Outline

- DigiPLACE Reference Architecture Framework: scope, purpose and relation with other DigiPLACE outputs

- Overview of the Reference Architecture Framework

- Selection of guidelines and open options

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Scope of the Reference Architecture Framework

DigiPLACE Reference Architecture Framework

A comprehensive set of common guidelines for building and deploying 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…)

Tools and services to be developped/generalized to support key use cases

Special focus on required public services and regulations, both at EU and MS levels

Purpose

Construction digitalisation is complex: regulations, standardisation works, public and private platforms and initiatives, IT architectures, business model disruptions,...

➢ Put the existing references into **a comprehensive and structured vision**, and highlight their interconnections

➢ Improve the **common understanding of the ongoing evolutions, educate ourselves on the disrupting potential of digital platforms** for the sector

➢ Identify the gaps in this current landscape, and the **actions to be carried out to fill them**, in order to facilitate **the development of platforms** based on a common vision

➢ Create a **level playing field** for both construction stakeholders and digital services providers

➢ Support identified underlying objectives: **sustainability, competitiveness, single market...**

D5.2 – Architecture guidelines

- Delivered Jan. 2021

- Reference Architecture Framework

DigiPLACE key outputs

5.1 Use cases analysis and high level specifications

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

5.2 Reference Architecture Framework

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

WP6 Strategy Roadmap
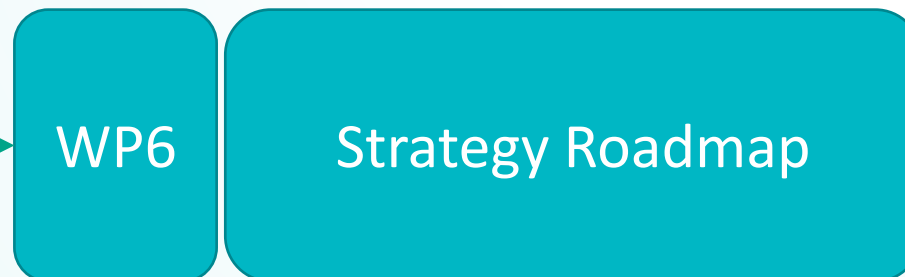
How to get there
Promotion, Research effort, pilot projects, regulations, deployment of new services…

Selection of key use cases

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PLATFORM FOR CONSTRUCTION

Examples of key use cases

➢ 36 key use cases

➢ Clustered in 5 areas

Common language, interoperability, standards	➢ Seamless access to products data, readable by machines, and automatic matching between manufacturers' products and BIM data
Regulations, public services	➢ Digitalized building permit application and delivery, with semi-automated compliance checking
Data and knowledge sharing	➢ Business to government data sharing for the public interest
Environmental performance	➢ Propose standardized BIM-Based LCA workflows and guarantee smooth integration amongst the tools used
Business, market and collaboration	➢ Integrate project tools with ERP, CRM and other business management tools

