

The EUB SuperHub Online Platform

Towards a smart and sustainable construction future

Imagine how much easier life would be with an online repository containing all relevant information about a building over its lifecycle while also connecting all stakeholders, from developers and contractors to tenants and maintenance teams. Moving from imagination to reality, Ahmed Khoja, senior researcher at Munich University of Applied Sciences, Germany, and Dr Marina Malinovec Puček, lead consultant at the Energy Institute Hrvoje Požar, Croatia, worked on the EUB SuperHub project aiming to establish a digital one-stop-shop which meets the demands of all the construction sector value chain in one place. One of the central focuses was the development of a digital building logbook, a repository for all relevant building data comprising a EUB e-passport as the final output of the building certification process. The elaborated digital building logbook contains all input values to calculate the passport rating in three domains: energy efficiency, sustainability, and smartness.

Ahmed Khoja, senior researcher at Munich University of Applied Sciences, Germany, and Dr Marina Malinovec Puček, lead consultant at the Energy Institute Hrvoje Požar, Croatia, are ushering in a new age of technological revolution for the next generation of building certification. Over the past three years, they have worked on developing the European Building Sustainability Performance and Energy Certification Hub, also called EUB SuperHub. The EUB SuperHub comprises several components, including the digital building logbook, an online database containing all relevant information about a building through its lifecycle.

DIGITISATION OF BUILDING-RELATED DATA

Building-related data are scarce, often of unreliable quality and limited accessibility. We have all been in a situation where we had to find information about a building – either our own house, office, or a public building – and all we could muster was scattered information across different online platforms, documents prepared by different people, for different purposes.

How confusing this must have been for us, who just wanted to check when the last time a key maintenance was done, let alone how time-consuming it is to find and decipher this information!

Now, multiply this problem by a larger number of buildings or buildings with more complex information that goes beyond the simple questions of ‘who is the owner?’ or ‘when was the fire alarm checked last?’, and you have a plethora of indiscernible data. There is building-related information that should be easily available to the public, information that should be private, and information that should be available on a need-to-know basis and can be accessed quickly. In this era of digital renaissance, a collection of data in one place seems more necessary than ever, even for buildings.

Digitalisation is rapidly becoming the norm in our everyday lives, with information readily available at any time or place. In this era of accessible information, ease of communication, and technological advancement, looking at paper files and trying to connect

dots across different files and locations sounds absurd. Thankfully, digitalisation has now reached the construction sector, with the EUB SuperHub being developed as part of the new digital norm, acting like a repository where all building-related information is contained in one place, online.

A ONE-STOP-SHOP

The EUB SuperHub platform designed by Khoja and Malinovec Puček contains four separate modules representing different activities and stakeholders relevant to a building: the planning and verification tool (PVT), the E-cockpit, the virtual marketplace (VM), and the E-training module.

The planning and verification tool (PVT) is a private or permission-based access section, where real-time building performance information can be stored in the form of a digital building logbook. It is up to the building owners to decide which of the building information would be available to the public or stakeholders. The digital building logbook contains basically all building-relevant information segregated into eight categories, from admin, general, and specific element information to data on operation and use,

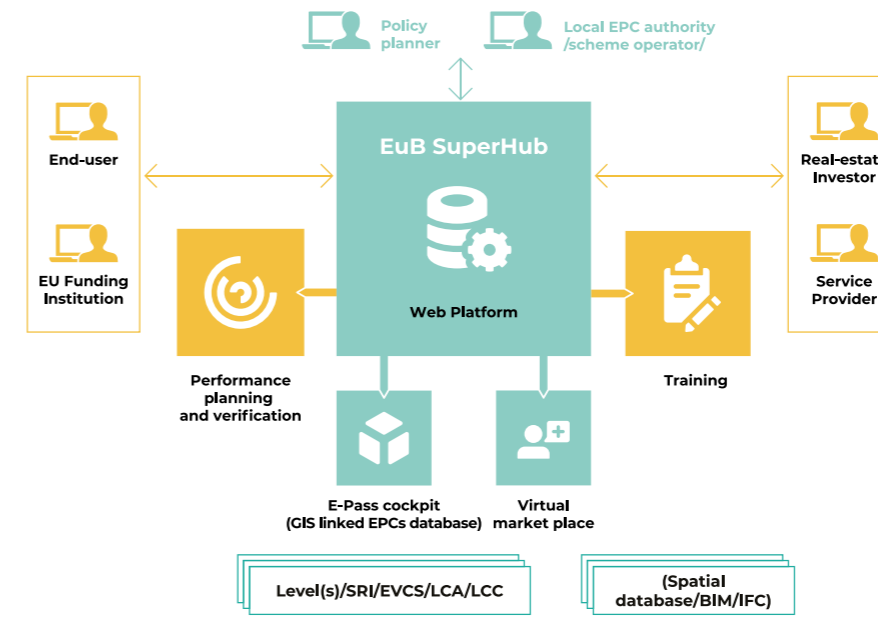


Figure 1. Schematic illustration showing the interaction between the EUB SuperHub four modules and the stakeholders.

