



**Building Performance Digitalisation  
and Dynamic Logbooks  
for Future Value-Driven Services**

**Deliverable 4.1**  
**CHRONICLE Dynamic**  
**Building Logbook**



**Funded by  
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## Executive Summary

CHRONICLE is an EU-funded research and innovation project developing building performance digitalisation and dynamic logbooks for future value-driven services.

The document presents the logbook prototype elaborated in the CHRONICLE Dynamic Building Logbook (DBL) task (T4.1). The objective of this deliverable is to provide a summary of the elements that establish the origin of DBL, the requirements and architecture. Additionally, the functionality is presented visually so that this document can serve as a complementary material for an eventual demonstration or presentation. The information about the functionality is supported by a discussion section where we have detailed some of the challenges and issues that we have encountered during the research, design and development process.

To illustrate and make clear the work of T4.1, a prototype demonstrator has been developed. This prototype, which represents a trusted and scalable DBL, has been presented live to project partners on multiple occasions and will be used at corresponding project validation activities. Certain functionalities and screens are also demonstrated and explained in this document.

Regarding the challenges and conclusions, it is essential to note that despite the existence of literature concerning what a DBL should do and include, there is no clear consensus on this issue. This leads to overlap between different tools within the construction sector, and requirements vary depending on the country, region, or user role.

This makes it essential to have clear and scalable designs, with a focus on Open BIM and trusted archiving. This has been our approach when designing and developing the CHRONICLE Dynamic Building Logbook.

# Contents

1. Introduction.....	8
2. Context.....	10
2.1. Digital Building Logbooks.....	10
2.2. Dynamic Building Logbook vs Digital Building Logbook.....	11
3. Technical Specification.....	12
3.1. Starting point and TRL.....	12
3.2. Use Cases.....	12
3.2.1. UC 5.1 Documental archive for building maintenance and renovation.....	13
3.2.2. UC 5.2 Registration of data into the DBL.....	13
3.3. Initial List of Requirements.....	13
3.4. Data Sets.....	14
3.5. Architecture.....	15
3.6. Technologies and software stack.....	16
3.7. Interoperability, integration and interfaces.....	17
4. Demonstration.....	19
5. Discussion and Challenges.....	25
6. Conclusion.....	27
7. References.....	28

## Figures

Figure 1: Original Definition of the DBL	10
Figure 2: DBL Architecture	16
Figure 3: DBL login screen	19
Figure 4: Asset portfolio	20
Figure 5: Shortcuts to key information	20
Figure 6: DBL record	21
Figure 7: Creation of a new record	22
Figure 8: Attached file	22
Figure 9: List of records, and filtering	23
Figure 10: Traceability	23
Figure 11: Document visualization	24
Figure 12: Notification and alerts	24

## Tables

Table 1: Requirements Summary	14
Table 2: Data sets	15

## Table of Abbreviations

API	Application Programming Interface
BIM	Building Information Model
BRP	Building Renovation Passport
CDE	Common Data Environment
CSS	Cascading Style Sheets
DBL	Digital Building Logbook
EC	European Commission
EPC	Energy Performance Certificate
HTML	Hypertext Markup Language
IFC	Industry Foundation Classes
LC	Life Cycle
SRI	Smart Readiness Indicator
TRL	Technology Readiness Levels
UC	Use Case
UI	User Interface
WP	Work Package

# 1. Introduction

Digital Building Logbooks (DBL) are an emerging trend in the construction industry. Reinforcing digitalization in construction and buildings, Europe has mandated the future use of DBLs in the Energy Performance of Buildings Directive.

The European Commission has organized two tenders, one for defining these solutions [1] and another one for providing technical implementation guidance [2]. While these documents offer a solid starting point, there are still many aspects that need to be developed to adapt the DBL concept to various use cases.

Currently, the market offers several software solutions that address functionalities related to DBLs in different ways [3]. Some focus basically on data storage, while others are essentially Common Data Environments or even repurposed asset management solutions branded as DBLs [4]. The lack of consensus in terms of requirements and functionalities, as well as some overlap with other construction sector software tools, makes it essential to adopt a DBL approach that focuses on the core logbook functionality, such as traceability and archiving.

This deliverable describes the CHRONICLE Dynamic Building Logbook, a BIM (Building Information Model) based repository, whose purpose is to store the enhanced building information related to performance, renovation advice, housing quality and other building aspects. In summary, a dynamic, BIM based Digital Building Logbook.

This deliverable summarizes the steps taken in designing and developing the DBL (e.g., use cases, requirements, etc.). It also seeks to visually present some of the screens of the logbook to make it more understandable to readers who have not been able to participate in demonstrations or validation sessions.

The work package behind this document is the "*WP4: Applications for Energy and LC Performance assessment*". This work package is highly focused on developing applications that support the entire ecosystem of CHRONICLE. Therefore, the task associated with the DBL is fed by the activities carried out in WP2 (Holistic Building Performance Assessment Methodologies) and WP3 (Building Digital Twin Framework), specifically concerning the definition of use cases and the integration. The results of this task will be validated in the pilots (WP5) and evaluated as Key Exploitable Results in WP6 (Dissemination, Communication, Exploitation & Innovation).

Within the scope of work package 6, two scientific articles related to DBL have been published. The first one is [4], focusing on the DBL concept and analysing the state-of-the-art. The second article is [3], more geared towards discussing relevant information that may be stored in a building logbook.

The current deliverable is structured in the following Sections:

- **Section 2:** Provides the **context** around the building logbook and explains the links between the dynamic building logbooks and digital building logbooks.
- **Section 3:** Summarizes the **technical specification**, detailing the use cases and the requirements, together with the technical decisions

- **Section 4:** Is focused on the **demonstration** and presents screenshots and details about the DBL
- **Section 5:** Mentions some of the **challenges** we found when designing and developing the CHRONICLE DBL
- **Section 6:** Presents the **conclusions** and next steps.

## 2. Context

### 2.1. Digital Building Logbooks

Before diving into the dynamic and digital logbooks, it's interesting to begin with the original definition that EC requested in 2020 to a group of experts [1]. These experts concluded that a digital building logbook is what is outlined in Figure 1.

A digital building logbook is a common repository for all relevant building data. It facilitates transparency, trust, informed decision making and information sharing within the construction sector, among building owners and occupants, financial institutions and public authorities.

