Empowering Energy Education

eTEACHER

D4.4: Manual for Configuration, Installation and Commissioning of eTEACHER

WP 4

Date of document

November, *2019 (M24)*

Authors: Elina Neugebauer, Danny Pape, Nicolas Mayer (ASC), Gloria Calleja-Rodríguez (CEM), Markku Vuouri (GRA)

eTEACHER

EE-07-2016-2017

Innovation Action

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768738.

Disclaimer

The information reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Technical References

Project Acronym	**eTEACHER**
Project Title	end-user Tools to Empower and raise Awareness of Behavioural Change towards EneRgy efficiency
Project Coordinator	Noemi Jimenez Cemosa noemi.jimenez@cemosa.es
Project Duration	1 October 2017 – 31 September 2020

Deliverable No.	D4.4
Dissemination Level	CO[1]
Work Package	WP 4 – Demonstration and Evaluation of Behavioural Change through eTEACHER solutions
Lead beneficiary	7 (ASC)
Due date of deliverable	30 Spetember 2019
Actual submission date	18 November 2019

[1] CO = Confidential, only for members of the consortium (including the Commission Services)

Versions

Version	Person	Partner	Date
V1.0	Elina Neugebauer, Danny Pape, Nicolas Mayer, Gloria Calleja, Markku Vuori	ASC, CEM, GRA	15 November 2019

Table of Content

List of Figures

0 Introduction

The eTEACHER concept consists of encouraging and enabling energy behaviour change of building users by means of continuous interventions displayed through a set of empower tools to drive informed decisions in order to save energy and optimise indoor environment quality. These empower tools are a set of ICT solutions that ensures friendly connection in between end-users and building systems, implement continuous behavioural change interventions and provide tailored advice.

The tools can be classified into:

- The **BACS add-ons** (What-if-Analysis, data processing and universal BACS/monitoring system interface)
- The **user-friendly solutions**

0.1 Deliverable Purpose, Scope and Context

The purpose of this deliverable is to accompany the prototype of WP2 and WP3. It is described, how it can be used and what the eTEACHER project is doing, to increase the success of the testing phase. There will be an updated deliverable, where the documents gets adapted based on feedback about using the app and updates. Further, the deployment will be described in the second release, which is important for the exploitation.

0.2 Document Status and Target Audience

This deliverable is qualified as public in the Description of Action (DoA), for this reason the information gathered, and their distribution is for external readers as well, besides the consortium members.

The target audience of the content of the first release are mainly end users, who want to use eTEACHER.

0.3 Document Structure

This deliverable is broken down into the following sections:

- Section 0 (Introduction) provides an introduction for this deliverable including a general overview of the project and outlines of the purpose, scope, context, status and target audience of this deliverable.
- Section 1 (How to use the eTEACHER App) explains, how the app can be used from an end user perspective.
- Section 2 (Action Plan for Validation) describes, how the pilots and testing phase will be coordinated and what falls in which responsibility
- Section 3 (Use Cases and Actors) gives a brief overview over the different pilot sites
- Section 4 (References) provides a list with used references

1 How to use the eTEACHER App

1.1 Accessibility and Installation

The eTeacher Project app has been developed for several platforms to help people solving their problems on the most frequently used devices. It can be used as a mobile app and also as a desktop application in the browser. For mobile devices, It is available in the well-known app stores of Google (Playstore) and Apple (iOS Appstore) as well as in any browser via a website.

The App eTEACHER is available in the respective stores under the following link:

- Play Store: https://play.google.com/store/apps/details?id=de.ascora.eteacher
- AppStore: https://apps.apple.com/de/app/eteacher-project/id1485405835

For using the eTeacher Project app in a browser, the following URL can be used:

- https://eteacher-app.ascora.eu/projects

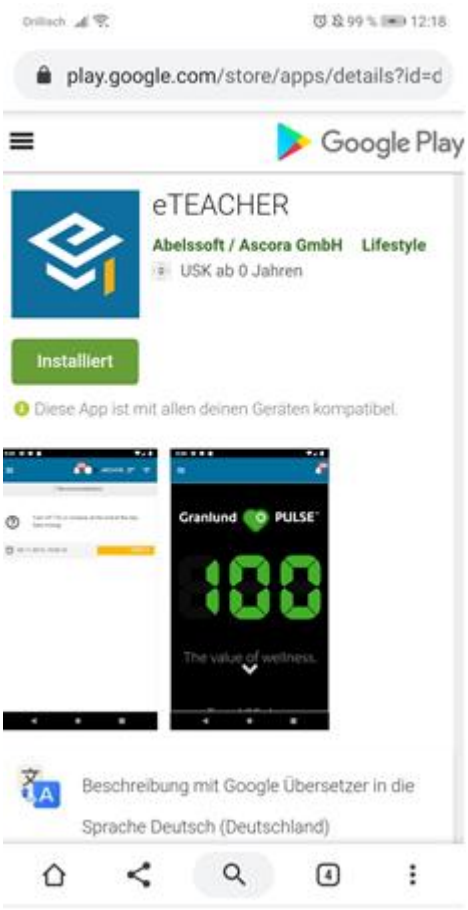


Figure 2: Appearance in the Google Play Store

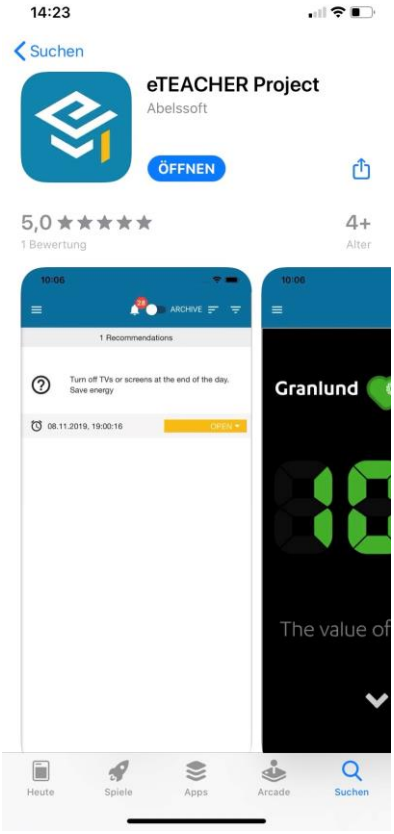


Figure 1: Appearance in the Apple App Store

An installation is only necessary for the mobile devices, as the website can be used out of the box with full functionality. To install the apps, the normal process of app installation can be followed as usual by clicking the download button on the app page of the store.

1.2 First App Start

When the app starts for the first time, the user is asked to login with its user credentials. If the user is new, a registration process follows. As the UI of the apps only differs in nuances, only the Android version will be used to visualise the figures.

1.2.1 Registration Process

To register on eTeacher as a new user, it must be clicked on "Register" in the login screen below the input fields. A window will then appear with a register form (). To complete the registration process, the user has to enter its first name, last name and e-mail address. After that, the us is asked to choose a password. The password must follow the following rules in order to guide the user to choose only safe passwords. It must consist of:

- lowercase letters,
- uppercase letters,
- at least 1 number,
- and at least 1 special character.

After the user has filled in the mandatory fields, the registration process finishes with a click on the button "Register". The user will then receive a confirmation email, which must be confirmed by the user (Figure 3).

Attention! This e-mail can also end up in your Spam folder. Not confirming the email will lead to a non-authorized login.

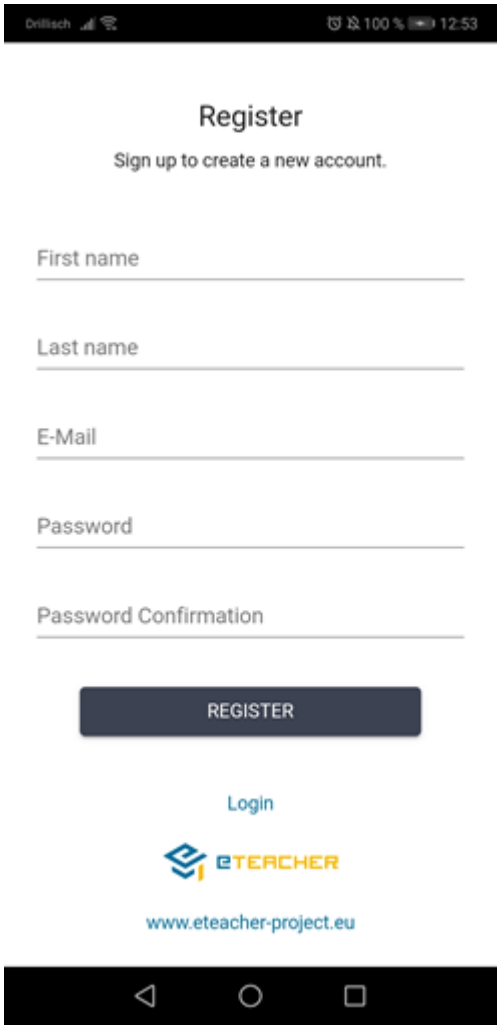


Figure 4: Register form

Figure 3: Confirmation email

1.2.2 User profile

After a successful authentication, a context menu (three dots) on the top right-hand side appears, which enables the user to open the user settings.

These settings enable the user to:

- Select a profile image
- Change the email address
- Change the language to be used in the app. Currently available languages are:
  - English
  - German
  - Spanish
  - Romanian

Any changes must be saved manually by pushing the button "Save".

1.3 Navigation Overview

After a successful login, the user can use the functionality the app provides. In the navigation bar (Figure 6) on the top, there are different symbols, which guides the user through the functionalities.

1. A click on the three lines to open the so-called hamburger menu (Figure 5) leads to find all menu items; these are selectable from there. The Hamburg menu can be accessed from all views of the app by clicking on the three dashes in the upper left corner.

2. Notifications will keep you up to date. These will be sent automatically and will be received in real time after an action has been triggered.

3. The magnifying glass enables the user to have full text search in the app.

4. A click on the three dots on the right side opens a popup to change the app settings.

Figure 6: Top navigation

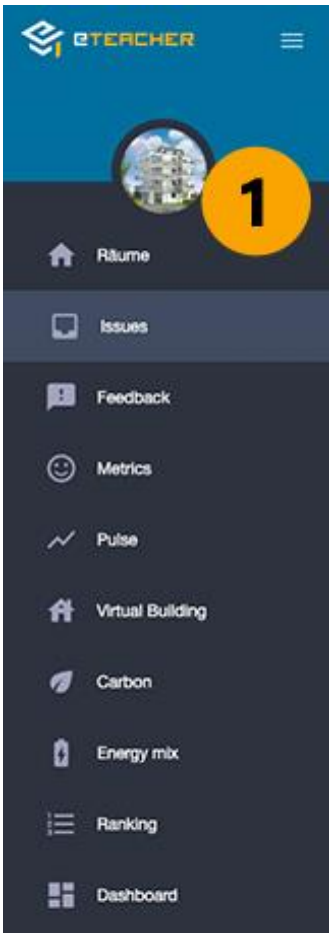
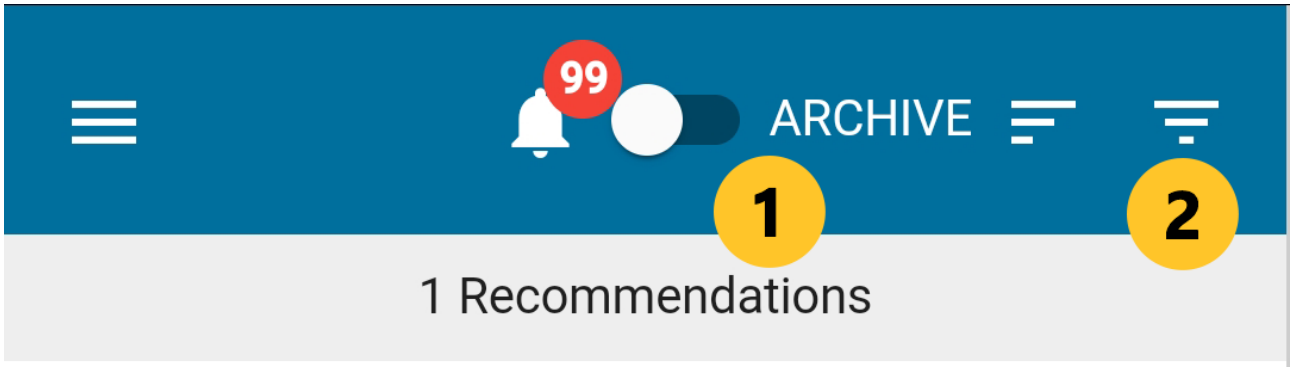


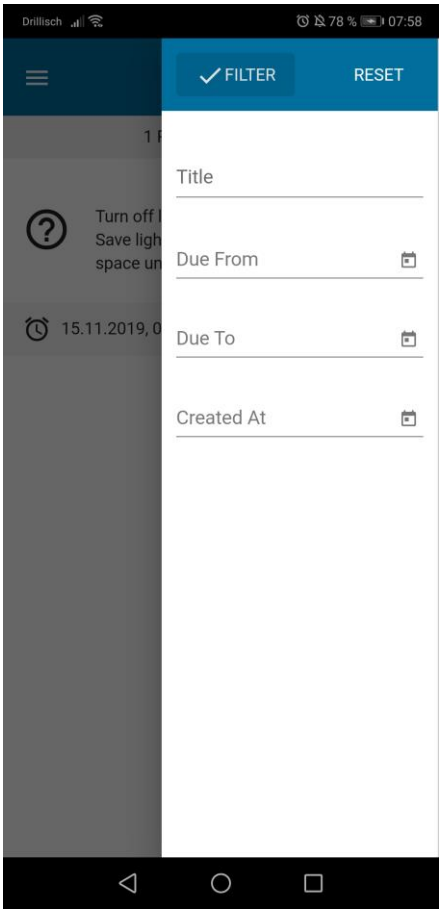
Figure 5: Hamburger menu

When you click into a room you get your recommendations displayed and the upper menu view changes.



The hamburger menu and the bell have remained the same from the functions, what is new added is the archive and the filter option:

1. If you activate the archive you will see all closed recommendations, you have closed in the past.
2. If you right click on the right symbol with the three horizontal lines the filter radio opens. You can filter by title, due date, due from and create at.



1.4 Create room and retrieve room information

To create a new room, either a QR scan can be used or a manual entry via a form. By using the manual addition of a room, a new window will appear where the user must fill in the following details (**¡Error! No se encuentra el origen de la referencia.**):

1. An image, that will be used to identify the room. It can either be selected from a gallery or generated by the internal camera of the mobile device
2. A room name, e.g. Kitchen
3. A room size to determine the energy efficiency

After a successful addition of the room, it will be added to the start page of the app.

To import information about a room to the app, the QR scan can be used. Therefore, a camera on the mobile device is needed to scan the QR code, which is then provided in the room of the user. After scanning the code, the app is downloading all necessary information for the intended room and provides tasks/recommendations.

