



# Digital Building Logbook a Software Engineer perspective

Ruben Alonso

# Digital & Sustainable Transition in Buildings

- **Objective**

- Digital and green transition for a more sustainable built environment and society, leaving no one behind

- **Focus on**

- Innovative Building and Digital Technologies
- Digitalisation in construction
- End Users

- **Topics**

- Energy Efficient Buildings
  - Innovative building components, Smart technologies, Sensors
- Data and information management and representation
  - Scan2BIM, 3DVM, BIM, Digital Twins, AR/VR
- Data management and monitoring
  - DBL, Dynamic EPCs, IEQ monitoring
- Capacity Building programmes

# Research and Develop a DBL

**PREDICTING THE SUCCESS OR FAILURE OF A NEW PRODUCT  
BASED ON WHAT ENGINEERS AND PROGRAMMERS ARE SAYING ABOUT IT.**

IF THEY SAY...	IT MEANS...
"IT DOESN'T DO ANYTHING NEW"	THE PRODUCT WILL BE A GIGANTIC SUCCESS.
"WHY WOULD ANYONE WANT THAT?"	
"REALLY EXCITING"	THE PRODUCT WILL BE A FLOP. YEARS LATER, ITS IDEAS WILL SHOW UP IN SOMETHING SUCCESSFUL.
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"WAIT, ARE YOU TALKING ABOUT <UNFAMILIAR PERSON'S NAME>'S NEW PROJECT?"	THE PRODUCT COULD BE A SCAM AND MAY RESULT IN ARRESTS OR LAWSUITS.
"I WOULD NEVER PUT <COMPANY> IN CHARGE OF MANAGING MY <WHATEVER>."	WITHIN FIVE YEARS, THEY WILL.

source: <https://xkcd.com/1497/>

# What is a Logbook?

- **Nautical:** .... a record of important events in the management, operation, and navigation of a ship
- **Industrial:** ... record state at the production plant, but it can also contain simple planning functions that notify personnel about upcoming maintenance activities
- **Transport:** ... to register driver and operator work time for commercial heavy vehicles
- **Amateur radio:** ... register their contacts and other radio operations
- **Scuba diving:** ... documents the experience of a diver by logging a diver's dives.
- **Health:** ...Patient records...

**Summary:** ... record used to record states, events, or conditions applicable to complex machines or the personnel who operate them

# What is a Digital Building Logbook?

- **Divide and conquer**
  - Solve a complex problem by breaking the problem into smaller ones and solving them
- **Logbook**
  - (trusted and shared) repository of events, records, states...
- **Building**
  - construction, permits, models, BIM...
- **Digital**
  - web based, accessible, integrable, scalable...

**A basic definition:** common cloud based repository of building relevant data related to the life of a building

# What is a Digital Building Logbook?

- EC: “**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”*
- Is this definition accepted?
  - We see a lot of emphasis in
    - Integration external sources
    - Calculate, estimate
    - Benchmarking and comparisons

source: E. Commission, E. A. for Small, M. sized Enterprises, S. Dourlens-Quaranta, G. Carbonari, M. De Groote, G. Borragán, S. De Regel, Z. Toth, J. Volt, J. Glicker, A. Lodigiani, M. Calderoni, T. Loureiro, R. Sterling, B. Vandeveld, C. Spirinckx, I. Kondratenko, N. Rajagopalan, O. Rapf, Study on the development of a European Union framework for digital building logbooks : final report, Publications Office, 2021. doi:doi/10.2826/659006.

# Are we sure this isn't something different?

- **CMS** - Construction Management Software
  - Software for managing the documentation and communication in construction projects
- **DT** - Digital Twins
  - virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision making (IBM)
- **CDE** - Common Data Environment
  - Collaborative platform for storing and centralising BIM data and workflows
- **Others**
  - BMS - Building Management System
  - AMS - Asset Management System