A digital building logbook is a dynamic tool that allows a variety of data, information and documents to be recorded, accessed, enriched and organised under specific categories. It represents a record of major events and changes over a building's lifecycle, such as change of ownership, tenure or use, maintenance, refurbishment and other interventions. As such, it can include administrative documents, plans, description of the land, the building and its surrounding, technical systems, traceability and characteristics of construction materials, performance data such as operational energy use, indoor environmental quality, smart building potential and lifecycle emissions, as well as links to building ratings and certificates. As a result, it also enables circularity in the built environment.

Some types of data stored in the logbook have a more static nature while others, such as data coming from smart meters and intelligent devices, are dynamic and need to be automatically and regularly updated. A digital building logbook is a safe instrument giving control to users of their data and the access of third parties, respecting the fundamental right to protection of personal data. Data may be stored within the logbook and/or hosted in a different location to which the logbook acts as a gateway.

#### Figure 1: Original Definition of the DBL

In this definition, certain key concepts can be observed, including storage, trust and the facilitation of decision-making processes. Furthermore, also which information a DBL could include is also mentioned: administrative documents, plans or even performance metrics are mentioned as potentially relevant content.

If we summarize this definition, we reach the reference definition considered for CHRONICLE.

A Digital Building Logbook (DBL) is a comprehensive digital repository that serves as a central hub for capturing, storing, and managing a wealth of data, documents, and information related to a building's entire lifecycle. This dynamic tool ensures that valuable insights and records, from construction to ongoing operations, are accessible, shareable, and easily comprehensible for stakeholders.

And we can reach the one-liner that defines R2I's strategy regarding DBLs and the concept of DBL in this document.

A Digital Building Logbook is a **trusted archive** of **relevant** building data.

Trusted because we believe that the information in the DBL must be integral and traceable. It should be known who, when and how it was stored, as well as any types of modification made on it.

Relevant, because we believe that the DBL should not store all available information, but rather only what is necessary for the user to have an overview of the building's evolution and to assist in its decision-making.

The importance of relevance lies in two key points:

- The DBL should facilitate access to information, rather than confuse the user with hundreds of disorganized documents.
- To differentiate itself from other solutions in the construction software ecosystem. There are already other tools available for daily work and collaboration among stakeholders, such as Common Data Environments. Additionally, there are also tools that provide real-time information about the building, such as digital twins. The relevance of the data can help in reducing the potential overlap.

Archive, because this is what the concept of logbook conveys. A logbook is about recording relevant activities in order to preserve them for further use. For this reason, the logbook is considered a destination of information, a book where a user or software records data.

## 2.2. Dynamic Building Logbook vs Digital Building Logbook

CHRONICLE focuses on dynamic logbooks, the EC concept is more about digital logbooks, in general, we do not see a significant differentiation. Primarily because when discussing Dynamic Logbooks it is understood that it is about digital information. And when discussing Digital Logbooks it is understood that it's not just a static snapshot of the building and there are elements that change over time.

Perhaps the concept could have been referred to as DDBL to cover both aspects, but we believe that with DBL both aspects are already covered and dynamic or digital can be used interchangeably depending on the emphasis we want to convey.

It is true that we often prioritize the term Digital Building Logbook because it is the one promoted by the European Commission and is also the most widely used in both industry and academia. However, as we just mentioned, dynamism is inherently implied. The idea that different software or even users themselves can archive information, allowing for versioning and traceability, already provides a certain level of dynamism to the data. Additionally, the interface with the Common Data Environment (CDE), which is by definition dynamic and collaborative, further enhances the dynamic capabilities of the DBL.

In general, these two concepts are not seen as opposed, nor are they very distinct from one another in most contexts. In the case of CHRONICLE both can be considered equivalent.

## 3. Technical Specification

In the context CHRONICLE a Dynamic Building Logbook is a cloud solution for the archiving, organization and traceability (thanks to blockchain) of documents and other relevant information about the life of a building.

This information can be received from the user or from software (e.g. CDE) and serves as a valuable resource for building owners and stakeholders to observe the evolution of the building based on trusted information.

In this section we present the summarised technical specification for developing an efficient DBL system to optimize data management and support stakeholders throughout the building's lifecycle.

### 3.1. Starting point and TRL

The journey from the starting TRL 2-3 of the DBL concept to its final state at TRL 6 has been marked by continuous growth and refinement. Our starting point was defined by the initial discussions and conceptualization of the DBL idea. At this stage, the DBL was a theoretical concept aimed at addressing the fragmentation of building-related data and the necessity for a unified digital repository that could serve a multitude of stakeholders, from building owners to facility managers. These early discussions outlined the fundamental goals and features expected of the DBL.

As discussions evolved and the DBL concept became more refined, it progressed along the TRL scale. The advancements have been supported by extensive research, technical developments, and a commitment to fulfilling the original vision. The advance towards TRL 6 is indicative of the significant efforts made in converting the theoretical concept into a practical and effective tool. This advancement also involves the publication of a survey on the DBL concept [3], the development of a DBL architecture and its key components, the discussions on the relevance of the data [4], the integration of robust security measures, and extensive testing to ensure the reliability and scalability of the DBL.

### 3.2. Use Cases

In this section, we summarize the use cases related to the DBL. These use cases were defined in initial phases of the project and established the basis for requirements, therefore guiding the development of the solution. These cases will also be validated in final phases of the project.

The complete information about these cases together with the corresponding sequence and semantic diagrams are included in the Deliverable D2.1 *CHRONICLE Business requirements, Use cases & System architecture*, which is also a public deliverable.

### 3.2.1. UC 5.1 Documental archive for building maintenance and renovation

This use case focuses on the usage of the Digital Building Logbook by the building owner. The DBL provides a secure and trusted archive to the building owner for relevant data (e.g.: .ifc files). The user is able to access documents and data related to the present and past situation of the building. The information accessed through the DBL is stored so they can be retrieved in the future. The goal of the use case is to allow the user to have access to easy to understand, accessible, trusted, unaltered and reliable information about the building's state history.

### 3.2.2. UC 5.2 Registration of data into the DBL

This use case is split into 2 cases, depending on who uploads the data to the DBL.