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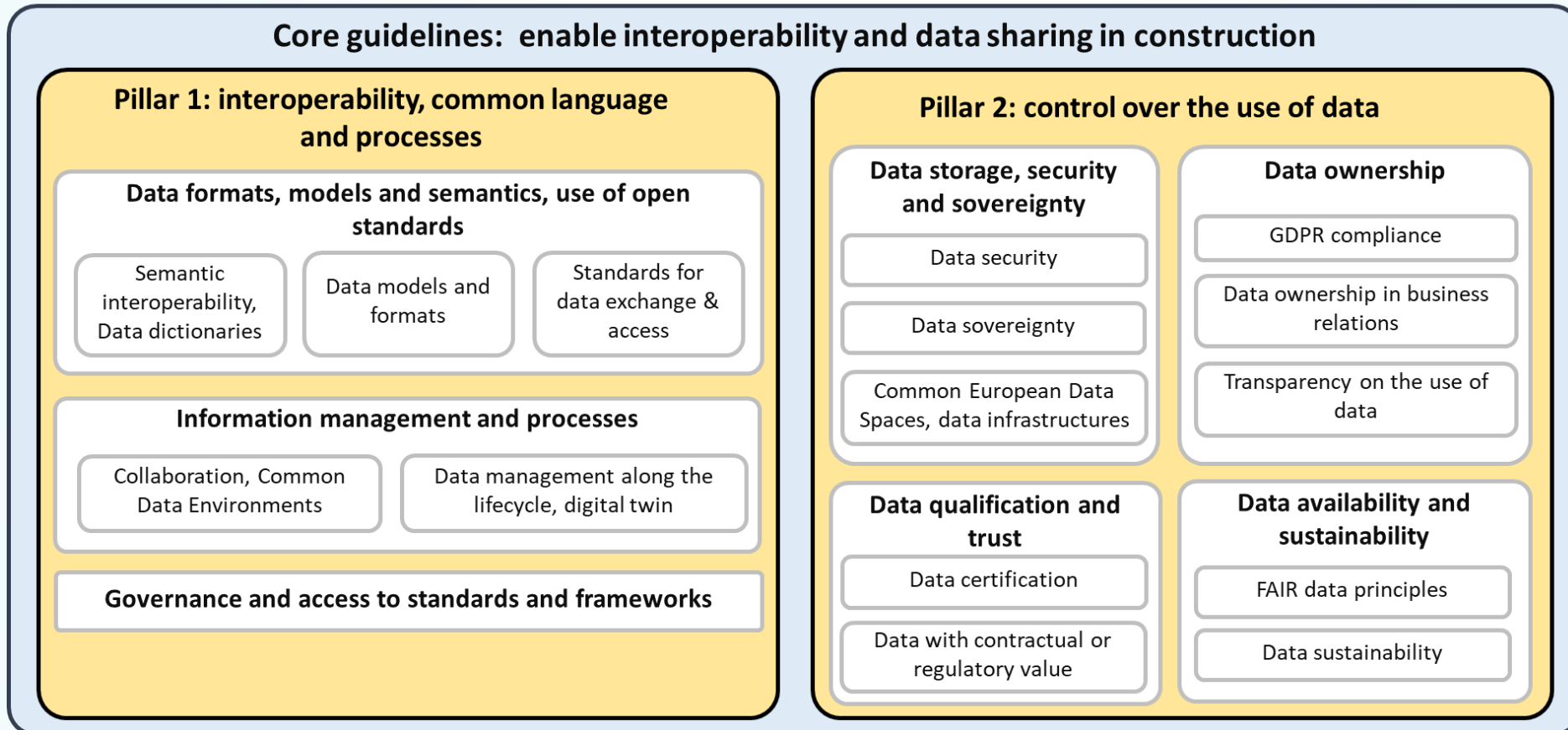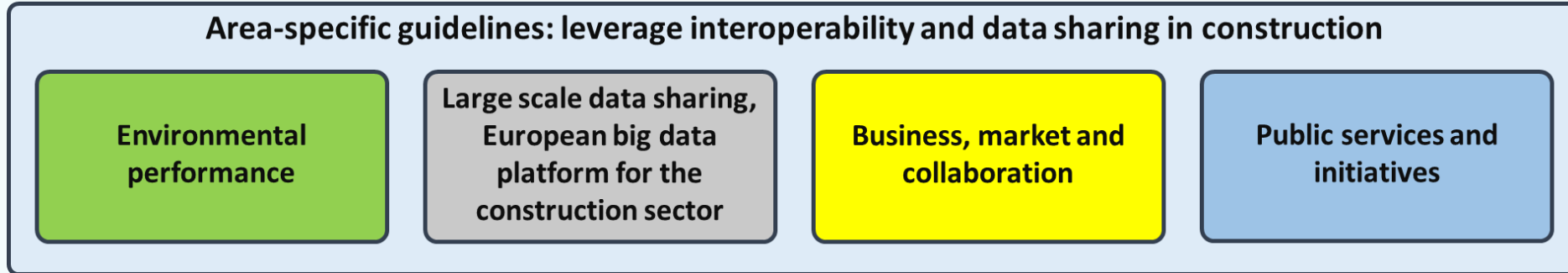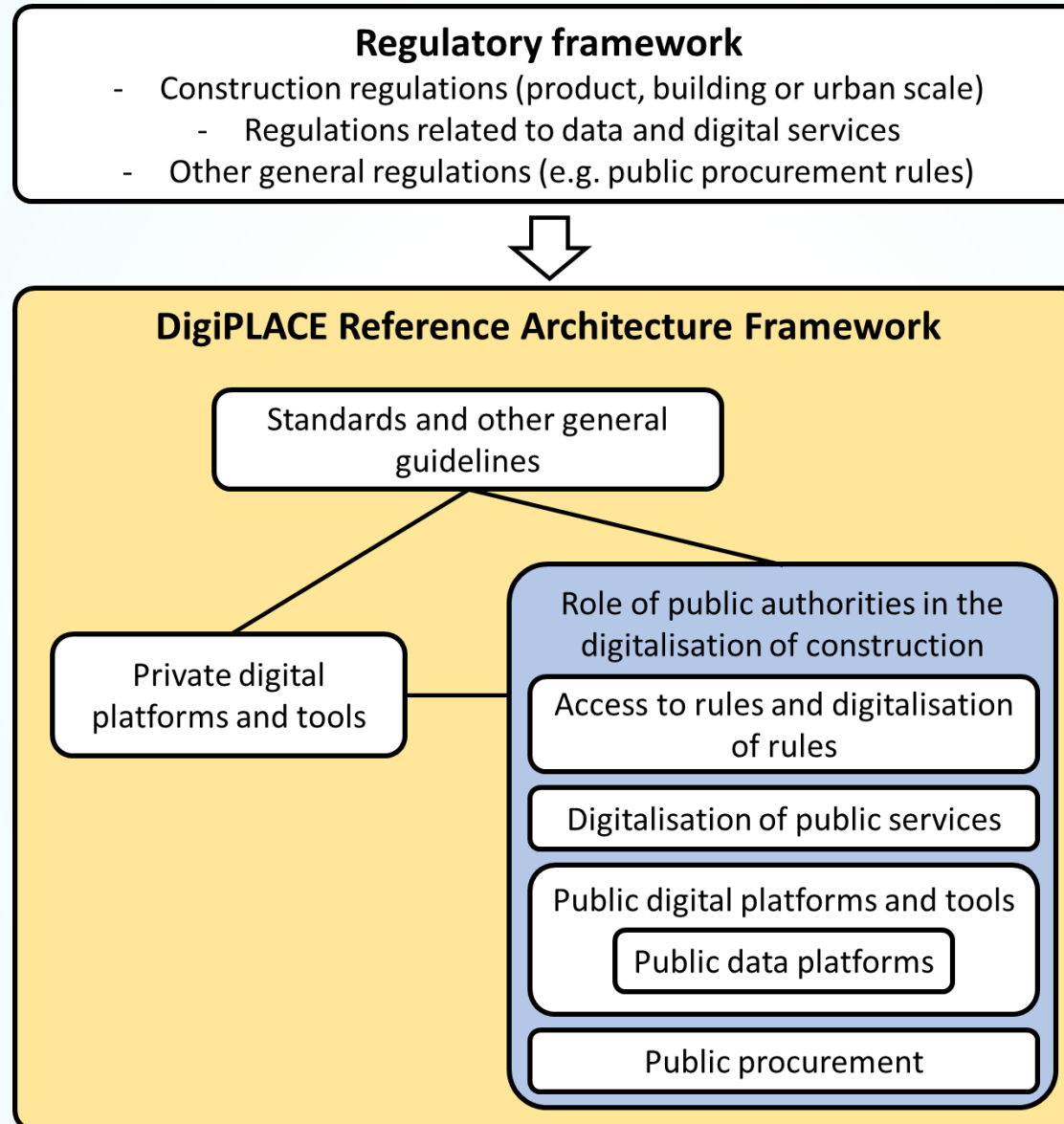# Reference Architecture Framework for interoperable digital platforms for construction

DigiPLACE
TOWARDS A EUROPEAN DIGITAL
PLATFORM FOR CONSTRUCTION

Area-specific guidelines: leverage interoperability and data sharing in construction

Environmental performance	Large scale data sharing, European big data platform for the construction sector	Business, market and collaboration	Public services and initiatives

Core guidelines: enable interoperability and data sharing in construction

Pillar 1: interoperability, common language and processes

Data formats, models and semantics, use of open standards

Semantic interoperability, Data dictionaries	Data models and formats	Standards for data exchange & access

Information management and processes

Collaboration, Common Data Environments	Data management along the lifecycle, digital twin

Governance and access to standards and frameworks

Pillar 2: control over the use of data

Data storage, security and sovereignty

- Data security
- Data sovereignty
- Common European Data Spaces, data infrastructures

Data ownership

- GDPR compliance
- Data ownership in business relations
- Transparency on the use of data

Data qualification and trust

- Data certification
- Data with contractual or regulatory value

Data availability and sustainability

- FAIR data principles
- Data sustainability

6/2/2021

Relation with the regulatory framework

Regulatory framework
- Construction regulations (product, building or urban scale)
- Regulations related to data and digital services
- Other general regulations (e.g. public procurement rules)

