

HEART

Holistic Energy and Architectural Retrofit Toolkit



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This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement N° 768921.



Challenging context for digitalisation and renovation of social housing ...

- The challenge is to promote the modernisation of the building stock, including comfort and affordability
- To achieve this, we not only need adequate policies but mostly we need change within the construction sector to boost productivity and innovation. This will allow the development of adapted products and processes in order to stimulate the demand for NZEB
- On the other hand, we need better skills from the demand side perspective (housing providers) in order to stimulate the supply of standardized and tailor-made solutions.
- The demand side has to improve the way to procure for renovation on buildings, most specifically by making guarantee of performance a common approach and the supply side must provide solutions. This required a better concerted approach in terms of quality control, risk sharing, but also users acceptance and empowerment
- This calls for more EU initiatives to support interdisciplinary skills among housing providers but also among renovation/construction companies in particular SMEs (the EC has launched a call for proposal under ERASMUS + programme)
- The future EU R&D and education programmes should promote technical, social and interdisciplinary skills which will allow the development of standardized solutions to large scale renovation of homes aiming at creating comfort and affordability for residents.

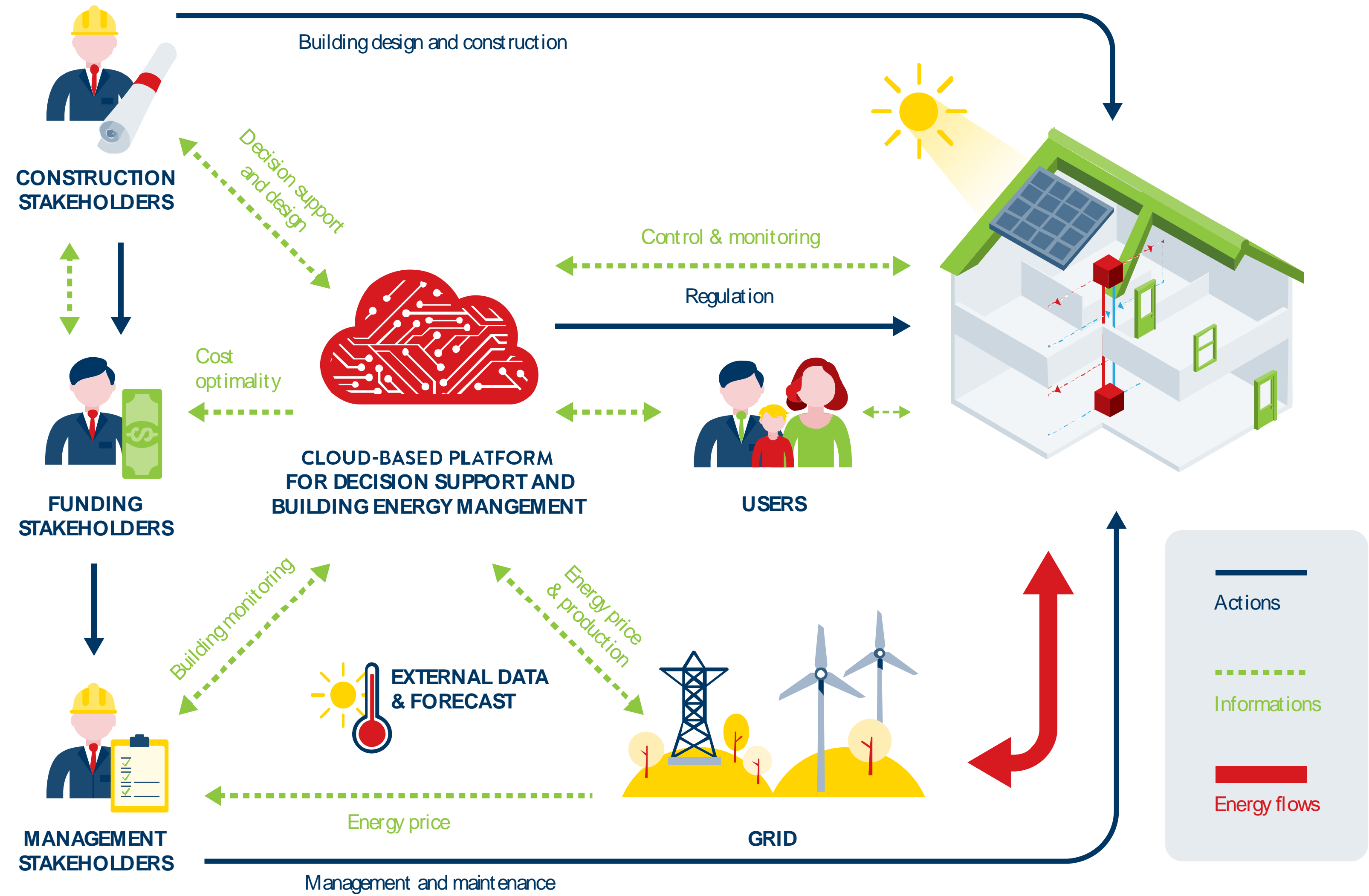


Time is ripe for industrialisation of insulation solutions as well as of ICT based solutions for energy production

