H2020 MOBISTYLE Project

Motivating end-users behavioral change by combined ICT based tools and modular information services on energy use, indoor environment, health and lifestyle

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‘‘We know less about the buildings in which we spend most of our time, than we know about the cornflakes we had for breakfast or coat we wore this morning.’’

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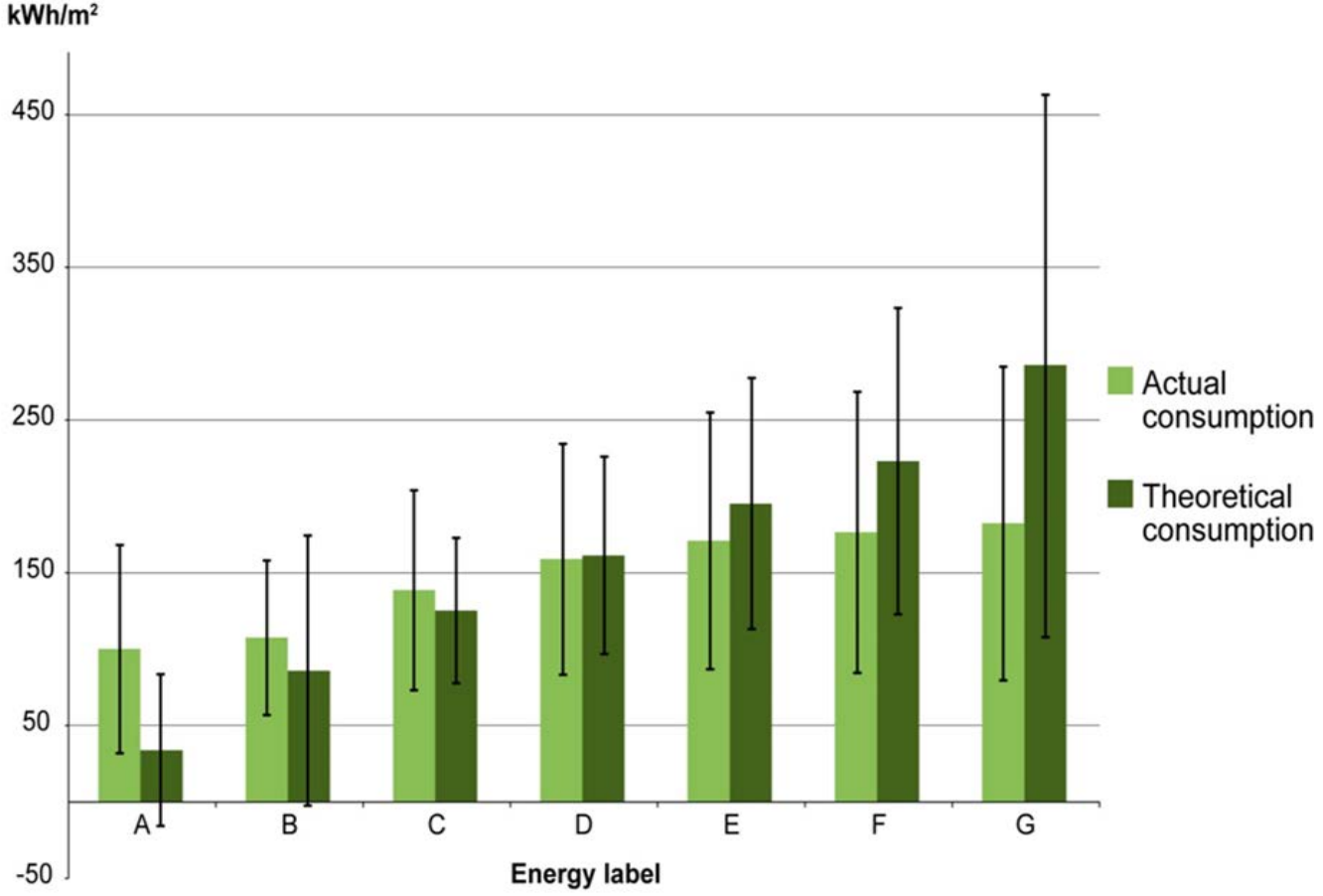
Performance gap in different building types

Actual and theoretical energy consumption per m² of detached housing per energy label



[UserTEC – User Practices, Technologies and Residential Energy Consumption]

Performance gap

Cause for performance gap:

- Prediction modelling
- Technical issues
- Poor metering
- Poor maintenance & commissioning
- **Occupant behavior**

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Let’s change perception from

‘Buildings consume energy’…

…to the fact that

‘People use energy.’

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MOBISTYLE: Motivating end-users behavioral change by combined ICT based tools and modular information services on energy use, indoor environment, health and lifestyle

Duration: October 2016 – March 2020

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MOBISTYLE Objectives

MOBISTYLE has the following specific measurable qualitative objectives:

- To transform measured data into **understandable information** for identified user profiles raising awareness on energy use, health and indoor environment.
- To motivate **long lasting behavioral change** of end users by combined **modular information on energy use, health and lifestyle**.
- To develop **easy to use ICT-based tools** which will make energy monitoring a **well-accepted and attractive** 'daily activity' (routine).
- To deploy and validate the developed solutions for 5 demonstration cases featuring **different building types and end user types**: employees in an office environment, residents in a social housing, students and staff in university buildings, residents living in a smart city, guests staying in a hotel.
- To foster **new business models** and applications.

The main quantitative objective of MOBISTYLE is reduction of buildings energy use for 16 %.

