KER 11 | LOGOS RI

Urban Digital Twin

TYPE

[SERV] [METH]

TECHNICAL READINESS LEVEL

TRL 5

INTELLECTUAL PROPERTY RIGHTS

PROPRIETARY

EXPLOITATION ROUTE

OPEN SOURCE | SOFTWARE REGISTRY

The Urban Digital Twin (UDT), developed by LRI in the context of the PER use case, is a modular platform that creates a real-time and semantically enriched representation of people mobility in urban areas. It fuses multiple data sources—such as mobile device positions, environmental sensors, and satellite imagery—into a dynamic digital mirror of the city. The platform enables continuous monitoring, semantic reasoning, and visualization of city dynamics, supporting emergency response and long-term urban planning.

KEY BENEFITS FOR THE PER USE CASE

The Urban Digital Twin (UDT), developed by LRI within the PER use case, is a modular platform that creates a real-time and semantically enriched representation of urban dynamics in urban environments. The platform integrates heterogeneous data sources, including mobile device positions, environmental sensors, traffic information, and satellite imagery, into a dynamic digital representation of the city. The UDT enables continuous monitoring, semantic reasoning, and visualization of urban dynamics, supporting both emergency response operations and long-term urban planning activities.

A key component of the UDT ecosystem is the 5G MEC component, deployed at the edge layer, which enables low-latency communication and coordination between the Urban Digital Twin, inference services, and connected devices. The 5G MEC component receives updated city states from the UDT, requests optimized evacuation routing from AI models, and distributes guidance instructions to affected mobile devices in near real time.

FOR RESEARCHERS AND INDUSTRIAL TEAMS

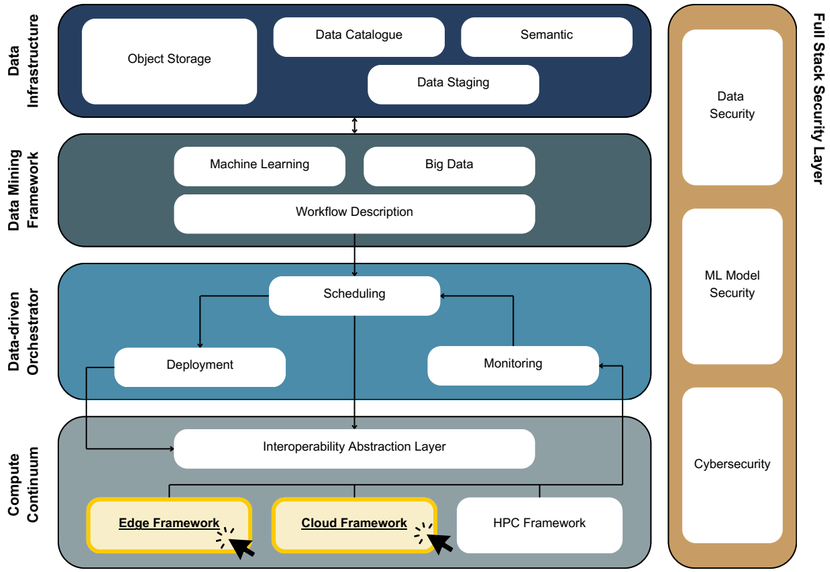
- Evaluate the effectiveness of emergency strategies using live simulations
- Query historical and real-time mobility patterns for urban analysis
- Integrate additional data sources (e.g., IoT sensors, Copernicus) through ontological extensions
- Adapt the semantic model to different cities or use cases
- Experiment with AI-driven evacuation and traffic optimization models
- Validate edge-cloud orchestration approaches through the 5G MEC infrastructure

FOR ADMINISTRATORS AND CDOS

- Enable dynamic response plans based on real-time device clustering and traffic congestion
- Visualize critical situations in a user-friendly interface, supporting quick action
- Generate daily snapshots of the city state for compliance, analytics, and reporting
- Integrate with local emergency broadcast systems for proactive citizen alerts
- Improve coordination between emergency responders and city authorities
- Enable low-latency emergency management workflows through edge computing technologies

USE AND IMPACT BEYOND EXTRACT PROJECT AND ITS PARTNERS

Beyond the PER use case, the UDT platform can support a wide range of Smart City initiatives. Its architecture allows seamless extension to new domains such as public health monitoring, crowd management at events, or energy usage optimization. By offering a real-time, queryable semantic layer of urban life, it enables both operational responses and strategic insights for resilient, data-driven cities.



https://gitlab.bsc.es/extract/extract-use-cases/per/UDT_v.1

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