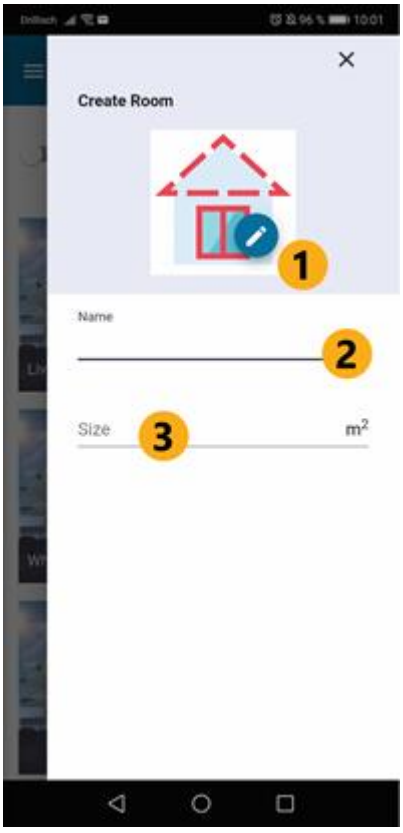


Figure 7: Create ticket manually

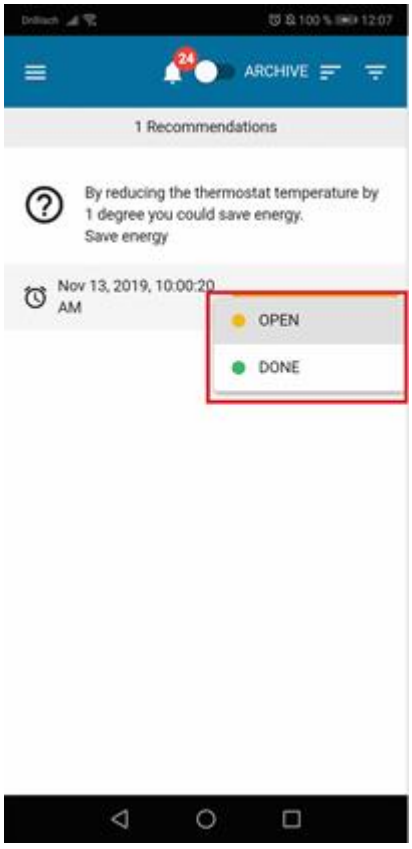


Figure 8: Ticketlist

1.5 Recommendation

By selecting rooms, an overview of all imported rooms is provided. Selecting an entry out of the room collection enables the user to get recommendations for a specific room. On the one hand, the recommendation guides the user to reduce energy consumption and the associated costs and on the other hand to do something good for the climate, which is nowadays a very sensitive and important topic.

The ticket list displays all recommendations/advices to reduce the energy consumption for possible energy savings. List entries are extended with additional meta information about the ticket, such as purpose, target, or creation date of the ticket

The ticket is set to "Open" by default. It can be set to done, when the user followed the instructions. Therefore, the user has to change the status to “closed”. Following those recommendation influences the app to motivate and reward the user, i.e. gamification mechanics, ranking, etc.

In the Figure 9, in which the user can see further details of the ticket (e.g. how much you really save in the end) and perform actions on it.

The detailed display of a ticket looks as follows. On the upper right side, you can change the status to "Done". Besides the Change Status button, you can also share the ticket via Facebook, Twitter and WhatsApp. Furthermore, the date and time of the ticket are displayed.

There is a detailed display of how high the savings potential is if you follow the instructions.

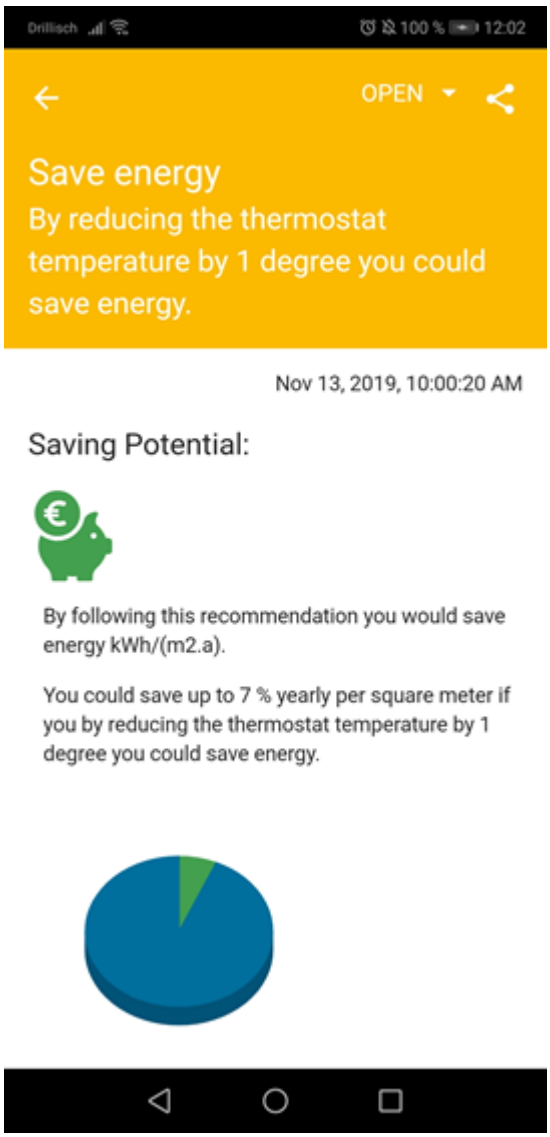


Figure 9: Ticket details

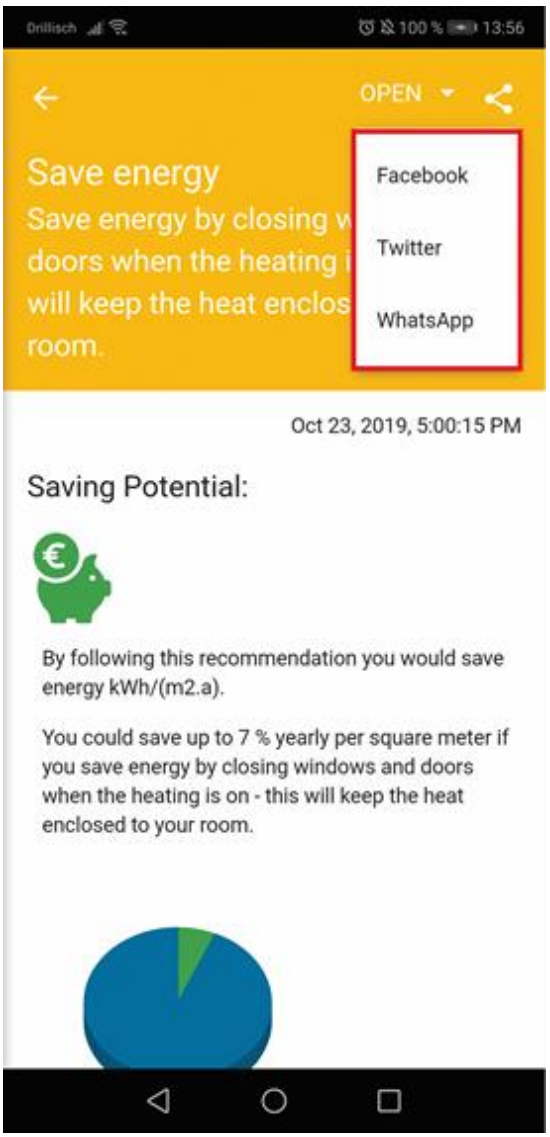


Figure 10: Sharing

1.6 Share

Sharing content is a great opportunity to spread achievements for the users and to advertise the app for eTeacher. The app provides the abilities to share recommendations and achievements to communicate the benefits that has been performed with the app. To share the content, the user can interact with the “share-symbol” (Figure 10) and select one of the following platforms.

- Facebook
- Twitter
- WhatsApp

If the links has been shared, visitors are being redirected to a webpage, where they can learn more about the eTeacher and also get it contact with the user that shared this post. (Figure 12)

Figure 11: Sharing via Facebook

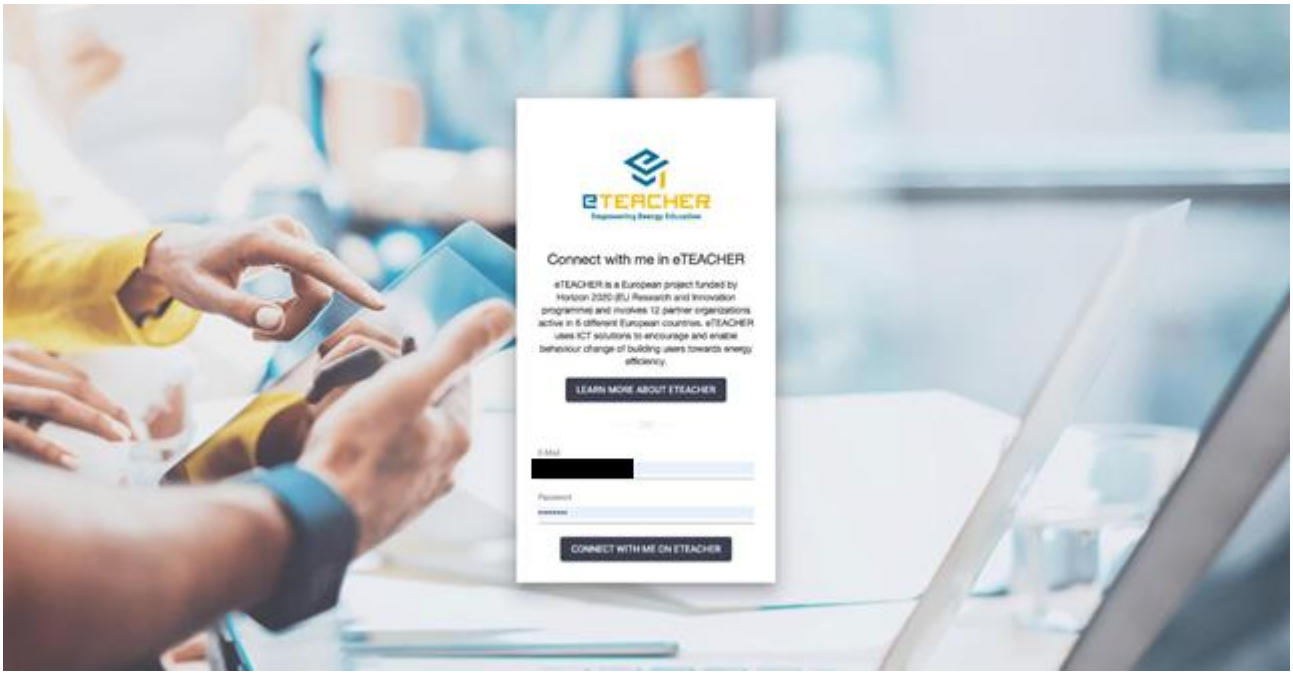


Figure 12: Visitor Redirection

1.7 Notification

Notifications are the latest activities that have been sent to the user. This is a great option to keep the user always up to date. These notifications will be sent automatically from the backend to the app and will be received and displayed in real time.

eTeacher provides two different kinds of notifications.

- **App notifications** are always highlighted inside the app during the usage. The indicator for new notifications can be seen in the upper right corner of the app. As soon as new notifications arrive, the app visualizes it within a bell-symbol that has a red circle with a number indicating how many new notifications arrived.
- **Push notifications** are used to also notify the user on the mobile device, even the app is not running. The notifications are be shown directly on the lock display. By clicking on the notifications, the app starts and shows detailed information.

Figure 13: App Notifications

1.8 Dashboard

The app also provides a dashboard to analyse individual consumption values of the last months or other defined timespans. The dashboard can be found inside the hamburger menu as the “Dashboard”-entry. There, charts are shown to visualise the development of the sensor data. This chart is customisable via a datepicker. There the period of energy consumptions can be changed to fit the needs of the user. To explain the single chart lines, an agenda is provided with desriptions of the sensor values.

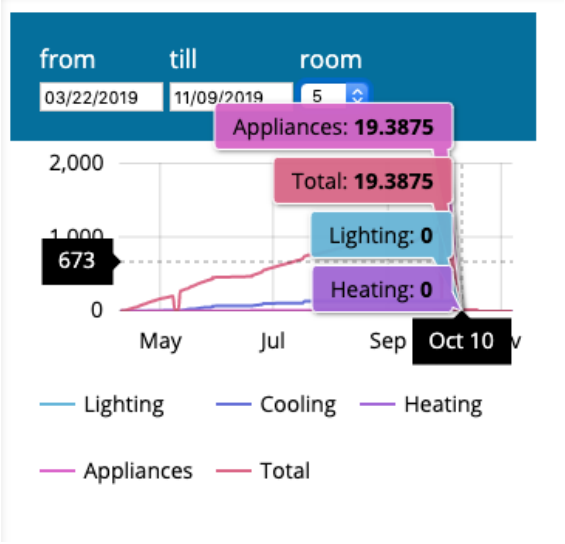


Figure 14: Dashboard

1.9 Recommendations and Advices

The What-if-Analysis is a software tool that aims at providing building users with tailored recommendations on how they can reduce building energy consumption and energy costs. For that purpose, different strategies for engaging users into more energy-efficient behavior have been investigated and a catalogue of energy conservation measures has been elaborated. These energy conservation measures consists of different simple actions on the building energy system that a building user (resident, facility manager, staff, etc.) can undertake. These actions shall support him/her saving energy and removing his/her bad habits that lead to energy wasting. These energy conservation measures consist for example of:

- Saving cooling and heating energy through more optimal HVAC settings, improvements of solar energy gains by acting on shading components, avoiding energy wastes through openings or when rooms are not occupied.
- Saving lighting energy using more natural light or powering-off fixtures when there is no need for using artificial light.
- Saving electrical energy by switching off unnecessary appliances, devices or equipment when not used
- Etc.

To make it possible for this software tool to automatically identify and evaluate proper energy conservation measures in real time during building operation, the WiA implements computational methods that analyze information about the building and its current usage. This information is provided by a monitoring system of the building including meter and sensor data. By processing this information, the WiA can identify different relevant energy conservation measures and translate them into tailored recommendations that are transferred to the eTeacher App. End-users can then read and apply them for engaging their actions towards more energy efficiency. One important feature of the What-if-Analysis tool resides in its ability to be used in any kind of building regardless of its existing technical systems, usage and users. Fraunhofer IIS EAS is developing this tool that is part of overall eTeacher software package. The results of the What-if-Analysis can be found in the eTEACHER app as recommendations and advices.

