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“Irish 3D town models”

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The Charles Close Society was founded in 1980 to bring together all those with an interest in the maps and history of the Ordnance Survey of Great Britain and its counterparts in the island of Ireland. The Society takes its name from Colonel Sir Charles Arden-Close, OS Director General from 1911 to 1922, and initiator of many of the maps now sought after by collectors.

The Society publishes a wide range of books and booklets on historic OS map series and its journal, *Sheetlines*, is recognised internationally for its specialist articles on Ordnance Survey-related topics.

Irish 3D town models

Rob Wheeler

I first came across 3D models in a mapping context during a visit organised to the Imperial War Museum at Duxford when we were shown the models produced in 1944 to facilitate precision attacks by the RAF on certain targets in France and the Netherlands. Each model covered a very small area and had been produced manually at the cost of considerable effort.

Two-thirds of century later, technology has progressed immeasurably and the party that visited Ordnance Survey of Ireland (OSI) this July were shown their digital 3D model which is under development but which in 2009 had been expected to cover all towns by 2012.¹ A sample view appears in OSI's corporate brochure, *An insight into OSI*.²

The basis for the product is a height model derived from lidar survey. An aircraft has shone a laser down at the ground every two metres and measured the height by timing the returned pulse. Heights obtained in this way are highly accurate: a root-mean-square error of less than nine centimetres was quoted. The laser beam has spread out by the time it reaches the ground, so multiple returns may be present, for example from chimneys, from roofs and from street level. The software takes all this information and derives from it a simple geometrical model which might, for example represent all the buildings as a collection of rectangular blocks.

So far, there is no colour and no texture. OSI has overhead photography which it can drape on this model to colour the horizontal surfaces, but this is of little use for building façades. So one takes the equivalent of Google *Streetview* shots and projects them back within the model thereby applying not just colour but the shapes of doors and windows to the building façades. A final subtlety is to add a representation of vegetation whose approximate size will have been determined from the lidar survey. One now has a model one can look at from any viewpoint, even a moving one. Indeed, especially from a fast-moving viewpoint, it will give a convincing image of what one might see.

This would be ideal if the Irish Air Corps were planning precision attacks to rid Dublin of some of the monstrosities built before the beauties of Georgian architecture had become appreciated once again. However, so far as I am aware, that is not actually the intention behind this product. Rather, it seems that the idea is to assist planners in understanding the visual impact of proposed new buildings from a range of key (but static) viewpoints. For an aesthetic purpose like this, it is important to represent properly those features that are of aesthetic importance.

For Georgian houses, the symmetry and regularity of façades is important. For

¹ Geraldine Ruane, *Stories from the people, who put Ireland on the map*, Dublin: OSI, c2009, page 112

² This can be downloaded from the home page of OSI's website <http://www.osi.ie/>. The hard-copy version is unpaginated, but on the electronic version see page 11.

other buildings the spikiness of the roofline may be critical.³

Now the basic model onto which the images have been projected has little spikiness to it. The lidar appears to have spotted the occasional chimney, but the occasional chimney is as much as can be expected with a data spacing of two metres. There is no way the pinnacles of St Pancras would be recognised for what they were. And while the *Streetview* images will show the pinnacles, at best they will be back-projected onto the sky and lost; at worst they will be projected onto the wall of some tower block that happens to be in line with them, and anyone viewing that tower block from a different angle will be scratching his head and wondering why someone has chosen to paint a gothic pinnacle there. Fortunately for OSI, Dublin has no St Pancras, but it has an awful lot of chimneys whose absence on their sample image makes the buildings look '*not quite right*'.

Worse is to come. It would be too much to hope that the camera position and direction for the *Streetview* images should be known with absolute precision. Make just a tiny error in this and all the windows and doors on the façades shift by a couple of feet. As was noted earlier, the regularity and symmetry of façades is a key aesthetic feature of Georgian architecture. So the eye is troubled when, looking at the left-hand side of their sample view, it spots a fine Georgian house just one bay of windows wide. To make matters worse the left-hand jambs of these windows are just inches from the street corner. Structurally, it looks in imminent danger of collapse. Aesthetically it looks as though the side street has been widened by taking a giant circular saw to the buildings on one side of it. This of course is exactly what will happen when doors and windows are shifted sideways as a result of alignment errors.

I simply do not see how the user can form a considered opinion on the aesthetic impact of a distant office block when the foreground buildings whose ambiance is to be preserved have been so callously treated. It may be protested that a crude representation is better than none. However, there is a very simple alternative, which is to take an ordinary digital photograph from the viewpoint of interest and to tweak it digitally by inserting the proposed new development in the background. Now there is certainly a requirement for a GIS product to facilitate inserting the new building in the right position in the photograph. One could even imagine such a product using the 3D model and knowledge of where the real photograph was taken from to insert the new building with the correct amount of it obscured by intervening structures or trees. Effectively one would take the product that OSI has developed and replace 99% of the scene with a real photograph.

Perhaps that is what OSI really intends. Or perhaps it has some other customer in mind, like the Irish Air Corps!

³ O' Connor's view of St Pancras Hotel in London, hovering above the smoky haze like a vision of the New Jerusalem, is a fine example. See: <http://www.movinghere.org.uk/search/catalogue.asp?sequence=122&resourcetypeID=2&recordID=57146>