European Commission

DBL

DIGITAL BUILDING LOGBOOK

Meeting report

Announcement Webinar Digital Building Logbook Study

15 June, Virtual meeting

DG GROW

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List of acronyms and definitions

Term	Definition
API	Application Programming Interface. It is software that allows programmers of other software to use it without needing to know the internal details
CEN	European Committee for Standardization.
CityGML standards	A standard to store and exchange 3D city models with semantics in the GIS domain. Source: Open Geospatial Consortium.
Digital twin	Digital twins are meant to bridge the gap between real-world physical systems and virtual representations. Both stand-alone and descriptive digital twins incorporate 3D geometric models, which are the physical representations of objects in the digital replica.
DBL	Digital building logbook, "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." Source: Study on the development of a European Union framework for digital building logbooks.
GIS	Geographic Information System.
GML	Geography Markup Language – "GML is an XML grammar for expressing geographical features." Source: https://www.ogc.org/standards/gml.
IFC	Industry Foundation classes – "IFC is a standardized, digital description of the built asset industry." Source: buildingSMART International.
JSON	JavaScript Object Notation – "JSON is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate." Source: https://www.json.org/json-en.html.
Master data or reference data	The actual data facts in a database typically in the context of a specific organisation.
Ontology	A semantic data model in the W3C linked data/semantic web context. It defines the concepts, attributes and relationships used in the actual (maser/reference) data. Source: https://www.w3.org/standards/semanticweb/ontology.
OGC	Open Geospatial Consortium.
OWL	Web Ontology Language – "The W3C Web Ontology Language (OWL) is a Semantic Web language designed to represent rich and complex knowledge about things, groups of things, and relations between things." Source: https://www.w3.org/OWL/.

QL	Query language. “Any computer programming language that requests and retrieves data from database and information systems by sending queries. It works on user entered structured and formal programming command based queries to find and extract data from host databases.” Source: Techopedia
RDF	Resource Description Framework.
Semantic data models	Semantic data models or information models are data specifications that define meaning for an information set. In linked data technology such a model is called an ontology
SKOS	Simple Knowledge Organisation System
SML	Semantic Modelling and Linking standard
SPARQL	SPARQL Protocol and RDF Query Language
STEP-technology	The technology behind the ISO 10303 - Standard for the Exchange of Product model data (STEP) standard (like EXPRESS and STEP Physical File Format – SPFF)
TC442	CEN Technical Committee on BIM
Turtle	Terse RDF Triple Language - A Turtle document allows writing down an RDF graph in a compact textual form.
UOI	Unique Object Identifiers, which is an identifier that is guaranteed to be unique among all identifiers used for those objects and for a specific purpose.
URI	Uniform Resource Identifier, which is a unique sequence of characters that identifies a logical or physical resource used by web technologies
UUID	Universally unique resource identifier
W3C	World Wide Web Consortium: an international community that develops open standards to ensure the long-term growth of the Web.

Opening of the session

Mr Andreas Pauer, Principal consultant, Ecorys, opened the session by extending the welcome of the project team to the audience. Mr Pauer was pleased to see a large interest in the subject of digital building logbooks (DBLs) and that many stakeholders have responded to the call to join an expert community to support the development of technical guidelines to deploy DBLs in the EU Member States. Mr Pauer highlighted the fact that stakeholder engagement is essential to make this study a success. He further emphasised that it is possible to ask questions when topics are unclear as well as to provide comments and suggestions for the study team's work. Mr Pauer then introduced the agenda of the webinar and explained the objectives of the meeting.

Opening remarks by the European Commission

Ms Fulvia Raffaelli, Head of Unit, DG GROW H.1, European Commission, thanked Mr Pauer for his words and explained the importance of DBLs, as they offer tremendous opportunities for the digitalisation of the construction industry. Ms Raffaelli added that there has been an increase in data availability and data that is being stored. It is therefore important to collect this data systematically, to use it for efficient and effective decision making. DBLs can help increase competitiveness, circularity, energy efficiency and safer buildings by facilitating informed decision-making across the entire life of a building including its renovation, maintenance and demolition.

Ms Raffaelli also explained that this study builds on previous work on defining DBLs and mapping existing European DBL initiatives[1] and the different Horizon projects that experiment and push limits in research, development and demonstration of DBLs. The **goal of the present study is to build up on all this experience and to propose a European model for DBLs**. This model will build on good practices and help the EU Member States to set up national DBLs or improve their existing DBLs. In addition, the work that has been done on the environmental performance of buildings[2], on energy performance certificates and renovation passports will be considered. Ms Raffaelli also noted the strong attention shown by the European Parliament on the screening and registration of data about asbestos in buildings, which could offer an additional objective for the DBLs in the future.

The idea behind DBLs is to reward the ones that are producing good and reliable data, to allow transparent and robust use of data and enable a more efficient performance across the life cycle of buildings. Ms Raffaelli highlighted the importance of stakeholder engagement and encouraged stakeholders to participate in the rounds of consultations that will be done as part of the study.

Presentation on the overall approach and timeline

Mr Michael Flickenschild, Project Coordinator, Ecorys, introduced himself and welcomed everyone to the announcement webinar. Mr Flickenschild explained that he will be presenting the overall approach of the study and moderating the discussions. He further explained the layout of the session as well as the different polls and questions that will be asked to improve the engagement during the session. He then moved on to present the overall approach of the study.

Overall approach

Mr Flickenschild started by introducing the main aim of the project, which is **the development of an EU model for digital building logbooks**. In particular, the work should result in a new model for DBLs and deliver practical guidelines for public authorities so that they can implement these. This work will

[1] Study on the development of a European Union Framework for Digital Building Logbooks (2020).
[2] https://environment.ec.europa.eu/topics/circular-economy/levels_en.

not be done from scratch, as there has been other work done before as mentioned by Ms Raffaelli. For example, the work heavily relies on the preceding study which had defined DBLs as:

> *"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."*[3]

Mr Flickenschild further explained that it can be a quite daring activity to connect all the different actors in the fragmented construction sector. This connection should be along the value chain, but also connect along the lifecycle of a building. It can be beneficial to implement these DBLs at the national and connect them at the EU level, as it can **support the construction sector to address its fragmentation by supporting data sharing, data use and the organisation of data**. This will support the creation of a single EU digital construction market.

The aim itself is therefore not to develop such a framework for DBLs, but to provide technical guidelines on how to implement it as a means to strengthen the sector and also make it more circular and more sustainable. There have been many national initiatives. These initiatives can lead to further fragmentation, therefore there is a **need for a common EU framework** to allow these different DBLs to interact with each other and be interoperable. Furthermore, there is also the need to avoid the reinvention of the wheel and provide guidelines and ideas on a common baseline.