DigiPLACE Reference Architecture Framework

Standards and other general guidelines

Private digital platforms and tools

Role of public authorities in the digitalisation of construction

Access to rules and digitalisation of rules

Digitalisation of public services

Public digital platforms and tools

Public data platforms
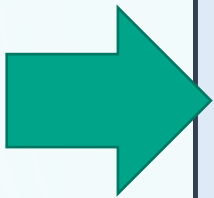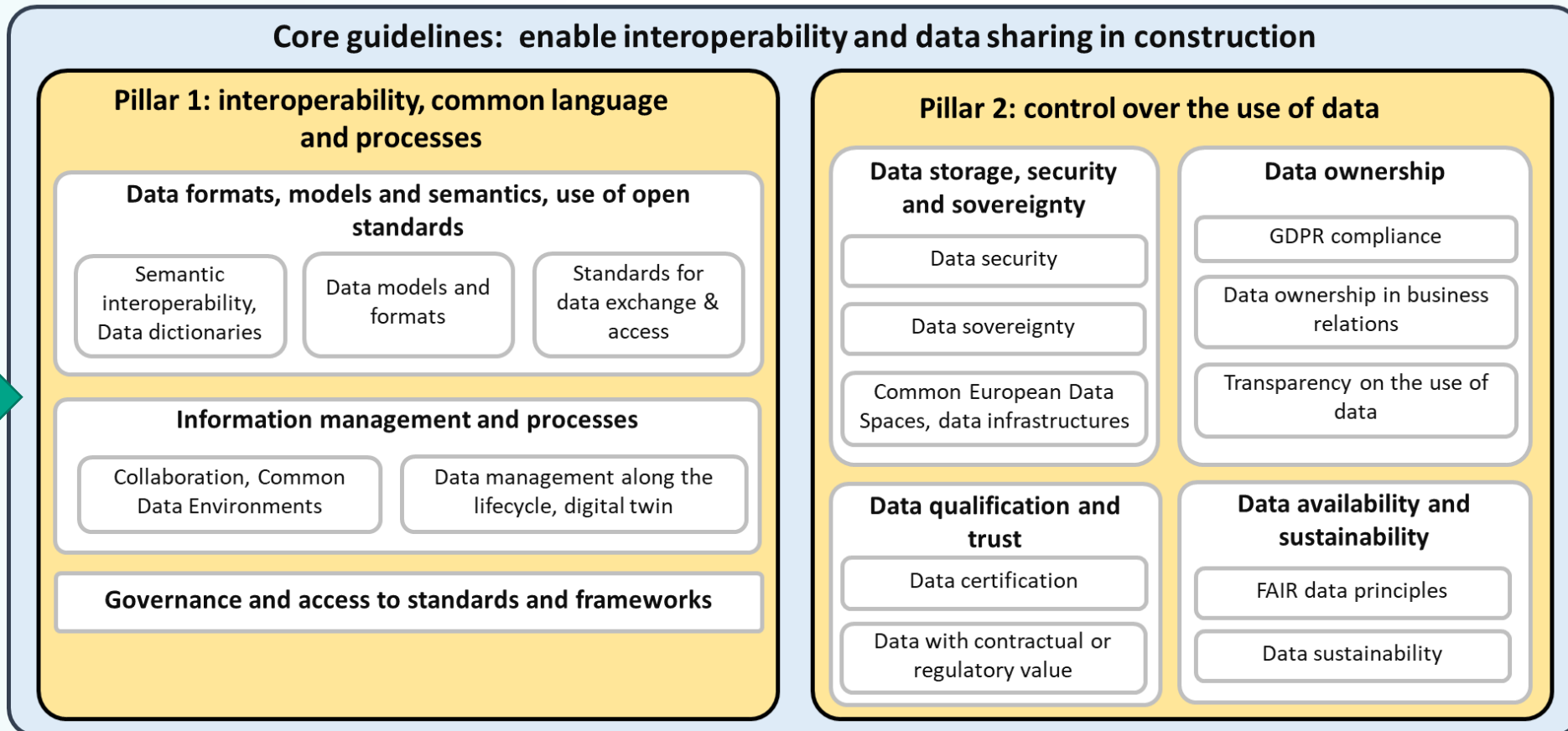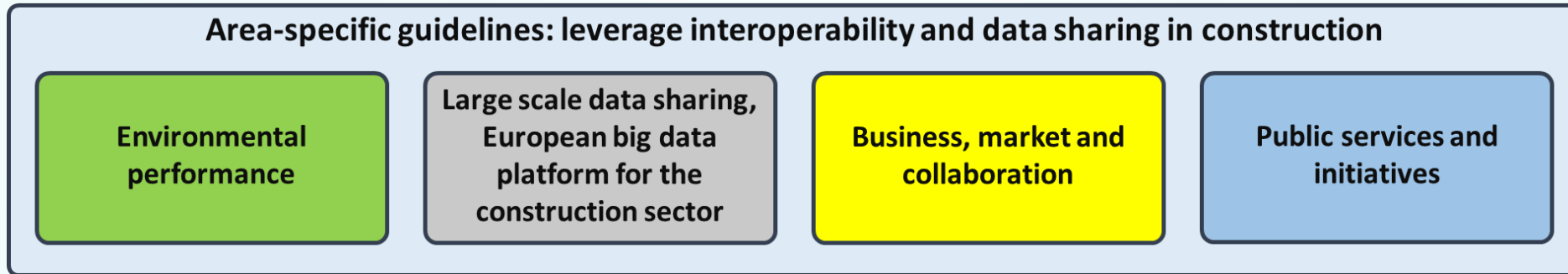
Public procurement

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Reference Architecture Framework for interoperable digital platforms for construction

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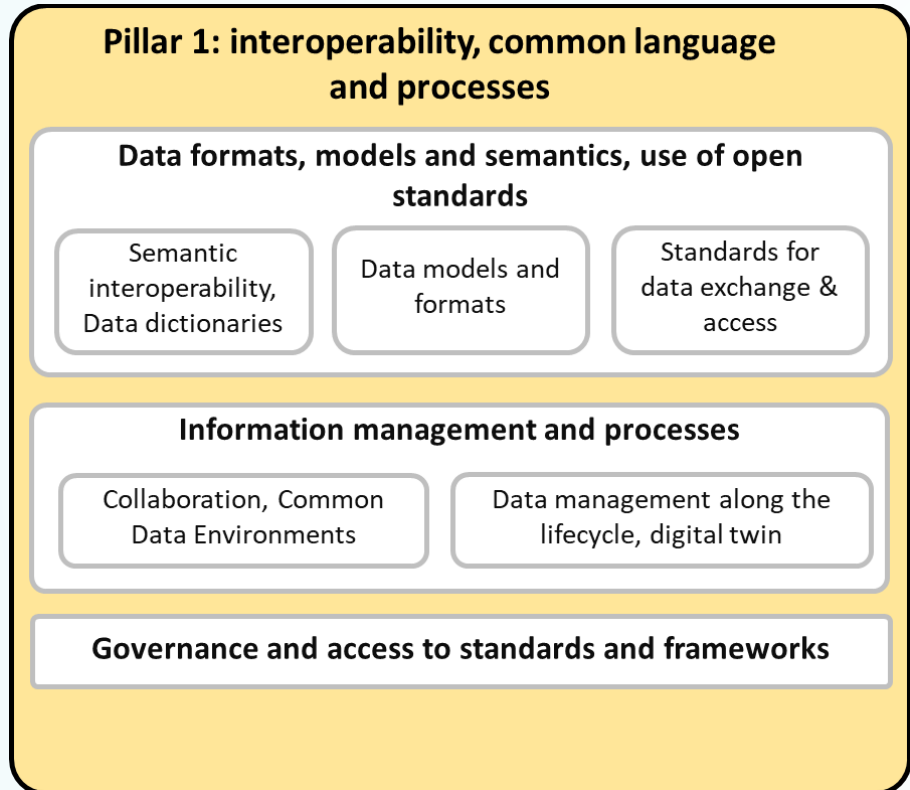
| Collaboration, Common Data Environments | Data management along the lifecycle, digital twin |

