



MOBISTYLE

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MOTivating end-users Behavioral change by combined ICT based modular Information on energy use, indoor environment, health and lifeSTYLE

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Executive summary

The innovative MOBISTYLE approach is embedded in range of technical components (platform, end-users' solutions) to achieve an overall integrated solution to deliver business opportunities and bring an added value to the current market.

The objective of the MOBISTYLE task 5.5 resulting in the confidential deliverable D5.5 is to elaborate the detailed MOBISTYLE project exploitation strategies and decision that were reached to execute the MOBISTYLE business models developed and presented in D5.4. This task was amended after the 1st review meeting (M20), half way through the project due to the identified need that there is needed specific focus on exploitation aspects in order to maximize the project impact and ensure sustainability after the project has officially ended.

Exploitation activities in T5.5 were aimed at defining appropriate measures and methodologies for managing exploitation, including identification of exploitation risks, making internal exploitation agreements (definition of roles of different partners) and demonstration of pay-back time. Furthermore, this task also describes the development of the exploitation plan and business strategy for execution of the developed D5.4 business models. The connected deliverable D5.5 is confidential due to the nature of information presented in this deliverable: commercialization/business opportunities with different commercial parties (MCAB members, stakeholders involved in the demonstration sites) the IPR management and strategy. In short, this deliverable presents the concrete actions of the consortium partners to ensure the use of the results for the exploitation while ensuring the scalability of the identified MOBISTYLE key results.

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1. Introduction

The consortium recognizes that invested time in developing MOBISTYLE exploitation strategy and making the business plan thorough and accurate can be paid off well on long-term, therefore during the project development (after 1st review meeting, M20) the agreement was reached to amend a separate exploitation task where the consortium dedicates a special focus on development of different exploitation roadmaps. As none of the partners is an exploitation or business expert, a professional support was sought when necessary.

As a starting point, the European Commission's Support Services for Exploitation of Research Results (SSERR) services were analyzed where two types of services were requested:

- Exploitation Strategy Seminar (ESS) during the 7th consortium meeting, Oct 2018 (M25)
- Business Plan Development (BPD) during the 9th consortium meeting, Oct 2019 (M37)

ESS was requested to get some more in-depth knowledge on efficient development of the different MOBISTYLE business and exploitation ideas (for the consortium as individual partners' commitments) and to clearly assess the key exploitable results via professional guidance. MOBISTYLE exploitation strategy was based on the following approach:

- To analyze the *market and users needs* and assess the competitive environment surrounding the project.
- To prepare a sound and realistic *exploitation plan* aiming at the commercial exploitation of the project's results beyond the consortium, ensuring the scalability of the results and aiming at market penetration (enhancing the project's innovation capacity).

The second service, BPD, was requested to get guidance on how to:

- To prepare a realistic *business plan* that will establish guidelines for the commercial deployment of the MOBISTYLE results focusing on technology analysis, distribution, marketing, pricing, risks identification and financial plan.
- To define different user-centric *business models* suitable for the exploitation of the MOBISTYLE's main results and to analyse the viability and profitability of each business model (in relation with Task 5.4, reported in D5.4).

Together with the Task 5.4, the Task 5.5 aimed to develop and present the first project's business models that are discussed with the interested parties represented in the MCAB board (both groups, demonstration case holders, commercial companies that signed LoS).

2. MOBISTYLE Exploitation strategy development

To ensure that MOBISTYLE results will go on beyond the project duration, an action plan was done as part of the exploitation strategy development during the project duration. Even though the agreement on elaboration of the Task 5.5 was done half through the project, the timing was good as there were already tangible results available and it was easier to understand their market potential. Therefore, business plans could be developed easier and also it remained enough time (18 months) to elaborate a good road map and to avoid unnecessary bumps at the end.

Actions that were done and organized:

M20 – 1st MOBISTYLE Review meeting at the European Commission (EC). It was agreed that a new task force will be dedicated elaborating project's exploitation plan.

M21 – As a follow-up, EC Support Service for Exploitation or Research Results (SSERR) was contacted to request a professional support to maximize the project's impact and exploitation potential. Exploitation strategy seminar (ESS) seminar was requested.

M23 – Plan for Exploitation and Dissemination of Results (PEDR) template is presented by the ESS expert as a preparation guideline for the consortium.

M24 – The coordinator together with the consortium started with the deeper elaboration of the first plan for exploitation in the coming months including identification of the to identify the Key Exploitable Results (KER's).

M26 – Exploitation Strategy Seminar (ESS) seminar as part of the 6th consortium meeting (consortium with the external expert) to get a further guidance by the appointed exploitation expert. The focus was on the discussion of exploitation of the main KER: the MOBISTYLE Open Users Platform (MOUP).

M26 – First definition and design of the MOUP technical functionalities including an open architecture for developer engagements and for further deployment of the developed tools (e.g. MOBISTYLE Game & Dashboard), modular information services, data storage and management, compatible for integration with existing modular services based on the same data storage and exchange principles (D5.3).

M28 – First discussions with MOBISTYLE Consumers Advisory Board (MCAB) took place during the Active House Alliance Symposium in Nov 2018 to discuss the functionalities and requirements of the MOUP with different commercial companies taking part in the advisory board.

M30 – Based on the MCAB discussions the architecture and functionalities of the MOBISTYLE Open Users Platform improved in a close cooperation with WP4 to define the possible integrations with additional modules and data sources, creating an open user platform.

M31 – Exploitation workshop based on PEDR during the 7th consortium meeting (consortium). Clear strategy to be defined for T5.4 Exploitation and business plan for the MOBISTYLE Open Users Platform and T5.5 MOBISTYLE exploitation and clearly define the plan and feasible business models.

↓
T5.4: Separate business model developed for the IT asset (MOUP) where the shift is made from offering traditional (product dominant) business model to user-centric (offering added value – service) business models.

↓
T5.5: Several iterations with the MCAB board to discuss the unique value proposition of the MOBISTYLE and to receive feedback as an input to improve both the MOBISTYLE business models. Further emphasis was done on the discussion on separate exploitation paths related to each pilot.

M33 – Second review meeting took place to review the MOBISTYLE exploitation ambitions. Mostly discussion around IP has been initiated.

M37 – Business Plan Development (BSN) service was requested as a follow-up service to analyze the components of the different business models and provide further feedback to the relevant partners. Also, ‘how to pitch’ session has been organized to improve partners pitching approaches.

↓
M40 – Agreed for which partners the exploitation agreements (momerandum of understanding) will be prepared and signed.

↓
M42 – The recommendations on how to upscale and mainstream selected business models outside the consortium, MCAB board and pilots implemented due to an emphasis to focus in the last half year on preparing target plans for the different early adopters.

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M45 – Final exploitation events to be organized with MCAB board, trainings at the pilot sites, public business pitching events etc.

M45 – End of the EU funded project & roll-out of the exploitation ambitions.

3. MOBISTYLE Exploitation vision

Exploitation is oftentimes to be left until late in the project, pushing innovations out into the market, rather than addressing what market will want to pull through to commercialisation. The consortium quickly visualized and mapped which relevant stakeholders should be targeted and have a potential for adoption of the project results beyond the project duration. Therefore, in MOBISTYLE the focus was on establishing the MOBISTYLE Consumers Advisory Board from the beginning of the project (even during the proposal writing).

Two groups were established as in Figure 1:

- The 1st group of MCAB is the core group with owners/managers or other relevant involved organizations and persons directly involved in the 5 cases.
- The 2nd group of MCAB are targeted European umbrella organizations, consumers organizations, commercial companies that are interested in project exploitation.

