

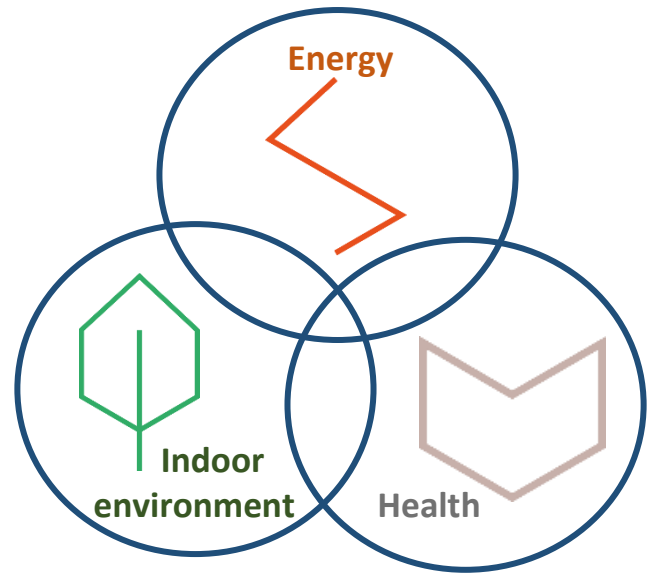
MOBISTYLE

Newsletter

March 2018



This project has received funding from the European Union's Horizon 2020 framework programme for research and innovation under grant agreement no 723032.



What is MOBISTYLE?

42-months European project focusing on motivating end users' behavioural change through ICT-based personalised information on energy use, indoor environment, and health.

This newsletter introduces...

the MOBISTYLE behavioural change intervention action plan.

As discovered through the organised MOBISTYLE focus groups (presented in the [2nd newsletter](#)), energy saving as such is not a sufficient motivation factor for building occupants to change their behaviour. The findings from these focus groups showed that **personalised feedback on energy use in combination with information on generated indoor environment, health and lifestyle** can lead to **improved occupants awareness**. Hence, this achievement requires a **multidisciplinary holistic approach and involvement of various scientific expertise**.

In this perspective, the MOBISTYLE approach combines four fields of expertise shown in Figure 1. To stimulate users to perform more conscious actions, the 4-step methodology is developed as a combination of data collection, data analysis and provision of tailored information via different ICT based solutions as shown in Figure 2.

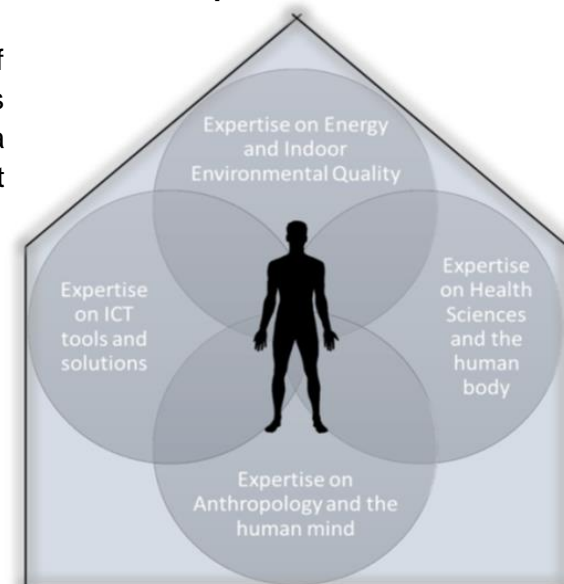
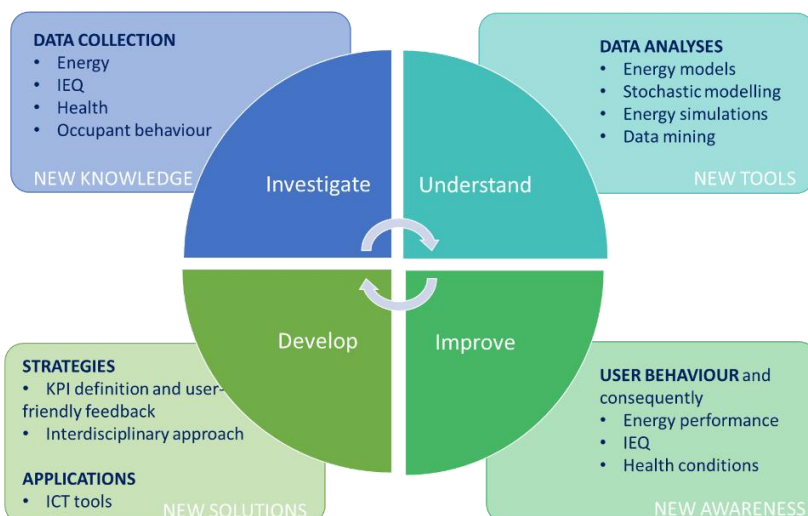


Figure 1 (above): The MOBISTYLE holistic approach involving expertise for behavioural change and energy savings. Developed by Fabi, V., POLITO.

