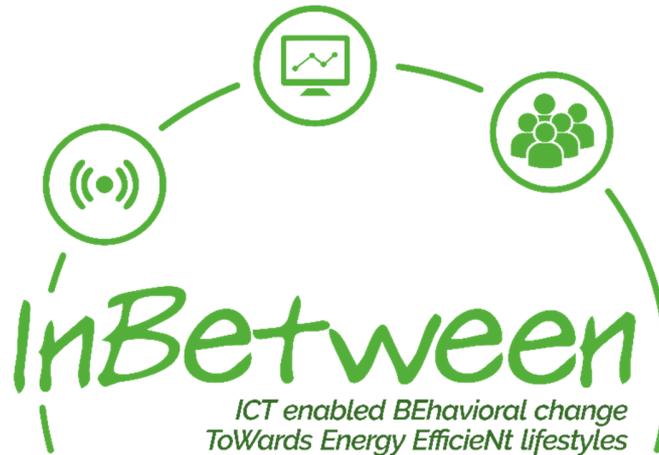




D3.3 PROTOCOL OF STRATEGIES FOR APPROACHING CONSUMERS

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DISCLAIMER

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EXECUTIVE SUMMARY

This report discusses strategies for approaching users in the stages of the platform development and calibration (first phase) and the stage of platform and app trialing (second stage). In the first stage users' collaboration is needed to help calibrate the platform. In the second stage users' collaboration is needed for evaluating and developing the various advice and services provided by the app.

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1 INTRODUCTION

Inducing behavioral change towards energy efficiency (EE) represents an unsolved societal challenge with potentially enormous environmental impact. But, why is it so difficult to induce a behavioral change towards EE? There are several factors:

- a)** relatively limited perceived benefits to Users associated with EE measures. In particular, low EE associated monetary benefits to the individual (an average energy bill already does not represent a significant portion of the home budget (~ 5%) and even less if we consider that only a share of it (maximum 20%) can be saved),
- b)** low capability to change energy demand patterns and energy use practices due to aspects related to lifestyle, habits, daily routines, work/family commitments, resulting in low levels of Users' demand flexibility,
- c)** lack of global conscience related to the impact of energy generation and use on the environment (pollution, Greenhouse Gas emissions), and the tendency to perceive the individual consumption as insignificant ("My individual consumption will not make the difference"),
- d)** the complexity of existing ICT platforms/tools (e.g. leveraging on gamification approach) which usually require intensive User engagement often interfering with the normal, everyday activities. Additionally, although there is an increased number of Home Automation platforms present in the market, they are typically focused on energy monitoring and supplying the User with information related to consumption and, in some cases (more advanced solutions) on providing control functionalities.

While proven to be effective to a certain extent, energy information technologies and apps still face significant adoption barriers that can be roughly summarized into three basic aspects: barriers for technology acceptance, barriers for technology use, and barriers for technology effectiveness. These barriers change significantly between the commercial, residential and industrial sectors. The InBetween project aims to reduce these barriers by engaging and consulting Users in the process of the platform development and initial deployment.

The InBetween project develops a machine-learning based platform that does not require complex or expensive equipment installation (beyond a smart energy meter) and that aims to provide easily accessible tailored information which is perceived by Users as relevant to them and with clear energy (and non-energy) added value.

The project sample of buildings includes:

- (1) 55 residential dwellings in VIL, out of which 33 have replied to the project initial survey. All of them have individual conventional electricity meters (no smart meters). Almost none are equipped with sensors before the project start. The project aims at providing sensors for most of them.
- (2) 8 residential dwellings and 6 non-residential buildings in SON, of which all are connected to smart meters and sensors.

From deployment site and Users' point of view the platform development includes a pre-deployment survey and two stages:

The pre-deployment survey included a detailed questionnaire that collected technical, personal and social information on each household and building. D 1.2 and D3.1 elaborate on the survey, hence this report does not elaborate further on the pre-deployment survey.

Stage I: Platform and app development and calibration. In this stage data is collected from Users but no advice or energy-related intervention is offered.