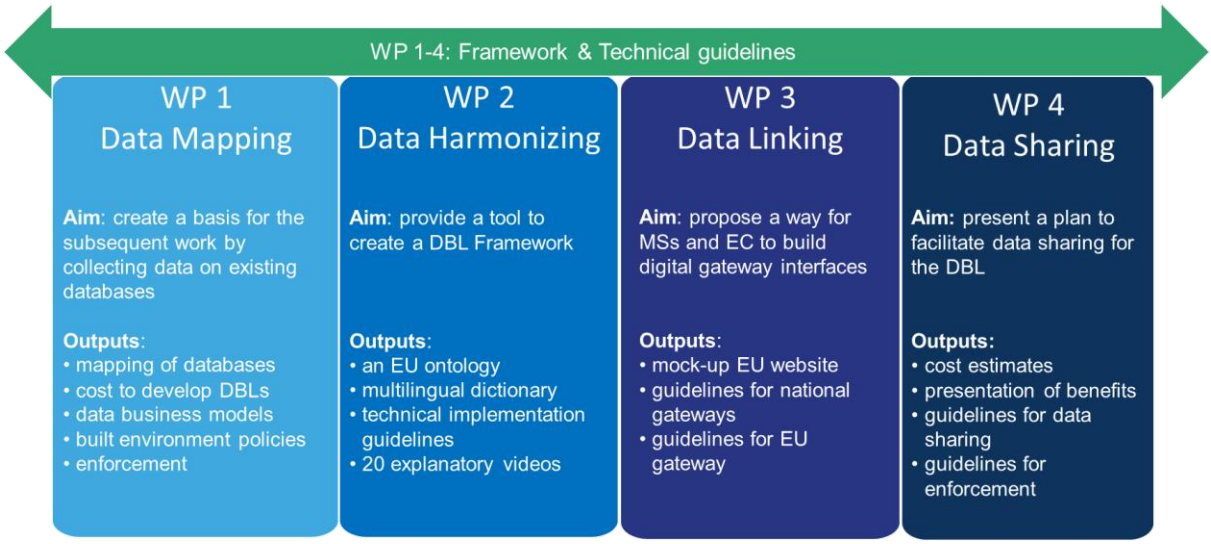
In terms of the operational aspect, it is important to allow the combination of data sources, regardless of the software and to allow these tools to interact with each other. Mr Flickenschild also highlighted that a DBL should not be a self-contained library but it should link to existing databases and connect them. He further explained that previous studies have determined different needs and barriers, which this study tries to address and overcome by involving stakeholders to **further define the scope of DBLs, clarify its legal framework as well as to provide guidelines on how to validate data, how to share data and provide a user-friendly guideline for implementation**. All in all, many issues need to be addressed. Mr Flickenschild noted that these goals will be reached by working towards five different key deliverables:

- An ontology for European DBLs, which includes a dictionary and a semantic data model to provide relevant information to set up these logbooks at the national level;
- Overview of existing databases at the national level;
- Guidance and ideas on how to set up the logbook as a gateway and how to link existing databases;
- Technical guidelines on the implementation of logbooks at a national level;
- Guidelines on data sharing, intellectual property and licenses.

To produce the different key deliverables, the work is organised in four work packages. An overview of these work packages can be found in Figure 1.

[3] The full definition can be found in the final report of the study: https://op.europa.eu/en/publication-detail/-/publication/40f40235-509e-11eb-b59f-01aa75ed71a1/language-en/format-PDF/source-184010877.

Figure 1 Overview of the different work packages of the study



These four work packages are supported by stakeholder consultations (Work Package 5). Mr Flickenschild further shared the planning on stakeholder involvement and explained when and how stakeholders can participate in the study. An overview of these moments is outlined in Table 1.

Table 1 Overview of stakeholder involvement during the study

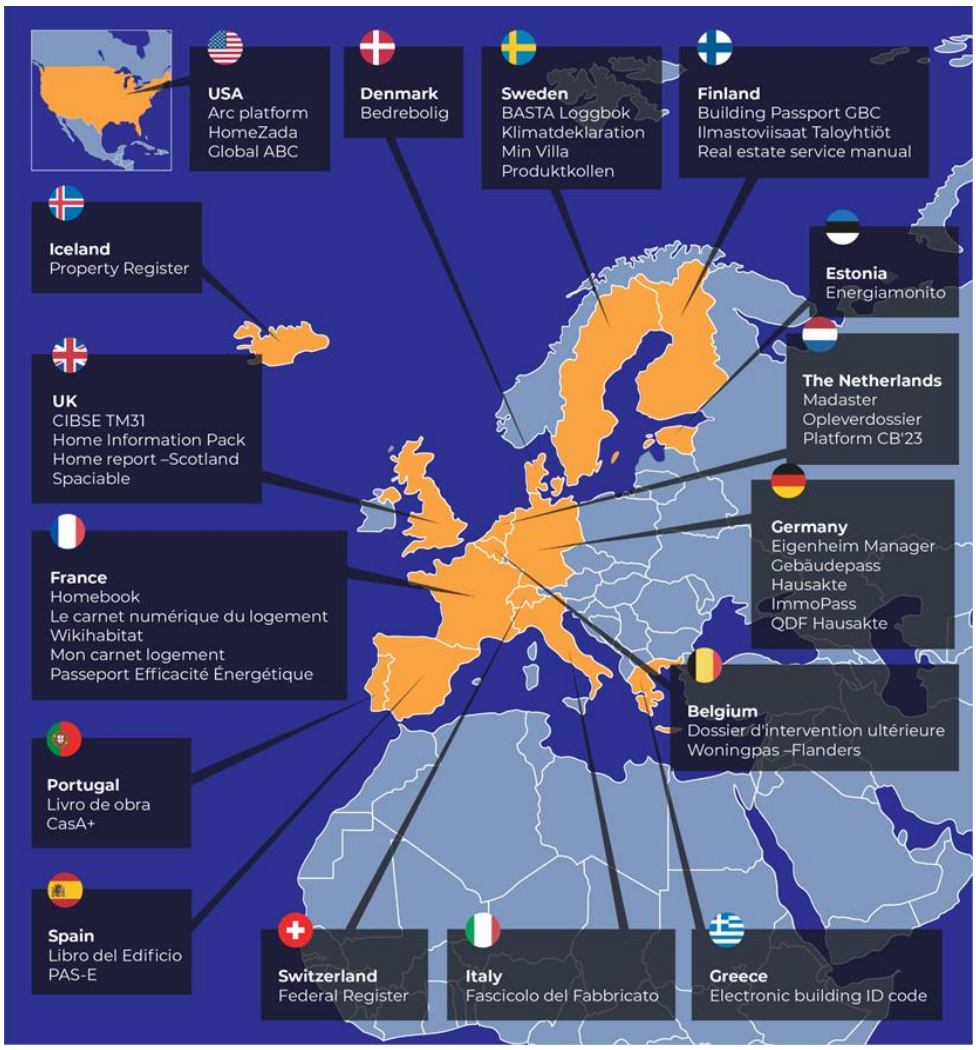
Month	Year	Activity	WP	Aim	Aspect
Jul-Sep	2022	Survey	1	Filling gaps	Database coverage
Sep	2022	Workshop	1-3	Discussion	Linking data & gateway approach
Nov	2022	Workshop	2	Discussion	Semantic data model approach
Dec	2022	Survey	1-2	Filling gaps	Existing semantic data models, costs
Mar	2023	Workshop	4	Discussion	Data sharing, costs, enforcement
May-Jun	2023	Survey	2-3	Validation	Feasibility of technical guidelines
Jun	2023	Workshop	2-3	Validation	Feasibility of technical guidelines
Sep	2023	Full-day event	1-4	Next steps	Technical guidelines

