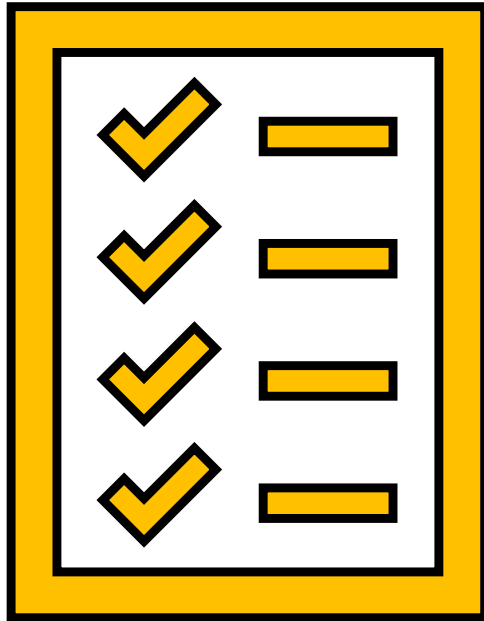# BUILDCHAIN - Aims & Ambition

Jairis Alvarez Trujillo – RINA Consulting

The Digital Building Logbook(DBL): An Overview

The digital building logbook has become increasingly popular in Europe due to its ability to improve building management efficiency and sustainability. However, data restrictions and accessibility vary across different countries, making it essential to consider the legal requirements before implementing the logbook.

Definition of DBL:

A digital building logbook is a dynamic tool that allows a variety of data, information and documents to be recorded, accessed, enriched and organised under specific categories. It represents a record of major events and changes over a building's lifecycle, such as change of ownership, tenure or use, maintenance, refurbishment and other interventions.

As such, it can include administrative documents, plans, description of the land, the building and its surrounding, technical systems, traceability and characteristics of construction materials, performance data such as operational energy use, indoor environmental quality, smart building potential and lifecycle emissions, as well as links to building ratings and certificates. As a result, it also enables circularity in the built environment.

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

# The Digital Building Logbook(DBL): An Overview

How to create a Building Digital Logbook?

To create a building digital logbook, building owners and operators should consider the building's specific needs and choose software that fits those requirements. The software should allow for easy data entry, data visualization, and analysis. Additionally, staff should be trained on how to use the software effectively to ensure that the logbook is updated and accurate.
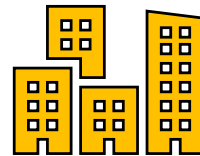
How to apply a DBL to a Building?

Once the digital building logbook is created, it can be used to monitor and track building performance, maintenance work, user disturbance, energy usage among other aspects. Building owners and operators can use this data to identify areas of improvement and make informed decisions to optimize building operations.
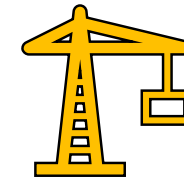
### How are Digital Building Logbook Transforming the Construction Industry?

Digital building logbook are transforming the AEC industry by improving building management efficiency and sustainability. It allows for real-time monitoring of building performance, which enables building owners and operators to identify and address issues promptly. Additionally, it helps to optimize building operations, reduce energy consumption, and improve occupant comfort. Overall, the digital building logbook is a powerful tool that is revolutionizing building management and sustainability in Europe and beyond

Reference: European Commission - Data Protection: https://ec.europa.eu/info/law/law-topic/data-protection_en French RT2012 Regulation: https://www.ademe.fr/sites/default/files/assets/documents/guide-pratique-rt-2012-tome-1.pdf, Building Performance Institute Europe - Digital Building Logbook: https://bpie.eu/publication/digital-building-logbook/, Sustainable Buildings and Construction Programme - United Nations Environment Programme: https://www.unep.org/resources/report/sustainable-buildings-and-construction-programme, Building Owners and Managers Association International - Building Performance: https://www.boma.org/advocacy/energy-environment/building-performance/, Smart Buildings Magazine - Digital Building Logbook: https://smartbuildingsmagazine.com/features/digital-building-logbook-the-benefits-of-a-single-source-of-truth

The Digital Building Logbook(DBL): An Overview

Data Restrictions in Each Country in Europe

Each country in Europe has its own data protection laws that govern the collection, storage, and processing of personal and building data. For example, the General Data Protection Regulation (GDPR) in the European Union applies to all member states and regulates the processing of personal data. Additionally, some countries have specific regulations for building data, such as the French RT2012 regulation, which requires building owners to provide detailed energy performance data for buildings
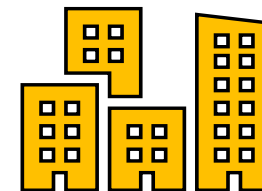
Who Can Access the Data?