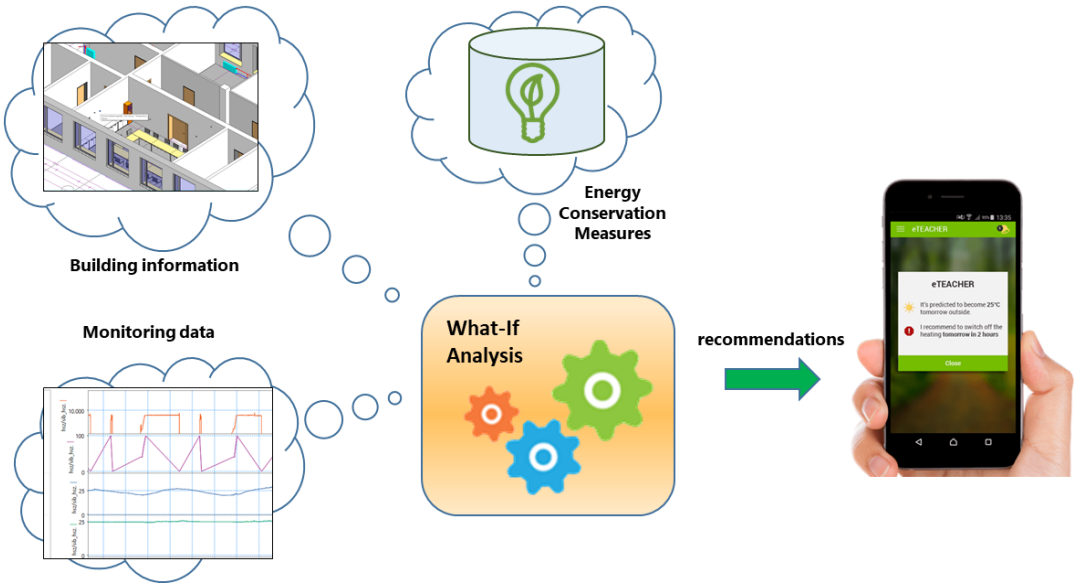


Figure 15 - What-if-Analysis

1.10 Ranking

The ranking works in such a way, that it rewards the user, if he follows recommendations and marks them as done in the app. For each completed recommendation there is a different number of points earned, which is based on the possible savings. It compares the actual logged in user to other users and shows behind the name, the actual rank in comparison to all eTEACHER users. The other profiles, where the user is compared to range from the user with the most points in the complete eTEACHER app. So, the user can compete against the best. But additional, the average user can be seen as well, which summarizes the average points of all users of the eTEACHER project. Further, the user can see, how far away the next user is, so that he is able to see an easy catch up. While all mentioned profiles are anonymous, out of privacy reasons, it is possible, that users can compare with each other directly. With the sharing functionality described in 1.6, it is possible to connect to each other. So, the users are able to see each other in the ranking, with their profile picture. These can be individual users, like friends and family or if only one account is used for certain community office rooms, also different office rooms.

By hovering the individual rankings or clicking them, it is possible to see the exact amount of points.

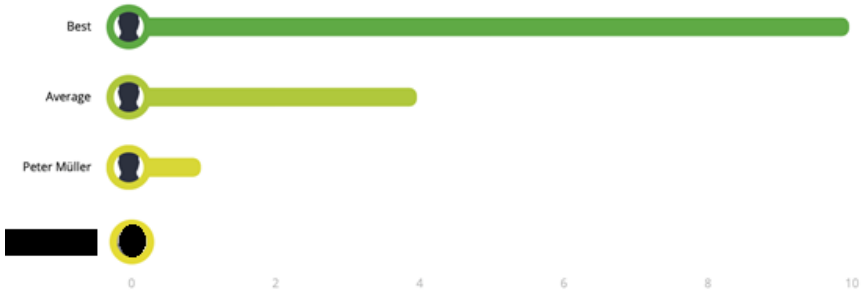


Figure 16 - Ranking

1.11 Carbon

If the user clicks on the menu item Carbon he will get an overview of the CO2 savings. These are compared against a tree. Trees and forests are able to produce biomass and oxygen from CO2 and sunlight and to bind CO2 permanently. In order to absorb one tone of CO2, an oak has to grow for about 60 years.

In this graphic the app visualizes how much carbon got saved by following the recommendations of the app with the help of a tree. If the tree is filled completely, that would mean, that your savings equal the amount of CO2 saved, of a 60 year old oak.

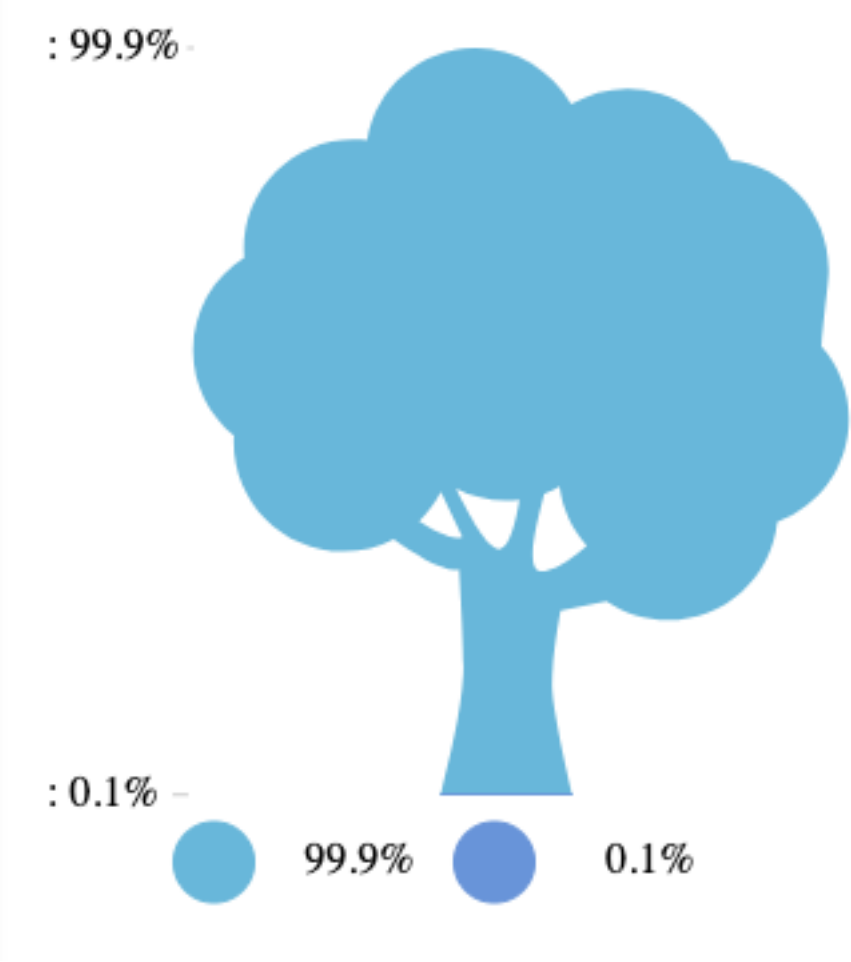


Figure 17 - Carbon Savings

1.12 Energy Mix

The menu item Energy mix from the menu shows the energy distribution of the added appartments/rooms of a profile. In this view, the user of the eTEACHER system can see, how his energy distribution is. How much of his complete energy usage is used by cooling, heating, appliances or lighting. So the user can be more aware of possible savings, if he sees how much energy is used in cooling for example.

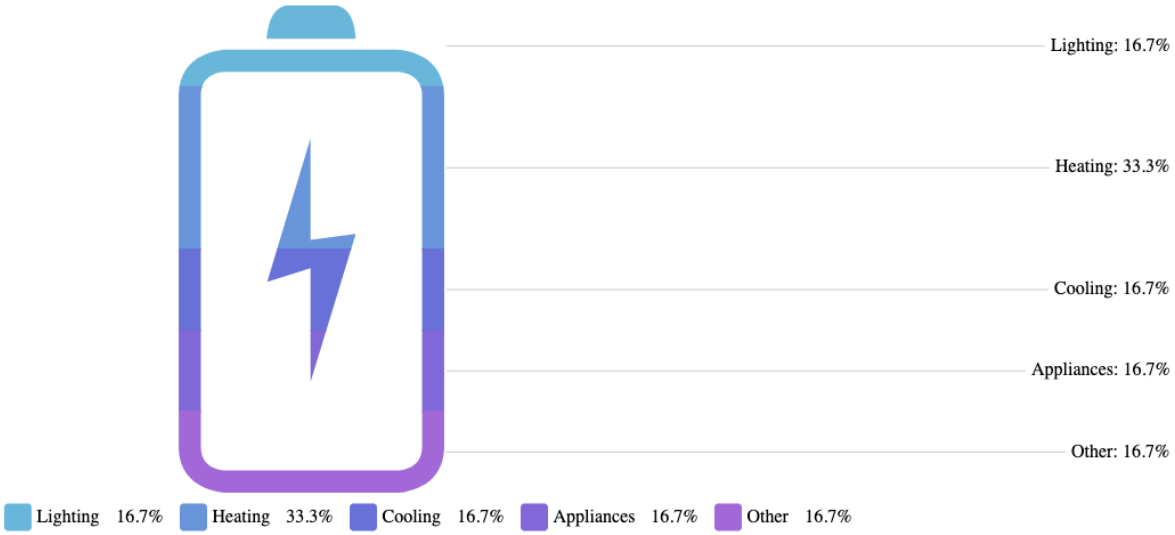


Figure 18 - Energy Distribution

1.13 Your Comfort Opinion

The user can provide feedback on indoor air quality or the overall comfort of the property. Feedback can be given by pressing a separate smiley face and sad face buttons located on the property or via the web interface.

The web interface can be accessed by typing a web address into a computer browser or by mobile phone for example by reading a QR code from the flyer or poster.

1.13.1 Feedback

When you sign in to the feedback page, the web page has a view as shown in Figure x. You can give feedback by pressing a smiley face or sad face.

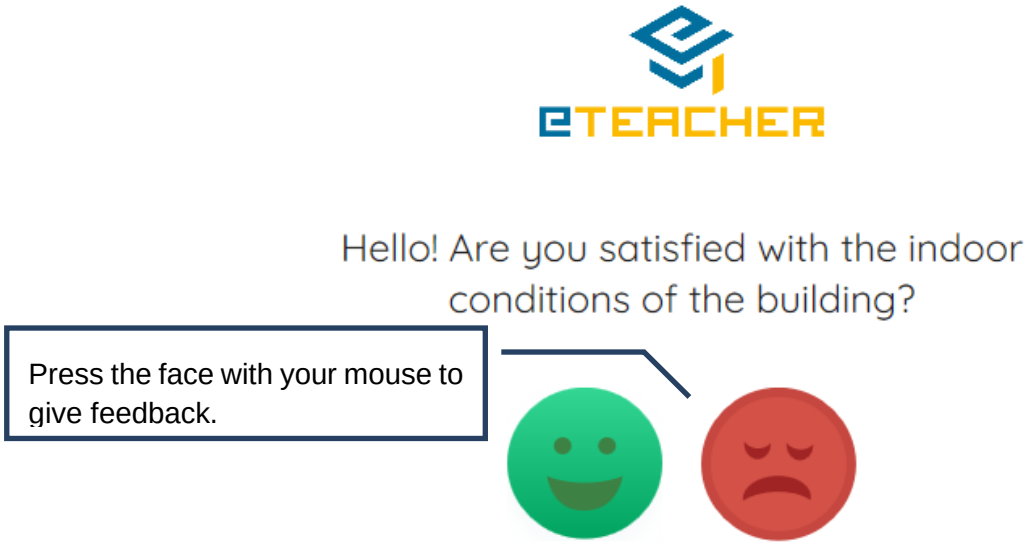


Figure 19 - Main view of feedback page

When you sign in to the feedback page, the web page has a view as shown in Figure x. You can give feedback by pressing a smiley face or sad face. When you press one of the faces on the face, a text box will appear below the faces, which will give you more accurate feedback. Below the text box, there are still different tags that can further refine feedback, for example, to the room level. (see figure 1.x).

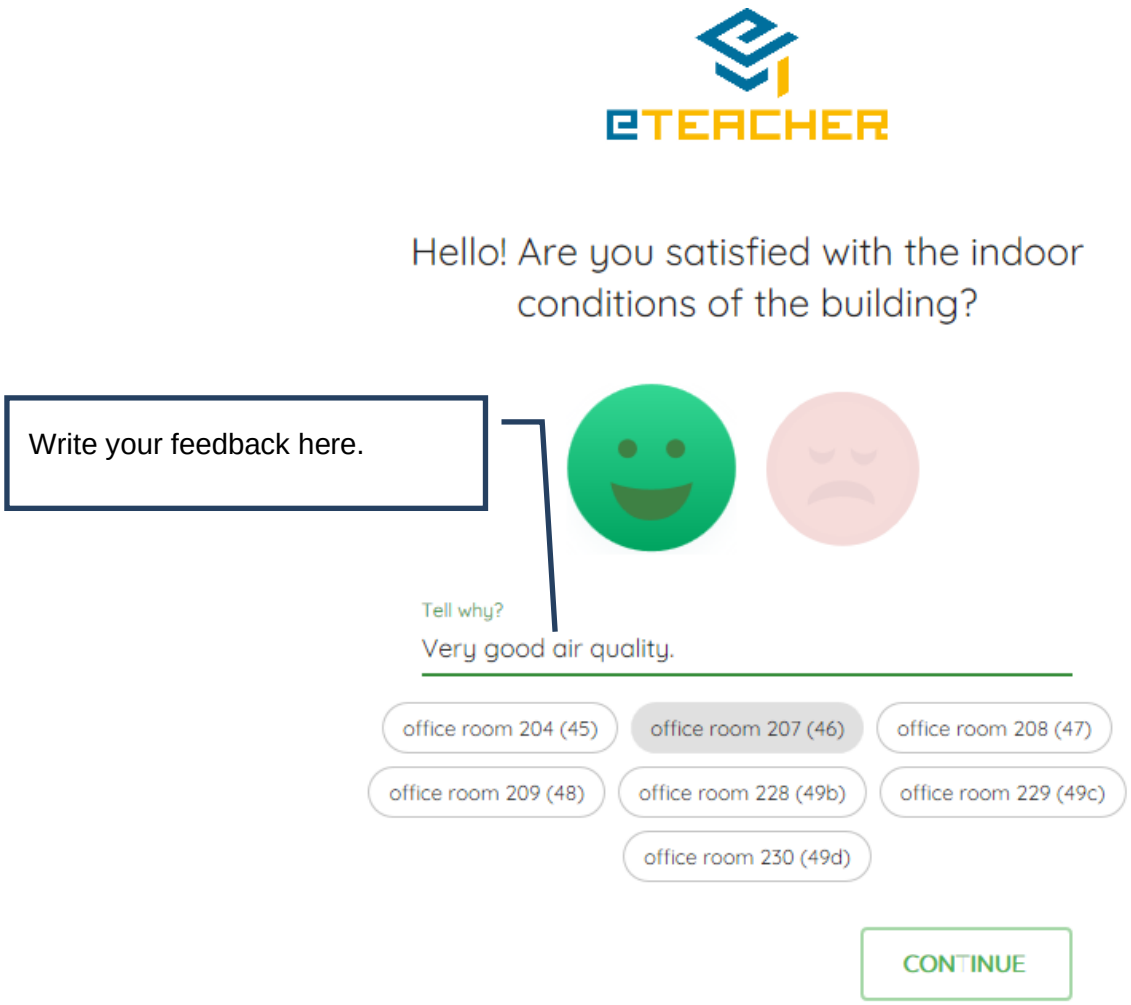


Figure 20 - Feedback page after you press faces.