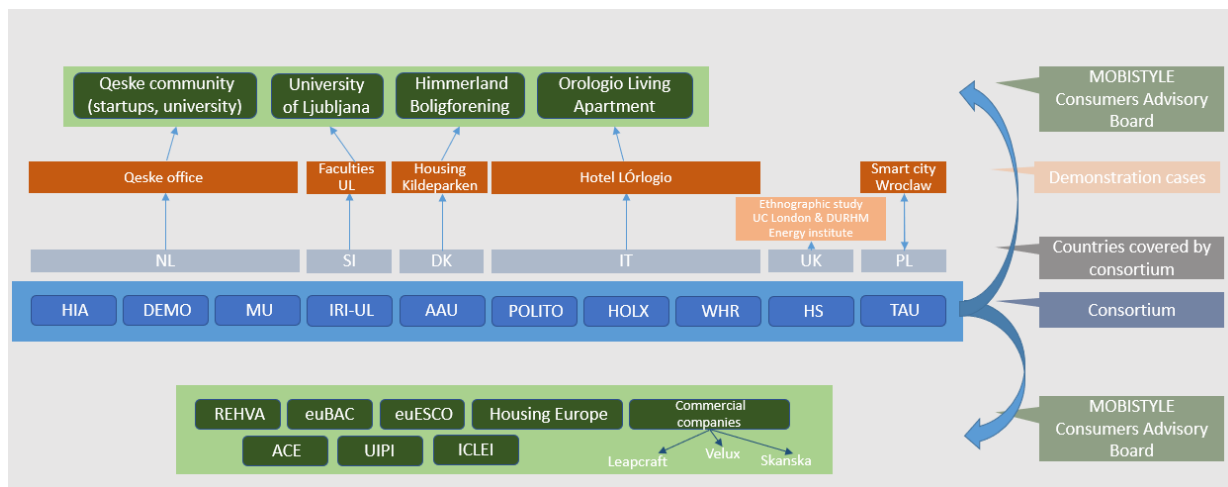


Figure 1: MOBISTYLE Consumers Advisory Board represented by two groups.

MOBISTYLE's Unique Value Proposition (UVP)

The MOBISTYLE's Unique Value Proposition (UVP) was identified already during the project proposal. Therefore, this UVP could be communicated at an early stage to the different MCAB members. The unique point of MOBISTYLE comes in:

- Combining data coming from different sources and translating this data into useful and understandable for different building occupants (no one size fits all) based on anthropological methodological approaches.
- Introducing occupants multiple (correlated) benefits when behaving energy efficient (energy-IEQ-health). Knowing that information on energy, environment preservation is not attractive to users – there

are multiple energy feedback programs on the market that are not attractive for users (they don't understand what means kWh). Yet, combining information on energy use and behaviour with other relevant information such as the actual indoor environmental quality, personal health (and the relation with energy and behaviour patterns), eventually combined with other attractive life style information can be used to catch the interest of consumers and even more important maintain their new habits and interest on the long term.

- There are many state of the art sensing devices that can be used for cost-effective monitoring with various level of feedback to consumers. The challenge however is how to utilize all the data and make use of it - provide knowledge and insights to occupants in the buildings. The idea is not to develop new technology but to offer new services (this is what the current market is missing). We already have technological saturation.

This understanding led to the innovation embedded in the MOBISTYLE ICT solutions.

The Key Exploitable Results (KERs)

The Key Exploitable Results (KERs) were mapped after 18 months working on the project when first SSERR service (Exploitation Strategy Seminar – ESS) was delivered. Since the project followed the people-centred approach, first year was intended to agree on the design of the different solutions. Once these solutions were in development phase, it was possible to aid data collection for these KERs. These KERs and their business models are well defined in D5.4

To summarize, the MOBISTYLE offers the following possibilities:

1. to store the data from different cost-effective sensing devices in the MOBISTYLE database,
2. to use end-user ICT solution:
 - i. Dashboard (HOLX)
 - ii. Game (HS)
 - iii. Office App (HIA)
3. to use the “open” part of the platform to develop their own apps:
 - MOBISTYLE Open Users Data (HOLX) and analytical Expert tool (DMO)
 - Methodologies (POLITO, MU, AAU, IRI UL) to do different data analysis and information insights.

See a more detailed captured vision in Annex 1.

4. MOBISTYLE Exploitation roadmaps

4.1 Exploitation routes for the different demonstration cases (1st group of MCAB)

The MOBISTYLE project is not a stand-alone development of ICT solutions and services, rather MOBISTYLE project paves the path for a long-term approach where ICT solutions and services are supported and communicated to users through awareness campaigns at the demonstration sites.

The five demonstration cases where the MOBISTYLE approach is tested served as a basis to develop further a strategy and action plan for the exploitation in 5 different climatic regions (geo-clusters) covering different building types (office spaces, university, social housing, smart homes, hotel), different types of end-users and different scales (building, district). Due to the different needs, different solutions were proposed and for this reason different exploitation routes have been identified and developed. For the different MOBISTYLE results, different targeted market players have been identified.

The following sub-chapters describe partners identification of possible upscale target areas per demonstration case. The following aspects were analysed:

- Potential geographical coverage and size of the target markets where project results could be replicated and exploited:
- Segmentation and prioritization of potential MOBISTYLE customers. Who will use our results?
- Which projects results (intellectual property) are needed and should be brought to the project, including for example information on knowledge and inventions.
- Which competitors do we have in the local area (main competitors on the (local) market):
- What benefits do you foresee due to using the solution?

The awareness campaigns were supported by the different demonstration tools demonstrations. It should be clear that the Danish and Polish demonstration included the MOBISTYLE Game validation where the Italian and Slovenian case included MOBISTYLE Dashboard validation. The amended Dutch case included MOBISTYLE Office App demonstration.

4.1.1 Danish demonstration case

- **Market size:**

About 3 mill. residences in Denmark

- **Potential customers:**

Utilities (District Heating) is probably the most interesting potential customer, followed by Social Housing Associations.

- **Project results:**

Game.

- **Competitors:**

There is no competitor on the market for game solutions, but there is a number of competitors for dashboard solutions including for example: IC Meter (<http://www.ic-meter.com>), Leapcraft (<http://www.leapcraft.dk>), Visility (<http://www.visility.com>), Danfoss link (<http://www.smartheating.danfoss.com/dk/>), etc. Additionally, several district heating companies also offer dashboard (web and/or app) solutions to their customers informing about their energy and hot water use.

- **Benefits:**

The game solution potentially provide motivation for use as well as guidance to customers, which none of the present solutions provide.

Short- and long-term exploitation potential:

Social housing corporation *Himmerland Boligforening, Aalborg, Denmark* was an active MOBISTYLE Consumer Advisory Board member and was directly involved in the Danish demonstration case. Future Himmerland ambition is to offer all needed services in one package accompanied with a manual for residents living in this community to give instructions on how to manage their apartment (and home appliances in it). Therefore, their idea is to expand the MOBISTYLE functionalities with further residents' services (e.g. burglary alarm) in a single social housing application.

The company *Varmekontrollen*, which delivered and mounted the smart meters and IEQ sensors in the Danish case have their own dashboard solution, they offer to customers. They see a potential in increasing the value of their solution by including recommendations and guidance to customers on how they can improve IEQ and energy use (MOBISTYLE Behavioral Action Plan methodology).

4.1.2 Polish demonstration case

- **Market size:**

The initial phase of exploitation (based on AMI) – Wrocław area and TAURON's DSO - the number of smart meters installed in TAURON's DSO exceed 400.000. TAURON is an energy provider to almost 5 mln residential clients (almost 30% of polish market). 4 mln will have installed smart meters until 2026.

The scale up for Poland (based on AMI) - total number of smart meters installed in Poland is approximately 1,5 mln (9% of all total number of residential meters). The national regulations require upgrading meters to reach the level of 80% in 2026.

- **Potential customers:**

Customers of MOBISTYLE platform: Households, Housing communities, Housing companies, Building administrators, SOHO, Small enterprises, Offices

Customers of the game: Home owners, residents of Wrocław with high IT literacy.

- **Project results:**

The algorithm for converting big data to smart data to provide feed forward for the development of new products and services. Trusted data from smart meters and devices verified and stored in data lake. The tool ready to collect, store and analyze data from other sources – any smart devices, appliances and utilities.

- **Competitors:**

1) Utilities: PGE, ENEA, ENERGA, PGNiG (gas and electricity company). All of them are using smart meters, applications and behavioral studies for better client engagement.

2) Telecom companies: Orange, T-mobiles, Plus,

3) Smart home and technology providers – disruptors searching for new markets, where technology can change deliver the solution clients will need.

- **Benefits:**

Direct engagement of end user providing specific data about his habits, behaviors and responses for motivation signals concerning life change, indoor environment and energy consumption.

Possibilities for direct communication, responding to client needs and behaviors in a real time.

The MOBISTYLE Platform offers an ecosystem where suppliers can improve their businesses by correlating their products data. A platform that heals the fragmentation of data, connects it in one data lake and allows new information extraction by advanced data analytics.