The digital building logbook contains sensitive data related to building operations, maintenance, and performance. Therefore, access to this data should be limited to authorized personnel only, such as building owners, operators, and maintenance staff. Additionally, the logbook should comply with data protection laws and regulations to ensure that personal data is not accessed by unauthorized parties

Study on the Development of a European Union Framework for Digital Building Logbooks).

In Ireland, the architect prepares a safety file, a record of information outlining health and safety risks, which is handed over to the building owner when the project is completed. Architects and developers in many countries (see e.g. Sweden and Germany) are required to produce similar building commissioning handbooks which not only describe technical systems and performance, but also sustainability, health, comfort, productivity, safety and security aspects.

Private initiatives in Germany (Eigenheim Manager) and Sweden (MinVilla) are offering building owners the possibility to store all building-related information in a digital repository

In Sweden, it is common to log the products and materials used during construction and renovation works to prove compliance with environmental requirements and certificates.

Public authorities in Portugal and Flanders (Belgium) are embedding the energy performance certificate databases and related renovation roadmaps into a DBL7.

In the United Kingdom, building owners are entitled to be provided "with summary information about a new or refurbished building, its building services and their maintenance requirements in a building logbook"8. Facility managers in most countries have a long tradition of developing maintenance plans and logs

BUILDing knowledge book in the blockchain distributed ledger

Trustworthy building life-cycle knowledge graph for sustainability and energy efficiency

Motivation

Problem:
- Building stock consumes over 40% of the overall energy consumption in the European Union
- Need for a built environment that is more resilient, sustainable, and healthier

Hypothesis:
Efficient, transparent, and trusted data exchange   sustainability, resilience, and energy efficiency

Obstacles and Challenges:
- Replicated building-related processes during the life-cycle
- Lack of coordination, lack of trustworthy data exchange in the building sector (collected information is currently spread in an isolated manner over different databases and is in the hands of different actors)
- Lack of standardization: difficult to compare and combine information from different projects
- Data security: often sensitive information,
- Lack of incentives to share data and collaborate on projects

Objectives:

Create a decentralized quality data ecosystem management system using blockchain technology

Improve energy efficiency, cost effectiveness, circularity and climate resilience by monitoring the current state of buildings through the integration of existing digital technologies such as digital twining, blockchain, and IoT-based sensing.

Improve the safety, health and comfort of building occupants integrating data-driven modelling tools and optimizing functions.

Improve the management of large building stocks

Ensure the trustworthiness, transparency and traceability of logbook data

Create a new tokenized economy around Digital Building Logbooks (DBLs

The Core Idea:
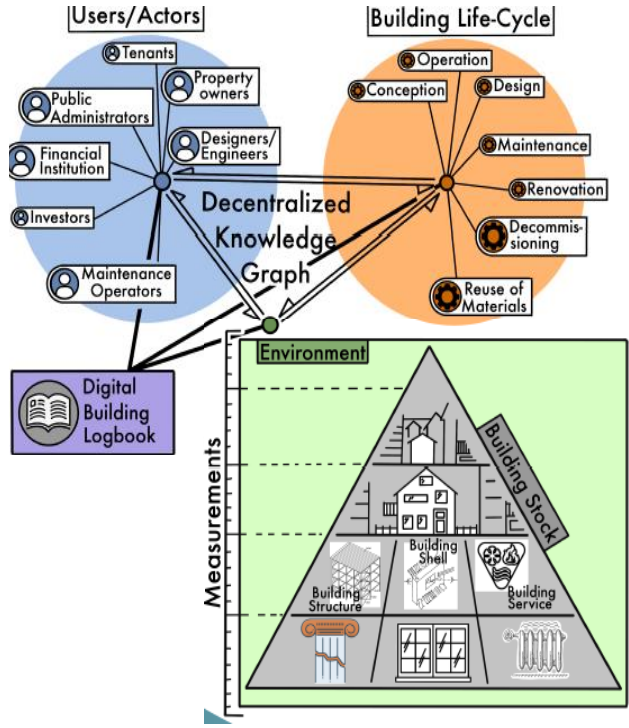
BUILDCHAIN targets to exploit the potential of using Digital Building Logbooks (DBLs) for a smarter and more sustainable built environment of the European Union

Build a Knowledge Base, that can be used to trace all activities related to the overall life-cycle of buildings.