1.13.2 Dashboard

Once the necessary refinements to the feedback have been made, the feedback can be left by pressing the continue button. Dasboard shows user feedback statistics and Pulse score. You can browse for user feedback at any time interval. Once you have selected a time period, you can view the number and distribution of feedback during that time period. You can also view comments and reply to comments.

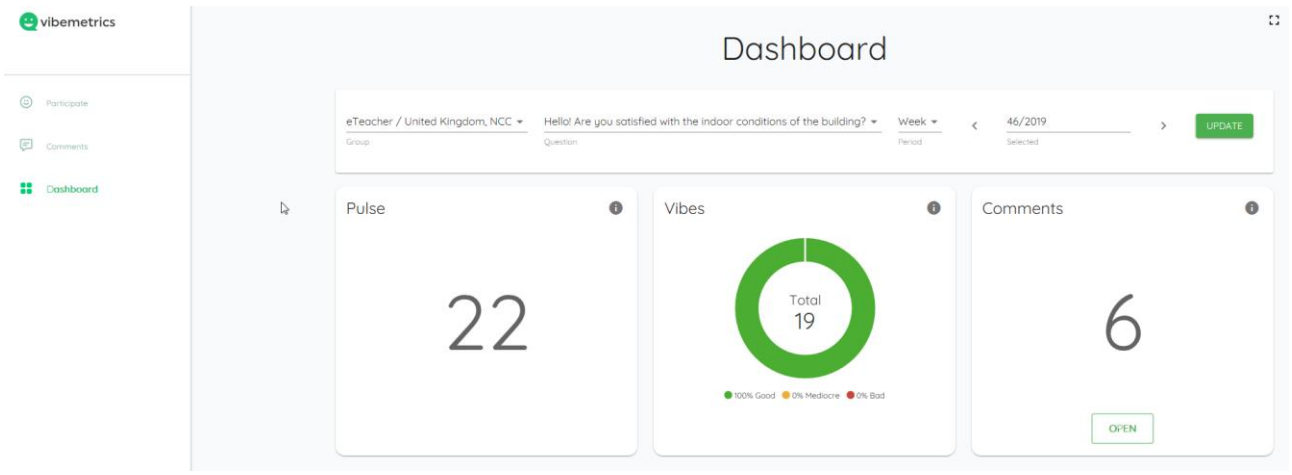


Figure 1.21:Dashboard view

1.13.3 Comments

You can view, comment, like, and respond to users' comments (see picture.)

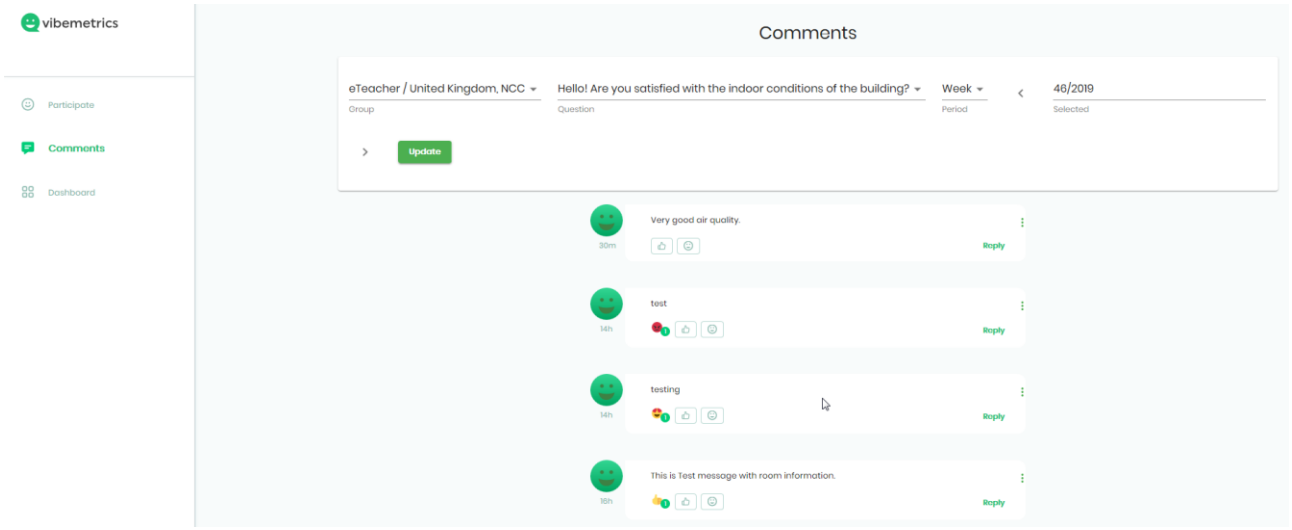


Figure 22 - Comment View

Metrix, performance optimization

Performance Optimization gathers the building automation data and translates it into performance indicators of the property. These indicators help to optimize the facility performance to the planned or targeted level.

1.13.4 Control Panel

On the top of the Home Page locates Control Panel. In Control Panel you can manage system setting and user specific setting.

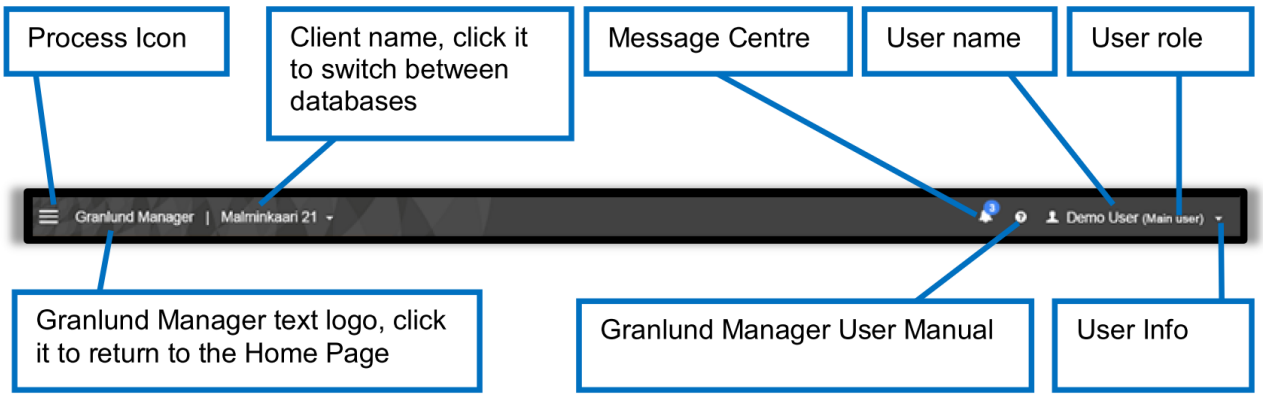


Figure 23 - Control Panel

When granted access to Granlund Manager, each user is assigned with a specific user role, e.g. Owner, Property Manager, Service Provider and etc. User role determines which processes and/or functions you have access to.

The top left corner locates the process icon, through which user can navigate to process panel. Process Panel shows all the processes and functions available to you in the system.

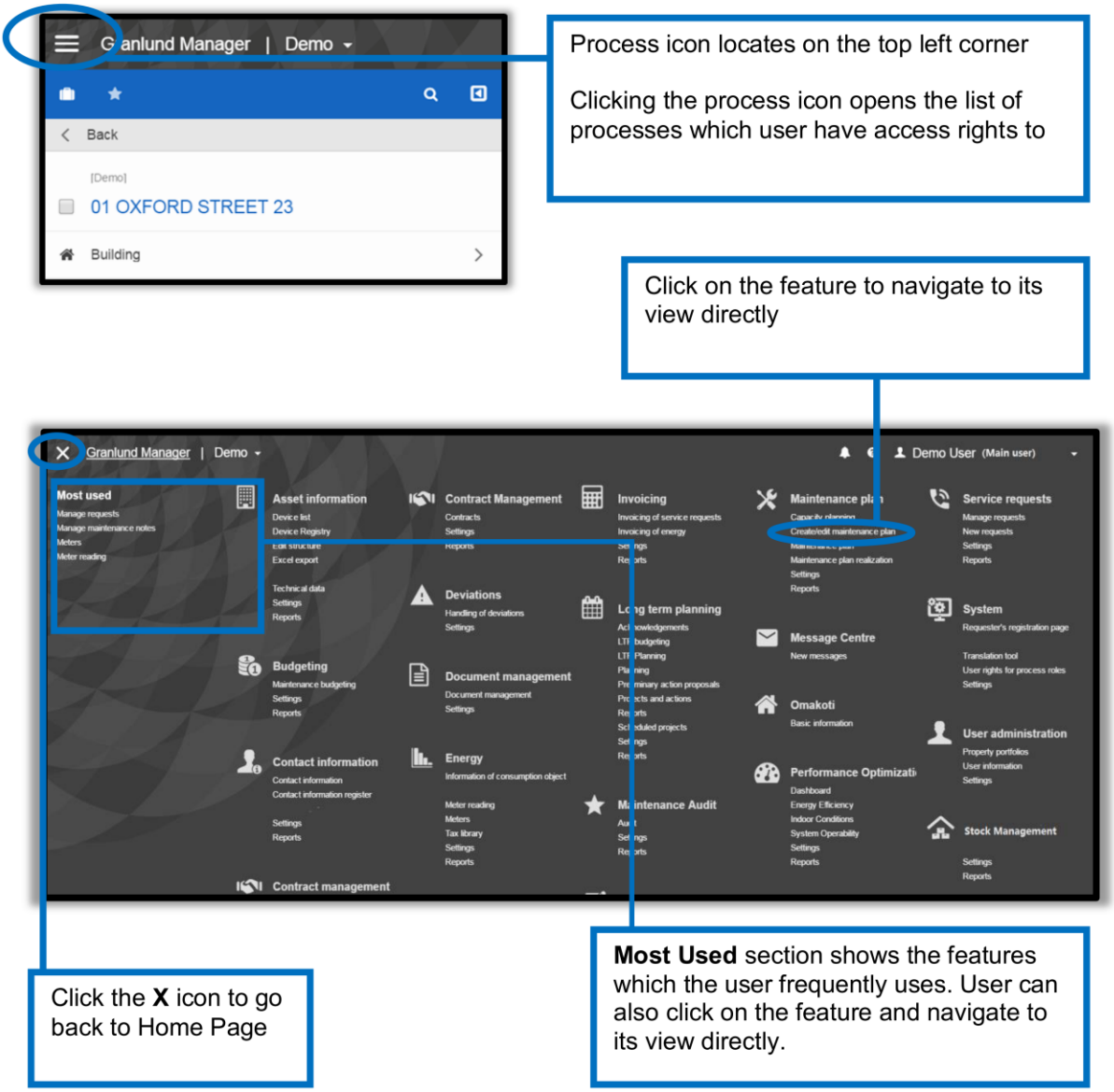


Figure 24 - Process Panel

Your Process Panel may look different from the one shown here, as the process and its functions are shown in accordance to your user access rights.

1.13.5 Performance Dashboard

To view Dashboard

1. Select site in Property Portfolio to view the site you are interested in.

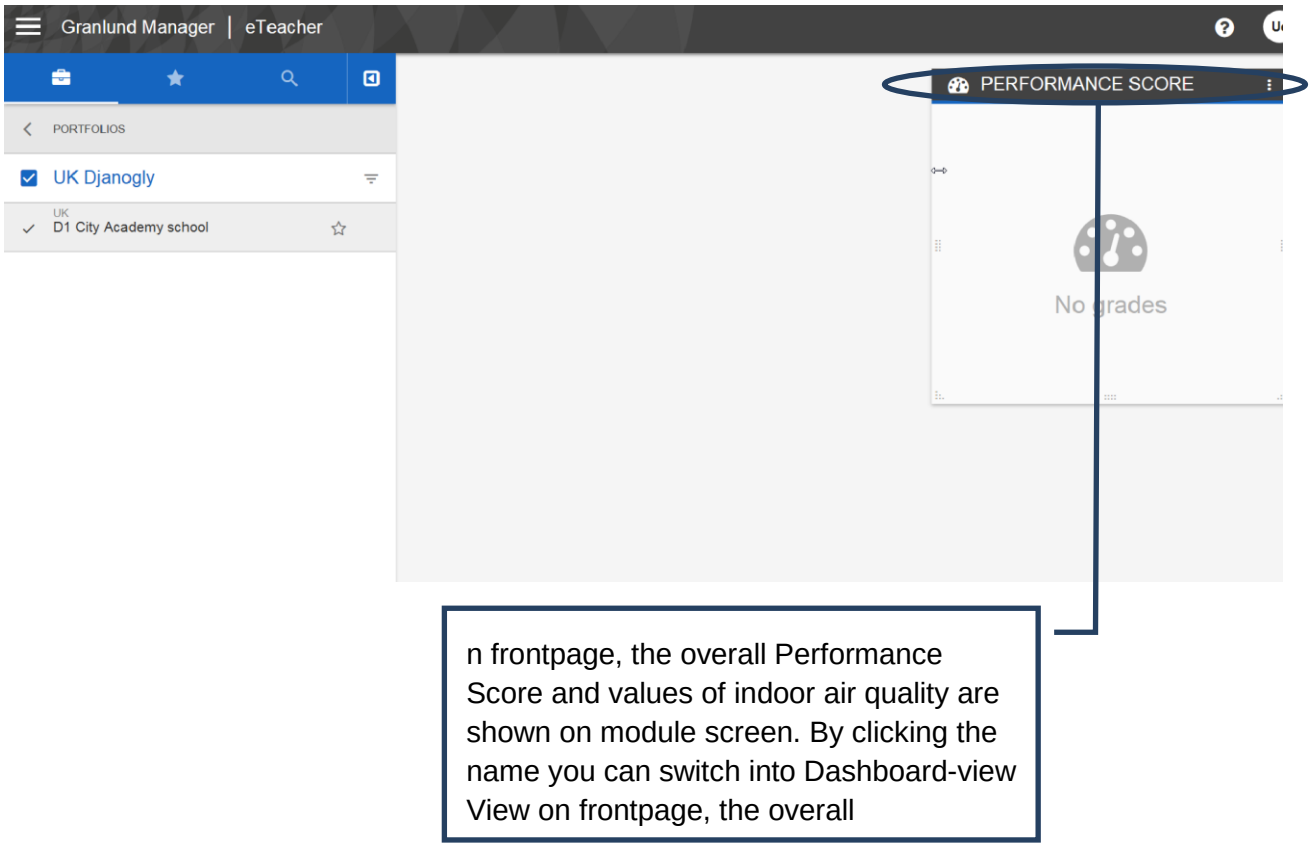


Figure 25 - Main page. Select site in property portfolio.