While several other projects have attempted to develop industrialised solutions for the insulation of homes, HEART tries to combine solutions of prefabricated insulation with automatized demand response management using Building Energy Management System : the objective is to allow for an optimal balance between energy reduction and production of energy on site (PV, heat pumps). The ultimate outcome is to provide for a packaged solution and incentivize enterprises to cooperate to offer this integrated solution when bidding for the renovation of buildings, in particular social housing.



HEART Cloud-Based Structure



Objectives (1)

OBJECTIVE 1 - To develop systemic and cost-optimal solutions for energy retrofit

The main objective of the project is to develop an holistic and multifunctional toolkit based on the synergistic interaction between building technologies and technical systems.

The solution has to decrease installation time by at least 30% compared with normal construction practices and to ensure payback periods lower than 15 years.

OBJECTIVE 2 - To develop, update and adapt innovative technologies for their systemic integration

HEART toolkit will systemically integrate different types of subcomponents - envelope technologies, technical systems, renewable energy sources and building energy management systems - offering high levels of performance and communicating with each other.

OBJECTIVE 3 - To foster building's smart upgrade

The developed solutions will enable to convert existing buildings into Smart Buildings, i.e. in interactive buildings characterized by dynamic and multidirectional flows of energy and information.

The control logic will learn about the building's behaviour and its end-user habits and preferences, identify and apply optimal operating profiles, allow real-time monitoring, allow active involvement of end-users and enable dynamic interfacing with the grid.



Objectives (2)

OBJECTIVE 4 - To support and improve the decision-making process

By means of an iterative simulation of various feasible solutions, HEART selects and sizes the most effective one, providing a detailed prediction of the achievable cost-performance-benefit ratio.

In addition to strengthening the economic and energy-related benefits HEART can support and facilitate decision-making, reducing the choices' processing time by at least 30% and decreasing final outcome uncertainty of the decision-making phase.

OBJECTIVE 5 - To promote energy efficient financing

HEART reduces energy consumption, optimizes overall performance and, through a continuous monitoring and makes a building's operating transparent. This aspect translates into an effective conduct of a retrofit intervention and a constant documentation of its performance.

HEART will develop innovative business models to support energy efficiency financing, oriented both at private investments and at public incentives. It can be estimated that these tools, breaking down risks and uncertainties, will increase by 20% the attractiveness of energy retrofit investments.



Possible “angles” of the project

Scientific Potential

- Creation of an innovative toolkit that combines existing technologies to maximize the impact of their synergistic application in building renovation.
- Transformation of traditional low-performance buildings in self-adapting smart buildings

Economic Potential

- Creation of a toolkit which is highly scalable, highly replicable and which ensures relevant economic performances in numerous EU markets and contexts

Societal Challenges - Energy

- HEART main impact is a dramatic reduction of energy consumption, due to the innovative and high-performance renovation strategy
- HEART contributes to the efficient management of power peaks in grid overload periods

Societal Challenges - Environment

- The dramatic reduction of the energy demand translates in a positive impact on environment in terms of pollutant emission