Presentation on the review of existing databases and sources

Mr Martin van der Ende, Project Manager, Ecorys, introduced himself and noted that this will be a challenging albeit interesting study. Mr Van der Ende reminded everyone that the **first work package aims to create a basis for the subsequent work by collecting various data**. The foreseen outputs are a mapping of databases, an overview of costs to develop DBLs at the national and EU level, a data business model for sharing data, and collecting information on built environment policies at the national and EU level (including on DBL enforcement) and how this can be combined with business models. The mapping of different databases and sources will focus on national DBLs. However, there

will also be one case study on a local DBL at the asset level. Mr Van der Ende further explained that DBL initiatives exist worldwide and highlighted a few examples from the EU (see Figure 2).

Figure 2 Overview of the different work packages of the study



One example that will be illustrated is the initiative of the E-construction platform in Estonia, which is a public initiative and uses a life cycle approach. This platform is a tool that can be used to exchange data between systems, authorities and interested parties. Mr Van der Ende introduced Mr Jaan Saar, who provided further information on the E-construction platform.

The Estonian E-construction platform

Mr Saar, Head of Digital Construction from the Estonian Ministry of Economic Affairs and Communication, thanked Mr Van der Ende for his introduction and for the opportunity to talk about the project in Estonia. Estonia has been using a kind of building logbook for years, which is called the building registry and has been in place since 2016. It is used to manage all different kinds of building permits. Mr Saar explained the basic setup of an information system, where one has the database layer at the bottom followed by services provided by the system and the user interfaces. **The building registry itself is a logbook of built environment data, but it also manages the process of building permits and approvals.** However, there is a movement beyond this narrow scope towards a more holistic approach.

Estonia is developing and has already launched the E-construction platform. In addition, to the building registry services, a lot of new services have been added. For example, **they added a database on utility network services, BIM-based building permits, automated BIM checks and a national digital twin**. Moreover, services from other departments that are related to the built environment or the building lifecycle are being added. The platform is designed as an open platform, which besides government services also allows for connection to external commercial services.

Although different databases have been added, the aim is not to create a "super database" and **the platform is still following the Estonian E-government principle, which is based on a distributed architecture**. This will provide more resilience, and more robustness and will lower costs. The platform itself is formed from the service layer and it can be seen as a set of agreements between these different services, which follow a common IT architecture so that APIs can communicate between each service. Estonia also aims to work with a common language using common semantics in the built environment, namely through a classification system, data templates and standardisation. An important agreement is that of a **common philosophy that everyone shares their services to come out of their silos**.

Mr Saar concluded his presentation by explaining the main goal of the construction platform, which is to **enable a lossless exchange of standardised and trustworthy data between all stakeholders throughout the building life cycle**. The DBL, or the building registry as we call it, is a crucial part of this platform, but it is only one piece of it. The Estonian government sees this platform as an enabler for connecting data and services, which in the end it will be used to make better-informed decisions. BIM is an important part of this as it is becoming the default in construction. Mr Saar further explained that by digitising all these processes, government services will be more transparent, more efficient and raise productivity. More importantly, this creates the opportunity for completely new digital products and services from the industry.

Mapping of the databases and sources

Mr Van der Ende thanked Mr Saar for his intervention and then continued by explaining that DBLs can combine information from many different sources. As potential building blocks of a DBL, it is important to identify all sources that are relevant for the built environment. Certain information is already used in many building logbooks, such as building descriptions, building materials, financial and insurance information, legal documents and ownership data. However, there is a **potential to add many other data fields to DBLs, such as information from BIM models, renovation potential, dynamic data on electricity, water and gas consumption, cost information and tax valuations**. These data fields are less often used in DBLs.

These few examples show the large potential of DBLs. For all the EU Member States, the data types presented in Table 2 will be collected. Moreover, for three selected Member States, additional information will be collected by assessing databases in these countries in more detail. During the process of data collection, stakeholders will be asked to fill in certain gaps through a survey.

Table 2 Information that will be collected for mapping the different databases and sources

All Member States	Three selected Member States
• Name of the database, hyperlink to access the database. • Whether the database is open, downloadable, viewable or free.	• Use cases for the databases and what types of processes they support. • Whether the databases are voluntary or mandatory.

• Whether the database has a query feature to search for individual buildings or a selection of buildings. • If the owner's name and contact data can be found.	• Access conditions/business models behind the databases. • User-friendliness of interfaces of the databases. • Language homogeneity between databases. • Aggregation level, interoperability, data sharing.

The selection of three Member States will be based on different criteria. The idea is to select two Member States that already have an interesting DBL initiative that links databases or facilitates data exchange between different data sources. Therefore, the focus will be on the Member States with best practices that other Member States can learn from. Furthermore, the idea is to include one country that has regional construction legislation, such as Italy or Spain as well as one smaller Member State (e.g. Estonia, the Netherlands) and a larger Member State (e.g. France, Germany). Mr Van der Ende further explained that **most data used in DBLs are building and administrative information. However, the most wanted information is often not the most available information.** The most wanted features are automatic input for 3D or BIM models, alerts on the conditional performance of buildings and notification of the resource consumption such as electricity. Of course, he explained, these may be the most wanted, simply because they are currently hardly available.

