The logbook data quest

Setting up indicators and other requirements
for a renovation passport

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Authors (ADENE)

Paulo Libório

Rui Fragoso

Cláudia Sousa Monteiro

Joana Fernandes

Eugénio Silva

Authors (VEA)

Tine Vande Casteele

Reviewers

Mariangiola Fabbri, Jonathan Volt, Maarten de Groote (BPIE)

Marianna Papaglastra, Alexander Deliyannis (Sympraxis Team)

Alexander Stankov, Dragomir Tzanev (EnEffect)

Peter Mellwig, Mandy Werle, Martin Pehnt (ifeu)

Alice Corovessi, Eleftheria Touloupaki, Nikolaos Lemonas (INZEB)

Marcin Dluzewski, Anna Mazur (KAPE)

Lukas Kranzl, Iná Maia (TUWien)

Page layout

Sympraxis Team

Cover illustration

Rawpixel/depositphotos.com / Sympraxis Team

TABLE OF CONTENTS

TABLE OF FIGURES

I.   INTRODUCTION

Roughly 97% of the European Union (EU)'s building stock, corresponding to over 30 000 million m^2, is not considered energy efficient and about 75% to 85% of it will still be in use in 2050 [1] [2] [3]. Setting out a pathway towards a 'highly efficient and decarbonised building stock by 2050' is a fundamental pillar of the revised Energy Performance of Buildings Directive (EPBD) requiring the transformation of the majority of buildings from highly inefficient to, at least, nearly zero energy buildings.

This constitutes an opportunity to significantly improve the quality of the building stock and the living conditions of all Europeans. However, to achieve this goal the multiple barriers building owners face when planning a renovation must be addressed. Besides the difficulty in accessing finance, one of the main barriers of renovation is the lack of knowledge about what to do and in which order. Building renovation is often considered a burden that many associate with time consuming planning, uncertainty about the value of the planned measures, dust and unreliable professionals.

The iBRoad project works on addressing these barriers by developing an Individual Building Renovation Roadmap for single-family houses. This tool provides a customised renovation plan over a long-term period of time (10-20 years). The roadmap is at its core a home-improvement plan which considers the occupants' needs and specific situations (e.g. age, financial situation, composition and expected evolution of the household, etc.) and avoids the risk of 'locking-out' future renovation solutions due to lack of planning.

The renovation roadmap is combined with a building logbook, a repository where all the building's related information can be stored and continuously updated. The type of information stored in the logbook and its functionalities can evolve over time and could range from energy production and consumption, to equipment maintenance, as well as insurance, property plans and obligations, energy bills, smart meter data and links to available financing options for renovation projects (e.g. green loans, incentives, tax credits).

This report provides guidance on setting up a logbook supporting the implementation of an Individual Building Renovation Roadmap addressing the following aspects essential for the success of the iBRoad concept: (i) what data should be sought and why should it be collected; (ii) which stakeholders could provide or benefit from accessing that information; (iii) where is the information stored, who owns the data and how could it be accessed and (iv) data availability and protection.

i.   Objective

The purpose of this report is to map the data associated to a building logbook (iBRoad-log) which could be used as a repository to enable better action on the building's renovation and support the implementation of a building's renovation roadmap (iBRoad-Plan). This plan, acting as a "passport" to guide the building owner, is tailored to be a real driver for deep renovation[1] of single-family houses and to avoid lock-in effects or improve the overall quality of the residential building stock.

In this sense, both the logbook and the renovation roadmap are truly interlinked and supporting each other. The information from the logbook will provide better guidance and support evidences to the establishment of a renovation roadmap and this last one will contribute to the update of the logbook with relevant information related to the renovation strategy and with updated data concerning the real implementation of improvement measures. Figure 1 illustrates the interaction between the logbook and the renovation roadmap.

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[1] Defined in iBRoad proposal text as "step by step measures over a long-term period (10-20 years)"

RENOVATION ROADMAP
- Step-by-step guidance
- Resulting from an on-site energy audit
- Long-term: 15 to 20 years
- Considers individual context

LOGBOOK
Repository of all building-related information
- Energy consumption
- Energy production
- Executed maintenance
- Construction plan
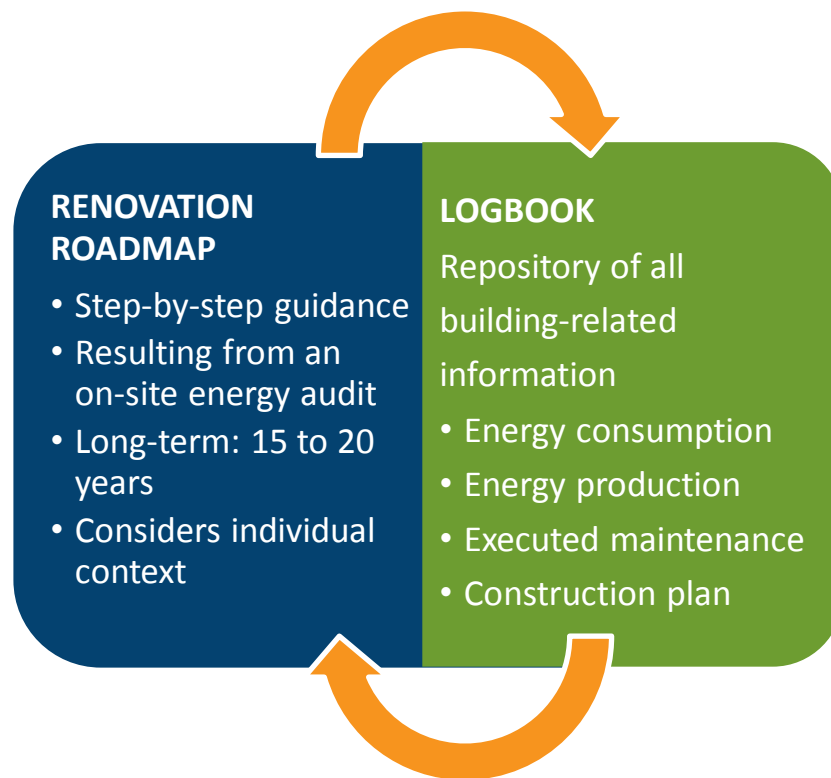
Figure 1 – Interaction between the renovation roadmap and the logbook

The logbook is also a relevant tool in providing support to different stakeholders since the building owner is at the centre of its use. This means that as the building user interacts with the logbook and implements the improvement measures, it is possible to start mapping this data. Therefore, the stakeholders, as for example real estate or construction companies benefit from having this data available. In this sense, this report also addresses the type of stakeholders that could interact with the logbook (both supplying or accessing information) as well as aspects related with data protection, such as data concerns to have in mind when setting up the logbook database and after the logbook implementation. The report provides useful guidance for any entity setting up a logbook or evolving from an existing one.

ii.   Report overview

The report structure addresses different topics. In **Chapter I**, an explanation on the report objectives, the logbook framework and the data mapping main concerns are presented. **Chapter II** is dedicated to the logbook structure approach, its modules, specific data collection and data mapping definitions. In **Chapter III**, several stakeholders are identified, and the logbook database structure and their data sources are presented. The goal is to enable the understanding of the stakeholders' role and their contribution to the logbook and database use. Furthermore, data protection regulation and other legal aspects are also discussed in this chapter. In **Chapter IV**, lessons learnt from other projects are presented and in Chapter V the final considerations are highlighted.

iii.   Framework

The renovation roadmaps and logbook concepts are not new and have been previously addressed in the document The Concept of the *Individual Building Renovation Roadmap* [1]. The logbook data mapping described in Chapter III was initiated by analysing the information collected in other existing European initiatives, but also the data collected under the Energy Performance of Buildings Directive (EPBD), namely in the buildings energy performance databases.
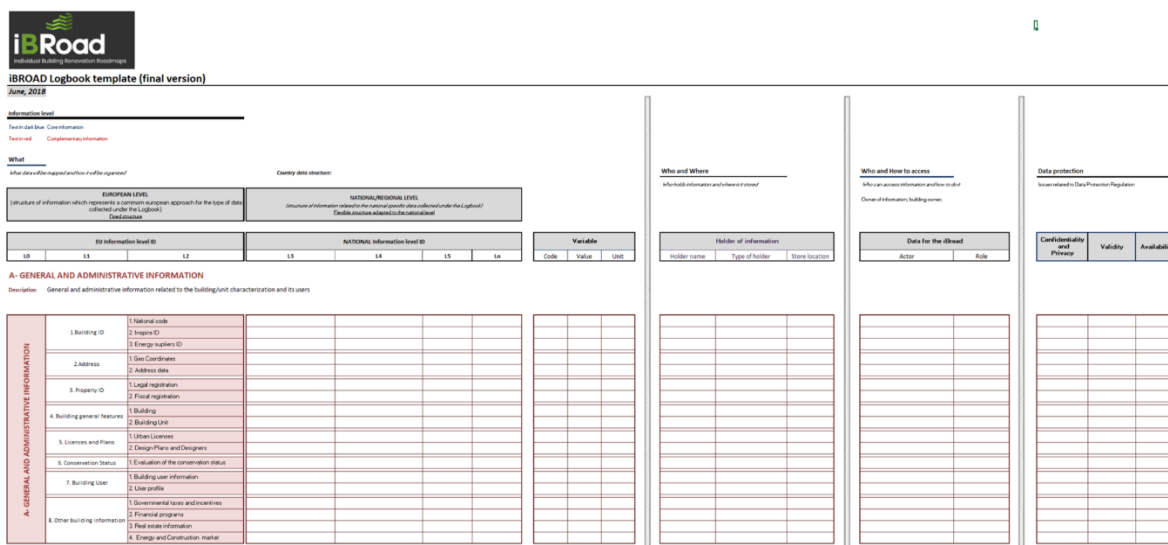
Energy audits or Energy Performance Certificates (EPCs) were the logbook core sources of information. To test this framework, a detailed evaluation of the Portuguese energy performance certification (SCE) database was taken. The SCE was established in 2007 and already collected nearly 1.5 million of EPCs. Each EPC supplies the database with an average of 150 variables (from residential buildings) and around 300 variables (from residential and non-residential buildings), meaning that the current database stores around 250 million entries. The SCE database is structured in 8 sections as presented in Figure 2.

Figure 2 – Structure of the SCE database: sections and number of available variables

In addition to the sources of information previously mentioned, complementary data such as occupants' behaviour and preferences or building conservation status, for example, that could serve the logbook purpose, were also identified. These data are not directly related with the energy audit or the EPC but can be considered relevant by any entity setting up a logbook, since they relate to the building sector and eventually to the stakeholders involved.

After setting up a draft proposal of data indicators and other requirements necessary for the logbook development, different partners from the iBRoad project were invited to evaluate the proposed structure and predict the feasibility of applying that structure in their own country and scenario (Figure 3). The complete logbook template can be found in the Annex and an example of the information collected for the Portuguese case in chapter IV. Different inputs were received from almost every partner which allowed to evolve to a more robust logbook data model. After setting the basic structure for the logbook, all pilot countries within the iBRoad project, namely Portugal, Bulgaria, Poland and Germany were invited to test the logbook with a real case scenario, whenever possible. Contributions provided by the project partners and (future) users of the iBRoad concept are important, as they focused on various aspects ranging from the type of data collected, to the use, availability and privacy, among others.

Figure 3 – partial iBRoad Logbook template

iv. The concept of a logbook

The logbook will aggregate **information and specific data about buildings throughout time** which can be provided from numerous sources. It allows characterisation and identification, in a distinctive way, of each building and its previous interventions. Figure 4 presents an example of a building logbook timeline where relevant and different moments of the renovation process are identified. The logbook is updated after the implementation of the iBRoad-plan.
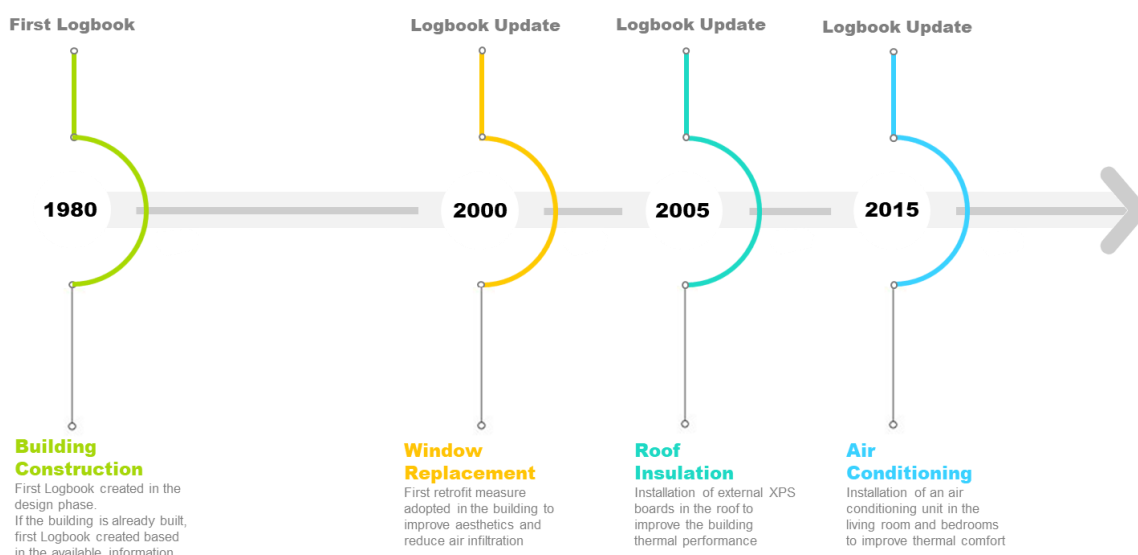
Figure 4 – Illustrative iBRoad-plan timeline