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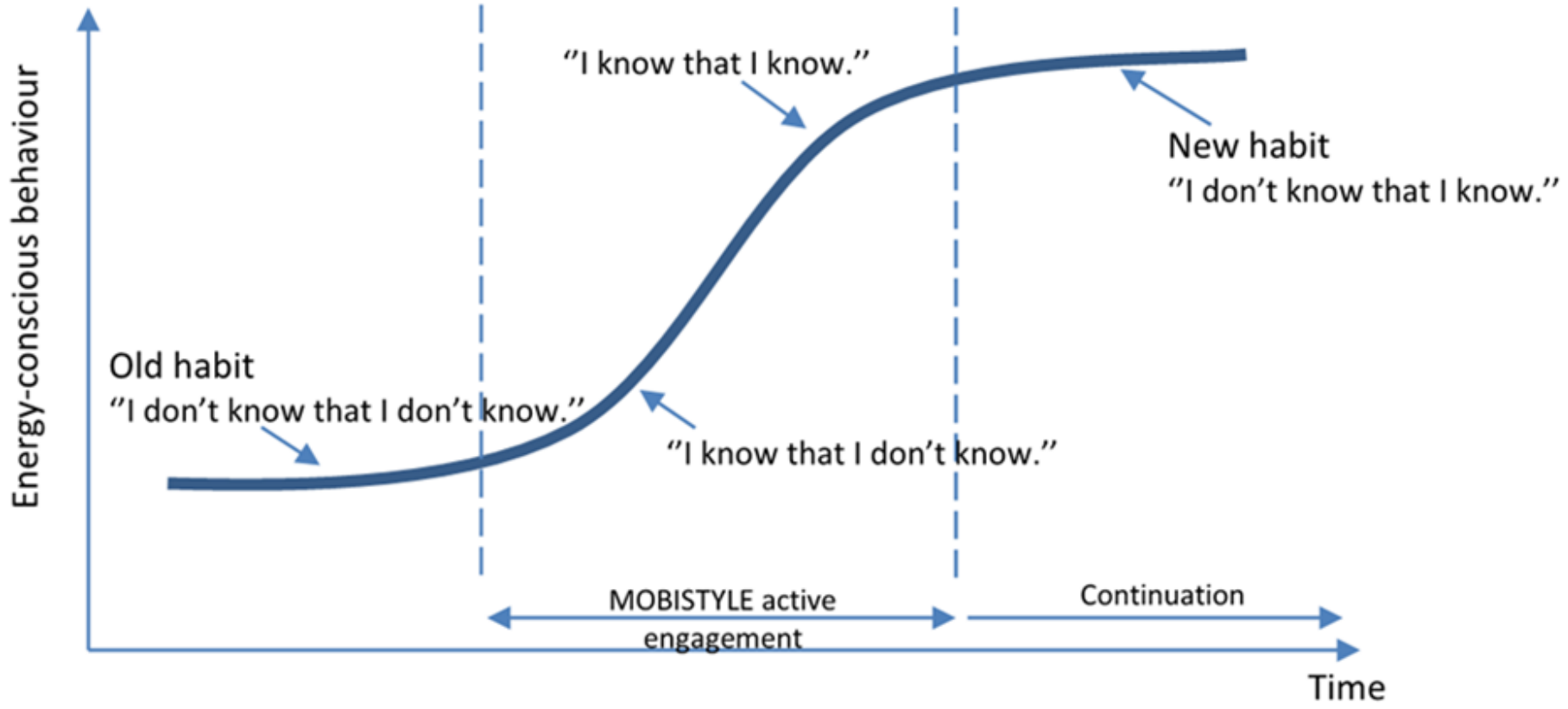
Change is gradual…



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MOBISTYLE 4-step people-centric ICT design approach

IDENTIFICATION

Who are we solving for?

RESEARCH

What do people want?

INTERPRETATION

What and how will we create to serve the user needs?

USABILITY TESTING

What and how will we create to serve the user needs?

improvements

Design and development of services

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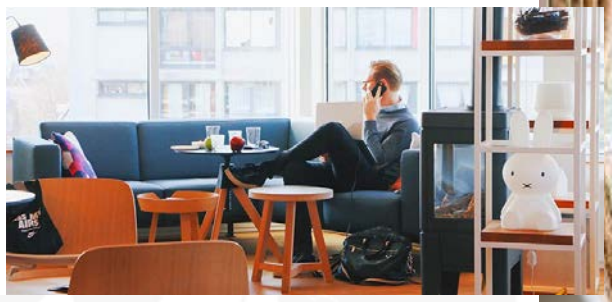


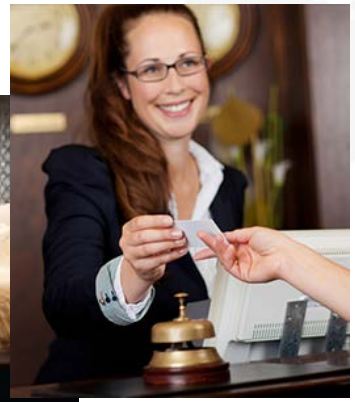
Denmark, Aalborg:
Residential area Kildeparken