Short- and long-term exploitation potential:

TAURON DSO as an utility provider is an active MOBISTYLE Consumer Advisory Board member. Through involvement of TAURON R&D as project beneficiary, they are exploring the interest to scale the MOBISTYLE game methodology for their customers (TAURON R&D department, beneficiary in the MOBISTYLE project part of TAURON Sprzedaż sp. z o.o.).

Due to the data flow issues, the tool as such not going to be part of the TAU commercial offer. Furthermore, TAU learned that gamification can be a trigger for gathering attention from clients, however, not to be used on its own in a separate tool. For these reasons, there is no perspective of scaling up the solution for the mass market per se.

However, the comprehensive MOBISTYLE approach developed in the project will be maintained in the processes of shaping new products or services for TAURON customers which in the long terms could lead to better client engagement and allow to respond client's needs in a real time.

4.1.3 Slovenian demonstration case

- **Market size:**

Slovenian public buildings, starting with University of Ljubljana (UL) buildings (~350.000 m²), then scale up to other public buildings (in line with UL Energy strategy).

Due to recent good cooperation with the City of Ljubljana (COL), specifically the energy management team, the potential exists in the city buildings as well. They just finished the ESCO financed retrofit of 48 buildings funded by ELENA EIB mechanism.

In addition to the city administration, all the entities of Javni holding Ljubljana (transport, energy, water, waste) conglomerate present a potential for exploitation.

- **Potential customers:**

Users of UL buildings with focus on the employees, who are mostly office workers. In May 2020 IRI UL won the tender for energy management of UL building for next 3 years.

The main costumer when entry point health, increased productivity and well-being would be head administration responsible for all non-academic activities, including taking care of the real states, human resources and organizing health related activities (e.g. regular walks at FRI, promoting hydration at EF, daily short physical exercises at COL...).

Entry point could be also ergonomics in association with modifications in offices such as “MOBISTYLE hero” prof. Klementina Zupan, who teaches ergonomics.

The user is occupant of the office, most of the time sitting. The decision maker for the use of MOBISTYLE solutions will be the person responsible for occupational health and/or the person responsible for energy and facility management.

- **Project results:**

- The IEQ-Energy-Health nexus clear continuous data based communication.

- The people centered flexible iterative design process of solutions, including the campaign that proved to have some effect and were noticed

- The tailored made campaigns taking in to account realities and driver factors of individual social environment at the specific building.

- The temperature training presents a great potential. Recently the Covic-19 related changed habits are excellent example that human behaviour can be rapidly changed.

- **Competitors:**

- Organizations dealing with providing occupational safety/health trainings and solution providers.

- Energy management/solutions providers.
- Ergonomics solutions/indoor design providers.

- **Benefits:**

The following benefits come:

- Improved IEQ thus increased productivity
- Lower energy use and/or peaks,
- Less risks in health issues related absenteeism, more satisfaction of the building users.
- Improved building and systems use.
- Improved feeling of employees that employers cares for their health by addressing them via combined Health-Energy-IEQ campaigns.

Short- and long-term exploitation potential:

University of Ljubljana is an active MOBISTYLE Consumer Advisory Board member where the dean expressed an interest to scale the MOBISTYLE approach implemented at the two faculties during the project duration across other faculties and university buildings. IRI UL will be energy manager of all University of Ljubljana buildings until 2023. Project results are already and will be even more intensely used in daily activities of energy management team, because campaigns on 4 faculties that were demo buildings have been well accepted and have some positive impact. COVID-19 changed the perception of health as most important factor also at working premises. IRI UL participated in translation of REHVA guide how to safely operate buildings and added the aspects of improved human-building interaction. We had events on international and national level (targeting primary UL buildings) combining MOBISTYLE results and epidemics related building use precautions. We foresee to further exploit this momentum. Methodologies and tools developed in the project will be (are partly already) put to practice.

There has started discussion with the largest Slovenian company Petrol, specifically energy service division interested in MOBISTYLE dynamic temperature profile. Meetings and visits were held, IRI UL prepared a proposition, but no relevant agreement reached yet. However, due to the COVID-19 situation all communication is on hold. The findings are being used in several H2020 CSA and IA projects bringing the knowledge to other circumstances and partners.

4.1.4 Italian demonstration case

- **Market size:**

The number of people that hotel “Orologio Living Apartments” can approach is estimated to be approximately 8030 a year. Being a hotel means to have a large degree of replicability. In particular, “Orologio Living Apartments” offers small apartments for renting, as more than 2’300 businesses in Italy

(according Istat classification in its latest report, 2015), representing a sector characterized, between 2010 and 2015, by a mean annual rate of increase close to 4%. A market has to be found taking into account the potentiality of tourism sector facilities in general, at regional and at national level by considering, for instance, national hotel federations as channel (the Italian hotel federation is divided into 127 territorial association grouping around 27'000 hotels). The neZEH project (<http://www.nezeh.eu/home/index.html>) channel could also be used.

- **Potential customers:**

- Academic community. MOBISTYLE data could be exploited for benchmarking analyses.
- Hospitality market stakeholders. In this market the main MOBISTYLE customers would be others hotel managers if motivated by the project evidences in deploying ICT and non-ICT solutions (awareness campaign) in their own hotels, targeting both guests and staff members. Considering the results of the project, especially staff members could be the target.
- ICT developers. E.g. further development of solutions. Potential customers for them would be building managers willing to deploy MOBISTYLE solutions.

- **Project results:**

In MOBISTYLE, in the specific case of Italian case study, new knowledge generated by the project is related to the impacts of users' behavior in buildings on energy consumptions and IEQ, especially for the tourism context, where a large audience can be reached. MOBISTYLE content has the potential to generate a wider interest among hotels, since it deals with health, IEQ and energy efficiency. Moreover, the setting of the ICT-tools can be considered as exploitable solution as well. Going more in detail for single user types, it is possible to define a set of beneficial results which should be brought from the project:

- Academic community. The community would benefit from the project results and its "lesson learnt". Moreover, the definition of KPIs, the creation of baseline database, the clusterization of guests and the development of a common data lake (and the Expert tool) are beneficial for the research environment, as well as data analysis results.
- Hospitality market. Exploitable results are MOBISTYLE tools, namely MOBISTYLE Dashboard and awareness campaign contents. The set of impacts identified in the development of the Cost-Benefit Analysis can represent issues to leverage on when targeting the hospitality market.
- ICT community. ICT developers could benefit from the MOUP and its aggregation service. The translation of measured data in user friendly KPIs (in MOBISTYLE Game and Dashboard) and in aggregated KPIs (in the aggregation service of the MOUP) is added knowledge bringing competitiveness to MOBISTYLE platform. Conclusions on usability and willingness to use MOBISTYLE ICT-tools offer insights on possible future development for ICT developers in the identified market (as reported in D6.4).

- **Competitors:**

In the academic environment, the innovation is guaranteed by the inclusion of health-related issues and the human-centric approach, which are characteristics of the project as a whole (not specifically related to the Italian case study, where no data about health are gathered). This innovation allows to not have big competitors.

Looking at the hospitality market, there have never been solutions similar to MOBISTYLE. The existing hotel management system of the Italian demo case does not include any information about the indoor parameters or electric consumptions. Therefore, no information and awareness services have been provided to the guests about the impact of their behavior on energy use, indoor environmental quality and health before MOBISTYLE, neither in “Orologio Living Apartments”, nor in other hotels. Previous initiatives like neZEH project were stressing more on energy and environmental issues than on comfort. Well-being and health-related impacts are the novelty of MOBISTYLE.

Looking to a more general picture of the ICT market, in Piedmont Region there is an example of open smart data platform, born with the idea to build a public-private environment to share data, providing also some open visualization and analytics tool. It has been the support for many national and international project. Some data of indoor parameters and electric consumptions related to “the4bees” project are stored there and accessible. In our knowledge, at the moment, no data about indoor air quality and electric consumptions in hotels are collected.

- **Benefits:**

Differently from existing solutions, MOBISTYLE data are collected to be showed to the occupants as KPIs through user-friendly tools, combining information from different domains (energy, IEQ and health). Additionally, the Cost-Benefits Analysis identified other potential impacts generated by MOBISTYLE ICT-tools deployment (e.g. IEQ improvement, productivity level, emissions, ...) providing insights about the related economic value (in terms of monetized benefits for the owner/occupant/employer or the society).

Short- and long-term exploitation potential:

The previous hotel manager was an active MOBISTYLE Consumer Advisory Board member. the hotel management board changed in 2019. Thus, the scaling up within the Italian pilot is not foreseen.