Martin further explained that the remainder of the webinar is mostly about harmonizing data because the potential for linking data depends on that and because the sharing of data is also covered later in the study.

Q&A and discussion

Mr Flickenschild thanked everyone who already posted different questions in the chat and introduced the first poll. The question and the results of the first poll are listed in Figure 2.

Figure 3 Question and results from the first poll

Responding to a question by Boverket, Mr Flickenschild explained that both the workshops and the final event will be online to accommodate all interested participants and make it easier for them to join these events.

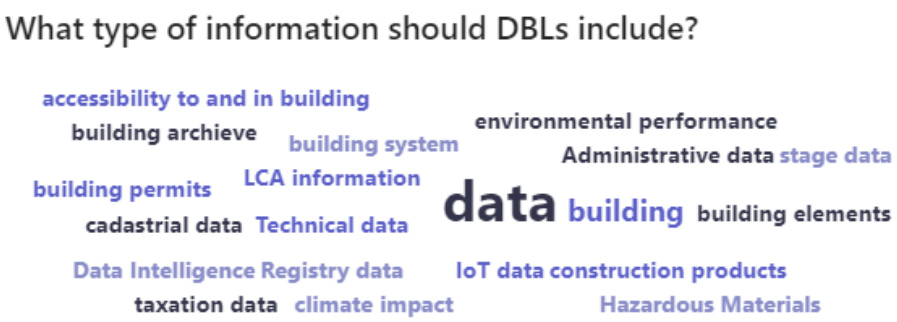
A participant from the Foundation for International Blockchain and Real Estate Expertise (FIBREE) raised a question towards Mr Saar about how they deal in Estonia with data ownership issues in their decentralized interoperable structures. Mr Saar explained that in a distributed network data ownership is not that big of an issue because the data remains with the owner. Through the use of

APIs, one can make secure queries to the data owner but does not need to copy or store the data elsewhere. This requires that data owners have online services connected to the platform but if this condition is met then most of the issues regarding data ownership are eliminated. Users can be granted different access rights and the e-construction platform provides the required secure identification and logging services.

Mr Saar further commented that in the case of a distributed network, it is only necessary to ensure that the connection between these services is managed properly, securely and is reliable. If this is done, one can get questions and answers through these APIs without actually getting the data. There are a lot of options and flexibility to make sure that the data remains with the owner and is quite safe.

A participant responded to this by explaining that his organisation, FIBREE, has been involved in the Netherlands (but also in DE, UK, PO, and many other countries in the EU and USA) in different projects that are closely related to DBL. The conceptual idea, like Estonia, is what we are embracing and managed to enable in cross-border settings. Upon a question by Mr Flickenschild, the participant from FIBREE added that the organisation started research in 2019 on creating a system that enables us to remove silos. FIBREE worked on unique object identifications, which are a kind of connector code. The idea of this process is that information about buildings is stored in different levels of detail. They have found a way how to connect these different levels of detail with different parties in the supply chain, to turn these silos into interoperable systems, similar to what has been done in Estonia. He further explained that they investigated over thirty different identification protocols during which they found that nobody was creating something that was context-independent. The participant further stated that he would be happy to share more information on this. Mr Flickenschild thanked the participant for this answer and introduced the next poll. The question and results can be found in Figure 3.

Figure 4 Question and results from the second poll



Mr Flickenschild asked Mr Van der Ende if he would like to respond to the different information that should be included. Mr Van der Ende noted that it is interesting to see that many aspects are potentially relevant for DBLs. He further emphasised the importance of data mapping to facilitate the inclusion of all this data. Furthermore, **DBLs should link different data instead of building everything from scratch**. Mr Flickenschild thanked Mr Van der Ende for his answer and called upon a representative from Construction Products Europe, who commented that the CPR revision is announced for 2045 and therefore the study must work with the current legal framework, including mandatory Declarations of Performance (DoP) and voluntary Environmental Product Declarations (EPDs). He further explained that EN15804 form the basis for EPDs and that there is no need to reinvent the wheel. Mr Flickenschild thanked the representative for this intervention and closed the polls and introduced *Mr Michel Böhms, WP2 Leader, TNO.*

Presentation on the envisioned framework for an EU-level DBL

Mr Böhms thanked Mr Flickenschild for the introduction and stated that he would dive more into the technical side of the project. He further explained that **work package 2 aims to provide an EU-level DBL framework**. He then summarised that the main outputs of this work are:

- An EU-level semantic data model (or ontology as it is also called);
- A multilingual dictionary where the terms used in the data model will be clearly defined;
- Technical implementation guidelines, providing guidance on software and how to use and apply these different aspects.

DBLs involve many perspectives. First, one needs to decide on which **types of building** data will be collected and assessed. A common delineation is that of individual houses, multi-apartment buildings, office buildings, industrial buildings and public buildings. This study covers all types of buildings, but the proposal is to focus on residential buildings which are the object of most current national DBL initiatives. A second perspective involves the **life-cycle phases**. In this study, the whole asset life cycle will be considered, from programming requirements over the design and the building phase (including fabrication and construction processes) to the operation of the building. During the operational phase also maintenance, renovation or repurposing, as well as demolition and recycling, will be considered. Demolition and recycling can be seen as the ultimate repurposing use case, as the building has "no purpose anymore".

In all the different life cycle phases, the whole supply chain needs to be considered, from client to contractor, subcontractor and also the provider of the products. There should be a balance between the demand and supply side for all these phases, therefore products play an important role in all the modelling of these life cycle phases. Mr Böhms added that with construction becoming more industrial, the supply and product side is becoming increasingly more important.

A third perspective that should be considered is that of the **different disciplines**. In general, all disciplines are considered but a certain selection will be considered for the selected cases. The last and fourth perspective focuses on **data levels**. Mr Böhms noted that besides the semantic data and parametric models there are still a lot of representations around ranging from BIM models to geometry models from the BIM and the GIS side. He further highlighted the problem of an enormous amount of unstructured documents and at least 80% of everything is still in documents. These should therefore be taken into account as well. Table 3 summarises the four perspectives.

