



City procurement and Digital Twins

Working with UDT providers. A comprehensive overview

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About me

- Telecommunications and Aeronautics research background
- 6 years IT Innovation at the Municipality of Barcelona (2017-2023)
- Currently, Algorithmic Supervision at the Joint Research Centre, European Commission

About me



Objective

- How to purchase a set of software and hardware building blocks that will be part of the UDT implementation, taking into account:
 - The technological stack involved in UDT
 - City governance and internal organization
 - Public procurement particularities, especially when it comes to IT-related purchases.

Outline

- Objective
- Setting the scene:
 - **What is needed to buy?** The technological stack involved in an UDT.
 - **Who needs to buy?** The impact of the municipality organization.
 - **How should it be bought?** The public procurement framework
- How to procure digital twins?

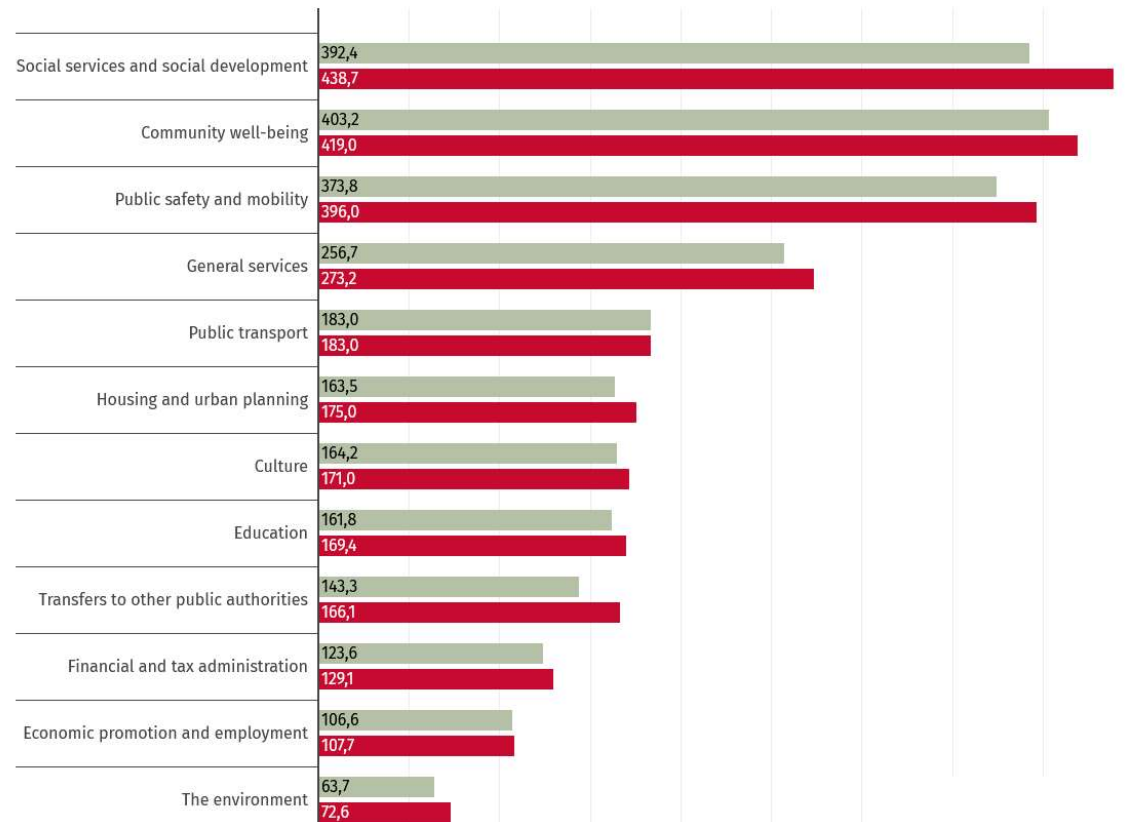
Setting the scene. What is needed to buy?