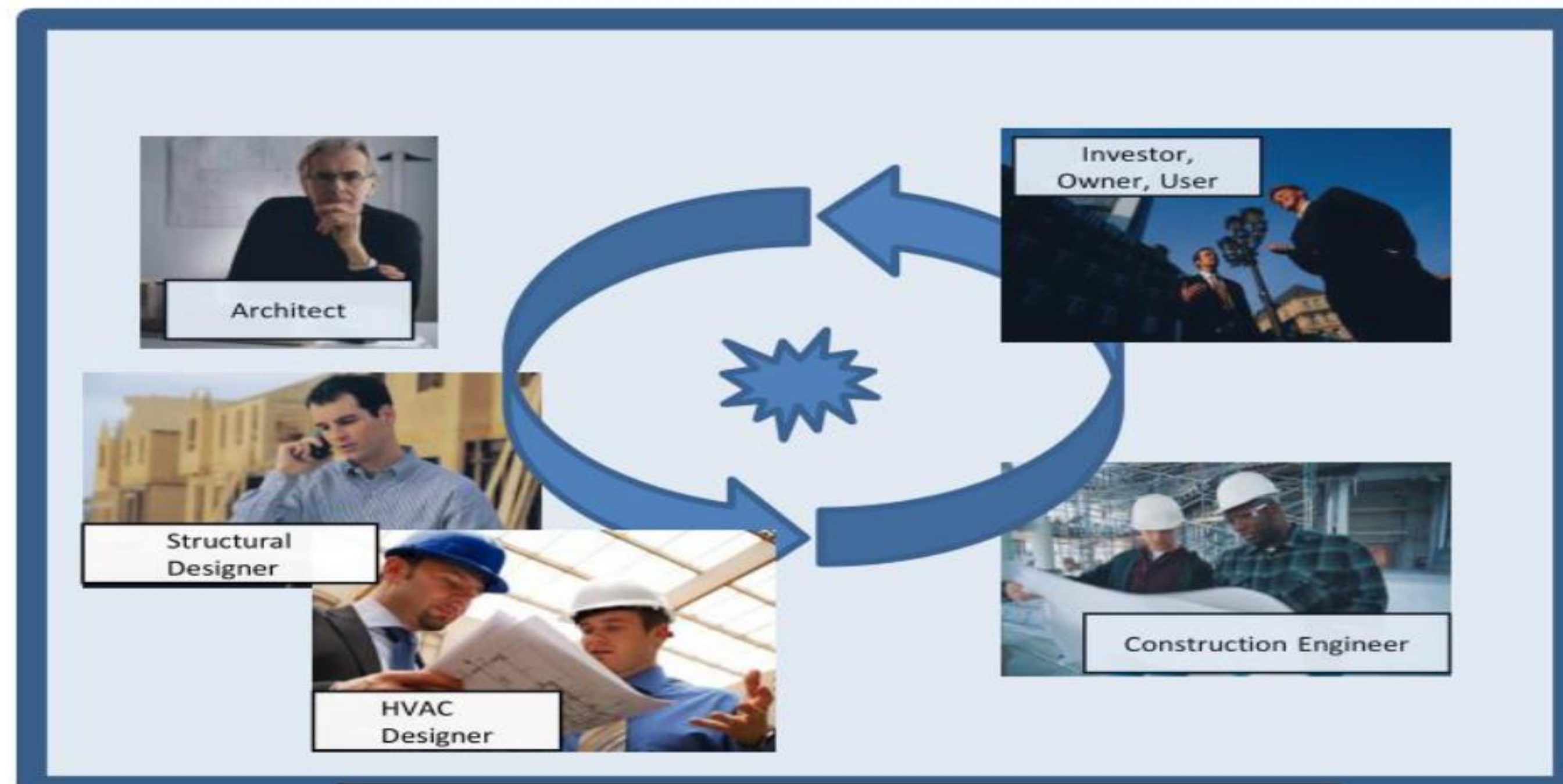
Societal Challenges - Inclusion and social life quality

- HEART pilots will be hosted in social housing complexes: the focus on low-level buildings will also translate in an increase of life quality of peripheral areas



Long term strategies for the decarbonisation of the building stock (art. 2 EPBD) require new approach to skills in the construction/building sector

New technical skills + soft skills required to work in integrated teams. Also from contracting party.



A new generation of construction/renovation experts in the making ?....

Cooperation with ENTPE (National School of Public Works) to develop the integrated approach to renovation

Focus on interdisciplinary skills (including engagement with tenants)



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General information

- OFFICIAL TITLE: HEART - Holistic Energy and Architectural Retrofit Toolkit
- PROVOCATIVE SUBTITLE: “HOME IS WHERE YOUR  HEART IS”
- RELEVANT KEYWORDS: Renovation, Energy efficient buildings, Internet of Things, Interoperability, Integrated design
- DURATION: 48 months (01/10/2017 - 30/09/2021)
- EU CONTRIBUTION: 5,669,012.50 €
- PROJECT COORDINATOR: prof. Niccolò Aste, Politecnico Di Milano, niccolo.aste@polimi.it
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Consortium

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3	University of Ljubljana	UL	Slovenia
4	Accademia Europea di Bolzano	EURAC	Italy
5	Turbo Power Systems	TPS	UK
6	Heliotherm	HT	Austria
7	ZH	ZH	Italy
8	VyzVoice	VV	Luxembourg
9	STILLE	ST	Croatia
10	Revolve Water	RW	Belgium
11	Quantis	QT	Swiss
12	GarciaRama	GR	Spain
13	Housing Europe	HE	Belgium
14	ACER RE	ACER	Italy
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