Dealing with hospitality market, on long-term the MOBISTYLE exploitation for the hotel chains is enormous where the MOBISTYLE application functionalities can be integrated in franchises hotels. A frequent hotel guest can in this way follow his loyalty programme rewards, information about his stay as the room IEQ performance from one single place. The experience in the Italian pilot provided for some lessons to take advantage from in support potential future exploitation in the identified market.

- Targeting franchises hotels by looking for hotels with bigger infrastructures and more organized staff. The first point facilitates the integration of MOBISTYLE tools with other services for guests

(e.g. tablet in rooms to have internet access, lighting dimming, etc.), the second allows to better target the staff members, whose role and tasks are more specific in big businesses, with a better time management and, thus, wiliness to put some efforts in adopting new solutions.

- Look for synergies with existing informatic services. E.g. when targeting guests, direct link between access to MOBISTYLE services for guests and Wi-Fi-registration landing page. E.g. when targeting staff, integration of MOBISTYLE services in hotel management software.
- Look for integration with new services, as control functionalities. Objective of MOBISTYLE is to engage people towards a more aware interaction with the building, so control is done by people interacting with the building itself. However, to make people interested in using ICT services in this context, some sense of control through them should be given. E.g. when targeting guests, remote control setpoint is of interest. E.g. when targeting staff members, direct communication with guests is the most valuable service they look for, together with remote control of lights.

4.1.5 Dutch demonstration case

- **Market size:**

Offices account for 6% of EU overall building floor area. In the Netherlands, office spaces about 2.000.000 m² net floor area. Specifically, market of mainly real estate owners, about 200 companies.

- **Potential customers:**

- Owners of real estate e.g. real estate renters;
- Owners of real estate for their own use e.g. hospitals, campuses (Brightlands), banks;
- Real estate from educational institutions e.g. Tilburg University.

- **Project results:**

Dynamic indoor profiles & MOBISTYLE feedback campaigns (knowledge on energy, IEQ and health)

- **Competitors:**

There are technologies, applications providers but no COMPREHENSIVE solution integrating all the aspects (sensing, building services, feedback loops).

In office buildings the feedback about the indoor climate is given to the manager or/and all building occupants (e.g. employees). So if needed, the building managers can have direct contact with their occupants but this is not a practice normally. The MOBISTYLE office app can be used in several ways:

- As a tool able to collect opinions and feedbacks from occupants (users in the loop data) for building managers for easy contact with occupants, where the app also gives the first feedback to occupants.
- As a tool for an independent party in case a building manager got stuck in a discussion or got in conflict with occupants about the indoor climate.
- The MOBISTYLE-office app can collect data anonymously, what makes the work of the building manager easier by having less conflict about emotional response.

- **Benefits:**

Beside lower energy operational costs, more important are improved health for employees and lower costs due to improved productivity and reduced absenteeism.

- Healthy employees who feel pro-active are more productive than unsatisfied passive employees.
- It costs less to prevent health issues than to treat them after they occur.

Short- and long-term exploitation potential:

The Qeske building manager and Brightlands Huygen CEO have been active members of the MOBISTYLE Consumer Advisory Board through the involvement at the Dutch demonstration case. For the case of Qeske, they are interested in continuing the dynamic profile conditions where in case of Brightlands, the idea is to exploit the MOBISTYLE office app together with the dynamic conditions settings.

There has been interest expressed by Brightlands Campus real estate director, general manager of Roermond and Maastricht hospitals and Merin real estate owner of the office buildings. The discussion with the Brightlands Campus real estate director is to extend the solutions to some more commercial office floors on the campus. The discussion with Maastricht University is still on going in case more expertise and research on the side of human physiology is needed.

The dynamic indoor conditions consultancy together with the Office App will be available through a dedicated web page and marketing campaign of Huygen: www.huygen.net. It is expected to be life within the 6-12 months.

4.2 Exploitation routes through the MOBISTYLE Consumers Advisory Board members (2nd group)

During the proposal writing it was clearly implicit that the continuous communication with relevant market players is needed to ensure the long-term MOBISTYLE future. Several target groups were identified relevant for MOBISTYLE impact maximization and long-term exploitation. Several business cases presented below helped defining the MOBISTYLE Exploitation vision for these different target groups.

Target Group	Business Case	Use Case
End-consumers households and users of buildings	Easy access for all end consumers, from building facility managers to households, to information on real energy use by easy accessible media and, as a secondary effect, access to advanced energy services for households to understand their total energy use and energy costs, based on online information on energy use and guidance for measures and change of energy behaviour. Major benefits of the side effects such as better thermal comfort, indoor air quality and health.	<ul style="list-style-type: none"> To provide data driven (contextual) behavioral change suggestions and guidance to end-consumers
Manufacturers of monitoring and control equipment, related services	Benefit of a new range of technical services which bring monitoring and user targeted information together. This range of products will be a strong support in the implementation of the EPBD/EED. The positive impact of these products will strengthen the competitiveness of these industries. Guidance to industries for new products in monitoring and control equipment, smart metering and interactive information.	<ul style="list-style-type: none"> To offer their products and services to the target group; To develop interoperable and aspect-oriented CDT solutions;
Manufacturers of home appliances	Benefit for a new generation of smart home appliances, not only 'communicating' on services and (mal) functioning but also interactive communication with consumers, load prediction, efficient use of appliances. These new services contribute to a better competitiveness of European industries on home appliances.	
Energy suppliers utilities	Benefit of new tools for real time optimisation of energy demand and supply (smart grid) using intelligent energy management systems for reducing the difference between peak power demand and minimum night time demand, application of future energy storage technologies	<ul style="list-style-type: none"> To combine the deployment and implementation of smart meters, control systems and BMS with monitoring real energy use and consumers behavior.

<p>ESCOs</p>	<p>Profit by removing one of the major barriers for ESCOs and performance contracts, (the discrepancy between real and predicted energy use). Opportunities for new business in energy services by improved transparent contracts and procurement procedures, implementation of methodologies to control total energy use and savings hence controlling and mitigating the risks in uncertainties of performances. Cost-benefit relations of energy saving measures becomes clearer, increasing the deployment of energy contracting and financing constructions.</p>	<ul style="list-style-type: none"> • To overcome the limited access to necessary data to understand which factors influence energy use in buildings and behavior and to what extent.
<p>Social Housing Companies</p>	<p>Possibility to offer affordable energy costs for their tenants in combination with the development of a sustainable housing stock. Controlling real total energy costs is prevents and mitigates fuel poverty.</p>	<ul style="list-style-type: none"> • To provide case studies demonstrating applications of ICT tools and user-centric methodologies for a number of building types and end-users
<p>HVAC and engineering branch</p>	<p>Deployment of the results and application of monitoring and control systems providing information on real energy use and diagnostics of differences, failures and predictive maintenance by comparing with the predicted energy use. The HVAC Branch will engage new market opportunities, for example to the out roll of new energy services based on real energy use. Traditionally, this branch is involved in energy services, yet until now mainly product orientated; this sector can make a transition to advanced energy services based on real performances and energy use and by providing information on performances of HVAC systems.</p>	<ul style="list-style-type: none"> • To provide e-learning material that can be used for self-instruction and the development of CPD courses
<p>Industries on building construction, building fabric, building services (part of the total chain approach)</p>	<p>New opportunities in NZE building and retrofitting market by offering concepts with guaranteed energy performances by better understanding of user behaviour. Possibility to profile themselves by guaranteeing real energy use to their clients rather than only an energy label. Performance contracts with suppliers, contractors/ installers give the certainty of the level of delivered quality and robustness</p>	<ul style="list-style-type: none"> • To offer their products and services to similar target groups and building types

<p>Building constructors Real Estate Developers</p>	<p>Possibility to distinguish themselves by delivering reliable and products with proven performances and taking their responsibility in this chain. Enhancing their image in social engaged and green entrepreneurship. For serious manufacturers and suppliers this gives an extra stimulus for promoting their products and to enhance their competitiveness. Understanding and communicating on real energy use implies that the building and HVAC industry must provide realistic figures on energy performance and energy use in practice. This can be an important marketing tool for serious industries.</p>	<ul style="list-style-type: none"> • To provide case studies demonstrating applications of ICT tools and user-centric methodologies for a number of building types and end-users
<p>Policy makers</p>	<p>Support for standardization and benchmarking of total energy use to set down indicators for energy use in buildings that takes end-user's related factors into consideration, to achieve the better acceptance of energy labelling systems among the public, and to improve the ability to communicate to the public on behaviours that will influence energy use in buildings.</p>	<ul style="list-style-type: none"> • To overcome the limited access to necessary data to understand which factors influence energy use in buildings and behavior and to what extent.