This **information** will be stored in a unique digital file for each individual building. The core data feeding the logbook will be gathered mainly by **on-site visits** through the experts issuing **an EPC or energy audits** (which collect the necessary information directly from the building and the owner/user) and

through other different sources such as **automated data** from smart meters or monitoring devices. Nevertheless, other type of data might be available and gathered in future such as automatic integration of registers or cadastres, for example, which can be automatically integrated into the logbook database. As described further in Chapter III, the IT solution is designed to accommodate several data types and formats and integrate them in a unique format. Figure 5 illustrates how the core data available at the present time feeds the logbook and the renovation roadmap.
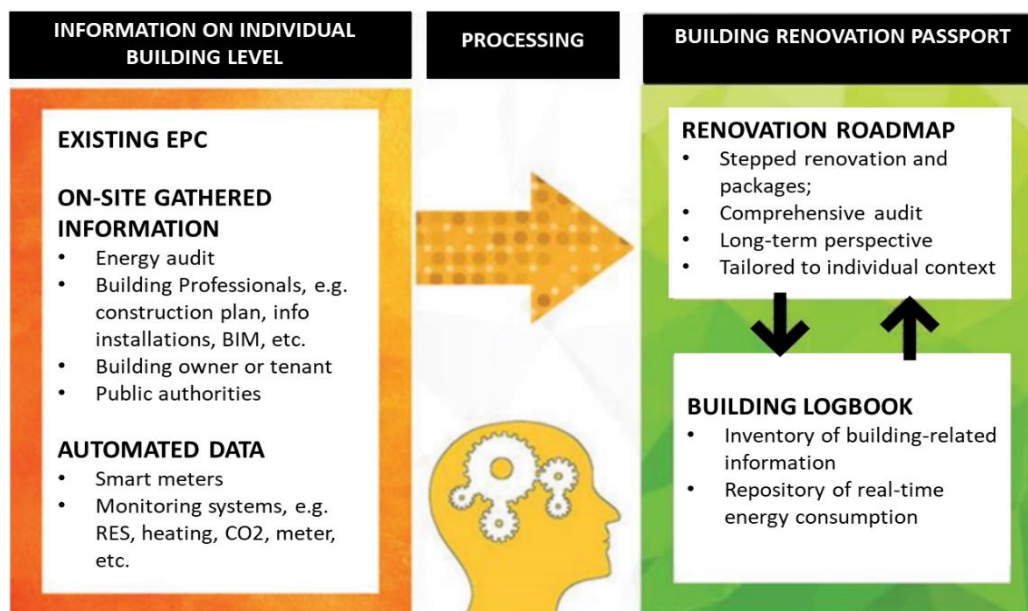
Figure 5 – Individual Building Renovation Roadmap (iBRoad) – Sources of information (Source: BPIE)

From a holistic point of view, the logbook builds on a modular approach being able to provide several functionalities[2] to the building user (or participating stakeholders), which can be summarised in the following theme features:

▪ **Repository** of all relevant building information including non-dynamic information which will serve as base to set other functions such as:
  o Property identification (legal and fiscal aspects);
  o Building plans and urban licences;
  o Relevant statistical information about the building (e.g.: from Census);
  o Registration of previous renovation works;
  o Record of the building construction features;
  o Record of energy consumption & production;
  o Smartness information;
▪ **An Interactive and dynamic tool** allowing the building user to have access to the building information, promoting awareness and incentivising her/him to take the following actions:
  o Monitor and compare energy consumption (real versus forecasted);
  o Monitor energy generation from renewable energy sources;

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[2] To be further explored in the next activities of the iBRoad Project

- o Automated renovation advice (e.g. improvement of the building envelope if the thermal performance is above/below a certain threshold);
- o Automatic notifications in case of unusual consumption patterns;
- o Alerts and guidance concerning maintenance aspects;
- o Information about the building improvement potential and benefits that may arise from the recommendations implementation, linking the iBRoad-log to iBRoad-plan;
- o Benchmark with surrounding buildings;
- **Link to third parties** to enrich the information made available to the building user and support the decision-making process but also to other entities that may provide support in the iBRoad-plan implementation, namely:
  - o Public Authorities (to provide the available information about the building or existing incentives, tax reductions, etc);
  - o Market actors (that may participate in a marketplace of qualified building professionals like installers);
  - o Financial services to find specific information like: loans, subsidies for energy efficiency, etc…).

The logbook is therefore a support tool for the implementation of the iBRoad plan. It also assists any entity developing solutions dedicated to creating market value. To build up this tool it is necessary to answer 4 key questions (Figure 6). In this way it is possible to shape the logbook development and relate it to the engaged stakeholders (discussed in more detail in Chapter III).
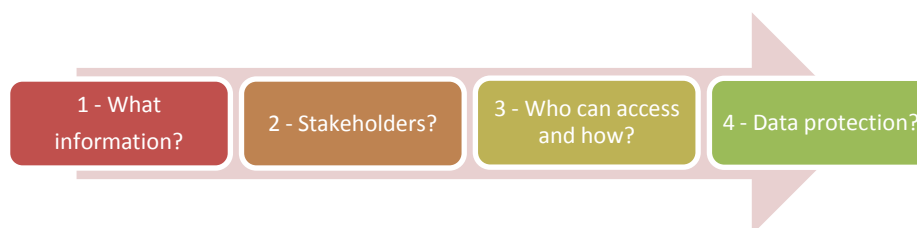
Figure 6 – Kick-off questions when setting up an iBRoad-log

Question 1 – **What type of information** should be stored and how to organise it is the starting point from which the whole data collection is developed. The goal is to give a clear perception of what data is needed to fulfil the logbook database.

Question 2 – The logbook may have different sources of information from different stakeholders. In order to create a logbook it is important to identify **who holds the information and where**. In this case it is relevant to identify the entities that hold the data (considering also that the same data may be held by different entities) and who could manage the logbook database. In this context, existing databases storing EPCs or energy audit information should be considered since this information is at the core of the logbook.

Question 3 – Furthermore, it is important to make clear which stakeholders participate in data sharing and access and to establish protocols and confidentially agreements. This step will also make clear **who can access the data and how**. Since the logbook, under the iBRoad project, is a digital database, the most common access between databases may be through an eXtensible Markup Language (XML) file [2] or preferably by web services [3].

Question 4 – Finally, aspects related to data availability, privacy, confidentiality or data management must consider the **general data protection regulation** (GDPR) [4] which took effect on May 25, 2018 and regulates the use of personal data.

II.   LOGBOOK MODEL

A logbook supporting a renovation roadmap must be structured in a way that allows the registration of all relevant data in specific areas related with the building physics, energy performance, improvement measures, energy consumption and generation or smart indicators, among others. The logbook implementation must also be flexible to be adjusted to a specific country or regional context. The following subchapters provide an example of the structure that can be implemented at national or regional level, but also how the data can be organised in different modules, topics and subtopics, and examples and definitions of the variables available.

i.   Approach to the logbook data structure

Building renovation passports can be a useful tool to raise the building user awareness about which steps can be taken to increase the quality of its renovation, supporting the uptake of deep renovations. This tool can also be integrated in the national long-term renovation strategies required by the Energy Performance of Buildings Directive. This means that it is recommended that the logbook structure supporting the renovation roadmaps (within the passport concept) must allow for a certain flexibility to serve both national/regional needs but also to integrate into a wider European approach. Therefore, the logbook structure defined for the iBRoad project is based on a core/fixed component and a flexible component (Figure 7).
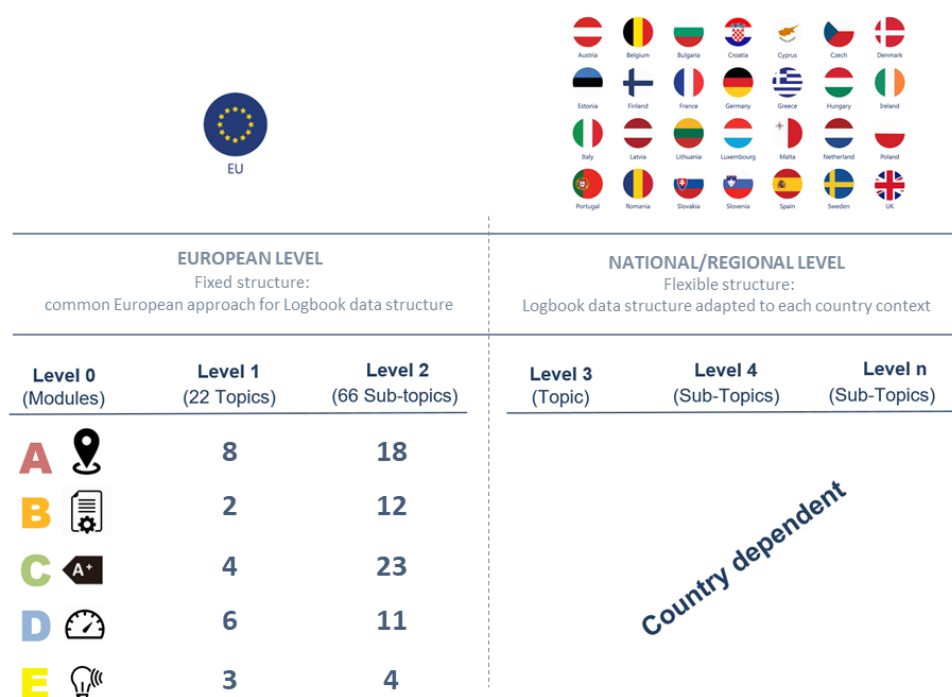
Figure 7 – iBRoad-log data structure at European and National/Regional level

The fixed structure represents the common European approach detailed in 3 levels of information while the flexible one gives support to the national/regional approach and will embrace the remaining data required to complete the logbook.

Fixed structure (core) – the data collected under the logbook should share a common European framework. Every national or regional logbook should adopt the same topics registered in the database to allow for a harmonisation and quick overview on which data is collected by every Member State or

region. A classification under the fixed structure is proposed where 3 information detail levels are defined (Level 0, Level 1 and Level 2).

Flexible structure – this structure is dependent on the previous one, meaning that it always complies firstly with the topics of the fixed structure. However, it will allow for each Member State to clearly adapt the logbook implementation to the data collection procedure specific to their region (e.g. terminologies, existing data, etc). The detail of the collected data is also defined at national or regional level meaning that this structure can accommodate the number of necessary levels to better classify the data (Level 3 up to Level *n+1*).

The vertical structure of the logbook accommodates 5 different modules from A to E (Level 0) and the corresponding topics and sub-topics (Levels 1 and 2) that detail further the data structure. All the information from Level 3 onwards is adapted by each Member State and therefore is dependent on each country specificity. The following sections describe in detail the modules and mapped data to be adopted in the logbook.

ii.   Logbook modules

The logbook general framework proposed under the iBRoad project is categorised in 5 areas of knowledge that accommodates the general information necessary to support the concept of a building renovation passport. These categories, designated here as "modules", have the goal to facilitate the aggregation of information and the use of the database among different stakeholders, making a clear distinction between the topics related to administrative data on one side, or the EPC and SMART data on the other side. **The 5 modules of the logbook are**:

A.   General and administrative information
B.   Building construction information
C.   Building Energy Performance
D.   Building Operation and Use
E.   SMART information.

Figure 8 presents the modules concept translated into layers of information contained in the logbook and a brief definition of each module.

A - GENERAL AND ADMINISTRATIVE INFORMATION
General and **administrative Information** related to **the building/unit** characterization and its **user**

B - BUILDING CONSTRUCTION INFORMATION
Technical information and data related to the **building construction**

C - BUILDING ENERGY PERFORMANCE
Energy Information based on **EPC information** or other energy assessments

D - BUILDING OPERATION AND USE
Data and information on how the **building is operated**

E - SMART INFORMATION
Smart information related to the building

Figure 8 – iBRoad-log modules

iii.   Logbook mapped data

All the data mapped contained in the logbook will be the trigger for supporting the functionalities expected in the building renovation passport. Being a tool to implement deep renovation in buildings, these passports are mostly based on data related to the building's characteristics, energy audit and EPCs. The majority of this data is considered **core information** for the logbook, which can also accommodate **complementary information** enabling a more robust database, enlarging the scope and functionalities of the logbook and potentially involving more stakeholders.

As described previously, the logbook data structure is categorised horizontally in a fixed or flexible structure, to accommodate the European and National/Regional levels, respectively, and vertically to accommodate different modules and topics regarding the data structure. To better illustrate how the information can be gathered in a logbook based on the fixed (European level) and flexible structure (National level), an example from module B - Building Construction Information - extracted from the Portuguese logbook is presented. Figure 9 illustrates the information collected for a single building component from the building envelope. The information presented includes the different **levels necessary to classify the information** on the type of data collected, the **variables description** from the building's energy audit and the **variables coding** to identify the information in the database.

	European level			National level		
	EU			Portugal		

Level 0	Level 1	Level 2	Level 3	Level 4	Variable description	Variable code
B - BUILDINGS CONSTRUCTION INFORMATION	1. Envelope	1. Walls	1. Wall Type 1	1. Location of the element	Exterior	B.1.1.1.1
			2. Contructive Solution	-	Masonry (after 1960) w/ exterior insulation	B.1.1.2
			3. Surface area information	1. North orientation	-	B.1.1.3.1
				2. Northeast orientation	48,01 m^2	B.1.1.3.2
				3. East orientation	-	B.1.1.3.3
				4. Southeast orientation	88,05 m^2	B.1.1.3.4
				5. South orientation	-	B.1.1.3.5
				6. Southwest orientation	55,10 m^2	B.1.1.3.6
				7. West orientation	-	B.1.1.3.7
				8. Northwest orientation	137,68 m^2	B.1.1.3.8
				9. Internal area	-	B.1.1.3.9
				10. Total area	328,84 m^2	B.1.1.3.10
			4. Thermal insulation characteristics	1. Type of insulation	XPS	B.1.1.4.1
				2. Thickness	0,06 m	B.1.1.4.2
				3. Thermal conductivity	0,034 $W/m.°C$	B.1.1.4.3
			5. Thermal transmittance (U-value)	-	0,42 $W/m².°C$	B.1.1.5
			6. Date of the refurbishment	-	2015	B.1.1.6
			7. Cost of refurbishment	-	11.500 €	B.1.1.7
			8. Contractor	-	ABEL, Lda.	B.1.1.8
			9. Source of financing	-	Energy Efficiency Fund	B.1.1.9

Figure 9 – iBRoad-log structure: example of a single building component information

Based on the overall structure of the logbook described previously, the following sections present the topics and sub-topics that are included in Level 1 and 2 as well as a brief description of each variable with relevant examples.

A. General and administrative information

The first module corresponds to **A - General and administrative information** and it is divided in 8 different topics in Level 1 and 18 sub-topics in Level 2 (Figure 10).