- a) The **building owner** wants to upload the property deed in order to store it in a secure and trusted documental archive for future reference. The building owner logs into the DBL. Through the UI it is possible to add or manage metadata (i.e.: comments, author, date, type, description) about the file and to upload the document. The DBL stores integrity and authenticity information about the uploaded data in the blockchain. The document is stored in the DBL.
- b) A **software component** wants to store the building's dynamic EPC in the DBL storage. The DBL and the CDE exchange the needed data (i.e.: EPC in .pdf or .json format) making use of the interoperability capabilities of the CDE and DBL. The DBL stores integrity and authenticity information about the data in the blockchain. The data is archived in the DBL.

## 3.3. Initial List of Requirements

Based on these use cases and the initial discussions on functionality and alignment with the project objectives, it was decided to create a list of key requirements. These requirements were defined at a high level to establish a clear objective and a general implementation roadmap. The following table summarizes these requirements:

ID	Requirement	Priority
1	Document search functionality	High
2	Document upload functionality	High
3	Document download functionality	High
4	Document version control	Moderate
5	Document metadata management	Moderate
6	Advanced search options	Low

7	Search result sorting and filtering	Moderate
8	Access control	High
9	Encrypted traffic	Moderate
10	File Storage	High
11	API's for data upload	High
12	System performance	High
13	Timeline View for Building Data	Moderate
14	Intuitive and User-Friendly Interface	High
15	Alert and Notification	Low
16	Integration with Blockchain	High

**Table 1: Requirements Summary**

### 3.4. Data Sets

Similarly, examples of what information could be classified as relevant in a project like CHRONICLE were also discussed, considering the building owner as the target user. The position of the DBL within the ecosystem and its interoperability were also considered, leading to the definition of some data sets originated in other project tools. The next table (Table 2: Data sets) shows the list of data sets.

Data sets	Data flow	When to upload the data
BRP	This data comes from the other tools developed within CHRONICLE. Data will be stored in the CDE. The CDE will transfer the data to the DBL through Oracle and Blockchain.	Once final version is available or in case of updates
Renovation scenario		Once final version is available or in case of updates
Carbon bill		Once final version is available or in case of updates
Post renovation analysis		Once final version is available or in case of updates
EPC (incl. SRI)		Once a month
Historic data (e.g: property deed)	Data that can be uploaded by the end user	When the user wants

Files metadata (e.g: comments, author, date, type, description)	Information added in the DBL by the end user or automatically generated by the DBL	n/a
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**Table 2: Data sets**

### 3.5. Architecture

The generic DBL architecture (Figure 2) used in the CHRONICLE concept, comprises three key elements: the core DBL, data input, and data output. This separation serves three main purposes:

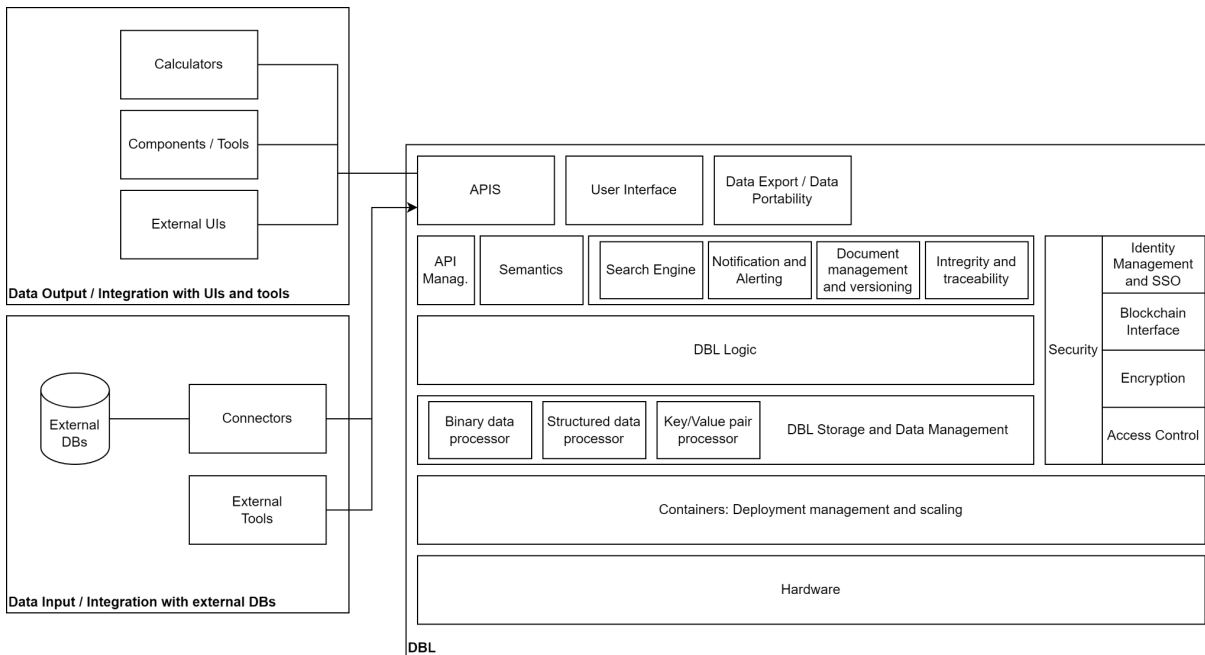
- **Scalability and Adaptability:** The architecture provides a reference framework adaptable to various DBL implementations, allowing a focus on core DBL elements rather than associated components.
- **Data Integration:** Instead of attempting to implement interoperability with multiple databases, a conservative approach allows new databases to be added, ensuring scalability and adaptability as future data needs arise.
- **Third-Party Compatibility:** The DBL primarily focuses on providing a way for other tools to use its data for assessments and simulations.

The main part of the architecture is the core DBL that is formed of the following sub-blocks:

- **Hardware:** The core DBL relies on cloud-based servers to ensure flexibility and scalability in data management.
- **Containers, Deployment, and Scaling:** These elements make it easier to configure and adjust the system, suiting both smaller, specialized DBLs and larger, multi-user platforms.
- **Storage and Data Management:** This layer oversees how data is stored and processed. It's segmented into various data types, providing versatility in handling different information.
- **DBL Logic:** Serving as the central brain, the DBL Logic manages communications between different components and offers a wide range of functions to make the DBL work efficiently.
- **Functionality Layer:** Offering a suite of features, this layer includes tools for searching, notification, document management, data integrity, traceability, semantics, and API management, enhancing the DBL's capabilities.
- **Views and Interfaces:** This segment focuses on user interaction. It encompasses APIs, user interfaces, and data export functions, enabling users to effectively engage with the DBL.
- **Security:** This layer plays a pivotal role in ensuring data security and control. It handles identity management, interfaces with blockchain technology, encryption, and access control, safeguarding data integrity and user privacy.

