips C-Side tablet and Geo display; below: ISA software using an Archos tablet and an Archos tablet)

Figure 7 – InovCity's project tested equipment features (current experience)

Equipment:	*Main Features:*
Onzo display	Current consumption information Aggregate consumption information CO_2 emissions information
Geo display	Current consumption information Aggregate consumption information Possibility of setting consumption targets
Phillips C-Side	Current consumption information Aggregate consumption information Graphical representation of consumptions "Special plugs[3]" remote control

[3] Plugs that, when connected to appliances, can be remotely controlled to switch on/off, or programmed to automatically do so according to a pre-determined schedule

Figure 8 – Image representing the proposed interface between the energy box and the television

Figure 9 – Image representing an example of how EDP's provided feedback would be displayed in the television screen and seen by the consumer

Figure 10 – Online questionnaire related to the proposed interface between the smart meter (energy box) and the television

1. 1) Estaria interessado em poder ter acesso, em tempo real, aos gastos energéticos da sua habitação, quer em unidades energéticas (watts), quer em unidades monetárias (€)? (Se responder Não a esta questão, o questionário terminará aqui) Criar gráfico Baixar

	% de respostas	Contagem de resp.
Sim, bastante	76,0%	76
Moderadamente interessado	22,0%	22
Não	2,0%	2
	questão respondida	100
	questão ignorada	0

2. Seria do seu interesse ter acesso a este serviço no ecrã da sua televisão? Criar gráfico Baixar

	% de respostas	Contagem de resp.
Sim	73,2%	71
Não	26,8%	26
	questão respondida	97
	questão ignorada	3

3. Se possuísse este serviço, consultá-lo-ia com regularidade? Criar gráfico Baixar

	% de respostas	Contagem de resp.
Sim, diariamente	13,3%	13
Sim, semanalmente	37,8%	37
Sim, mas com uma frequência indefinida	46,9%	46
Não	2,0%	2
	questão respondida	98
	questão ignorada	2

4. Para além de informação relacionada com consumos instantâneos, estaria interessado em ter acesso a gráficos ilustrativos do seu consumo energético ao longo de um determinado período de tempo (diário, semanal, mensal, etc), comparações entre consumos efectuados, e mensagens e aconselhamento personalizados por parte da EDP? Criar gráfico Baixar

	% de respostas	Contagem de resp.
Sim, estaria interessado em poder visualizar gráficos ilustrativos do seu consumo energético ao longo de um determinado período de tempo (diário, semanal, mensal, etc)	66,3%	65
Sim, estaria interessado em poder visualizar comparações entre consumos efectuados	52,0%	51
Sim, estaria interessado em receber mensagens e aconselhamento personalizados por parte da EDP	26,5%	26
Não estaria interessado em receber qualquer um destes	2,0%	2
	questão respondida	98
	questão ignorada	2

5. Estudos passados relacionados com este método revelam diminuições de consumo entre 5% e 20%. Se este serviço fosse pago, quanto estaria disposto a pagar mensalmente para usufruir do mesmo? Criar gráfico Baixar

	% de respostas	Contagem de resp.
Entre 1 e 3 euros	38,8%	38
Entre 3 e 6 euros	11,2%	11
Entre 6 e 10 euros	1,0%	1
Mais de 10 euros	0,0%	0
Não estaria disposto a pagar para usufruir deste serviço	49,0%	48
	questão respondida	98
	questão ignorada	2

6. Consideraria fazer um investimento inicial no equipamento que possibilita a transmissão da informação dos seus consumos para o ecrã da televisão, se posteriormente não tivesse qualquer custo adicional com o serviço? Até quanto estaria disposto a dispender? Criar gráfico Baixar

	% de respostas	Contagem de resp.
a. Até 10 euros	39,8%	39
b. Até 15 euros	11,2%	11
c. Até 20 euros	13,3%	13
d. Mais de 20 euros	4,1%	4
e. Mais de 40 euros	0,0%	0
f. Não estaria disposto a fazer um investimento inicial	31,6%	31
	questão respondida	98
	questão ignorada	2

7. Se na resposta anterior respondeu d) ou e), por favor quantifique o valor. Baixar

	Contagem de resp.
Ocultar respostas	4

Respostas (4) | Análise de texto | Minhas categorias (0)

RECURSO GOLD: A Text Analysis permite visualizar as palavras e expressões frequentemente usadas, categorizar as respostas e transformar o texto em aberto em dados factíveis de uso. Para usar a Text Analysis, atualize para um plano GOLD ou PLATINUM. Saiba mais | Atualizar »

Exibindo 4respostas de texto — Nenhuma resposta selecionada

30
8-12-2011 20:27 Exibir respostas

30 euros
8-12-2011 19:25 Exibir respostas

Até 30€.
8-12-2011 7:09 Exibir respostas

25 euros
7-12-2011 21:43 Exibir respostas

questão respondida	4
questão ignorada	96