eTEACHER Validation and Impact Assessment Methodology

Behavioural change towards energy efficiency by utilizing ICT tools Workshop

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CONTENT

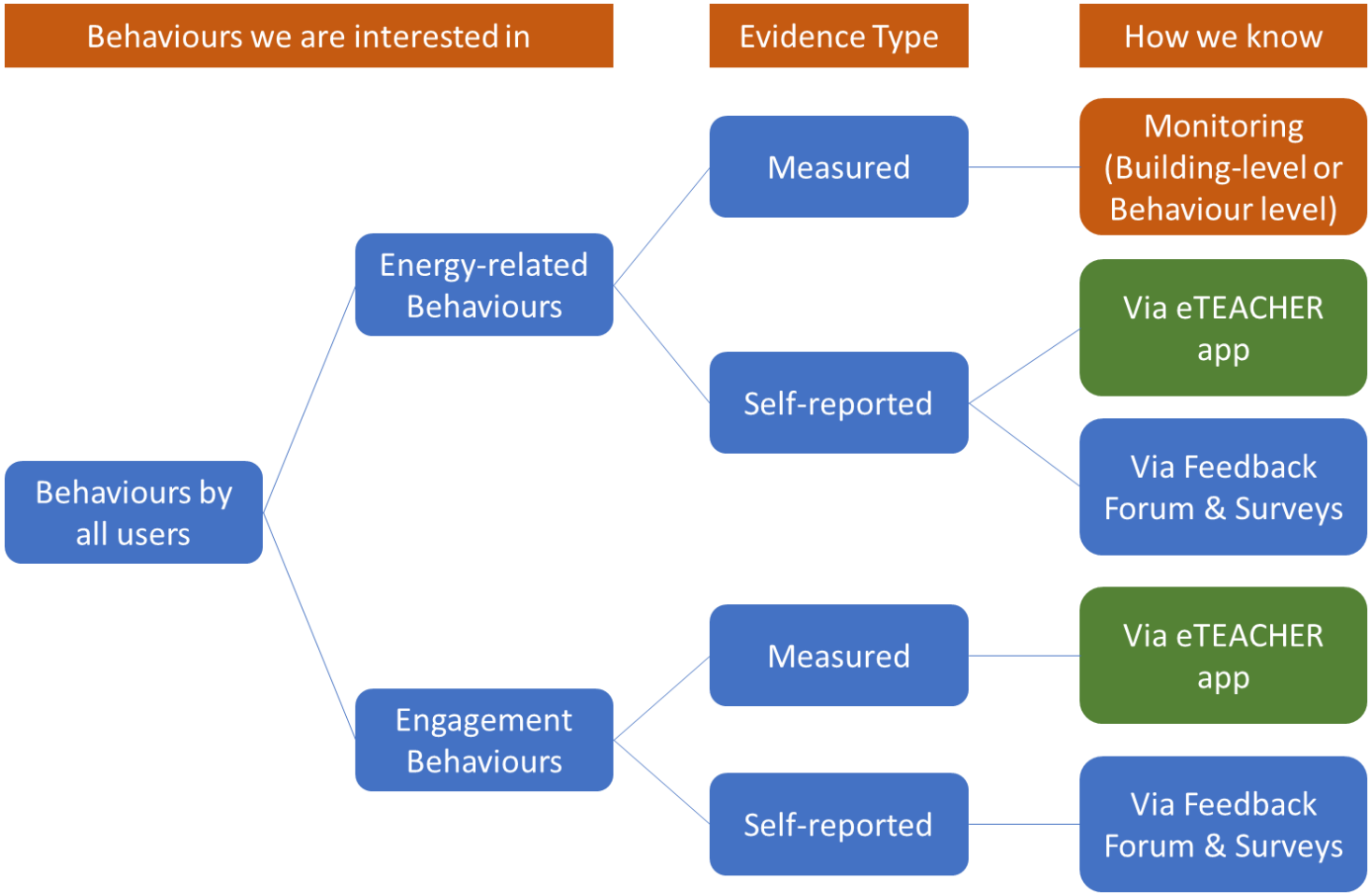
- Introduction
- Methodology
- Experimental design
- KPIs
- Action Plan
- COVID Impact

INTRODUCTION

VALIDATION OBJECTIVES

- Identify **behaviour changes of building users** towards energy efficiency and better indoor conditions encouraged by eTEACHER tools
- Evaluate the **impact and effects** of behaviour change regarding **energy savings** and improvement of **indoor conditions**
- Summary of **tools** provided to the pilot buildings:
  - Monitoring devices
  - Cloud services for data storage & processing
  - eTEACHER App

