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**Introduction**

This report provides an overview of progress in the first nine months of the “Technical study for the development and implementation of digital building logbooks” which commenced upon the contract signature from both sides on 4 April 2022. The Consortium met for an internal kick-off on 4 April, where the work plan was discussed. On 2 May the Consortium and the client had a joint kick-off to align the overall approach and workplan.

The report discusses the activities in the various work packages (WPs), the challenges and results so far, the current status, any delays, and future planning. It is structured as follows:

- Chapter 1 – Data set review (WP1);
- Chapter 2 – DBL Framework (WP2);
- Chapter 3 – Portal guidelines and visual identity (WP3);
- Chapter 4 – Cost-benefit analysis (WP4);
- Chapter 5 – Stakeholder engagement (WP5)
- Chapter 6 – Workplan (same as in progress report).
1. Data set review (WP1)

1.1 Dataset identification

The draft dataset identification was completed in August 2022. The data that were collected have been reported in the progress report of 18 October 2022.

Upon reflection, it was commented that building specific data are more interesting for a DBL than data on the wider building environment. In response to this, for some countries where we could find such data, more detailed building specific data was added:

- in the row for “Building permit compliance data, e.g., nr floors, type of roof, ...”, namely for Austria, Czechia, Estonia, Finland, France, and Slovenia.
- In the row for “National building materials database”, for Estonia items from the building register have been added between brackets.

Activities

Since early October 2022, the overview of datasets has been updated with responses from the scoping survey for Belgium (3 datasets), Croatia (3), Germany (1), Italy (1), Netherland (2), Portugal (5), Spain (4). A check for case study countries (Estonia, France and Italy) with experts from those countries resulted in the addition of two additional data items for Estonia (a more detailed dataset on basic materials and one on energy labels) and one for France (an additional private data set on energy labels).

A quality review resulted in further additions and corrections. In particular, a few researchers included statistical data at the national aggregate level assuming that the statistical office would have data per building. References to national statistical data are now removed.

Challenges/results

The main challenge for an open-access data digital building logbook portal is assessed to concern countries mostly in the east of Europe where data is only viewable for owners of the building or building units (apartments, shops), their legal representatives and/or housing associations. Regional fragmentation will cause a challenge to build a national digital building logbook portal in certain federally organised countries (notably Austria, Italy and Spain).

A challenge for this particular study is the effort required for a complete overview of relevant data sets. However, we are hopeful that Member States will add to the overview of data sets when it is made public, based on responses from Member States that we contacted one-on-one to comment on the dataset overview for their country (Czechia, Estonia, France).

Current status/future planning

We propose to prepare the database overview for publication end of January and share it with the stakeholder community.

The data set overview and specifically the overview of variables in the data sets is also used to feed the development of the semantic data model (see Section 2.2 below) with real-life examples of data collected for digital building data sets.
1.2 Dataset analysis

The dataset analysis builds on task 1.1. To further analyse relevant datasets for three specific countries, to support the development of a semantic data model.

Activities

Three countries have been selected for further analysis:

- **Estonia** as a small frontrunner country
- **France** as a major nation
- **Italy** as a large, federated country. For Italy two regions, Lazio and Lombardy, were selected to analyse additionally, as the data available on a building level in Italy on a country level was limited.

Among the relevant data sets, those data sets with information at the building level were further analysed to report on ICT and BIM related aspects that are relevant for a DBL and interoperability.

Challenges/results

The country specific results have been dissected in the task report as well as the progress report. The general lessons learned were:

- **Documentation**
  - Extensive documentation about the structure of the dataset or database helps to understand the content and is input for Task 1.5 on metadata about datasets.
  - Documentation is often only available in the national language. When documentation is not in the language of the user or even in English, documentation on a webpage is preferable to a PDF. The reason is that browsers (e.g., Edge and Chrome) provide opportunities to translate the documentation to the preferred language of the user. The result would be that documentation is useful cross-border in the EU.

- **Formats**
  - A large variety of formats was found. Geoformat was amongst the most common presentation styles. This is a good and interactive way for some use cases. However, for gathering and analysing large sets of data (on a national scale), having access to the underlying databases and datasets would provide a better opportunity to gather and analyse large quantities of data.

- **Standardisation**
  - Several variables are used in multiple datasets. However, the exact meaning of variables is often unclear, and different possible interpretations become evident when comparing datasets. Concretely, a variable named ‘Floor Area’ or a variable ‘Surface Area’, might mean the same in two different datasets. Vice versa, a variable labelled ‘Floor Area’ in two datasets, might have a different working definition. Hence, a standardisation is necessary to ensure interpretability across different countries. This is related to the FAIR principles further expressed in Task 1.5.

- **Privacy**
  - Data in Estonia, France, Italy is in some cases very detailed, however none of the data in the analysed datasets leads to the identification of specific persons (however
an Austrian database includes the name of the architect of a building). Additionally, financial data such as the mortgage position, and (in Estonia) the property value are not shared in the datasets that we analysed.

Current status/future planning
The final report on Task 1.2 has been submitted November 2022 and has been disseminated to the community of the DBL project.

1.3 Building permit requirements
The data from the Worldbank website on Doing Business – Building Permits has been collected and an overview table has now been constructed. This data includes the types of documents that are required, who is liable for the quality of the building and whether they need to take insurance. In addition, we collect data on the government level at which document requirements for building permits are regulated (national, regional and/or local).

Activities
Most data have been collected, although the regulatory data (at which government level document requirements are regulated) still needs to be collected for some countries.