Table 3 Overview of different perspectives involved

Building types	Life-cycle phase	Disciplines	Data levels
Individual houses (90%)	Program	Cadastral	Semantic data
Multi-apartment buildings (67%)	Design	Financial	Representations
Office buildings (48%)	Fabrication	Functional	Visualisations
Public buildings (48%)	Construction	Architectural	Documents
	Operate & maintain	Structural	
	Renovate or repurpose	Materials	
	Demolition	Installations	
	Recycling	Energy	

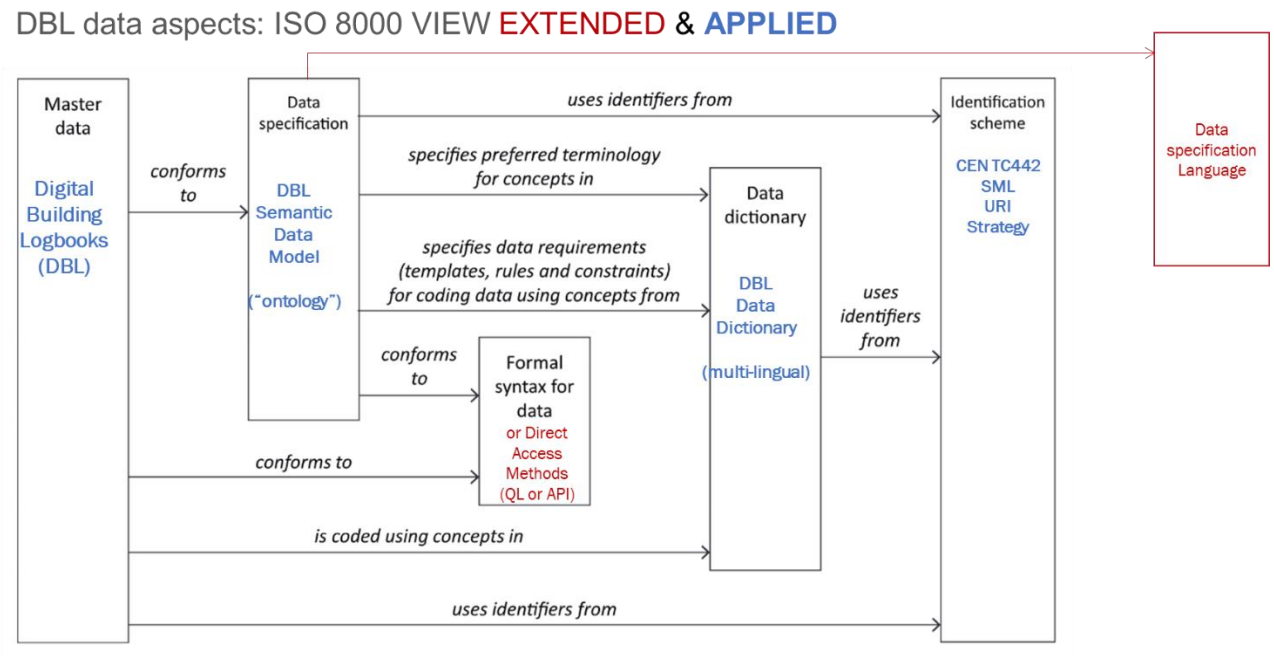
		Finishing	

Mr Böhms then explained the envisioned framework for DBLs basing it on a standard ISO 8000 view as presented in Figure 4. This framework starts from the available master data (or reference data), such as the DBL data. To be useful for decision making, this master data should **conform to several aspects**:

- First, it should conform to a data specification. This requires a good specification to provide the semantics and to interpret the data accurately. In our study, we refer to this as the DBL semantic data model, or the ontology, as linked data technology is used.
- Hereafter, all the terms that are used have to be clearly defined in multiple languages, which is done through the DBL data dictionary.
- Additionally, an identification scheme is needed not only to identify data items, but also dictionary items and data model items. Blockchain will be taken into account when looking into the potential identification scheme, as it is a form of decentral identification.
- Also, a formal syntax is needed to express the data (e.g. an Excel, XML or RTF file). However, this can also be organised differently, for example through a direct interface as a direct access mechanism using a query language such as SPARQL.
- Finally, an actual data specification language that is used by the semantic data model is needed. In a linked data build, we use languages such as OWL and others.

Based on this framework, we know now what data aspects to address.

Figure 5 Overview of the ISO 8000 view



The various aspects have to be defined based on three different levels:

- the EU level;
- the Member State level;

- and the individual portfolio or asset level.

In terms of the **technology used** (formats, access methods, identification and languages), this will be handled by our project, i.e. on the EU level as it is not desirable for every Member State to use different methods. This would lead to data not being interoperable. The key result of our project, the **semantic data model and the data dictionary** is defined as a core model/ontology on the European level, but there will be a need to be flexible and to be able to extend it for the national and even the level of professional users. The **actual data** for a DBL will namely also be generated on these three levels.

For all aspects that need to be defined, the **FAIR principle** will be used. According to this principle, data should be findable, accessible, interoperable and reusable. Reusable in the FAIR principle means that the data is well-defined by the data model. The data is reusable because the software can interpret it. Additionally, the data quality should be addressed.

The FAIR principle is closely related to proposed technology for this project, the **W3C Linked Data/Semantic Web approach**[4]. The findability and accessibility of the data are handled by the internet given the right accessibility standards. Interoperability is provided by the next layer of the internet, the world wide web through interoperable HTML documents, etcetera. Hereafter, new aspects are added, such as the linked data technology and the semantic web technology. So that structured information also becomes interoperable and linkable to each other. The final step is to define data via ontologies to create a semantic web. In summary, it started with linked computers, then moved on to linked documents, then linked information and finally, knowledge can be linked. Simultaneously, the standardisation effort is in no way limiting the flexibility and innovation behind it.

Mr Böhms further gave an example that can be seen in the future semantic data model by showcasing the definition of a building using the standardised **Building Topology Ontology** (BOT)[5]. It defines a building as a subclass of a zone and provides more information about the term of the building in the data dictionary. The DBL data dictionary is included in the DBL semantic data model so that multiple definitions (for example in English or Dutch). In addition, synonyms or homonyms can be added. All of which can be defined by using one standard way of representation. Once the semantic data model and data dictionary have been defined, one can define their own house as well. He then showed the example of the Dutch 3D GEO Buildings Registry[6] of how one could link from some kind of gateway to a specific database while leaving the data at its source.

Mr Böhms further explained how the actual **DBL ontology** will be developed. This will not be done from scratch, as there are many semantic resources:

- Firstly, there is a lot of work within **CEN TC442 SML** – Semantic Modelling and Linking, which deals with European BIM standardisation. Especially, Working Group 4 on data dictionaries, ontologies and dictionaries. In particular, they are developing a semantic modelling and linking guide on how to apply these in the built environment modelling of assets.
- Additionally, resources from the **buildingSMART** (bSI) Industry Foundation Classes (IFC)[7] will be used, which use the traditional primary IFC form (using step-technology), but also in ifcOWL and ifcJSON formats. It is important to keep the connection with BIM in mind. Therefore IFC can be helpful as this is typically used in BIM applications, such as REFIT.
- Another area is that of **GIS** and that of the **Open Geospatial Consortium** (OGC)[8] with CityGML and CityJSON standards. These standards are also important to take into account.

