Seeing the bigger picture

Helen Gilmartin explains how a combination of technology and software development means that geospatial professionals no longer have to just live in a 3D world - they can now work in one as well!

Humans are visual creatures with a tremendous capacity to process and respond to visual data far better than any other type of data. In the geospatial industry, seeing more than two dimensions opens up a whole new world. It enables us to convert our captured data into usable, understandable knowledge for wider markets and contributes to better, accurate, decision-making.

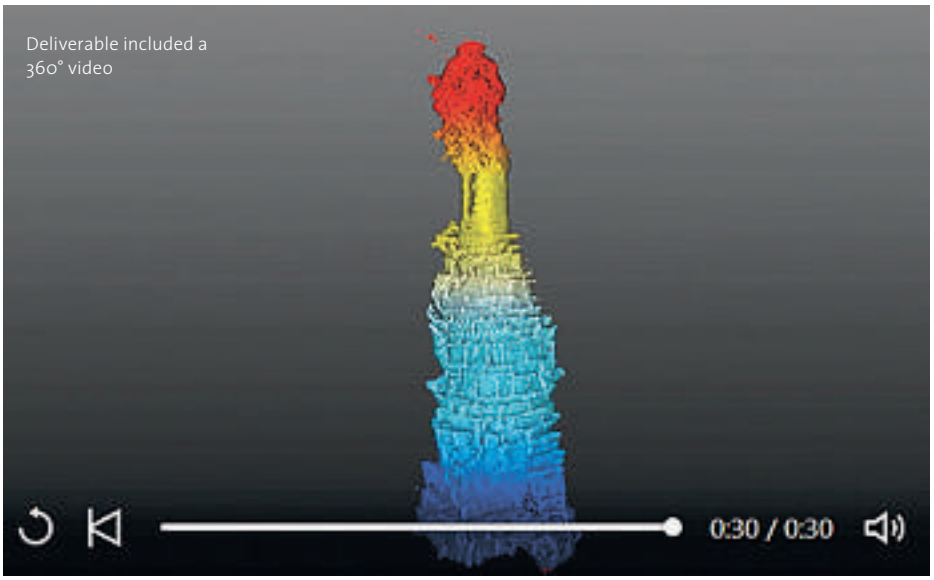
Of course, for some jobs, 2D plans can be faster and cheaper to produce than a detailed 3D model, but we are now firmly moving into an era of mainstream 3D that is more accessible and affordable. The all-encompassing deliverable is not only a point cloud that captures everything, but also provides an unbeatable tool for visualisation.

No-brainer

'Visualisation' is becoming the buzz word of 2019/20, particularly as the demand for spatial information continues to grow and as we see a rise in stakeholders outside of our industry. With 90% of information transmitted to the human brain being visual*, surely it makes sense to focus on the best visual representation of sometimes complex information?

Here are five examples of recent projects in which we've been involved and where the visual benefits of a 3D model have been key to their success:

1.Using a GeoSLAM ZEB REVO RT handheld scanner, and while still on-site, a client was able to provide a customer with a 3D point cloud of a sinkhole. This provided sufficient information to initiate a remedial plan before the final deliverable was issued.



The main challenge for engineers dealing with sinkholes is the unknown. Until a thorough investigation has been completed, their depth and size can be disguised by a small surface diameter, or a bottleneck, and the risk of further collapse remains a threat. In this case, the data collected by the handheld scanner lowered into the sinkhole revealed it to be more than 10m deep. By using the real-time feed to maintain accuracy and see what the scans were producing below ground, the client had full confidence in the data and had some early visuals of what, until then, had been a totally unknown factor. The final deliverable also included a 360° video. (see image above)

2. Using a senseFly eBee X fixed wing drone with the S.O.D.A 3D camera, a client in Ireland was able to produce an aerial survey of such clarity that it was suitable for many applications (for example coastal erosion) as well as for what was originally intended – a 3D model to identify the optimum location for constructing a skywalk viewing platform (as pictured right). The latter would be located off the side of a cliff to provide the best possible experience for tourists.

As there was no access to the beach, and as scanning from a boat was not feasible, high quality imagery was obtained courtesy of the S.O.D.A 3D. This professional drone photogrammetry camera changes orientation during flight to capture three images simultaneously (two oblique and one nadir), making it ideal for vertical environments. The flight took just 25 minutes to complete. Additionally, there was no need for Ground Control Points (GCP's) as the eBee X has its own on-board GPS that can achieve real time accuracies of +-50mm using the VRS network.