performance and smart readiness, and financial information and documentation. Moreover, the user can evaluate the building performance based on existing information stored in the digital building logbook or use what-if simulations to assess possible technology-neutral interventions and retrofitting options. Technology neutrality is a valued principle in EU countries; here, policymakers set a standard to be met without dictating how this is archived (ie, they are not privileging or penalising one set of technologies over another).

The next module, E-cockpit, is an open-access data and communication hub containing all information relevant to a building and building performance certificates that can be viewed by stakeholders such as planners, building users, investors, and policymakers. Thanks to the wealth of information that can be displayed in the E-cockpit, the user of this module can conduct a multi-building analysis in which a group of buildings can be selected and analysed in terms of CO₂ emissions, energy performance rating, sustainability rating, smartness, possible synergies, or other benchmarks.

The third module of the online platform is the virtual marketplace (VM), which facilitates connection between various stakeholders for building-related purposes; for instance, if there is a need for specific maintenance work, the building owners can access and assess

relevant services through the VM module. Finally, the E-training module can be used for training the platform users to understand the available tools, navigate the platform, and ultimately be cognizant of various aspects of the building.

All four modules act together and create a digital one-stop-shop accessible to all building stakeholders to address barriers relevant to building renovation and smartness, sustainability, and energy efficiency of the building. This platform can facilitate the flow and visibility of

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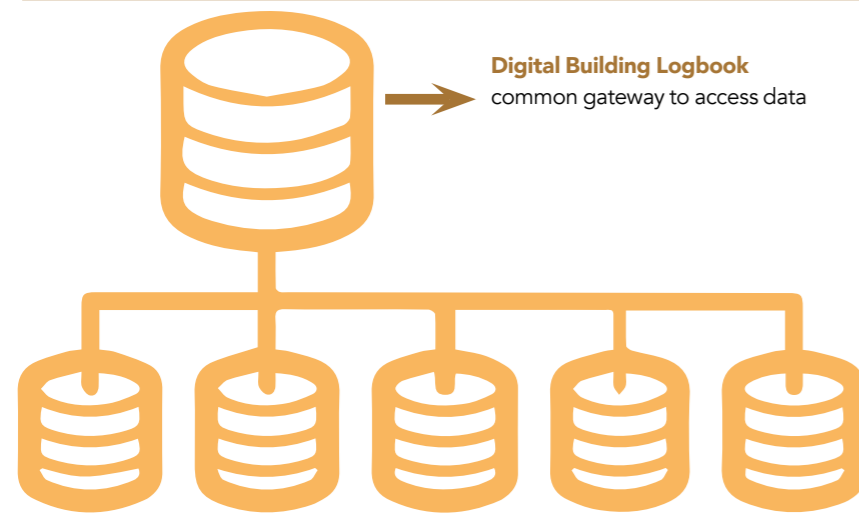
Figure 2. The main categories of the EUB SuperHub digital building logbook.

information and help us explore any possibilities through simulations before investing time and money in taking action.

DIGITAL BUILDING LOGBOOK

A digital building logbook, as described in the previous section, could be similar to our health history records maintained by a medical practitioner. It could highlight the need for updated certificate issuing, maintenance requirements, or give us insight into the building rating in the areas of energy efficiency, sustainability, and smartness.

It is certainly quite complex to create the digital building logbook data structure. Still, if done right, this could address barriers to building renovation with a significant impact on energy performance, facilitate the smooth flow of relevant information for other sectors, and lead to tremendously streamlined civil service. There are already several digital building logbooks and initiatives in place across Europe at different maturity levels. All those logbooks and initiatives differ in terms of their focus and types of buildings they cover. Although the proposal on the energy performance of buildings (EPBD recast) published in December 2021 does not state that digital building logbooks are mandatory, from January 2023, digital building logbooks have been made compulsory in France for all new-build housing and existing homes undergoing renovation work.



National databases (eg, database for energy performance certificates, building cadastre, property price/leases registers)

Figure 3. Linkage between digital building logbook and existing national databases.

The EUB SuperHub project aims to facilitate the EU's transition to a decarbonised building stock by 2050.