- IT related vs. not-IT related
- Hardware
 - Data collection
 - Data transportation
 - Data storage
 - Data computation
 - Data visualization
- Software
 - Data processing
 - Data visualization
- Data
 - Own data
 - Third-party data
 - Knowledge!

Setting the scene. Who needs to buy?

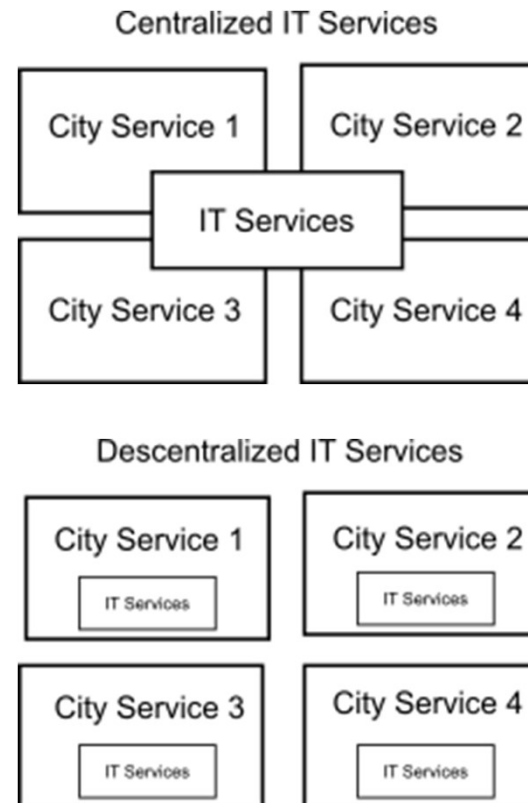
- City budgets are typically organized by areas/services.
- Often, it is not clear where the IT-related budget is situated.

Amounts in millions of euros.



Setting the scene. Who needs to buy?

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- Often, it is not clear where the IT-related budget is situated.



Setting the scene. How should be bought?

- Core principles of public procurement in the EU:
 - Transparency
 - Equal treatment
 - **Open competition (!!!)**
 - Sound procedural management
- General tips on IT-purchases:
 - Avoid lock-in situations. Not only break city data silos but also technology silos.
 - Use well-known and open standardized frameworks as much as possible.

How to procure digital twins.

General considerations

- Most city council areas can be positively impacted by the use of urban digital twins.
- Trying to tackle all business cases at once can be risky, especially if the whole framework is not yet deployed.
- The associated computational resources and Return on Investment (ROI) can vary dramatically depending on the business case.
- An incremental approach should be considered, with a strong reliance on a defined master plan.
- Interoperability should be at the core of the strategy.

How to procure digital twins. Considerations on data collection.

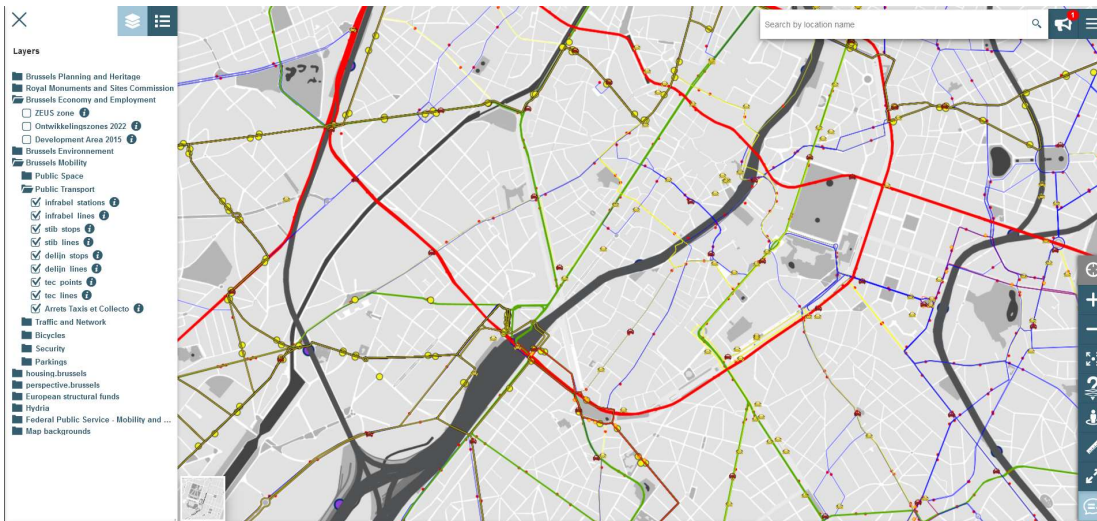
- Use well-known open standard frameworks for data management.
- Use as much as possible already existing information.
- Use as much as possible already deployed sensors.
- Ensure that sensors planned to be deployed are interoperable.
- If new sensors need to be deployed analyse the public assets property of the city council with connectivity.