After the target groups and the potential business cases were identified, different organizations and companies fitting into these groups were contacted to start further discussions. Several organizations and commercial companies around Europe have expressed their interest in the MOBISTYLE approach by signing a Letter of Support (LoS). REHVA (also MCAB member) expressed their interest as MOBISTYLE Ambassador and their manager Andrei Vladimir Litiu was the coordinator of the MCAB.

The MCAB interest was expressed by 33 organizations signing Letters of Support (LoS):

- Manufacturers (11): [Elgato EveHome](#), [GDC Telecom/Fibaró](#), [bGRID](#), [Leapcraft](#), [Velux](#), [Inap](#), [S-Labs](#), [Lerta](#), [Netatmo](#), [Schneider Electric](#), [Leanheat](#);
- Voluntary certification schemes (1): [Active House Alliance](#) (AHA);
- Industry associations (5): [eu.bac](#), [eu.esco](#), [EHPA](#), [smartEN](#), [EuroHeat&Power](#);
- Professional associations (3): [Federation of European Heating, Ventilation and Air Conditioning Associations](#) (REHVA), [Housing Europe](#) (HE), [Architects' Council of Europe](#) (ACE);
- Property owners associations (1): [UIPI](#);
- Consumers associations (2): [Citizens Advice](#), [BEUC](#);
- Anthropology institutes (1): [Institute of Anthropology F. I. Rainer of the Romanian Academy](#);
- Healthcare associations (1): [EFA - European Federation of Allergy and Airways Diseases Patients' Associations+](#)

- Utilities (4): [Engie Lab](#), [e.on](#), [Alliander](#), [Mälarenergi](#);
- Real estate developers (1): [Skanska](#);
- Building services designers, contractors (2): S.C. PRODAO-ING S.R.L.; Israeli ESD [esd-env.](#)
- Municipalities (1): Municipality of Munich.

The first MCAB gathering event was organized during the Active House Alliance Symposium, 8 November 2018, Lecco Italy. Discussions with 14 members took place – representatives of Leapcraft, ACE, AHA, REHVA, eu.BAC and S.C. PRODAO-ING S.R.L. The MOBISTYLE consortium was represented by the members of the coordinator (Ana Tisov), people-centric and occupant behaviour approach (Simona d’Oca), multidisciplinary MOBISTYLE methodology (Andrei Litiu), MOBISTYLE ICT solutions – game, dashboard as Open Users Platform (Eva Coscia), demonstration case representative (Per Heiselberg) and Marco Signa, representing the consortium partner Whirlpool.

The discussion with the MCAB members resulted in valuable feedback and input for the MOBISTYLE team in relation to business case development. As the project was then two years on its way, the outcomes of the discussion serve as an input for improving the current solution development. Afterwards, the MOBISTYLE team translated these key takeaways from these discussions into specific requirements for the MOBISTYLE Platform and the different modules.

Through facilitating a workshop with an open discussion between the MCAB members, the team came to a further exchange of ideas, discussed the usability of the improved MOBISTYLE solutions and discussed the MOBISTYLE exploitation strategy with these important market players from the MCAB.

Afterwards it was agreed to continue the communication online/via phone when necessary. Stakeholders taking part in MOBISTYLE Consumers Advisory Board (MCAB) – Group 2 were consulted regularly to discuss the MOBISTYLE progress, results and business models.

Second MCAB gathering took place as part the international conference CLIMA 2019 (26-29 May 2019, Bucharest, Romania) where MOBISTYLE project beside organizing a workshop also organized informal MCAB gathering after the MOBISTYLE-TripleA-reno workshop on 27 May 2019. More information about the workshop is available on REHVA website: <https://www.rehva.eu/news/article/triplea-reno-mobistyle-joint-workshop-at-clima-2019-1>

A concluding MOBISTYLE physical MCAB event would take place in spring 2020 to conclude the MCAB activities in a physical setting. Nevertheless, due to COVID-19 this was not possible. Nevertheless, instead 4 closed MCAB webinars were organized to give MCAB members an opportunity to get to know the technical solutions, explore their functionalities and discuss commercial interests for each of the developed MOBISTYLE tools:

- MOBISTYLE Game by Huygen - 12h00-13h00 CEST 3rd Feb 2020
- MOBISTYLE Expert tool by DEMO - 12h00-13h00 CEST 9th June 2020

- MOBISTYLE Dashboard by HOLONIX - 12h00-13h00 CEST 11th June 2020
- MOBISTYLE Game by HIGHSKILLZ - 12h00-13h00 CEST 18th June 2020

Through collaboration with members involved in Concerted Action EPBD (CA EPBD <https://epbd-ca.eu/>), Ecodesign (<https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:32009L0125>), Level(s) (<https://ec.europa.eu/jrc/en/publication/levels-common-eu-framework-core-sustainability-indicators-office-and-residential-buildings-part-3>) several MOBISTYLE recommendations were given for the relevant existing EU policy tools covering buildings (e.g. EPBD - especially Smart Readiness Indicator, ecodesign requirements).

At several occasions, it was discussed how to bring the multiple MOBISTYLE benefits as motivator/trigger for building renovation and include behavioral action plan methodology as one of the first steps in the case of Individual Building Renovation Roadmap (concept developed in <http://ibroad-project.eu/>).

5. MOBISTYLE Exploitation risk analysis

Project quality assurance tool (part of D1.5) also allowed identification of potential risks and their contingency plans. Below it is presented an exploitation risk analysis with the identified mitigation plans where several potential issues have been identified related to the future exploitation of the project's results.

Issues	Response
Technological risks	
Implementation of MOBISTYLE tools and methods does not succeed due to the complexity of the ICT sensing equipment and ICT system.	The well accepted and cost-efficient sensing equipment will be used. The WP6 Leader together with the Project Coordinator will monitor these issues and support WP leaders.
Does not produce the desired results in terms of the performance indicators.	Have midterm evaluations.
Some tools are not familiar and easy to use for all participants.	The tools development dependent on the actual knowledge of the people involved (people-centered approach).
Boundary conditions are the limited data types that can be measured and data flow latency. Restrictions may occur out of the daily workload of application.	To avoid or delimitate this risk the boundary conditions of possible changes have to be estimated. Demonstrations will show the applicability of the result. Involve MCAB stakeholders as early as possible to receive the market feedback.
The MOBISTYLE ICT system is complex and dedicated for the few demonstrators, but it's much more complicated to fit it for the new cases.	It is decided to define to go to market with different ICT solutions (multiple KERs) instead try to merge everything under one MOBISTYLE platform. This eases possibilities for exploitation, some can adopt just an ICT tool, some can go with people-centered service.

MOBISTYLE business discussion started when tools were mostly developed (after M24). If not properly coordinated, the approaches proposed to develop the business architecture - the processes and the models - may not result in adequately precise and consistent solutions to ensure actual market uptake of the solutions.	The WP4 (ICT WP) leader and the coordinator, took the initiative to start business discussion. SSEERR support was granted to still maximize the exploitation. All the partners took active part in these exploitation tasks in order to assure that the business models and processes created will be beneficial.
Partnership risks	
The collaboration between multidisciplinary and international project partners highly interdependent.	Regular communication and common enthusiasm over the MOBISTYLE UVP.
Disagreement on ownership rules.	The CA was discussed during the regular consortium meetings. The exploitation agreement template prepared.
Partners on the same market.	There are no overlaps between ICT partners offering solutions and partners are geographically spread.
One of the partners is not able to provide contractual deliverables.	Consortium will make the decisions whether the uncovered project activities can be assumed by the remaining consortium members. If this is not possible another partner will be recruited.
Partners have their own areas of interest which they are focused on while ignoring other tasks.	The research activities by individual partners are to be boosted by frequent (e)-meetings and seminars not only to maintain communication links but also to support collaborative work. The coordinator will stress the integrated nature of the project and ensure an adequate level of collaboration.
Market risks	
Not be competitive commercially	Several commercial partners have already competitive and attractive products on the market. META GROUP provided support which has extensive experience in exploiting research results.
Nobody buys the tools. Too expensive.	Promote value for money and sustainability. Adhere to objectives balancing them – CBA results.