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

Selection of guidelines and open options: core guidelines

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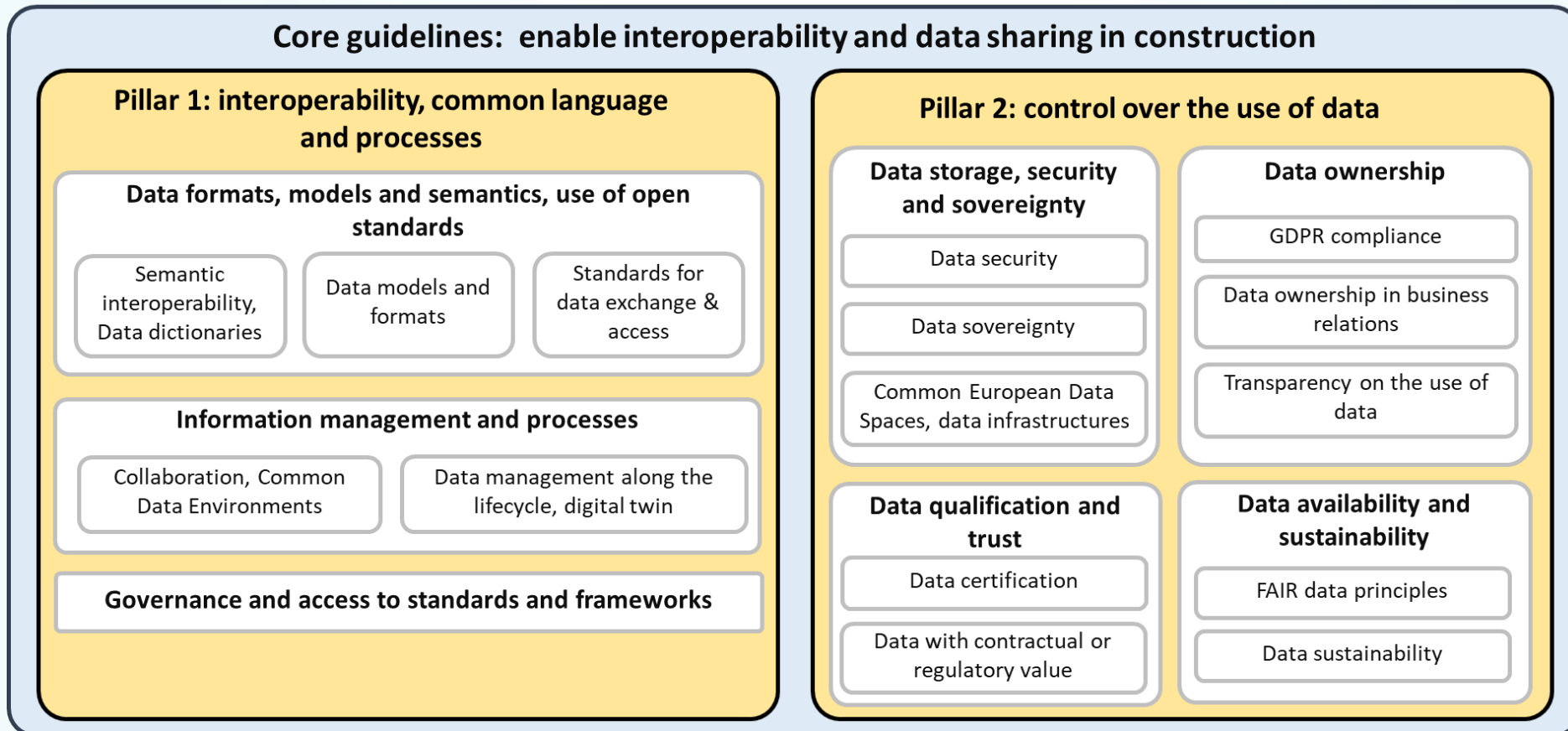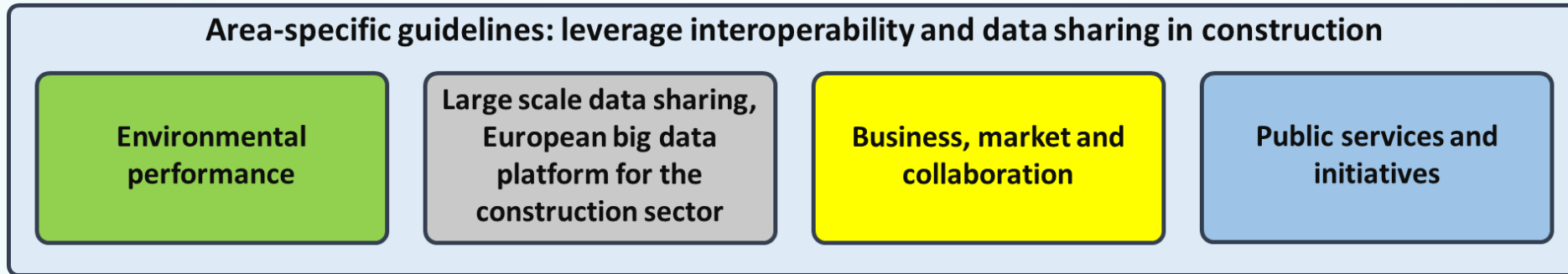
Open standards are key to enable:

- Digital continuity over the full life cycle of construction works

- Cross-domains and multi-scale digital twins

- More generally, interoperability between proprietary software and platforms

- BIM-based public procurement and regulatory procedures (e.g. permitting)

- Sustainable long-term preservation of information

- Contribution of the publicly funded academia to the progress of BIM technology in a vendor neutral way

