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TO HOLD THE HOLY GRAIL

LIDAR CAN POTENTIALLY GIVE SURVEYORS ALL THE DATA THEY WANT – BUT IT HAS CHALLENGES OF ITS OWN

For years, many surveyors believed that more, accurate data was the answer to practically every geospatial question that could be posed. An experienced surveyor armed with a theodolite can take many readings in a day, but somehow, it was never enough: the area was too large, the margin of error in position too high, the question of altitude too difficult to gauge. Even with aerial photography, satellite imagery, GPS and other technological innovations, there was still not enough data. If only there was more time, more money, more staff, better equipment – if only there was *more.*

The advent of LiDAR gave us the Holy Grail of 'more'. With a spinning laser able to determine the location of innumerable points to millimetre accuracy in short periods of time, whether on the ground or mounted on a plane, suddenly it was possible to have as much data as a surveyor could want, when they wanted it (give or take). And in this issue, we look at some of the ramifications of actually having found this surveying Holy Grail. What does it enable surveyors to do and what difficulties of its own does it bring with it?

On page 18, Alistair Maclenan argues that LiDAR could soon become the most prevalent geo-based technology in the world, thanks to the autonomous or self-driving car. The recent sale of HERE to a consortium of car manufacturers suggests that the cars of the future are going to need highly accurate, pre-prepared images of the road network and a method of locating the cars in that network, with LiDAR being the key to both – something that might make Google and perhaps even Apple rivals to those car manufacturers.

The race will soon be on to get as many LiDAR-equipped surveyors out into the field to get an accurate view of the world's roads as possible. Indeed, the advantages of LiDAR make it eminently suitable for surveying existing roads. No one likes getting stuck behind a slow-moving surveying vehicle and a busy road is hardly the safest environment for anyone trying to take accurate measurements while paying attention to the instrumentation in their hands.

On page 22, Peter Csörgits looks at how his company has developed a Mobile Map-ping System to survey Hungarian roads. Based around a LiDAR system mounted on an SUV, it can record 1.1 million points a second while travelling at 70kph. But as Peter reveals, there are challenges both simple – slopes – and difficult – automatic identification of features – that still need human expertise to overcome in order to get the most value from that LiDAR data.

Indeed, the most obvious problem for many with LiDAR is dealing with the sheer amount of data that systems produce – other than for the smallest of sites, LiDAR data is almost inherently a Big Spatial Data problem. With LiDAR recording so much data the term 'point cloud' had to be invented to convey the sheer amount of information available, displaying and processing that information alone, let alone analysing it, has been a challenge for even the most powerful of computers and software, in some cases making them unusable.

What's a surveyor to do? On page 27, Rick Harrison reveals eight simple steps that can help. Rather than using brute force to plough through the data, Rick's approach winnows it down to a more manageable size – or better still, getting the company that obtained the LiDAR data in the first place to winnow it down.

That, in itself, can present challenges. Assuming the company is even willing to do so, what format should it provide the data in? There's no single, standard format or one that beats all the others in every department. Uncompressed ASCII files can be opened by anything but take up huge amounts of storage and memory, while LAZ cuts down on storage space but may require a certain amount of technical expertise to use properly. And then there are proprietary formats such as MG4 and zLAS, each with its own advantages and disadvantages. On page 30, Jared Dominguez and Robert Parker run through the strengths and weaknesses of the most popular formats and what they can offer you.

It seems with LiDAR, just as the Knights of the Round Table discovered on the quest for the original Holy Grail, it can bring as many challenges as benefits. But there would be few who would doubt the value of it.