How to procure digital twins. Considerations on data processing & visualization

- Processing capabilities:
 - Cloud vs. on premise
- Re-use as much as possible.
- Integrate as much as possible.

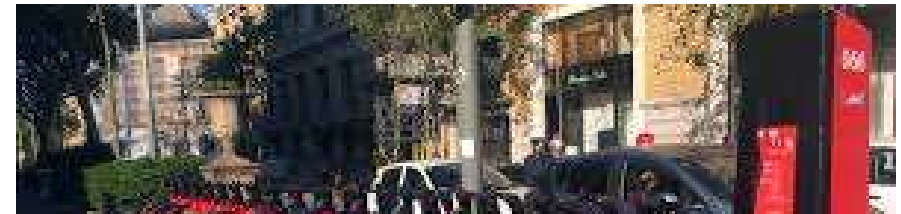
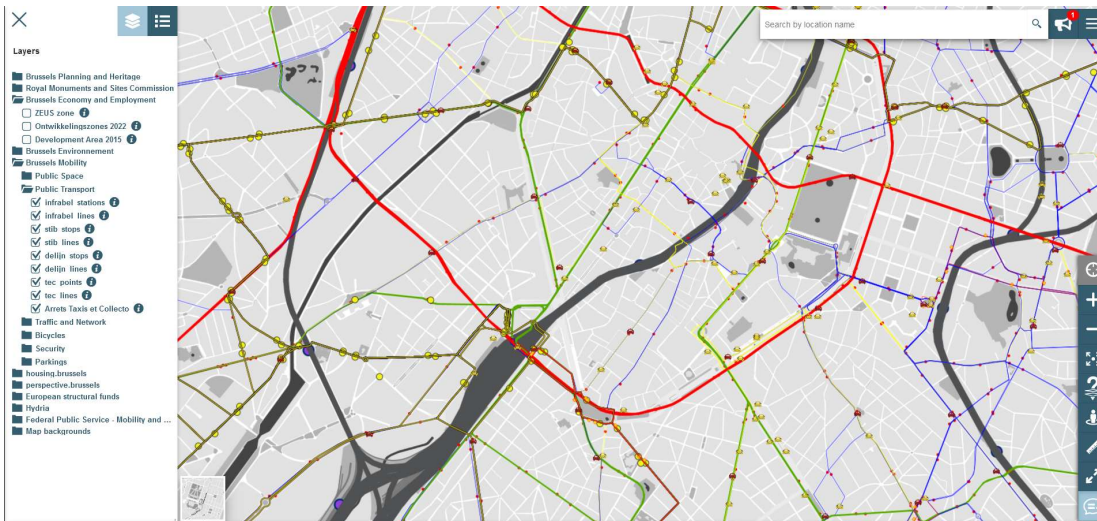
How to procure digital twins. What **not** to procure?

- Your own data:
 - Data generated internally
 - Data generated by contractors



How to procure digital twins. What **not** to procure?

- Your own data:
 - Data generated internally
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15.6. Serveis de dades

L'adjudicatari oferirà, des de la fase de cohabitació dels serveis definida en la gestió de la transició, accés públic mitjançant serveis de dades web a la informació de disponibilitat de bicicletes i ancoratges a totes les estacions del servei Bicing 2.0 i proporcionarà, com a mínim, les dades següents:

- Codi d'estació
- Estat de l'estació (operativa / no operativa)
- Coordenades geogràfiques
- Carrer i número
- Altitud
- Bicicletes disponibles
- Ancoratges disponibles
- Estacions properes

Les dades s'hauran de proporcionar, segons la tipologia de petició, en format *JavaScript Object Notation* (JSON) o *eXtensible Markup Language* (XML).