Selection of guidelines and open options: core guidelines

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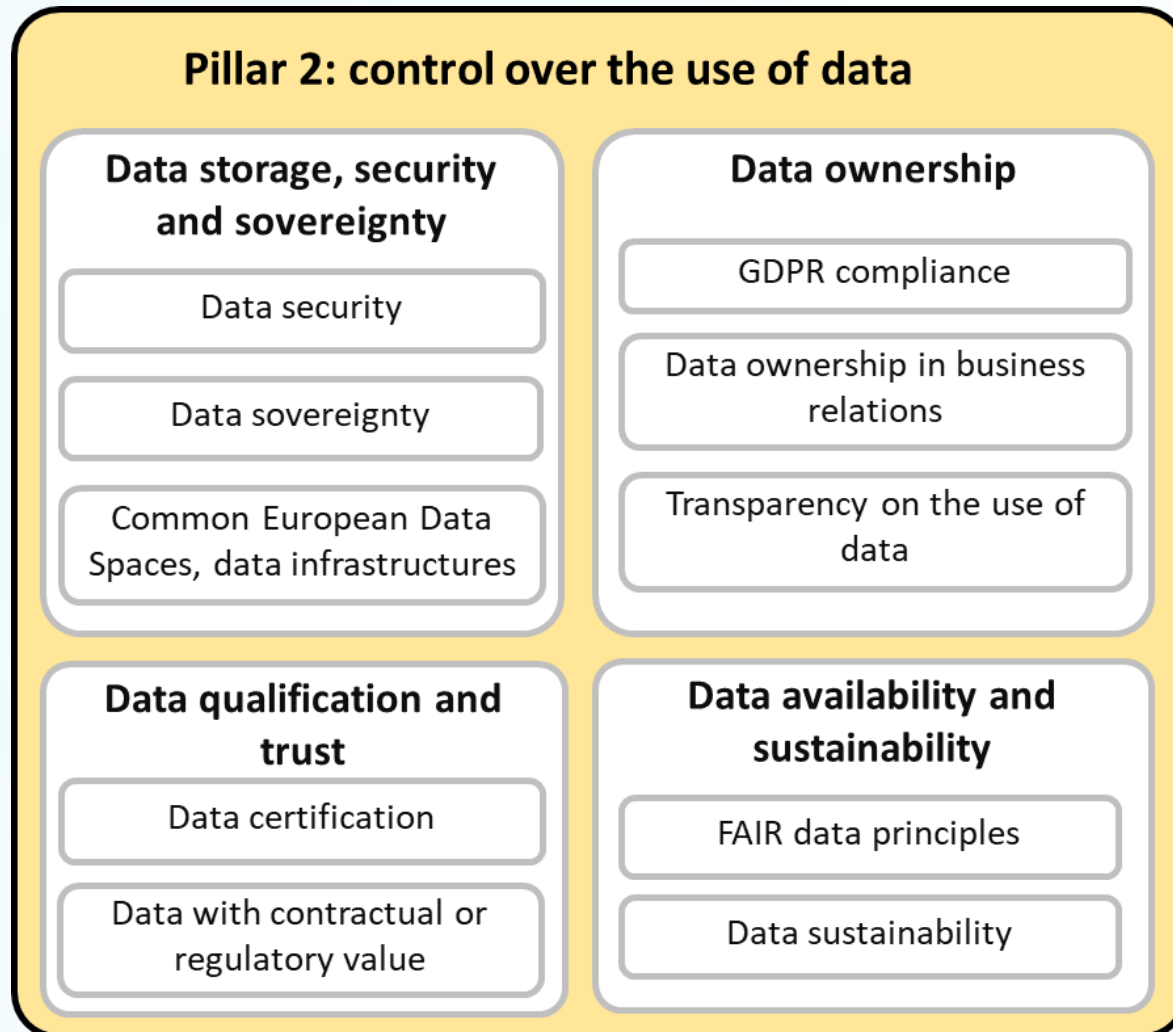**Governance and access to standards and frameworks**

- Integration of BIM and GIS data, enable territorial digital twin

- Importance of **semantic interoperability**
  - ➢ Guidelines for **interoperable product data,** align common digital language with technical language
  - ➢ Towards a **European data dictionary** (network of dictionaries with common framework and governance)

- Semantic Modeling and Linking Standard: need to define/adopt reference ontologies ?

- Collaborative processes: implementation of ISO 19650

- Define/harmonize **building digital twin methodologies** (incl. handling of IoT data) ?

Reference Architecture Framework for interoperable digital platforms for construction
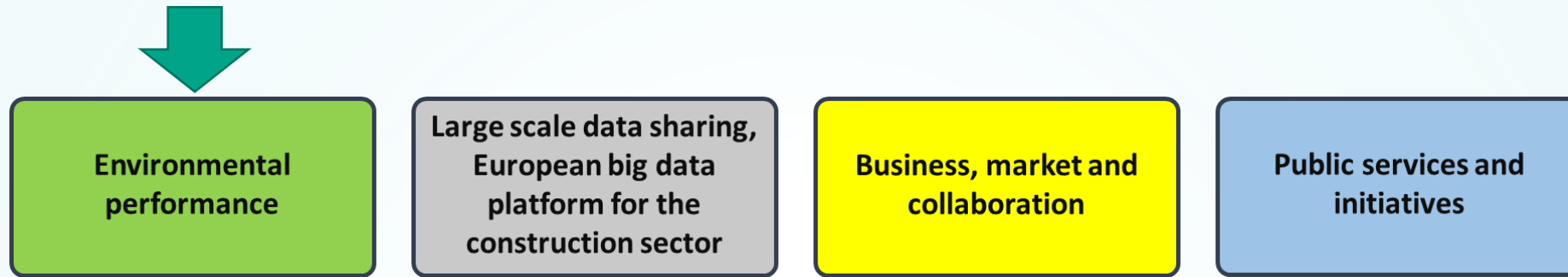
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Selection of guidelines and open options: core guidelines

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Data availability and sustainability
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- **Data sovereignty**
  - ➢ Sovereignty of cloud services
  - ➢ Link with Common European Data Spaces and European data infrastructure, GAIA-X initiative
- Data security, cybersecurity
- **GDPR compliance**
- Data ownership in business relations, **transparency on the use of data**
- Management of data with contractual of regulatory value
- Data sustainability over the full life cycle (at least)

Selection of guidelines and open options: application areas

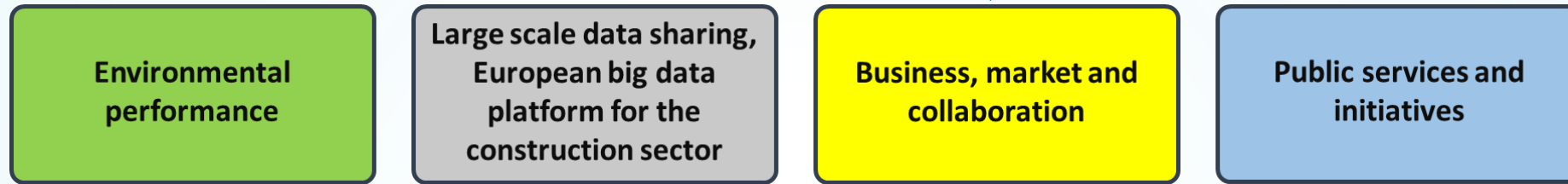| Environmental performance	Large scale data sharing, European big data platform for the construction sector	Business, market and collaboration	Public services and initiatives

- Support the widespread use of LEVEL(s) framework:
  - ➢ Need to provide digital tools enabling to inform as well as to use Level(s)

- Life Cycle Assessment for the construction sector:
  - ➢ Smooth the access to buildings products description and building characteristics data through the availability of adequate standards
  - ➢ Standardize the products' impact data, access through APIs
  - ➢ Availability, transparency and flexibility of LCA applications' methodologies
  - ➢ Provide guidance for users
  - ➢ Make BIM-based LCA a reality: **ISO/DIS 22057 EPD for BIM**