Level 0	Level 1	Level 2	CORE	COMP
A- GENERAL AND ADMINISTRATIVE INFORMATION	1. Building ID	1. National code	✓	
		2. Inspire ID	✓	
		3. Energy suppliers ID	✓	
	2. Address	1. Geo Coordinates	✓	
		2. Address data	✓	
	3. Property ID	1. Legal registration	✓	
		2. Fiscal registration	✓	
	4. Building general features	1. Building	✓	
		2. Building Unit	✓	✓
	5. Licences and Plans	1. Urban Licenses		✓
		2. Design Plans and Designers		✓
	6. Conservation Status	1. Evaluation of the conservation status		✓
	7. Building User	1. Building user information		✓
		2. User profile		✓
	8. Other building information	1. Governmental taxes and incentives		✓
		2. Financial Programs		✓
		3. Real estate information		✓
		4. Energy and Construction market		✓

Core Information (CORE); Complementary Information (COMP)

Figure 10 – Logbook Module A topics and subtopics

Besides the fixed structured information that characterises the EU level information (Level 0 to 2), the detailed information collected in the logbook needs to reflect the country specific needs. To better explain the type of data collected at the national or regional level (Level 3 onwards), the following list presents a definition of the information collected:

A.1. Building ID – Information that allows for a clear building codification. This information can be originated from European sources (Inspire ID [5]) allowing for the identification of the building across country boundaries, national cadastres or utilities. The use of the last two sources of IDs (cadastre or utilities) will promote and enable improved data sharing processes among national entities, particularly those who already aggregate these IDs within their databases.

    A.1.1. National code – National code for identifying each individual building at national or regional level. This information may be available from public authorities or cadastres.

    A.1.2. Inspire ID - Building European identification. The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of the EU environmental policies or activities which may have an impact on the environment. This ID will enable the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries.

A.1.3. **Energy suppliers ID** – Identification of the energy delivery point (electricity, gas, district heating, etc..) provided by the energy supplier.

To exemplify the Building ID implementation, Figure 11 illustrates the identification process taken for EPCs under the Portuguese building energy certification scheme (SCE). The information stored in every single EPC in the SCE database aggregates up to 6 different IDs at the building level and 5 IDs at the building unit level for a total of up to 11 IDs, for different types of ID such as INSPIRE, National, Utilities, Fiscal, Notary and the SCE ID.

Figure 11 – Building and units identification in EPC – the Portuguese case

A.2. **Address** – Building geographic coordinates and postal address.
 A.2.1. **Geo coordinates** – Latitude and longitude coordinates
 A.2.2. **Address data** – Postal address consisting of: street name, house number, postal code, county, district, etc...

A.3. **Property ID** – Legal and fiscal identification concerning the building and its legal owners typically used for registration, transactions, cadastre or other purposes. This information is country dependent.
 A.3.1. **Legal registration** – Official legal registration of the building used in the country at the notary level or similar.
 A.3.2. **Fiscal registration** – Official legal registration of the building used in the country at the fiscal level or similar.

A.4. **Building general features** – Information related to the building and/or building unit concerning its generic construction features and use.
 A.4.1. **Building** – Information at building level. Example of information collected at Level 3 (Portuguese example):
  A.4.1.1. Building type (according to the use license):
   ▪ Full ownership (FO);
   ▪ FO with independent use;
   ▪ Horizontal property (HP);
  A.4.1.2. Ownership type:
   ▪ Private;
   ▪ Local administration;
   ▪ Central administration;

A.4.1.3.   Building age;
A.4.1.4.   Building category:
- Residential exclusively;
- Mixed (including non-residential units);

A.4.1.5.   Geographical location;
A.4.1.6.   Photographs;

A.4.2.   **Building unit** – Information at the building unit level which represents the "building level" in the case of a single-family building. Example of information collected at Level 3 (Portuguese example):

A.4.2.1.   Net floor area;
A.4.2.2.   Mean height;
A.4.2.3.   Number of bedrooms;
A.4.2.4.   Number of floors;
A.4.2.5.   Position of the building unit within the building;
- Ground floor;
- Between floors;
- Top floor,
- Over a non-residential unit;

A.4.2.6.   Building inertia:
- Light;
- Medium;
- Heavy;

A.4.2.7.   Brief description of the house:
- "Single-family building consisting of two residential floors located on the periphery of an urban area of Cascais, County of Cascais (climatic zone I1-V3), at an altitude of 52m and with 2km distance to the coast. According to the available information, the building was constructed in 1988. There are obstacles/buildings that cause shadowing. The building has exterior walls oriented to Northeast, Southeast, Southwest and Northwest, with 8 bedrooms, has a useful area of 509.63 m² and consists of an entrance hall, 2 living rooms, 1 dining room, 1 office, 1 playground room, kitchen, 8 bedrooms and 8 bathrooms. The property is located on the ground floor. The building has a gas boiler as the main heating system but no cooling system. For DHW there is a gas boiler, an electrical heater and gas water heater.

A.4.2.8.   **Other dependent areas** (complementary information) - Other dependent areas that belong to the building unit, like garage (box), parking place, store room, etc…

A.5.   **Licences and Plans** – Complementary information corresponding to municipal licensing process which includes the design plans and the designer's identification.

A.5.1.   **Urban Licenses** – Information from the licensing process with relevant information from the licensing entity, construction and occupancy permits obtained

Design Plan and Designers – The design plans available on the licensing process (when applicable) for each area (architecture, civil, electrical, mechanical, etc…) as well as the designers.

A.6.   Conservation Status:

Evaluation of the conservation status – Complementary information which intends to collect data about the building conservation status. Typically, available as a qualitative or quantitative indicator representing how degraded is the building or the building elements.

A.7.   **Building User** – Information about the end user (name, address, contacts, etc.) such as preferences in terms of occupancy needs, technical buildings systems or energy sources preference, user behaviour and habits, etc.

A.7.1.   **End user Information** - Personal identification data from the end user of the building.

A.7.2.   **User profile** - Information about the user preferences aiming to better understand his/her preferences and allow a better adjustment of the iBRoad plan implementation.

A.8.   Other building information:

A.8.1.   **Governmental taxes and incentives** – Information about governmental taxes and incentives previously applied to the building or taken up by users.

A.8.2.   **Financial programs** - Financial programs, green loans, subsidies or other similar programs previous applied to the building or taken up by users.

A.8.3.   **Real estate Information** – Real estate information regarding the building as price evaluations and benchmarking information.

A.8.4.   **Energy and Construction market** – Information about the energy sector business and construction industry previously involved in the building construction or refurbishment (Energy expert or auditors, builders, contractors/installers, manufacturers and suppliers, etc.).

B. Building construction information

The second module corresponds to **B – Buildings Construction Information** and it is divided in 2 different topics in Level 1 and 12 sub-topics in Level 2 (Figure 12).

Level 0	Level 1	Level 2	CORE	COMP
B - BUILDINGS CONSTRUCTION INFORMATION	1. Envelope	1. Walls	✓	
		2. Roofs	✓	
		3. Floors	✓	
		4. Thermal bridges	✓	
		5. Doors	✓	
		6. Windows	✓	
	2. Technical Building Systems (TBS)	1. Ventilation systems	✓	
		2. Heating systems	✓	
		3. Cooling systems	✓	
		4. DHW systems	✓	
		5. Lighting systems	✓	
		6. Building automation & control (BAC)	✓	

Core Information (CORE); Complementary Information (COMP)

Figure 12 – Logbook Module B topics and subtopics

B.1. Envelope - Technical information regarding each component from the building envelope identified in the energy audit process. This information can include description of the building element, technical characteristics and performance and complementary information about previous refurbishments, costs and contractor involved or source of financing.
- **B.1.1.** **Walls** - Description of the building walls;
- **B.1.2.** **Roofs -** Description of the building roof;
- **B.1.3.** **Floors** - Description of the building floor;
- **B.1.4.** **Thermal Bridges** (including flat and linear thermal bridges) - Description of the building's thermal bridges;
- **B.1.5.** **Doors** - Description of the building doors;
- **B.1.6.** **Windows** - Description of the building windows;

B.2. Technical building systems (TBS) - Technical information regarding each TBS identified in the energy audit process. This information can include the description of the system, technical characteristics and performance and complementary information about previous refurbishments, costs and contractor involved or source of financing.
- **B.2.1.** **Ventilation systems** - Description of the building ventilation systems;
- **B.2.2.** **Heating system** - Description of the building heating systems;
- **B.2.3.** **Cooling System** - Description of the building cooling systems;
- **B.2.4.** **Domestic hot water system (DHW)** - Description of the building DHW systems;
- **B.2.5.** **Lighting system** - Description of the building lighting systems;
- **B.2.6.** **Building automatisation & controls (BAC**) - Description of the BAC systems;

C. Building energy performance

The third module corresponds to **C – Buildings Energy Performance** and it is divided into 4 different topics in Level 1 and 23 sub-topics in Level 2 (Figure 13).

Level 0	Level 1	Level 2	CORE	COMP
C- BUILDING ENERGY PERFORMANCE	1. EPC General information	1. Expert name	✓	
		2. Expert ID	✓	
		3. Type of EPC	✓	
		4. EPC Number	✓	
		5. Energy label	✓	
		6. Issue date	✓	
		7. Term date	✓	
		8. Photograph report	✓	
		9. EPC support documentation	✓	
	2. Audit General information	1. Expert name	✓	
		2. Professional order	✓	
		3. Audit date	✓	
		4. Energy label	✓	
		5. Photograph report	✓	
		6. Energy audit support documentation	✓	
	3. Energy and other indicators	1. Energy use	✓	
		2. Delivered energy	✓	
		3. Primary energy	✓	
		4. Environmental and energy indicators	✓	
		5. Other indicators		✓
		6. Comfort level		✓
	4. Recommendations	1. Individual impact	✓	
		2. Collective impact	✓	

Core Information (CORE); Complementary Information (COMP)

Figure 13 – Logbook Module C topics and subtopics

C.1.   **EPC general Information** – Generic information provided in the energy performance certificate (EPC).
  C.1.1.   **Expert Name** – Name of the expert that issued the EPC;
  C.1.2.   **Expert ID** – Number of the expert that issued the EPC according to the national or regional EPC scheme;
  C.1.3.   **Type of EPC** - Typology of the EPC according to the EPC scheme. Example of the information collected at Level 3 (Portuguese example):
  ▪ New building
  ▪ Major renovation
  ▪ Minor renovation

- Advertising
- Buy or sell
- Rent
- Access to fiscal benefits
- Access to financial instruments
- Update after implementation of recommendations
- Voluntary
- Ruined building

C.1.4. **EPC number** – Number of the EPC according to the EPC scheme;

C.1.5. **Energy label** – Label or class of the building/building unit according to the EPC scheme;

C.1.6. **Issue date** – EPC date of issue;

C.1.7. **Term date** – Date in which the EPC validity ends;

C.1.8. **Photograph report** – Photographic report of the evaluated building or single photo of the building;

C.1.9. **EPC support documentation** – Documentation prepared by the expert that issued the EPC containing relevant information as documents used for the EPC evaluation, evidences, etc.

C.2. **Audit general Information** – Generic information provided in the energy performance certificate (EPC);

C.2.1. **Expert Name** – Name of the expert that performed the audit;

C.2.2. **Professional order** – Professional body of which the expert is a registered member;

C.2.3. **Audit date** – Date on which the audit was performed;

C.2.4. **Energy label** – Rating of the building according to the audit;

C.2.5. **Photograph report** – Photographic report of the audited building or single photo of the building;

C.2.6. **Energy audit support documentation** – Documentation prepared by the expert that audited the building containing relevant information as documents used for the audit, evidences, etc.

C.3. **Energy and other indicators** – Energy indicators coming from the EPC evaluation or audit, describing the demand, delivered or primary energy (by use, type of energy, costs with energy, etc), including environmental indicators (e.g. CO_2 emissions) or energy produced by renewable energy sources (RES).

C.3.1. **Energy use** – Energy demand by end-use (heating, cooling, DHW, etc…);

C.3.2. **Delivered energy** – Energy delivered by end-use, type of energy (electricity, gas, etc..), costs with energy or other indicator defined at national/regional level;

C.3.3. **Primary energy** – Primary energy use by end-use;

C.3.4. **Environmental and energy indicators** – Environmental and other energy indicators (e.g. CO_2 emissions, RES production);

C.3.5. **Other indicators** – Other complementary information defined at the national/regional level. Example of information collected at Level 3 (Portuguese example):
- Heating season – Building heat losses:
    - Through envelope
        - Walls
        - Roof
        - Floor
        - Windows
    - Through air renovation

- Cooling season – Building heat gains:
  - Through envelope
    - Walls
    - Roof
    - Windows
  - Through internal gains

Figure 14 exemplifies the graphical indicators produced by the information collected in C3.5 and displayed in each residential building/building unit evaluated in Portuguese EPC scheme.
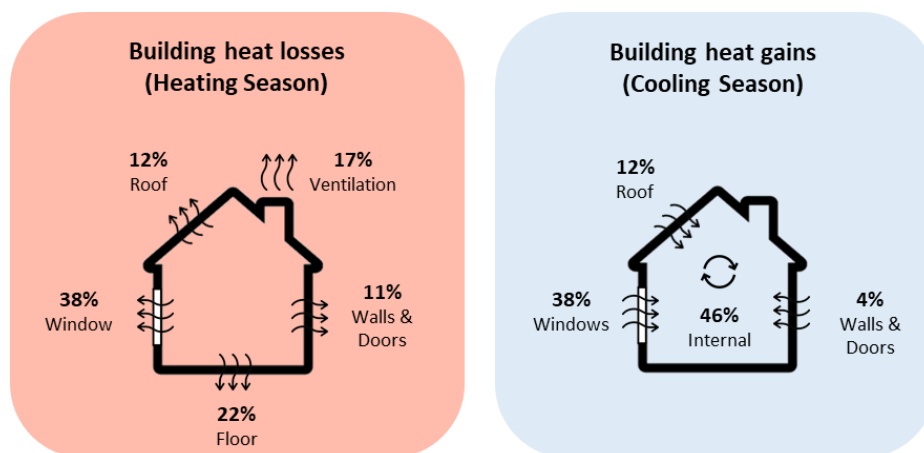

Figure 14 – Heat and gains losses in the building (Source: ADENE)

C.3.6. **Comfort level** – Comfort level Indicator used at national/regional level to express the thermal comfort level of the building/building unit evaluated;

D. Building operation and use

The fourth module corresponds to **D – Buildings Operation and use** and it is divided into 6 different topics in Level 1 and 11 sub-topics in Level 2 (Figure 15).

