DELIVERABLE 1.5
Societal impact report – Final Report

RISA
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D1.5: Societal impact report – Final Report

Summary

This document presents all the social, gender and ethical issues that were encountered during the project's lifetime, as well as the actions that were taken by the consortium partners so to handle these issues effectively.

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List of Acronyms and Abbreviations

DMP: Data Management Plan

DPO: Data Protection Officer

GDPR: General Data Protection Regulation

PU: Public

WP: Work Package

Executive summary

This deliverable presents the social, gender and ethical issues that have been encountered during the project's lifetime, as well as the actions that were taken by the consortium partners to address them in an effective manner.

Eco-Bot's main objective is to engage consumers in energy efficiency behaviours, which is a key factor in the endeavour of tackling climate change. In order for Eco-Bot to achieve its objectives, social issues that could have an effect on the intended behaviour change were examined, so as to find proper ways of addressing them and maximise the potential of Eco-Bot. To this end, the examined social issues involved, among others, how to make Eco-Bot relevant and beneficial to different groups of people with different needs and expectations and how to tackle the common misperceptions of energy consumptions and savings as well as the rebound effect issue that could hinder the achievement of energy savings. A predominant social issue that unavoidably affected Eco-Bot on many levels, was the outburst of the Covid-19 pandemic. The deliverable discusses the actions that were taken in light of all relevant social issues.

Based on our research findings, it was concluded that gender is not relevant, i.e. it is not a parameter that affects the approach, the behavioural model or the type and content of recommendations that would fit to a particular segment. Other demographics, such as income, education, number and age of persons in the household, were found to be more relevant to the behavioural model.

Ethical issues related to the project were successfully addressed due to the precautions taken by the consortium partners so as to ensure compliance with the GDPR and ethical principles.

1. Introduction

This deliverable presents all the social, gender and ethical issues that were encountered during the execution of the project, as well as the actions that were taken by the consortium partners so to handle these issues effectively.

The deliverable is structured as follows:

Section 2 discusses the social issues of the project and the ways these issues were addressed.

Section 3 refers to the gender issues of the project.

Section 4 describes the ethical issues and the measures that were taken to address them.

Section 5 summarises the conclusions.

2. Social issues

Climate change is a major social issue that affects the entire world and causes a wide range of impacts, making it one of the most important and pressing issues faced nowadays. The urgent need to tackle climate change emphasises the importance of finding effective and affordable ways to turn to sustainable energy solutions; engagement of consumers towards more energy efficient behaviour is a key factor in this endeavour. While much progress has been made on the science and the types of policies needed to support a transition to low carbon, climate resilient development, a challenge that many countries are facing is to engage citizens. It is critical that people are brought along in the decision-making process; this requires access to information and citizen engagement on climate risk and green growth in order to overcome behavioural inertia to decarbonisation [1].

The main objective of Eco-Bot is to engage consumers in energy efficiency behaviours. Earlier research [2] has shown that energy efficiency is not salient for many consumers; although it is a concern in the form of an energy bill, it is not top of mind for most people. Besides reducing cost, in many cases there is no strong imperative to become more energy efficient and it has not been seen generally as an important social goal. Therefore, one of the main challenges is *how to engage consumers with energy efficiency in a way that is relevant for their lives, making it more likely that they take up energy efficiency measures*.

Many studies in the literature have shown that there are systematic misperceptions of energy use, i.e. people are usually not aware of how much energy they use for different activities in the home. Moreover, *those with more accurate perceptions of energy use and savings may be able to better identify the actions that can save the most energy*, as a first potential step towards behaviour change and reduced CO_2 emissions. Providing consumers with better information about their energy use and potential savings brings the promise of promoting the implementation of more energy efficiency strategies and reducing consumers' environmental footprint [3]-[8].