Challenges/results
A major challenge is that the document requirements do not provide insights in exactly which data items are required in the document needed for the building permit application. The proposal offered to collect these data for three countries, however on request we have collected other data that are more relevant for the DBL development (see Section 1.6 below).

Current status/future planning
In the end, we consider the data items that are currently available in actual national digital building logbooks in frontrunner countries (as discussed in Section 1.1 above) a better guideline for relevant DBL data than building permit data. The reason is that data requirement in building permit documents are mostly at the BIM level. Requirements or even guidelines for data at the BIM would be too rigid in our view (see also Section 1.5 below). It should be noted that the INSPIRE guidelines (see Section 2.2 below) and the data needs in the use case study (see Section 2.5) are also input for decisions about what data can be considered necessary and relevant for DBLs.

1.4 Built environment policies
The progress report already outlined the structure of the overview of built environment policies. The scoping survey resulted in the identification of additional built environment policies that were not described in the national action plans. The survey responses on built environment policies were almost all about BIM strategies and digitalisation of the construction sector. Based on the overview, we propose the following classification of built environment policies:

1. Energy efficiency
2. Renovation
3. Building control
4. Climate/environment
5. BIM
6. Digitalisation
7. Other

**Activities**

The data collection from the various national plans has been completed and the survey responses are being added to the country lists of the policies. The classification of the built environment policies still needs to be done. This classification will help us generate an EU overview of built environment policies per Member State, and thus in which policies a DBL development could be integrated. With the modular approach to DBLs, Member States can select the most relevant modules for the data collection they prioritise.

**Challenges/results**

As noted in the progress report, Member States can simply follow EU policies rather than develop separate national policies. When analysing the types of EU policies, it also became clear that Member States may have more policies that they just do not mention in their national plans.

**Current status/future planning**

The built environment policies are classified. We aim to share the data with the stakeholder community in March, in the form of a short report on findings and limitations of the overview and the policy database.

**1.5 DBL input processes**

Central in Task 1.5 is the question how operators of portals ensure that data in the DBL is correct and up to date. With this Task 1.5 aims to provide a guideline to document the status of the metadata and contents of the data sets that are used in the DBL.

For us Task 1.5 is about bridging the results and insights achieved in WP1 with the portal implementations of WP2 and WP3 respectively, by analysing input processes in the databases of EU Member States. To this end, we first explored what requirements data should meet, and then how to assess the quality of data and changes to these data. Additionally, we identified good practices of metadata quality assessments which provide insights in how data quality can automatically be assessed and rated. Finally, the INSPIRE monitoring and control infrastructure and processes are described.

**Activities**

Because it is essential to ensure that the available data is relevant and up to date, we defined relevant parameters in two dimensions:

- Inputs from BIM and the INSPIRE model for spatial information (as well as other designs):
  - Which BIM data are relevant for a DBL. This is presented in a table with relevant aspects and property examples specifying the aspects.
  - An insight into which data should be available and how individual buildings are identified. The only mandatory data we propose, are building identifiers and some

general properties. Otherwise, the requirements would be rigid, and very few databases might adhere to the requirements.

- ICT requirements, namely:
  - Metadata which informs software where what type of data is found and in what format. Three forms of metadata are described as a condition for the ICT domain.
  - Depending on data architectural choices, the method of extracting data. This is based on the FAIR principles which are central in the ability to combine datasets, as well as allow for machine-actionability.

In addition to the definition of the two dimensions, a description is given of two metadata quality score examples and a short description of the INSPIRE monitoring and control process and infrastructure. While not exactly a guideline, this provides useful principles for both (digital) building logbook processes and automated rating mechanisms on the datasets meant for the digital building logbook.

**Challenges/results**

Data only needs to be linkable within countries (e.g., Estonia will not link with French datasets). However, it is important at the EU level to be able to interpret variables in the same manner, because some variables such as “area” are defined differently across the EU.

The description of the INSPIRE monitoring and control process, gives an idea on how to form the process of allowing for automatic checks on the presence of relevant ICT and BIM aspects in databases. Additionally, the two examples of metadata quality scores, provide insights into how the datasets can subsequently be rated.

**Current status/future planning**

The first draft has been shared internally within the consortium. The final version will be delivered on the 30th of January 2023.

**1.6 Additional data collection**

During the study, it turned out that certain other data were useful for the development of DBLs that were not covered in the technical proposal for this study, namely how Member States (land registers) identify buildings and a typology of buildings.

An INSPIRE methodology for building addresses looks to us to exhaustively cover all address elements. In reality, we can imagine that a house number like “1T2” (building 1, floor T, apartment 2) or “22A” (if a new house in built between two houses with house numbers 22 and 23) is entered as one text field rather than in two or three separate fields, especially since the INSPIRE methodology does not go into this much detail. Still, the INSPIRE methodology for addresses seems ready-for-use for an EU format.

On building identifiers, we have identified sources from land registers for six countries (EE, ES, FR, IT, NL, UK) and analysed those of EE, FR, IT and NL. There are some common elements such as separate identifiers for buildings and for streets. However, the general impression is that each national land register has its own system for identifying buildings. Naturally, large countries like Italy have numbers for both regions and municipalities while smaller countries such as the Netherlands skip the numbers for regions. Land registers may also register objects that are not buildings (post box numbers, tent camps, phone booths, houseboat berths, caravan pitches). Some countries (such as the Netherlands) reserve digits in the code to classify the type of object, whereas other countries (such as Italy) classify the type of object in a different variable. In the Italian system the type of object is not evident from the building identifier itself which makes the identifier less transparent. However, a separate variable
could have the advantage of more flexibility or a lower risk of a need to change a building identifier if the object is incorrectly classified.