Level 0	Level 1	Level 2	CORE	COMP
D- BUILDING OPERATION AND USE	1. Energy consumption	1. Energy source	✓	
		2. Metering system information	✓	
	2. Energy generation	1. Renewable energy source	✓	
		2. Metering system information	✓	
	3. Energy suppliers	1. Energy source		✓
		2. Metering system information		✓
	4. Inspections	1. Building element		✓
		2. Inspection information		✓
	5. Maintenance	1. Building element		✓
		2. Maintenance information		✓
	6. Climate data	1. Weather data		✓

Core Information (CORE); Complementary Information (COMP)

Figure 15 – Logbook Module D topics and subtopics

D.1.   **Energy consumption** – Information related to the energy consumption of the building;
    D.1.1.   **Energy source** – List of energy sources delivered to the building;
    D.1.2.   **Metering system information** – Information, by energy source metered, concerning for example, type of meter, period of meter, energy metered, among other relevant data identified at national/regional level;

D.2.   **Energy generation** – Information related to the renewable energy generated at the building;
    D.2.1.   **Renewable energy source** – List of renewable energy sources generated at the building;
    D.2.2.   **Metering system information** – Information, by renewable energy source metered, concerning for example, type of meter, period of meter, energy metered, among other relevant data identified at national/regional level;

D.3.   **Energy suppliers** – List of energy suppliers that deliver energy to the building;
    D.3.1.   **Energy source** – List of energy sources delivered to the building by energy supplier;
    D.3.2.   **Metering system information** – Information, by energy source delivered to the building by energy supplier. Example of information collected at Level 3 (Portuguese example):
        D.3.2.1.   Name of the energy supplier;
        D.3.2.2.   Contracted power;
        D.3.2.3.   Tariff;
        D.3.2.4.   Contracted consumption level;
        D.3.2.5.   Type of meter;
        D.3.2.6.   Counting period;
        D.3.2.7.   Energy metered;
        D.3.2.8.   Energy cost charged in that period;
        D.3.2.9. CO_2 emissions;

D.4. Inspections – Historic information of inspections performed in the building concerning its elements (typically technical buildings systems);

    D.4.1. Building element – Identification of the building element inspected;

    D.4.2. Inspection information – Information provided from the inspection (e.g. ID of the inspection, date, validity or future inspection date, identification of expert or entity that performed the inspection, inspection certificate and report);

D.5. Maintenance – Historic information of maintenance performed in the building concerning its elements (envelope or technical buildings systems);

    D.5.1. Building element – Identification of the building element maintained;

    D.5.2. Maintenance information – Information provided from the maintenance inspection (e.g. ID of the maintenance, date, validity or future maintenance date, identification of expert or entity that performed the maintenance, maintenance certificate and report);

D.6. Climate data – Historic data regarding weather parameters at the building location;

    Weather data – Weather data over a period (e.g. outside air temperature, solar radiation, wind speed, etc.);

E. Smart information

The fifth module corresponds to **E – Smart information** and it is divided into 3 different topics in Level 1 and 4 sub-topics in Level 2 (Figure 16).

Level 0	Level 1	Level 2	CORE	COMP
E – SMART INFORMATION	1. Smart Indicator	1. SRi – Smart Readiness Indicator		✓
		2. Other smart indicators		✓
	2. E-mobility	1. EV Charging points		✓
	3. Smart district	1. Smart district indicators		✓

Core Information (CORE); Complementary Information (COMP)

Figure 16 – Logbook Module E topics and subtopics

E.1. Smart indicator – Information related to the building or its surrounding infrastructure through information and communication technologies (ICT) or other technological features to promote a better management of the building and its TBS (e.g. charging points, energy storage systems, demand response, etc.), to ensure an efficient and comfortable building operation.

    E.1.1.SRi – Smart Readiness Indicator – Information on the SRi of the building[3]

    E.1.2.Other smart indicators – Other indicators identified at national/regional level concerning the topics addressed in E.1.

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[3] More information available at https://smartreadinessindicator.eu/

E.2. **E-mobility** – Specific information related to the electric vehicle (EV) charging point infrastructure available at the building.

    E.2.1.EV charging points – Information regarding EV charging points (e.g. infrastructure, number, type, technical specifications, etc.)

E.3. **Smart district** – Information related to the infrastructure available in the building's surrounding (considering the possibility to interact with it) promoting a better management of the building or the infrastructure.

    E.3.1. Smart district indicators – Information regarding features available that promote a better management of the building or the surrounding infrastructure.

III. SETTING UP A LOGBOOK DATABASE

i. Stakeholders

In the process of setting up a logbook to support a building renovation passport, it is essential to identify the existing stakeholders that can contribute or benefit from participating in that process, not only considering the data that they can provide/retrieve but also by promoting the building renovation passport concept. This will allow a more efficient adoption at national or regional level but also promote a better link with entities or institutions at wider level (e.g. European level).

A good example of this link could be the use of the data collected in the logbook to support a better reporting to Eurostat [6], to enrich the EU Building Stock Observatory [7] or to contribute to the development and monitoring of the Long-Term Renovation Strategies required under the revised 2018 version of the Energy Performance Buildings Directive.
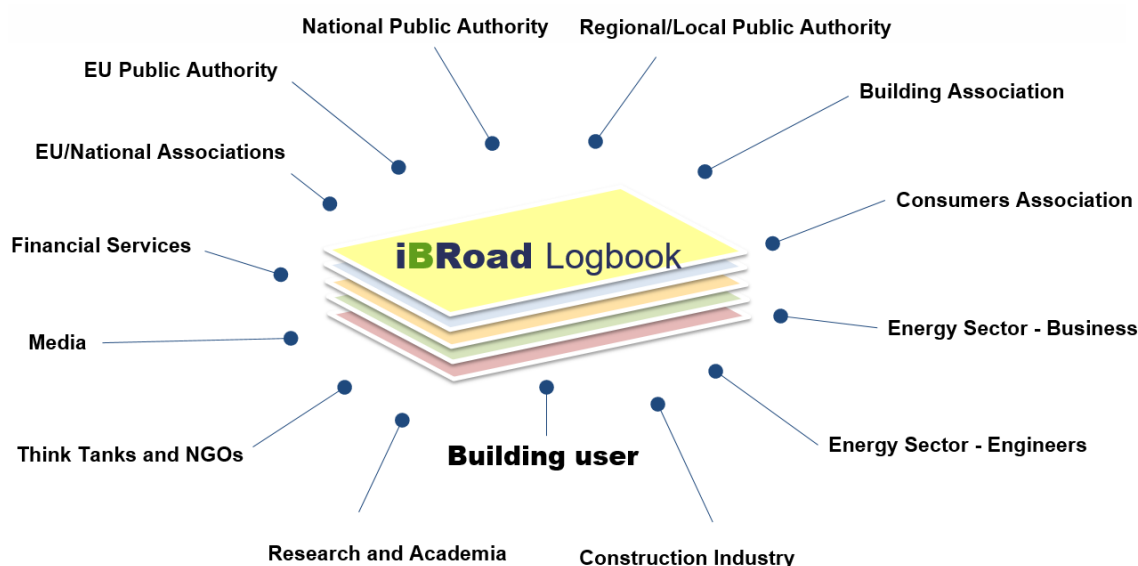
Figure 17 – Type of Stakeholders interacting with the iBRoad-log

Besides the different typology of stakeholders that can participate in the logbook (Figure 17), one should bear in mind that **the main target of the building renovation passport** is the building user. Media and non-governmental organisations (NGOs) are not sources of data but can be relevant for dissemination and information purposes.

ii. Data sources

As explained previously in Figure 6 – Kick-off questions when setting up an iBRoad-log, the logbook establishment requires the definition of what data is necessary to store and who holds or can supply that data. Considering the expected use of the logbook, the stakeholders involved and the mapped data, it is now possible to identify the data sources and existing limitations as for example data availability, quality, integration, coverage, update, sharing protocols, among other aspects. Stakeholders play a relevant role and can be good sources of data to support building passports or logbooks. Figure 18 identifies some stakeholders and possible information that could be provided to support the logbook.

	Source of information for...
Type of stakeholder	
EU public authorities	• EU spatial data infrastructure, like the INSPIRE ID, for the purposes of EU environmental policies or activities enabling the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries • EU statistical data for comparison purposes
National/Regional/Local Public Authorities	• Statistical data for comparison purposes • Spatial data infrastructure • Buildings addresses and identification • Fiscal and cadastre identification of buildings • Buildings categorisation • Buildings design plans • Existing taxation and incentives related with building renovation • Energy performance certificates and associated data • Buildings energy consumption • Buildings energy production • Energy efficiency schemes/incentives
Energy sector - Engineers	• Energy audits
Financial services	• Existing financing schemes
Construction Industry *Energy sector - Business*	• Existing construction solutions to renovate buildings • List of companies or installers to implement solutions to renovate buildings
Research and Academia	• State of the art solutions that can guide the level of ambition established in the buildings renovation
Building user	• Buildings user information • Buildings user profile and patterns • Buildings energy consumption • Buildings energy production • Improvements implemented in the buildings (including all relevant data) and stakeholders involved • Energy suppliers contracted • Type and characteristics of the energy supply contracted • Inspections performed in the building • Maintenance performed in the building • Relevant documentation and evidences of performed actions in the building
Real estate market	• Market price of the building • Benchmark/statistical data for comparison purposes
Utility companies	• Real consumption data / energy bills

Figure 18 – Type of stakeholders and information provided

Sharing information and engaging the right type of stakeholders in a trustful environment is critical to establish a robust and long-lasting database to support the iBRoad building rehabilitation national policies. Besides the data sources, knowing who holds the data will be crucial to successfully implement this concept in each partner country. In this sense, knowing where the information is and who owns it opens the door to the necessary understanding that contributes to the positive environment that an innovative program needs to evolve. At the same time, it is important to know the role of the stakeholders involved, in particular, how they can contribute.

The mapped data presented in the Annex allows an overview of the iBRoad possible ways of combining building data and its sources for the scenarios foreseen in each pilot country. To summarise, the following figures present an example of the data holders for each module in 4 pilot countries.

A- GENERAL AND ADMINISTRATIVE INFORMATION

EU Information level ID		Pilot countrys (national Levels)			
Type of data		*Who owns the data* (HOLDER)			
Level 0 (L0)	**CODE** (L0.L1.L2)	PORTUGAL	BULGARIA	GERMANY	POLAND
A- GENERAL AND ADMINISTRATIVE INFORMATION	A.1.1	NPA	NPA		
	A.1.2	NPA	-		
	A.1.3	ESB	ESB	ESB	
	A.2.1	NPA			NPA/BU
	A.2.2	NPA	NPA	BU	NPA/BU
	A.3.1	NPA			
	A.3.2	NPA		NPA	
	A.4.1	NPA/LPA	NPA/LPA	BU	LPA/BU
	A.4.2	NPA/LPA	EA/NPA	BU	LPA/BU
	A.5.1	LPA	LPA		
	A.5.2	LPA	LPA	LPA	
	A.6.1	LPA		LPA	
	A.7.1	BU	LPA/BU	BU	NPA
	A.7.2	BU		BU	BU
	A.8.1	NPA/LPA	LPA/BU	LPA	NPA/LPA
	A.8.2	FS/NPA	LPA/BU	NPA/LPA/ESB/CAss	FS/NPA/BU
	A.8.3	ONAss		LPA	FS/BU
	A.8.4	NPA/ESB/ESEng/CI		CI/ESB	EA

Legend: *National Public Authority (NPA); Energy Sector - Business (ESB); Building User (BU); Regional/Local Public Authority (LPA); Financial Services (FS)*

Consumers Association (CAss); Other National Association (ONAss); Energy Sector - Engineers (ESEng) Construction Industry (CI);

Information currently not available

Figure 19 – Holders of general and administrative information in 4 pilot countries

B – BUILDING CONSTRUCTION INFORMATION

EU Information level ID		Pilot countrys (national Levels)			
Type of data		**Who owns the data** *(HOLDER)*			
Level 0 (L0)	**CODE** (L0.L1.L2)	PORTUGAL	BULGARIA	GERMANY	POLAND
B – BUILDING CONSTRUCTION INFORMATION	A.1.1	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.1.2	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.1.3	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.1.4	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.1.5	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.1.6	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	A.2.1	QE/EA/NPA	EA/NPA	QE/EA	EA
	A.2.2	QE/EA/NPA	EA/NPA	QE/EA	EA
	A.2.3	QE/EA/NPA	EA/NPA	QE/EA	EA
	A.2.4	QE/EA/NPA	EA/NPA	QE/EA	EA
	A.2.5		EA/NPA	QE/EA	BU/EA
	A.2.6			QE/EA	BU/EA

Legend: Qualified Experts (QE); Energy Auditors (EA); *National Public Authority (NPA);*

Information currently not available

Figure 20 – Holders of building construction information in 4 pilot countries

A+ C – BUILDING ENERGY PERFORMANCE

EU Information level ID		Pilot countrys (national Levels)			
Type of data		*Who owns the data* (HOLDER)			
Level 0 (L0)	**CODE** (L0.L1.L2)	PORTUGAL	BULGARIA	GERMANY	POLAND
C – BUILDING ENERGY PERFORMANCE	**C.1.1**	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.2	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.3	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.4	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.5	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.6	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.7	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.1.8	QE/EA/NPA	EA/NPA	QE/EA	QE/EA/BU
	C.1.9	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.2.1	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.2.2	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.2.3	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.2.4	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.2.5	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.2.6	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.3.1	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.3.2	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.3.3	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.3.4	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.3.5	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.3.6	QE/EA/NPA	EA/NPA	QE/EA	QE/EA
	C.4.1	QE/EA/NPA	EA/NPA	QE/EA	EA
	C.4.2	QE/EA/NPA	EA/NPA	QE/EA	EA

Legend: Qualified Experts (QE); Energy Auditors (EA); *National Public Authority (NPA); Building User (BU)*

Figure 21 – Holders of building energy performance information in 4 pilot countries

D – BUILDING OPERATION AND USE

EU Information level ID		Pilot countrys (national Levels)			
Type of data		*Who owns the data* (HOLDER)			
Level 0 (L0)	CODE (L0.L1.L2)	PORTUGAL	BULGARIA	GERMANY	POLAND
D – BUILDING OPERATION AND USE	D.1.1	BU	EA/BU	ESB/BU	QE/EA/BU
	D.1.2	BU	EA/BU	ESB/BU	QE/EA/BU
	D.2.1	BU	EA/BU	BU	QE/EA/BU
	D.2.2	BU	EA/BU	ESB/BU	QE/EA/BU
	D.3.1	ESB/BU	EA/BU	ESB/BU	QE/EA/BU
	D.3.2	ESB/BU	EA/BU	ESB/BU	QE/EA/BU
	D.4.1	BU		BU	QE/BU
	D.4.2	BU		BU	QE/BU
	D.5.1	BU		BU	QE/BU
	D.5.2	BU		BU	QE/BU
	D.6.1	NPA	NPA/EA	R&A	BU