In summary, this architecture is designed to be flexible and adaptable. It provides a basis for scalable and maintainable DBL solutions that can fit diverse needs and changing

technologies. By focusing on the essential functions and enabling interaction with external tools, it remains relevant in the ever-evolving field of building data management.



**Figure 2: DBL Architecture**

### 3.6. Technologies and software stack

The main framework used for the development of the DBL is the **Frappe framework**. The Frappe framework is a versatile and robust open-source platform designed to empower developers to build scalable and user-friendly web applications. Its core functionalities align well with the requirements of the DBL architecture presented in this deliverable. Indeed, with Frappe we can implement a user-friendly interface that simplifies data interaction, making it ideal for constructing a DBL, and, we can create a visually appealing and easy-to-navigate DBL platform.

One of Frappe's main features is its robust document management capability. This functionality allows for effortless document upload, storage, categorization, and version control. It's perfect for managing various building-related documents, ensuring data integrity and traceability.

Frappe's architecture is built for interoperability, supporting seamless integration with external systems and databases through **RESTful APIs**. This feature enables the DBL to interact with third-party tools and services, making it a versatile and interconnected system.

Scalability is another advantage of Frappe. As a cloud-native framework, it adapts effortlessly to the DBL's needs, whether it starts as a limited user system or expands to a countrywide scale. With features like containerization and orchestration support, Frappe ensures high availability and efficient resource management as the DBL grows.

In essence, the Frappe framework offers a solid foundation for creating an efficient and user-friendly DBL system. Its intuitive interface, document management capabilities, interoperability, and scalability make it a valuable tool in the development and deployment of a versatile DBL.

Inside and along the Frappe framework we used other technologies to implement different parts of the DBL.

In the backend we used the **Python** programming language to develop most of the DBL logic. The database utilized is **MariaDB**, an open-source relational database management system that is known for its speed, reliability, and robust feature set. It's designed as a drop-in replacement for MySQL and offers strong data security and scalability.

The user interface is implemented with **HTML 5** and **CSS**. No specific front-end framework is used but the versatility of the Frappe doctype representation together with some specific JavaScript Libraries (e.g: Chart.js or Frappe Charts) allows us to cover the UI needs.

All the presented technological stack is being developed in a **Linux** environment, using **NGINX** as webserver and load balancer. This together with the **Redis 6** backend for caching and **Socket.io** for low latency communication provides us a reliable infrastructure to deal with the requirements of the DBL.

It is also worthwhile to note the ongoing works on integrating the Frappe Backend with **Node.JS** opening the capabilities of having a JavaScript runtime and processing in the server if needed. The objective is to rely on the python backend the maximum possible but this Node.JS support can be useful for future developments of the DBL.

### 3.7. Interoperability, integration and interfaces

The DBL is designed to be more than just a standalone system; it's a crucial component in a broader ecosystem of building data management. To achieve this, seamless interoperability and integration with other CHRONICLE components are key. The primary components that play a central role in this integration include the CDE and the Blockchain.

At the core of this interoperability strategy is the DBL's role as a data "*sink*." It functions as the central repository for all valuable information generated by various CHRONICLE components. To enable this, a crucial interface exists between the CDE and the DBL. The CDE, in its role as a comprehensive data management system, interfaces with the DBL through a set of well-defined APIs. This interaction ensures that all data generated in the CDE that is considered valuable can be efficiently transferred to the DBL, where it can be further enriched and utilized.

In the following we present a list of functionalities that can be supported by the DBL APIs system:

- **Document Upload API:** This API allows for the secure and straightforward uploading of documents, which is essential for the smooth flow of building-related data between other components and the DBL.

- **Update API:** The Update API enables the modification and updating of existing documents. This is crucial for keeping building information accurate and up-to-date as changes occur.
- **Login API:** The Login API is integral for secure authentication and access control. It ensures that only authorized users can interact with the data and contribute to the DBL.
- **Search API:** This API facilitates the retrieval of specific information from other components and can assist in efficiently identifying relevant data to transfer to the DBL.
- **Access Control and Permissions API:** This API is vital for managing user roles and permissions, ensuring that the right users have access to specific data, a critical aspect of maintaining data security and integrity.
- **Data Export and Portability API:** For situations where data needs to be extracted or migrated from other components to the DBL or vice versa, Data Export and Portability APIs are essential for enabling these operations.

The link with the Blockchain plays a key role in the DBL. The Blockchain is especially crucial in maintaining data integrity and trust, ensuring that any data entering the DBL is accurate and tamper-proof.

This integrated approach transforms the DBL into a comprehensive repository for valuable building-related information. It acts as a focal point for data produced by various CHRONICLE components, such as the Renovation Planner and others, enabling a holistic view of building data and enhancing the efficiency and reliability of building management processes. Through robust integration and meticulous interfacing, the DBL is positioned as the key element in the digital management of building information within the CHRONICLE ecosystem.