When it comes to behaviour change initiatives, it is crucial to their success to take into account different factors that could possibly trigger and facilitate the desired behaviour change, along with factors that could hinder the goal, mitigating the latter as much as possible. Given that Eco-Bot aims to encourage behaviour change towards energy efficient practices, a number of issues as the above mentioned were taken into account in its design and implementation, so as for Eco-Bot to achieve its objectives. These issues and challenges, as well as the way they have been addressed, are described below:

A) Engage consumers with energy efficiency in a way that is relevant for their lives, making it more likely that they take up energy efficiency measures

People with different needs, concerns and interests need different incentives to get them interested and motivated to turn to energy efficiency behaviours. To this end, the Eco-Bot approach involved the design of optimal personalised engagement strategies based on market segmentation along consumer needs and taxonomies of the energy efficiency models. The developed engagement strategies for Eco-Bot users were based on the results of extensive research, taking into account various target groups of energy consumers.

The engagement strategies of the energy consumers and users of Eco-Bot were divided into five behavioural segments, taking into account their attributes characterising affiliation to the developed segmentation:

a) Ecological Idealist;
b) Aspiring Ecologist;
c) Dedicated Saver;
d) Opportunist; and
e) Indifferent.

For each segment, the main goals were identified and a set of recommendations was prepared, tailored to the characteristics of consumers belonging to it. All recommendations in engagement strategies were prepared by taking into account factors identified based on literature review and/or obtained as a result of conducted surveys, with the most important being the behavioural segmentation; the assumptions regarding energy behaviours of end-users (based on the TRIANDIS model) enabled the identification of the above mentioned five major segments, which explain the underlying motivation of the end-users to take action. This segmentation – with the additional data characterising individual segments – was then chosen as the basic determinant in the formulation of the recommendations, as referring to the underlying motivation of the end-user should bring better results in changing their energy behaviours.

Moreover, in order to make the recommendations even more relevant to the end-users, the behavioural model that enables the allocation of each end-user to a specific segment based on his/her behaviour and motives, is also combined with additional factors such as the user's income and type of residency (tenant, owner), thus enhancing personalisation and allowing tailored advice and recommendations towards energy efficient behaviour and investments.

In addition, recommendations are also customised per pilot, in order to take also into account the country's characteristics and thus further increase their relevance.

B) Misperception of energy consumption and savings is a barrier to improving energy savings by consumers

As Lesic et al. [9] pinpoint, strategies aiming to reduce residential energy consumption, including behavioural programs that encourage efficient energy use, which rely on building owners and end-users making informed investment and operational decisions, may be ineffective if individuals are unaware of how much electricity is consumed by different devices in their homes and buildings. As mentioned above, consumers with more accurate perceptions of energy use and savings may be able to better identify and engage with energy saving actions, and this kind of awareness and realisation could pave the way for behaviour change towards more energy efficient lifestyles and sustainable choices.

To this end, Eco-Bot provides consumers with detailed information about their energy use and potential savings. More specifically, Eco-Bot offers, among others, the following features:

- Provides information on the energy consumption (both total and on appliance level), its cost and its conversion to environmental units.
- Enables the end-user to compare the energy consumption, both total and appliance-specific, in two different periods and responds to questions about energy/cost savings after an energy saving event as well as about high/low consumption days and hours.
- Provides guidance on selecting appliances and informs the end-user about the cost savings of a new appliance and its payoff time.
- Enables the end-user to set energy efficiency goals and monitor his/her progress in achieving them, as well as to define the type and frequency of the notifications and alerts he/she receives.
- Sends to the end-user notifications about appliances consumption, high/low consumption days, changes in consumption after an energy saving event, progress in goals and behaviour change, as well as alerts on high consumption and rebound effect.

As shown above, Eco-Bot provides consumers with rich and detailed information about their consumption, thus keeping them aware of how much energy they consume, not only in total, but also on an appliance level. Furthermore, end-users are enabled to make consumption comparisons for different periods, which also helps them realise how and when they consume the most energy and identify ways to achieve energy savings. This is further supported by giving users the option to investigate potential savings that could be achieved by replacing energy-consuming appliances with more energy efficient ones, as well as to compare their consumption before and after specific energy efficiency improvements. Moreover, overconsumption alerts and other notifications help in keeping consumers aware and alerted of their consumption and further facilitate them in realising how their behaviour and habits affect their energy use and in exploring opportunities for improvement.