Stage II: Platform and app trialing (Beta phase). In this stage, based on stage I and the data collected in the survey, the effectiveness of and the interest in various tailored advice and services will be examined.



This report discusses strategies for approaching Users in the stage of the platform development and calibration (stage I). It also outlines initial guidelines for approaching consumers in the stage of app trialing (stage II). A more detailed guideline for the second stage will be developed when the capabilities of the platform and app will be clearly defined, including the advice it will offer Users.

2 STRATEGIES FOR APPROACHING USERS

2.1 FIRST STAGE

In the first stage of the InBetween project we are not approaching energy consumers as such, but rather households (and building Users) whose dwellings will be monitored for twelve months (baseline period). The data collected from the participants' energy meters, and in some cases sensors, together with the data collected in the survey, will be analyzed using algorithms and machine learning techniques, to help develop the InBetween platform and app.

In this first stage we will not provide energy feedback or tailored advice to Users, but will approach them periodically and ask for their assistance in calibrating and validating the analysis done on their personal data. Put differently, we will actually ask for participants' personal data, time and effort for the project's benefit, while not providing them any visible or practical added value. They rightly might ask, 'what is in it for me?'

Given the low level of interest in energy consumption or energy saving which were displayed in the survey (see D1.3& D3.2), engagement in the calibration stage might be insufficient - in particular if the benefits of participation are unclear to the Users.

The project team, especially the pilot sites and platform developers, need to think of creative ways to provide Users with various material incentives and non-material (e.g., environmental concern) motivations to engage in the first stage. Participants should be able to clearly identify what's in it for them.

Essentially, there are three separate issues to overcome: (a) language barriers, (b) gaining trust, (c) ease of participation, and (d) providing motivation for participating.

2.1.1 Overcoming participation barriers

2.1.1.1 Language

To engage Users in the project the language barrier must first be overcome. Two types of language barriers exist in this project: (1) Translating from English to French/Austrian. (2) Translating the professional jargon to the 'lay' User terminology.

All communication between developers and participants need to go through the intermediary for translation. This translation, which is under the responsibility of each demo site, is likely to result in an additional time lag, which needs to be incorporated into the project schedule. Sufficient time needs to be dedicated for translation.

The consortium as a whole, but especially the developers and technical staff, need to always keep the Users in mind. It is not only what information we will be collecting- but how we interact with the User, that will ensure that the project is able to collect the information that is needed from the pilot sites. The designer of any User-*InBETWEEN* (GA:768776)



app or User-platform engagement or interaction should ask him/herself if the text/information/request is clear and easy to understand. Would his/her parent be likely to understand the question and or follow the instructions?

2.1.1.2 Trust

To gain consumers' trust and encourage collaboration, transparency is important. It is recommended that:

- (1) Clear and accessible information on the project and on the process of data analysis is presented on the project website, and a hyperlink, for those who are interested, is sent for every iteration with users. The website should also include ongoing updates on the project's progress. For this goal the Users in the pilot sites have been provided with fact sheets in their own languages, and the official project web site (<http://www.inbetween-project.eu/>) will soon be available in English, French and German. By sharing this information with the Users using simplified concepts, we are helping them to better understand the project aims.
- (2) If possible, a mock-app that looks like the final version should be presented to Users, or used for the validation process, so Users have an idea of what the system they are contributing to looks like.
- (3) The commitment that personal collected data is protected and not sold or shared (with anyone not involved in the project) is visibly highlighted on the website.
- (4) Every iteration/interaction with Users must include the message that they are participating in an innovative collaborative process of co-design for the benefit of themselves and the environment.

2.1.1.3 Ease of participation

Presumably, engagement will be done via a mobile app in a 'push notification' mode periodically. In such events, Users will be asked to validate some information (e.g., did you turn on the boiler?). It is essential that when asking such questions, the right person in the household or building is approached, i.e., the person who can actually validate the analysis. An 'I don't know' option should be presented too. However, there might be several 'relevant persons' in each hh/office. If the same validation request is received by several people, contradicting answers could be received. Therefore, the Demo sites VIL, SON will advise for each dwelling who to approach and a verification process will be presented by PUP and AIT to clarify how to resolve contradicting validations., In addition, the platform will ask User whether a particular appliance has been turned on or off, offering previously defined answers. In case of answer 'no', user will be presented with a drop-down list, or radio buttons, of several most probable appliances (or an extended list) to select from.