A potential EU system of building identifiers was presented at webinar 3 of 7 February. One option is of course to simply prefix the national number with a country code. Another option is to harmonise the systems of building identifiers in the EU. The responses about an EU structure of “real” world identifiers being worth the effort of changing existing IDs were evenly for and against. A presented structure of URLs leading directly to building specific data based on INSPIRE\(^1\) was recognized to be equivalent to Decentralized IDs.\(^2\) Connecting to GS1\(^3\) was also suggested, and after reviewing this it has become clear that a code for the identification scheme needs to be added to URLs. It was also discussed that many ways exist to localize buildings, and a table mapping localizations with an ID would be needed.

National statistical offices and national land registers use different typologies of buildings across the EU, with variations in detail (e.g., types of commercial buildings), and different breakdowns by characteristics of the building such as the construction year or the height. We propose to make an inventory of building classifications used by land registers in the EU and to propose an overarching typology. For an EU typology of buildings, we would like to discuss to what extent building characteristics should be separate from the building typology, as different variables in the EU semantic models (see Section 2.2 below).

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\(^2\) See https://www.w3.org/TR/did-core/#a-simple-example

\(^3\) See https://decentralized-id.com/web-standards/gs1/
2. DBL Framework (WP2)

2.1 Introduction

The first nine months of work package 2 (April 2022-January 2023) focused on the delivery of two key deliverables: D2.1 (the DBL Semantic Data Model) and D2.2 (the DBL Dictionary).

The interpretation of these deliverables was adapted:

D2.1, the Semantic Data Model covers both the DBL Ontology and the DBL Dictionary, and
D2.2 addresses the implementation aspects (the ‘coding’) in W3C Linked Data/Semantic Web technology.

2.2 DBL Semantic data model

Activities

Based on desk research, WP2 face-to-face/telcon team discussions (involving TNO, Arcadis & Ecorys) deliverable D2.1 (the semantic model) was defined. This is the key deliverable of WP2. It discusses the principles and technologies decided for the DBL model, discusses state-of-the-art relevant initiatives and proposes a first DBL ontology and associated dictionary.

This proposal is heavily based on existing European INSPIRE directive semantics, simplified where possible and expressed according to Linked Data approached and technology applied according to CEN TC442 Semantic Modelling and Linking (SML) standard.

Also, various industry experts were consulted (like the Dutch Kadaster and Madaster).

A start is made with the actual computer-interpretable coding (SKOS dictionary and RDFS ontology) to be reported in D2.1.

Challenges/results

D2.1 (final draft) covering:

a. use case types description like data exchange, data sharing and data integration
b. data architecture showing what data aspects need to be covered
c. guiding principles like FAIR data
d. technology (formats, language, access methods) overview and choices for DBL
e. state-of-the-art (focus on semantics, priority on EU-based INSPIRE directive)
f. first core DBL Semantic Data Model (ontology + dictionary) based as much as possible on existing EU INSPIRE semantics.

The key elements modelled are Building, Building Unit and Cadastral Parcel with their properties being attributes or relations. These properties are grouped together according to the property groups defined earlier in task 1.5 in WP1.

Specific Challenges
In the beginning we also covered functional facilities like homes, offices that are taking place in buildings. It was decided to stay on the technical side and only cover the building units, that part of the building related to a specific facility (such as an apartment in a flat or a shop in a shopping mall). We do still address functional properties for the building and their building units.

A challenge not yet resolved is the multi-lingual aspect. Currently the DBL dictionary has English (UK) terms for preferred labels and definitions. Typically, a dictionary has multiple languages which is also technically fully possible. However, this translation probably takes a lot of effort. We would like to further discuss this issue. Part of the solution could be to provide a guideline to get the English terms and definitions out in a user-friendly format like Excel, translate in Excel, and then import back into the multilingual terms and definitions section of the semantical model.

Current status/future planning
The final D2.1 will be finalized before end of January 2023.

2.3 DBL Linked Data Implementation

Activities
- representing all terms, concepts & properties in linked data
- SKOS code for terms, RDF/RDFS code for concepts & properties
- serialized using RDF serialisations Turtle and JSON-LD (appendix)
- including choices for base URIs, name spaces and prefixes

Challenges/results
D2.2 (under construction) covering
  a. the code is now ready for the core DBL ontology in RDFS and the core DBL dictionary in SKOS
  b. the code is serialized as Turtle from which equivalent JSON-LD will be generated automatically
  c. related to this code a proposal is made for the exact base URIs, namespaces URIs and related prefixes (all following the SML standard)

Current status/future planning
The coding is complete, to be described/included in D2.2 before end of January 2023.

2.4 Proposal for datasets and functionalities
Activities
Not yet started (delayed).

Challenges/results
D2.3, short report on key data sets and data services (“functionalities”) that could work on the DBL data as defined by the DBL Semantic Data Model.

This report will confront the initial common DBL Semantic Data Model (ontology & dictionary) with some key examples for basic building data sets from different countries. Furthermore, this report will build upon the functionalities described in the precursor study and aim to add some more functionalities and describing them in general terms.

It will identify the currently available functionalities and use this to propose minimum functionalities, base functionalities and assess coherence, consistency and completeness of data sets and functionalities.

Current status/future planning
To be finalized end of February 2023 instead of end of December 2022.

2.5 Case Study
Case study research is used to showcase the potential and advantages of the DBL. Different use cases will be developed to gain insight into the user perspective of the stakeholder and to disseminate the existing process. The focus of the case studies is to define the usage of the DBL in the cases process and added benefit compared to the existing process. The existing process is defined and disseminated to see where the stakeholder will logically have interactions with the DBL based on the existing concept. From the user perspective it is defined how and where in the process a DBL could have added benefit in the exchange of information.