Legend: Qualified Experts (QE); Energy Auditors (EA); *Building User (BU); Energy Sector - Business (ESB); National Public Authority (NPA); Research and Academia(R&A)*

Information currently not available

Figure 22 – Holders of building operation and use information in 4 pilot countries

E – SMART INFORMATION

EU Information level ID		Pilot countrys (national Levels)			
Type of data		Who owns the data (HOLDER)			
Level 0 (L0)	CODE (L0.L1.L2)	PORTUGAL	BULGARIA	GERMANY	POLAND
E – SMART INFORMATION	E.1.1				
	E.1.2				
	E.2.1				
	E.3.1				

Legend: Qualified Experts (QE); Energy Auditors (EA); Building User (BU); Energy Sector - Business (ESB)

Information currently not available

Figure 23 – Holders of smart information in 4 pilot countries

iii. Integration with external data sources

The iBRoad IT solution will receive information and will interact with several data sources. We envisage three types of integration as depicted in Figure 24: (1) initial data load, (2) data coming from human interface and (3) data coming from third party applications.
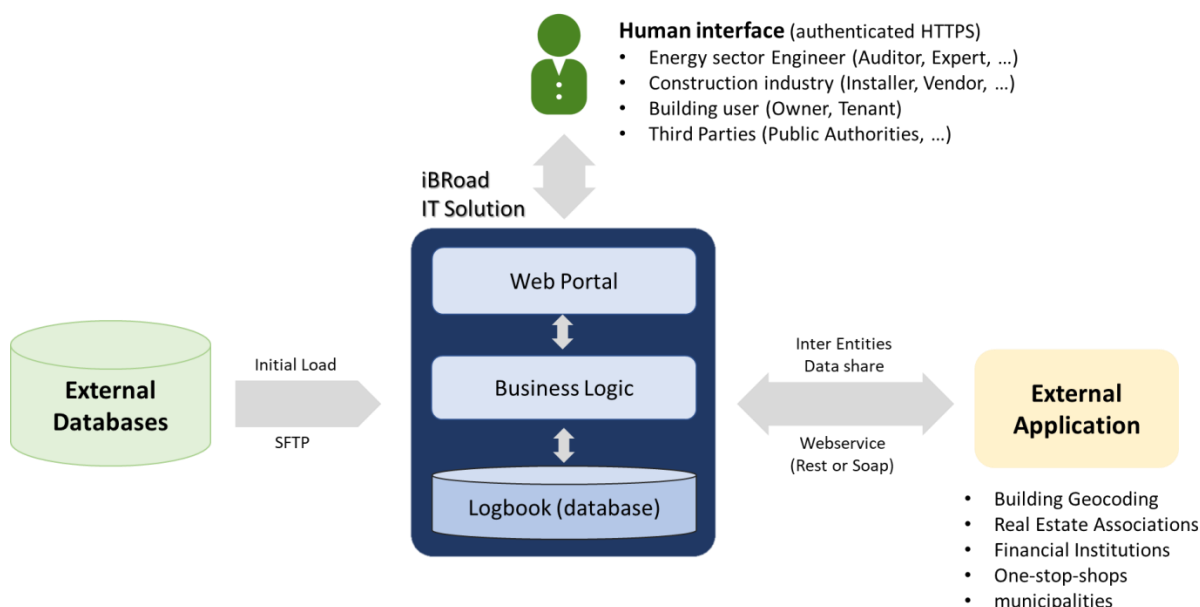

Figure 24 – Integration with external sources

Initial Load

The solution needs to be loaded with initial information, as for example existing buildings, existing energy certificates, etc. That bulk of the information is inserted into the solution database on a "one shot" basis. It makes no sense to develop future proof mechanisms for the initial load operation. The initial load will follow the steps below:

1. The external entity sends the information via SFTP in text format:
   a) XML
   b) JSON
2. The Solution Managing Entity runs ad-hoc scripts to load the text format files into the chosen database (ex: MySQL, SQL Server, Oracle, etc.);
3. All authentications used for the initial process will be revoked at the end of the process;

Data coming from the Human Interface

During the life of the solution, part of the information is introduced through the Human Interface. This data collection procedure will apply to low volume information, as for example specific information of a particular installation, introduced by the engineer, energy auditors and/or owners. Only authenticated users with an assigned proper profile are allowed to access, insert or change information in the solution. Therefore, the solution must have mechanisms to guarantee:

- User Authentication, assuring that a user is the person that he or she claims to be;
- User Authorisation that assures that a user is entitled for a specific profile, and only has access to features allowed to that profile;

Data Coming from Third Party Applications

Some of the information needed to the solution processing, during its life, may also come online from external entities, as for example:

- Information to authenticate users;
- Information to validate user profile/role;
- Information related to buildings (e.g. Geocoding);

Communication with third party applications will use online web services, preferably Restful, but SOAP could be accepted for the pre-existing web services. In the same way, the solution could provide information to external entities, like Real Estate Agencies or Associations. In that case, the solution must provide Restful web services. Security mechanisms must be used at least with the use of API Keys. Of course, the supply of data to external entities must be conformant with the GDPR.

iv.   Data protection

This section aims to clarify the personal data requirements given the possible limitations that may arise when using several databases which support the implementation of the residential building renovation passports, as foreseen in the iBRoad project. As seen before, iBRoad will be a digital tool based on a logbook which will contain a set of buildings' data (legal, administrative, technical and operational aspects and possibly some personal data) raising issues concerning the confidentiality, integrity and data availability. At the moment, this report will be published as a new approach to data protection came to force and it will impact current and future initiatives to build up the databases.

The new data protection framework is set to boost the digital economy and generate a greater confidence among European consumers on the electronic commerce with a special focus on the personal data processed by entities able to process personal data. The new *General Data Protection Regulation* (GDPR - Regulation 2016/679), which all Member States have to (mandatorily) adopt, was published in the Official Journal of the European Union on 4 May 2016 and, as of May 25, 2018, replaces the European Directive (95/46/EC). The regulation creates a single set of rules and levels which guarantees the legal security to companies and establishes the same level of personal data protection in all EU countries.

This regulatory framework is designed to harmonise privacy laws in the European area, in particular to protect and ensure the privacy of all European citizens and to reform the European approach to data privacy. The scope of the GDPR is securing **the processing of personal data** by wholly or partially automated means as well as the processing by non-automated means of personal data contained in filing systems or intended to form part of a filing system. **Personal data**[4] is defined as any information relating to an identified or identifiable living individual (data subject) which could be used to uniquely identify, directly or indirectly, a person by reference to an identifier such as:

- A name or surname, a home address, an identification card number, a bank account;
- An email address (i.e.: name.surname@company.com);
- Location data (i.e: the location data function on a mobile phone);
- A post on social networks, a curriculum vitae, an IP address;
- Biometrics data, genetic data or medical information, etc.

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[4] Article 4 (1) of the GDPR

In the same way, data that is not considered personal is not subject to such restrictions. Figure 25 illustrates an example of non-personal data from the Portuguese logbook. Examples of data not considered as personal data are a company registration number, an email address such as info@company.com or anonymised data [8].
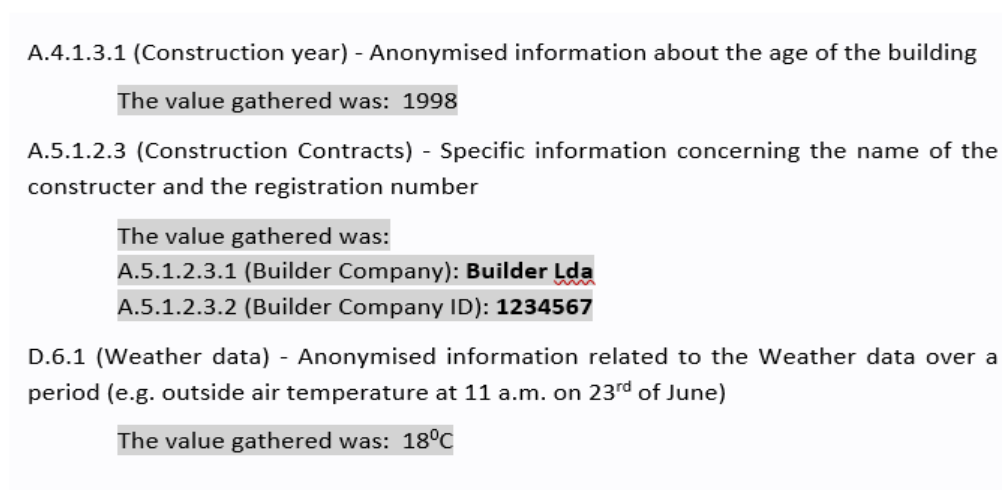
Figure 25 – Data not considered personal - example from the Portuguese logbook

The **data processing** can be defined as any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction. Therefore, a set of relevant questions arise when implementing the logbook, which are addressed hereafter.

Which objectives and rights does the new GDPR bring?

As described before, the GDPR is focused on the protection of citizens' rights to protect them in different contexts. The main objectives and rights under the GDPR are the following:

- **New and stronger rights for EU citizens** towards the organisations that hold their personal data (more detail in Figure 26);
- **Higher protection against data breaches,** being now mandatory to notify the data subject in relation to any security breaches and no later than 72 hours after its detection;
- **New role assignment: Data Protection Officer (DPO)** - the organisations need to appoint a responsible person for ensuring the privacy and the compliance of personal data processing;
- **Stricter rules and dissuasive fines** - applications of fines of up to 20M€ for non-compliant organisations;
- **Data protection by design and by default as a legal requisite** - demonstrate the compliance with this new regulation. In other words, the principles of data protection must be guaranteed from its design and with a friendly privacy approach.

Right to object, in different scenarios like direct marketing (including profiling) or processing for scientific/historical research purposes and statistics

Right to restriction of processing block or delete personal data processing (the information could be stored but not processed without a consent)

Right to data portability which includes the right to transfer personal data to other entities.

NEW RIGHTS FOR EU CITIZENS

Right to access the personal data and to know for what purpose its processed (a digital copy could be requested)

Right to rectification of personal data when inaccurate or incomplete

Right to information about the personal data processed

Right to be forgotten confers the right to request that personal data could be erased

Figure 26 – New rights for EU citizens

Which privacy and security aspects are relevant when setting up a logbook database?

Regardless of the logbook structure and how it is being implemented, it will always be subject to the GDPR rules. Therefore, it is important to guarantee right from the beginning the principles of data protection both through **the application of the privacy rules from its design and by default** as well as having a **controller or DPO** since the data processing will be one of the main logbook functionalities. In parallel and no less important, the **information security** collected to satisfy data protection requirements and threats must be assured. Information security can be defined as an organised and structured process of practices to protect people and business assets from threats, including cybercriminals [9]. It can be represented by a triad that integrates confidentiality (C), integrity (I) and availability (A) as represented in Figure 27.

Confidentially

Information security

Integrity   **Availability**
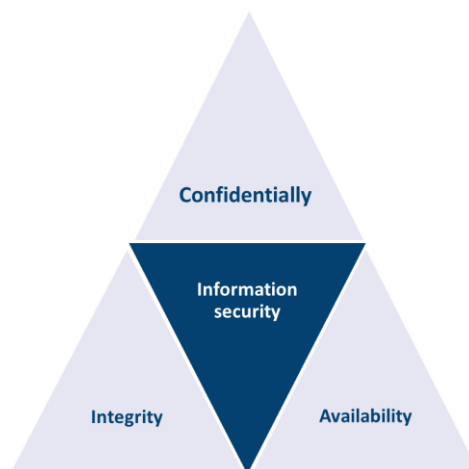
Figure 27 – Confidentiality, integrity and availability (CIA) model

The security aspects that are relevant when setting up a logbook can be defined as follows13:

- **Confidentiality:** Ensuring that the information can be seen only by authorised people. When properly achieved, confidentiality prevents unauthorised access to restricted data in an organisation. An organisation can enforce confidentiality by implementing access controls, such as authentication, and encryption.
- **Integrity**: Ensure that the information cannot be changed or removed without authorisation. An organisation needs to validate that the data, while in transit or at rest, has not been modified from its original state. Digital signatures and encryption help maintain data integrity.
- **Availability**: Ensure that only authorised people can access information when needed. Data and access to data must be highly available and resistant to single points of failure. Data backups, redundant disks, and multiple network connections help ensure availability.

Which questions should be asked when dealing with personal data?

When dealing with personal data, several questions arise that should be answered under the logbook implementation. Figure 28 illustrates 7 principles that will be discussed in the following section.
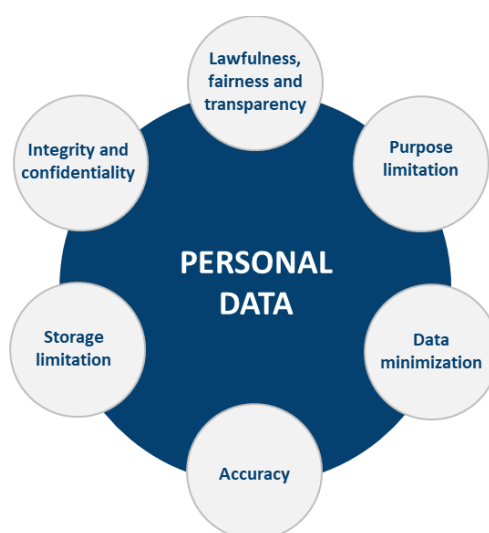
Figure 28 – Principles to address when dealing with personal data

1. *How to ensure the transparency of the information and the rights of the data subject?*

Only with the consent of the data subject it is possible to process and fill the personal data in a legal and transparent way ensuring its accuracy.

2. *For what purpose?*

Data processing must have specific purposes and be communicated to the data subject when data are collected. It is not permitted to simply collect personal data for undefined or other purposes different from the original intention.

3. *What personal data it really required to be stored?*

Only the private data needed to fulfil the purpose for the processing.

4.   How to ensure data is accurate and updated?

It must be guaranteed that all individual information needed for the purpose is accurate, updated and corrected, if required.

