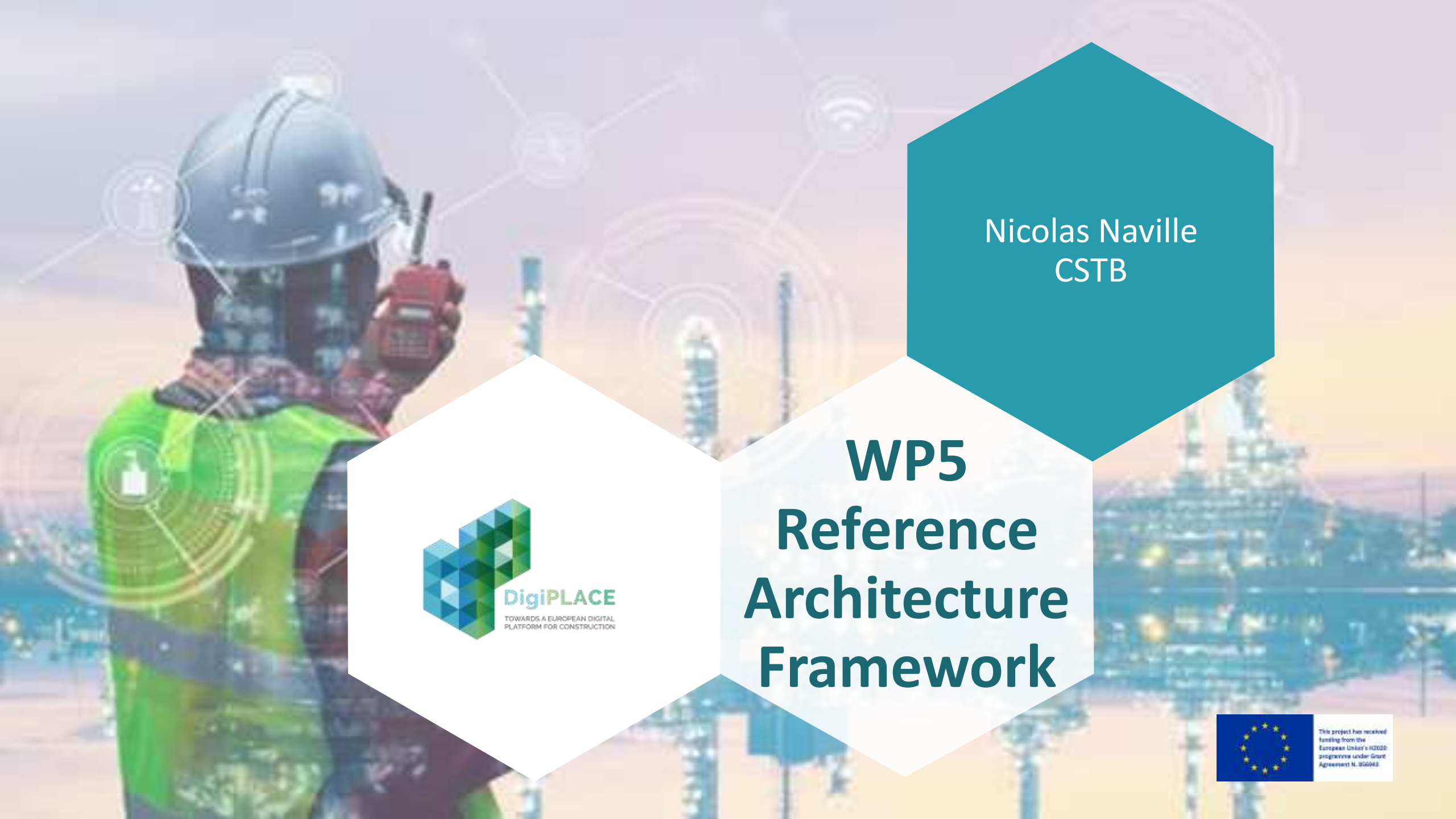


Nicolas Naville
CSTB

DigiPLACE
TOWARDS A EUROPEAN DIGITAL PLATFORM FOR CONSTRUCTION

WP5 Reference Architecture Framework

This project has received funding from the European Union's H2020 programme under Grant Agreement N. 856943