Consumers are also motivated towards behaviour change by being given the option to set their own energy saving goals in terms of consumption, cost, and environmental impact, and monitor their progress against these goals; Eco-Bot reminds users of these goals on a frequent basis, informs them about their progress and encourages them to continue their effort. Moreover, behaviour change towards energy efficient practices and lifestyles is further supported through personalised recommendations and tailored information, as discussed above.

Another issue that is to some extend related to the misperception of energy consumption and savings that could be a barrier to improving energy savings, is the rebound effect phenomenon. This issue, and the way it was handled in the project, are discussed below.

C) Rebound effect risk

The rebound effect phenomenon, which involves the negation of achieved energy savings through increased energy usage, is a complicated and multi-layered issue. There are direct rebound effects, involving increased demand for an energy service following an improvement in the efficiency of that energy service (e.g. substitution of an appliance with a more energy efficient one leading to increased usage of the new appliance) and indirect rebound effects, referring to the effect of an energy efficiency increase on the demand for all other goods and services, and the subsequent change in energy consumption (e.g. spend monetary savings on other energy-intensive goods and services, like purchase of an extra appliance) [10][11].

Although dealing with the rebound effect issue is not included in the primary objectives and challenges that Eco-Bot is focused upon, it remains an important issue that needs to be tackled.

In the context of Eco-Bot, the rebound effect issue is twofold: not only could it reduce or even negate the gains achieved from energy efficiency investments, but could also put the whole behaviour change endeavour at risk; consumers might get discouraged and disengaged from energy saving practices and improvements if they noticed an increase in consumption instead of an anticipated reduction after an energy efficiency investment, as in that case they would probably deem that their investment has not paid them off and that their effort is futile.

In order to address this issue, Eco-Bot makes users aware of the rebound effect phenomenon and its implications and gives information on how to avoid it, i.e. to act preventatively. More specifically, a mechanism has been put in place so that, when a user registers the purchase of a new appliance, Eco-Bot informs him/her about the risk of the occurrence of a rebound effect and gives recommendations on how to avoid it. Informative messages and reminders about the rebound effect risk are also sent to the user in the months following the purchase of a new appliance. Furthermore, the system supports tackling the rebound effect not only by keeping consumers alerted of this risk through reminders sent after energy saving investments, but also through energy consumption notifications and consumption comparison reports.

D) Improve awareness of the potential impacts of energy efficiency and develop understanding of the economic and social benefits and ways in which these can be achieved

Eco-Bot improves awareness of the potential impacts of energy efficiency through tailored advice and personalised information in this regard. Furthermore, awareness is further improved by keeping users informed and alerted about their consumption, its cost, and its environmental impact, as well as by providing information on savings achieved through energy efficiency improvements, thus helping them realise the economic and social benefits of behaviour change towards energy efficiency.

Additionally, the consortium has been working towards this direction by raising awareness of energy efficiency impacts through the dissemination and communication activities that have been performed, addressing different stakeholder groups with tailored key messages, aiming to highlight the benefits obtained by the adoption of energy efficiency practices. Raising awareness on the economic and social benefits of energy efficiency has also been supported through our liaison activities with other relevant projects (national, European, and international), governmental and non-governmental organisations, industry, EU and international organisations, and other relevant stakeholder groups, by addressing topics of energy efficiency, consumer behaviour, and sustainability.

Furthermore, consortium partners, in the context of promoting the Eco-Bot project, put effort on making social groups interested in energy efficiency issues and inform them of ways to achieve energy savings, highlighting the benefits of such actions. Academic and other partners inform students about the project and its objectives and, based on the feedback received, the students are paying more attention to environmental issues and the level of knowledge and awareness on topics related to sustainable development is increased. Moreover, business partners promote the project to their customers and draw attention to the potential benefits that can be achieved by adopting energy efficiency approaches and by introducing effective energy management tools in their companies or by offering such solutions to their customers.

Moreover, Eco-Bot can serve as a practical example that local and European authorities could use in designing ecological social campaigns or promoting sustainable energy use. Through practical examples, the message to societies becomes more expressive and easily digestible, hence better results can be achieved.