# Is there any good example of a DBL?

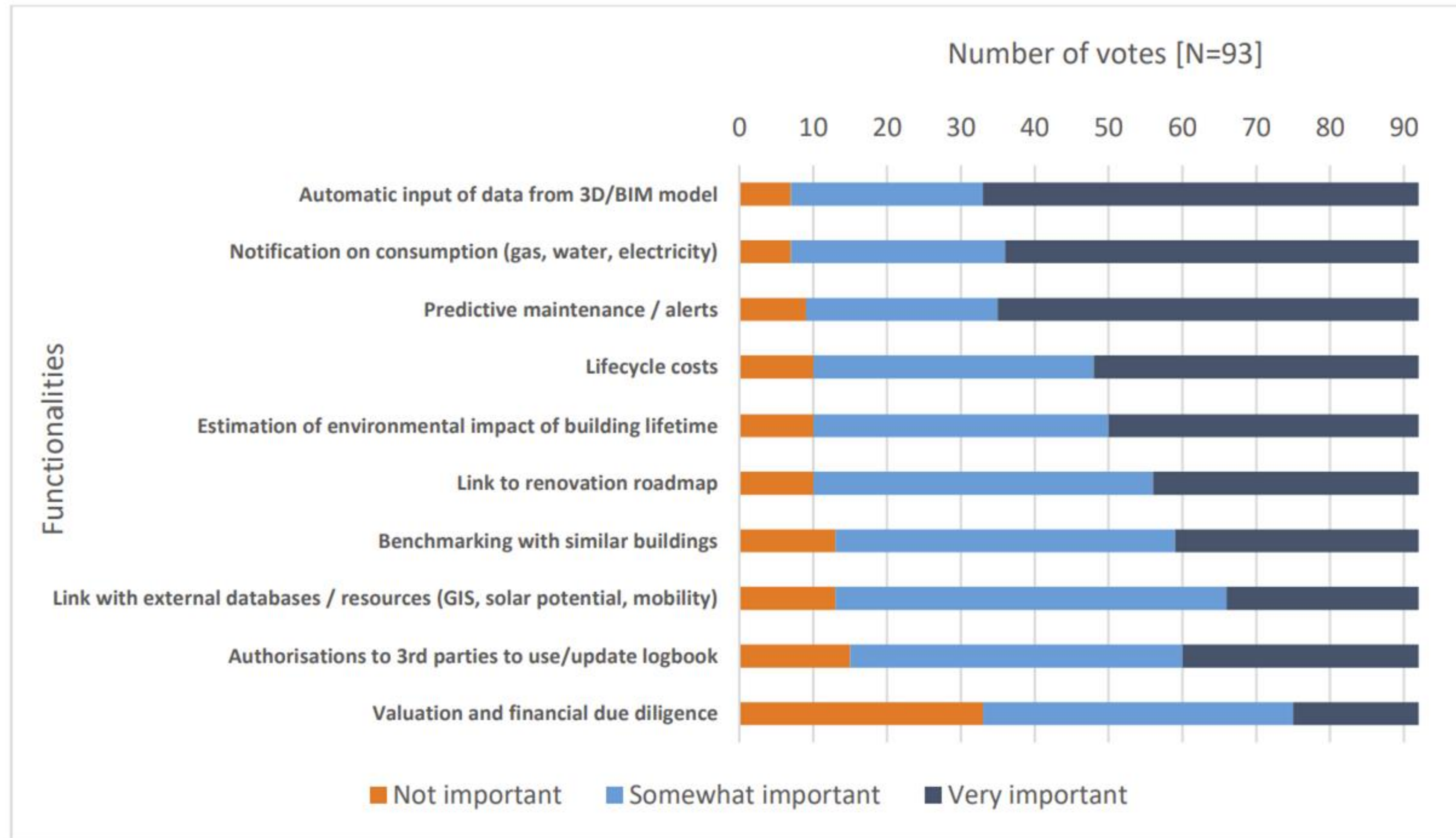
- Repositories of documents / Shared folders (Dropbox)
- Solutions for construction that may be adapted as DBL
- Social Networks, Communities + Document repository

Best approach:

- Develop from scratch or integrate?
- Focus on the DBL or in the added value services?



# What are the main functionalities of DBLs?



source: E. Commission, E. A. for Small, M. sized Enterprises, S. Dourlens-Quaranta, G. Carbonari, M. De Groote, G. Borragán, S. De Regel, Z. Toth, J. Volt, J. Glicker, A. Lodigiani, M. Calderoni, T. Loureiro, R. Sterling, B. Vandeveld, C. Spirinckx, I. Kondratenko, N. Rajagopalan, O. Rapf, Study on the development of a European Union framework for digital building logbooks : final report, Publications Office, 2021. doi:doi/10.2826/659006.

# Data sources and types

- What does “all relevant data” means?
  - EPC
  - BRP
  - Models (IFC, 3DVM)
  - Permits?
  - Sensor streams?
  - Pictures, quotes, documents,
  - what about future data we don't know yet?
- Lack homogeneity or consensus in the data formats a DBL should support or use to represent the data collected

# Users and stakeholders

- EC definition mentions
  - building owners and occupants
  - financial institutions
  - public authorities
- EC definition interviews considered
  - a) Demolition industry [1], building owners [2], finance [3] architects [4], digital services [4], engineers [4], contractors and craftspeople [7], construction material and products [13], public authority [18], research [30]
  - b) Building owner representatives [3], construction industry and manufacturers [2], suppliers of energy efficiency solutions [1], digital and data services providers [4], building automation and control [2], finance [1], real estate developer [1] and researchers [3].
  - Eight respondents have experience of implementing a version of a DBL, as a private [5] or public [3] initiative.