[4] https://www.w3.org/standards/semanticweb/data.
[5] https://w3c-lbd-cg.github.io/bot/.
[6] https://3dbag.nl/en/viewer.
[7] https://www.buildingsmart.org/standards/bsi-standards/industry-foundation-classes/.
[8] https://www.ogc.org/.

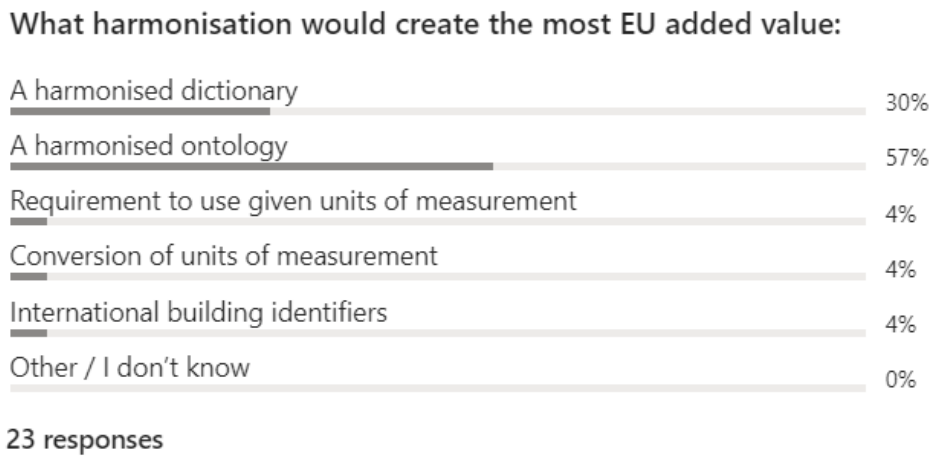
- Finally, we have the **W3C BOT ontology**, which is a lightweight version of IFC and therefore rather flexible in its use. People are also increasingly measuring their buildings, spaces and components, for which they are using the **W3C SOSA ontology**. These two ingredients will certainly be used in the final solution, making use of often reused sub-ontologies like Geo-sparql for geometry, GPS information from W3C, etc.

Mr Böhms further explained that commercial parties such as Google are becoming more interested in building ontology. However, it is important to keep interoperability in mind and not be too dependent on particular commercial parties. He then concluded his presentation by noting that **all of these inputs will be combined and used optimally to not reinvent the wheel** and redo the aspects that are already out there.

Q&A and discussion

Mr Flickenschild thanked Mr Böhms for the presentation and then introduced the next poll asking participants to share their experiences. The question and responses can be seen in Figure 5.

Figure 6 Question and answers of the first poll



A representative from Soprema Srl provided a comment in the chat arguing that for construction materials, respective CEN Technical Committees should be involved in the DBL implementation. Thereafter, a representative from IBM took the floor and commented on the work done by CEN TC-442. He noted that Working Group 7 is working on how to implement interconnected dictionaries and that also ISO/IEC JTC 1/SC 41 and in particular Working Group 6 on digital twins are if relevance. Additionally, CEN TC-442 established Working Group 9, which is looking specifically at digital twins within the built environment. The questions on ontology gateways are part of the discussion in this working group. He further asked whether the project team has consulted one of the big fours like IBM or Microsoft on the gateways regarding subjects like data fabric or clouds and data security. In the initial study, the participant mentioned also that one does not want to have the DBL wedded to a vendor, but to have a headless architecture, so one can move it around no matter who is the cloud provider.

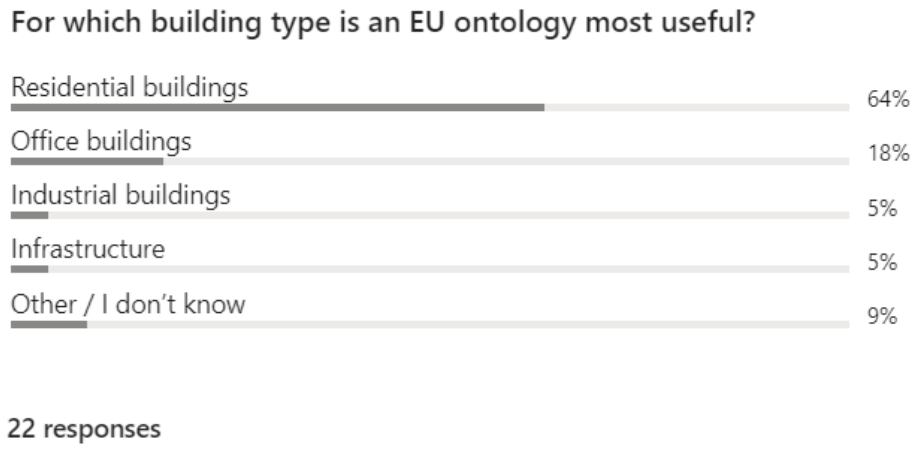
- Mr Böhms took note of the suggested working groups and added that there was a meeting in CEN recently on Working Group 4 and 7 interaction, which resulted in some good ideas on combining the results from CEN and the different existing standards to be able to apply them in the right way for the users of these standards. Working Group 9 becomes very relevant, as digital twins are now seen as data plus software plus the link to reality. Mr Böhms further

explained that all the data standardisation that we do, is also directly relevant for digital twins. He concluded by stating that as much information as possible will be reused.

- Mr Flickenschild thanked the participant for his comment on consulting Microsoft and IBM. He further stated that the work has just started and that it will be taken into account as well as other suggestions for particular stakeholders to consult.

Mr Flickenschild introduced the next poll, the question and results are given in Figure 6.

Figure 7 Question and responses to the second poll



Presentation on the digital gateway proposal

Mr Böhms stated that so far in the webinar the focus has mainly been on data and data aspects, however, **one also needs software to access the data**. Therefore work package 3 is aiming to propose a way for the Member States and the European Commission to build gateway interfaces. The output will be a mock-up EU website for both Member States and the EU guidelines will be developed on how to build and connect these gateways.

For both types of gateways, a lot of technical issues have emerged. For example, the EU gateway will be more at a meta-level and provide global access to total data sets, whereas the national gateways might go deeper in the integration of data itself and linking data sets. **These gateways will therefore have a bit of a different character**, but both sides should be able to deal with the data. It is important to come to an agreement on which standards for formats, APIs and query languages to use so that a common data environment is established and the gateways can directly or indirectly communicate. The conceptual part is the logical link between these data sets, but in the end, this means one needs to implement those conceptual agreements, i.e. the technology behind it.