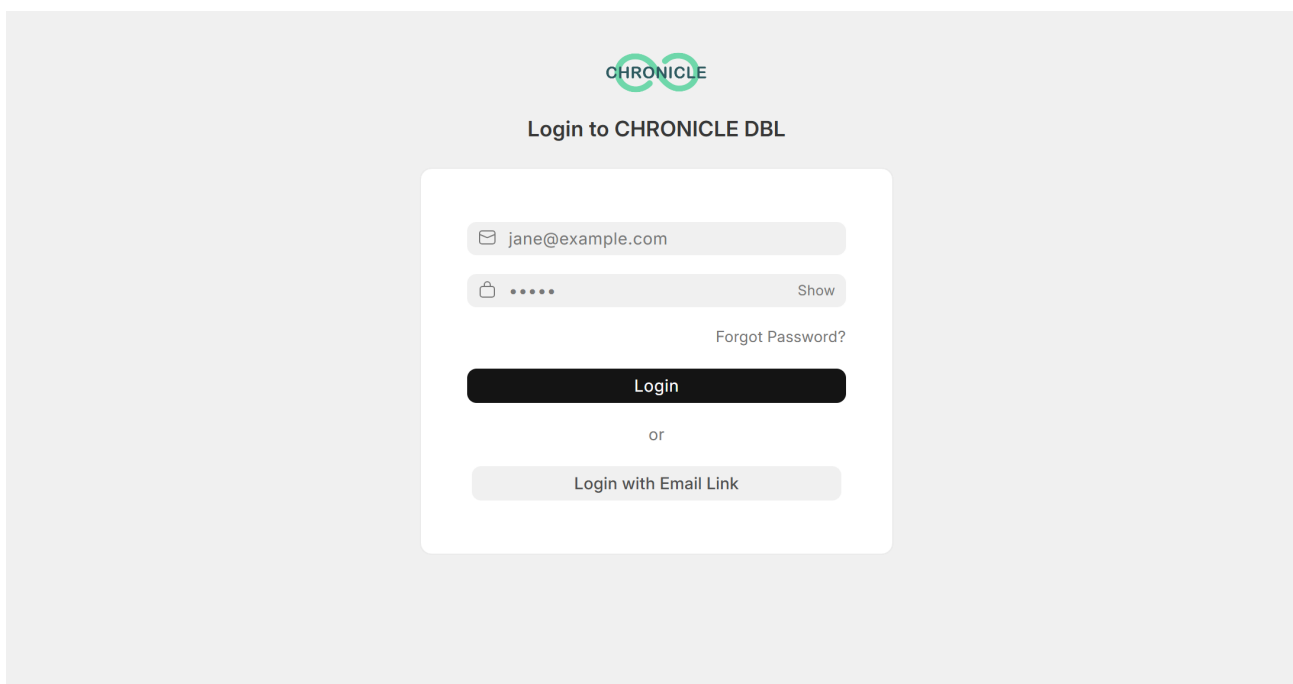
## 4. Demonstration

As this deliverable is a practical document, the following section aims to visually showcase the completed work. The DBL is a cloud-based system with a user interface and APIs that allow other solutions to register or retrieve information. The user interface is accessible through any standard web browser. The DBL has been designed to be multi-platform compatible, meaning the DBL can be used on any browser, including those on mobile devices.

The section includes a series of screenshots illustrating how a user would interact with the DBL through a web browser. Each screenshot is accompanied by a brief description explaining its functionality.

Figure 3 shows the landing and DBL access screen, with its corresponding login. The DBL supports access through username and password, and by a registration link sent to a user's registered email account. As is usual in these screens, the user can recover their password if necessary.

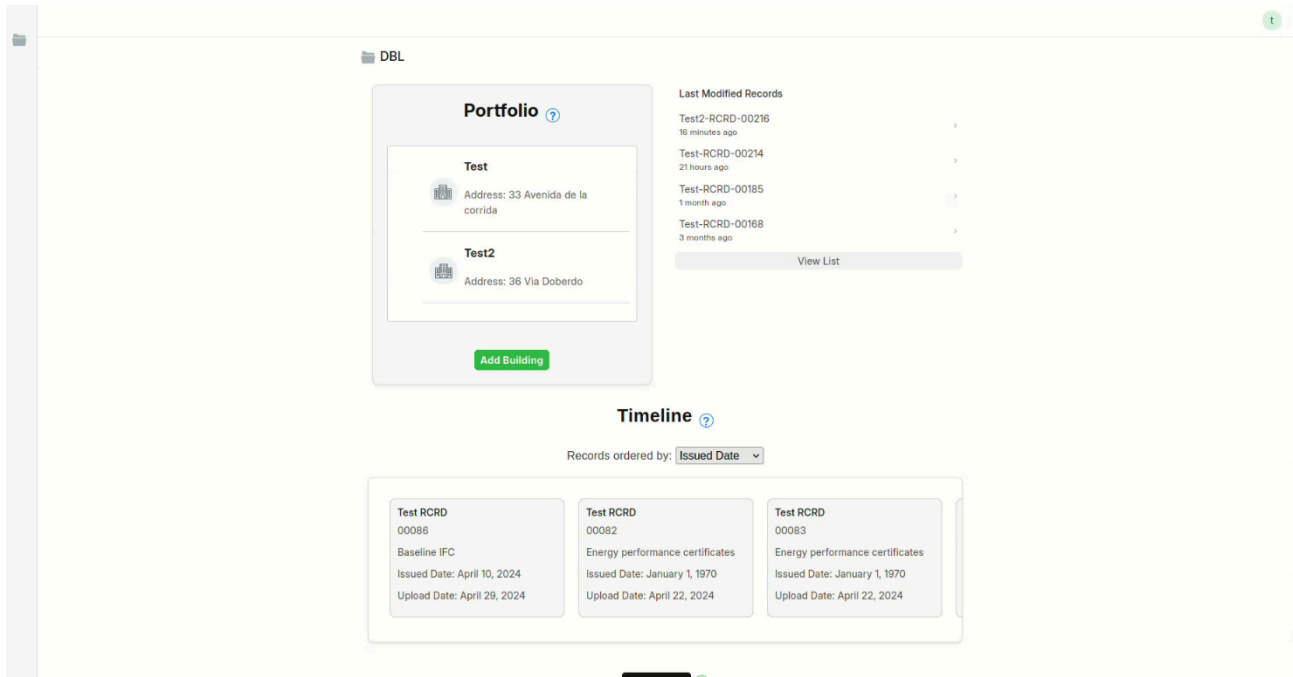
The registration functionality and interface is currently disabled to better manage the users at validation level. The administrator of the platform is responsible for registering users and configuring their permissions.



