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Project Title:

ORganizational Behaviour improvement for Energy Efficient administrative public offices

OrbEEt

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Collaborative Project

Public Summary

Deliverable No.	**D4.1 Report on Pilot Operational and Validation of the OrbEEt Framework Pilot**
Workpackage	**WP4 Pilot Roll-Out & Validation**
Task	**T4.3 Resuls Validation & Impact Assessment**
Lead beneficiary	**COVUNI**

1. PUBLISHABLE PUBLIC SUMMARY

This deliverable presents the key outputs of Task 4.3 - Results Validation & Impact Assessment. The purpose of the document is to provide an assessment of pilot operation and outline the validation methodology through the mixed methods approach, discussing the outcomes of the calibration stage. This version of D4.4 is an intermediate version, with the full validation of the OrbEEt framework to be presented in the final version in M36.

The validation methodology expands upon the work presented in D1.6 utilising a mixed methods approach to assess OrbEEt through points such as energy data, usage statistics and user feedback. The main research objectives being addressed relate closely to OrbEEt's KPIs such as 20% Average Demand Reduction (all pilots), 25% Peak Demand Reduction (all pilots) and 30% CO2 Emissions reduction, and include:

RQ1. What is the average demand reduction in OrbEEt per site during the intervention period, and does this reduction persist beyond the intervention?

RQ2. What is the peak demand reduction in OrbEEt per site during the intervention period, and does this reduction persist beyond the intervention?

RQ3. What is the CO2 emissions reduction in OrbEEt per site during the intervention period, and does this reduction persist beyond the intervention?

RQ4. How many employees (or visitors) actively engage with the OrbEEt platform during the intervention, and what are the perceived barriers to this engagement?

RQ5. Do any losses of productivity arise during the period of the intervention?

A key gain of OrbEEt over existing studies is a fine-grained approach to data capture. OrbEEt seeks not only to reduce energy consumption, but to also manage, monitor, and improve productivity. Furthermore, it does so using a range of configurable components: in office displays, intranet portals, and a serious game. Each of these components can track usage where directly measurable, and coupled with productivity and energy use monitoring, provides the basis of a mixed-methods approach which augments this measurable data with self-reporting from occupants, via survey, and qualitative feedback from lead individuals responsible for introducing and managing the system at each pilot site. The validation components include:

Method & Related Research Question(s)	**Participants**
Participatory Action, with Qualitative Interview (RQ 4, 5)	Lead individuals responsible for introducing OrbEEt at each pilot site.
Data Logging (RQ 1, 2, 3, 4, 5)	All pilot sites, captured via: Intranet portal, smartphone game, sensors and BPM.
User-Generated Qualitative Data (RQ 4, 5)	All pilot sites using intranet portal.
Quantitative Self-Report Survey (RQ	All pilot site participants, post-intervention

4)	
Quantitative Self-Report Survey (Environmental Awareness and Behaviour) (RQ 1, 2, 3, 5)	All pilot site participants, pre- and post-intervention, and post washout phase.
Qualitative Self-Report Survey (RQ 4)	Visitors to pilot sites

As outlined in D4.2, validation consists of four main stages, namely, Calibration, First Trial, Optimisation and Second Trial, and Monitoring of the Persistence of the Behavioural Change:

1. **Calibration:** This stage consists of baselining efforts.
2. **First Trial:** The stage consists of continued baselining and the beginning of intervention:
3. **Optimisation and Second Trial:** The stage consists of continued intervention and the washout period.
4. **Monitoring of the Persistence of Behavioural Change:** As this stage runs concurrently with Stage 3, it too consists of continued intervention and the washout period.

Calibration covers deployment validation and baselining efforts with respect to energy indictors, comfort indictors and operational ratings. In addition, as part of the behavioural change validation methodology, pre-intervention questionnaires were distributed during this stage. A focus is given to the hardware and software infrastructures in place at each of the four sites, which links intrinsically to T4.2. As T4.3 is a progressive evaluation over the entire validation period.

The hardware infrastructure at each pilot site includes:

- Gateway Raspberry Pi, with Daughter Card.
- Range Extenders.
- Smart Plugs.
- Smart Switches.
- Multi-Sensors.
- Heat Cost Allocators.
- PCs.
- Tablet Devices.

The software infrastructure at each pilot site includes:

Pilot Site	Interface Deployment
Spain, Asparrena, Town Hall	▪ Intranet Portal ▪ In-Office Display Application ▪ Smartphone Game ▪ eDecs
Germany, Erlangen, T&R Centre	▪ Intranet Portal ▪ In-Office Display Application ▪ Smartphone Game

	▪ eDecs
Austria, Innsbruck, Imperial Palace	▪ Intranet Portal ▪ In-Office Display Application ▪ eDecs
Bulgaria, Pernik Municipality	▪ Intranet Portal ▪ In-Office Display Application ▪ eDecs

For the calibration stage, the outcomes are the validation of the installed OrbEEt systems, the ongoing baselining efforts and the circulation of the pre-intervention questionnaires. At this early stage of validation, it is not possible to highlight any meaningful correlations in terms of occupant behaviour or general OrbEEt impact, however the activities performed have formed the bedrock for future stages. Efforts towards baselining are ongoing and data collection through the questionnaires is proceeding as planned. The next stage will introduce the first trial for technical assessment and the intervention period for the gamified interfaces. This is made possible through the deployment and calibration activities performed during this stage.