

3D Landscape Models

Traditionally, the term 'mapping' refers to geomatics technologies in which real-world objects are two-dimensionally represented in a physical medium, usually on a sheet of paper. The map is both medium of storage and visualisation, and its scale determines the features of the latter; the larger the scale the more detail shown. Anyone asking what the scale is actually wants to know how elaborate objects are represented. Today we have technology and datasets in place that enable the creation of 3D landscape models: satellite imagery with resolution as high as 50 centimetres (and even higher, if US government regulation on civilian imaging would allow), digital 2D topographic/cadastral maps, airborne and terrestrial imagery, airborne Lidar and terrestrial laser scanning. Mapping is dead, long live modelling! Store all the data on computer-accessible medium, push the button, and a couple of hours later you can take a virtual walk through the streets of your city. How wonderful and fascinating are geomatics! 3D landscape models can be automatically created, since all geo-data is geo-referenced.

It's that simple? I'm sorry to have to disappoint you. In an ideal world the answer would be a firm 'Yes', but in unruly reality the reply is plain 'No'. At smaller scales the automatically generated 3D model may look nice and realistic. But only zoom in, and your enthusiasm will turn into distress: parts of some roofs are projected on the street, buildings seem partly to rest on trees or railways, garages have green roofs and appear to hang like boxes in the air above a playground; trees are glued onto facades. One cause of such incongruities is the limited accuracy of the data.

Inaccuracy may be introduced as a shift between airborne imagery and Lidar data used to create the skeleton of the 3D model; it comes into view as roofs projected on streets, and buildings resting on other objects. Then there is the demonic influence of time. Revisiting an old haunt, you may wonder whether this is indeed the nice old town you once lived in. The street pattern is familiar, but for the rest there is a huge mismatch between your memory and the surroundings. Time flies, and this is also true for geo-datasets. A recently constructed building may be captured in the Lidar data but absent from earlier recorded aerial images and digital maps, causing it in the 3D model to hang in the air, roof decked with the land cover captured in the aerial image.

Laymen, who usually experience artificial 3D worlds through animations and games, often believe that the creation of 3D landscape models must be a piece of cake. The 3D world of games can be modelled perfectly, but creating realistic 3D landscape models requires much more craftsmanship and time, lots of time. As usual, the devil is in the detail, and it takes huge manual efforts to eradicate his tracks.