**Figure 3: DBL login screen**

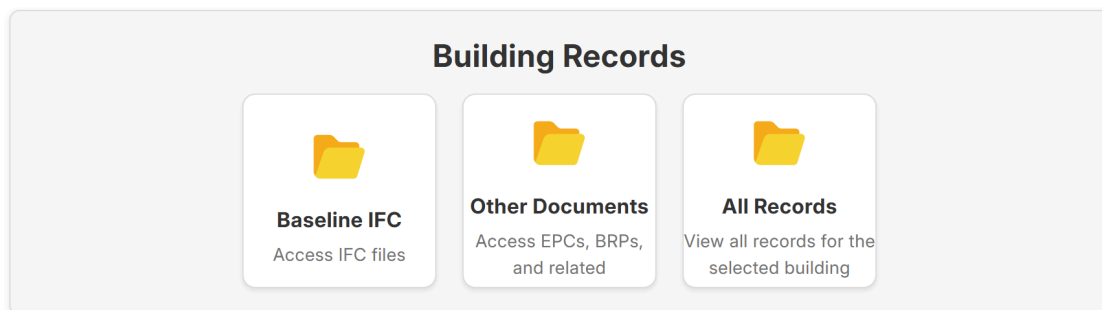
The following screen (Figure 4) displays what we can refer to as the portfolio or the list of assets. It also shows a summary of the most recently modified records.

At the bottom, configurable timelines allow users to organize information based on their needs. On this screen, the user can add items to the portfolio or access any asset to add associated records.



**Figure 4: Asset portfolio**

On some screens, primarily those related to adding records, shortcuts are available, as shown in Figure 5. These shortcuts provide quick access to Open BIM models (in IFC format), to the other documents listed in Table 2: Data sets (E.g: EPC files), and the complete list of records for a specific building.



**Figure 5: Shortcuts to key information**

To explain the information registration and logbook screen, an example is shown in Figure 6. It is important to note that an effort has been made to standardize the data entry process, ensuring a consistent format whether registering a building or any related documentation.

In the top left corner, the record's location within the DBL is displayed. On the top right side, the user receives the notifications, can access the help menu and can manage the user profile.

The central section contains the fields that the user needs to fill out. The left panel is used to associate binary files (e.g., PDFs) or structured formats (e.g., Industry Foundation Classes). Users can also mark documents as important or follow them to receive activity

notifications. Additionally, tags can be added, which can later be used to filter records. Finally, users can add comments, which will be recorded as part of the record.


DBL > Record > RCRD-00020-Herning Social Housing-009



### RCRD-00020-Herning Social Housing-009

Assigned To

+

Attachments

Attach File + 

 UT\_Tin\_1.ifc 

Shared With

+

Tags

Add a tag ...

