3D city modelling

Instructors:
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Target audience: Graduate students (PhD and Master's) in fields related to geomatics, staff from national mapping agencies, public authorities and interested third parties involved with 3D city models.

Course objective: This is an introductory course to 3D city modelling. 3D city models are becoming an ubiquitous tool in areas such as urban planning and environmental modelling. This course gives an overview on state-of-the-art in 3D city modelling and its applications, introduces the participant to the underlying principles of 3D city modelling and lets them experience hands-on what it means to create a 3D city model. A number of topics will be discussed: the international CityGML standard, the concept of Level of Detail (LOD) in 3D city models, and the importance of data quality. The goal of the practical exercise, to be executed with FME, is to create a valid and CityGML-compliant LOD1 3D city model by combining existing 2D topographical datasets with aerial LiDAR point clouds.

Course outline: The course will start with the kick-off seminar where the participants will be introduced to the basic concepts of 3D city modeling, the CityGML standard and data validation. There will also be small live demonstrations of the FME software that is used in this course. The e-learning part of the course involves working on the main practical assignment, which is the creation of a 3D city model of one part of the Netherlands. Support from the instructors will be available through the Internet.

Module 1. Principles of 3D city models
This module introduces the participant to the basic concepts of 3D city models. Some topics that will be discussed:

- various techniques to create 3D city models;
- what is CityGML and how are 3D city models represented in CityGML, both in terms of semantics and geometry?
- Levels of Detail (LODs) in 3D city models;
- for what applications are 3D city models useful?

Module 2. Automated creation of a 3D city model from existing datasets
This module focuses both on how to obtain and represent the 3D geometries that make up a 3D city model and how to add proper semantics. Techniques such as extrusion and surface draping are covered in detail. To what extent can this process be automated? The output of this module is a 3D city model that is fully CityGML-compliant.

Module 3. Data validation
In this module, the importance of data quality will be discussed. We will focus on the geometry and the topology of a 3D model, and on what goes wrong in practice if these do not

conform to the definitions in the international OGC standards. We will present the theory and the definitions, and will discuss how to validate your 3D city model.

In order to get familiar with FME before the course start, following websites are recommended:
FME 30-day trial version: https://www.safe.com/fme/fme-desktop/trial-download/
Getting started with FME tutorial: http://docs.safe.com/fme/pdf/FMEGettingStarted.pdf