WP5: Snapshot

Objectives

- Define the high level specifications of DigiPLACE
- Propose a **Reference Architecture Framework** for digital construction platforms in Europe

Purpose

- Define and share a common vision of how digitalization is expected to transform the construction sector
- Make sure that a proper framework is set up to support this vision based on agreed principles

Tangible Outcomes

- Selection of **35 key use cases** of digital platforms, from a discussion among partners and stakeholders
- Definition of high level specifications for the RAF
- WIP: definition of **the RAF scenarios**, SWOT analysis

WP5: Tasks and Deliverables

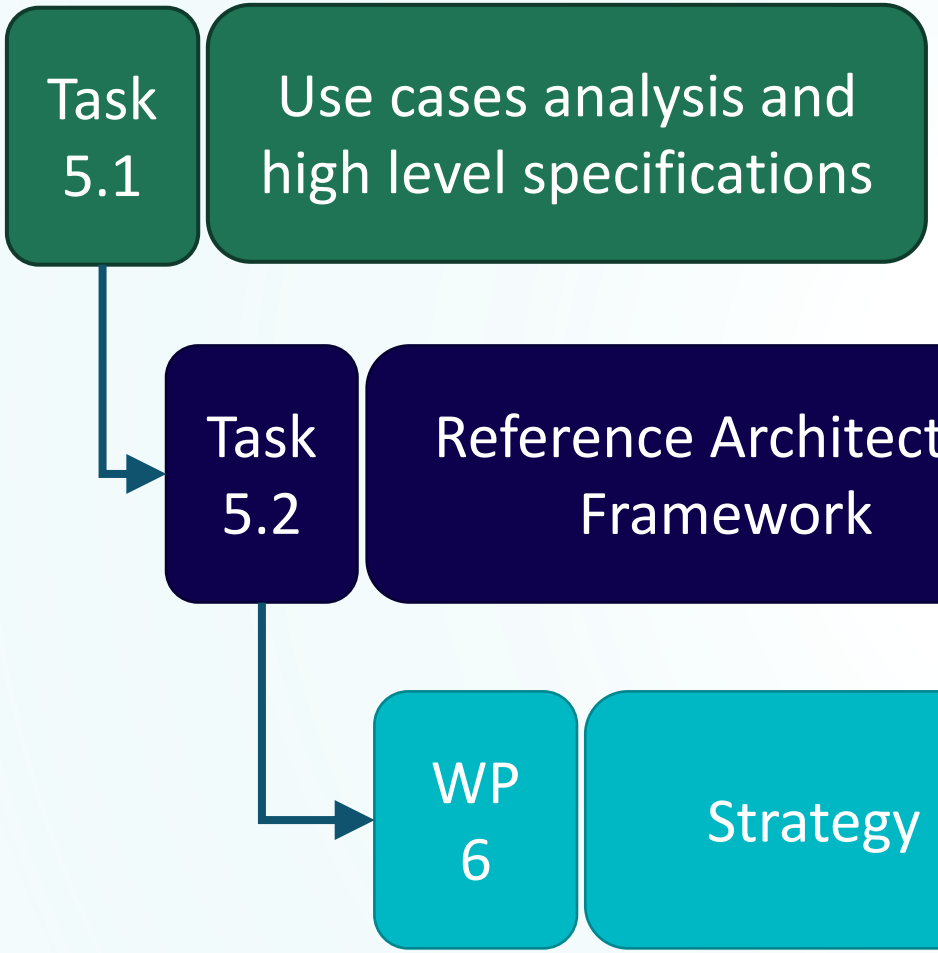
Tasks

- T5.1 (M6-M13): Use case analysis and high-level specifications (lead: PoliMi)
- T5.2 (M9-M16): Defining the Reference Architecture Framework (lead: CSTB)

Deliverables

- D5.1 (M13 – September 2020): Platform specifications
- D5.2 (M16 – December 2020): Architecture guidelines