5.   For how much time can the data be stored?

No longer than the necessary for the purposes of which it is processed. For example, in the Portuguese SCE database a period of 30 days is established to store personal data as property registration.

6.   How to ensure the security and integrity of the personal data gathered?

Providing appropriate technical and organisational safeguards to ensure the security of personal data, of which is included protection against unauthorised or unlawful processing and loss, destruction or accidental damage by adopting appropriate technologies for information security.

7.   What should be done in case of personal data breach?

Any breach must be notified to the Data Protection Authority (DPA) without undue delay and at the latest within 72 hours after having become aware of the breach.

Important remarks

iBRoad-log will be running under this new regulation. In the process of setting up a logbook, it is crucial to ensure that all GDPR requirements are fulfilled. As stated before this might be a key aspect and must be decided according to the configuration of the entity setting up the logbook in each Member State.

The referred task could be executed by a Controller or Processor or even by a Data Protection Officer (DPO), which is mandatory if the holder of a future database administration is a public organisation or if the core of the logbook involves the treatment of significantly sensitive data, such as personal data, or a regular and systematic monitoring of individuals. According to Articles 4 and 9 and Recitals 51 and 56 of the GDPR, the following personal data is considered 'sensitive' and is subject to specific processing conditions:

•   Personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs;

•   Trade-union membership;

•   Genetic data, biometric data processed solely to identify a human being;

•   Health-related data;

•   Data concerning a person's sex life or sexual orientation.

Besides the aspects and concerns presented above regarding the adoption of the GDPR, other definitions are important to better understand the role of persons/entities involved or the data use. Additional details can be found in Figure 29.

Filing system – means any structured set of personal data which are accessible according to specific criteria, whether centralised, decentralised or dispersed on a functional or geographical basis;

Controller – means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purpose and means of processing of personal data; where the purpose and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law;

Processor – means a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller;

Consent of the data subject – means any freely given, specific, informed and unambiguous indication of the data subject's wishes by which he or she, by a statement or by a clear affirmative action, signifies agreement to the processing of personal data relating to him or her;

Personal data breach – means a breach of security leading to the accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to, personal data transmitted, stored or otherwise processed;

Genetic data – means personal data relating to the inherited or acquired genetic characteristics of a natural person which give unique information about the physiology or the health of that natural person and which result, in particular, from an analysis of a biological sample from the natural person in question;

Biometric data – means personal data resulting from specific technical processing relating to the physical, physiological or behavioural characteristics of a natural person, which allow or confirm the unique identification of that natural person, such as facial images or dactyloscopy data;

Data concerning health – means personal data related to the physical or mental health of a natural person, including the provision of health care services, which reveal information about his or her health status;

Figure 29 – General definitions from the GPDR[5]

Finally, and as a recommendation concerning the effect that the data regulation might have on the iBRoad project and specifically on the logbook design, it is important to decide, as soon as possible and when setting up a database, what personal data is necessary and be aware of the aspects identified in this chapter, without prejudice to the full consultation of the GDPR.

Figure 30 exemplifies the different actions to take into consideration when considering personal data protections within the iBRoad project.

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[5] Article 4 of the GDPR

Figure 30 – Personal data protection actions on iBRoad

Action 1 - Data protection by design and default

From the design phase and by default, it is crucial that the personal data processing is based on privacy rules to prevent failures on data processing (for instance, when linking to external databases, these should be compliant with GDPR). This action occurs before the data is loaded into the database.

Action 2 - Controller or Data Protection Officer (DPO)

Hiring a Controller or a DPO to guarantee that personal data are rightly processed and protected as it is defined by the GDPR (for example, checking personal data processing and the existence of eventual breaches).

Action 3 - Policy Privacy

Database must have a policy privacy where data protection, confidentially, integrity and data management issues are identified and clarified (for example, publish a document with the ground rules for iBRoad policy privacy).

Action 4 - User profiles

Establish several user authentication profiles with different access levels (for example, private access given to the building owner/tenant and to the energy auditor while public access given to third parties as public authorities or construction industry, etc.).

Action 5 to 10 – Store personal information

Finally, when storing personal data it is necessary to guarantee the following aspects:

(5) Consent to personal data: to ask for consent for personal data utilisation within the privacy policy defined (for example, in the Portuguese SCE the experts can choose to be shown in the experts public list and be contacted);

(6) Purpose of personal data: when requesting consent, to explain and communicate the purpose of the personal data gathered;

(7) Accuracy and up to date nature of personal data: to ensure accuracy of private data gathered by regularly checking and updating (for example, by sending a reminder);

(8) Limitation to store the personal information: limit the personal data collected only for the agreed purposes (for example, data on occupant preferences collected during an energy audit can only be used for the energy audit purposes);

(9) Security of personal data: to provide and ensure the security of personal data by adopting proper technologies against unauthorised or unlawful processing and loss, destruction or accidental damage.

(10) Personal data breach: when data breaches are identified by the Controller or a DPO it will be necessary to notify the Data Protection Authority (DPA) without any delay and no later than 72 hours after having become aware of the breach.

v. Other legal aspects

This section gives a quick glance on the legal aspects that may impact the use of databases like the one developed under the logbook. Although not fully evaluated under this report, it is important to highlight aspects such as **intellectual property**, which usually include **copyright, database rights or licensing** and which can limit the full use of the logbook since it contains data and it is typically a database.

As a reference for further details on this matter it is recommended to consult **the World Intellectual Property Organization (WIPO)** [10], which is a global forum for the intellectual property services, policy, information and cooperation from the United Nations.

The European Commission is also focused on exploring other projects that deal with databases. This is the case of the **ExcEED project** – which stands for European Energy Efficient building district Database: from data to information to knowledge [11].

The ExcEED project evaluated license issues within that project, this being a common concern for the iBRoad project.

IV.   LESSONS LEARNED

PORTAL CASA +

To promote homeowner awareness on the energy efficiency potential of their houses, namely through accessing the information available in the EPC, the Portuguese Energy Agency developed the casA+ concept. A portal, still in development but close to being launched, it aims to engage home owners with the energy renovation opportunities that are identified in the EPC, bridging the gap between (a) the "EPC paper", (b) the energy expert and (c) the energy renovation market of service providers, all in a one-stop-shop portal that simplifies the renovation process and allows the homeowner to go through a transparent and user-friendly experience.

What is the portal casA+?

The portal casA+ (Figure 31) is a digital platform that offers a public area for homeowners to know more about the building's energy efficiency. It also displays a private area where it is possible to check all the aggregated information about their house's use profile (Figure 32), energy certification data and process (Figure 33), energy renovation measures (Figure 34) and service providers that can help the homeowner to implement them, and finally, energy and water consumption (Figure 35).
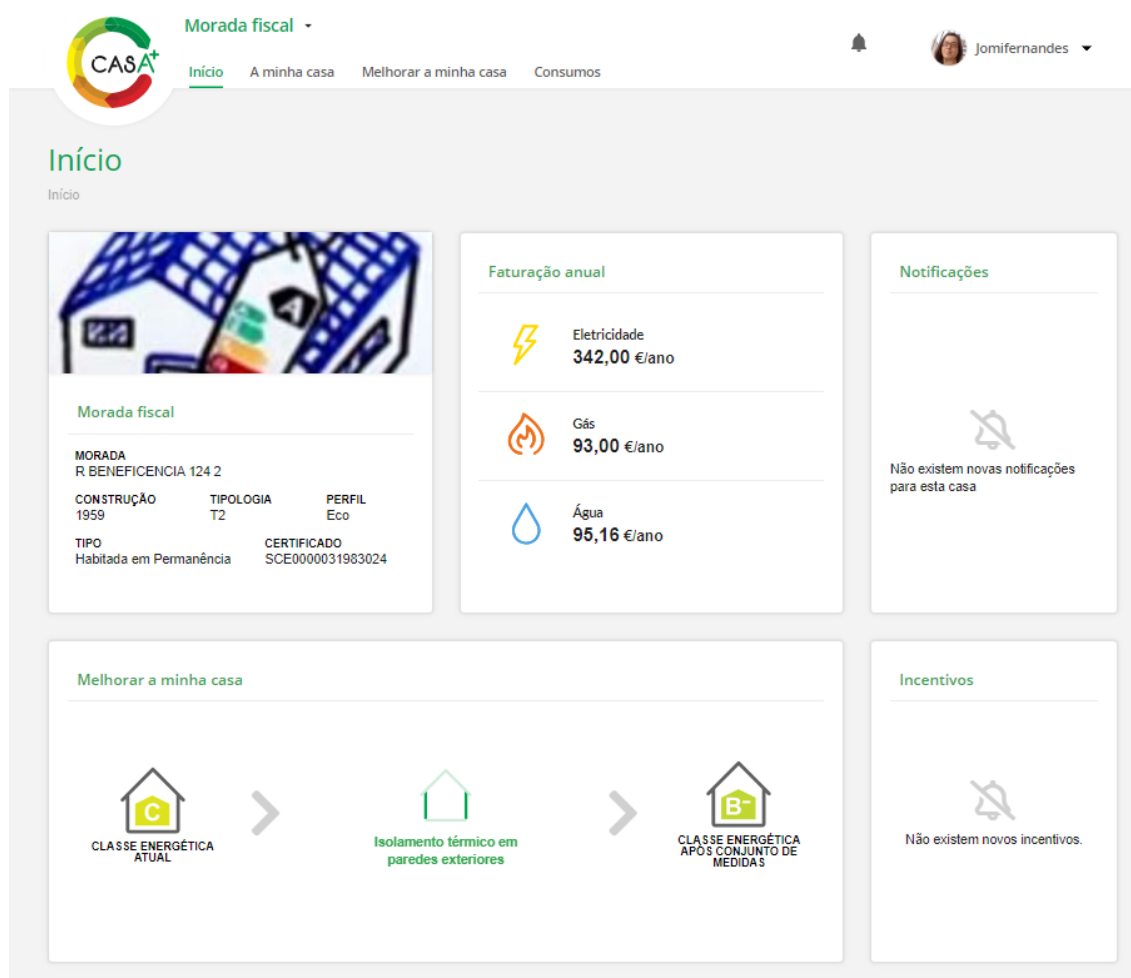

Figure 31 – casA+ digital platform
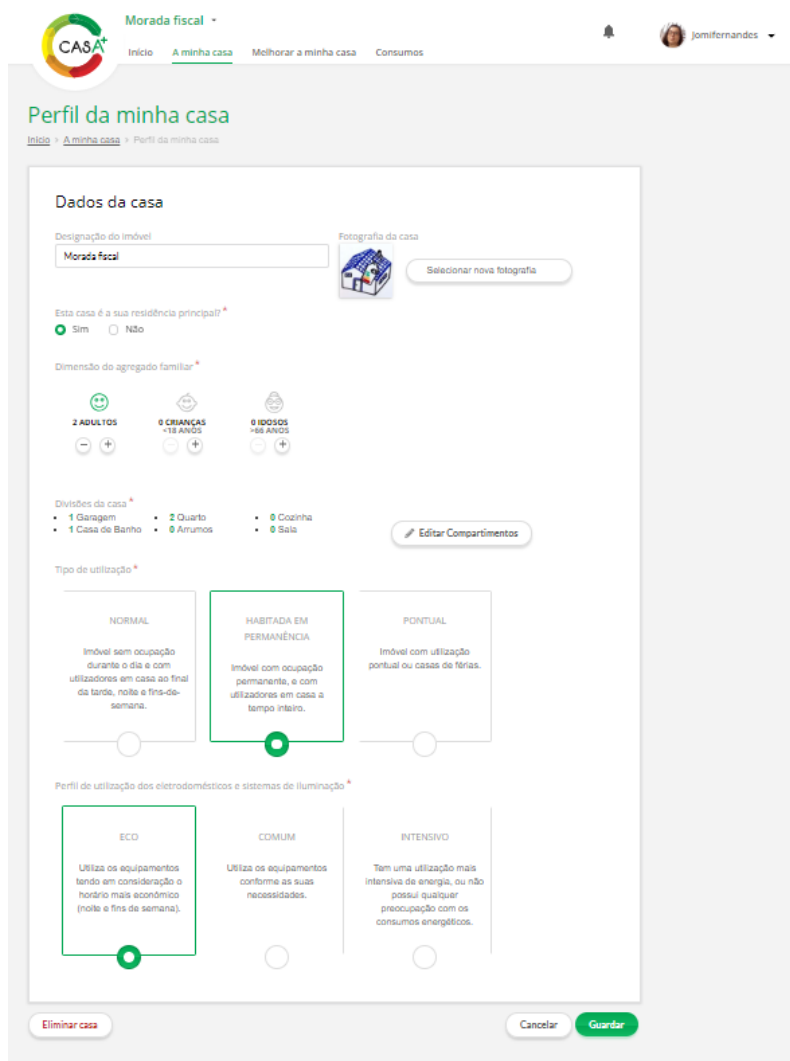
The information available in the platform comes from the EPC (all the building information regarding construction, energy needs, energy class and energy renovation opportunities), from the National Statistics Institute (information on the building registration) and from the house owner (information on the energy and water consumption and house use profile). Dwellers that do not own an EPC can also register in the portal casA+, accessing fewer functionalities, but allowing direct contact with energy qualified experts to request an EPC.

How was portal casA+ designed?

The portal casA+ was born out of a European project, the Request to Action, which started addressing the homeowner relation with the EPC in 2009. The initial steps of the process were through dedicated support to the homeowner on how to read and take advantage of the information available in the EPC, namely using it as a means to contact energy efficient solution providers to receive budget proposals and move forward the implementation stage of these energy efficiency measures. The concept evolved into the digital dimension with the concept of facilitating homeowners' interaction with the market, based on trust in the EPC information. In this sense, the portal casA+ was developed as a user-friendly interface to access EPC information and address the energy efficiency market. The definition of the portal was designed in close cooperation with consumer organisations and market stakeholders. To this end, several brainstorm and concept discussion workshops were held, as well as bilateral meetings where all the stakeholders were called to give their contribution on how to better address user and market needs. The main barriers to address with the one-stop-shop were identified via a dedicated survey that mapped the issues the portal needed to tackle in order to succeed.

What are the goals of portal casA+?