The interface of data validation by Users for the purpose of calibration should be designed to be simple and easy to use. Therefore validation and calibration questions have to be asked in local language and should ideally come shortly after the trigger-event of the question with easy answering options (e.g., yes/no/I don't know; very much-----not at all).

A free text feedback option should be provided for participants who want to add information regarding the survey which the previous dialogue option does not allow. The feedback option should be visible and easy to access.

There should also be an easy and visible option for participants to raise issues or ask questions regarding the process.

An option to be removed/withdraw from the process should also be presented, e.g. by naming the local contact person from the demonstration sites VIL, SON for further requests.

It is likely that calibration and validation will mostly refer to the load disaggregation service that the platform will offer. The engagement (i.e. questions coming from the platform) will be sent as soon as the platform realizes the change in the load, and the algorithm is able to identify the appliance causing the change. The frequency of engagement will depend on the hh/office operation. To increase accuracy, engagement will take place close to real-time. However, it is important to make sure that messages are not sent during night-time, early morning or any other time that might be considered as inconvenient (e.g. sending a question about work place appliances during a holiday). If very frequent engagement is required, the provision of an incentive is likely to increase User's participation. It is reasonable to assume that towards the end of the first year the frequency of engagement will be reduced. Yet, it is also important that the frequency of engagement not be too seldom. On the one hand, we do not want participants to be annoyed by the engagement effort, on the other hand, we do not want Users to completely forget the project, as their help will be needed in the second stage as well. It is therefore recommended that the interaction with Users will occur at least once every two months.

2.1.1.4 Motivation for participation

Users' validation of the analysis is crucial for the system calibration. To increase the likelihood of participation and reduce withdrawal rates, it is recommended that some sort of public recognition, reward system and/or payment for participation is provided.

The option of public recognition should be explored by each demo site, given the particular circumstances and opportunities (e.g. if a social event is taking place). In some places and contexts, and in line with the GDPR, demo sites might decide to publish participants' names in the building (if a message board – virtual or real – exists) or communicate in any other available platform.

The partners will decide, together with the demo site managers, how to incentivize the Users. One option is that every time a User validates data he/she will earn points – and these points will then be traded in for something (to be decided based on available local options). As pointed out above, rewarding participants becomes more crucial if the frequency of engagement is high.

Depending on the developer's needs and the hardware installed in each dwelling, we should consider grouping participants according to their effort and frequency of engagement into high, medium and low engagement groups, and provide different incentives to each group.

2.1.2 Residential vs. non-residential demo sites

While some issues discussed above are valid for the residential and non-residential buildings alike, some aspects related to the 'relevant person', motivation and incentives for engagement should be considered separately for each non-residential building/office/space.

One issue that needs to be resolved is who is the right person in each hh/building to validate data? This might be the owner of the building, or the facility manager, who will then need to give feedback. This should be decided at the demo site level and the name should be provided by the contact person there. In any case, the advantage of non-residential buildings is a different command-chain. In case the owner of the building gives the task to an employee, then we will expect a higher participation rate. As discussed in 2.1.1.3, a decision should be made regarding what to do in the case of contradicting validations.

The questions 'why engage?' and 'what's in it for me?' are likely to be more fundamental in the case of the non-residential building / offices users. The challenge is to keep the boss/building owner motivated and engaged.



Incentives for participation might not be possible for the non-residential users, hence, it is suggested that emphasis should be put on communicating to the participants the importance of their contribution to the development of the innovative tool that will help to reduce GHG emissions and protect the environment.

2.1.3 Electricity meters only vs. meters and sensors

As mentioned above, the project sample of buildings includes:

- (1) 55 residential dwellings in VIL, out of which 33 have replied to the project initial survey. All of them have individual conventional electricity meters (no smart meters). Almost none are equipped with sensors before the project start. The project aims at providing sensors for most of them.
- (2) 8 residential dwellings and 6 non-residential houses in SON, of which all are connected to smart meters and are also equipped with various sensors.