DigiPLACE key outputs



The vision

of the digital transformation of european construction industry, expressed as key use cases, in order to achieve the core objectives (eg climate, resource use, health, productivity, competitiveness…)

The required architecture

to support this vision, in terms of digital tools, services and platforms, interoperability, data and knowledge sharing…

How to get there

Research effort, pilot projects, regulations, deployment of new services…

Identification of key use cases: the methodology

Step 1	- Analysis of the results of previous WPs in terms of use cases - **First clustering of the different topics to address and potential use cases**
Step 2	- **Collection of contributions from partners and AB members** - Based on a table of use cases - Objective: get a more comprehensive list of the topics to address, identify priorities and different points of view
Step 3	- **Workshops on 5 identified areas**
Step 4	- Further analysis and synthesis - **Selection of 35 key use cases**

The 5 identified areas

AREA / WORKING GROUP

- Common language, interoperability, standards
- Rules & Regulations, public services
- Data and knowledge sharing
- Environmental performance
- Business, market and collaboration

- 5 working groups on 5 main areas
- Not disconnected issues, but rather different viewpoints to address all the issues, with some overlap

The working groups

	Working Group	Group leader	Date of the workshop
WG1	Common language, interoperability, standards	BSi	July 13, 2020
WG2	Regulations, public services	Ministries from France, Germany and Italy	July 10, 2020
WG3	Data and knowledge sharing	POLIMI	July 15, 2020
WG4	Environmental performance	LIST / ECTP	July 15, 2020
WG5	Business, Market and Collaboration	CSTB	July 3, 2020

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Identifying DigiPLACE key use cases: a dual approach

Construction sector use cases

- Related to the digital transformation of construction
- Supporting the underlying objectives: productivity gains, improved environmental performance,
- …

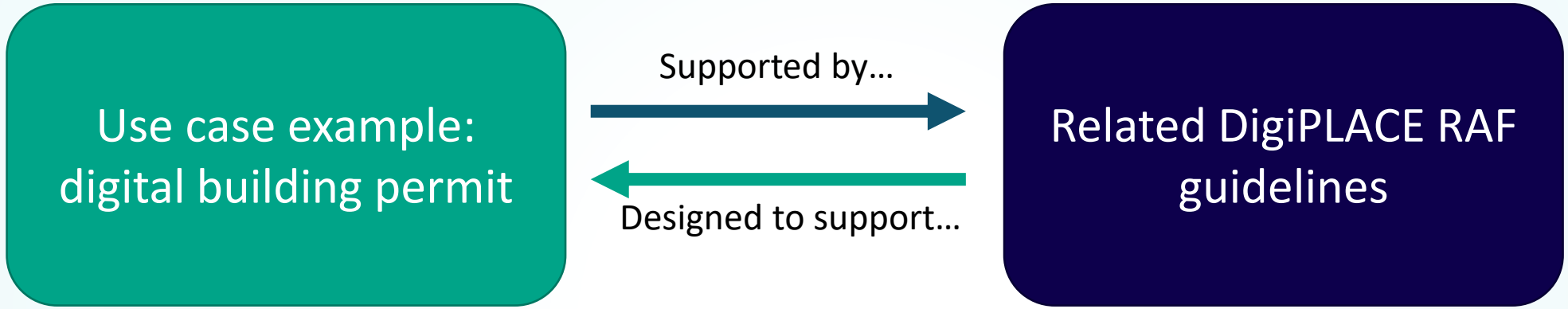
Supported by…

Designed to support…

DigiPLACE RAF guidelines

- Guidelines for construction platforms architecture
- Guidelines for standards implementation
- Proposal of tools and services
- Guidelines for public services/ regulations
- …

An example



- Use case description: digitalized building permit application using BIM models. Semi-automated compliance checking

- Use of Open BIM standards
- Dedicated information requirements
- Need of ontologies for urban planning rules
- Required public tools & services
- …

Identification of key use cases: main outputs

- Synthesis of the discussions for each area
- Identification and analysis of the main trends and topics to address
- **Selection of 35 key use cases**, to provide a synthetic view and serve as a shared base for the definition of the RAF