E) Covid-19 pandemic

The Covid-19 pandemic has had an enormous impact on the lives, work patterns and daily activities of people all around the world. Consequently, the pandemic has unavoidably affected Eco-Bot's demonstration and validation phase, taking into account that during this period not only do people spend much more time at home and even work from home, but also their priorities and concerns have changed. Staying at home and remotely working apparently also has an impact in the energy consumption, and not only makes it difficult to achieve energy savings, but it can also lead to increased consumption.

Various mitigation actions took place in an effort to keep Eco-Bot relevant to the users, even during this extremely difficult and disorienting situation.

First of all, the recommendations given to the users were enriched with new ones, adapted to the situation caused by the pandemic. The approach that was followed, took into account that unusual and unpredictable events, such as the Covid-19 pandemic, can have a significant effect on the behaviours, including energy-related ones, of large groups of people.

Although it is difficult to predict and expect homogeneous behaviours and thus provide unified recommendations, the new recommendations were prepared taking into account the typical and most common guidelines related to reducing the risk of exposure, such as social distancing, avoidance of crowded places and staying at home. The recommendations were prepared on the assumption that some people will switch to remote work, if the nature of their job allows it, as well as that learning at various levels will take place using e-learning platforms and remote communication tools. Apparently, such cases would not apply to everyone, however if at least one person from a given household, instead of spending eight hours at work, school or university, spends this time at home, then the energy consumption of the household is very likely to increase.

On the other hand, working from home, unless of course there is a rigid framework that needs to be followed, allows for greater flexibility and the possibility of better planning of other activities related to the general functioning of the home, such as working or scheduling the housekeeping activities in lower tariff hours. That is, however difficult and demanding it is to operate during the pandemic, it may be both a threat to good practices and the already developed and implemented actions related to increasing energy-saving behaviours, but also a chance to develop new ones. It should be noted that given that external and user-independent circumstances caused by Covid-19 pandemic force a behavioural change, which may be associated with a sense of loss of control and increase the discomfort and general level of stress, focusing on energy behaviours may allow them to regain the feeling of having a certain degree of control over the situation. The new recommendations were prepared taking this into account as well, aiming to inspire users to develop new, beneficial habits and make the most of this difficult situation.

Apparently, besides the necessary adjustments that had to be made as regards the recommendations given by Eco-Bot so that it can remain relevant to the user during the pandemic, Covid-19 had an impact on other aspects of the project as well, including recruitment, user engagement, pilot testing, and dissemination activities.

As far as the recruitment is concerned, given that many persons that had initially expressed interest in participating, changed their opinion as their plans and priorities changed after the outburst of Covid-19, the pilot partners continued recruitment activities throughout the pilot period, enriching their strategies also with alternative, more personalised ways of recruiting users.

User engagement was also unavoidably affected by the pandemic; in order to mitigate the risk of low user engagement involving both infrequent use of Eco-Bot and pilot dropouts, besides adapting Eco-Bot's recommendations so that it remains relevant to the user as discussed above, pilot partners put effort on keeping users engaged by providing incentives,

sending them newsletters and organising demo sessions to highlight the system's advantages and motivate users to use it regularly. More information on the mitigation actions performed regarding the recruitment and engagement challenges is given in D5.1 as well as in D5.2-D5.4, which describe the actions taken by the pilot partners.

As far as the pilot testing is concerned, which was affected by the low recruitment and user engagement, in order to perform a credible evaluation of the different parameters involved, we used the following approach:

- For the evaluation of system parameters that are related to behaviour change and therefore require an adequate level of engagement and regular use of the system – as, obviously, unless someone interacts with the system regularly, it would be pointless and unreasonable to evaluate Eco-Bot's potential impact on the user's energy-related behaviour – we considered only those users that used the chatbot regularly and participated in the pilot for an adequate period (e.g. persons that were recruited in the last couple of months before the pilot's end, were excluded from this analysis).

- For other parameters, for which the regular use of the system for an extended period is not a prerequisite for their evaluation, e.g. in the case of chatbot metrics, all participants were included in the monitoring / evaluation group, with only one exception: in the case of the retention rate evaluation, and given that cohort analysis was performed in order to evaluate how many users returned to the chatbot on a monthly basis, taking into account when they started using it, users that were recruited in the last month of the pilot were excluded from the evaluation group, as there were no available data for them for the month after.