At this point, a decision regarding which equipment and sensors will be placed in each dwelling has not been made. However, it might be that Users will be divided into two groups: (1) inhabitants of dwellings with electricity meters only (External meter interface), and (2) inhabitants of dwellings with meters and sensors.

The following equipment will be installed:

- External meter interface – to harvest smart meter data
- Smart relay (Smart cable mount) – measures electricity consumption. Offers relay function for connected appliance.
- Smart relay (smart plug mini) - measures electricity consumption. Offers relay function for connected appliance.
- Window/temperature sensor – detects window/door opening/closing and temperature.
- Motion/temperature sensor – detects motion, measures light intensity and temperature
- Air Quality sensor – detects Humidity, Temperature and VOC (volatile organic compounds), a value that can be used to indicate if more ventilation is needed.
- Smart thermostat valve – actuator to operate hot water supply to radiators. Temperature set point can be set locally on the device or remotely through InBetween app.

From the InBetween platform developers' point of view, sensors would be very helpful as they provide 'objective' data and can ease the process of data validation and platform calibration. However, from the participants' point of view, installing sensors in the hh / office, on top of the electricity meters, implies that the platform developers (and in VIL the land lord) can monitor their behavior 24/7 – and this means a greater degree of privacy loss. In addition, the installation itself requires that an unfamiliar person will come into the house, wandering around and entering the various rooms in which the sensors will be installed. It is likely that not all hh / office users will be interested in this level of exposure, in particular if the added value is insufficiently clear.

The issue of trust (discussed in 2.1.1.2) is even more crucial when sensors are installed, and in particular the level of trust between the tenants and land lord (in the case of VIL – VIL is a member of the consortium) is crucial.

It is suggested that, on top of what discussed in 2.1.1.2:

- (1) An information sheet with an explanation on each sensor and the data it collects will be distributed to the candidates' hh some time before the installation.



- (2) Candidate hh/offices will be advised in advance as to which sensor is planned to be implemented in which room (if possible, using the floor plan of the dwelling) and by who. Users should have the option and time to discuss the possible implication of installation on their privacy.
- (3) If for some reason, User objects to a specific type of sensor (e.g., motion sensor) or specific location for a sensor (e.g., near the bathroom), it is recommended that an alternative placement in the dwelling be suggested.
- (4) Users should be aware that according to the GDPR they have the right ask for the data collected. The log of the data collected (or an example of such log) should be presented to Users upon a request, so they know how the collected data looks.
- (5) Users should be advised that, as per the project contract with the Commission, after the project end, the sensors will be left in the Demo sites offering basic monitoring functionality while the provision of InBetween advance energy services will be offered through individual service level agreement with each Demo site.

Once sensors are installed, the interaction with the dwellers will take place only periodically and probably less frequently than the interaction with those who have electricity meters only. The interaction will have two aims:

- (1) Helping to better match dwellers' preferences and behavior.
- (2) Keeping in touch with Users and engaging them with the development of the platform. As we would like them to participate in the second stage, it is important that they do not feel 'forgotten'. We might want to consider presenting information such as weather forecast, which all users are usually interested in, in the app, alongside the data collected or inferred by the platform.

Issues regarding incentives and ease of use are the same as discussed above in 2.1.1.2 & 2.1.1.3.

2.2 SECOND STAGE

2.2.1 Providing energy and non-energy advice

In the second year, once the Beta version of the platform is up and running, the app will be able to provide energy information and tailored advice. Energy advice might include tips on how to save energy, information on energy consumption by appliances, energy use compared to others, how to efficiently use appliances, etc. It should be noted that various tools / apps / websites provide such information and are already available on the market. While providing good and detailed information, many such apps are not used frequently.