Key use cases: Area 1 - Common language, interoperability, standards

Identified topics	Selected key use cases
Access to standards	Free and neutral accessibility of the standards. Publish all kinds of standards in a publicly available repository.
	Mapping between standards at the document and entity levels
Use of standards	Engage with a broad community, provide standards implementation guidelines to end users, and collect feedback from end users
Standards for improved data usage in the operation phase	**Using digital twin with BIM and linked data in the operation phase, enabling an ecosystem of digital twins**
Interoperable product data databases	**Seamless access to products data, readable by machines, and automatic matching between manufacturers' products and BIM data**
Contracts	Have computer interpretable definitions of exchange requirements

Key use cases: Area 2 – Rules and regulations, public services

Identified topics	Selected key use cases
Building permit	**Digitalized building permit application and delivery, with semi-automated compliance checking**
Rules compliance checking	Making available tools to check the compliance of a project with the various existing regulations and certifications (European, national, local), at any stage of a project
Access to construction rules	Provide easy and harmonised digital access to local, national or European rules
Environmental, health and toxicity regulations	Integrate LEVELS framework in tools, services and platforms, to promote its use and generalization
Cadastre/land register and Territorial Digital Twin	Urban or National digital twin to provide easy and standardized access to territorial data (e.g.: 3D view, cadastre, town planning, utility networks…)
Public procurement	Manage calls for tenders for BIM projects and/or enable linking with (public, national) call for tenders' platforms
Building logbook	**Digital / BIM-based building logbook, to ensure the continuity of information about a building**
Large infrastructures' data	Sharing data of large public infrastructures and transnational projects

Key use cases: Area 3 – Data and knowledge sharing

Identified topics	Selected key use cases
Data sharing, open data and data analytics	Access to European technical databases, public administration databases and research databases
	Access to performance data of products, seamless information exchange regarding products, connection between existing local databases
	Sharing of private data (e.g.: on projects, assets, costs….)
Sharing of digitalization best practices	**Sharing of BIM and digital best practices through a European platform**
Sharing of innovation patterns	**Give access to innovation and research results to small and medium companies**
Reskilling of workforce	Online training modules for digital transition