The Netherlands, Kerkrade:
Office building Qeske

Poland, Wroclaw:
Smart city Wroclaw

Slovenia, Ljubljana:
Buildings of University
of Ljubljana

Italy, Turin:
Hotel LÓrologio



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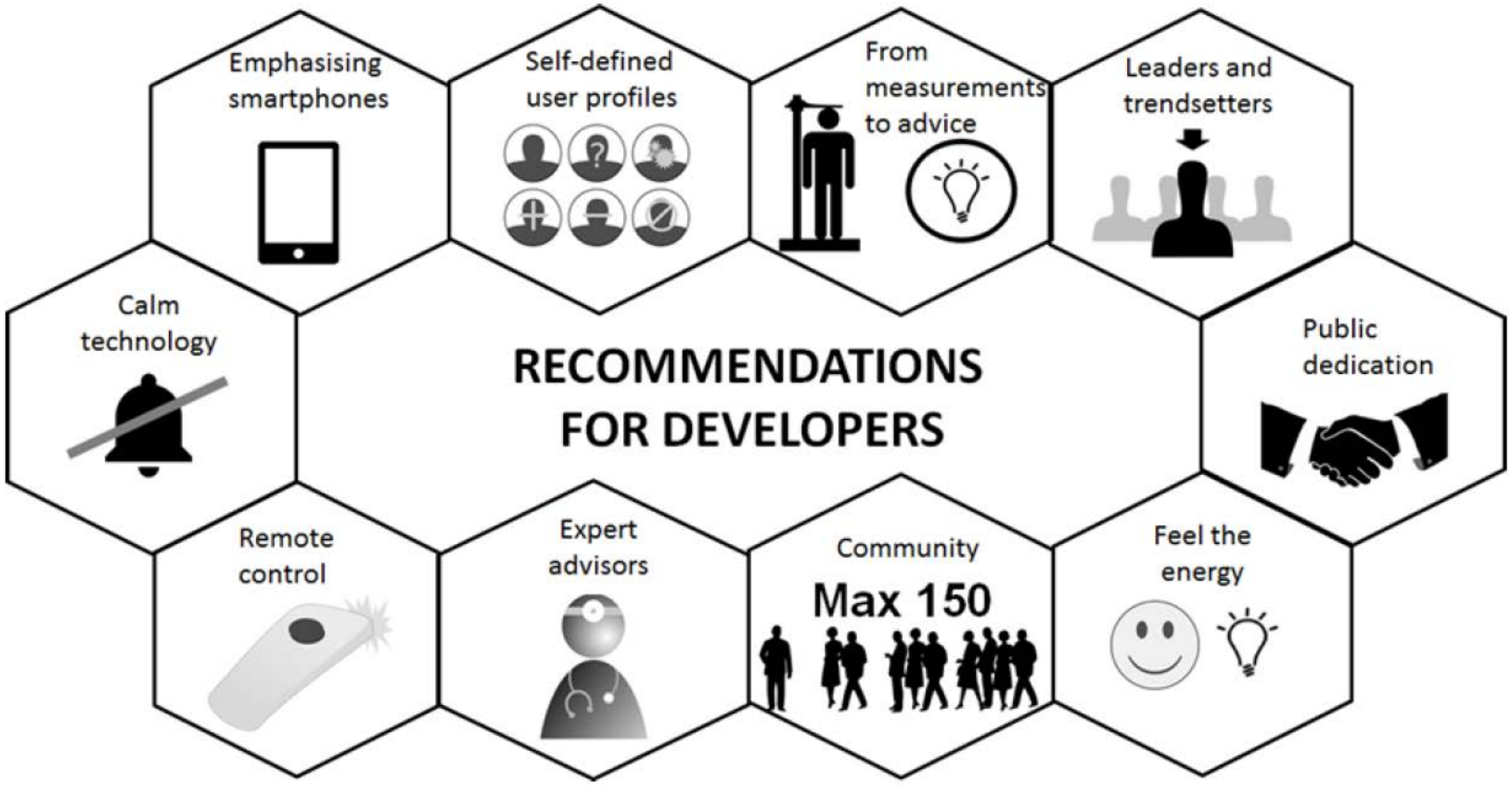
MOBISTYLE recommendations for the ICT developers

based on the focus groups findings (organized at the 5 demonstration locations)



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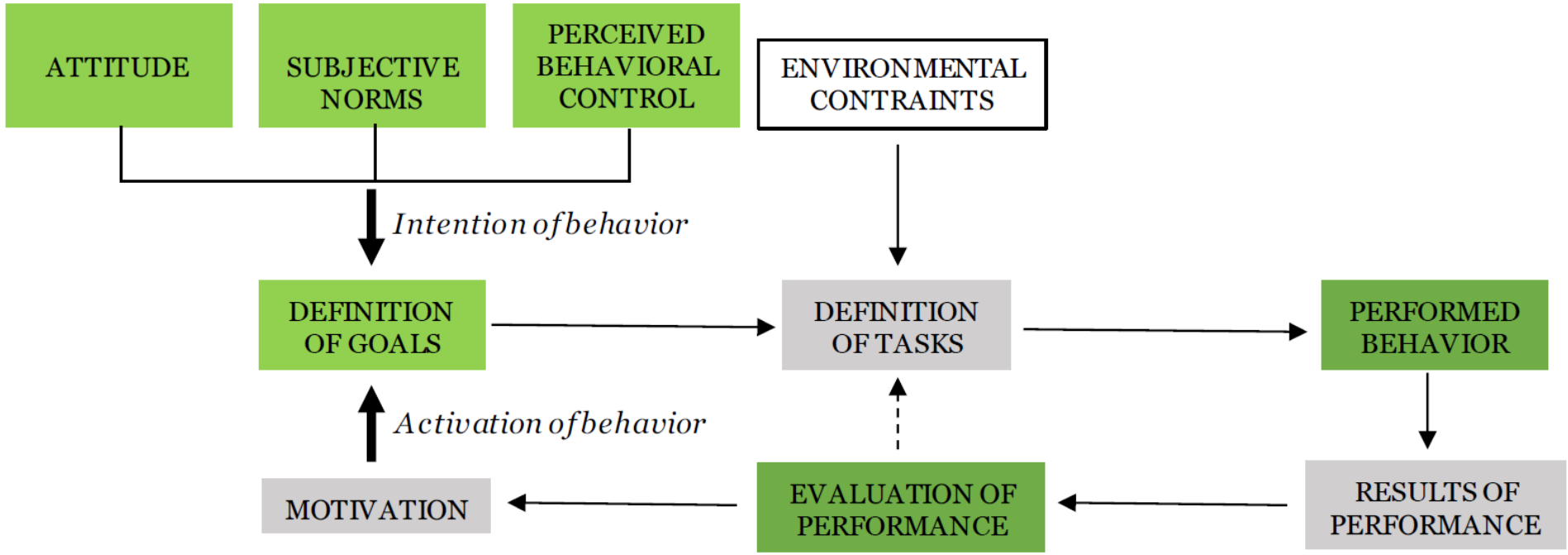
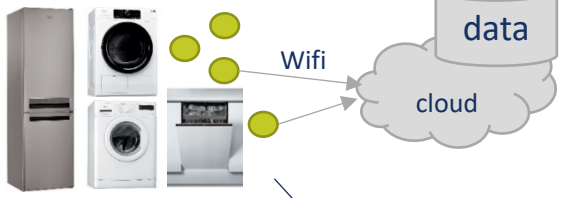
MOBISTYLE flow diagram of the Behavioural Action Plan

Method to provide feedback to users about their energy use and indoor environment and guiding them to change their practices.