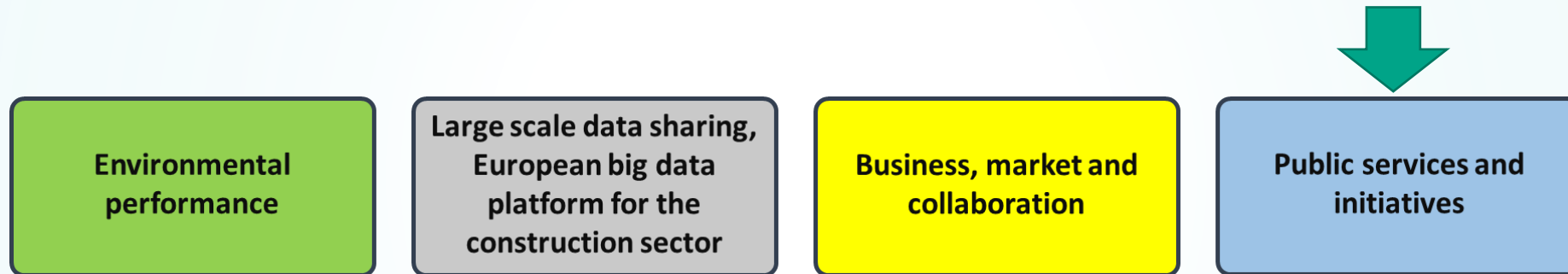# Selection of guidelines and open options: application areas

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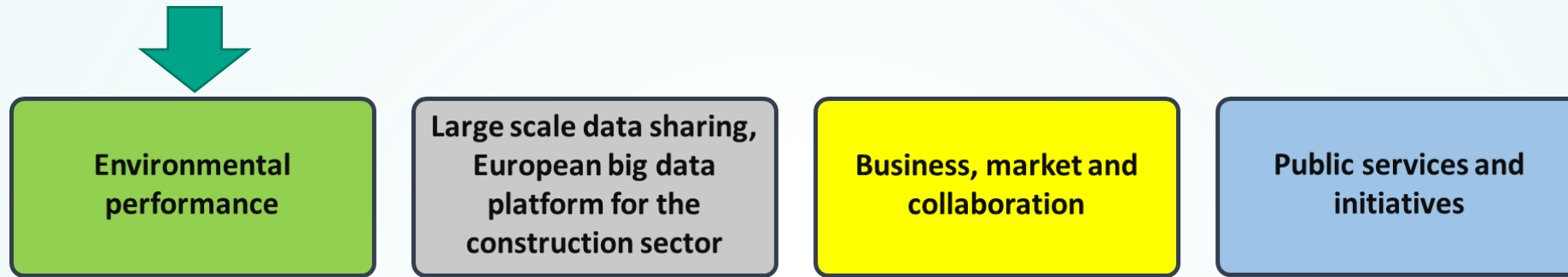
- Circular economy
  - ➤ Conditions for buildings as digital material banks
  - ➤ Standard templates for the inventory of existing components
  - ➤ Digital deconstruction process

- Other guidelines
  - ➤ Enable generic dashboards of geoclustered buildings performance in the EU
  - ➤ Harmonize scan-to-BIM for renovation or deconstruction
  - ➤ Sharing of best practices

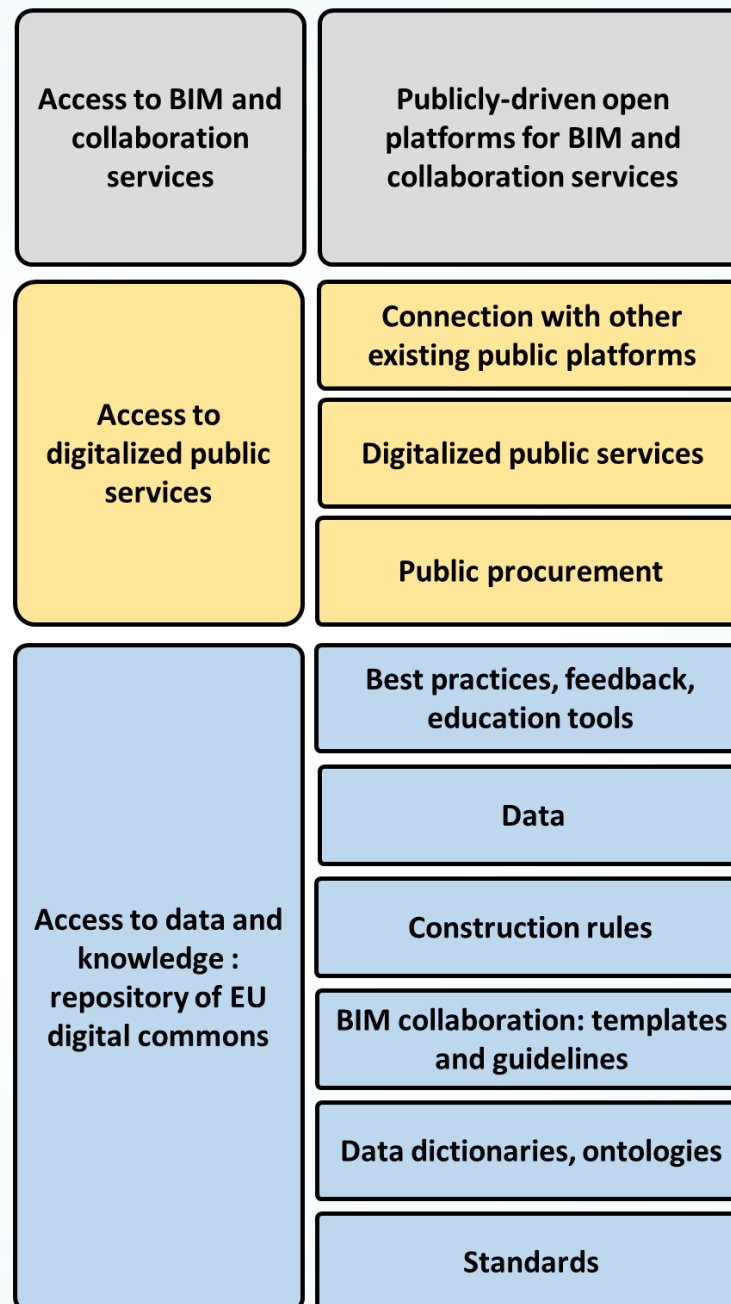# Selection of guidelines and open options: application areas

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PLATFORM FOR CONSTRUCTION

| Environmental performance | Large scale data sharing, European big data platform for the construction sector | Business, market and collaboration | Public services and initiatives |