Key use cases: Area 4 – Environmental performance

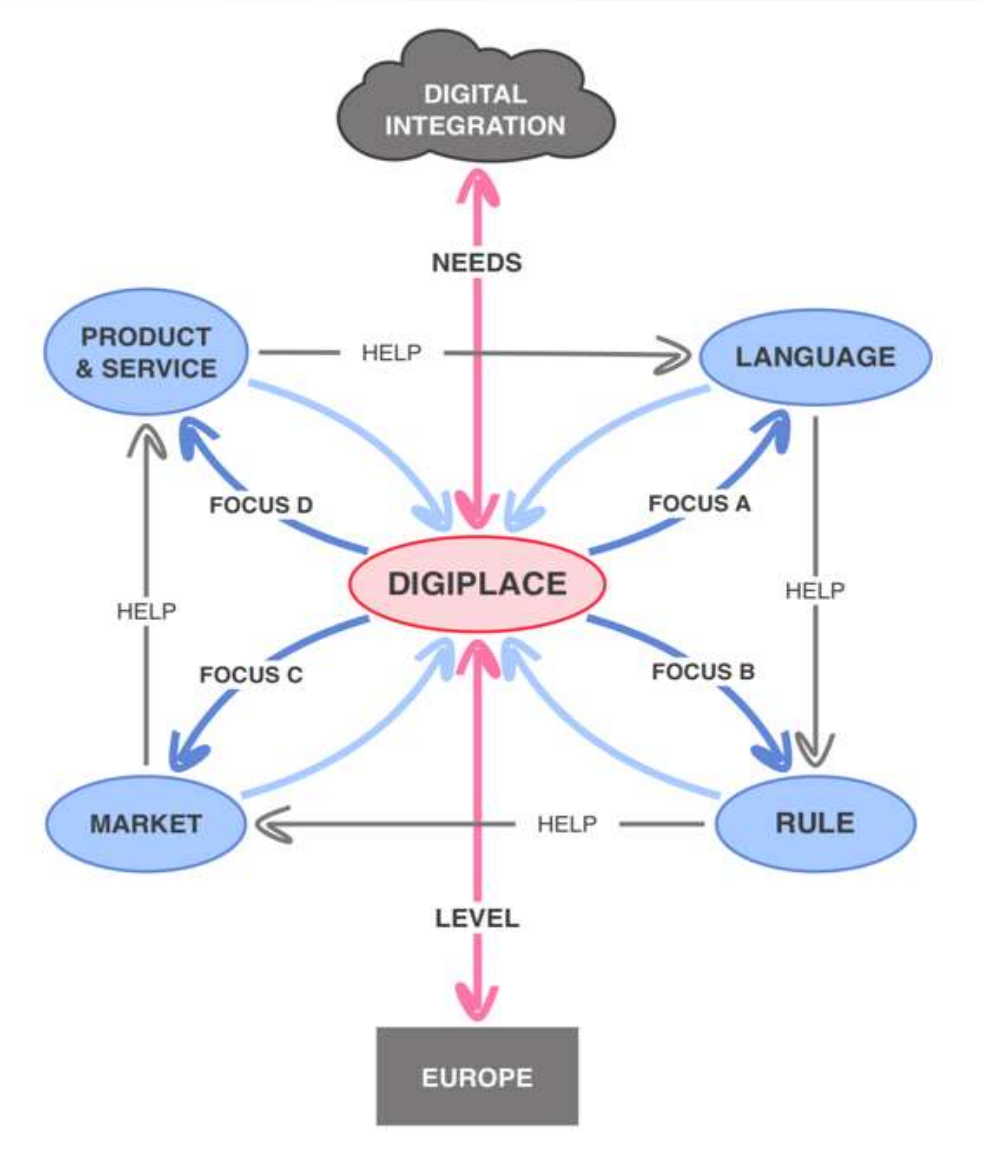
Identified topics	Selected key use cases
Sharing of environment-related data	Sharing of projects environmental LCA data
	Management and access to national EPC databases
	Access to environmental performance data of products (generic or manufacturers products) to be used in LCA calculation
	Provide access to CPR environment-related data of products in a harmonized digital format
Integration of LEVEL(s) framework	**Support the widespread use of LEVEL(s) in tools and services, integrate it in a common European data space, and provide tools to compare environmental performance of construction projects**
Life Cycle Assessment	**Environmental LCA calculation with BIM at different stages of the project, link between BIM and EPD**
Sharing of environmental best practices	Standardise the presentation of best practices associated to environmental performance of projects, processes, buildings or products

Key use cases: Area 5 – Business, market and collaboration

Identified Topics	Selected key use cases
Access to BIM and other services, marketplaces	Directory of public and private BIM platforms
	Ensure a level of interoperability between the different proprietary platforms (easier access to services, data portability…)
	Easily accessible BIM and collaboration toolkit, especially for SMEs
Collaborative platforms, Common Data Environments	Common guidelines for implementing common data environments
	Guidelines to ensure interoperability / data exchange between different CDEs
Digital supply chain, Industry 4.0	BIM approach in the call for tender phase
	E-catologues, integration of manufacturers' BIM objects into BIM models
	Integration of construction equipment in digital supply chain, use of construction equipment data
Contractualisation, Smart Contracts, Blockchain	BIM-related contracts standardisation: sharing of best practices, contract agreements templates
	Implementation of innovative solutions to ensure trust, data traceability and smart contracting (eg blockchain technologies)
Others	Integration of project tools with ERP, CRM and other business management tools

High level specifications

- A complementary desk work on platform functionalities
- Analysis based on mindmaps
- Scenarios analysis based on use cases