Green boxes indicate inputs/action required from the user, while gray boxes indicates activities performed by the app.



Wifi

data

cloud

White goods

Energy
IEQ
Health

Methodologies
(Algorithms, models)

API

data

cloud

API

Wearables

data

cloud

API

Energy, IEQ sensors

M2M

MOBISTYLE
Database

Digital authentication

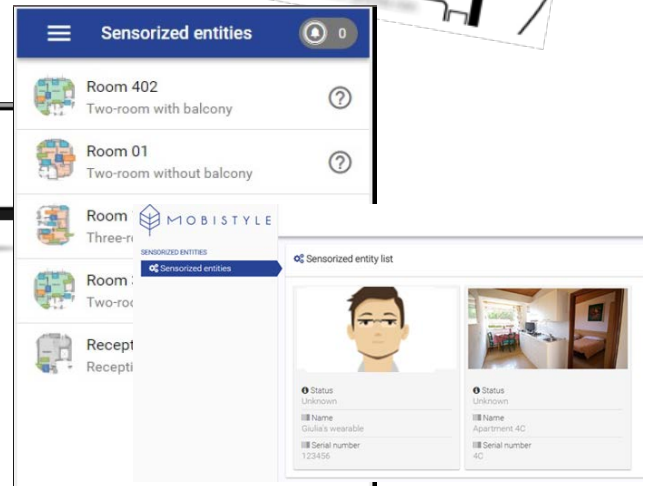
M2U

MOBISTYLE
Users Platform

MOBISTYLE
Expert Tool

GAME

DASHBOARD



OFFICE APP

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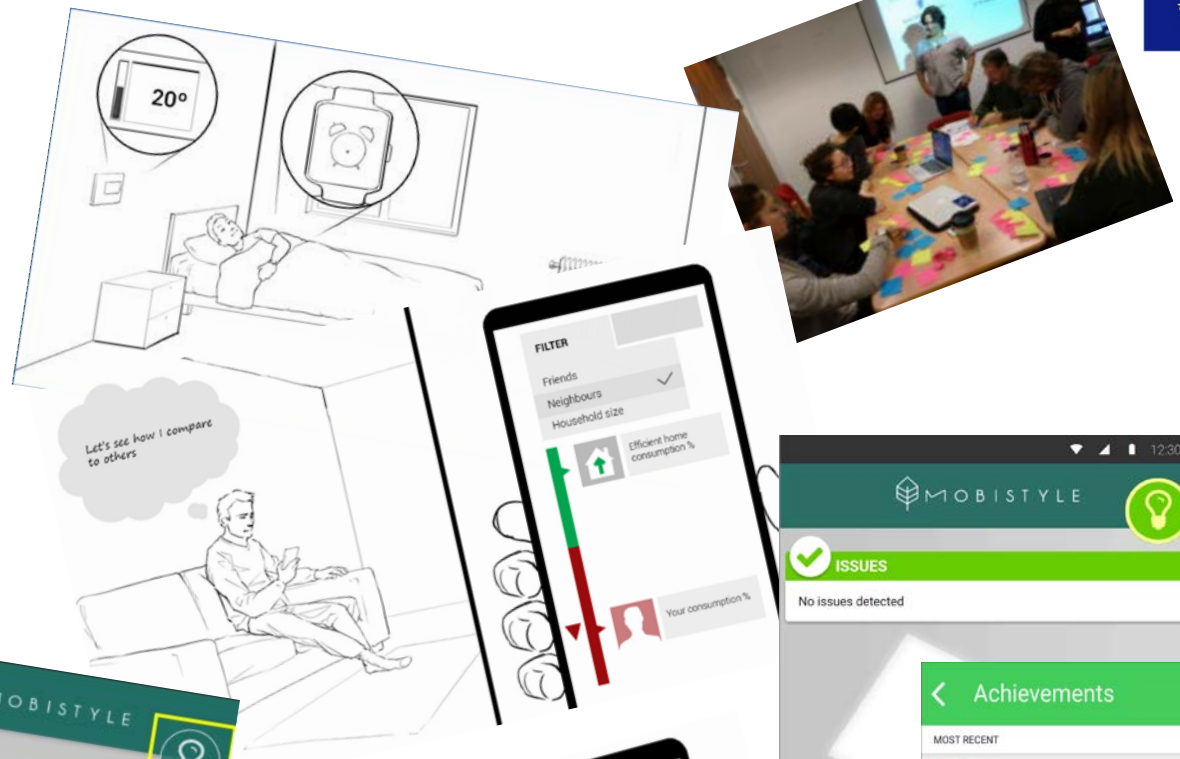
MOBISTYLE Game

Mobile application:

- Used in homes.
- Uses “nudges”, complemented by “tips”.
- Using data from energy-IEQ sensors.
- Triggers missions & detects their completion.



