

Open Local Digital Twin Ecosystem Concept Note

Connecting city use cases, specialist technologies and future partnerships

Short public note on the ecosystem work that shaped the Open Local Digital Twin.

Scope	ecosystem mapping and technical development	Audience	public authorities, providers, researchers and integrators
Focus	use cases, capability matching and implementation routes	Open base	Open Local Digital Twin
European context	EU LDT Toolbox applications and models	Collaboration stage	open to focused future partnerships

Why this note exists

Over several months, we mapped Local Digital Twin needs with public authorities, technology providers, researchers, integrators and support organisations. The work began through a European LDT collaboration process and expanded into a broader view of city workflows, available technologies and the conditions required to turn them into credible projects. This note presents the use cases, capabilities and partnership patterns identified through that work, together with the open technical base now available for future collaborations.

Core proposition

A strong LDT project connects:

- a city workflow with a responsible user
- governed data that can support the question
- specialist technology with clear inputs and outputs
- validation, provenance and authority status
- a realistic deployment, funding and continuity route

Collaboration scope

Each partnership can select a focused combination of capabilities according to technical maturity, available data and the city's operational priorities. The common objective is a documented, measurable service that can be validated locally, connected to existing systems and prepared for reuse by other cities.

City Use Cases Identified

Planning and digital construction. Connect parcels, planning areas, GIS constraints, BIM/IFC evidence, building envelopes and review information so municipal teams can find, compare and validate inputs more quickly. The practical opportunity is to shorten workflows measured in weeks to workflows measured in days.

Resilience, reconstruction and preparedness. Relate hazards to buildings, roads, infrastructure, shelters, assembly areas, critical services and access routes. The resulting evidence can support preparedness gaps, reconstruction priorities and scenario comparison.

Mobility, people flow and evacuation. Combine transport networks, events, origin-destination patterns, synthetic populations and crowd models to examine congestion, service access, infrastructure change and evacuation conditions using aggregated or synthetic evidence that protects individual privacy.

Climate, operations and public assets. Bring together wind, heat, solar exposure, air quality, pollution, flooding, energy, lighting, utilities, maintenance, heritage and public-space evidence for operational or analytical use.

A Cross-Sector Opportunity

The strongest common opportunity is to reuse governed BIM and GIS evidence across planning, disaster readiness and environmental readiness. Information collected for construction or planning review can also support future analyses of vulnerability, vibration response, safe areas, evacuation routes, urban heat, wind or infrastructure exposure. The same evidence can be presented through familiar 2D maps, analytical 3D environments and Civic XR scenarios for specialists, decision-makers and residents. Each direction can be framed as a measurable pilot and validated by the responsible city teams.

Technology Capabilities Mapped

City data and federation: PostGIS, NGSI-LD, FIWARE, OGC services and APIs, DCAT, JSON-LD, catalogues and data-space exchange.

Urban evidence: GIS, BIM/IFC, CityJSON/CityGML, LiDAR, 3D Tiles, satellite/UAV observations, municipal APIs and sensors.

Specialist analysis: crowd, mobility and evacuation; wind/CFD; heat, flood and pollution; building-energy and renovation scenarios.

Operational interfaces: AI/video indicators, heritage digitisation, 2D/3D/XR, participation, policy indicators, training and continuity.

How A Credible Match Is Built

A useful partnership aligns a recognised city need with a responsible team, governed data, a documented technical module, a validation route and a credible plan for delivery and continuity. We compared public profiles, city needs, demonstrations and technical material to identify where these elements could reinforce one another. This provides a repeatable method for forming focused collaborations with explicit roles, interfaces, evidence and outcomes.

Match element	Question asked	Evidence required
City need	Which workflow or decision should improve?	named operational owner, baseline and useful output
Data and systems	What exists, who controls it and what may be shared?	sources, formats, identifiers, quality and access conditions
Technical module	What does the service consume and return?	interface, units, method, version, licence and deployment needs
Validation	Who can review the result and with what criteria?	provenance, confidence, warnings and authority status
Delivery	How will the service be implemented and sustained?	roles, budget route, hosting, adoption and post-pilot support

What The Open Local Digital Twin Brings

The Open Local Digital Twin is an open, self-hosted city workbench designed to organise a city baseline, connect municipal and provider information, run analytical workflows and present consistent evidence through maps, 3D environments and Civic XR.

- PostgreSQL/PostGIS backbone with city workspaces, entity records and source traceability
- separation of source records, consolidated objects, provider outputs, simulations and approved indicators
- ingestion routes for CSV, GeoJSON, Shapefile, GeoPackage, OGC services, STAC, CityJSON and BIM/IFC metadata
- provider contracts for inputs, outputs, provenance, method, units, model version, confidence, warnings and validation state
- standards-oriented routes through NGSI-LD, OGC API Features, DCAT, JSON-LD, OpenAPI, GeoJSON, CityJSON and data-space mechanisms
- local handling of restricted information with controlled publication of approved data, indicators, models or service definitions

Connecting With The EU LDT Toolbox

The EU LDT Toolbox brings together applications, models, data platforms, identity services, visualisation environments and data-space components. Its value for a city depends on connecting each component to a defined municipal workflow, governed inputs, explicit interfaces, provenance, validation and responsible users. The Open Local Digital Twin provides a city-controlled integration environment for this connection: it can supply governed evidence to suitable Toolbox components and receive approved outputs in a form that can be inspected, compared and reused.

Public Technical Resources

Source code and documentation	github.com/polisplexity/open-local-digital-twin
Installation and self-hosting	Open Source Installation Guide
Public laboratory and demos	lab.polisplexity.tech
Official EU LDT Toolbox	code.europa.eu/ldt-toolbox

Best Next Conversation

Future collaboration can begin with one concrete city challenge, its operational owner and the information already available. From there, a focused group can identify the appropriate technical module, connect it through the Open Local Digital Twin, select relevant EU LDT Toolbox components and define validation, delivery and financing. Depending on the fit, the route may be a European or national call, research collaboration, international financing mechanism or direct city pilot.