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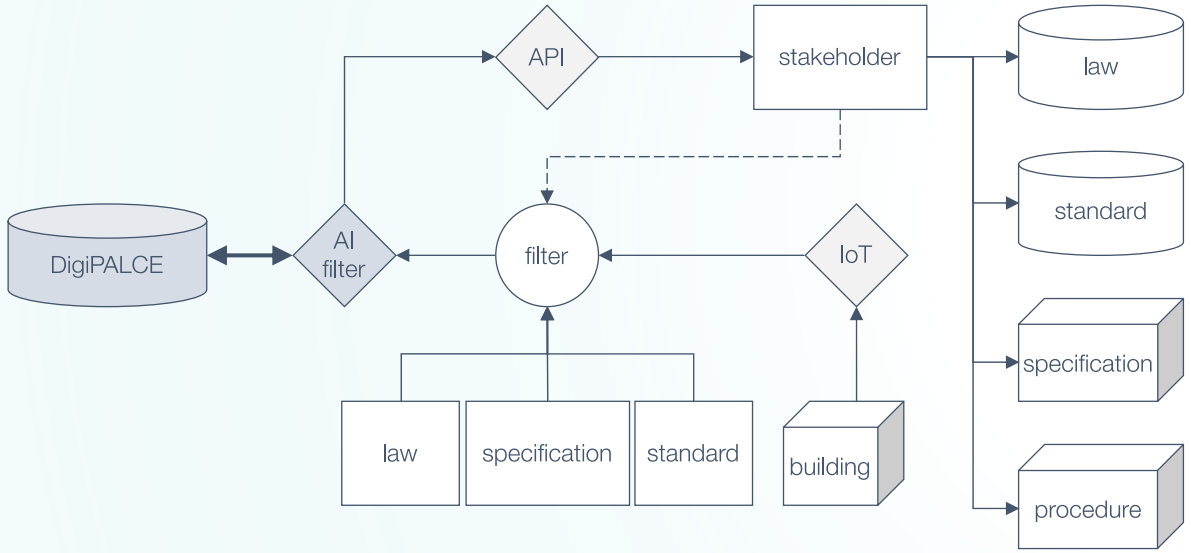
High level specifications

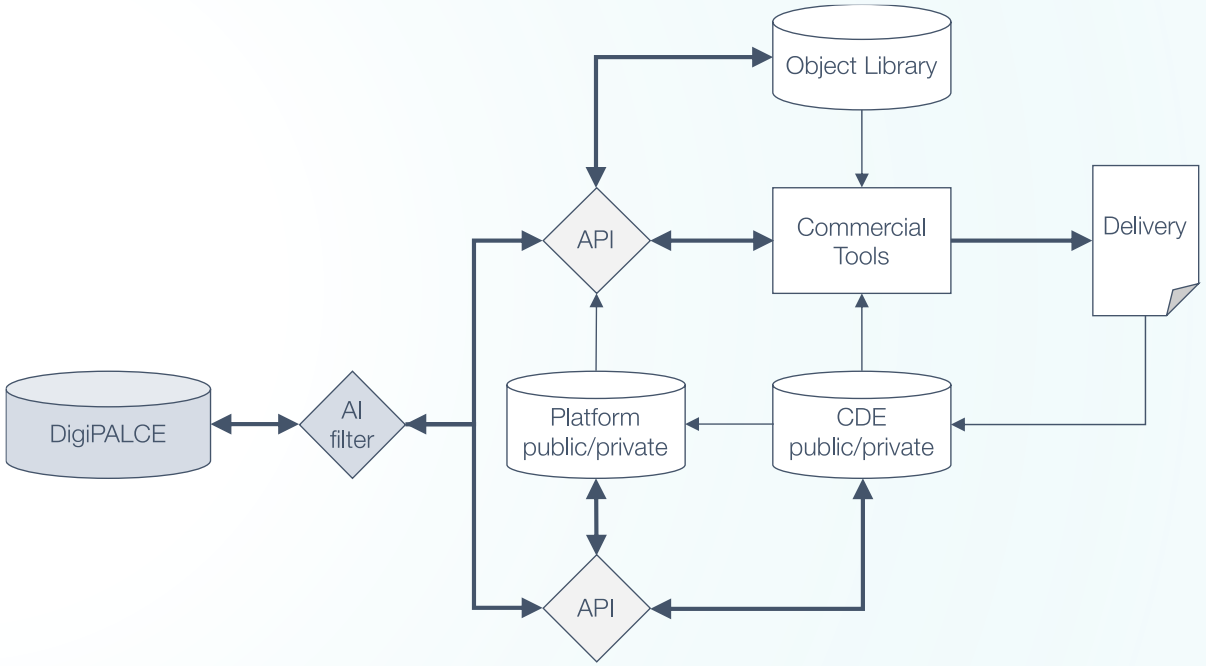
Scenario	Relation with use cases
Common language scenario	Standard for improved data usage in the operation phase Environmental regulation, health and toxicity regulation Data sharing, open data Data analytics
Integrated rules scenario	Access to standard Use of standard Rules checking compliance Access to construction rules Data sharing, open data Contractualisation, Smart Contracts, Blockchain
Integrated design process scenario	Data analytics Sharing of digitalization best practices Sharing of innovation patterns Life Cycle Assessment Access to BIM and other services, marketplaces Collaborative platforms, Common Data Environments Digital supply chain, Industry 4.0 Contractualisation, Smart Contracts, Blockchain
Improved product performance scenario	GIS Data, integration of BIM and GIS data Environmental regulation, health and toxicity regulation Data analytics Sharing of environment-related data
Securization of market and player scenario	Contracts Digitalized building permit Rules checking compliance Cadastre/land register and Territorial Digital Twin Public procurement Building logbook Data analytics Life Cycle Assessment Contractualisation, Smart Contracts, Blockchain
CE mark, smart CE scenario	Integrated product data bases Integration of LEVEL(s) framework