Approach
To find out where the DBL can add value for the user groups, their current experiences and processes need to be understood. To collect the input that is needed to fill in the templates for personas and customer journey, workshops are organized. Each user group will get their own separate workshop, so it is possible to focus and get in-depth information. Moreover, all workshops will be physical, have the same content and the same duration. Two use case workshops have been held or planned:
- One on building renovation, with a design manager and two BIM experts (held)
- Financial institutions: with the project manager of a technical due diligence team (held)

Templates
The persona and customer journey map templates are printed four times in A2 format. Sticky notes in multiple colours and a pen/pencil are used to fill in the templates. The sticky notes allow for flexible handling of the user input, and it is easier to correct a mistake or make additions. The different colours are easy for visual coding based on topic.

The templates are worked out in a customer journey map pro use case.
Activities

The activities have been started.

The following activities have been undertaken:

1. Use Case fundamentals have been described (the methodology)
2. Multiple workshops with Stakeholders
3. The use cases are worked out with the following elements:
   a. Consists of a persona
   b. Consists of a Customer Journey Map

The following activities have yet to be undertaken:

1. Actual use cases under construction will be used to analyse the data needs of the DBL and will be used to further develop the aspects in the DBL Ontology.
2. Two workshops with stakeholders:
   a. Facility Management – Asset Management – OIB
   b. Governmental – Basque DBL pilot

For the latter, we do not envisage a full use case (only one was promised in the technical proposal and we are developing two), but rather an exchange of ideas what element from a national DBL would be useful for OIB and for which purposes, as well as the cost of providing data for a national DBL.

Challenges/results

The main challenge will be to check the results from the use case with data in actual data sets (which are hopefully covered in WP1.1).

D2.4

Current status/future planning

Ongoing.

Planned for end of February 2023.

The activities that have yet to be undertaken are described above.

2.6 Elements interoperability / Connections existing DB

Activities

This activity has formally not yet started but initial ideas have been documented and discussed on the linking of data sets. Various scenarios for “modes of interaction” have been identified and prioritized.

Some aspects of interoperability have already been studied in earlier tasks, such as the need for unique building identifiers (Section 1.6) and harmonised and more precise terminology (Section 2.2). However, the main work is planned to start in March 2023.
Interoperability also means that the DBL should not be incompatible with other EU initiatives such as the Digital Product Passport (DPP). On 2 March, Mr Galatola and Mr Wasik clarified that the DPP regulations would likely require manufacturers of construction products to classify their products and provide the characteristics of those products. Ecorys clarified that the DBL would only include information on broad categories of products without product codes. The conclusion was that the DBL would be compatible with the DPP.

**Challenges/results**

A minor challenge is to ensure that the DBL project does not negatively affect the Digital Product Passport for which legislation is being prepared. The challenge is minor because the proposed DBL contains only higher-aggregate information on certain building materials without classifying products or proposing identifiers for construction products.

In the technical proposal, two separate tasks were presented that are integrated in one task:

- Elaborate the essential elements needed to enable interoperability with existing databases
- Technical proposal to ensure a connection with existing databases

We will first identify (existing) formats (serialisations), in particular the following elements: file-based interactions, direct access interfaces, APIs, and predefined queries. In the technical proposal, a roadmap towards decentralisation was seen as a possible element but seems less relevant in the context of a central DBL with links to source data.

We will then identify and specify necessary data transformations (syntactic translations, semantic conversion and plug-in approaches) to integrate existing data sets and data extraction functionalities.

Thirdly, we will develop a roadmap for future conceptual and technical developments, advocating the SOLID principles of object-oriented design.

Fourthly, assuming semantic interoperability and a common dictionary (see Section 2.2), we will propose a Reference Architectural Framework (RAF) for a digital platform.

Lastly, we will investigate methods to link data, discussing pros and cons of implementation with Lace (and teams responsible for updating the Object Type Library) and without Lace (where the Object Type Library must be fully defined from the start).

**Current status/future planning**

Inactive for now. This work has been planned for March/April 2023.

**2.7 Data management plan**

The work on WP2.7 (Data management plan) is planned to start in May, with a first draft delivered 31 May and a final version on 30 June. WP2.7 will build on aspects of data management covered in the case study. Content wise, no changes are foreseen compared to the technical proposal, which we present below with some further initial thoughts.

- Collection of data (building on WP1.5 input, update and validation processes): *minimum requirements should be very minimal*

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4 See e.g., https://www.iema.net/articles/circular-credentials-digital-product-passports-in-construction?
5 See e.g., https://www.digitalocean.com/community/conceptual-articles/s-o-l-i-d-the-first-five-principles-of-object-oriented-design
- Storing of data: proposal to store also building data in one document / link which the EU portal can refer to
- Processing and using data (also building on WP1.5): with authorization processes
- Providing data for re-use: minimum requirements for metadata

The data management plan will focus on the EU portal and Member State DBLs. Technical guidelines (see Section 2.9) will suggest ways to collect data from private sources, but this will be based on WP4 rather than WP2.7.

2.8 New databases

The work on WP2.8 (New databases) is planned to start in June with a first draft 30 June and a final delivery 31 July. As noted in the technical proposal, this task will focus on the likely evolvement of databases using existing concepts. The main DBL concepts are:

- Storage of data values
- Storage of documents (building permits, reports, certificates, drawings and photos)
- Storage of links to (owners of) BIM models
- Calculation tools

Current DBL initiatives all involve the storage of data. Land register portals in addition offer access to documents (usually at a price). We have seen a private initiative where owners of BIM models can be contacted through a portal (Netherlands), but this was in a stand-alone setting and not embedded in a DBL. The research team is converging to a vision where Member States make data publicly available, which commercial providers may use to develop calculation tools.