2. Select the Dashboard view by clicking on the dots

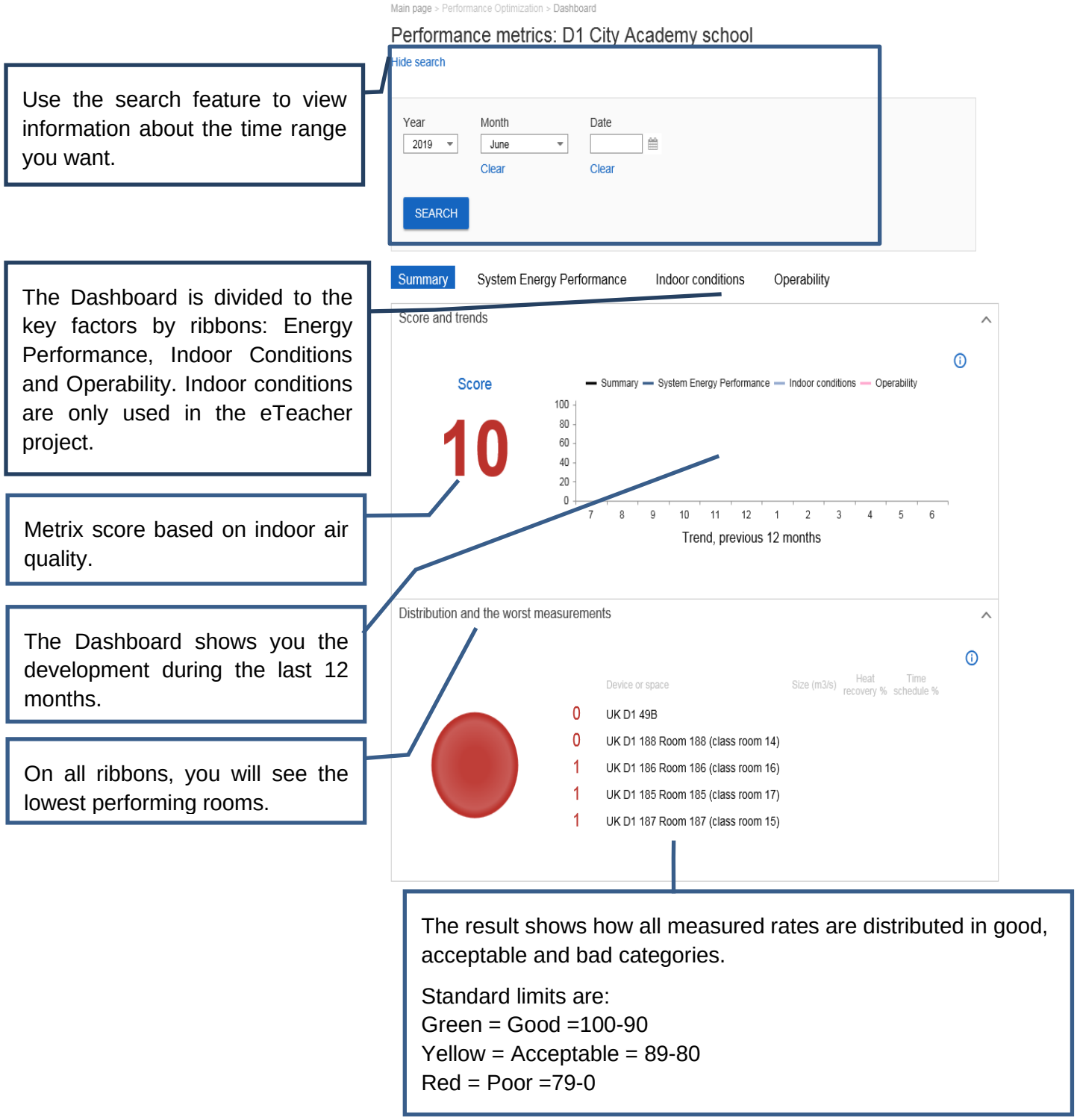


Figure 26 - Dashboard View

3. The default view is the Summary. Click on the panel to switch to indoor air conditions.

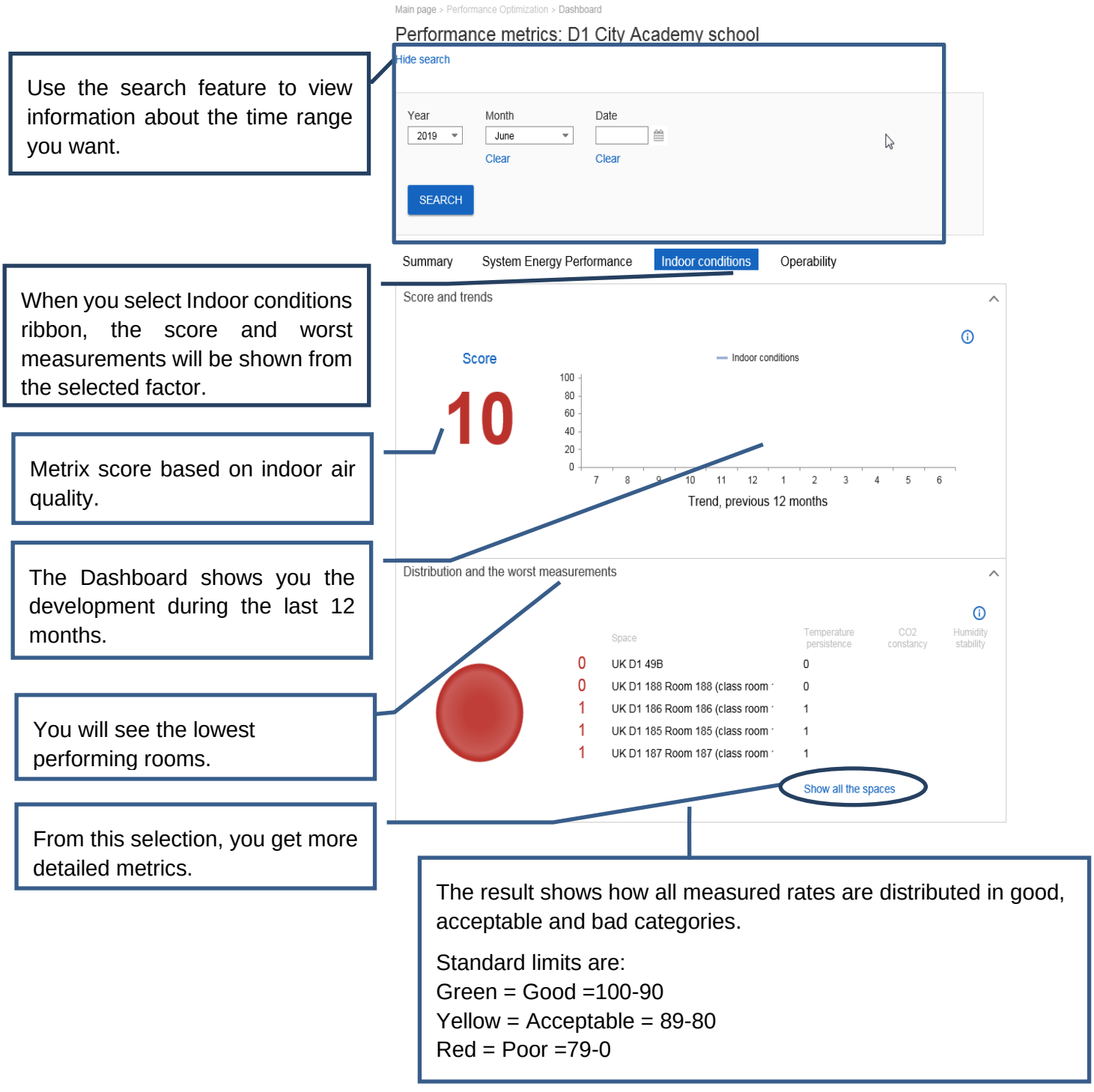


Figure 27 - Indoor conditions ribbon

1.13.6 Detailed Metrics, indoor conditions

1. In the pop up **Process Panel**, find **Performance Optimization** and click **Indoor Conditions**.

Figure 28 - Indoor air conditions, detailed metrics

1.13.7 Reporting

1. In the pop up Process panel, find Performance Optimization and click on Reports.

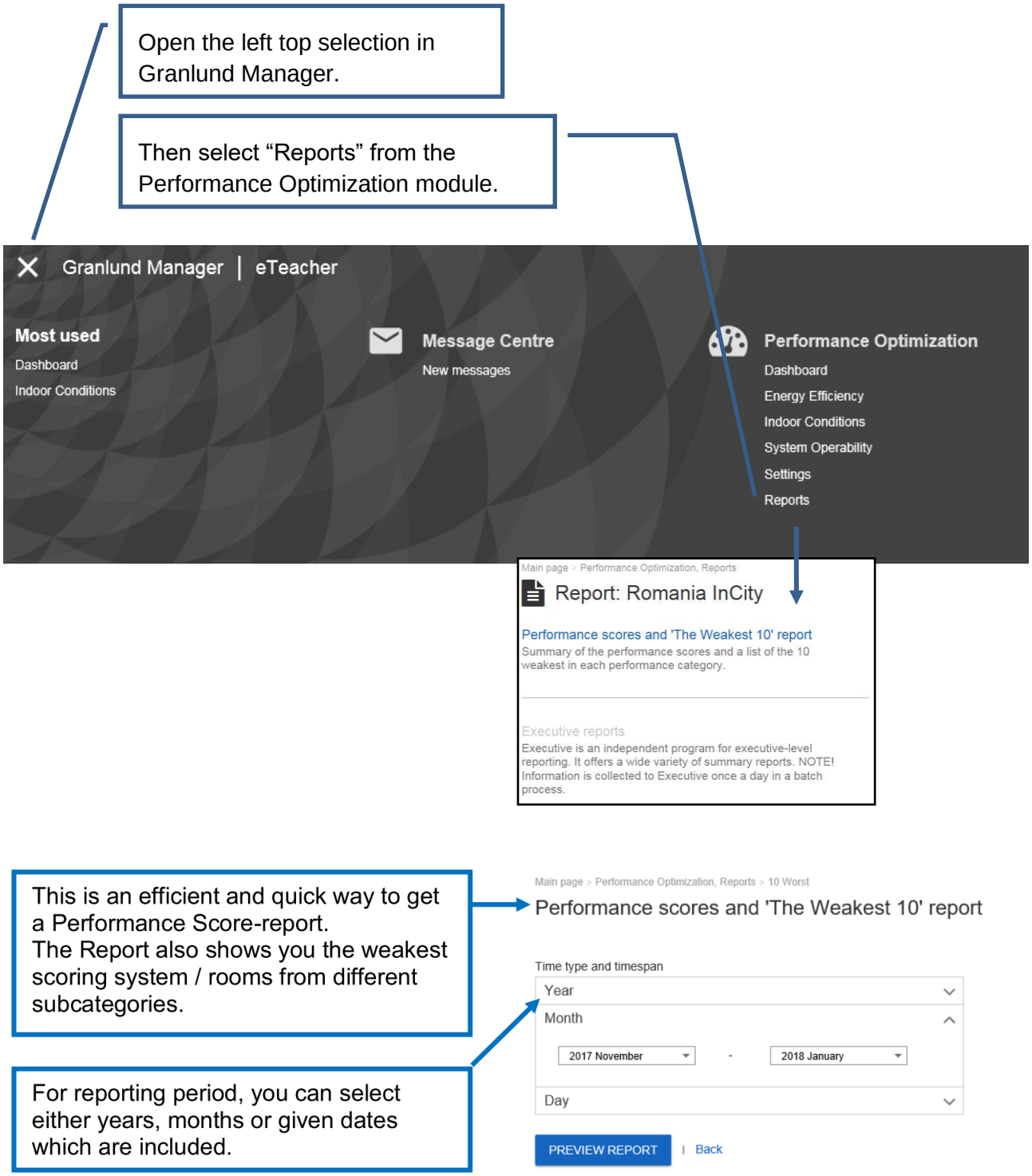
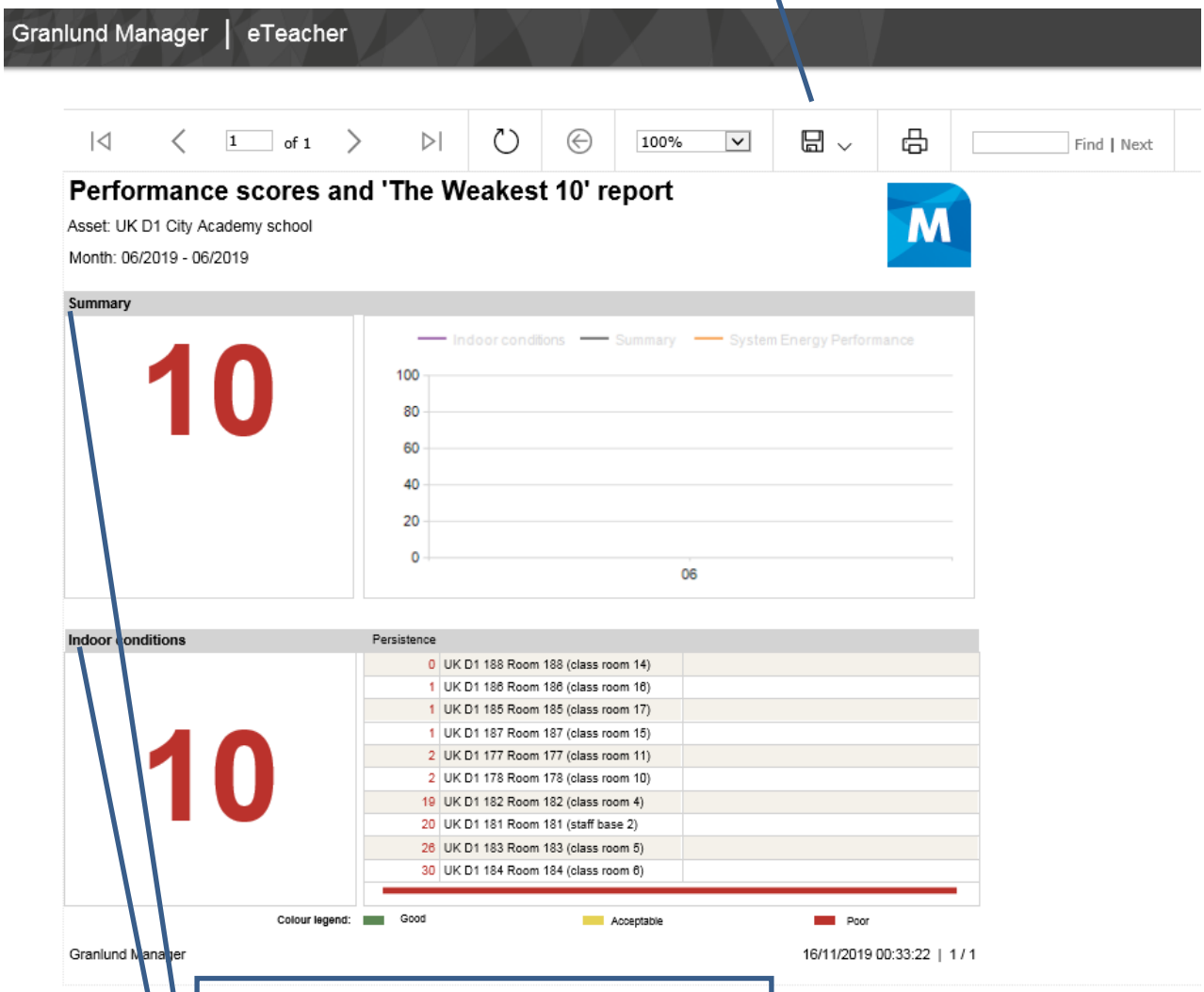


Figure 29 - Reports selection from process panel

2. By selecting “Preview Report” generates the report.

You can also download a PDF, Word or Excel version by clicking the disc icon.