Global COVID-19 crisis which might limit the market uptake of innovative solutions.	Emphasize on long term benefits: decrease of operational cost, improved well-being and environmental benefits.
Legal risks	
Know- how risks: it is easy to counterfeit the tools.	Uncomplicated foreground. Request for SSERR support for project results.
IPR protection. The CA is generic and does not clarify which partner will protect what.	Separate exploitation agreements are formed.
Management risks	
Many tasks run in parallel	Firm management procedures
Other risks	
Financial risks, Co-financing, use of resources.	The project budget is comprehensive to cover all costs associated to the work performed. Partners also will co-finance the work with own resources. Regular financial monitoring to evaluate budget spending vs. reached objectives/estimate costs.
The exploitation and business activities are not adequate to ensure optimal use of the project results	New task was amended, support from META group.
Resources for marketing	It is advisable for commercial partners to involve their marketing staff when preparing the pitching sessions for the tools (D5.4).
Positive Risks	
Services with high expected growth rate.	Exploit results as early as possible

6. MOBISTYLE IPR management

Intellectual property is an essential tool to secure value generated by software. However, the means to create such value can vary considerably depending on the exploitation scheme chosen and the related ecosystem for which the use of software developments are intended. The aim of this fact sheet is therefore to introduce the various IPR that can protect software, the main licensing schemes available and their respective potential business impact.

Status of IPR: Foreground

The Consortium Agreement tackles the topic of foreground IPR.

Exploitation agreements and IPR

During the 7th consortium meeting in Krakow, Poland it was decided that the following exploitation agreements (memorandum of understanding) were defined between:

- HS and AAU;
- HOLX and DMO;
- HOLX and POLITO;
- HOLX and IRI-UL;
- HIA and MU.

These exploitation agreements were defined and signed between certain consortium partners. The exploitation agreement template is available in Annex 2.

Several exploitation forms have been identified. Those are taking into account the different legal status and vocation of each MOBISTYLE partner:

- For educational purposes – universities (such as POLITO, MU, AAU).
- Service for clients – offering the holistic commercially integrated solution with consultancy (Huygen, DEMO)
- ICT developers to offer their end-user solutions (such as DEMO, HOLX)

Exploitation: Sources of financing foreseen after the end of the project

In the third reporting period (M31 on), the emphasis was on exploring further financing to guarantee long-term sustainability of the project's achieved results. As presented in chapter 4.1, the exploitation discussions via the demonstration case holders were intended to look for possible investors interested in scale up and scale across the demonstrator.

Different exploitation discussions were undertaken between certain MCAB members and consortium partners.

Sources of financing are consistent with the different exploitation paths foreseen:

- Universities (MU, POLITO, AAU) will integrate the results of the project for educational purposes;
- Service for commercial clients (renters of commercial spaces, housing associations etc.) for MOBISTYLE Dashboard within Holonix consultancy and MOBISTYLE Office App within Huygen
- Social housing association and energy provider involved in Danish case interested to upgrade their internal applications according to the MOBISTYLE game engine and behavioral action plan methodology.
- Service for clients of housing corporations and ESCO's – offering the holistic commercially integrated solution (technical system + long-term behavior changes service).
- Third party developers and other MCAB board (such as dashboard, game).

Furthermore, several partners are looking for MOBISTYLE continuation through national funding programmes.

AAU is working on preparing a national MOBISTYLE related activity within the national research funding called the EUDP (energy development and demonstration programme), <https://ens.dk/en/our-responsibilities/research-development/eudp>.

Outcomes of MOBISTYLE are already being translated to the ongoing EU projects TripleA-reno, U-CERT and Drive 0 (see also D6.5 to better understand this result integration). Furthermore, LC-SC3-EC1 is being under closer consideration for the final H2020 September 2020 submission.

7. MOBISTYLE Economic and financial perspective

Economic assessment for MOBISTYLE was introduced as part of the evaluation strategy in D3.3 and deepened in D6.3, with the adjustment and application of the Cost-Benefit Analysis (CBA) to the different demo cases. Aim was to assess whether MOBISTYLE was able to produce economic value in terms of benefits for the owner/occupant/employer and for the society. To do so, a multiple impacts approach was adopted, monetizing also impacts that are not strictly monetary. Indeed, as described in D3.3, the CBA is built on top of a first financial assessment, where only impacts with a financial nature (i.e. for which a market exists) are included, and then, adopting a macro-economic perspective, non-market ones are added to the appraisal.

On the contrary, in this deliverable the focus is strictly on the financial assessment of MOBISTYLE, aiming to assess the profitability of the MOBISTYLE solutions deployment at demo case level by taking the perspective of a potential adopter of the solutions. Financial assessment of the MOBISTYLE project implies the evaluation of all the cashflows produced by the project which have a financial nature. It means that it requires taking into account costs and revenues. In this application costs are related to investments for technologies enabling MOBISTYLE strategy at demo side (i.e. sensing systems, ICT-tools, ...), and revenues are monetary savings in the energy bills gained thanks to MOBISTYLE, as estimated in the different demo cases. Operation and maintenance costs of monitoring system can be considered negligible compared to initial investment, so they are not considered between the costs. Given this cash outflows

and inflows, synthetic indexes are required to measure the overall financial performance (in terms of profitability) of the project at each demo case level. In this regard, the Return on Investment and the Payback Period indexes are discussed in the followings.

7.1 MOBISTYLE Return on investment

The Return on Investment (ROI) can be defined as the profitability of a project per each euro invested. It is computed as the ratio between the benefits/revenues produced by the project over a predefined period (in the following called 'reference calculation period' or 'time-horizon') and the initial investment. From a methodological point of view, the ROI index calculation requires some attentions:

- Costs: since the methodology is based on a long-term analysis, costs for maintenance and replacements of the systems should be also included. However, in MOBISTYLE they are not considered.
- Reference calculation period: concerning investment project evaluations for energy sector and for research and innovation field, the EU Commission suggests reference ranging between 15 and 25 years (Annex I of the Commission delegated regulation (EU) No. 480/2014). Keeping the time-horizon shorter compared to the 30-50 years usually adopted in project dealing with buildings (as MOBISTYLE is) is recommended also in order to take into account the useful life of the systems that MOBISTYLE relays on and of the technological obsolescence they could run into.
- Benefits/Revenues: to include additional MOBISTYLE benefits in terms of, first of all, energy costs is a simplification, since their demonstration was proven only through few months of monitoring where their projection would be over the whole year. So extending these results assuming they can be projected over the whole time-horizon that in ROI assessment need to be set in advance could be questionable for some demonstration cases.

Therefore, from business financial assessment seems more accurate to only look at the Payback Period index. It is true that this index is simpler, however, results are expected to be more stable and robust. In particular, given the level of simplification of the index, assumptions needed in this application are less questionable when Payback Period is concerned.

7.2 MOBISTYLE Payback period

The Payback Period (PP) is defined as the number of years required to repay the capital invested in a project. It is estimated by comparing year by year the accumulated sum of expected annual cashflows with the initial investments, until the former overcome the latter. Thus, it represents the count of year between the date of the investment and the one when the sum of the expected cashflows resulting from the project equals the investment itself. This index, in its simple form, does not take into account the timing of the cashflows (i.e. cashflows are not discounted). When annual cashflows are constant every year, it can be easily computed as the ratio between initial investment and the annual cashflow according to the following equation:

$$\text{Payback Period} = \frac{\text{Initial investment}}{\text{Annual cashflow}}$$

Its application is reported as example in the following for one of the MOBISTYLE demo cases (i.e. Danish residential demo case) to measure the actual profitability of the MOBISTYLE solutions deployment at demo side.

An example of application: Danish demo case

In Danish demo case costs are expenses for sensors (including installation costs) and MOBISTYLE ICT-tool (i.e. HS Game) tentative market price, namely the price HS would be selling the Game to a new user willing to adopt MOBISTYLE. While sensors costs represent initial investment, Game market price is provided as an annual cost, thus representing an annual cash outflow for the final users adopting MOBISTYLE. Annual cashflows are annual energy savings, estimated thanks to the analysis of monitored parameters by demo case holder, monetized by multiplying the results for the energy price, at net of annual outflows represented by Game App annual price. In face of 20 000 euros invested for new monitoring system (in MOBISTYLE project) and 816 euros/yr of price of the HS Game (tailored for DK case), given an energy savings of 40 kWh/m²yr referring to 1801 m² and assuming an energy price of 0.07 euro/kWh, the following results are obtained:

- Initial investment = 20 000 €
- Annual cashflow = 4227 €/yr

PP for the Danish demo case can be inferred, and it equals 4.7 years. It means that, if MOBISTYLE kept producing the measured benefit in terms of energy saved, investments would be recovered within the 5th year from the initial investment.