The creation of a trusted data ecosystem economy around such high-quality data will significantly improve the offered services and products in the Building Life-Cycle sector.

The Core Idea

BUILDCHAIN will **extend a Digital Building LogBook (DBL)**, used by the municipality of Florence, for the management and administration of its huge set of buildings, with several available and **novel data, tools, and functionalities, with the help of a Decentralized Knowledge Graph (DKG)**, an open source blockchain-based solution

DKG software will include specific building-related ontologies, so that the whole knowledge base about the life-cycle of the building can be logged and by that continuously updated, providing mechanisms and interfaces for the relevant stakeholders, to publish, trace, share, tokenize, end even trade models in a market economy.
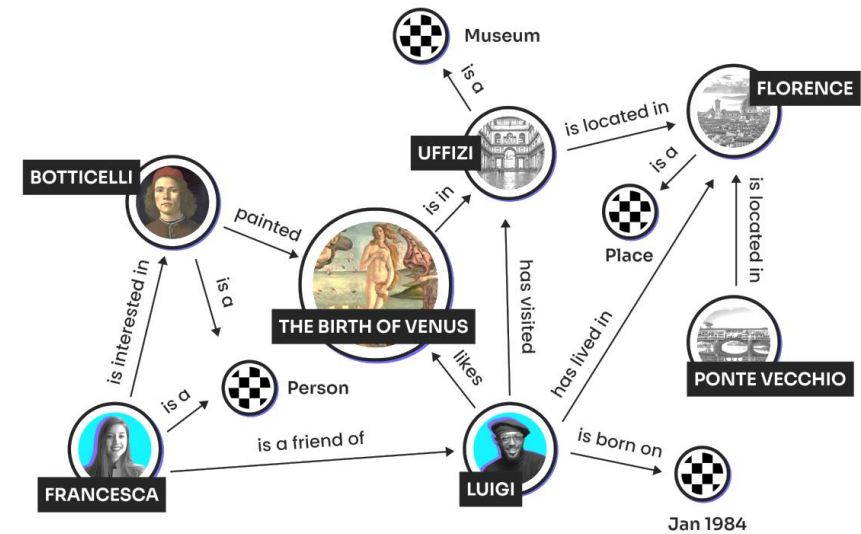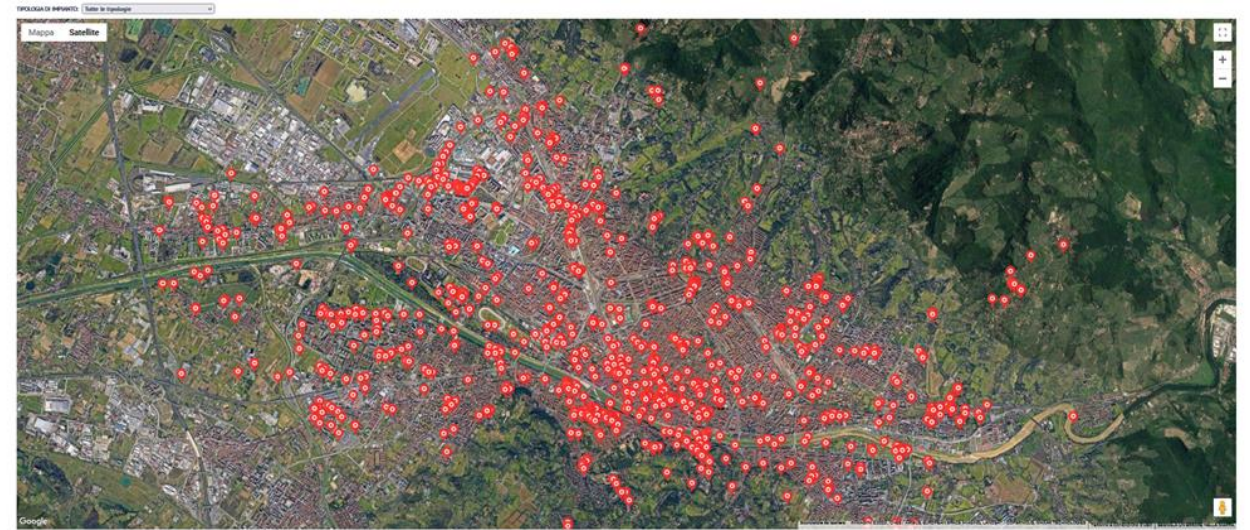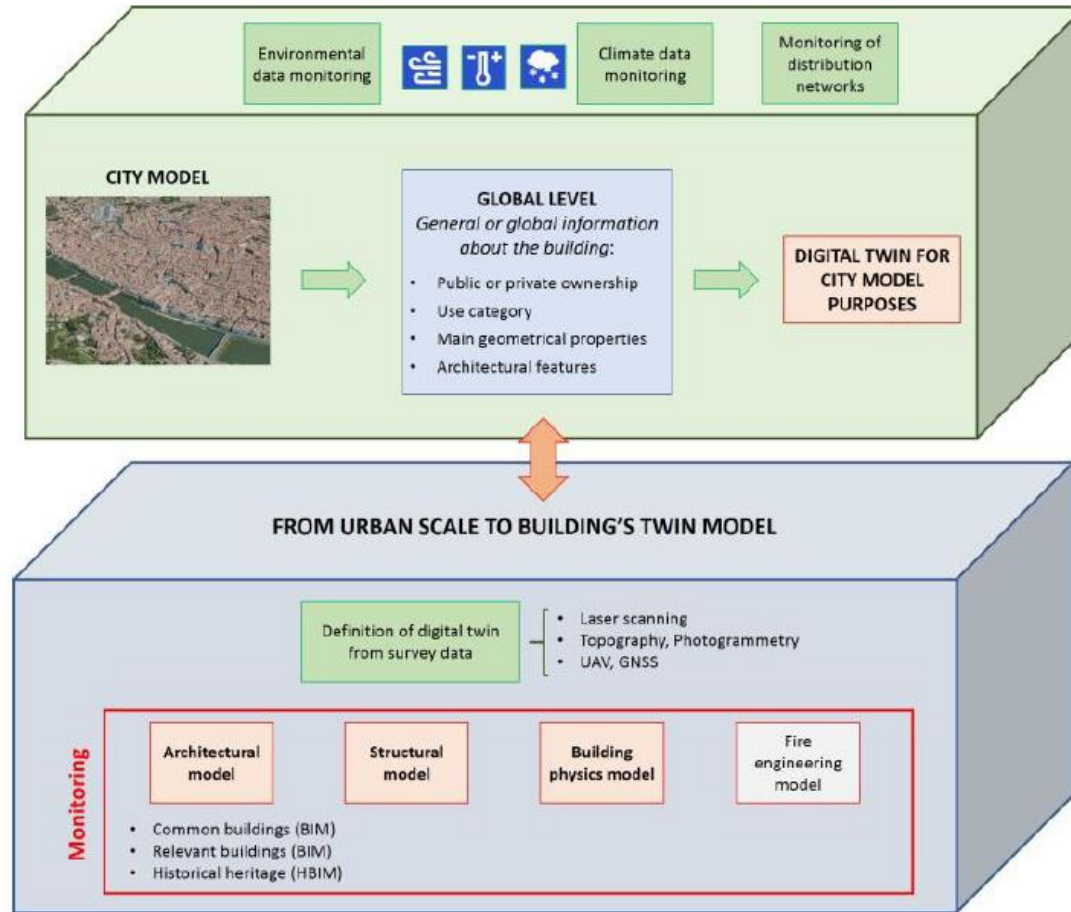
The Core Idea
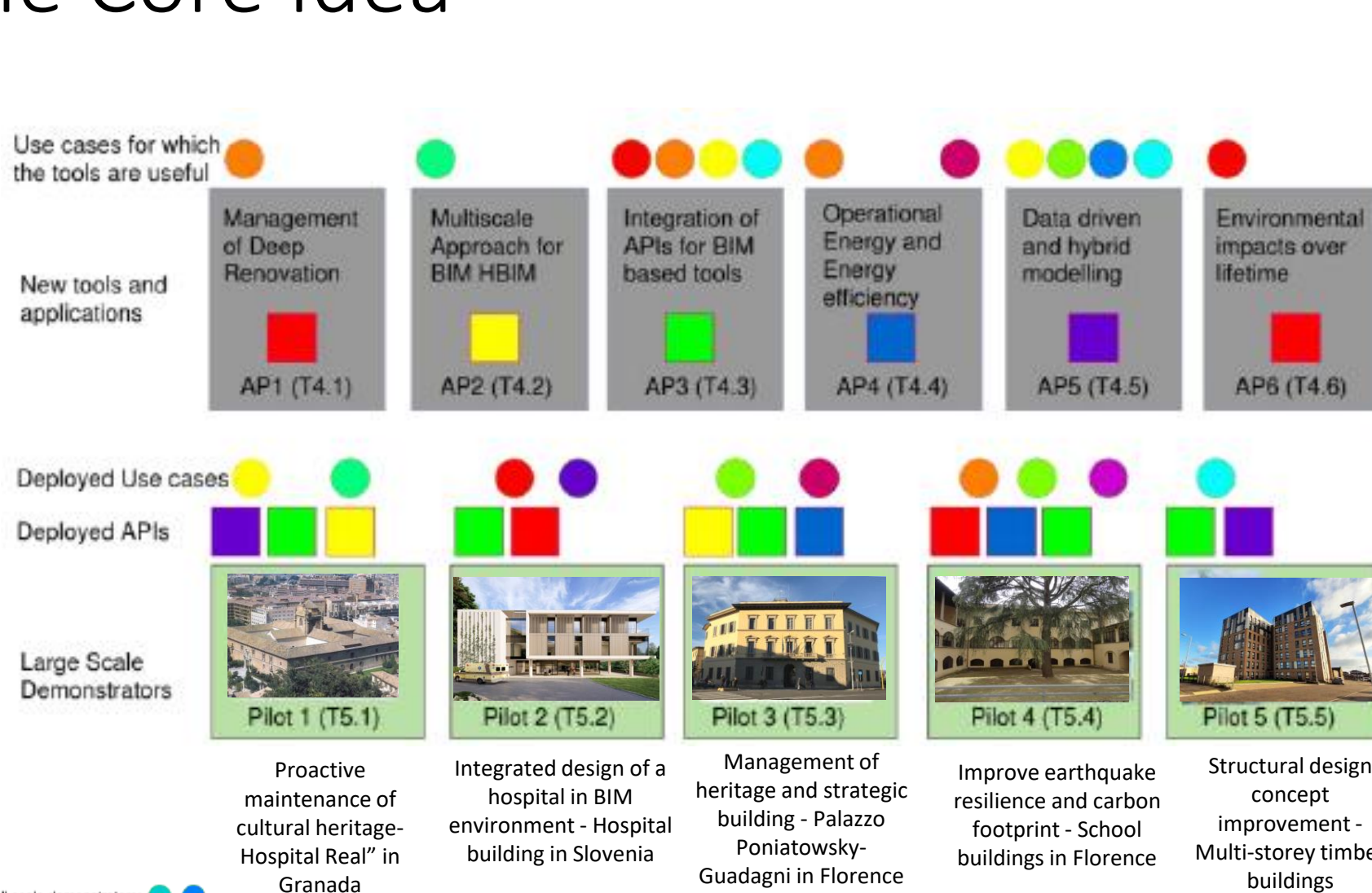
Use Cases