This view shows the development during the wanted period.

These views show the situation on different sub-categories during the selected period and also the weakest 10 systems and / or during the period.

Figure 30 - The weakest 10’ report

1.14 Building's pulse

Building's pulse is score where building performance and users feedback are combined and represented through a single PULSE score. Building users can provide user feedback via the web-based user interface or through feedback buttons.

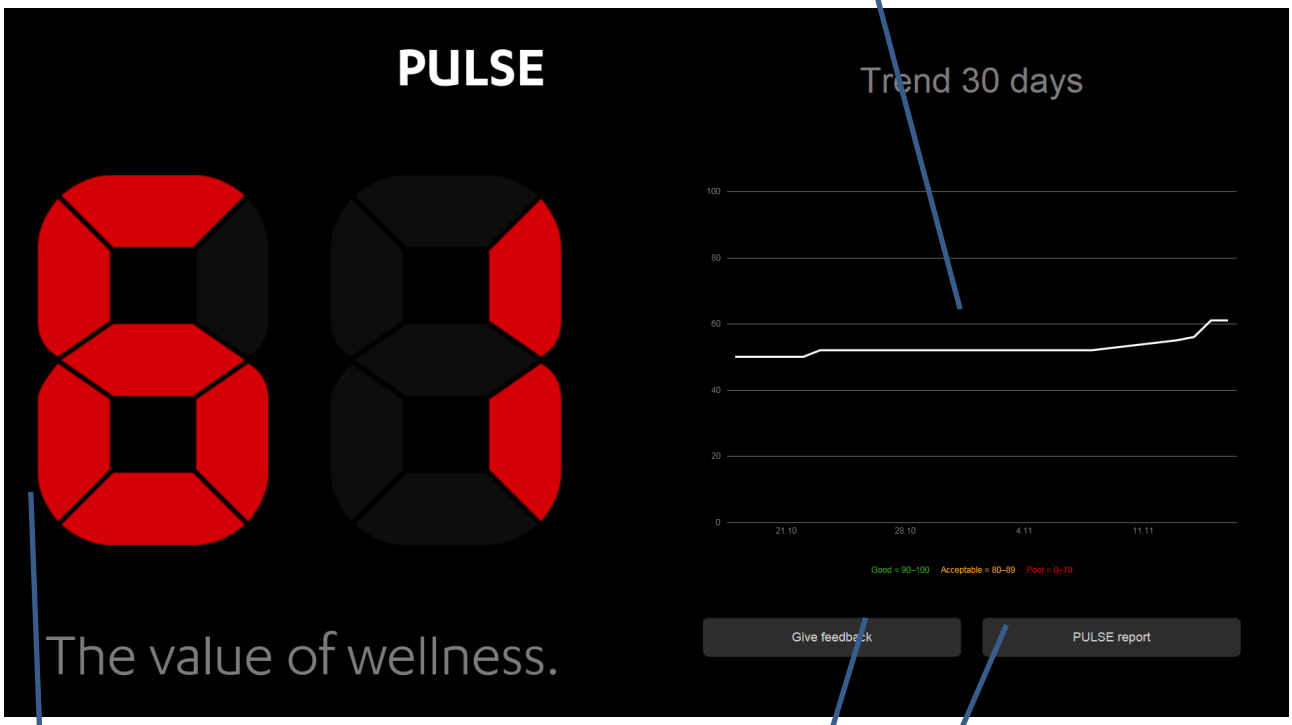


Figure 31 - Pulse score and it's history.

1.15 Virtual building

Virtual building is a virtual version of a real building. In a virtual building, real data can be displayed with spatial data using a 3D representation. Virtual real estate provides a more easily accessible way for people to read information and to target information at a specific location. For a human being, the thermal imaging-type 3D representation is more illustrative than a list of temperature measurements. In a virtual building , actual temperature measurements can be represented as in a thermal image. see picture x.

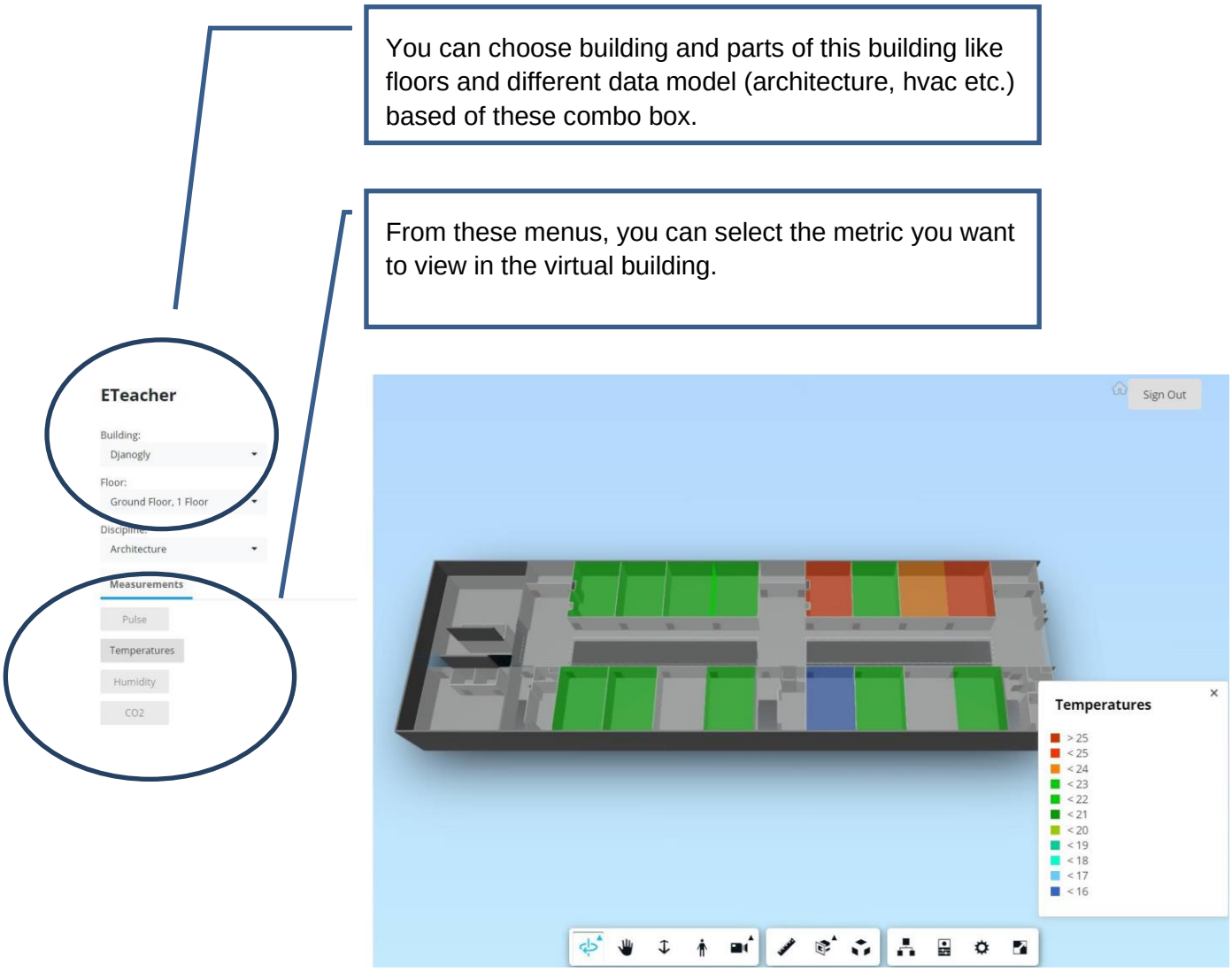


Figure 32 - Virtual building

2 Action Plan for Validation

This section describes the plan for the validation activities including:

- Detailed activities to be implemented by individual partners in each validation phase, detailing continuous, periodic or even ad-hoc activities
- Roles and specific responsibilities assigned to the partners for the support of the validation activities
- Specific steps and actions per pilot site, type of users and staging of specific interventions in each step.

The validation has been divided into 3 phases: kick off, core and closure phase (**¡Error! No se encuentra el origen de la referencia.**).

- The **Kickoff phase** takes place during the two first months (October 2019 and November 2019). It's the preparation of the demonstration and it aims to produce the planning and procedures for users training and engagement as well as for the supervision of the tools and monitoring data/sytems.
- The **Core phase** is from December 2019 till July 2020. It is the time when the building users are using eTEACHER tools. The keys of this phase are: the supervision of the monitoring and the tools to ensure good performance as well as supervision and enhance of the users´ engagement.
- The **Closure phase** lasts 2 months (August 2020 and September 2020) and is focused on evaluating results to draw main conclusions, best practises and suggestions.

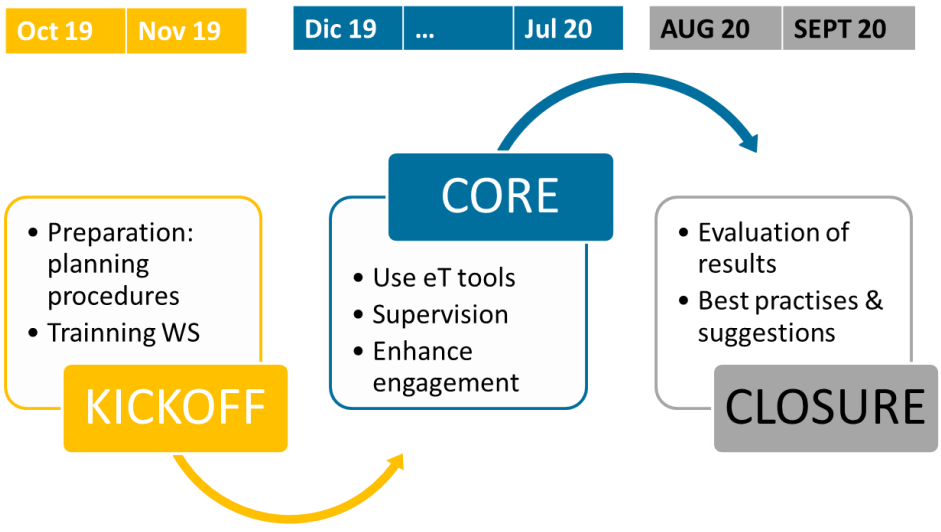


Figure 33 - Three Validation Phases: Kickoff, Core and Closure

2.1 Overall Action Plan

Figure 34 shows the overall action plan for validation with 10 activities foreseen for the first phase, 8 activities for the second phase and 4 activities for the last phase, the leader and contributors of every activity are defined as well as the timing. These validation activities are further described in the following sections.

				oct-19	nov-19	dic-19	ene-20	feb-20	mar-20	abr-20	may-20	jun-20	jul-20	ago-20	sep-20
				KICKOFF		CORE								ENDING	
	KICKOFF PHASE	Leader	Contributors												
1.1	Internal validation monitoring	CEM	NCC, ICPE, AGE, GRA, EAS, ACX, ASC												
1.2	Internal validation tools	GRA/ASC	EAS, ACX												
1.3	Internal demo	GRA/ASC	EAS, ACX												
1.4	Engagement planning	DMU	NCC, ICPE, AGE, CEM, ICE												
1.5	Procedure for engagement supervision	ASC	DMU, CEM												
1.6	Procedure for tools supervision and maintenance	GRA	ASC, ACX, EAS												
1.7	Procedure for monitoring supervision and maintenance	CEM	NCC, ICPE, AGE												
1.8	App, dashboard and tutorial available to be downloaded by users	ASC	GRA, EAS, ACX, NCC, ICPE, AGE		★										
1.9	Trainning workshops	ICE	NCC, ICPE, AGE, GRA, ASC		★										
	CORE PHASE	Leader	Contributors												
2.1	Building users have and use eT tools	ASC	NCC, ICPE, AGE			×	×	×	×	×	×	×	×	×	×
2.2	Monitoring supervision and maintenance	CEM	NCC, ICPE, AGE			×	×	×	×	×	×	×	×	×	×
2.3	Tools monitoring and maintenance	ASC	ACX, GRA, EAS			×	×	×	×	×	×	×	×	×	×
2.4	Engagement monitoring	ASC	DMU, NCC, ICPE, AGE			×	×	×	×	×	×	×	×	×	×
2.5	Enhance engagement	DMU	ASC, ICE, CEM, NCC, ICPE, AGE			×	×	×	×	×	×	×	×		
2.6	FF, surveys and users interviews	DMU	NCC, ICPE, AGE												
2.7	Result/Impacs evaluation	CEM	DMU, ASC						★						
2.8	Track results	CEM	DMU, ASC												
	CLOSURE PHASE	Leader	Contributors												
3.1	Analysis of monitoring data to evaluate impact on energy consumption, target behaviours and IEQ	CEM	NCC, ICPE, AGE												
3.2	Analysis on how frequently the tool are used to evaluate users acceptance and engagment	DMU	GRA, ASC												
3.3	Analysis on FF, survey and users interviews to evaluate users acceptance and engagement	DMU	NCC, ICPE, AGE												
3.4	Conclusions, best practices an suggestions for policity makers	CEM	ALL												★
3.5	Reports D4.6, D4.7, D4.8, D4,9	CEM	ALL												★

Figure 34 - Overall Action Plan for Validation

2.1.1 Kickoff Phase

10 activities have been defined in this phase focused on the internal validation and demonstration of the tools, the preparation of the training workshops and the definition of procedures for supervision of the tools and users as well as for increasing users´ engagement during the demonstration.