By considering these results as representative of MOBISTYLE profitability, it is important to keep in mind that:

- investments depend case by case on the scope where MOBISTYLE also aimed to use the existing systems¹. So, it depends on the case needs, requirements, country specific,
- MOBISTYLE ICT-tool costs are not related to their development (which was financed as R&D activity within MOBISTYLE), but they are tentative market price (provided by ICT developer of the consortium). This is because it is assumed the perspective of a potential adopter of the solutions, who would pay for an already existing service, and not investing for its development.

¹ it is not required to distinguish the benefits relying on pre-existent systems from the one attributable to the new ones. Indeed, EU guidelines about project appraisal state that if a project integrate pre-existing services, both additional and new contributions can be taken into account to calculate the projects revenues. The same principle is here applied to the determination of the positive impacts of MOBISTYLE project (i.e. energy saving).

8. MOBISTYLE system and its sustainability

The following demo case related sections show what will happen with the MOBISTYLE sensing equipment & ICT tool after the project duration.

8.1 Demonstration cases status

Danish case

Sensors will be dismantled and removed from the apartments and necessary repairs carried out. Data collection equipment and repeaters will also be removed from the buildings.

At the start of the project we deliberately did not select the very newest equipment, but focused on choosing a reliable and well-proven system to reduce the project risk. There has been and is still a very fast development in sensor and ICT technology, which means that the sensors and data collection platform used in the MOBISTYLE project by the company has changed and improved a lot during the last 4-5 years. Therefore, the removed equipment removed from the apartments does not bring much additional value today for the company.

Polish case

Once the project ends the smart home devices will become the property of the project participants. The Game will no longer be supported.

Slovenian case

The hardware deployed in the offices of demo buildings has no more accounting value. The intention is to remove the sensors from all rooms. The sensors have, in addition to communication data to the MOBISTYLE system, LED changing colour based on air quality. This was very well accepted, and some users already expressed they would like to keep the “light” in their room, because it helps them to know when they need to open the window. Each room users will be consulted and based on their wishes sensor will be removed. Energy information systems will remain in function and used by facility management. At the moment, no dashboard (and associated app) use is foreseen at least not in the demo buildings. The removed sensors will be used for regular trainings for facility management personnel carried out by IRI UL energy management team.

Italian case

After MOBISTYLE project duration, Dashboard deployment is not foreseen, but measurements will be still gathered for educational and research purposes. Thus, sensing equipment installed in the Hotel will be kept in place (under expected agreement with the current Hotel property).

Dutch case

The MOBISTYLE Office App will be further exploited and promoted to the other clients of Huygen. There are ongoing discussions with several potential early adopters that see the potential in dynamic conditions application together with the MOBISTYLE Office App as a gadget.

Furthermore, the wearables used for the Dutch case experiments will be further used for the research purposed done by Maastricht University. All other sensing equipment needed for the purposes of the MOBISTYLE experiments provided by Huygen will be used for further research applications.

8.2 Normalization of the system

Social feasibility

MOBISTYLE aimed to delivered modular solutions where the development was following the people-centered approach, where the pre-requirement is “social feasibility study”. During Initial step is the identification and mapping of users, and buildings technical characteristics with capabilities (e.g. available sensors and actuators) and possibilities for human-building interactions (e.g. thermostat adjustments, window opening). it is to be defined what kind of needs. These identified needs and expectation of people involved in the design process serve as a basis to define the appropriate awareness campaigns, and right suitable ICT tools and channels to be used in order to effectively reach the desired users and help hem modify building use. Several methods are used for obtaining adequate understanding of users and their expectations such as: wide surveys (e.g. addressing all building user), workshops with developers (e.g. developing personas), focus groups and semi structured interviews with relevant segments representatives and participant observation as principal ethnographic inquiry method.

Based on the mapped needs, it is to be decided which ‘module’ (ICT solution) is to be applied and whether some additional knowledge or consultancy service is needed.

When preparing the solutions, the co-development approach can be used, where same people are involved in all phases of development and deployment. The methods and tool for keeping people engaged with solutions and/or project activities are case context specific, because motivations are different in home, working or leisure environment of demo buildings. In all activities, especial ethnographic research, ethics, respecting participant integrity, their privacy and associated collected data security is of outmost importance. If trust is lost, because participant get the feeling they are being mistreated or tricked, this can be the end inquiry or at least no more honest opinions are obtained.

Technical feasibility

Afterwards, several technical possibilities are available where it is possible to request a full MOBISTYLE Information model consisting of the MOBISTYLE database (DEMO’s database) and the different tools allowing transformation of raw data into useful, user understandable but reliable information based on the standardized exchange protocols and reliable ICT architecture (intellect).

The MOBISTYLE database can gather and categories a range of diverse data coming from building monitoring systems (BMS), individual indoor environmental quality (IEQ) sensors and other third party (European) databases. Directly linked to the database are statistical analysis tools and algorithms that allow elaboration of the chosen MOBISTYLE KPIs based on the measured data allowing certain statistical analyses as also transfer of data into useful information and knowledge for identified user groups.

MOBISTYLE Expert tool (DEMO's intellect) allows data management with functionality allowing external developers and third parties to access to the data for validation and filtering. The second purpose is to enable the expert to calculate basic KPI related to energy and also to IEQ, comfort and health. The last purpose of the expert tool is to support data needs of third-party tools. When disclosing the information to users for the MOBISTYLE demonstration cases, the MOBISTYLE Game (Highskillz), Office App (Huygen) and Dashboard (Holonix).

It is possible to request the demo version of the tools: <https://www.mobistyle-project.eu/en/mobistyle/results/tool-access>

Annex 1 - MOBISTYLE captured vision

MOBISTYLE is designed to reduce your building's energy costs, improve the indoor environment conditions and well-being of your building's occupants. Especially the latter. It does not matter whether a residential or non-residential building, we help your employees to feel better, improve their health, increase their productivity and wellbeing and in this way create a positive return on investment. Through our mission to consider both, the buildings as its occupants we fulfil the "wants" and "needs" of both groups where we, furthermore, create a relation between building and occupant that has so far remained invisible visible!

In recent years there has been a widespread of IoT in smart buildings, however, there is a lack of attractive information presentation that will motivate users to start behaving in an energy efficient way. If the captured data is analysed and presented in an attractive and understandable way to the building occupant, this can open doors to a lot of opportunities where building users are triggered to behave in a more energy efficient and optimized way in their buildings. In MOBISTYLE the aim is therefore at: 'Less automation, more information' – your occupants can do the right decisions as long as they received the right information. Smart buildings are driven by innovative technologies but are meaningless without consideration for the people in it.

By gathering the different types of data we offer you new valuable information by correlation of individual products data (energy usage, indoor environment, occupant's behavior and well-being) and aggregating it we discover macro common patterns.

Why do we know less about the buildings in which we spend most of the time than we do about the cornflakes we had for breakfast or coat we wore this morning? We spend a lot of time in buildings. But what do we truly know about them – about our indoor climate, the effect of buildings on our health and the energy we're using? MOBISTYLE changes this. Through dashboard and game, MOBISTYLE provides people with personalized information on energy use, indoor climate and health. Including tips to improve!

Concept:

People take buildings for granted. They have often limited knowledge about the quality of the indoor climate they are working or living in. They are not aware of the influence of their own behavior on overall building's performance, indoor climate and oftentimes even on their personal health.

People should feel proactive in their buildings and easily relate to their surrounding indoor environment, instead of being overburdened with information and suggestions coming from the different "smart systems". In MOBISTYLE, the goal is to use existing building technologies and make them user-friendlier. Building use should be improved in order to ensure healthy, productive and comfortable living environments for people.

Therefore, direct, dynamic and comprehensible feedback on energy consumption, indoor environmental quality (IEQ) and health should be provided to people in a meaningful way, since it assures constant improvements and changes of mindset on a longer run. In this way we make invisible connections between

buildings and its occupants visible. Through a provision of understandable information to building occupants we can help shaping habits, transforming practices and consequently improve building's overall performance.