- Implementation issues for digital collaborative processes:
  - ➢ **Streamline and simplify the setup of BIM collaboration**: BIM Execution Plans, Exchange Requirements, Model View Definitions…
  - ➢ Re-use Information Delivery Manueals (IDMs), repositories of IDMs
  - ➢ **Common syntax and classification for use cases**
- Digital supply chain, in integration of BIM objects into BIM models (incl. construction equipements)
- Link with ERP and CRM tools
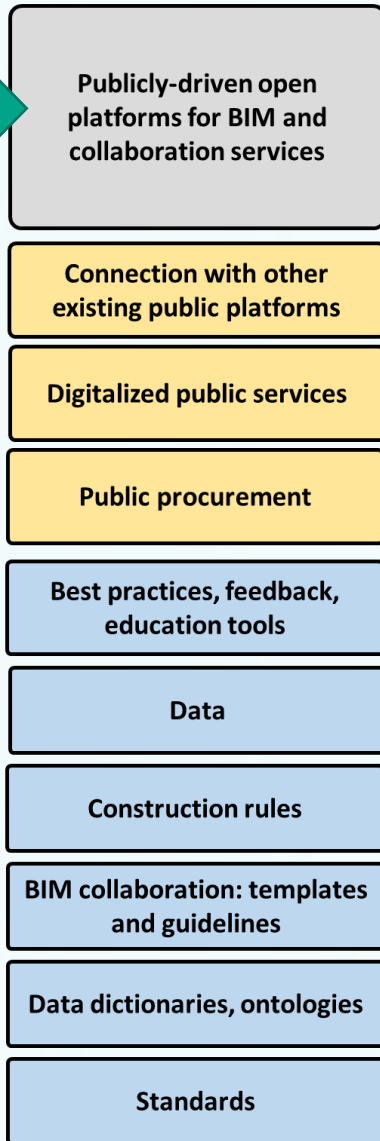- Digitalisation of SMEs, skills

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Selection of guidelines and open options: application areas

| Environmental performance | Large scale data sharing, European big data platform for the construction sector | Business, market and collaboration | Public services and initiatives |

Proposed perimeter of public digital platforms for construction

Access to BIM and collaboration services

Publicly-driven open platforms for BIM and collaboration services

Access to digitalized public services

Connection with other existing public platforms

Digitalized public services

Public procurement

Access to data and knowledge : repository of EU digital commons

Best practices, feedback, education tools

Data

Construction rules

BIM collaboration: templates and guidelines

Data dictionaries, ontologies

Standards

Selection of guidelines and open options

Publicly-driven open platforms for BIM and other digital services: principles

- Provide an open architecture and orchestration system to integrate services in meaningful workflows for AEC use cases

- Coordinate different public and private services

- Ensure a fair distribution of value

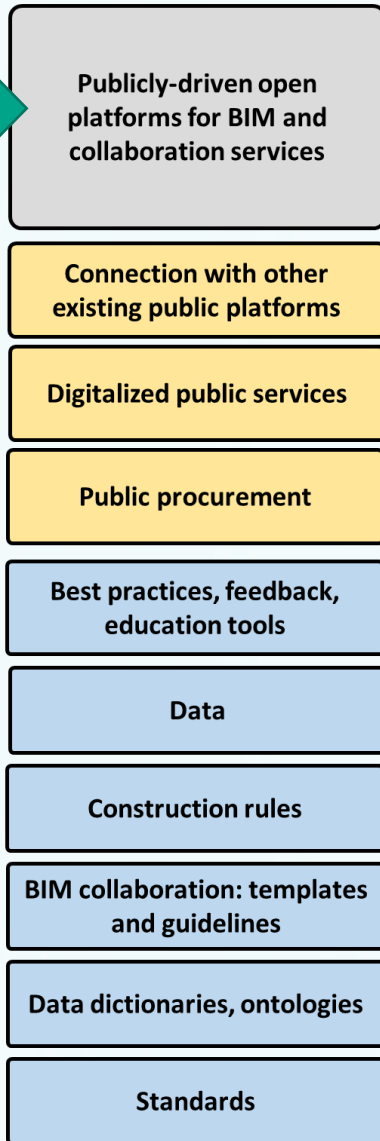- Facilitate collaboration through the use of templates, assessment of compliance and interoperability level…

Publicly-driven open platforms for BIM and collaboration services

Connection with other existing public platforms

Digitalized public services

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Best practices, feedback, education tools

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Selection of guidelines and open options

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Publicly-driven open platforms for BIM and collaboration services
Connection with other existing public platforms
Digitalized public services
Public procurement
Best practices, feedback, education tools
Data
Construction rules
BIM collaboration: templates and guidelines
Data dictionaries, ontologies
Standards

Rationale

- Provide a BIM and collaboration toolkit readily **usable all stakeholders, including SMEs**, that can be used to answer the requirements related to the use of BIM in **public procurement**

- Create a **level playing field** through a platform that is opened equally to all providers, and designed to:

  - Promote innovation and new entrants (esp. small players)

  - Foster competition, avoid market capture by some players, ensure a fair distribution of value across the value chain

  - Promote European vendors and increase the technical value of smaller players' services by integrating them, thus reinforcing the **ecosystem of European digital AEC services**
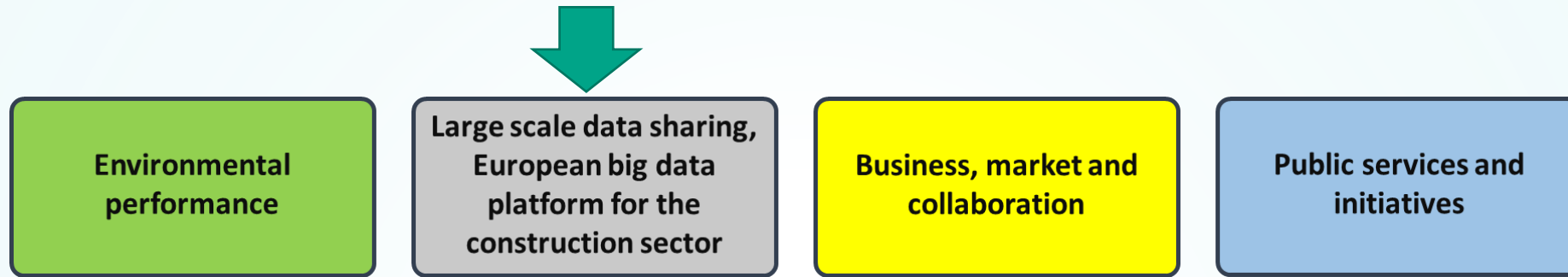
Selection of guidelines and open options

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Rationale

- Ensure the respect of European principles in terms of data security, data sovereignty or data ownership

- Focus on unmet needs: multi-scale, cross-lifecycle data integration

Points of caution

- **Vendor neutrality** must be ensured, through adapted processes to enrol and assess the services

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Selection of guidelines and open options

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- Improve EU wide access to public data

- Leverage existing or developing frameworks (e.g. LEVEL(s), building logbook)

- Business to government data sharing for the public interest (future data act)