Internal Monitoring Validation

Activity description:

This activity consists of checking and validating that the monitoring systems are working correctly. It means all monitoring devices are sending quality data to the central database. This validation is carried out internally by the consortium before given the tools to the users. However, the monitoring systems will be continuously supervised during the core phase (see activities 1.6 & 2.2). 3 validation levels have been defined:

1st validation level – Pilot coordinators (NCC, ICPE, AGE) validate that the sensors are measuring correctly and sending quality data to the local databases

2nd validation level – ACX validates that quality monitoring data is in the central database

3nd validation level – CEM as demo coordinator visualize the monitoring data and validate data quality. Other tools developers (EAS, GRA) validate that the quality of the monitoring data received by their tools is appropriated.

When a monitoring issue is identified by any of the validators, it is reported in a common document to pilot coordinators and/or ACX and allocated (if possible) into monitoring system or central databases. If the problem is allocated into the monitoring system/local database should be solved by pilot coordinators. If the problem is allocated in central database should be solved by ACX. When the problem is solved, its status should be updated in the common document.

Pilots sites details

Pilot coordinators have used different methods for their validation ((Calleja-Rodríguez, y otros, 2019)). Table 2.1 summarises the methods used for 1st validation level in every pilot site.

Table 2.1: Validation methods used by pilot coordinators

Pilot site	Method used for 1st validation level
Spanish pilots	The method used for the validation consists of checking sensors status in local database (Calleja-Rodríguez, y otros, 2019)
Romanian pilots	They use three ways to validate data: their online platform[2], NETATMO system (Netatmo, 2019) and HOMEMATIC (eQ-3, 2019) system (see D4.2)

[2] http://e-proclient.com

UK Pilots	They use eedomus gateway website, Measure My Energy portal and Amazon Webservices database to validate data.

Partners Roles:

The partners involved are **CEM**, NCC, ICPE, AGE, GRA, EAS, ACX

- CEM is responsible for coordinating the activity, visualize monitoring data and report on data quality issues.
- Pilot coordinators (NCC, AGE, ICPE) are responsible for validating that the monitoring devices send quality data to the local databases
- ACX is responsible for validating that quality monitoring data is stored in the central database

Other tools developers (EAS, GRA) are responsible for validating the quality of the monitoring data received by their tools through the central database and reporting if any problem is identified in the data.

Internal Tools Validation

Activity description

On top of the internal validation that every developer must carry out with their tools, the integration between different eTEACHER tools must be tested. Specifically, 5 tools connections need to be validated:

- UBCI and WiA by ACX and EAS
- UBCI and Metrix/Pulse by ACX and GRA
- UBCI and eT App by ACX and ASC
- eT App and WiA by ASC and EAS
- eT App and Metrix/Pulse by ASC and GRA

For that purpose, the involved partners have organised parallel online meetings to test the connections.

Pilots sites details

The main particularity is related to the validation of the UBCI which includes its integration with pilot sites. In the case of Spanish and UK pilots, this validation is related to the eTEACHER SyncTool which is responsible for updating the central database (Frank & Calleja-Rodríguez, 2019). In the case of Romanian pilots, this validation is related to eTEACHER API, which is responsible for pushing data from local to central database.

Partners role

The partners involved are **GRA, ASC**, EAS, ACX

- GRA is one of the leaders of this activity. In addition, they are responsible for validating their tools (Metrix and Pulse) as well as the for the integration of their tools, Metrix and Pulse, with UBCI and eT App

- ASC is one of the leaders of this activity. They are responsible for validating their tools (eT App and Dashboard) as well as the integration of their tools with WiA, UBCI and Metrix/Pulse
- EAS is responsible for validating WiA as well as its integration with UBCI and eT App
- ACX is responsible for validating UBCI as well as its integration with WiA, Metrix/Pulse and eT App/Dashboard

Internal Demo

Activity description

This activity consists of tools demos carried out by developers to other partners. This is a kind of internal training and has several objectives:

- Prepare pilot coordinators for the training workshops
- Collect feedback from other partners to ensure that the tools and their introduction in the pilots are user friendly.
- Validate tools for the demonstration

Two internal demo sessions have been planned. One face to face session in the meeting of Malaga in October 2019 and one online session in November 2019

Pilots sites details

The internal demos are done in the same way and at the same time for all the pilot sites

Partners role

The partners involved are **GRA, ASC**, EAS, ACX

- GRA is responsible for doing the demo of their tools Metrix/Pulse that includes the following tags in the App and functionalities: Feedback, Metrix, Pulse and Virtual Building.
- ASC is responsible for doing the demonstration of their tools that includes the following tags: Recommendations, Ranking, Carbon, Dashboard, energy mix
- EAS is responsible for finalizing WiA for the demos so ASC can show the functionalities of their tool.
- ACX is responsible for finalizing UBCI for the demos so GRA and ASC can show their tools.
- CEM and ICE are responsible for scheduling, managing and organizing the demos

Engagement Planning

Activity description

The engagement planning aims to define monthly actions to engage more users such as; face-to-face training or interactive workshops, online workshops, pilot visits, distributing tools videos, feedback forums, email notifications/newsletters, poster campaigns, use of competitions (within pilot buildings and/or across pilot buildings)

The overall engagement planning is the same for all the pilots. Initially all the pilots' sites will have training workshops and videos. The rest of the interventions/actions will be applied on demand depending on the users' engagement in every pilot, such participation will be monitored every month.

Partners role

The partners involved are **DMU,** NCC, ICPE, AGE, CEM, ICE

- DMU leads this activity and will develop the engagement planning
- NCC, ICPE and AGE support DMU providing their experience and knowledge on pilot sites.
- CEM contributes to the engagement planning as demo coordinator
- ICE supports DMU providing their experience and skills on dissemination and communication.

Procedure for Engagement Supervision

Activity description

This procedure defines the frequency, method and indicators used to track the users´ engagement during the demonstration. eTEACHER will use the Analytics tool of the App (Figure 35) to track the users' engagement. Specifically, the number of users connected in a specific timeframe to the app will be used as indicators to track the user engagement. These indicators will be provided per building in order to identify which buildings have low engagement. The resulting figures will be reported every month to the consortium in the monthly webex and the consortium will decide whether actions to engage more users are necessary or not.

Pilot sites

The procedure for the supervision of the users engagement is the same in all the pilot sites.

Partners roles

Partners involved: **ASC**, DMU, CEM

- CEM specifies the requirements for tracking the users´ engagement in terms of indicators to be used and frequency of the supervision
- DMU provides its experience on users´ engagement to define the procedure
- ASC is leading this activity as developer of the analytics tool used for the supervision. They are responsible for providing the final procedure that fulfil the requirements of CEM and DMU

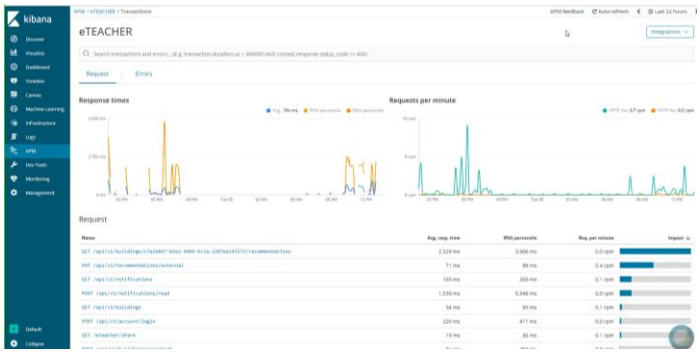


Figure 35: Analytic tool used for supervising the users engagement

Procedure for Tools Supervision and Maintenance

Activity description

This procedure defines the frequency, methods and indicators that will be used to supervise the proper performance of the tools, identify problems and solve them quickly. The supervision will be done every day/week by the developers of the tools (GRA, EAS, ACX, ASC). Every developer will use their own methods, tools and indicators to track the performance of their tools. Developers will report on the incidences every month in the monthly progress webex. After identifying a bug, the developers will find a solution and update their tools as soon as possible. These updates cannot all be done directly, since some require an update of the app. To not reduce the number of users, the developers will try to reduce the updates, so users are not seeing update notifications everyday, but this should be not so far away timing wise. The update of the tools is different in every case.

Pilot sites

The only particularity in the pilots is related to the supervision of UBCI since the central database is updated by the SyncTool in Spain and UK and by the eTEACHER API in Romanian.

Partners roles

Partners involved: **GRA**, ASC, ACX, EAS

- GRA manages this activity, collecting and aligning the methods used by all the developers to track the performance of their tools and update them.
- Tools developers (GRA, ASC, ACX and EAS) are responsible for defining the methods and indicators to track the performance of their tools and update them to solve incidences.

Procedure for Monitoring Supervision and Maintenance

Activity description

This procedure defines the frequency and methods used to supervise the proper performance of the monitoring systems, identify problems and solve them quickly. This procedure was already defined in (Calleja-Rodríguez, y otros, 2019) and it has 3 steps:

Step 1: Pilot coordinators (ICPE, NCC, AGE) check the sensors and data every week. If any issue is identified they report and solve as soon as possible.

Step 2: CEM as demo coordinator review the monitoring data and report on data quality issues every month. CEM has developed some scripts in Python to connect to the databases and represent the monitoring data into graphs**.**

Step 3: Tools developers (GRA, EAS, ACX) report on monitoring issues identified during the implementation or supervision of their tools (every month approximately)

A shared life document has been created to report on monitoring data issues where the problems are described, the responsible to solve it is defined and the status of the problem is indicated

Pilot sites details

The methods used by pilot coordinators to supervise the monitoring data are different:

- Spanish pilots check sensors status in local database.

- Romanian pilots visualize sensors status and monitoring data on their own online platform[3], NETATMO system (Netatmo, 2019) and HOMEMATIC (eQ-3, 2019) system
- UK pilots use eedomus gateway website, Measure My Energy portal and Amazon Webservices database to validate data

Partners Roles:

The partners involved are **CEM**, NCC, ICPE, AGE, GRA, EAS, ACX, ASC

- CEM is responsible for coordinating the activity and providing the overall procedure to supervise the monitoring systems and data
- Pilot coordinators (NCC, AGE, ICPE) are responsible for providing the procedure to supervise their monitoring systems and local databases (step 1)
- Tools developers (EAS, ACX, GRA) are responsible to refine step 3 of the overall procedure

App to be Downloaded by Users

Activity description

This activity consists of uploading the app to Google Play Store (Android) and iOS App Store (Apple) so the pilot users can download eTEACHER tools and use them. It is considered as a milestone of the Kickoff phase.

Pilot sites details

eTEACHER tools and their corresponding documentation will be translated to the 3 languages of the pilot sites: Romanian, Spanish and English

Partners roles

The partners involved are **ASC**, NCC, ICPE, AGE, GRA, EAS, ACX

- ASC is responsible for uploading the app to Google Play and iOS App Store
- GRA, ACX and EAS must support ASC 1) finalising their tools and their integration with eTEACHER App and dashboard 2) providing the adequate documentation of their tools.
- Pilot coordinators (AGE, ICPE, NCC) will support ASC by translating the App and the information about the App in every language

Training Workshops

Activity description

This task consists of organising and holding the training workshops to present eTEACHER tools to the pilot users, teach them how to use our tools and encourage them to use it. It includes defining the agenda and content of the workshops, producing the material to be used (presentation, videos, guides, etc.), organise the workshops in every pilot sites in terms of logistic (location, date, etc.) and carry out the trainings (presentations and onsite support to pilot users)

Pilot sites details

[3] http://e-proclient.com

There is common material (presentation, manual and videos) and guidelines for all the workshops but every pilot coordinator can customise the training workshops to every pilot building taking into account the type of users. In addition, the dates and location of the workshops depend on the availability of the pilot users. **Table 2** and **Table 3** summarises the functionalities presented and emphasized to every type of user.

Table 2: Functionalities related to IEQ advisor presented and emphasized to end-users

	Feedback	Metrix	Pulse	Virtual building
OAR	Employees	Facility Manager	Facility Manager & Building Manager	FMs
Guareña	Doctors, nurses, patients and other staff[4]	Facility Manager	Facility Manager & Building Manager	FMs
Villafranca	Doctors, nurses, patients and other staff	Facility Manager	Facility Manager & Building Manager	FMs
Torrente	Teachers, students and other staff	Facility Manager	Facility Manager & Building Manager	FMs
Arcoiris	Teachers and other staff	Facility Manager	Facility Manager & Building Manager	FMs
Residential Badajoz	Residents	Facility Manager	Facility Manager & Building Manager	FMs
InCity	Residents	Facility Manager	Facility Manager & Building Manager	FMs
Djanogly	Teachers and other staff	Facility Manager	Facility Manager & Building Manager	FMs
NCC	Employees	Facility Manager	Facility Manager & Building Manager	FMs

[4] Staff: cleaning crew, administrative staff, etc.

Table 3: Functionalities related to energy advisor presented and emphasized to end-users

	Carbon/Ranking	Recommendations	Energy Mix	Dashboard
OAR	Employees	Employees	Facility Manager & Building Manager	Facility Manager & Building Manager
Guareña	Doctors, nurses and other staff	Doctors, nurses and other staff	Facility Manager & Building Manager	Facility Manager & Building Manager
Villafranca	Doctors, nurses and other staff	Doctors, nurses and other staff	Facility Manager & Building Manager	Facility Manager & Building Manager
Torrente	Teachers, students and other staff	Teachers, students and other staff	Facility Manager, Building Manager, students, teachers	Facility Manager & Building Manager Students, teachers
Arcoiris	Teachers and other staff	Teachers and other staff	Facility Manager & Building Manager	Facility Manager & Building Manager
Residential Badajoz	Residents	Residents	Facility Manager, Building Manager, residents	Facility Manager & Building Manager, residents
InCity	Residents	Residents	Facility Manager & Building Manager, residents	Facility Manager & Building Manager, residents
Djanogly	Teachers and other staff	Teachers and other staff	Facility Manager & Building	Facility Manager & Building

			Manager, teachers	Manager, teachers
NCC	Employees	Employees	Facility Manager & Building Manager	Facility Manager & Building Manager

Partners roles

The partners involved are **ICE**, NCC, ICPE, AGE, GRA, ASC

- ICE is responsible for the highlevel management through the 3 pilot sites (content, agenda, material, guidelines, etc.)
- Pilot coordinators (ICPE, AGE, NCC) are responsible for holding the workshops in every pilot site and translating material, if necessary
- Tools developers (ASC, GRA) produce the material to explain their tools (videos, tutorial, e-guides, etc)
- CEM will support the highlevel organisation of the workshops as demo and project coordinator

2.1.2 Core Phase

Building Users Have and Use eTEACHER Tools

Activity description

The core phase is focused on pilots´ users experiencing our tools. For that purpose, pilots users must download the tool from Apple Store or Google Play, register, configure the App, start using it and keep using it.