High level specifications

Integrated rules scenario



Integrated design process



Stucture and content of DigiPLACE Reference Architecture Framework

DigiPLACE Reference Architecture Framework

A comprehensive set of **common guidelines** for building and implementing **interoperable digital platforms** for the construction sector across Europe (public or private, local or european…)

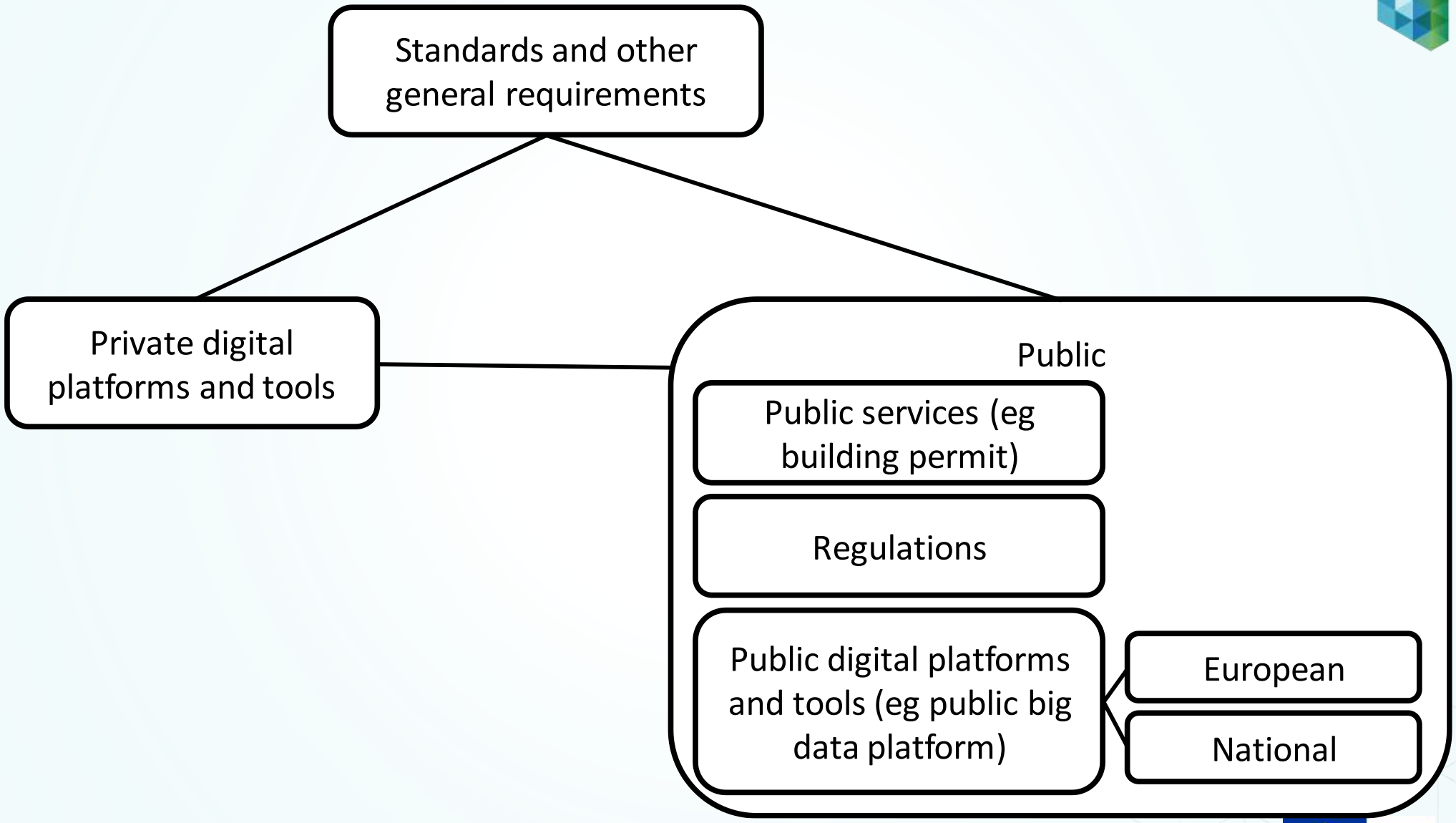
Different types of guidelines

- General guidelines for implementing digital platforms (interoperability, open standards, data security & privacy…)
- A referential of tools and services to be developped/generalized in order to support key use cases
- Special focus on required public services and regulations, both at EU and MS levels
- ….

Definition of DigiPLACE RAF: preliminary outline

1	General architecture requirements derived from WP3 and WP4
2	Analysis of a selection of key topics/use cases in terms of architecture requirements
3	Structuration and synthetic formulation of the RAF - General requirements (standards…) - Private tools and public tools/services, interactions between them
4	Focus: perimeter of public platforms, European and nation

High level structure of the RAF



Key topics to develop (1/2)

- Interoperable product databases, object catalogues and integration into BIM processes, optimize the supply chain
- European Big data platform (which data to share ? Link with European common data spaces…)