The European Commission could support the development of commercial calculation tools by developing a prototype tool and making it available through an open-source licence, as the USA Department of Energy has done.6

In the technical proposal for this study (8 December 2021), it was expected that Member State DBLs would start with data from government agencies, with private data providers increasingly tempted or enforced to contribute. This would be a natural route for countries where no DBL currently exists, and possibly also for countries with many private DBLs (France). In federally organised countries, however, a different route may need to be followed because the main challenge will be to agree to a national format, or to reformat local and regional data into the national format.

In the discussion of new databases, we will also discuss the role various actors could play, including:

- Building permit requirements (national authorities)
- Public procurement requirements (for public sector buildings and infrastructure)
- Development of EU standards (European Commission)

2.9 Technical guidelines

The technical guidelines will bring the outputs of the various tasks in one document. We have generated ideas for the technical guidelines since January. The planning is to deliver a first draft in the first half of May, with the aim of validating it in the fifth and final webinar in the second half of June (before the main summer break). The first draft will not include the deliverables of WP 2.7 and

6 See https://www.energy.gov/eere/buildings/about-building-energy-modeling
2.8 (data management plan and new databases), but we can still outline our ideas for these aspects in the final webinar.

As a reminder from the technical proposal of 8 December 2021, the proposed outline of the technical guidelines include:

1. Introduction
2. Benefits of the building logbook
3. Social implementation
4. Technical implementation – concept explanation
5. Technical implementation – set-up
6. Resources
7. Risks inventory

In the technical proposal, 20 explanatory videos were foreseen. We are not sure that many videos will be necessary, but we still plan to create several videos to explain different aspects where we think guidelines in report format alone are not sufficient:

- the software language used to program the semantic model in,
- how to import and export a dictionary
- the concept of decentralised IDs,
- a use case

### 3. Portal guidelines and visual identity (WP3)

This work package consists of three deliverables:

- A guideline/proposal on how Member States can build national portals for a DBL
- A visual identity for the EU portal website
- A proposal for further feature of the EU portal + mock-up placeholders

### 3.1 Guidelines for national portals

**Activities**

For national DBL portals, the purpose of this study is quite clear, namely, to outline the pros and cons of critical choices of:

1. Supporting digital infrastructure
2. Recovery from faults (backup and restoring)
3. User interface design with best practices on its implementation
4. Validation and security
5. Data exploration

The idea of graph databases is no longer pursued (they were introduced in the progress report, but for now considered to be out of scope for the new role of DBL portals), because the simplified version of EU portal doesn't require an introduction of the new extra (graph) technologies to maintain.
An important new proposed feature is that the Framework from WP2 is downloadable from the EU portal, and the national authorities will have a choice to follow the same data model and extend it for their purposes.

TNO and Contecht have discussed the structure of the guide document in view of the above points.

**Challenges/results**

The main change in approach will be that instead of a graph structure, we propose that Member States make data available according to certain standards:

- Using harmonised terminology (dictionary)
- Using a harmonised format (semantic model)
- With an upload facility, or a structure that allows automatic processing

The upload facility or automatic processing facility would only work for data without access restrictions. The semantic model could also be used to generate building specific data in “flat format”, which are put in documents that can be accessed through a unique URL which includes a “real-life” (decentralized) building ID.

**Current status/future planning**

Contecht has already outlined a proposal for national DBLs in the summer of 2022. Minus the graph structure, this proposal is still applicable and will be elaborated.

We had two internal Consortium meetings to align ideas for the semantic data model and the DBL platforms in November-December 2022. The results of alignment should come back in guidelines to design the national portals. The internal alignment will enable us to elaborate guidelines for building national DBL portals on the basis of EU portal and following up the Semantic model provided by WP2.

The next step is to elaborate the structure of the guidelines for national portals and check for feedback from the Commission.

As part of WP3, we will draft proposals for:

- The functionality for the user to query data or to search for a building
- The functionality for the user to browse data.

**3.2. Visual identity**

**Activities**

A DBL logo and templates for Word documents, PowerPoint presentations and email banners were developed before the first progress report of October.

**Challenges/results**

Results:

- A DBL Email banner
Current status/future planning
We will further develop the visual identity style to use it in the creation of a mock-up of an EU repository (short run) and an EU portal (long run), planned in May.

3.3. Further features of an EU portal

Activities
After discussions about the EU-level portal, the Commission concluded (email of 14 October 2022) that “It is necessary to still see it as more than just guidance as we have the ambition with this project to create some basic model (dictionary, identifiers, data structure), with guidelines on how to follow this model, as indeed our finality is to have an EU-level database connecting at the top level.”

From this we conclude that the EU portal be based on a pan-EU data set that is periodically downloaded from national data sets, and semi-automatically converted to one data format? The Commission would to invest in harmonizing data from different formats, although without developing automatic converters and translators, and the more Member States use the EU format the less resources the Commission would need to spend on reformatting data sets.

Challenges/results
The original idea was that an EU portal would be a scaled-up version of national DBL portals. Scalability would need to be featured in the guidelines for DBL portals, but the structure would essentially be the same for national and EU portals. However, the vision for the EU has become simpler and no longer would need a graph structure of building data.