The EUB SuperHub team elaborated the logbook structure to contain eight main categories. Out of the eight categories of the digital building logbook, the largest one in terms of information volume is the specific building element information that focuses on the 'guts' of the building. This category covers the building envelope (which separates its interior from the outdoor environment such as outdoor walls, bottom floor, roof, windows/doors and skylights) and the technical building systems (including space heating, space cooling, domestic hot water preparation, ventilation, and built-in lighting systems, building automation and control system, energy generation and storage systems). The second largest category pertains to information regarding building performance and certificates across various metrics, such as energy, sustainability, and selected key performance indicators like lifecycle cost and global warming potential, indoor air quality, thermal comfort, and greenhouse gas emissions, among others.

These categories of the digital building logbook are designed to contain all information possibly necessary for any work related to a building's life cycle, to facilitate availability and flow of information and to improve the overview of building stock, energy

efficiency upgrades where applicable, data-informed decision-making and policy development, and ultimately, the monitoring of progress towards decarbonisation of the sector.

It is important to note that the main goal here is not to establish another new database, which would be both time and cost consuming. The digital building logbook needs to act as a common gateway to access data and bring data from different sources together by linking with existing, reliable, building information databases.

Building-relevant information expands to different stakeholders, such as developers, builders, realtors, owner(s), beneficiaries, users, renters, and auditors, and phases related to the building, such as conception, construction, certification, maintenance, refurbishment, decommission or demolition, if applicable. It also applies to designs relevant to the building, including blueprints for pipework, electrical work, and core beams, energy requirements, requests for building retrofitting, and more.

Storing this information in the digital building logbook could improve efficiency in terms of time, cost, and identification

of possible risks compared to having separate files stored in different locations and evaluated by different people. It would also improve sustainability and support the decarbonisation of the construction sector. This is the core idea around the digital building logbook – that information on all aspects relevant to buildings is digitally collected, readily available, and shareable.

A LOOK TO THE FUTURE

Khoja and Malinovec Puček introduced the idea of the online platform and digital building logbook through the EUB SuperHub project. The project, launched by the European Union's H2020 research and innovation programme in 2021, aims to establish a comprehensive platform, serving as a one-stop-shop for the next generation of building certification and rating systems to facilitate the EU's transition to a decarbonised building stock by 2050.

The digital building logbook can be regarded as the core of the EUB SuperHub platform. Its structure was developed after reviewing currently available databases for building information, relevant completed projects that proposed digital logbook structures previously, existing legislation and expected future additions, and grant requirements. The researchers' main priorities for the project were sustainability, energy efficiency, and smartness during a building's lifecycle. Based on these priorities and the review of available information, they compiled a list of criteria that the digital building logbook should meet.

These criteria include the applicability of the logbook for residential and non-residential buildings, ease of use for various stakeholders, a hybrid information format – enabling direct input of information and links to existing databases, the collection of the building's history, including construction, maintenance, and building retrofitting, and the ability to extract life cycle assessment and cost values based on the available information. This project sets the basis for a new and improved digital era for universally applicable building documentation, wherein information is available, traceable, and directly useable for the benefit of building stakeholders.

Behind the Research



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Research Objectives

The research team introduces the EUB SuperHub platform – the integrated cloud data hub for building information and next generation of building certification with the EUB e-passport (European Building electronic passport) as the final output.

Detail

Bio

Ahmed Khoja is a senior researcher at Munich University of Applied Sciences, Germany. He researches sustainable, smart, and resilient urban developments and building performance evaluation.

Marina Malinovec Puček, PhD, is a lead consultant in energy efficiency and renewable energy sources in buildings covering HVAC systems at the Energy Institute Hrvoje Požar,

Croatia, and is deeply involved in the Croatian energy certification of buildings.

Funding

The EUB SuperHub project has received funding from the European Union's H2020 research and innovation programme under grant agreement No. 101033916.

Collaborators

• Geonardo Environmental Technologies –

GEO, Hungary

- International Initiative for a Sustainable Built Environment Research & Development – iSBE, Italy
- Energy Institute Vorarlberg (Energieinstitut Vorarlberg) – EIV, Austria
- FeliCITY-Tools Engineering Ltd., Hungary
- Scientific and Technical Center for Building (Centre Scientifique et Technique du Bâtiment) – CSTB, France
- University College Cork – UCC, Ireland

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Personal Response

Could the tool be developed on a global scale?

One barrier preventing the building renovation rate from growing is the lack of building-related data in one place. The EU renovation wave strategy, published in October 2020 by the European Commission to improve the energy performance of buildings, has committed itself to introducing digital building logbooks. The EUB SuperHub project supports the evolution of the next generation of building certification: moving towards sustainability and smartness by developing the EUB SuperHub online platform based on the digital building logbook, which contains all relevant building-related data over the whole lifecycle of a building, providing different types of stakeholders with different information for different purposes at the right time. The online platform could be developed on a global scale. //

