Postdoctoral Position Proposal

Duration: 6–12 months
Expected starting date: November 2026
Location: Civil and Geo-Environmental Engineering Laboratory — LGCgE, Cité Scientifique Campus, Villeneuve d'Ascq, France

Project Title

Development of a City Digital Twin Platform for Flood Risk Management and Evacuation Simulation

Context

This position is part of the European project **BONSAI** (*Boosting flood resilience in estuarine systems anticipating shifting climate zones*), funded by the **Interreg North-West Europe** program. The project aims to enhance the resilience of estuarine systems to flooding by anticipating the impacts of climate change.

Within this context, the recruited person will contribute to the development of an **urban digital twin**–oriented platform (particularly for cities located along rivers and seas), designed to support flood risk management, evacuation planning, collaborative data management, interactive visualization of information produced by project partners, and the development of serious games in this field.

More information:

- https://bonsai.nweurope.eu
- https://www.smartdata2030.com
- [1] Aljer, A., Itair, M., Akil, M., Sharour, I. (2024). Knowledge Infrastructure Data Wizard (KIDW): A Cooperative Approach for Data Management and Knowledge Dissemination. Innovations in Smart Cities Applications Volume 7. SCA 2023. Lecture Notes in Networks and Systems, vol 906. Springer, Cham. https://doi.org/10.1007/978-3-031-53824-7_4

Objectives and Main Tasks

The postdoctoral researcher will contribute to the design and development of digital tools supporting flood resilience and decision-making. The main tasks include:

- Developing an **urban digital twin** integrating GIS data, flood risk indicators, infrastructure information, evacuation zones, shelters, road networks, and relevant territorial data, in particular the levees protecting the city, which must also be integrated into the digital twin.
- Designing **evacuation simulation and decision-support tools**, including route analysis, shelter allocation, accessibility analysis, graph-based network analysis, and the possible management of mobile barriers;
- Contributing to a **shared data management system** allowing project partners to upload, organize, access, and reuse heterogeneous data, including geospatial datasets, experimental outputs, technical reports, and risk-related information;

- Developing **Python-based data analysis and processing tools**, particularly for cleaning, structuring, analyzing, and visualizing project data;
- Supporting the development of **web-based interfaces** for visualizing maps, simulation results, digital twin components, indicators, and project knowledge;
- Contributing, depending on data availability and contract duration, to the **digital twin representation of dike-related experiments** or hydraulic/infrastructure monitoring data;
- Exploring the integration of **citizen science, participatory data, or stakeholder-generated information** to support socially informed flood-risk analysis.

Depending on the candidate's skills and the project needs, the position may also include complementary tasks such as satellite image analysis, serious games, digital storytelling tools, or the integration of GPR/ERT-related data.

Candidate Profile

The ideal candidate will have a strong background in **city digital twins, GIS, spatial data analysis, data management, and digital tools for urban or environmental decision-making**. The position is particularly suited to a researcher with experience in smart cities, urban digital twins, spatial risk analysis, and applied data-driven platforms.

Essential Skills

The candidate should demonstrate strong skills in:

- City Digital Twin / Urban Digital Twin concepts;
- GIS and spatial analysis using tools such as ArcGIS, QGIS, or equivalent platforms;
- BIM (Building Information Modeling) tools, e.g. Revit and other related software.
- Flood risk management, evacuation planning, accessibility analysis, or route optimization;
- Python programming for data analysis, especially using libraries such as Pandas, GeoPandas, NumPy, or similar;
- Algorithm development for spatial analysis, graph structures, routing, or decision support;
- Database and data management systems, such as MySQL, PostgreSQL/PostGIS, or equivalent;
- Web-based interface development and interactive data visualization;
- Ability to work with heterogeneous datasets produced by multiple project partners;
- Ability to work in a multidisciplinary research environment.

Additional Assets

The following skills would be considered advantages:

- Experience with citizen science, participatory data, social sensing, or stakeholder-generated data;

- Knowledge of 3D GIS, digital twin visualization, or infrastructure representation;
- Experience with web mapping, dashboards, serious games, or digital storytelling;
- Familiarity with satellite image analysis or remote sensing;
- Knowledge of GPR/ERT data, dike monitoring, or hydraulic/geotechnical experimental data;
- Experience in European or collaborative research projects;
- Ability to contribute to scientific publications, technical reports, and project deliverables.

Expected Outputs

Depending on the duration of the contract, the expected outputs may include:

- A City Digital Twin framework for flood risk and evacuation analysis;
- A GIS-based evacuation simulation prototype;
- A collaborative database and metadata structure;
- Python scripts or algorithms for spatial and data analysis;
- Web interface components for visualization and knowledge dissemination;
- Technical documentation, project deliverables, and scientific publications.

Conditions

- **Duration:** 6 to 12 months, depending on availability and project needs
- **Expected start:** November 2026
- **Location:** LGCgE, University of Lille, Cité Scientifique Campus, Villeneuve d'Ascq, France
- **Possible extension:** Depending on performance and available funding

Application

Applicants should submit the following documents:

- A detailed CV;
- A cover letter outlining their motivation and relevant experience;
- Copies of Master's and/or PhD degree certificates or transcripts.

Applications should be sent to:

Ammar ALJER
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