For the short run, the EU portal is conceptualised as a repository of hyperlinks to national DBLs combined with a depository of guidelines and metadata. The EU portal in the short run is thus a start page facilitating the search for national DBL portals. For this, we could for example take inspiration from the EU-Justice portal,7 or the EU social protection portal.8

For the long run, we propose that Member States make data (that are accessible without authorisation) available in an EU format, either through a download facility or through an automatic processing facility. For example, Member States could provide a document listing all building IDs combined with localisation information (cadstral numbers, geo coordinates), and data for each building in a separate document using a URL which includes the building ID.

During the third webinar of 7 February, it was discussed that building IDs in reality may need to be changed over the lifecycle of the building, although others argued that building IDs should be designed in a way that remains unique over its lifecycle. One participant in particular warned against

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8 See https://ec.europa.eu/eurostat/web/social-protection/overview
a blockchain approach, especially with regard to building IDs and implicitly with regard to building data in general (for which updates depend on the use of the correct building ID).

For the EU portal, a similar proposal for quality checks and automatic processing of data will be proposed as for Member State portals. Where conversions of formats and translations of dictionaries are still necessary, we will draft a proposal for who is best made responsible, and possible solutions for the conversions and translations.

For the repository of data sets to be developed in the long run, upon the consortium conclusion EU portal should be able to deal with:

- Different formats
- Maintenance of correct links datasets from Member States
- If needed, managing the licenses obtaining with the Member States
- Providing a downloadable version of the semantic data model coming from WP2.

The main foreseen challenge is to manage the diverse licenses for data access.

**Current status/future planning**

Now that the pan-EU dataset approach is confirmed, we can draft the WP3 accordingly. The proposal for the EU gateway interface was planned to start in the second half of March and to be completed in the first half of May, but in reality, the discussions over the past months have helped shape the ideas for the EU portal, which we can now develop further.
4. Cost-benefit analysis (WP4)

4.1 Overview of tasks planned in the first nine months

The main part of the work on WP4 was planned to start in January 2023. Nevertheless, certain activities were already completed in the first nine months. Specifically, the scoping survey included several questions about incentives and enforcement. The responses have now been analysed and disseminated to the wider stakeholder community.

4.2 Challenges/results

The key results of the work carried out so far were already summarised in the progress report:

- Legal barriers and commercial sensitivity are equally important barriers
- Privacy issues are the most often mentioned legal barrier
- Legislation needs to be motivated and EU requirement are a good motivation
- For commercial sensitivity, any form of remuneration may resolve these
- Three Horizon budgets for developing a DBL framework are about EUR 2 million each so this is an indication of the cost to develop a national DBL framework

4.3 Future planning

The planned interviews about cost drivers still need to be held, as well as the mini survey among national cadastres about costs of managing certain types of data.

For an assessment of the costs, we will focus on the cost of collecting or converting data per building. After all, the cost of developing the framework seems limited to about EUR 2 million (see above). Providing data or converting data from Excel or PDF into a DBL and verifying completeness or even correctness of data may be labour intensive, meaning that costs may quickly add up to much higher amounts.

For an estimate of the cost of input, update and verification of data, we will build on the data from WP1.5 (DBL input processes) and 2.5 (Case study). By limiting data requirements to data that need to be provided anyway (such as in building permit procedures or energy performance assessments), the costs of a DBL could be considered as business as usual. We therefore aim to ask stakeholders which activities are ‘business as usual’ and to distinguish between those costs and additional costs from DBL requirements. This proposed distinction between ‘business as usual’ costs and additional costs is new compared to the proposal. We will ask about costs in interviews (Basque pilot) and the feedback survey, detailing both the largest factors contributing to costs of developing a DBL as well as any indications of lead time (time between start and finish), man-days and expenses.

Contrary to what was proposed in the technical proposal, we propose to focus on costs of DBLs for Member States, and not costs of for example adjusting BIM models to comply with DBL requirements. The main reason is the decision not to impose an EU data format on Member States. Hence, the EU DBL initiative will not affect formats in which Member States may require data to be delivered. The approach to periodically download Member State building data to update the EU portal will require Member States to make data downloadable, an aspect we propose to consult the stakeholders about.

With regard to incentives and enforcement of sharing of data, the scoping survey has already generated a lot of material for guiding principles, but less so on success factors and barriers. We
propose to cover this in a mini survey not only among owners of DBLs (private owners may be nonresponsive about commercially sensitive information) but also among national cadastres, because they manage most of the relevant building specific data.

With regard to enforcement, setting priorities for types of buildings will require a balancing of trade-offs. Providing and verifying data on new buildings will likely require less work because more information is required to be digitally available for new buildings. However, new buildings need to meet more requirements and thus have less potential for improvements. As noted in the technical proposal, we expect that lower costs will be the main argument to prioritise data on new buildings.

We will look up the legal barriers that stakeholders mentioned in the relevant piece of legislation, as offered in our technical proposal. The piece of legislation mentioned most often by the scoping survey respondents was a provision in the Public Procurement Directive about the possibility for buyers (“contract awarding entities”) to require that information is provided in a technical tool, which we looked to find out the precise requirements which we disseminated in the scoping survey report. We will do so consistently for all stakeholder feedback about current legislation.

In the coming month we will classify the stakeholder feedback (mostly from the scoping survey) about implementation risks (barriers). Some mitigation strategies such as for loss of data are technological, for which guidelines will be developed in WP3.

The cost-benefit assessment is planned to be completed in February 2023 and the incentive / enforcement guidelines in March 2023. The guidelines for mitigation strategies are planned for April 2023, also using input from other Work Packages.
5. Stakeholder engagement (WP5)

The goal of WP5 is to collect stakeholder inputs, receive feedback on intermediate outputs, validate deliverables, disseminate results and ultimately to get buy-in and support from key stakeholders for the final technical guidelines.