This could alternatively also mean that one implements the data in an open-source Jena database[9], that directly supports the linked data approach and where SPARQL queries can be added to it. It is also possible to implement relational technology via a PostgreSQL database and use SPARQL queries for mapping mechanisms. These examples show the many options that can be used to interconnect these components. Mr Böhms further stated that there is always the possibility of input and output or uploads and downloads of data from one to the other. However, this is not preferred in this case as the transformation, translation and conversion of data will lead to multiple sources. Therefore, we prefer data sharing over data exchange. Mr Böhms noted that the big IT companies have software to

[9] https://jena.apache.org/.

deal with data lakes[10] and business intelligence, which are relevant here. So certainly, we will look at what is feasible from the supply side.

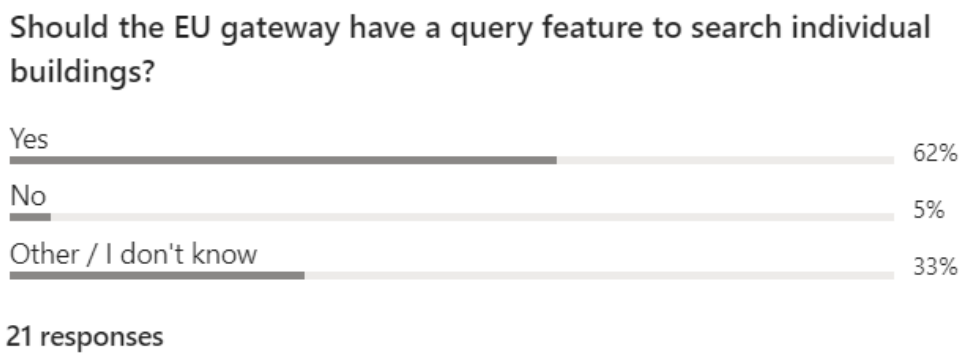
Q&A and discussion

Opening the Q&A, Mr Flickenschild gave the floor to a representative from IBM, who noted that, in terms of the mapping, it would be good to look at the proper architecture or marketecture, as certain aspects such as servers need to be considered in terms of what is on-premise and what is off-premise.

The participant also gave an example of the Port of Rotterdam, as they deal with multiple data sources and use a data fabric to deal with different ontologies. A lot of these data gateways protocols already exist, so a lot can be re-used. Mr Böhms answered that the team will further consult the participant on this. He added that at the same time interoperability should be kept in mind. If these protocols are open and implemented, they will be considered. The IBM representative further added that he was suggesting looking at hybrid or multi-cloud reference architectures. He further noted that when looking at the work of large IT companies, all their strategies are looking at an open architecture where one can use multi-cloud environments. The gateways do exist, so it is more a case of re-using the protocols for a specific use case called DBL.

Mr Flickenschild thanked the participant for their contributions and introduced another poll. The question and the answers can be found in Figure 7. Mr Flickenschild asked the participants who answered "Yes" whether the building identifying search terms should be harmonised at the EU level or should the EU gateway forward the query to a Member State gateway and forward the responses back if the query fails. Responding to this, Mr Saar noted that the **EU work should focus on the ontology, agreeing on standards for definitions and the semantics to help standardise the built environment data that is available in all different Member States**. He further added that if DBLs are set up with services and the same ontology is used, it does not matter if it is an EU, national or private gateway. Mr Saar added that we should not overthink the gateway at a European level. The focus should be on the data standardisation and the way data is handled between these gateway systems. Mr Böhms responded as well and explained that a discussion had taken place on the conceptual level on how optional or obligatory a data model should be from an EU point of view. Mr Böhms further noted that it is becoming clearer that a common model is desired that is based on international agreements. This helps in the decision for developing a core model on this. Mr Flickenschild added that this is just a first scoping of ideas and that more in-depth stakeholder consultations will take place in the future.

Figure 8 Question and answers to the third poll



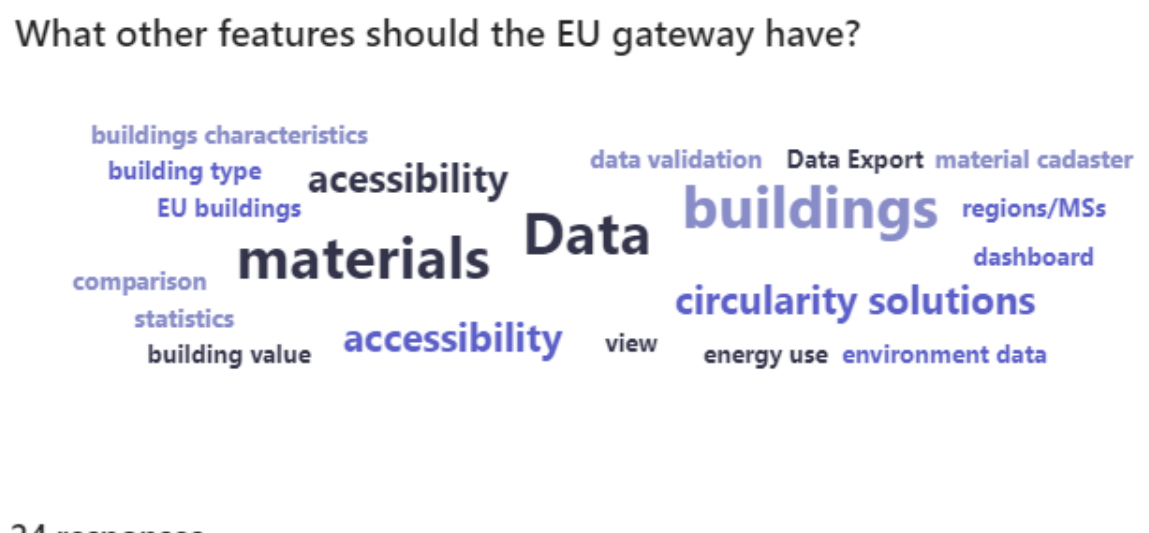
Mr Flickenschild noted the following comment in the chat by a representative from Construction Products Europe who said that the last time we counted, there were over 160 BIM initiatives in the EU. How can one expect the value chain to operate under such conditions? In response, Mr van der

[10] See https://en.wikipedia.org/wiki/Data_lake

Ende added in the chat that the map on our slide was about nationwide initiatives, not about BIM initiatives. However, the harmonizing of data will of course be relevant for both national DBLs and private BIM initiatives.