→**Game developer:**

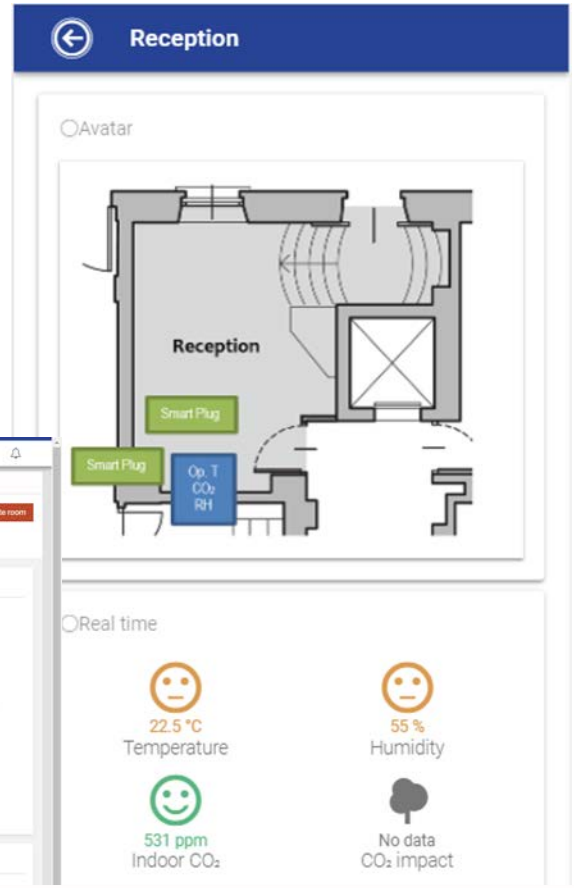
HIGHSKILLZ
HIGHLY PERSONALIZED LEARNING EXPERIENCES

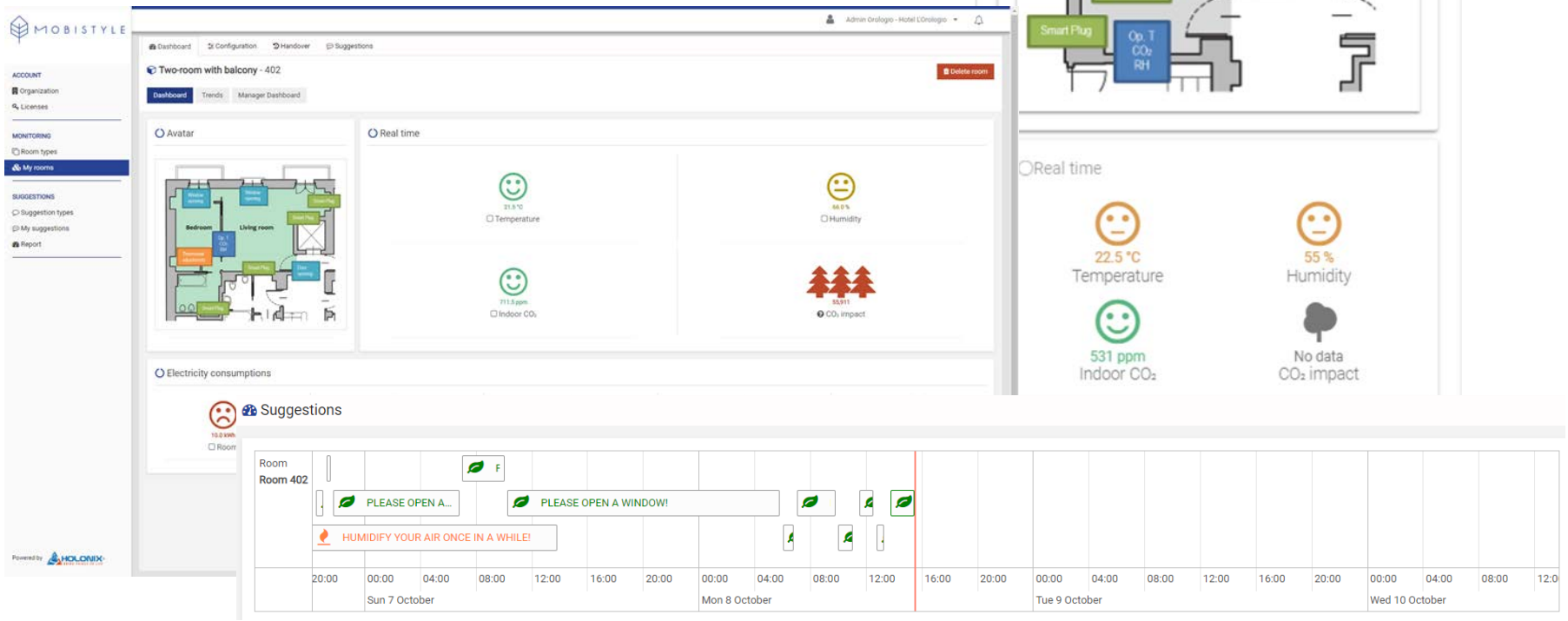
MOBISTYLE

MOBISTYLE Dashboard

Desktop and Mobile application:

- Used in universities & hotel demonstration cases.
- Aimed to both consumers & company managers.