How to procure digital twins. What **not** to procure?

- Data owned by other public administrations:
 - Metropolitan area institutions
 - Regional / national government bodies
- Agreements between administrations

How to procure digital twins. What **not** to procure?

- Some third-party data (as much as possible!)



Examples of architectures

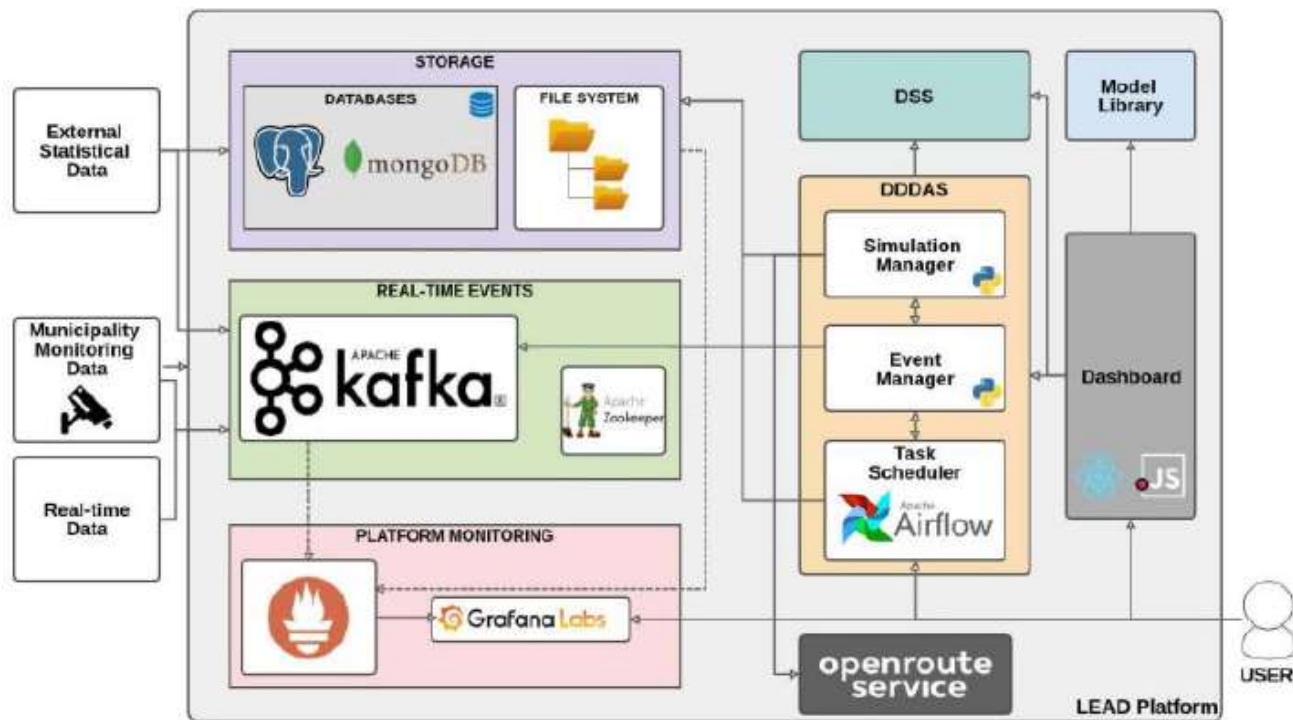


Figure 9: Technology choices for the deployment of the LEAD project

Examples of architectures



D05.02 Public report on the LDT Toolbox detailed specifications requirements

CNECT/2022/OP/0098 – Procurement of the Technical Specifications for the Twins (LDTs) Toolbox