Pilots site details

The users of the tools are different in every pilot

- OAR and NCC offices: employees, facility managers and building managers
- Guareña and Villafranca HCC: doctors, nurses and other staff like cleaning crew and administrative staff as well as facility managers and building managers
- Torrente High School: Teachers, students and other staff like cleaning crew and administrative staff as well as facility managers and building managers
- Arcoiris and Djanogly: teachers and other staff like administrative staff and cleaning crew as well as facility managers and building managers
- InCity and Badajoz residential: residents, facility managers and building managers

Partners role

The partners involved are **ASC**, NCC, ICPE, AGE

- ASC is responsible for uploading the App in Apple Store or Google Play and create the manuals and videos to explain it
- Pilot coordinators are responsible for promoting the use of eTEACHER tools in the pilot buildings

Monitoring Supervision and Maintenance

Activity description

The performance of the monitoring system and the quality of the monitoring data is checked. If any problem is identified the monitoring system will be repaired. The procedure defined in activity *1.7 Procedure for monitoring supervision and maintenance* is used. There are weekly and monthly supervisions. The problems, their status and solutions are reported in a shared document in real time and explained to the consortium every month during the progress online meeting

Pilots sites details

The methods used by pilot coordinators to supervise the monitoring data are different:

- Spanish pilots check sensors status in local database.
- Romanian pilots visualize sensors status and monitoring data on their own online platform[5], NETATMO system and HOMEMATIC system
- UK pilots check visualize sensors in eedomus gateway website, Measure My Energy portal and Amazon Webservices database

Partners roles

The partners involved are **CEM**, NCC, ICPE, AGE

- Pilot coordinators (ICPE, NCC, AGE) are responsible for checking the sensors and data every week. If any issue is identified they report and solve as soon as possible
- CEM review the monitoring data and report on data quality issues every month. They will coordinate the activity
- Tools developers (GRA, EAS, ACX) report on monitoring issues identified during the implementation or supervision of their tools (every month approximately)

Tools Supervision and Maintenance

Activity description

The performance of tools is checked. If any problem is identified the corresponding tool will be repaired and/or updated as soon as possible. The procedure defined in activity 1.7 Procedure for tools supervision and maintenance is used. There are daily, weekly and monthly supervisions. The problems, their status and solutions are reported in a shared document in real time and explained to the consortium every month during the progress online meeting

Pilots sites details

[5] http://e-proclient.com

The only particularity in the pilots is related to the supervision of UBCI since the central database is updated by the SyncTool in Spain and UK and by the eTEACHER API in Romanian.

Partners roles

The partners involved are **ASC**, ACX, GRA, EAS

- ASC leads this activity
- Tools developers (GRA, EAS, ACX, ASC) are responsible for tracking the performance of their tools and repair/update their tools as soon as possible

Engagement Monitoring

Activity description

The users´ engagement is tracked every week in terms of number of users using the App Analytics. The figures of the users´ engagement will be reported to the consortium every month in the progress online meeting.

Pilot sites

The supervision of the users´ engagement is the same in all the pilot sites.

Partners role

The partners involved are **ASC**, GRA, DMU, NCC, AGE, ICPE

- ASC is the main responsible for the engagement monitoring since their tool will be used
- Pilot coordinators (NCC, AGE, ICPE) and DMU are also responsible for tracking the figures in order to be able to react.

Enhance Engagement

Activity description

The users´ engagement is enhanced, if it is necessary, every month applying the actions (pilot visits, targeted campaigns, etc.) defined in activity *1.4 engagement planning* to engage more users. The decision whether to apply an engagement action or not is taken in the monthly progress meeting of the project based on the figures of the users´ engagement in every pilot. This is a monthly action but it will be applied only in those pilot buildings that really need it.

Pilot sites

The first actions to enhance users´ engagement are the same: training workshops, feedback forum and videos. However, the subsequent actions to enhance engagement will be applied and customised to every pilot according to their needs (level of engagement, target users) and the experience in other pilots where these actions have been applied before. For example, if it is identified that visits are more successful than emails, then these kinds of actions will be prioritized.

Partners role

The partners involved are **DMU**, NCC, AGE, ICPE, ICE, ASC, CEM

- DMU coordinates this activity as expert in users´ engagement.

- Pilot coordinators (ICPE, AGE, NCC) are responsible for applying the actions to enhance users´ engagement directly in the pilot buildings
- ICE provides their expertise in D&C to support pilot coordinators to elaborate these actions. If it is necessary, they will produce material such as posters, videos, etc.
- ASC is also involved in this activity. If it is necessary and feasible, they will update the App to have higher impact on the users
- CEM will support the enhancement of the engagement as demo coordinator.

FF, Surveys and Users Interviews

Activity description

This activity consists of developing, organising and carrying out the feedback forums, surveys and users interviews to collect users´ feedback on our tools. This activity is key to evaluate the project results and see the impact of our project.

Feedback forums are scheduled for December2019/January 2020 and March/April 2020. A first round of interviews and surveys are planned in the middle of the demonstration phase about February/March. A second round of interviews and surveys are planned at the end of the demonstration phase about July 2020. Interviews shall be used to target specific user types, whereas surveys can be used to collect feedback from a more substantial and wider user group. The results of the surveys, feedback forums and interviews will be analysed in terms of users acceptance, perception and engagement of the tools.

Pilot sites

The FF, surveys and users interviews shall follow the same guidelines in all the pilots

Partners role

The partners involved are **DMU**, NCC, AGE, ICPE,

- DMU designs FF, surveys and users´ interviews. They provide guidelines, training and support to pilot coordinators.
- Pilot coordinators (ICPE, AGE, NCC) carry out the FF and interviews onsite and distribute surveys in every pilot

Result/Impacts Evaluation

Activity description

This activity consists of analysing monitoring data on energy consumption and indoor environmental conditions as well as surveys and interviews after eTEACHER deployment to evaluate the behavioural change and its impact on energy savings and indoor climatic conditions. First conclusions of the analysis are drawn by March 2020 and it is used to evaluate the demonstration and have a reaction to improve the results if it is necessary (update tools, improve e-guides, increase dissemination, etc.)

Pilot sites

The analysis is the same in all the buildings although the results will be different in every building.

Partners role

The partners involved are **CEM**, DMU, ASC:

- CEM does the analysis based on monitoring data: characterization of energy consumption, IEQ and target behaviour after the deployment of eTEACHER to evaluate energy savings, improvement of IEQ and behavioural changes. In addition, CEM will evaluate the indicators defined to measure the project impacts.
- DMU does the analysis based on surveys and interviews to evaluate the users engagement, acceptance and any resulting behaviour change from the tools
- ASC provides the data recorded by their analytics tool regarding the users´ engagement.

Track Results

Activity description

The analysis described above, specially the analysis based on monitoring data, is continuously extended and updated with new data and the results are tracked till the end of the core phase in order to identify demonstration problems and solve them as soon as possible.

Pilot sites

Initially, the tracking of the results is the same in all the pilot buildings. However, those pilots identified as the weakest in terms of the demonstration will get more attention and closer supervision.

Partners role

The partners involved are **CEM**, DMU, ASC:

- CEM leads this activity and tracks results on behavioural change and their impact on energy savings and IEQ improvement based on monitoring data
- DMU tracks results on users engagement, acceptance and behaviour change based on surveys and interviews
- ASC supports CEM and DMU by providing the data recorded by their analytics tool regarding the users´ engagement.

2.1.3 Closure Phase

Analysis of monitoring data to evaluate impact on energy consumption, target behaviours and IEQ

Activity description

All the monitoring data collected before and after the deployment of eTEACHER is analysed to evaluate the behavioural change and its impact on energy consumption and IEQ. For that purpose, energy savings, improvement of IEQ, improvement of target behaviours and indicators of project impacts are characterized.

Pilot sites

The analysis of monitoring data and the evaluation of project impacts is the same in all the buildings

Partners role

The partners involved are **CEM**, ICPE, AGE, NCC:

- CEM leads this activity and is the main responsible for the analysis
- Pilot coordinators (ICPE, NCC and AGE) support CEM on the analysis

Analysis on how frequently the tools are used to evaluate users acceptance and engagement

Activity description

This is the analysis of the users´ engagement and acceptance based on the indicators defined to track the use of the tools in activity *1.5 Procedure for engagement supervision* (time series of users connected and time series of the usability of every tag/functionality).

Pilot sites

This activity is the same in all the pilots

Partners role

The partners involved are **DMU**, GRA, ASC:

- GRA and ASC provides the figures on the use of their tools
- DMU does the analysis

Analysis on FF, survey and users interviews to evaluate userrs acceptance and engagement

Activity description

This is the evaluation of the users´ engagement and acceptance based on surveys, interviews and feedback forum data

Pilot sites

This activity is the same in all the pilots

Partners role

The partners involved are **DMU**, AGE, CEM, ICPE:

- DMU elaborates the FF, surveys and users interviews as well as analyse the results
- Pilot coordinators (AGE, CEM, ICPE) carry out the FF, surveys and interviews followings the guidelines provided by DMU, they also report on the results.

Conclusions, best practices and suggestions for policy makers

Activity description

It consists of collecting the results of all the analysis, based on monitoring data, surveys and interviews, evaluating the project impacts and drawing main conclusions. In addition, the experience and feedback from the different point of views (ESCOS, public agencies, council, developers, etc) provided by different partners is also collected and analysed. Lessons learned, best practices and suggestions for policy makers are part of those conclusions.

Pilot sites

This activity is the same in all the pilots

Partners role

All the partners are involved in this activity:

- CEM will lead this activity, compile the results of all the analysis and provide the conclusions
- DMU will support CEM providing results related to users´ engagement, acceptance, surveys and interviews
- All other partners will contribute to this global analysis of the results providing their experience and expertise.

Reports D4.8 and D4.9

Activity description

This activity consists of writing the report on evaluation of eTEACHER results and suggestions for policy makers to incentive behavioural change

Pilot sites

This activity is the same in all the pilots

Partners role

All the partners are involved in this activity:

- CEM will lead this activity and is responsible for writing D4.8 Evaluation of eTEACHER results.
- AGE is responsible for writing D4.9 suggestions for policy makers to incentive behavioural change.
- All partners will support AGE and CEM to write the deliverables.

3 Use Cases and Actors

eTEACHER is deployed and demonstrated in 12 building that includes offices, residential buildings, schools and heath care centres (Jiménez- Redondo, y otros, 2018). The target users are building and facility managers, cleaning crew, office employees, security teams, householders, teachers, medical staff, students and patients. Six use cases have been defined (Calleja-Rodríguez, y otros, 2018):

ECM1 - Save cooling energy using HVAC control, windows and blinds; (Calleja-Rodríguez, y otros, 2018)

ECM2 - Save heating energy using HVAC control, windows and blinds;

ECM3 - Save lighting energy using natural lighting or power-off when there are not people using it;

ECM4- Save electric energy power-off unnecessary appliances, devices or equipment;

BP1 - Detection of building underperformance conditions;

IEQ1- Monitoring and advisor of indoor environmental quality to improve the wellness and productivity

Table 3.1 summarizes pilot buildings, target users and use cases.

Table 3.1 Pilot buildings, target users and use cases

Type	Building name (location)	Target users	USE CASES
Office	OAR - Organismo Autónomo de Recaudación (Spain) 2011, 3210.97 m^2 (3 floors)	Building and facility managers, employees, cleaning crew, security team	ECM1, ECM2, ECM3, BP1, IEQ1
	NCR - Nottingham Council House (UK) 1927, 5826 m^2 (7floors)	Building & facility managers and employees	ECM2, ECM3, ECM4, BP1, IEQ1
Residential	Apartment Block Badajoz (Spain) 1984, 4540 m^2, 5 floors	Building & facility manager and householders	ECM1, ECM2, ECM3, ECM4, IEQ1
	InCity (Romania) 2009, 67900 m^2, 4 buildings	Energy/Facility managers and householders ESCO	ECM1, ECM2, ECM3, ECM4, BP1, IEQ1
School	IES Torrente Ballester - High School (Spain) 1965, 5307 m^2 3 floors	Building & facility managers, staff, teachers & students	ECM2, ECM3, IEQ1
	CEI Arco Iris – Kindergarten (Spain)	Building & energy managers and teachers	ECM1, ECM2, ECM3, ECM4, IEQ1

Type	Building name (location)	Target users	USE CASES
	1976, 905 m2, 1 floor		
	Djanogly City Academy (UK) 2005, 9163 m2, 2 floors	Building & facility managers and teachers	ECM1, ECM2, ECM3, ECM4, BP1, IEQ1
Health Care Centre	Guareña (Spain) 2000, 1270 m^2, 2 floors	Building and facility managers, medical staff and patients	ECM1, ECM2, ECM3, ECM4, IEQ1
	Villafranca de los Barros (Spain) 2002, 2180 m^2, 2 floors	Building and facility managers, medical staff and patients	ECM1, ECM2, ECM3, ECM4, BP1, IEQ1

On top of the target users, there are other important actors already identified in D5.2 (Lóhr, Doretto, Kopf, & Anghelita, 2019) such as ESCOS and utility companies whose cost-benefits will be analysed based on the demonstration experience.

ESCOs are considered as potential customers for the eTEACHER solution. Their responsibilities include energy cost reductions and they can offer eTEACHER to their clients as an energy efficiency measure to save energy and costs. In addition, eTEACHER can provide the ESCO a solution for end-users engagement. It is also a tool to have more intensive contact with their building users to work together on reducing energy and to receive valuable customer data.

In the same way, utilities can use eTEACHER to provide their customers with a tool that allows for better energy demand management and higher end-user satisfaction and loyalty since the end-user has more information about their energy use and a possibility to reduce their energy consumption and costs.

4 References

Calleja-Rodríguez, G., Peralta, J.-J., Forns-Samso, F., Dooley, K., Pruvost, H., Meyer, R., & Frank, F. (2018). *D2.1 Requirements for BACS add-on services.* Brussels: eTEACHER project.

Calleja-Rodríguez, G., Peralta, J.-J., Jiménez-Redondo, N., Morton, A., Márquez, F.-J., & Anghelita, P. (2019). *D4.2 Monitoring results in the pilots before eTEACHER. Baseline for demonstration.* Brussels: eTEACHER Project.

eQ-3. (11 de 2019). *Homematic*. Obtenido de https://www.eq-3.com/products.html

Frank, F., & Calleja-Rodríguez, G. (2019). *D2.5 BACS add-on services container and Universal BACS Commmunication Interface.* Brussels: eTEACHER Project.

Jiménez- Redondo, N., Peralta-Escalante, J. J., Calleja-Rodríguez, G., Morton, A., Bull, R., Reeves, A., . . . Onose, B. (2018). *D4.1 Evaluation Methodology and preliminary pilots descriptions.* Brussels: EC.

Lóhr, E., Doretto, S., Kopf, E., & Anghelita, P. (2019). *D5.2 eTEACHER Business Models.* Brussels: eTEACHER project.

Netatmo. (11 de 2019). Obtenido de https://www.netatmo.com/en-eu