→**Dashboard developer:**

HOLONIX
BRING THINGS TO LIFE

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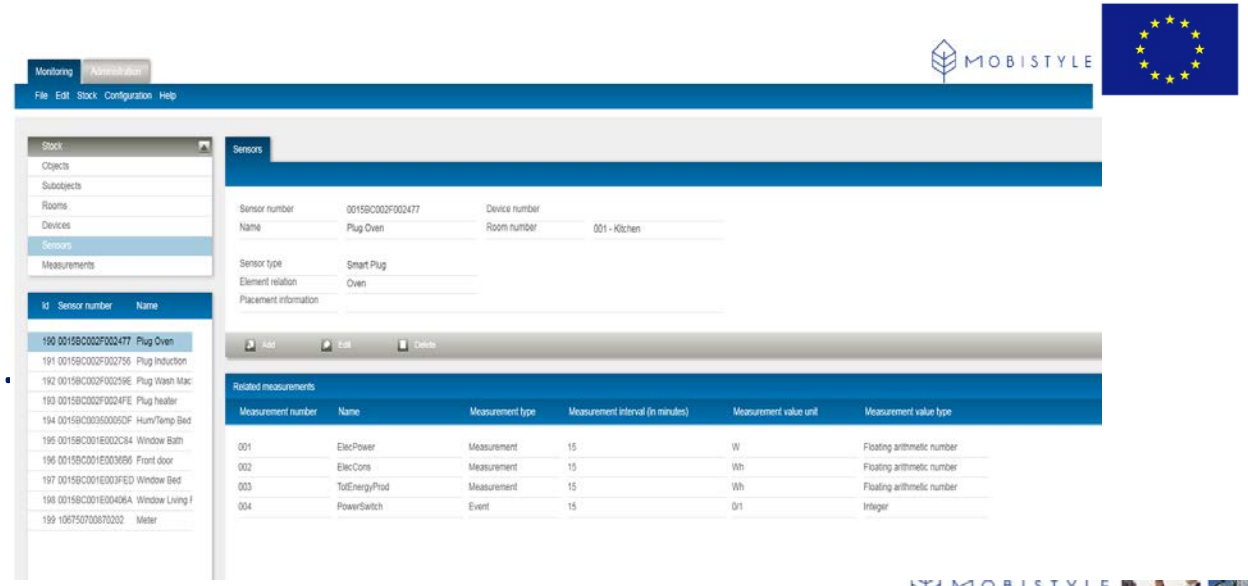
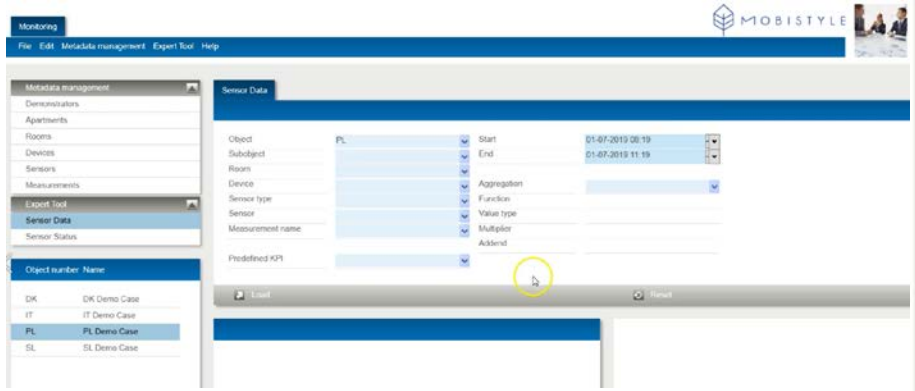
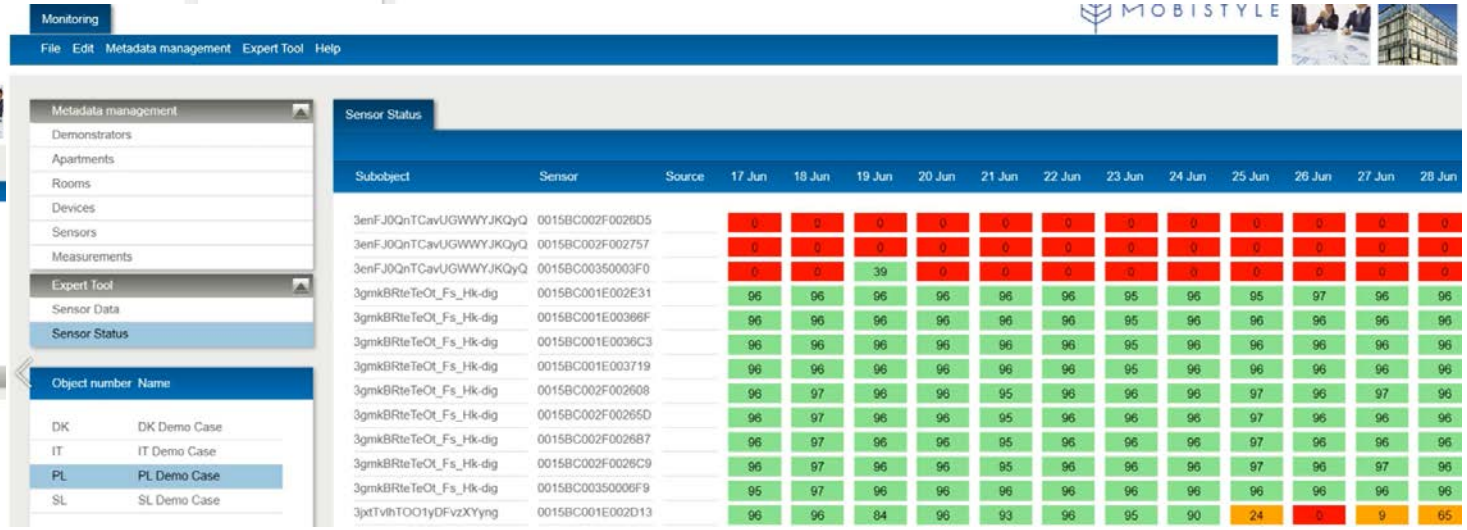
MOBISTYLE Expert tool

Desktop application:

- Primarily for building managers and experts.
- Allowing:
  - Data management;
  - KPI calculation;
  - Interoperability.