Examples of architectures

Visualising technical building blocks along ambition levels

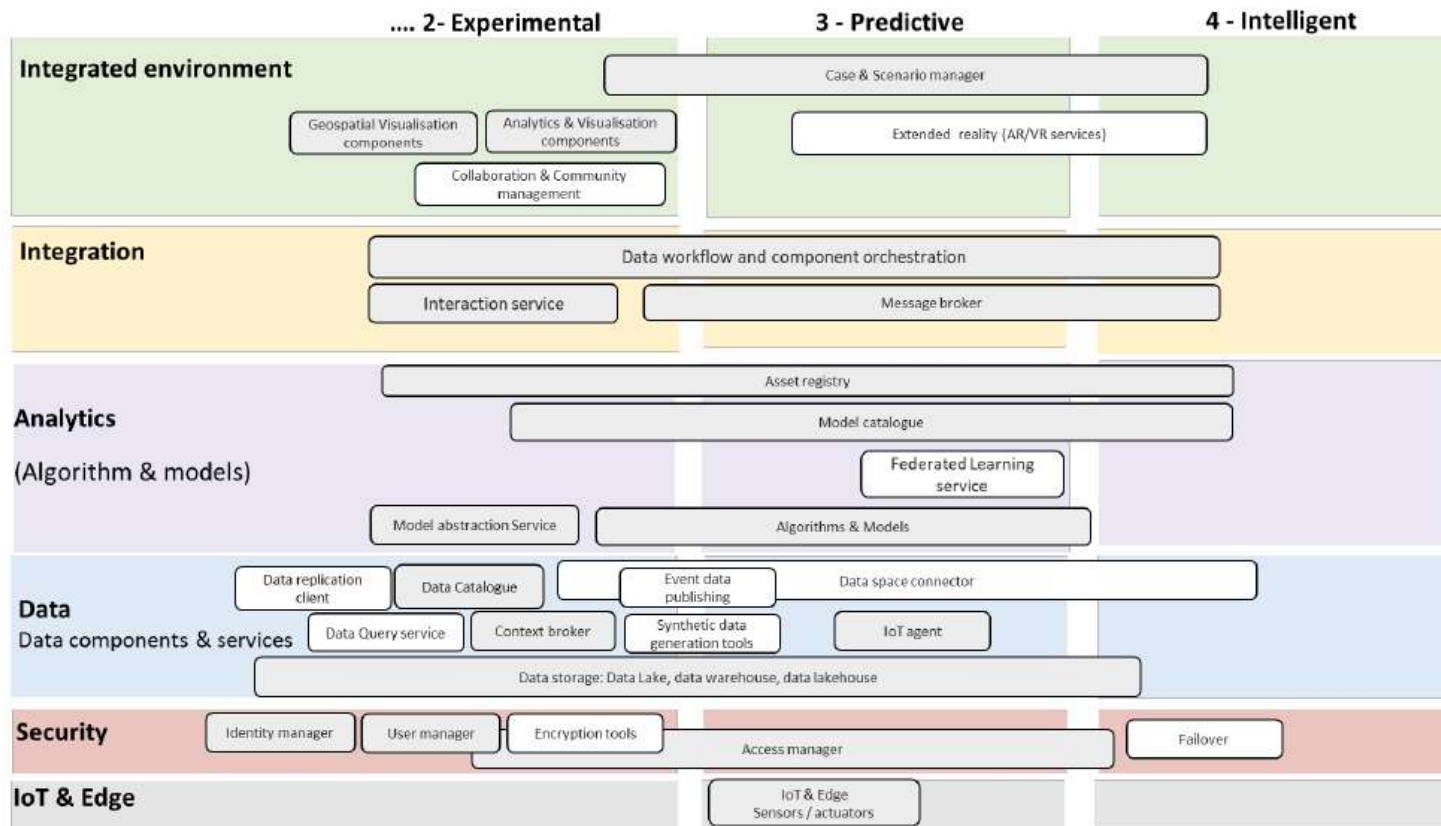


Figure 6: Visualising BBs described in Use case narrative

Examples of architectures

3.2.18 Building Block 18 | Data Storage

Table 69: Summary Table of Building Block 18

Minimum Ambition Level	2 – Experimental Twins
Kind	Software
Maturity Level	Good Enough
Internal code	BB.18
Relevant MIM	MIM2