Figure 2 (left): The MOBISTYLE 4-step methodology. Developed by Fabi, V., POLITO.

❖ Understanding and changing human behaviour

The MOBISTYLE approach is based on understanding human behaviour as a prerequisite to stimulate, support and establish energy conscious daily habits and to achieve a long-term behaviour change. The core concepts of the MOBISTYLE behavioural change strategy are drawn from psychological and anthropological theories, such as the Theory of Planned Behavior¹ and the Theory of Practice².

As presented in the previous newsletter, focus groups were organised at the five MOBISTYLE demonstration sites to gather the **'thick data'**, i.e. the qualitative information that provides insights into the everyday lives of people. This qualitative anthropological approach has proven to be effective to track group dynamics and understand social patterns beyond individual behaviour, especially in gathered communities. This understanding defined ten suggestions for MOBISTYLE ICT developers in order to make user-friendly and attractive services.

This 'thick data' will be supplemented by quantitative **'big data'**, collected via the MOBISTYLE ICT solutions (the MOBISTYLE game & dashboard) at the five demonstration sites.

A **MOBISTYLE Behavioural Action Plan** was developed that includes a full description of:

- Optimization objective(s) of the Behavioural Change Campaign;
- Definition of Action(s) that can be taken (and influences) from the users;
- Definition of the variables that can be monitored, related to:
 - actual energy usage (using indoor environment monitoring systems and smart meter data);
 - user's motivational drivers, attitudes, subjective norms and perceived behavioural control (using the questionnaire as a foundation of the app system architecture).

Accordingly to these action plans for each demonstration case and based on the information made available from the focus groups (thick data), together with data coming from sensors, wearables and questionnaire responses (big data), **scenarios of behavioural change intervention** were developed (Figure 3). These will be implemented into the MOBISTYLE ICT solutions.

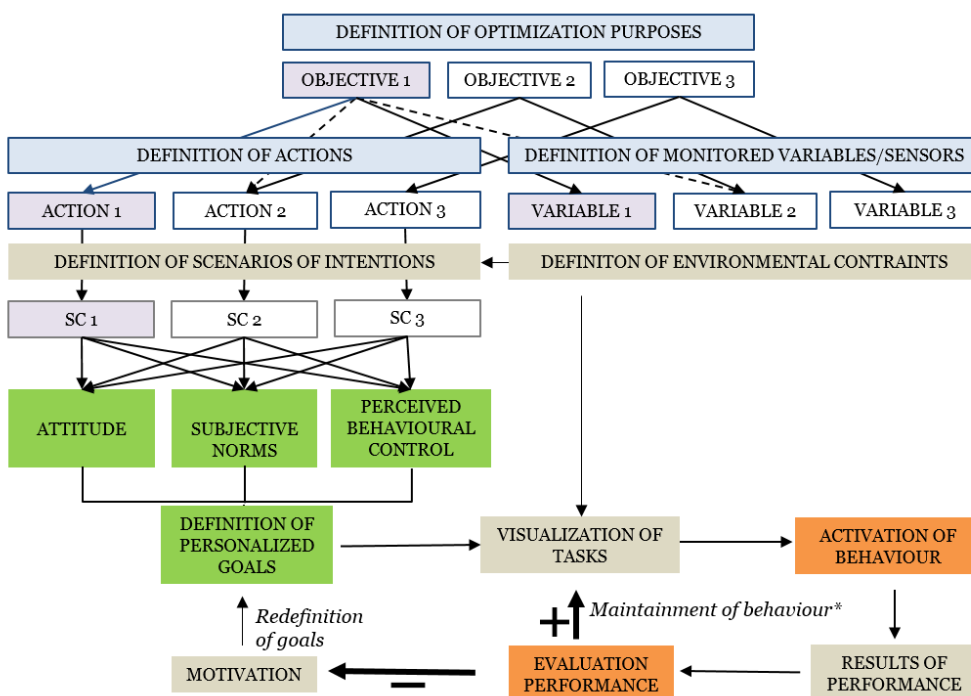


Figure 3: Structure of the Behavioural Change Intervention Action Plan, including optimization objectives, definition of actions and the data gathering from sensor, for the implementation of the scenarios of interventions (serious gaming) and the feedback system architecture into the MOBISTYLE ICT solutions. Developed by D'Oca, S., HIA.