This will be implemented through six tasks, which are presented in Table 1.

Table 1 Overview of WP5 tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Name</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Setting up the DBL community</td>
<td>1 database covering the full construction ecosystem and all 27 EU Member States</td>
<td>292 subscribers in the DBL community.</td>
</tr>
<tr>
<td>5.2</td>
<td>Surveys</td>
<td>3 surveys: scoping survey, feedback survey and validation survey</td>
<td>1 out of 3 implemented, next planned for March.</td>
</tr>
<tr>
<td>5.3</td>
<td>In-depth interviews</td>
<td>10 in-depth and gap-filling interviews (complementing the scoping survey results)</td>
<td>6 conducted. More to be planned in March-April 2023.</td>
</tr>
<tr>
<td>5.4</td>
<td>Organising webinars</td>
<td>5 online workshops</td>
<td>3 out of 5 implemented – 4th planned for May</td>
</tr>
<tr>
<td>5.5</td>
<td>Communication and dissemination of results</td>
<td>Disseminating 36 items to stakeholders and 9 intermediary events</td>
<td>6 dissemination items completed and attended 2 intermediary events. 1 intermediary event planned.</td>
</tr>
<tr>
<td>5.6</td>
<td>Organising the final event</td>
<td>Organising 1 final event on the technical guidelines</td>
<td>Pending.</td>
</tr>
</tbody>
</table>

5.1 Setting up the DBL community

At the start of the project we set up a mailing list of the DBL project. The aim of such a stakeholder database was to develop a community that provides input to our project and can later support the implementation of the technical guidelines for DBLs.

Activities

We implemented the following activities to set up the DBL community:

- Development of list of stakeholders based on existing lists (High Level Construction Forum) and research for additional relevant contacts.
- Setting up of a functional mailbox as the main contact point for this project (buildinglogbook@ecorys.com).
- Preparing a registration survey for stakeholders to sign up to our mailing list and the announcement webinar.
• Sending out an invitation to register through the functional mailbox.
• Checking representativeness in regard to geographical balance and EU coverage as well as in regard to the types of stakeholders (e.g., representation of the whole construction value chain).
• Targeted outreach to address gaps.

Challenges/results
This activity has been completed with the mailing list being set up. However, despite repeated attempts it was not possible to cover all EU Member States. Currently, stakeholder contacts from the following Member States are missing: Slovenia, Hungary, Slovak Republic and Latvia.

Current status/future planning
Our mailing list currently has 292 subscribers and is regularly updated. In particular, we see additional subscriptions whenever we disseminate items or after events.

5.2 Surveys
Three surveys are to be conducted to support the research through scoping, feedback and validation.

Activities
So far among the three surveys, the scoping survey has been successfully implemented. It was launched end of August and remained open until the 27th of September. The aim of the survey was to collect primary information on EU, national and private databases, relevant EU, national and private initiatives, challenges for maintaining DBLs, particular data requirements, existing data dictionaries and semantic frameworks, etc.

Overall, we received 114 responses, out of which 36 reached the end of the survey. Once the survey was closed, we started a survey analysis. The main findings were presented in the second webinar and a full survey report was shared with stakeholders in December.

Challenges/results
For the scoping survey, we observed a high rate of respondents not reaching the end of the survey. This was due to its length and the broad subject matter. The other two surveys will be more focused and should therefore have a lower dropout rate but will in turn be also more technical in their subject matter.

The main issue is a delay in activities as due to the summer months, the scoping survey was launched later than originally planned. The subsequent feedback and validation surveys also depend on the outputs of other work packages.

Current status/future planning
Due to the delays, the planning has been adjusted:

a. 2nd survey: The feedback and gap-filling survey has been prepared and will be launched in March (instead of November 2022). It will close in April and thereafter be analysed.

b. 3rd survey: The validation survey will be prepared and launched May (instead of April). It will close June and thereafter be analysed. As for the progress report and interim report, an extension of the draft final report from 9 June to one or two weeks later would be needed to address the feedback from the validation survey.
The alternative is to organise the validation survey in April as originally planned, before all analysis has been completed.

5.3 In-depth interviews

To fill gaps in survey results and in the research from WP1, 10 in-depth interviews will be conducted.

Activities

The interviews target key experts from Member States, technical bodies such as standardisation agencies or land registries. In addition, interviews with companies could also provide some more in-depth information on tendencies to make data available and aspects related to costs and benefits. The following activities have been completed:

a. We created an interview guide;
b. We created an overview document outlining potential interviewees based on our research;
c. We implemented 2 interviews;
d. We wrote a summary of the results from the completed interviews.

Challenges/results

So far 2 interviews have been conducted. One with an expert from Finland and the other one with four experts from Spain. No challenges were encountered when conducting the interviews.

Current status/future planning

We decided to not rush the interviews but organise them when we see the needs arise or when we encounter relevant stakeholders. We have already identified several other potential interviewees and plan to conduct further interviews in the coming months. The interviews should be completed in March to allow the use of their inputs in our work.

5.4 Webinars

To organise five online workshops to engage with stakeholders throughout the project.

Activities

To date, we have organised three webinars. The announcement webinar took place in June while the second one was organised on the 6th of October. To both webinars, over 100 stakeholders registered and over 50 actively participated.

The latest workshop was organised 7th February to discuss with technical experts the requirements for a European digital building logbook. The main topic of discussion was the Semantic Data Model (D2.1). Due to the technical subject matter of the workshop, the audience was smaller with circa 40 participants.

Meeting reports of all workshops have been prepared and apart from the third one have also been disseminated with stakeholders.

