

URBAN AND REGIONAL DEVELOPMENT

Urban Goes Digital

Funded By	Dipartimento DIST Politecnico di TORINO [P:iva/CF:00518460019]
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Context of the research activity	3D City Model production and Digital Twin implementation for innovative urban management
	<p>The Digital Twin of a city is its faithful copy, in the virtual world. Based on the concept originally developed for industrial systems, it is applied to the urban context, thanks to the advances made in the field of geospatial technologies, specifically the city three-dimensional (3D) digital modeling. Once the digital model of the city (City Model) has been created, different digital twin implementations can be taken into account, such as: (i) intelligent buildings, (ii) infrastructures dedicated to the mobility of people and assets, (iii) networks (energy, hydraulic, TLC, etc.).</p> <p>The resulting digital ecosystem will allow to:</p> <ul style="list-style-type: none">• describe the behavior of the real city and monitor its evolution;• plan and develop projects, observing in advance the effects of their implementation on the digital copy;• anticipate any problems and carry out corrective actions, thus preventing the emergence of critical issues. <p>The urban Digital Twin can be understood as a mediation between the physical and virtual worlds. This interpretation draws attention to the influence that its use can have on the life of the community, but also of the individual.</p>

Objectives

The ability to extract high value-added information from data has opened up a series of completely new opportunities, thanks to the different essence of the information transmission medium. This perspective is all the more interesting, and certainly not without its challenges, when we pay attention to the so-called Geospatial Revolution, the evolutionary phenomenon of urban culture that is well connected with the digital transformation of contemporary society.

In this context, the development and dissemination of Urban Digital Twins is to be considered an important application area of digital humanities, starting with an in-depth study of the conditions and ways in which participation in decision-making processes can be encouraged, facilitating communication between administrations and citizens and, in general, by contrasting and mitigating the worsening of the digital divide, induced by the use of technologies. It thus becomes possible to measure the city directly, while helping to perceive and possibly estimate the uncertainty that permeates the urban Digital Twin, despite the certainty of its metric content; all this also to survey and analyze the "digital footprint" of learning citizens, meaning the digital learning environment as a "twin" of the analog training organization. Technology is an essential component for the provision of services that meet the needs expressed by increasingly demanding citizens, and when technology meets people and places, communities need to become 'smart', to constitute an ecosystem of processes, technologies and systems. able to improve the places themselves and the lives of those who reside there.

The proposed research, starting from the above considerations relating to digitization, intends to focus on the creation of thematic verticalizations that place emphasis on the structuring of the space of flows and the dynamics of urban places. This is also to encourage, through the creation of concrete examples, spatial literacy and support the development of geo-digital skills.

The project activities related to the Turin urban area are listed below:

- production of an urban 3D model using high geometric resolution photogrammetric data acquired from an aerial platform; analysis of the precision and metric accuracy, of the completeness of the semantic content and generation of the corresponding metadata;
- integration with available cartographic open data and analysis of the procedures and techniques for sharing the urban 3D model
- generation of a Digital Twin that represents the space of mobility flows at different times of the day and different days of the year and that shows the dynamics of urban places, that is, how they can vary according to their use and the different modes of use (work, study, culture, entertainment, etc.)
- structuring of an interactive and immersive urban atlas that allows three-dimensional navigations between the spaces of flows and the dynamics of urban places

Skills and competencies

In-depth knowledge in the field of geomatics, with particular attention to data modeling, creation of geodatabases and tools for spatial analysis. Knowledge

**competencies
for the
development of
the activity**

in the field of open data and any experience gained in the context of the degree thesis or in specific activities of spatial data management.