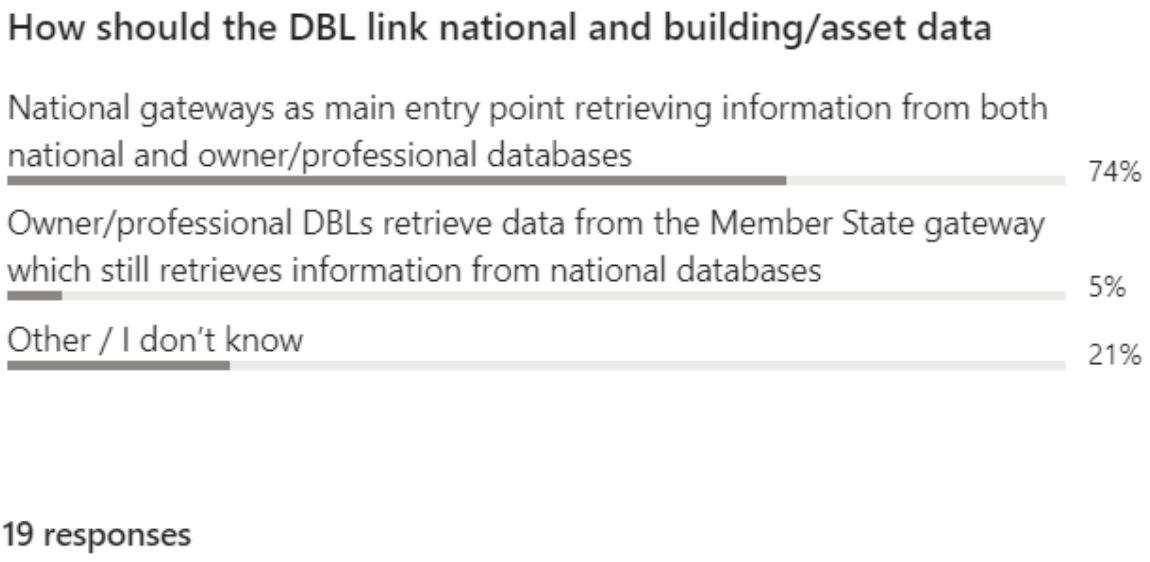
Mr Flickenschild then introduced the next two polls. The first poll was about the features an EU gateway should have (Figure 9).

Figure 9 Question and results of the poll



The other poll was about how a national DBL should link national and building-level data (Figure 10).

Figure 10 Question and results of the poll



Reflecting on the poll results, Mr Böhms added that the data architecture is the most important in the end and the process that will be supported. This is a topic that needs to be discussed further and it will influence the technical work. Responding to this the representative from IBM added that **it is important to define clearly what is meant by the words gateway**, database and data fabric. From the

gateway and cloud storage perspective, the data will be stored somewhere and it is important to know who is going to be the customer and where all the data will be stored. In this case, one can face the issues of latency and the cost of data being uploaded or downloaded because not everyone is in the cloud. To reduce latency one could start looking at edge computing.

Mr Flickenschild thanked for these contributions and introduced a comment by a representative from FIBREE from the chat, who stated that data should be attached to the building, rather than to a person or entity. So it can stay with the building along its entire lifecycle. Responding to this, Mr Flickenschild noted that this is exactly the idea, to connect the data to the building and not the other way around. In addition, Mr Böhms added that there have been discussions in the Netherlands with the Kadaster (i.e. building registry) on the future of linked data technology, where certain aspects are more distributed (such as personal information). Another aspect here is, that if data is at the asset level and not in a central repository such as a building registry, it should be possible for the registry to still be able to write into the local data. It is important to ensure that when data is distributed, it is still complete and that every asset has an information source included.

Mr Saar wanted to emphasise the point made by the representative from FIBREE about **separating the building technical data from any personal data**, as he feels this is extremely important to keep the building data with the building since the building data would not be considered private data. This data should remain non-sensitive so that it is more accessible to stakeholders. Mr Flickenschild thanked Mr Saar for his points and added that it is also important to clarify the terminology (e.g. a Kadaster or cadastre being a building registry).

Concluding discussion on additional suggestions for the study

Mr Flickenschild explained that some extra time had been reserved in case there were any additional comments or questions. He moreover, raised the following questions as relevant to the study team and invited participants to respond in the chat or writing by email:

- Which other stakeholders not present today should we reach out to?
- Would you be willing to share information about our study with them?
- What information about this project would be useful for you at this point?
- What relevant national, private or EU-level initiatives are you aware of?

It was also noted by a sector representative that it might be interesting to present to the Construction 2050 Alliance, which brings the whole value chain together. Additionally, Mr Saar commented that regarding ontologies one should look at the Construction Classification International Collaboration (CCIC)[11], which is a joint initiative by several EU countries to adopt a common construction classification system.

Closing of the session

Mr Flickenschild explained that stakeholders are invited to stay in touch and provide additional information or ask questions via BuildingLogbook@ecorys.com. He then thanked everyone for their participation during the session and closed the webinar.

[11] https://cci-collaboration.org/.

List of participating organisations

Organisations	Organisations
3M	European General Galvanizers Association
Arcadis	Foundation for International Blockchain and Real Estate Expertise (FIBREE)
Association for Standardisation	European Health and Digital Executive Agency
BenoitDomeConsulting	German Environment Agency (Umweltbundesamt)
Boverket, Swedish National Board of Housing, Building and Planning	IBM
Building Information Foundation RTS (Finland)	Institut für Verglasungstechnik und Fensterbau e.V.
CEN/TC442 Building Information Modelling	Mecanoo
Cobuilder	Ministry for the Ecological Transition in France
Construction Products Europe	Ministry of Economic Affairs and Communications of Estonia
Copper Alliance	Ministry of Regional Development and Public Works of Bulgaria
Department of Architecture, Built Environment and Construction Engineering (Italy)	Paolo Bulletti Studio
DLA Piper Nederland N.V.	Politecnico di Milano
Ecorys	Royal Institution of Chartered Surveyors (RICS)
European Calcium Silicate Producers Associations	Spanish Association for Standardisation
Energy Institute Hrvoje Požar	Soprema Srl
Environmental Coalition on Standards (ECOS)	Technical Chamber of Greece
Etex Group S.A.	TNO
Eurogypsum	Ulrich Paetzold EU-Consulting
EUROLUX	Università di Torino
European Commission, DG GROW	University of Brescia
European Commission, DG JRC	University of Liege
European Commission, OIB	Universidad Politecnica de Madrid
European Commission, Cabinet of Commissioners	University of Zaragoza
European Federation for Construction Chemicals	

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