- Raise homeowners' perception on the EPC added value, namely as the first step for home energy renovation;
- Facilitate the homeowner experience in energy home renovation initiatives;
- Bridge the gap between homeowners and market actors, from energy expert to service providers and third-party investors that manage energy renovation incentives;
- Further increase homeowner's perception of their house's energy dimensions, integrating all the relevant information in a single portal, namely regarding energy and water consumption, electric appliances, heating and cooling equipment, energy use profile, etc.;
- Support a robust national buildings information database that can be the central point of integrated data about buildings, further allowing for public authorities to define and implement long term renovation strategies according to national specific needs and goals.

**Figure 32 –** casA+ - Home occupancy and energy use profile


Figure 33 – casA+ - My house components

Figure 34 – casA+ - Energy efficiency opportunities identified in the EPC
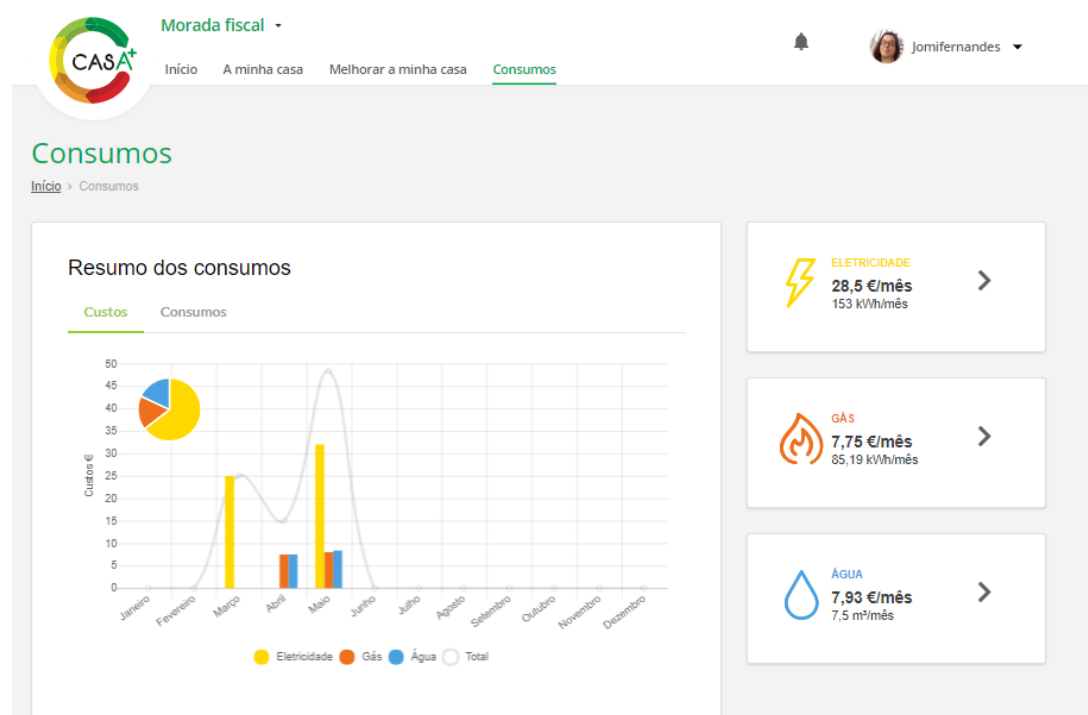

Figure 35 – casA+ - Energy and water consumption dashboard

Portal casA+ roadmap

Portal casA+ is to be established on an evolutionary basis, gradually making new functionalities available to the homeowner and involving more market agents. The first stage will be launched in

October 2018 and will be accompanied by a strong dissemination strategy aiming to invite homeowners into the portal and achieve a critical mass of users to facilitate the involvement of more market actors. The first stage makes available the following functionalities:

Automatic:

- Information about the building according to the National Statistics Institute;
- EPC information: building construction, heating, cooling and domestic hot water appliances;
- Direct line to contact the qualified energy expert responsible for issuing the EPC; to pose questions or ask for the update of the EPC upon the implementation of renovation actions;
- Access to the energy qualified expert database to request an EPC;
- In depth information about energy efficiency measures;
- Available incentives and financing opportunities.

Input by the home owner:

- Repository of documentation about the house: contract, registry, equipment, etc.
- Cadaster of electric appliances and lighting systems;
- Recording of equipment and electric appliance purchase process and maintenance interventions;
- Monitoring of energy (electricity and gas) and water consumption.

In the second stage, it is envisaged that the following functionalities will be made available:

- The portal casA+ may suggest new energy efficiency opportunities (not identified in the EPC);
- Contact service providers to implement the energy efficiency renovation measures;
- Contact the qualified energy expert, responsible for the EPC, to accompany the implementation of the energy efficiency measures, supporting the customer through the implementation journey;
- Rank the service providers and the qualified energy experts according to quality of their services (compelling the market to provide quality in their services and materials and reinforcing homeowner's trust in the portal).

A third stage will also include:

- Monitoring and quality check procedures;
- Access to finance.

What do we want to achieve in future?

Integral Platform:

- The portal casA+ is to be a complete one-stop-shop, covering all the stages of the house renovation process from the homeowner's point of view;

- Collect a wide set of data on building renovation to actively support public authorities in the definition of the national long-term renovation strategies;

- Portal casA+ collects and integrates building data from different sources and becomes a unique counter for data access to buildings.

Portal casA+ as a market pull tool:

- Facilitating and improving homeowners' energy renovation journey, it boosts the market and triggers increasing rates of energy renovation works in buildings;

- Financing institutions rely on portal casA+ to operationalise access to finance process, making it easier for the homeowner and third party investors to access and attribute financing to home energy renovation processes.

Reliable tool:

- Portal casA+ is a trustworthy platform for the homeowner and all the professionals involved, assuring the privacy of the user data and its safety.

WONINGPAS

To increase the renovation level of the Flemish residential patrimony, the Flemish Energy Agency is working together with a number of other entities of the Flemish Government on a Renovation Pact. Its aim is to improve the energy performance of the existing housing estate in the long term. In order to visualise the trajectory towards the long-term goal for every single home, we are developing a Woningpas in Flanders.

What is the Woningpas?

The Woningpas is a **digital passport** (Figure 36) available for every dwelling, accessible by the homeowner and other authorised persons (renter, notary, expert, future buyer, etc.). In this way, every owner or third party can gain access to and insight into **relevant building, ground and environment-** related information that the **government** owns on the dwelling.
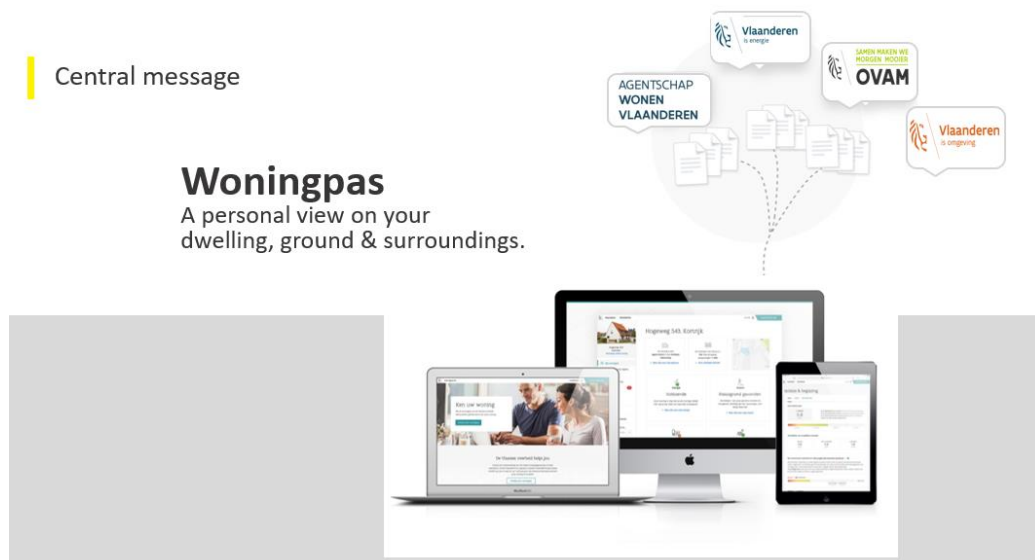
Figure 36 – Woningpas digital platform

This information comes from certificates, inspections, permits, technical data, and open data, which are available in various databases of the Flemish government. **The owner can supplement these data with his/her own information** (invoices of investments, plans, maintenance certificates, etc.). This makes it much easier for the owner to check, for example, to what extent the house is energy-efficient, or if it has the necessary certificates. Furthermore, the Woningpas allows the citizen to save a lot of time in the handling of the paperwork as builder, renovator, buyer or renter.

How did we design the Woningpas?

The Woningpas is for citizens and has been designed in close collaboration with stakeholders and citizens. To determine the concept, regular consultations were held with stakeholders through workshops and focus groups. The expectations of the future users were mapped out through a service-design process called 'user experience'. During this process, the actual user (citizen) is involved in the development and visualisations. In this way, ideas are quickly made realistic by means of photos and

drawings and always checked with the users by surveys, larger user testing on building forums or smaller user tests with individual citizens.

What do we want to reach with the Woningpas?

- Woningpas becomes a unique locket for data access to buildings:
  - o Overview **of governmental data** about the **dwelling, the land and its environment** gives citizens insight into the current situation;
  - o Overview of **certificates, inspections and permits**;
- **Digital safe** of **governmental** and **private information**: plans, certificates, executed works;
- Personal **advice** to increase the energy efficiency and home quality of the dwelling in the future & possibility to **follow up these steps in the Woningpas;**
- **Insight into administrative obligations and rights** for (purchase) sale, (re)building and rental process by reducing the administrative burden and costs and reducing the number of questions about this;
- Easy **sharing of building information** with third parties (buyers, tenants, construction partners);
- **Follow-up-tool** for the level of renovation and housing quality.
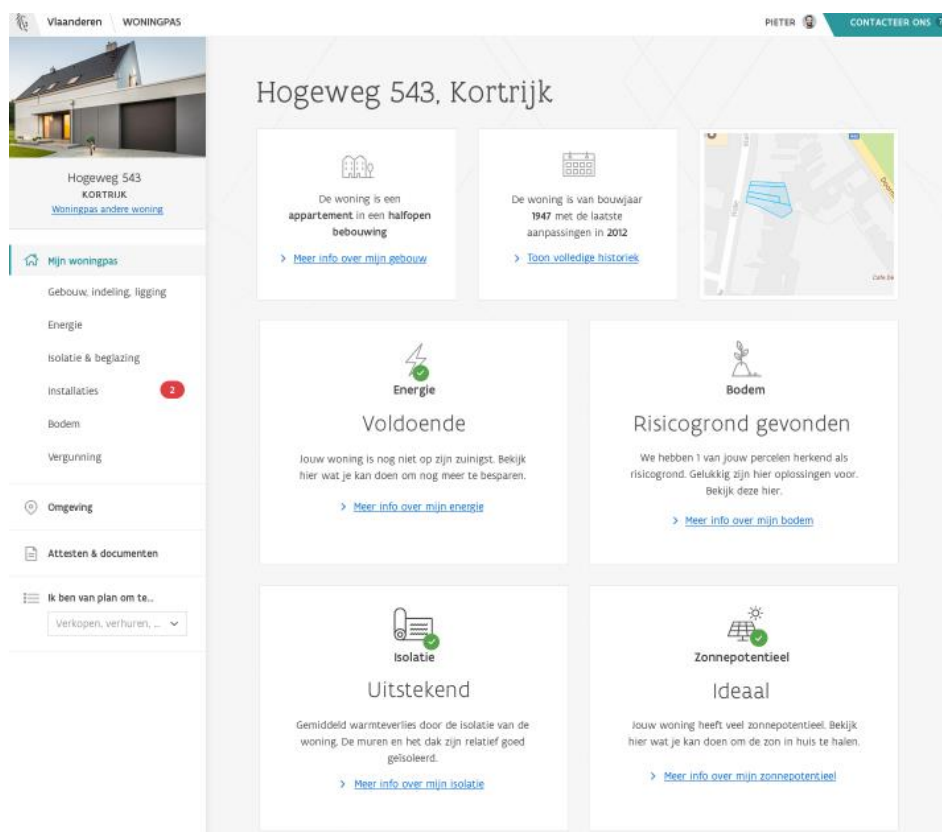