- As far as the behavioural model is concerned, in order to ensure a valid and trustworthy evaluation, a large number of participants was required; given that the achieved recruitment numbers would not be adequate for the specific analysis, UEKAT conducted an additional external survey with a high number of respondents, thus ensuring a trustworthy evaluation of the behavioural model.

More information on Covid-19 related issues that affected the pilot testing and the ways they were addressed can be found in D5.5.

As regards the dissemination activities, the plans for participation in exhibitions and other important events were not fulfilled, as most of these events were cancelled or moved to another date in the future. However, this situation urged us to focus even more on liaison activities and the organisation of online Eco-Bot workshops with different groups of stakeholders. These activities are discussed in D6.11 and D7.3.

3. Gender Issues

Based on the extensive research that took place in order to design and implement the behavioural model forming the basis for the personalised advice given to the users of Eco-Bot, it was concluded that gender is not relevant, i.e. it is not a parameter that affects the approach, the model or the type and content of recommendations that would fit to a particular segment. This means that our research showed that gender does not belong to the factors that need to be taken into account in the behavioural model, as well as that no adaptation of the recommendations or even of the general approach would be needed depending on the gender of the participants.

In fact, a question about the participant's gender was included in the preliminary survey on consumer activities and behaviours affecting sustainable energy consumption that was carried out by UEKAT, however, based on the findings of that survey, the gender question was not included in the behavioural surveys that followed. Other demographics, such as income, education, number and age of persons in the household, were found to be more relevant to the behavioural model.

As far as the project consortium is concerned, a mindful effort was made to achieve equality between men and women. In fact, Eco-Bot counts a high participation of women – more than 70% of the key personnel involved in the various project tasks. Female participants are also in leading roles in the management structure.

There have been no gender or equal opportunity issues raised by the Eco-Bot consortium during the project's execution. Principle equal rights have been respected during the project for all legal entities and physical persons irrespective of sex, age, race, gender, handicap and nationality.

4. Ethical Issues

The ethical issues of the project were addressed by taking all measures and actions required so as to ensure compliance with the General Data Protection Regulation (GDPR) that came into effect in May 2018, as was also presented in the thoroughly revised D1.3: Data Management Plan (DMP).

More specifically, the ethical issues that were relevant to the project, as well as the way they were addressed, are described below:

A) Principles relating to processing of personal data

Article 5 of the GDPR defines the main principles relating to processing of personal data as follows:

- lawfulness, fairness and transparency
- purpose limitation

- data minimisation
- accuracy
- storage limitation
- integrity and confidentiality
- accountability

In compliance with the above GDPR principles, personal data were processed in a lawful, fair and transparent manner in relation to the involved subjects. Data subjects received detailed information in an easy to understand way regarding their personal data that would be processed, the purposes of this processing, and the envisaged period for which they will be stored.

Moreover, personal data were collected only for specified, explicit and legitimate purposes, i.e. research and statistical, and will not be processed further in a way incompatible with those purposes.

In accordance with the 'data minimisation' principle, collected personal data were adequate, relevant and limited only to what was necessary in relation to the purposes for which they have been processed, as was described in Section 2 of the Data Management Plan.

As mentioned in the relevant datasets description in the DMP, personal data that were collected by the system were only limited to the locale, which was used for system configuration, and the energy consumption data. The system performed data validity check of the energy consumption data received from the pilots so as to ensure accuracy of the data, and in case any data were found to be inaccurate, they were deleted or rectified without delay.

Personal data collected by the system are stored and preserved in the designated repositories only for as long as they are needed in order to be used solely for the Eco-Bot research purposes, and in any case they will not be kept for more than two years after the project's completion.

Personal data that the system collected from the pilots had already been anonymised at the pilots before being made available to the system, and the only information associating the personal data to the user was his/her UID, which could be linked to the user's real identity only in the pilots' backends. Moreover, personal data that the system received directly from the participants through their responses in the behavioural and appliance surveys and in the time diary, were also linked to them only through their UID, and in order to protect privacy and confidentiality, these data have not been shared with the pilots. Additionally, in compliance with the principle of integrity and confidentiality, the system follows a strict privacy and security policy, which has been described in Section 5 of the DMP, and proper security measures have been used to ensure protection against unauthorised or unlawful processing and against accidental loss or damage.

