EduServ 25th Distance e-Learning Courses
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EuroSDR
European Spatial Data Research

TU Delft

3D city modelling: creation, standardisation and use in urban applications

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Pre-course seminar: March 2, 2027 (TU Delft)

Target audience: Staff of national mapping agencies, other public authorities; professionals and researchers from the public and private sectors; PhD researchers; students

Prerequisites: Participants are expected to be familiar with geographic information systems (GIS) and geodata processing. General IT experience is welcome, including familiarity with processing data through command-line applications and basic programming skills.

In order to create their own 3D city models, participants should have access to a computer where roofer (https://innovation.3dbag.nl/roofer/) or 3dfier (https://tudelft3d.github.io/3dfier/) can be run, which might involve administrator privileges.

To process and validate 3D city models (see also https://github.com/cityjson/cjio), the solutions *cjval* (https://github.com/cityjson/cjval) and *val3dity* (https://github.com/tudelft3d/val3dity) will be used, which require installing different libraries. The 3D city models that are created can be visualised on the web with Ninja (https://ninja.cityjson.org/) using a web browser. Participants can use any data for this purpose, such as from national/regional mapping agencies or data of their own.

Topics tackled: 3D city models have become essential tools for spatial analysis, urban planning and smart city initiatives. Advances in geodata acquisition and processing have revolutionised how these models are generated, enabling the automated creation of detailed 3D models for large regions for a wide range of applications. This course offers a comprehensive introduction to 3D city modelling,

covering: (1) how 3D city models can be created by combining diverse data sources, including building footprints, LiDAR, and GIS datasets; (2) how 3D city models are structured using international standards like CityJSON; (3) how 3D city models are used in applications, such as solar potential analysis and wind/noise simulations; and (4) how they can be integrated with building information models (BIM). Participants will also get a chance to create their own models using open-source software developed at the Delft University of Technology.

The course is structured into four modules, spread over two weeks.



Module 1: Background of 3D city models
The introductory module will cover background topics for 3D city models, including some key concepts of 3D GIS, how 3D geometries are represented in the ISO 19107 standard and the basics of 3D geodata georeferencing.

Module 2: 3D city models
Based on the background topics, the second module will describe what 3D city models are, how they are structured and the role of different international standards. This includes 3D city modelling concepts, such as semantic surfaces, the standardised levels of detail, and different best practices that can be applied.

Module 3: Creation and basic processing of 3D city models
This module will introduce different data sources and methods that can be used to create a 3D city model, with a detailed description of the method that is used for the 3D BAG (www.3dbag.nl), which is the automatically generated dataset containing LoD2 models of all buildings in the Netherlands. Afterwards, a variety of tools for the validation and manipulation of 3D city models will be introduced.

Module 4: Applications of 3D city models and integration with BIM (GeoBIM)
The final module will cover a variety of applications of 3D city models. In addition, the module will provide an overview of building information modelling (BIM), its relationship to 3D city modelling and how these two different types of data can be integrated.

To pass the course, participants must submit a 3D city model they created with the tutors' help, along with a short report explaining the model's characteristics and creation, and linking these elements to the different modules of the course.