→Expert tool developer:

DEMO CONSULTANTS

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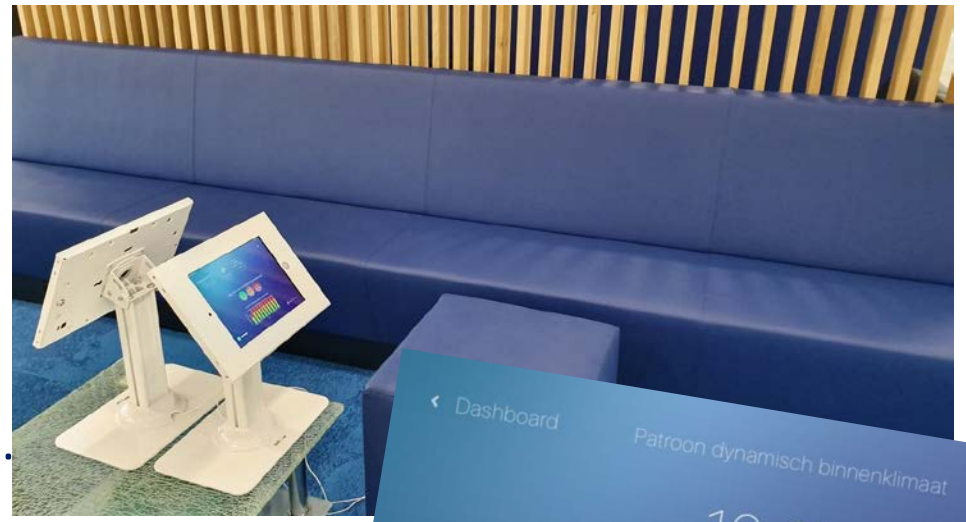
MOBISTYLE Office App

Desktop application:

- Aimed for employees & company managers.
- Used primarily to encourage dynamic indoor conditions.



→**Office App responsible:**

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MOBISTYLE Office App

Desktop application:

- Aimed for employees & company managers.
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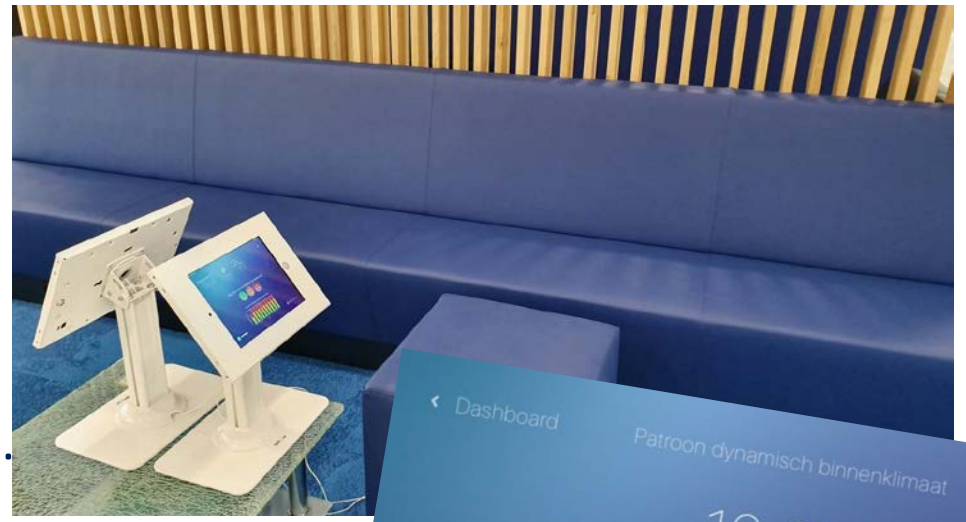

→**Office App responsible:**

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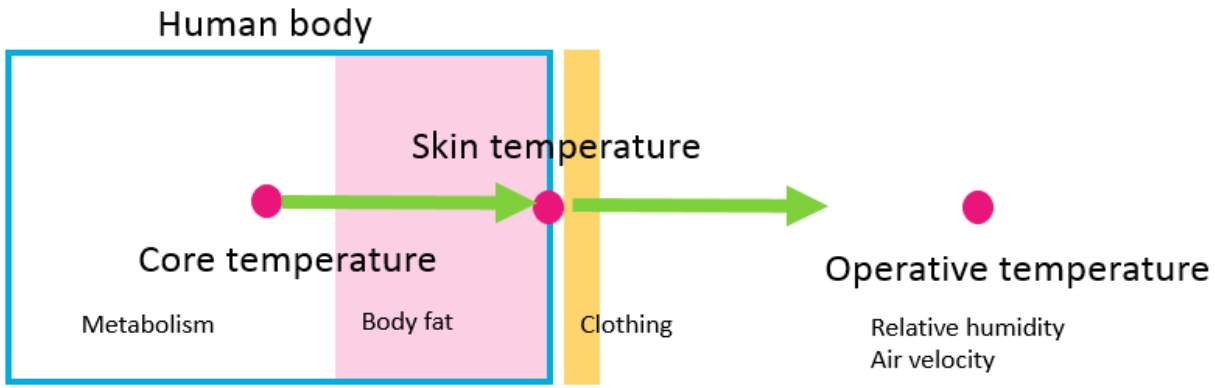
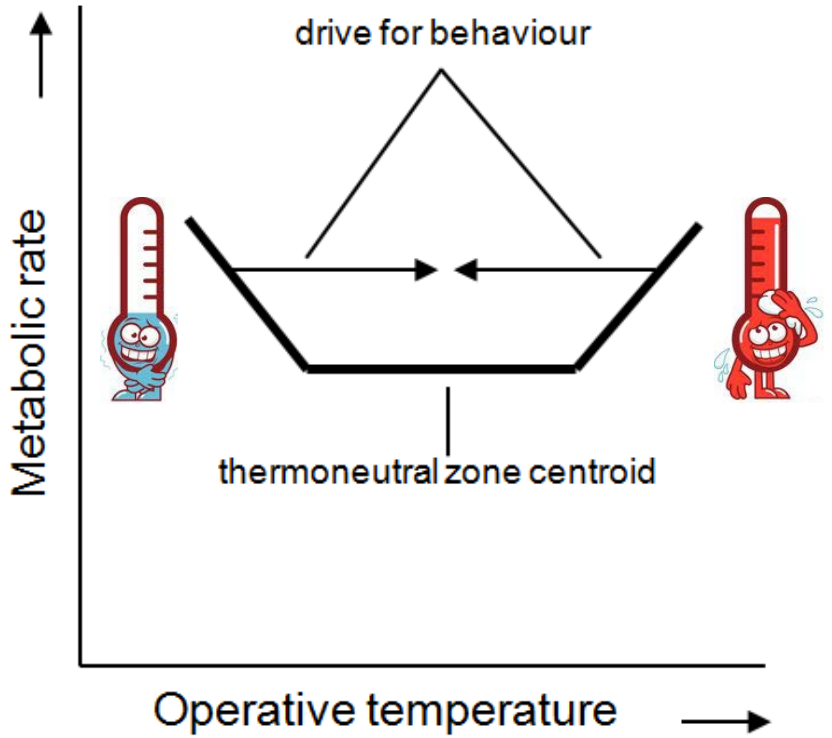
Are comfortable stable temperatures actually healthy?