¹Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.

[https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)

²Shove, E., Pantzar, M., Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How It Changes*. London, Thousand Oaks, New Delhi, and Singapore: SAGE, 2012.

❖ Combining information on energy use, indoor environmental quality and personal health.

Occupants' health and wellbeing have now become key requirements in buildings codes and represent a new target for sustainability. Many aspects of human health, physiology and behaviour are dominated by the exposure to surrounding conditions. Therefore, it is explored in the MOBISTYLE how different generated indoor environment situations (requiring a certain energy use) affect occupants health and well-being.

Health is new wealth

MOBISTYLE partner, MU, conducted several studies^{3, 4} where they showed that fluctuating temperatures may actually be better for our health than the recommended uniform design temperatures⁵. In the MOBISTYLE rather than applying constant set points from the standard a new approach is encouraged to enhance temperature dynamic variation as part of the healthy lifestyle. Such dynamic temperature profiles are called 'temperature trainings'.

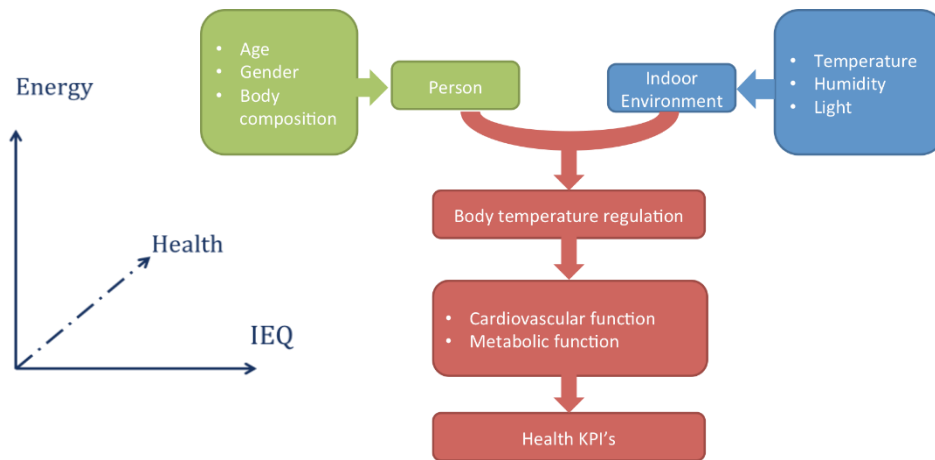


Figure 4: Example of KPI development combining health (physiological) parameters with the generated indoor environment situation which requires certain energy use.

Besides thermal conditions it is well known that indoor air quality is strongly linked to human health. It is important to minimize the exposure to pollutants like breathable particles, chemical emissions, mould spores, animal allergens, radon and combustion gases as to high exposures typically lead to headache, eye, nose and throat irritation, allergic reactions, dizziness, fatigue, etc.

In MOBISTYLE, indoor environment data with individual health parameters data is investigated to obtain knowledge for the individual occupants. By combining this knowledge with energy saving advices, awareness of building occupants is increased leading to more conscious energy efficient and healthy behaviour.

This newsletter's partners in style:

University of Maastricht, the Netherlands (MU)

The research group Human Metabolism



and Thermoregulation from MU is worldwide known for its metabolic unit and have international recognition for the research on the translation of physiological data to the daily living circumstances in the built environment. Website: www.maastrichtuniversity.nl.

Main role in MOBISTYLE

The research group from MU investigates the relationship between different health aspects and generated indoor environment situations (requiring a certain energy use). MU is responsible for the Dutch demonstration case.

University of Torino, Italy (POLITO)

Department of Energy is actively involved in



developing concepts and technologies for an energy conscious and comfortable built environment. Website: www.polito.it.