In the digital era the competition between information-providing apps and platforms rests on people's attention (their awareness of the platform), engagement (access to the app) and affinity/stickiness (using it over time). In this respect we must acknowledge that while the InBetween project focuses primarily on energy, the non-energy information and advice is likely to be perceived by Users as significantly more interesting, relevant and desirable, thus, the non-energy aspects should be equally considered by us. To illustrate, weather forecast information is frequently sought by many people (much more than strictly energy use information). Hence if the InBETWEEN app provides the weather forecast in an easy and accessible way, it is likely that more people will find the app beneficial, leading to greater awareness, engagement and stickiness. The challenge is to couple non-energy with energy advice.

A promising way to engage with energy consumers is by providing non-energy information and advice. Ideally, the platform will be able to match non-energy with energy advice. For example, information related to safety



(e.g., open window in empty hh) could be coupled with energy advice (e.g., the heating is on and the window is open); a weather forecast could be coupled with advice on how to use thermostats the next day for maximizing comfort while saving money; electricity rates of different providers (if applicable in the region) could help Users make a better-informed decision relating to switching providers.

There are not too many types of actions that people could take in their homes or workplace to save energy. However, timely information and advice could help people perform the right action at the right time.

Examples for energy advice where ‘timing’ is important and that the platform could provide:

- 1) we noted that the heating system is turned on, but it seems that the window is open
- 2) we noted the washing machine is turned on - the electricity price is high now, you might want to consider operating it later / early in the morning. This will save you X Euros
- 3) it seems that your fridge consumes more electricity than usual - it could be mal functioning
- 4) It seems that your oven/stove is on, but there is no one in the apartment

Ideally, the app would be able to allow Users to remotely control appliances and thermostats, and take actions to save energy and money, even when they are not at the premises.

2.2.2 User engagement

In the second stage Users’ feedback and active participation is essential – in this stage we will offer information and various engagement options to Users and examine which features are useful and to whom, what else people might want from the app, etc. While more of the participants’ time might be needed, the added value for them should be clearer and easier to explain and communicate. It is crucial that we do not ‘lose’ potential Users during the first stage, and that we maintain their trust, interest and involvement in the project during the second stage. To maintain engagement, an incentive system (discussed in 2.1.1.3) should be considered for the second stage as well.

It is recommended that before the launch of the second stage:

- (1) Clear and accessible information on the following stage and on the type of involvement needed is sent via the app, and presented on the project website.
- (2) The commitment that personal collected data is protected and not sold or shared (with anyone not involved in the project) is visibly highlighted on the website.
- (3) One aim of the project is to tailor advice to needs and interests (as provided in the survey, D1.3 & D3.2). It is recommended, therefore, that the co-design aspects and the user-centric approach is highlighted in the interaction with Users.
- (4) The added value to Users should be presented (what’s in it for them?).

Ideally, the app will offer information and various advice (energy as well as non-energy) and the participants will rate these in terms of relevance, usefulness, and desirability. A drop down menu will make the rating process simple (e.g., very relevant ----- not relevant at all; the information was useful / helpful / timely, etc.). A drop down menu will also be provided to reports on faults (e.g., technical, etc.). However, a free text feedback option should be provided too, as well as an option for contacting the developer.



2.2.2.1 [Focus groups](#)

It is recommended that focus groups will be set in each of the demo sites. Focus groups are important for co-designing processes. In our case, focus groups will allow the developers to 'dig deeper' into the User preferences regarding the calibration menu as well as the desirable energy and non-energy services. At the same time, they provide a stage for participants to elaborate on their concerns, needs and improvement suggestions. The number of focus groups and the timing of their meetings will be determined before the end of the first stage or at the latest, in the beginning of the second stage.

3 CONCLUSIONS

Throughout this report we stress the importance of maintaining the Users' trust and involvement in the project, despite the sometimes questionable added value they may feel at that particular point in time. The project team, especially the pilot sites, must keep this as a top priority. This will mean being creative, given the limited project budget, in incentivizing the Users. Each pilot site will need to keep their Users informed (and happy) to ensure their continued involvement in the project. This can only be done with the support of all the project team who will update, clarify and provide easy to understand information.

The consortium as a whole, especially the developers, etc., need to always keep the Users in mind. It is not only what information we will be collecting- but how we interact with the User, that will ensure that the project is able to collect the information that is needed from the pilot sites.