Challenges/results

There have not been any challenges apart from those reported in the progress report. However, similar to the survey implementation there has been a delay with activities, which has also led to the webinars taking place later than planned. Our third webinar on requirements for a European DBL was
initially planned to take place in November, however, given the delay due to the summer months and the ongoing discussion to finalise the semantic data model, we postponed it. The webinar was organised now for 7th February, which gave the team more time to work on the content.

**Current status/future planning**

The fourth webinar is planned for May and the fifth and final one for June.

### 5.5 Communication and dissemination of results

**Activities**

The dissemination of our findings is an ongoing activity throughout the study. Results are to be disseminated in the form of publicity articles, meeting reports after webinars, and update reports on the progress of our work following the approval of the client. In addition, we aim to attend intermediary events to present and discuss our work.

**Challenges/results**

So far six dissemination items have been shared, these include:

- a. A meeting report and the presentation slides of the announcement webinar were shared with the webinar’s participants, as well as the wider DBL community.
- b. An article outlining the aim of the project and the work we plan to carry out, as well as directing readers to the publicly available meeting report and presentation of the webinar was published.
- c. A report on initial findings of our work on data set identification was disseminated with the DBL community. The report included results on four countries – Sweden, Greece, Luxembourg, and the Netherlands.
- d. A meeting report and the presentation slides of the second webinar were shared with the webinar’s participants, as well as the wider DBL community.
- e. A report as well as an Excel file on the Findings from the analysis of databases in three EU Member States – Estonia, France and Italy – was shared with the DBL community.
- f. A report on the results from the scoping survey was shared with the DBL community.

We also attended one intermediary event in Prague in November as well as an event in the Netherlands in December. We will be attending a Smart Buildings conference 23.03 in Brussels. We are investigating additional events that would be useful for us to attend either for promotion or to get inputs.

**Current status/future planning**

More items will be disseminated as soon as more results are available. For example, a meeting report will be shared after the third webinar. In addition, the Semantic Model of the DBL could be shared as a dissemination item.
5.6 Final event

Planned for September 2023. It will likely be end of September, which would still be before the contractual end date of 11 October.
6. Updated workplan

The workplan (see below) has not changed compared to the progress report, although we do need to wrap up various results from WP1 and prepare them for dissemination to the wider stakeholder community in the coming weeks.

The core of the work, the development of the semantic data model, is planned at the end of January. Based on stakeholder feedback end of January (based on comments on the D2.1 document) and the third webinar of 7 February, we will revise the semantic data model and dictionary in February, according to the revised planning of the progress report.

The case study, technical guidelines and elaboration of essential elements for interoperability will also be delayed, but not by as much as the development of the dictionary and semantic data model. For example, with regard to interoperability the need for unique building identifiers and the many solutions for this have already been identified.
<table>
<thead>
<tr>
<th>Task &amp; Activities</th>
<th>Months</th>
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<tbody>
<tr>
<td><strong>Inception phase</strong></td>
<td></td>
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<tr>
<td>0.1 Kick-off meeting</td>
<td></td>
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<tr>
<td>0.2 Finalise workplan</td>
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<tr>
<td>0.3 Draft stakeholder engagement plan</td>
<td></td>
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<tr>
<td>0.4 Inception report</td>
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<tr>
<td>1.1 Review of existing databases and sources</td>
<td></td>
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<tr>
<td>1.2 Identification of data sets</td>
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<tr>
<td>1.3 Analysis of data sets in 3 countries</td>
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<tr>
<td>1.4 Identification of built environment policies</td>
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<tr>
<td>1.5 Describe processes for input and update of data</td>
<td></td>
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<tr>
<td>1.6 Desk research on business models and enforcement of building logbooks</td>
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<tr>
<td>2.1 Establishing a framework for an EU DBL</td>
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<tr>
<td>2.2 Develop a semantic data model</td>
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<td>2.3 Develop a standardised dictionary</td>
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<td>2.4 Proposal for datasets and functionalities</td>
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<td>2.5 Technical proposal to ensure connection with existing databases</td>
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<td>2.6 Case study</td>
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<tr>
<td>2.7 Develop data management plan for DBLs</td>
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<tr>
<td>2.8 Data management plan for DBLs forecast</td>
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<tr>
<td>3.1 Deliver technical and detailed guidelines</td>
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<tr>
<td>3.2 Gateway interface proposal</td>
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<td>3.3 Visual identity development</td>
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<tr>
<td>3.4 Development of features</td>
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<tr>
<td>3.5 Proposal of EU-level gateway interface</td>
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<tr>
<td>4.1 Present benefits of logbooks</td>
<td></td>
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<tr>
<td>4.2 Estimate resources to operationalise DBL</td>
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<tr>
<td>4.3 Costs and benefits of an EU DBL</td>
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<tr>
<td>4.4 Develop guidelines for data sharing</td>
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<td>4.5 Logbook enforcement proposals</td>
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<tr>
<td>4.6 Identifying implementation risks and propose mitigation measures</td>
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<tr>
<td>5.1 Stakeholder engagement activities</td>
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<tr>
<td>5.2 Set-up stakeholder/expert pool</td>
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<tr>
<td>5.3 Three surveys</td>
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<tr>
<td>5.4 Five half-day webinars/events</td>
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<tr>
<td>5.5 Monthly dissemination of interim results</td>
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<tr>
<td>5.6 Nine intermediary events</td>
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<td>5.7 Full-day event to present deliverables</td>
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<tr>
<td><strong>Regular progress reports</strong></td>
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<tr>
<td>Deliverables</td>
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