Still, people are not assembly parts of a machine; they have their own free will and make choices on their own. Think about smoking. Usually people do not quit smoking because saving few euros; they do it because they become aware how smoking affects their health and wellbeing. It is similar with energy consumption and IEQ. People start using stairs to live longer and not to save money. They decrease temperature in their room to improve their immune system and speed up blood circulation and not to save a fistful of euros at the end of the month.

In MOBISTYLE we developed 4 tools to accomplish this:

1. MOBISTYLE Dashboard;
2. MOBISTYLE Game;
3. MOBISTYLE Office App;
4. MOBISTYLE Expert tool.

Implementation:

The Dashboard is a tool for buildings energy and IEQ monitoring, with a suggestions system to guide users toward a more efficient behavior. The dashboard can show different energy types usage, IEQ in easy to understand way compared to sophisticated smart system dashboards. Information can be given through simple data monitoring, historical trend analysis, specific widgets or ad hoc suggestions. The Dashboard is tested in university offices in Ljubljana, Slovenia and at the hotel in Turin, Italy.

The Game is a gamified app for behavioural change on efficient energy use and for awareness creation on the associated health benefits. This mobile app provides users with timely information and relevant home specific recommendations. The game is designed to introduce energy efficient actions in homes in a fun and healthier way. The Game is tested in social housing apartments in Aalborg, Denmark and smart homes in Wroclaw, Poland.

The [Office App](#) introduces the dynamic indoor environments in order to increase occupants acceptance as such conditions can lead not only to lower energy bills but also to more productive and healthier employees. The Office App provides tips and information on how such conditions affect people's well-being, productivity and also building's IEQ and energy use. The Office App is tested in an open-plan offices at Brightlands innovation campus in the Netherlands.

The Expert Tool allows building managers harmonized management of different data types as also offers easy to visualize features. The experts are able to filter the information they need, calculate pre-defined KPIs as also set up their own KPIs. It allows building managers to filter information, make simple calculations, and export the data in the most suitable way. The Expert Tool is used for data management in all the demonstration cases.

Annex 2 - Valorisation and exploitation of ... *(please refer to the specific KER or to a group of KERs)*

Agreement between *partner, partner, partner*

The following Memorandum of Understanding (MoU) is made on the *ddth of month year* by and between

- **Partner a**, VAT ..., registered in ..., hereinafter referred to as ...
- **Partner b**, VAT ..., registered in ..., hereinafter referred to as ...
- **Partner c**, VAT ..., registered in ..., hereinafter referred to as ...

Individually referred to as a “Party” or collectively as the “Parties”.

Background of the Agreement

During the MOBISTYLE project’s life the KER was developed... *(clearly describe the KER)*

As per consortium agreement of the Project signed by the Parties, 8 Section: Results, 8.0 ‘Results are owned by the Party that generates them’ and 8.1 Joint ownership ‘Unless otherwise agreed...’.

Partner a, b, c, x, y and z contributed to the generation of the KER. Each one contributed in the following way:

- **Partner a**, ...
- **Partner b**, ...
- **Partner c**, ...
- **Partners x**, ...
- **Partner y**, ...
- **Partner z**, ...

Upon successful conclusion of the project activities, Parties agreed to jointly define the best way to exploit and valorise the KER.

Partners **a, b, c, ...** expressed the willingness to further valorise and exploit the above-mentioned KER, securing the needed resources, while partners **x, y, and z** agreed to give to partners **a, b, c, ...** the full right to exploit declaring to have nothing to claim.

Given the uniqueness and further impact potential of KER/s above mentioned, all Parties through this agreement aim to define clear roles and modalities to exploit the programme beyond the grant received from the European Commission.

Purpose of the Agreement

The agreement is therefore aimed at clarifying and regulating

- A. Scope and objectives of KER
- B. Use of the name *(example)*
- C. Use of the data collected via the platform *(example)*
- D. Use of the software/database *(example)*
- E. Procedures and Roles of the Parties *(example)*

1) Scope and objectives of KER

The Parties agree that KER is ...*(KER description)*

The KER is built around... and it is implemented through:

- A. A network(s)-based outreach approach; *(example)*
- B. ...;
- C. ...;
- D.

2) Use of the name

....

...

3) Use of the data collected

...The registered data are the property of each of the Parties, who can use them for other activities in respect of GDPR and only for non-competing purposes with the current agreement *(to be finetuned by partners legal offices)*.

4) Use of the software/database

5) Procedures and Roles of the Parties

All Parties shall appoint 1 person within their respective organisation as the first and foremost contact point for ensuring swift and clear communication between the Parties and for implementation of the exploitation plan for this KER as approved by MOBISTYLE and annexed to this MoU.

The initial persons responsible for being the contact point are:

- Partner a: Name, email address, telephone number
- Partner b: Name, email address, telephone number
- Partner c: Name, email address, telephone number
- Partner

All partners will be informed of changes in the contact points in a timely fashion, not exceeding 5 working days from the moment the appointment from the organisation.

Partners **a, b, c, ...** who expressed the willingness to further valorise and exploit the KER will proactively look for potential business development opportunities. Each time one of the Parties is clearly informed by a potential customer, the Party must inform the other Parties’ relevant contact points and receive organisational approval (**X out of X**) to proceed.

It is the responsibility of each Party to ensure the contact points of the other Parties are informed using, if necessary, more than one communication channel (*e.g. email, WhatsApp, phone, etc*). It is the responsibility of the other Parties to ensure the approval to proceed (or denial thereof) is communicated back to the Party in a timely fashion, not exceeding 1 working week (5 working days) from the moment the latter’s communication has reached them.

5.1) Dedicated KER management (in the case of a horizontal governance set-up – to be finetuned according to the governance set up chosen by the concerned partners, before the end of the project)

The Party in charge of any new contract will inform all partners about the client, the scope of the contract and foreseen role for each partner (if possible and to different degrees). In order to progress with a new programme, partners must agree on its relevance and viability. Parties have 5 working days to register non-agreement, otherwise the proposal will be considered suitable.

When the contract is finalised, agreed by all Parties and service sold to the client, the Party in charge will act as main contract manager and coordinator, responsible and liable for the smooth implementation of the envisaged activities throughout all phases.

The partner who secures the contract should also perform a “client financial check” and all Parties will be paid promptly upon payment from the client according to the payment schedules agreed upon.

The Party will be the interface between the client and the Parties and will also be responsible for proposing the allocation of resources among partners.

5.2) Promotion and marketing

Parties **a, b, c, ...** who expressed the willingness to further valorise and exploit the KER will ensure the proper outreach, using their networks and contacts (social media, newsletters, websites) to promote the KER toward the target markets and early adopters initially identified in the exploitation plan annexed to this MoU.

The most suitable party to deliver the communication activities will be decided on the basis of the scope of the contract and the main target audience.

Cost of marketing and sales activities will be split among partners according to the provisions of the exploitation plan for the current KER.

5.4) To summarise:

<i>Activity</i>	<i>Party responsible</i>	<i>Cost split between parties (%)</i>
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<i>Programme management and coordination</i>	<i>Party who secured a contract</i>	
<i>KER and methodology management</i>	...	
<i>Innovation and IPR management</i>		
<i>KER update</i>		
<i>Outreach and communication</i>	...	
...	...	

6) Intellectual Property Rights and NDA

The Parties acknowledge that nothing in this Agreement shall affect any pre-existing (background) and future (foreground) ownership of any intellectual property rights.

Dedicated NDA will be developed and signed between Parties and customers every time needed.

7) Miscellaneous

In the event of further participation in call for proposals covering actions that fall in the scope of this Agreement, the parties mutually recognize a first right of information and best effort to bid together

This Agreement is at-will and may be modified by mutual consent of all the Parties. This Agreement shall become effective upon signature by the authorised officials and will remain in effect until modified or terminated by any one of the Party by mutual consent. In the absence of mutual agreement by the Parties this Agreement shall remain in force for twenty-four months.

Any dispute that might arise concerning this Agreement shall be settled amicably.

Date & Signatures

FOR [please insert name of participant or potential or current partner]

Partner a: Name, Position

Partner b: Name, Position

Partner c: Name, Position

Partner x: Name, Position

Partner y: Name, Position



Partner	z:	Name,	Position
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