Maastricht University

The Thermo-neutral zone (*):



Experimental studies at MU showed that regular exposure to mild cold can increase:

- Energy expenditure, energy metabolism (*)
- Resilience to thermal discomfort due to acclimation (*, ***)
- Resilience to cardiovascular disease and insulin sensitivity (**)

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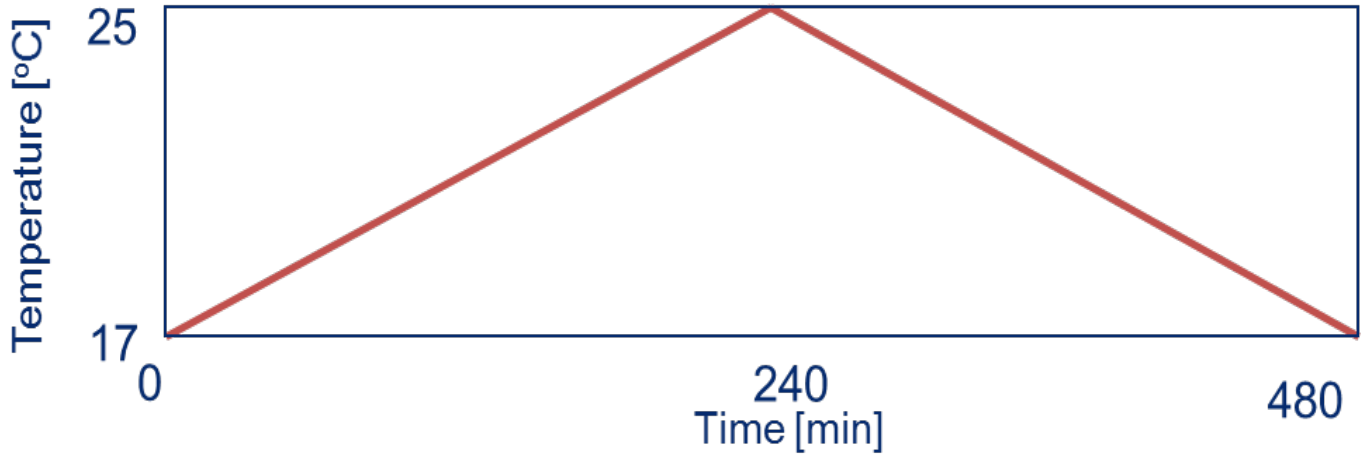
REFERENCE:
*Van Marken Lichtenbelt, W.D., Kingma, B., Lans, A., Schellen, L. (2014). Cold exposure – an approach to increasing energy expenditure in humans.
** van Marken Lichtenbelt, W. D.; Hanssen, M.; Pallubinsky, H.; Kingma, B.; Schellen, L. Healthy excursions outside the thermal comfort zone, Building Research & Information, 2017.
***van der Lans, A. A.; Hoeks, J.; Brans, B.; Vijgen, G. H.; Visser, M. G.; Vosselman, M. J.; Hansen, J.; Jorgensen, J.A.; Wu, J.; Mottaghy, F. M.; Schrauwen, P.; van Marken Lichtenbelt, W. D.. Cold acclimation recruits human brown fat and increases non-shivering thermogenesis, The Journal of clinical investigation, 2013, 123, 3395-3403.

Dynamic indoor conditions within MOBISTYLE

Temperature training

Schellen et al., Indoor Air 2010



Physiological response → Psychological response → Gradually cooler environment in winter and warmer in summer can lead to energy saving, improved comfort and higher acceptance.

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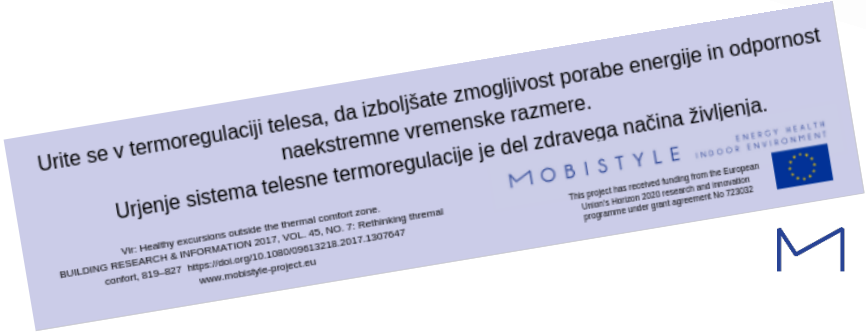
Health is today’s wealth.



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“MOBISTYLE is the way of life…

Let me tell you why!”

Health is today’s wealth.

Promote solutions and services where goals on energy efficiency, good IEQ and health overlap.

Energy conscious and healthy behaviour becomes a way of life and not only a one-time service, noticed as energy saving at the end of the month.

Reduced energy bills	16 %
Improved indoor climate	21 %
Improved health	5 %

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Thank you for your attention.

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www.mobistyle-project.eu

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IRI UL Institute for Innovation and Development of University of Ljubljana

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TAURON POLSKA ENERGIA

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