- Easily accessible BIM and collaboration toolkit, especially for SMEs, role of public platforms
- Ensure a level of interoperability between proprietary platforms, fair competition
- Provide common guidelines for implementing common data environments, and ensure interoperability / data exchange between different CDEs
- Data management along the lifecycle, digital twin (eg interlink, digital twin with linked data…)

Key topics to develop (2/2)

- Environment : Integraion of LEVEL(s) in platforms, EPD databases and EPD for BIM, LCA tools, sharing of EPC national databases, circular economy, material passports
- Digitalized building permit
- Building logbook
- Access to rules, rules checkers

WP5: Progress Update (M1-M12)

Work done

- T5.1 – Key use cases and high level specifications

Tangible outcomes

- Selection of 35 key use cases
- High level specifications

Deliverables issued

- D5.1: Platform specifications

WP5: Outlook – Planned Progress (M13-M24)

Next steps / actions

- T5.2 Reference Architecture Framework:
  - Workings sessions (Oct-Nov)
  - SWOT analysis of the different scenarios
  - Consultation of the CoS on key use cases and RAF

Planned outcomes

- Reference Architecture Framework
- SWOT analysis to identify key aspects to consider for the strategy roadmap (WP6)

Deliverables Due

- D5.2 (December): Architecture guidelines

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THANK YOU!

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