Furthermore, RISA's Data Protection Officer (DPO), Mrs. Katerina Papasileka, was appointed by the consortium partners to oversee the data management strategy and

implementation, and her responsibility has been to ensure compliance with the GDPR and with the ethical principles of the Grant Agreement.

B) Lawfulness of processing

In accordance with Article 6 of the GDPR regarding the lawfulness of processing, data subjects were asked to give consent to the processing of their personal data for the purposes that were clearly explained to them.

C) Conditions for consent

Article 7 of the GDPR defines the conditions for consent and states that the data subject has the right to withdraw his/her consent at any time, and that this should be as easy as to give consent. Eco-Bot participants were informed before giving their consent about their right to opt out at any time and information about how they could revoke their consent was also written in the consent form.

D) Transparent information, communication and modalities for the exercise of the rights of the data subject

In compliance with Article 12 of the GDPR, participants were provided with all necessary information relating to their personal data that would be processed in a concise, transparent, intelligible and easily accessible form, using clear and plain language. The information was provided in writing and by electronic means. When requested by the participant, the information could also be provided orally, provided that the identity of the data subject would be proven by other means.

E) Rights of access by the data subject

Article 15 of the GDPR defines the right of access by the data subject. Eco-Bot participants were informed about their right to access their personal data that were processed.

F) Right to erasure ('right to be forgotten')

In compliance with Article 17 of the GDPR regarding the 'right to be forgotten', participants were informed about their right to obtain the erasure of their personal data without undue delay, and upon participants' request, the respective content was erased from the system within five working days.

G) Security of processing

Article 32 of the GDPR defines the requirements regarding security of processing of personal data, including among others pseudoanonymisation and encryption of personal data, confidentiality, integrity, availability and resilience of the system. The security policy that has been followed in Eco-Bot was outlined in Section 5 of the DMP. Moreover, as mentioned above, the personal data that the system collected from the pilots had already been anonymised at the pilots' ends before being made available to the system, and the only information associating the personal data to the user was his/her UID, which could be linked to the user's real identity only in the pilots' backends, where all personal data are encrypted.

All Eco-Bot participants signed an informed consent during the recruitment phase that described in detail the data that would be collected from them, the way these data would be handled, who would have access to them, for how long, and for which purposes. The consent form also informed them about their right to withdraw their consent and their right to be forgotten. By signing the informed consent form, participants were agreeing to authorise access to all of their collected data (raw, aggregated, anonymised) and to the usage of their anonymised and aggregated data for research and exploitation purposes.

Moreover, it is noteworthy to mention that, given the fact that the pilot partners finally decided not to connect Eco-Bot with social media and provide access to it only though their own websites, sensitive data such as social and everyday habits information regarding the users, were not be available to the system. All data regarding the users have been collected in a transparent way, in compliance with the GDPR and with the ethical principles of the Grant Agreement.

5. Conclusion

This deliverable discusses the social, gender and ethical issues that were encountered during the project's lifetime, as well as the actions that were taken by the consortium partners to address them and mitigate the relevant risks, so as to ensure the successful completion of the project and the achievement of its objectives.

A number of social issues were identified as relevant to the project, and they were taken into account in the design of the system, so as to maximise the potential impact of Eco-Bot to its users and effectively support awareness and behaviour change towards more energy efficient lifestyles and sustainable choices. A predominant and unexpected social issue that unavoidably affected Eco-Bot on many levels, was the outburst of the Covid-19 pandemic; various mitigation actions were taken by the consortium partners so as to overcome or at least reduce the impact of the pandemic on the different project aspects that were affected and to ensure a smooth running and completion of the project.

Gender issues were properly addressed in our research so as to be able to draw safe conclusions regarding their relevance, while precautions taken by the consortium partners to comply with the GDPR ensured that ethical issues were effectively addressed and that ethical principles were respected throughout the project's execution.

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