METHODOLOGY



METHODOLOGY

MONITORING

Building level & apartment / room level:

- Outdoor conditions: Temperature (ºC), CO_2 (ppm), Relative Humidity (%), Solar radiation (W/m^2)
- Indoor conditions: Temperature (ºC) , CO2 (ppm), Relative Humidity (%), lighting level (lux)
- Energy consumption(kWh): lighting, HVAC, appliances
- Others: Presence & windows opening

eTEACHER APP

Users statistics (total users / average)

- Number of users registered
- Number of active users per specific building
- Number of users per specific route/functionality
- Number of accepted recommendations

METHODOLOGY

FEEDBACK FORUM & SURVEYS

Feedback Forum

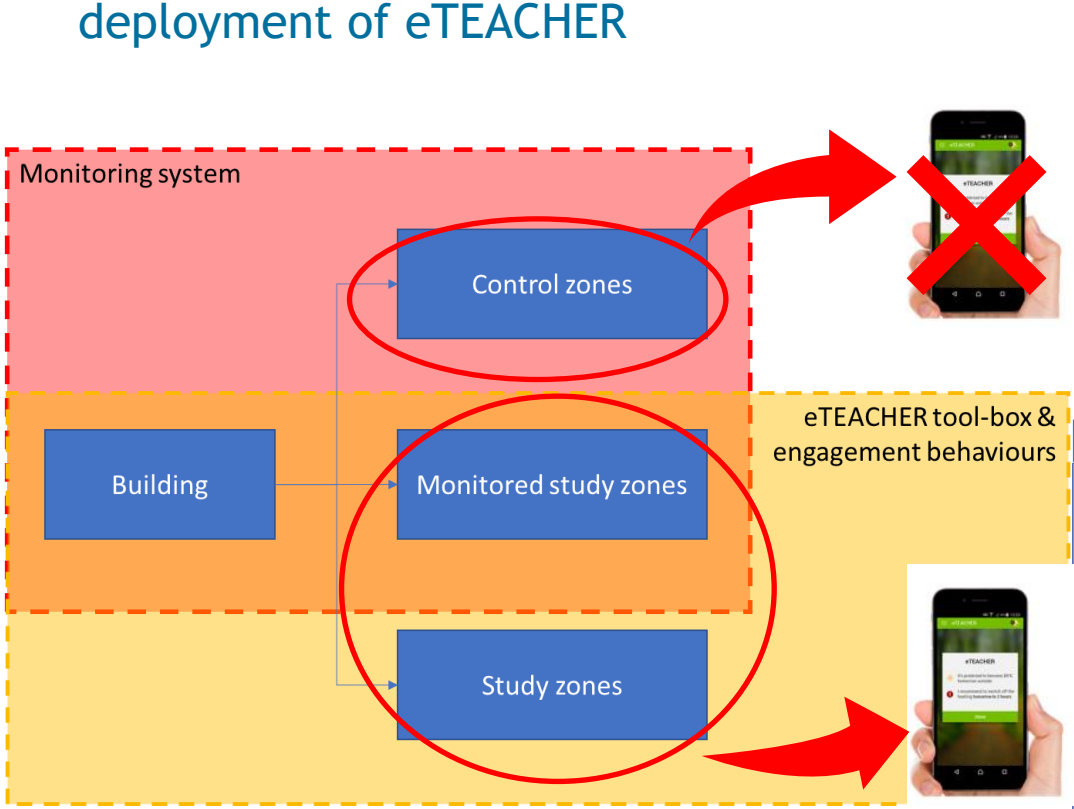
- Use of eTEACHER tool
- User feedback on tool – what do users like, dislike, think could be improved, what do users think they will use it for predominantly

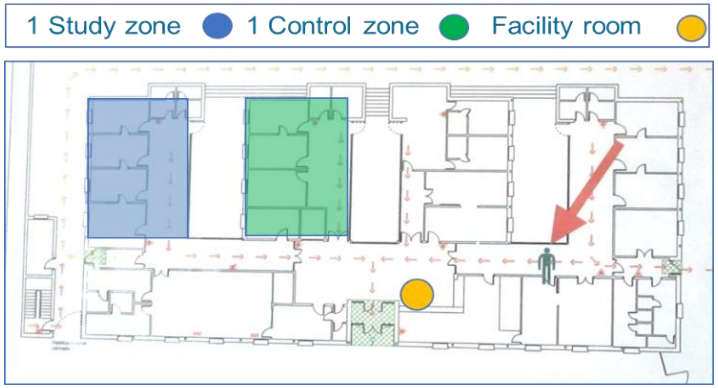
Surveys pre & post eTEACHER App:

- Comfort evaluation
- Energy behaviour and awareness
- Use of lighting, appliances, heating, cooling

EXPERIMENTAL DESIGN

- It is based on **eeMeasure Methodology**
- It compares **control environments** (environments without eTEACHER) with **study environments** (environments with eTEACHER) before and after the deployment of eTEACHER





KPIs for Impact Assesment

IM1 - Energy savings and reduction CO_2 emissions

- **KPI:** Energy savings vs. Number of interactions with eTEACHER's app
- **Target:** 6-10% savings
- **Measurement Method:** Monitoring & eTEACHER App
- **Calculation procedure:**

Building Energy Saving Ratio

$ESR_b = (E_b - E_{CR}) / E_{CR} / (1 - F_{es})$

$F_{es} = E_{CR} / E_{MS}$

CO2 savings

$GHG_s = C_F \times ES_b$

Recommnendations Accepted (N_R)

IM2 - Fast Deployment

- **KPI:** Time for building characterization + Time for monitoring deploying
- **Target:** 1 month (during project) ; 1 week (after project)
- **Measurement Method:** Monitoring pilots characterization time and deploying time
- **Calculation procedure:** Data collected from project experience

KPIs for Impact Assesment

IM3 - Fast Adoption

- **KPIs:** Users acceptance
- **Target:** 15-30% users satisfaction
- **Measurement Method:** eTEACHER App & Surveys
- **Calculation procedure:**

$IM3_{APP} = (A_V N_{U,A} / Nu) \times 100\ (\%)$

Survey: Percentage of users willing to use the app after demonstration

IM4 - Number of users changing behaviour

- **KPI:** Energy savings vs Number of users accepting recommendations vs Changes reported by users
- **Target:** 30% users
- **Measurement Method:** Monitoring; eTEACHER App ; Surveys

Action Plan

KEY ACTIVITIES

Kickoff:

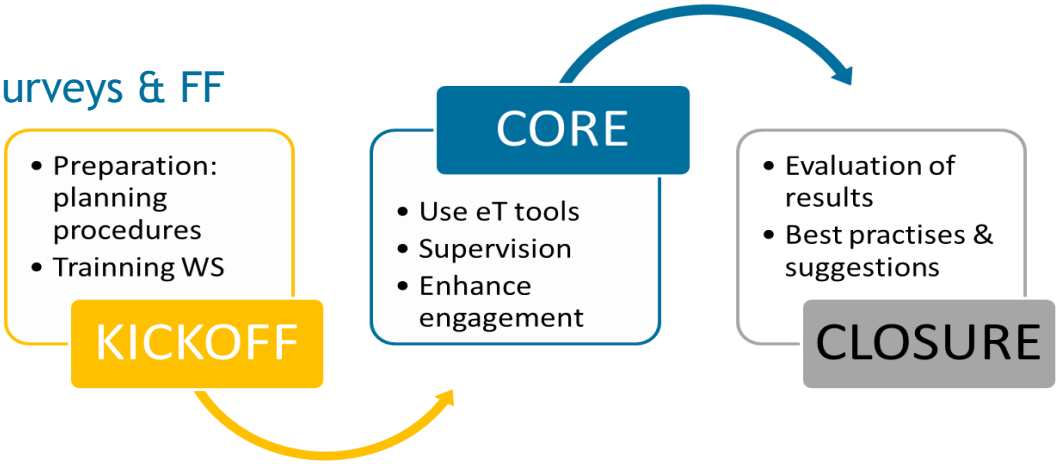
- Internal validation: monitoring tech. and tools
- Engagement planning and procedures for supervision: engagement, monitoring technology and tools
- Internal tools demos to other partners & training workshops with users

Core: building users have and use eTEACHER tools

- User Engagement Plan: weekly emails to encourage the use of eTEACHER App
- Supervision and Maintenance : monitoring technology, tools and engagement level
- FF, Surveys and Users Interviews
- Evaluate & track results & impact

Closure:

- Analysis: monitoring, App data, surveys & FF
- Conclusions & best practices



COVID IMPACT

- Project suspension & delay
  - No access to buildings to maintain monitoring
  - Reduced use of buildings
- Need to develop a **new user engagement plan** based on emails to introduce eTEACHER App
- **Online** feedback forums & emails
- It is **difficult to compare before & after** eTEACHER
- We will use **control rooms / environments**

THANK YOU

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