# One DBL to rule all?

- Do we need a Word processor or just a powerful text editor?
  - More complexity, less clarity, less transparency
- Do we need another platform on the construction ecosystem or the DBL is just a functionality of other construction software?
- Is a DBL for public authorities and for building owners the same?
- Will we ever see meta-DBLs, which aggregate information from DBLs?
- Is the DBL really a repository of relevant data or is it just an excuse for rating, benchmarking and data analysis.

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# Digital Building Logbook

## Our approach

# Approach - Back to basics

- Problem
  - During their lifecycle, buildings generate a large amount of **data** and information that usually are **scattered and difficult to access.**
- Solution
  - DBL as a key solution to bridge the gap between the great amount of data and information generated during the building's life cycle and the lack of methodologies and tools to **safely manage, organise, structure, and share this data.**

# Approach - Repository of relevant data

- Information management, search, filtering and visualization
  - Tags, bookmarks, filters, search engines, versioning, metadata
- Visual user interface (UI):
  - Web based, avoid complexity, present timelines
- User and role management
  - use of the platform, permissions and data sharing
- Integration and sources
  - facilitate data exchange (input) and allow the user to download filtered and generated data
- Notification and alerting
  - new documents, data input events

# Approach - Security, privacy and integrity

- Trust, transparency and data reliability appears often
- Smart-contracts and blockchain also usually mentioned
- Blockchain to store integrity info and validate the author, date, version of the document and integrity -> Traceability
- Multitenancy (cloud platform): One instance multiple clients
- Role Based Management Model, Authn + Authz
  - Federated Authn?
- Privacy by Default, Privacy by Design, User centric
- Separation of functionalities:
  - Kind of Model-view-controller (MVC) design pattern
    - Differentiation between DBL UI & Interfaces, DBL logic and DBL storage and data management



# Approach - Integration

- Developing a solution that integrates with everything is unrealistic
- Data formats and types
  - Our approach: i) document data, ii) key-value pair data, iv) (semi-)structured data.
- Support for regular data updates
  - Stream data and sensor data?
- DBL as a sink (computing)
  - destination of data flows
- API endpoints for storing and retrieving data

# Approach - Connectors & added value apps

- Solves the integration issues
- Prepares the DBL for future needs
- Enables the creation of scripts/tools for integrating new data
  - E.g: Download data from the source XYZ, preprocess and upload it to the DBL
- Enables the creation of tools using DBL data
- Enables to insert DBL data in other construction software
- Facilitates the research and the development of added values solutions surrounding the DBL

# Digital Building LogBooks - R2M Ecosystem



- Start: 01/07/2022 - End: 31/12/2025
- <https://www.chronicle-project.eu/>

- **Full name:** Building Performance Digitalisation and Dynamic Logbooks for Future Value-Driven Services
- Chronicle DBL is a cloud solution for storage, organisation and traceability of documents and relevant information about the life of the building.
- Integrate the logbook with the CDE for building data capturing in a dynamic way
- Methodology for regular data validation updates supported by blockchain technology for trust, transparency and data reliability
- Target user group is building owner

# Digital Building LogBooks - R2M Ecosystem



- Start: 01/07/2022 - End: 31/12/2025
- <https://www.smartlivingepc.eu/en>

- Full name: Advanced Energy Performance Assessment towards Smart Living in Building and District Level
- Roadmap for linking EPCs and EPC data to the DBL, based on stakeholders' needs
- Innovative use cases for DBL and EPCs
- Literature review and market analysis

# Digital Building LogBooks - R2M Ecosystem



- Start: 01/10/2022 - End: 30/09/2025
- <https://www.smartsquare-project.eu/>

- Full name: Smart Tools for Smart Buildings: Enhancing the intelligence of buildings in Europe
- SRI integration roadmap to digital logbooks with the aim to allow the future integration of the SRI ratings and its background information.

# Digital Building LogBooks - R2M Ecosystem

LEGOFIT

- Start: 01/10/2022 - End: 30/09/2025
- <https://www.smartsquare-project.eu/>
- Full name: Smart Tools for Smart Buildings: Enhancing the intelligence of buildings in Europe
- Residential Building BIM-based Digital Logbook
- Secure interoperable data governance framework for managing critical building data (materials used and energy performance)
- Integrate the logbook to the circularity passport

# Conclusion - S.E perspective

- There is still no clear consensus on what DBL is and what its functionalities are
  - There are ongoing discussions/initiatives solving this
- There is a significant overlap between different construction-related software
- Integrating with everything is unrealistic -> Connectors
- Room for research on side areas: Semantics, big data, AI, data Viz...

# Conclusion II - S.E perspective

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# Thank you!

[www.r2msolution.com](http://www.r2msolution.com)

T: +39 0382 1726596+

Via F.lli Cuzio 42, 27100 Pavia, Italia



[/r2m-solution](https://www.linkedin.com/company/r2m-solution)



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