- Leverage on existing initiatives, better integrate the construction sector: Common European Dataspaces, GAIA-X, Open DEI
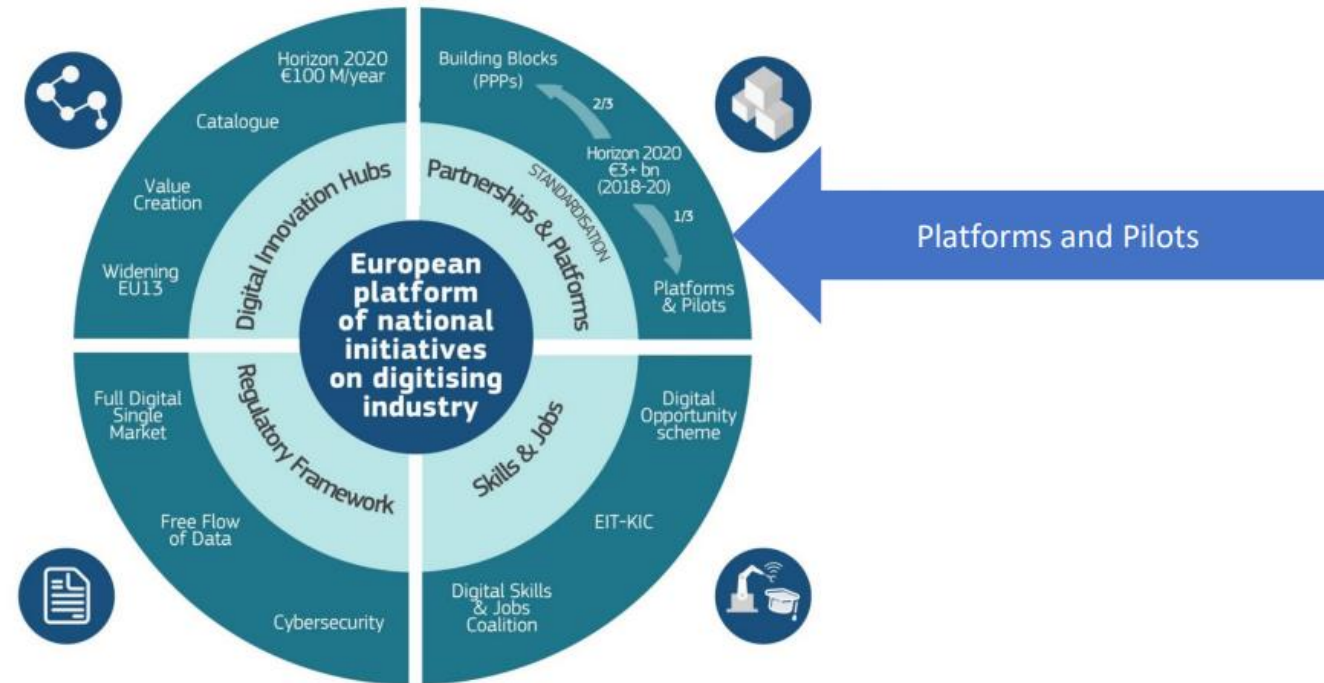
Data sharing – link with ongoing initiatives

European data strategy – Common European data spaces

Data sharing – link with ongoing initiatives

GAIA-X – a federated data infrastructure for Europe

- Use cases submitted in 8 domains
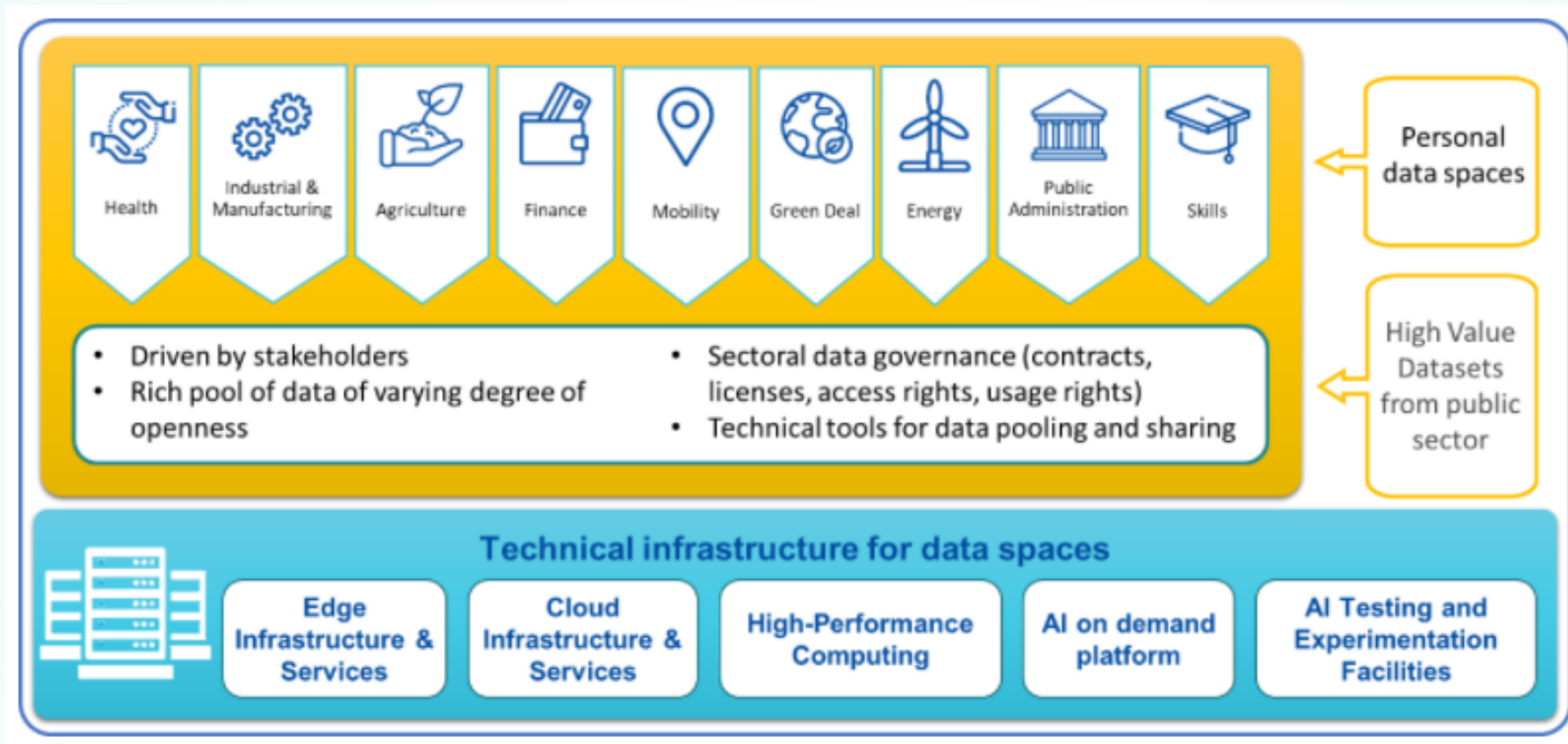
Data sharing – link with ongoing initiatives

Open DEI (Digitising European Industry)

- 4 domains
  - Manufacturing
  - Agriculture
  - Energy
  - Healthcare
- Reference architecture for cross-domain digital transformation

Data sharing – link with ongoing initiatives

European Strategy for Data
Common European data spaces

- Trans-sectoral approaches
- Focus on data sharing and cloud infrastructures
- Technical (IT) Reference Architecture Frameworks

DigiPLACE RAF

- Sectoral approch for the construction sector
- Not limited to data sharing and IT architectures
- Adresses the different aspects of digital transition: digital platforms, collaboration, interoperability…
- Bottom-up, use-case oriented

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THANK YOU!

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