0 · 0 FOLLOW

Administrator last edited this · 4 days ago

Administrator created this · 3 weeks ago

Type \*

Baseline IFC

Building

Herning Social Housing-009

Date

15/08/2023

File


/private/files/UT\_Tin\_1.ifc

Has access

eng@eng.com, herning@gmail.com, herning@gmail.com

**Add a comment**

Ctrl+Enter to add comment

 New Email

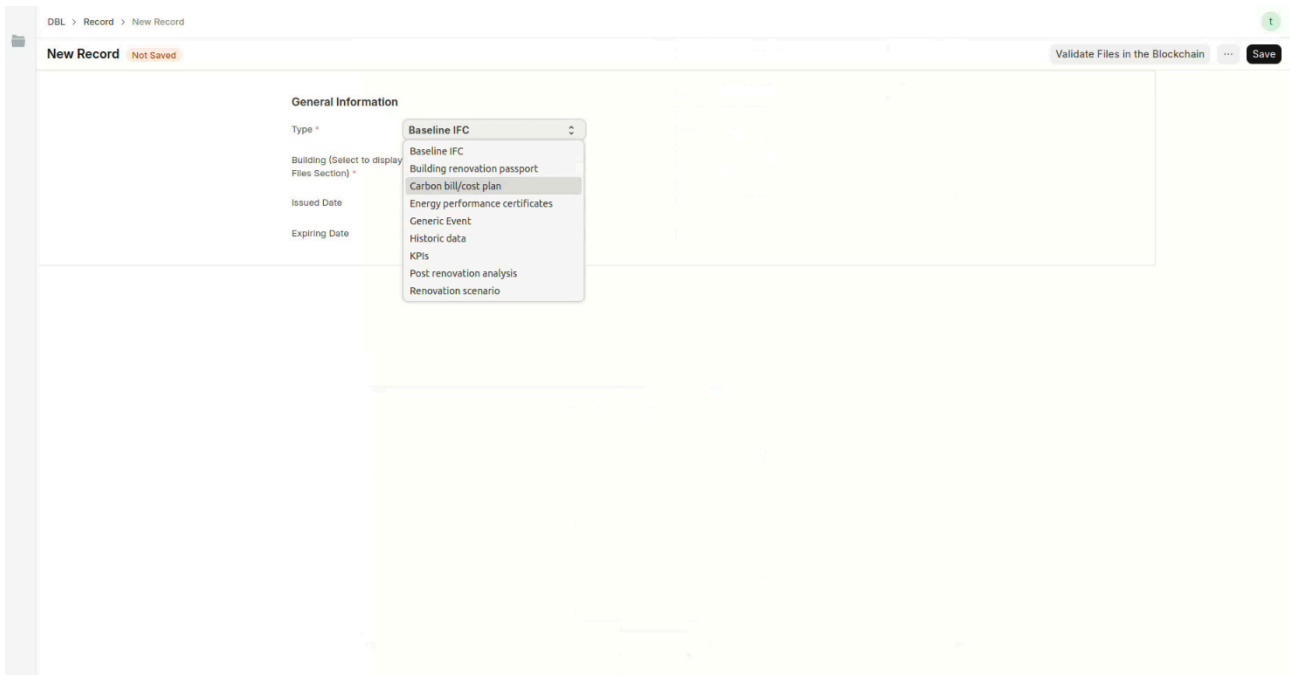
You viewed this · just now

You viewed this · 4 days ago

**Figure 6: DBL record**

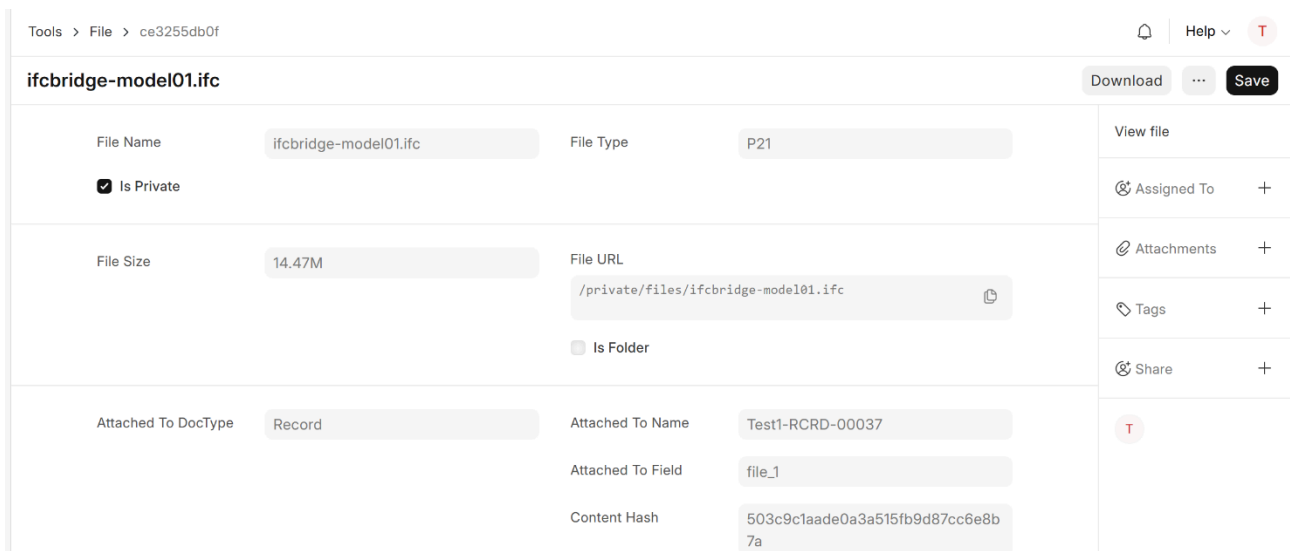
If the user wants to create a specific record, they will see a screen like the one presented in Figure 7. Here, the user can choose the type of information they want to register. The available options include IFCs, various types of certificates and passports, as well as historical data or generic events.

When a record is created with an associated file, integrity information can be stored in a distributed ledger. This way, blockchain technology can be later leveraged to verify that the file has not been modified and to confirm the document's upload date and owner.



**Figure 7: Creation of a new record**

The following screen (Figure 8) displays a specific record, specifically an IFC file. In addition to showing metadata about the file, integrity information and the associated record, this screen allows users to download or export the document. This screen (on the right side) also includes functionality for tagging or adding complementary information,



**Figure 8: Attached file**

The tagging subsystem has been mentioned in several of the previous screens. These tags can be used to filter information by file types, owners and upload dates, among other properties (Figure 9). The filters are located in the central part of the screen and dynamically update the displayed records. Additionally, a tag search function is available in the bottom right corner.

The screenshot shows the 'Record' page in Building Workspace. The main content is a table of records with columns for ID, Type, Uploaded By, Upload Date, and a status indicator. A sidebar on the right allows filtering by 'Assigned To', 'Created By', and 'Tags'. A search dropdown for tags is open, showing a list of tags and their counts.

ID	Type	Uploaded By	Upload Date	Status
Test1-RCRD-00010	Energy performan...	test1@test.com	19/03/2024	9 M 0 0
Test1-RCRD-00011	Building renovatio...	test1@test.com	19/03/2024	9 M 0 0
Test1-RCRD-00012	Renovation scena...	test1@test.com	19/03/2024	9 M 0 0
Test1-RCRD-00015	Post renovation a...	test1@test.com	19/03/2024	9 M 0 0
Test1-RCRD-00030	Energy performan...	Administrator	22/04/2024	9 M 0 0
Test1-RCRD-00031	Energy performan...	Administrator	23/04/2024	9 M 0 0

Filter By sidebar:

- Assigned To
- Created By
- Edit Filters
- Tags
  - EPC: 1
  - maintenance plan: 2
  - renovation scenario 1: 2
  - renovation scenario 2: 2
  - Renovation scenarios: 2
  - No Tags: 11

**Figure 9: List of records, and filtering**

The importance of traceability in archived information has also been mentioned in this document. As shown in Figure 10, each record has its own timeline that includes all traceability details, such as creation, viewing, editing, and modifications.

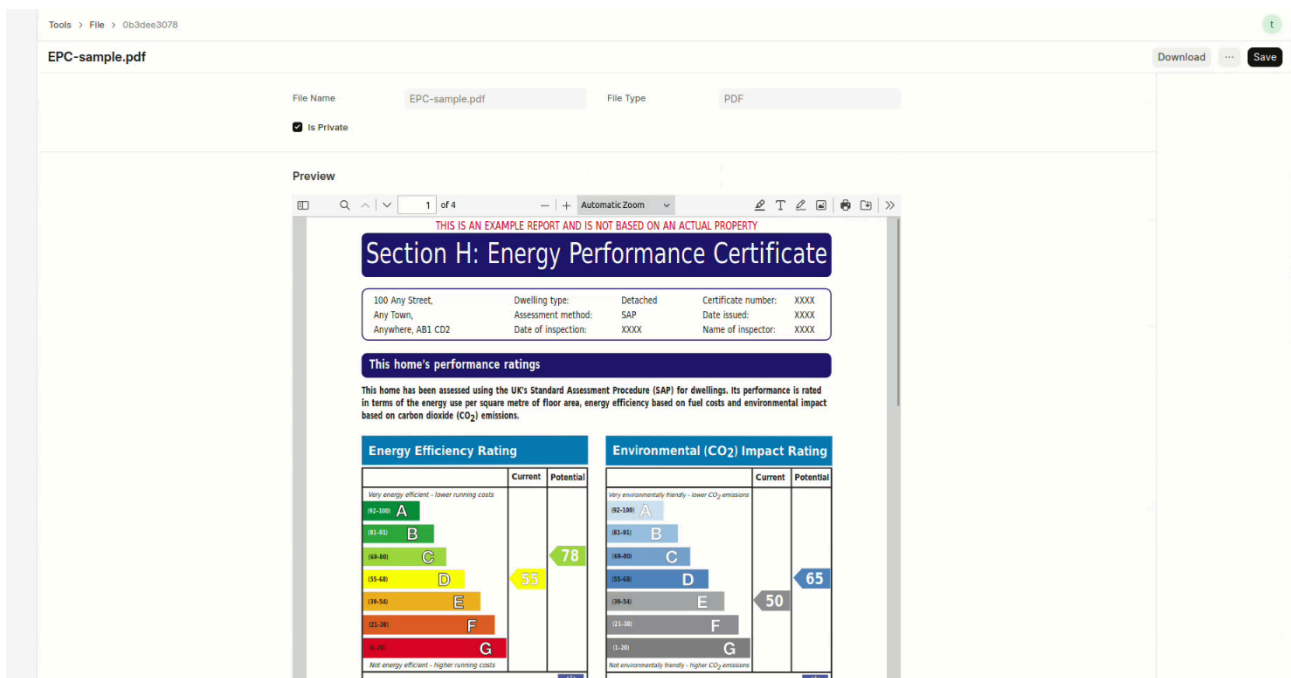
The screenshot shows the 'Activity' page for record Test1-RCRD-00059. The page displays a list of activities with timestamps and user names. A '+ New Email' button is visible at the top right of the activity list.