The multi-scale approach

Project structure

- **WP1 Project management and coordination**

- **WP2 Logbook design** (stakeholder needs, novel use cases, schematic flow of use cases, establishment of common data environment)

- **WP3 DKG Logbook implementation** (solution for off-chain and on-chain data management of the project, DKG integrated with blockchain, smart contracts, interaction among entities

- **WP4 Technological Applications of DBLs** (development of new features and tools, make use cases feasible)

- **WP5 Built environment Ecosystem and economy** (test and validate tools, collect and update data of buildings, improving resource efficiency, decarbonization, safety, intervention and maintenance strategies)

- **WP6 Dissemination and exploitation**
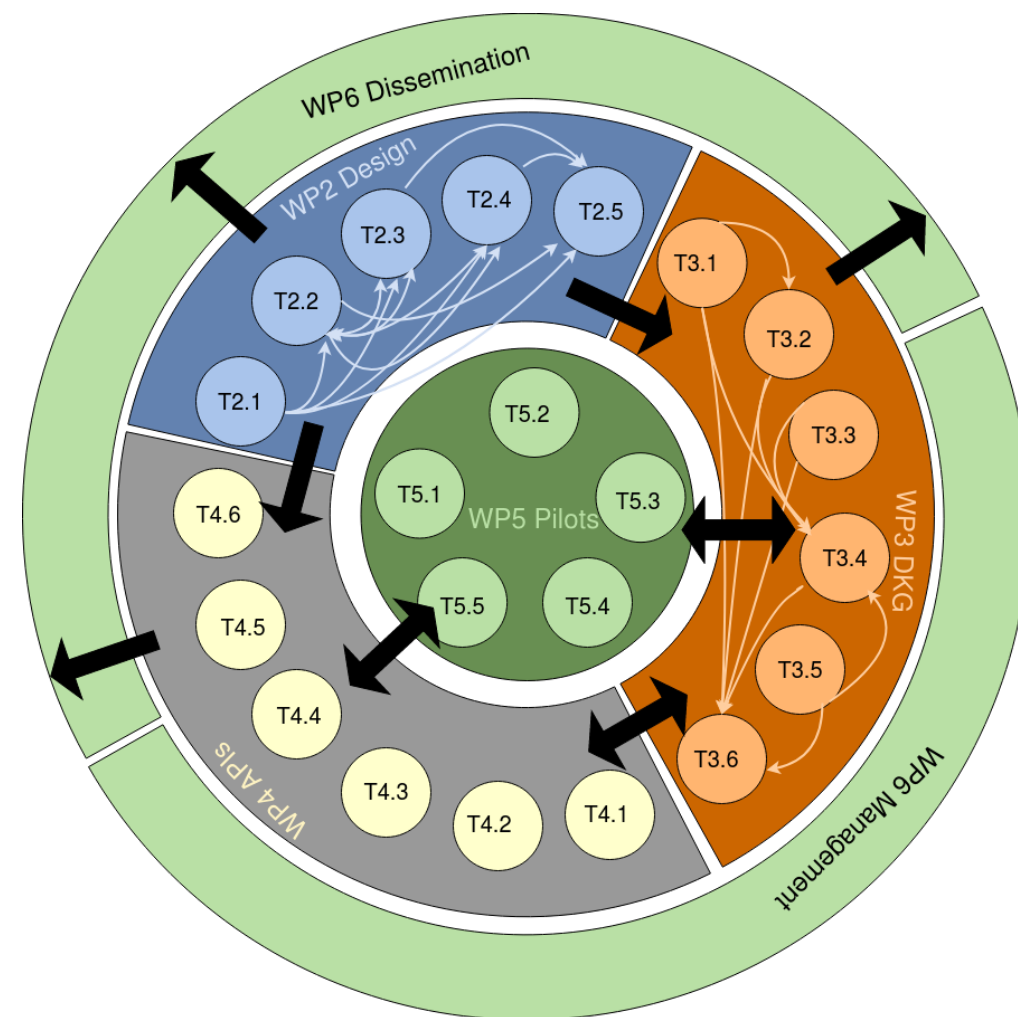
Expected impacts

Economical

Increase productivity, innovation capacity, resilience, sustainability, and global competitiveness

Global standardization of DBL data resulting in enhanced interoperability and increased competitiveness in the European building sector

Societal

Acceleration of the twin green and digital transition of the construction sector

A more resilient European society, prepared and responsive to threats and disasters
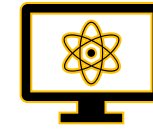
Scientific

Increment of innovation capacity through follow-up procedures

Thank you for your attention!

Contact: jairis.alvarez@rina.org / clemente.fuggini@rina.org