Main role in MOBISTYLE

POLITO provides a methodological guidance on the advances in research and applications of human thermal comfort and energy-related occupant behavior in buildings, as well as expertise on occupant behaviour modelling and statistical analysis, building energy simulations, meter-based feedback behavioural programs and familiarity with social, psychological, economic aspects of consumer energy behaviour. POLITO is responsible for the Italian demonstration case.

³Schellen, L.; van Marken Lichtenbelt, W. D.; Loomans, M. G.; Toftum, J.; de Wit, M. H. (2010). Differences between young adults and elderly in thermal comfort, productivity, and thermal physiology in response to a moderate temperature drift and a steady-state condition. *Indoor Air*, 20(4), 273–283.

⁴van Marken Lichtenbelt, W. D.; Hanssen, M.; Pallubinsky, H.; Kingma, B.; Schellen, L. (2017). Healthy excursions outside the thermal comfort zone, *Building Research & Information*.

⁵EN 15251. (2007). Indoor environmental input parameters for design and assessment of energy performance of buildings - addressing indoor air quality, thermal environment, lighting and acoustics.

What's new?

- ✓ Published MOBISTYLE paper in Proceedings Journal

The MOBISTYLE paper "*People-Centred Approach for ICT Tools Supporting Energy Efficient and Healthy Behaviour in Buildings*" has been published in the Proceedings journal. The full paper is available here: [LINK](#).

- ✓ MOBISTYLE at the conference Rethinking Energy Efficiency in Buildings and Energy Planning Education

Jure Vetršek (IRI-UL) presented the project at the international conference as part of the workshop "*Minimizing environmental impact while ensuring healthy indoor environment by modifying users behavior*", held in October 2017.



Figure 5: The MOBISTYLE presentation at the conference Rethinking Energy Efficiency in Buildings and Energy Planning Education, Krsko, Slovenia.



Figure 6: The MOBISTYLE presentation at the H2020 Sandpits event, Torino, Italy.

- ✓ MOBISTYLE takes part at the H2020 SHAPE ENERGY sandpits

At the H2020 SHAPE ENERGY sandpit event "*Energy efficiency and using less*" in February 2018 in Torino, the project and its approach was presented by Ana Tisov and Simona D'Oca (HIA).

The MOBISTYLE multidisciplinary approach was discussed together with other H2020 projects tackling energy efficiency issues. As recognized, occupants behavior in buildings most often cannot be seen as energy efficient as the term 'energy efficiency' is not understood by the building occupants.

The discussion during these two days was focusing on: "*How to achieve a behavior change that leads toward a more sustainable and energy conscious building usage?*"

The event tackled energy efficiency issues and encouraged generation of new project ideas that would nudge people towards changing behavior.

The MOBISTYLE project received special attention as it recognizes that without a user's acceptance and understanding of the importance of energy efficiency targets it is difficult to achieve these targets anticipated by the European Union (EU). In order to achieve ambitious goals of EU on energy savings, MOBISTYLE recognizes that users of the buildings are equally important part of the building ecosystem as building technologies. The MOBISTYLE poster is available: [LINK](#).

What's next?

- ❖ Development of the MOBISTYLE ICT based solutions for the five demonstration cases

Based on anthropological studies, the MOBISTYLE approach has developed a workflow that, starting from monitoring tools – such as building sensors and IoT devices – gives interesting information to the end user about energy use, indoor comfort, and health. Currently, the main focus is on development of the MOBISTYLE ICT solutions for the five demonstration cases.

The ICT partners workflow consists of three main phases: data collection at the demonstration site, data storage and processing, disclosing information to the end-user via the MOBISTYLE game and the dashboard according to the different behavioral action plans.

The main challenge is how to connect all different sensing devices from different sources to the single central MOBISTYLE platform and how to disclose the information for the different user types.

- ❖ MOBISTYLE 4th meeting in Milan, Italy

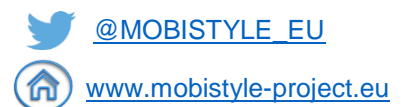
The 4th consortium meeting will be held in Milan, Italy 23 and 24 April 2018.

This meeting is important in order to discuss the work still needed to be done for a successful roll-out of the MOBISTYLE solutions for the five demonstration cases. Furthermore, a joint session with the MOBISTYLE sister project enCOMPASS will be organized to come to an exchange of ideas: www.encompass-project.eu.

MOBISTYLE partners:



Stay tuned until our next newsletter is out by following us on Twitter or visit our website!



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