Activity Timeline:

- You viewed this - just now
- You viewed this - 4 weeks ago
- Administrator viewed this - 4 weeks ago
- Administrator viewed this - 4 weeks ago
- Administrator viewed this - 4 weeks ago
- Administrator viewed this - 4 weeks ago
- Administrator viewed this - 2 months ago
- Administrator viewed this - 2 months ago
- Administrator viewed this - 2 months ago
- Administrator viewed this - 2 months ago
- Administrator last edited this - 2 months ago

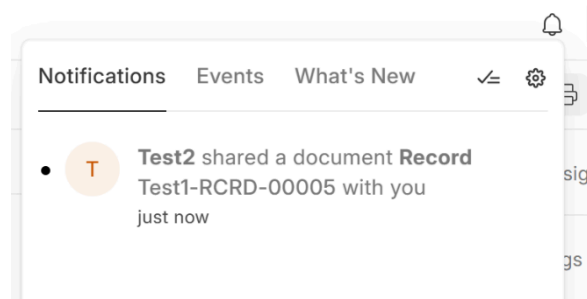
**Figure 10: Traceability**

The DBL includes a built-in viewer, primarily for unstructured data. Viewing files in PDF format is the most common use. Figure 11 shows an embedded view of an Energy Performance Certificate.



**Figure 11: Document visualization**

Finally, we showcase the alert and notification system, as it was one of the requirements discussed at the beginning of the project. This notification system allows users to receive alerts from system administrators, as well as notifications about shared files (Figure 12) and updates in files they have marked as favorites.



**Figure 12: Notification and alerts**

## 5. Discussion and Challenges

We have defined CHRONICLE's DBL as a "*trusted archive of relevant building data*". These terms detail the core ideas behind the DBL but also highlight the challenges involved.

One of the main challenges, as mentioned before, is determining which data is important. This mostly depends on the target users, their expectations and the requirements in different regions or countries. During our research for defining CHRONICLE's DBL concept, we observed cases where traditional file storage solutions were considered DBLs or where organizations kept records of public buildings using nothing more than a spreadsheet.

Reporting data from regional and national levels to the EU Building Observatory Database is being considered. The specific data to be reported is still under discussion, but this will influence the future direction of the DBL in terms of data and integration.

The DBL we designed supports various data types and formats to ensure adaptability. However, creating a solution that is fully adaptable and suitable for all use cases adds complexity in both development and maintenance. It can also be confusing for users, especially those expecting a structured data archive and instead encountering an overwhelming suite with dispersed information.

Beyond defining what data needs to be stored, it is also key to determine where it resides. In some cases, a DBL will be internal to an organization, where solutions like CHRONICLE can integrate seamlessly. In other cases, DBLs will be provided as a cloud-based service, which is the most common approach in similar solutions. However, a DBL, by definition, must last throughout a building's entire lifecycle, potentially hundreds of years. Neither CHRONICLE's DBL nor any current solution can realistically ensure such long-term maintenance. That is why it is critical to guarantee interoperability, use open formats and enable data export so that information can be integrated into future applications. Concepts like federated DBLs, where there is no centralized platform, could help extend the lifespan of DBLs and improve interoperability.

Another key challenge is overlap with existing solutions in the construction ecosystem. We often ask ourselves: Do we really need a dedicated DBL? Could an asset manager or construction management software simply be adapted to serve as a DBL? In many cases, adding traceability and logging features to existing tools might be enough. Similarly, the boundary between a Common Data Environment and a DBL is not always clear. In CHRONICLE, for example, the IFC file viewer is an external component, but there are cases where integrating it directly into the DBL would make sense. At the same time, offering users multiple IFC viewers could cause confusion.

Finally, one of the most complex challenges relates to the scale. During our research, we explored concepts like district level logbooks. In some cases, the "B" in DBL could go beyond a single building to aggregate multiple buildings.

This raises new challenges in user roles, permissions and data exchange. For example, if a building owner needs to share partial information with another building in the same

district, user management and access control become critical topics. In CHRONICLE, we have worked on defining roles, permissions, and data-sharing mechanisms, but as DBLs expand in scope, security and privacy challenges will continue to grow, and need to be addressed.

## 6. Conclusion

In the construction industry, there is a growing need for systems that record and archive relevant information throughout a building's lifecycle. This, combined with the policies and initiatives promoted by the European Commission (EC) to support Digital Building Logbooks, makes the concept of dynamic information records essential for any construction tool ecosystem.

It is true that there is still no absolute consensus on what Digital Building Logbooks should include or how they should work. While there are official definitions, there might be an overlap between some functionalities of DBLs and other tools used in the industry. Additionally, there is no clear agreement on what information is relevant. As a result, storing data in logbooks may hinder future retrieval and use.

In this deliverable, we have introduced the concept of CHRONICLE's Digital Building Logbook, a digital and dynamic DBL focused on trustworthiness and archiving. To achieve this, we have presented the context and detailed our vision of logbooks for the construction industry. Then we outlined the use cases that will be validated within the project, along with the requirements and technical information. Additionally, we aimed to provide the reader with visual details by showing key screens of the DBL developed in CHRONICLE and explaining its elements and functionalities.

DBLs have a place within the ecosystem of construction tools, particularly those DBLs based on BIM and focused on the archiving of relevant information. After this deliverable, the next step involves final integration and testing with other components and the validation of use cases, which will take place in the final phases of the project.

## 7. References

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