Examples of architectures

3.2.18 Building Block 18 | Data

Table 70: Capabilities Table of Building Block 18

		Ambition Level	Capability Nr	Capability Name	Category	MIM consider to	Standards
Minimum Ambition Level	2 – E	2 – Experimental Twins	10	Data storage	Data	MIM2	
Kind	Softw						
Maturity Level	Good	2 – Experimental Twins	13	Data processing	Data		
Internal code	BB.18	2 – Experimental Twins	5	Data replication	Data		LDES
Relevant MIM	MIM	2 – Experimental Twins	12	Data time travel	Data		LDES, Temporal
		3 – Predictive Twins	6	Data transformation	Data		SQL, GraphQL, SPARQL, REST, LDES, NoSQL

How to procure digital twins. Use case

- The telecommunications office of the city council wants to facilitate the access to telecommunication operators to suitable public assets to deploy 5G infrastructure.
 - Data gathering
 - Data processing
 - Data visualization



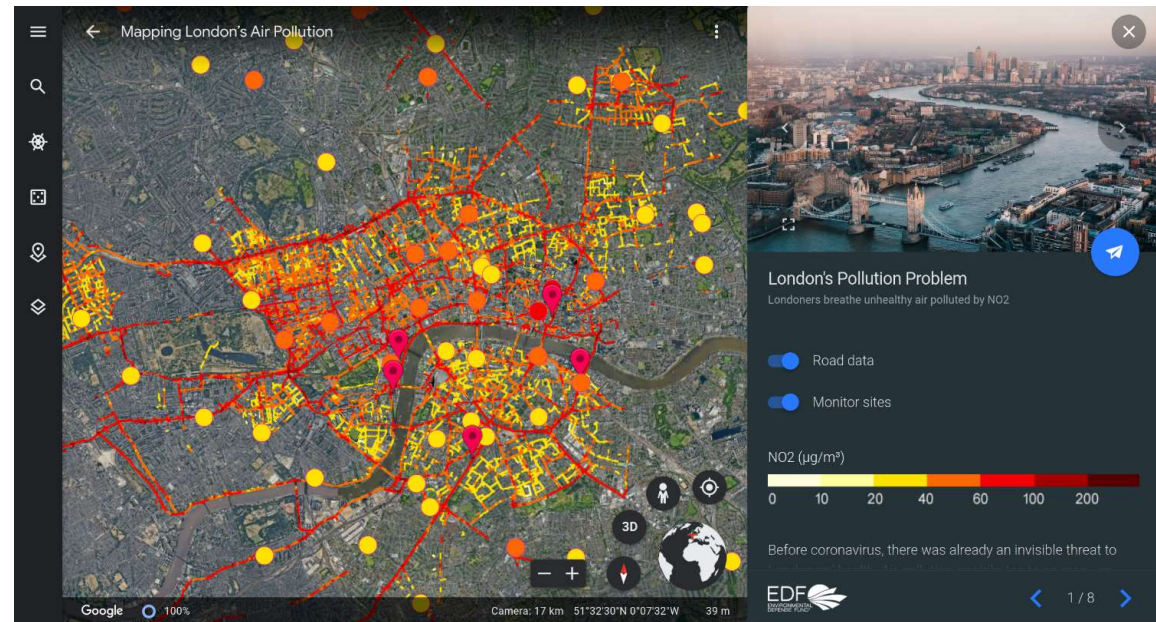
How to procure digital twins. Use case

- The tax department of the city council wants to audit the parking accesses public space register. They suspect that up to the 35% of register entries are inaccurate.
 - Data gathering
 - Data processing
 - Data visualization



How to procure digital twins. Use case

- The department of air quality of the city wants to monitor and predict mobility policies to measure their impact on air pollution
 - Data gathering
 - Data processing
 - Data visualization



Thank you!