Figure 37 – Woningpas – Modular
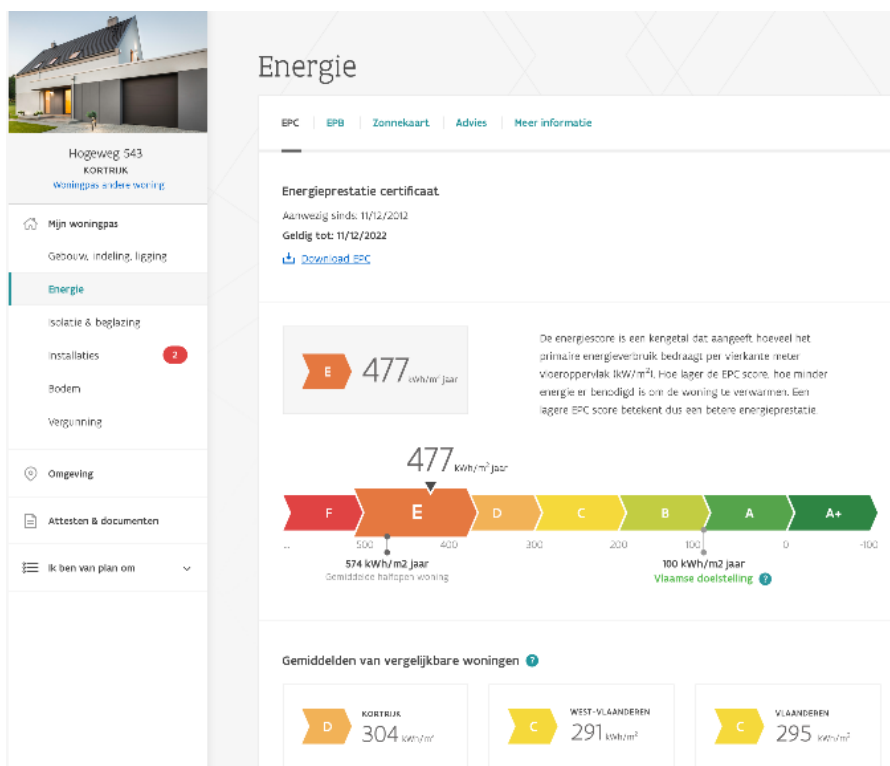
**Figure 38 –** Woningpas – data interpretation
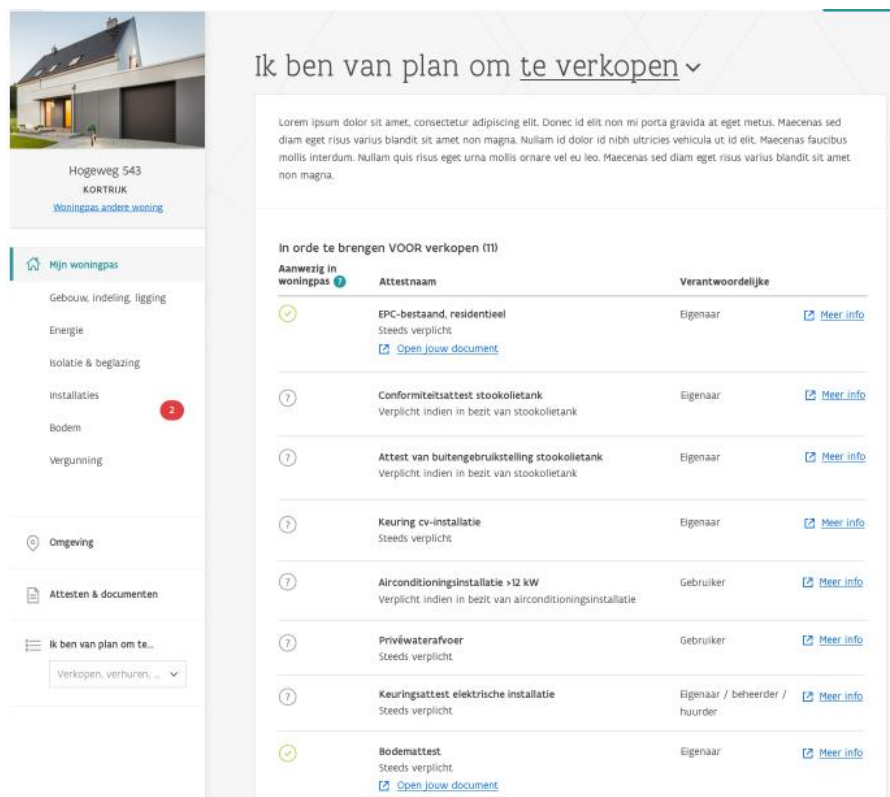
Figure 39 – Woningpas - Overview on obligations & rights

Figure 40 – Woningpas - Advice

Woningpas Roadmap

The Woningpas is established **step by step** (Figure 41). A first launch will take place in the autumn of 2018 (Light), followed by a next version (2019). Gradually the Woningpas is supplemented with new themes and functionalities over the years.

woningpas Light 2018 → woningpas Medium 2019 → woningpas Full 2020 → 2021 - 2023...

Figure 41 – Woningpas roadmap

In 2018 (light version) the owner can consult the Woningpas:

- Data on energy (EPB, EPC), insulation and installations, land information, solar potential and general building data (year of construction, classification, certain areas and volumes);
- Environmental maps on spatial planning, flood sensitivity, immovable heritage and a referral to the "geoloket" database for more information about the geological, hydrogeological, geotechnical and soil data of the site.

- Overview of certificates and historical records: the EPB declaration and the energy performance certificate.
- Step-by-step plan: overview of necessary certificates for (re) buying, (re) renting, (re) building.

In 2019 we will provide more information for the owner:

- Supplementary data: history of permits, additional soil information, the upgraded EPC + with additional step-by-step plan with measures to realise an energy-efficient existing house, data on the quality of housing;
- Additional attestations and inspections: certificate of conformity, technical report of the quality of the house, soil certificate, etc;
- Check tool quality of the house where citizens can test their house on different quality-themes;
- Overview of relevant premiums, loans and other financial help.

In addition, the owner can share his Woningpas with third parties. Owners, as a legal entity, should also have access to the residential properties of their company. Work is being done on a digital safe where the owner or authorised persons can add relevant documents in the Woningpas, such as non-digital certificates, plans, photographs, evidence of renovation works carried out, etc.

What do we want to achieve in future?

Integral Platform:

- The Woningpas contains an as complete set of building-related data and certificates as possible from federal, regional and local entities or other institutes with relevant data.

- The Woningpas becomes a unique counter for data access to buildings.

Woningpas as a catalyst:

- The Woningpas is a catalyst for realising a sustainable, high-quality and energy-efficient building stock by 2050.

- The Woningpas is used as a follow-up-tool for renovation works, offers a direct link to premiums.
  Citizens can actively benchmark themselves.

Active and unique counter:

- Citizens need the Woningpas in their contacts with the government or other institutions and should not be driven to the tool by communication. Everyone knows and uses the Woningpas. A link to real and real-time consumption-data, data on and tools for maintenance and smart meters is useful for this.

- The Woningpas has success as a gateway to information so that other institutions / entities want to use the Woningpas as a building information counter instead of building a tool themselves.

Reliable tool:

- The Woningpas becomes a reliable tool for the citizen that sufficiently guarantees the privacy of the user and his safety.

V. FINAL CONSIDERATIONS

Europe has a very well consolidated building stock where 80% was built before 1990 [12] and 75% to 85% will still be in use in 2050 [13]. This would not be a problem if these buildings were energy efficient, which unfortunately is not the case. Since roughly 97% of them are considered inefficient [14], this brings a tremendous opportunity to improve their energy efficiency through renovation. In fact, the main policy actions in force in the building sector address the need to correctly establish and implement renovation strategies with a vision to achieve a highly energy efficient and decarbonised building stock by 2050 [15].

According to the revised Energy Performance of Buildings Directive (EPBD), Member States will have to submit (or update) their **long-term renovation strategies** (LTRS) to support the renovation of the national stock of residential and non-residential buildings, both public and private. LTRS are supported by other features also included in the Directive that guide, and better help, the definition of those strategies, like:

- Buildings should be renovated into a highly energy efficient and decarbonised level, facilitating the cost-effective transformation of them **into nearly zero-energy buildings**;
- **One-stop-shops for consumers** and energy advisory services, on relevant energy efficiency renovations and financing instruments, that work as accessible and transparent advisory tools;
- Schemes for **building renovation passports**, to stimulate cost-effective deep renovation of buildings to improve policies and guide investments;
- The fact that, although voluntary, most of the Member States established **EPC databases** that still need to unlock its potential and **high-quality data** on the building stock is needed and this could be generated by those databases;
- Member states should make **available anonymised data** for statistical and research purposes and to the building owner.

According to this, it is clear that the iBRoad project addresses a good part of the aspects referred in the EPBD such as the building renovation passports, databases or a logbook model implementation. In detail, the concept of a logbook is a relevant step to provide Member States with the capacity to aggregate data and turn it into knowledge and action. This could be done by creating new databases or improve the existing ones.

The early engagement of **stakeholders** is also an important step when setting up a logbook. This involvement raising the acceptance and enlarging the scope and use of the logbook, which turns into more data accessed or provided and at the end, more and wider knowledge of the building stock and its opportunities.

The **General Data Protection Regulation** brings a new reality to which Member States must adapt. This new moment must be used to clearly define the scope and use of a logbook, setting the boundaries for what can be done, but also protecting citizens, which is also a core objective of the iBRoad project.

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ANNEX

iBRoad
Individual Building Renovation Roadmaps

iBROAD Logbook template (final version)
June, 2018

Information level

Text in dark blue	Core information
Text in red	Complementary information

What

What data will be mapped and how it will be organized

Country data structure:

EUROPEAN LEVEL	NATIONAL/REGIONAL LEVEL
(structure of information which represents a commom european approach for the type of data collected under the Logbook) Fixed structure	(structure of information related to the national specific data collected under the Logbook) Flexible structure adapted to the national level

EU Information level ID			NATIONAL Information level ID				Variable		
L0	L1	L2	L3	L4	L5	Ln	Code	Value	Unit

A- GENERAL AND ADMINISTRATIVE INFORMATION

Description: General and administrative information related to the building/unit characterization and its users

A- GENERAL AND ADMINISTRATIVE INFORMATION									
1.Building ID	1. National code								
	2. Inspire ID								
	3. Energy supliers ID								
2.Address	1. Geo Coordinates								
	2. Address data								
3. Property ID	1. Legal registration								
	2. Fiscal registration								
4. Building general features	1. Building								
	2. Building Unit								
5. Licences and Plans	1. Urban Licenses								
	2. Design Plans and Designers								
6. Conservation Status	1. Evaluation of the conservation status								
7. Building User	1. Building user information								
	2. User profile								
8. Other building information	1. Governmental taxes and incentives								
	2. Financial programs								
	3. Real estate information								
	4. Energy and Construction market								

iBRoad
Individual Building Renovation Roadmaps

iBROAD Logbook template (final version)
June, 2018

Information level

Text in dark blue — Core information

Text in red — Complementary information

What

What data will be mapped and how it will be organized

EUROPEAN LEVEL
(structure of information which represents a commom european approach for the type of data collected under the Logbook)
Fixed structure

EU Information level ID		
L0	L1	L2

Who and Where

Who holds information and where is it stored

Holder of information		
Holder name	Type of holder	Store location

Who and How to access

Who can access information and how to do it

Owner of information; building owner;

Data for the iBroad	
Actor	Role

Data protection

Issues related to Data Protection Regulation

Confidentiality and Privacy	Validity	Availability

A- GENERAL AND ADMINISTRATIVE INFORMATION

Description: General and administrative information related to the building/unit chara

A- GENERAL AND ADMINISTRATIVE INFORMATION									
1.Building ID	1. National code								
	2. Inspire ID								
	3. Energy supliers ID								
2.Address	1. Geo Coordinates								
	2. Address data								
3. Property ID	1. Legal registration								
	2. Fiscal registration								
4. Building general features	1. Building								
	2. Building Unit								
5. Licences and Plans	1. Urban Licenses								
	2. Design Plans and Designers								
6. Conservation Status	1. Evaluation of the conservation status								
7. Building User	1. Building user information								
	2. User profile								
8. Other building information	1. Governmental taxes and incentives								
	2. Financial programs								
	3. Real estate information								
	4. Energy and Construction market								

![iBRoad - Individual Building Renovation Roadmaps]

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Information level

Text in dark blue   Core information

Text in red   Complementary information

What

What data will be mapped and how it will be organized   *Country data structure:*

EUROPEAN LEVEL	NATIONAL/REGIONAL LEVEL
(structure of information which represents a common european approach for the type of data collected under the Logbook) Fixed structure	(structure of information related to the national specific data collected under the Logbook) Flexible structure adapted to the national level

EU Information level ID			NATIONAL Information level ID				Variable		
L0	L1	L2	L3	L4	L5	Ln	Code	Value	Unit

B - BUILDING CONSTRUCTION INFORMATION

Description: Technical information and data related to the building construction

B - Building construction information Building Elements - (technical specifications)									
	1. Envelope	1. Walls							
		2. Roofs							
		3. Floors							
		4. Thermal Bridges							
		5. Doors							
		6. Windows							
	2. Technical building systems (TBS)	1. Ventilation systems							
		2. Heating system							
		3. Cooling System							
		4. DHW system							
		5. Lighting system							
		6. Building automatization & controls (BAC)							

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June, 2018

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What

What data will be mapped and how it will be organized

EUROPEAN LEVEL
(structure of information which represents a commom european approach for the type of data collected under the Logbook) *Fixed structure*

Who and Where

Who holds information and where is it stored

Who and How to access

Who can access information and how to do it

Owner of information; building owner;

Data protection

Issues related to Data Protection Regulation

EU Information level ID			Holder of information			Data for the iBroad		Confidentiality and Privacy	Validity	Availability
L0	L1	L2	Holder name	Type of holder	Store location	Actor	Role			

B - BUILDING CONSTRUCTION INFORMATION

Description: Technical information and data related to the building construction

B - Building construction information — Building Elements - (technical specifications)		EU Information level ID	Holder name	Type of holder	Store location	Actor	Role	Confidentiality and Privacy	Validity	Availability
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L0	L1	L2	L3	L4	L5	Ln	Code	Value	Unit

C - BUILDING ENERGY PERFORMANCE

Description: Energy Information based on EPC information or other energy assessments

C - BUILDING ENERGY PERFORMANCE									
1. EPC general information	1. Expert Name								
	2. Expert ID								
	3. Type of EPC								
	4. EPC number								
	5. Energy label								
	6. Date (issue)								
	7. Date (term)								
	8. Photograph report								
	9. EPC support documentation								
2. Audit general information	1.Expert Name								
	2. Professional Order (PO)								
	3. Audit date								
	4. Energy label								
	5. Photograph report								
	6. Energy audit support documentation								
3. Energy and other Indicators	1. Energy use								
	2. Delivered energy								
	3. Primary energy								
	4. Environmental and energy indicators								
	5. Other indicators								
	6. Comfort level								
4. Recommendations	1. Individual impact								
	2. Collective impact								

iBRoad
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D - BULDING OPERATION AND USE

Description: Data and information on how the building is operated

D - BULDING OPERATION AND USE									
	1. Energy consumption	1. Energy source							
		2. Metering system information							
	2. Energy generation	1. Renewable energy system							
		2. Metering system information							
	3. Energy Suppliers	1. Energy source							
		2. Metering system information							
	4. Inspections	1. Building element							
		2. Inspection information							
	5. Maintenance	1. Building element							
		2. Maintenance Information							
	6. Climate data	1- Weather data							

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L0	L1	L2	Holder name	Type of holder	Store location	Actor	Role			

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	1. Energy consumption	1. Energy source								
		2. Metering system information								
	2. Energy generation	1. Renewable energy system								
		2. Metering system information								
	3. Energy Suppliers	1. Energy source								
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L0	L1	L2	L3	L4	L5	Ln	Code	Value	Unit

E -SMART INFORMATION

Description: Smart information related to the building

E -SMART INFORMATION	1. Smart indicator	1. SRi – Smart readiness indicator								
		2. Other smart indicators								
	2. E-mobility	1. EV Charging points								
	3. Smart district	1. Smart district indicators								

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L0	L1	L2	Holder name	Type of holder	Store location	Actor	Role			

E -SMART INFORMATION

Description: Smart information related to the building

E -SMART INFORMATION											
	1. Smart indicator	1. SRI – Smart readiness indicator									
		2. Other smart indicators									
	2. E-mobility	1. EV Charging points									
	3. Smart district	1. Smart district indicators									

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