3. Using a Trimble SX10 Scanning Total Station, a police force has been creating exceptional quality 3D deliverables for use in court. These clarify complex crime scenes, providing easily understandable graphics for judge and jurors. Once on the crime scene, the SX10 is used to establish external control outside the area of interest. Using a single instrument also reduces the chances of contaminating evidence while, at the same time, allowing a flexible approach to data collection and best use of site time.

Additionally, SX10-generated point cloud data - via third party software - is being prepared for use with a 3D printer. This will enable the Force's Imaging Unit to generate entire scaled-down crime scene models for use in the courtroom, again helping judges and jurors understand complex situations.

Amazing clarity of aerial data obtained for the viewing platform project by senseFly's eBee x with a S.O.D.A. 3D camera

4. Using Trimble SiteVision, a customer has trialled this outdoor, Augmented Reality system on the A14 road improvement scheme to provide real-time, in-field visualisation of new routes and structures. This helps local residents and landowners, as well as construction teams, to better understand why they are digging in certain areas and how damage to objects, such as trees, can be avoided. This new approach to on-site visualisation brings design information to life and provides reassurance for those who might find it difficult to interpret conventional highway plans and documentation.

It can also be used for visual verification of models and data sets and for checking construction progress and as-built information.

5. Using Trimble's mixed reality HoloLens system, the rail industry has been exploring ways of improving site safety. Wearable systems such as this are all about the merging of real and virtual worlds to produce new environments and visualisations and where physical and digital objects co-exist and interact in real time.

This enables the efficient interpretation of physical and digital information and the spatial relations between them. The rail industry is particularly interested in how this technology can be used for office-based site briefings in which engineers can be familiarised with a site without having to set foot upon it, or undertake time-intensive or costly exploratory work.

Overcoming barriers

In the past, 3D modelling has entailed scan/point cloud registration, specialist expertise, super powered computers and expensive software licenses ... all to get data onto a single laptop.

Thankfully we're moving on. Terabytes of information have been condensed into sensible Gigabytes or, for for a small scanning job, even Megabytes. 3D laser scanners are falling in price and easier to use than ever before thanks to automated processes - the recent release of Trimble's X7 is a fine example of this - and finally, we have new ways to view and share this data.

Easy-to-use cloud-based portals (e.g., KOREC's K-Portal) can, among other things, now host point cloud data for anyone who wishes to share it with customers, free from the need for specialised software, training or the handling of huge data volumes. With a license providing unlimited logins, a portal is a great way to share and view 3D models, or to measure and create cross sections.

Getting the picture

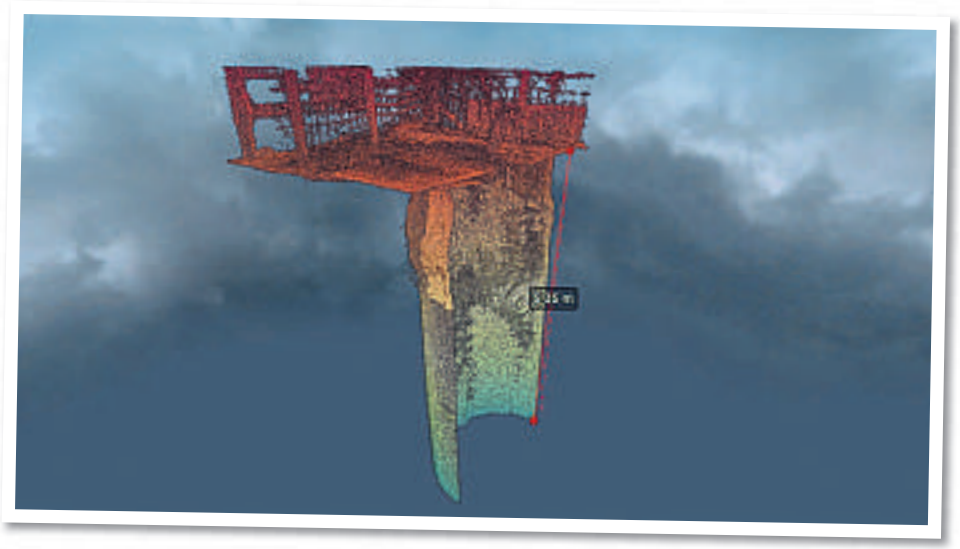
The demand for 3D models is rising fast,

Graphics and 3D models generated from point cloud data can provide valuable help for those involved in the legal process

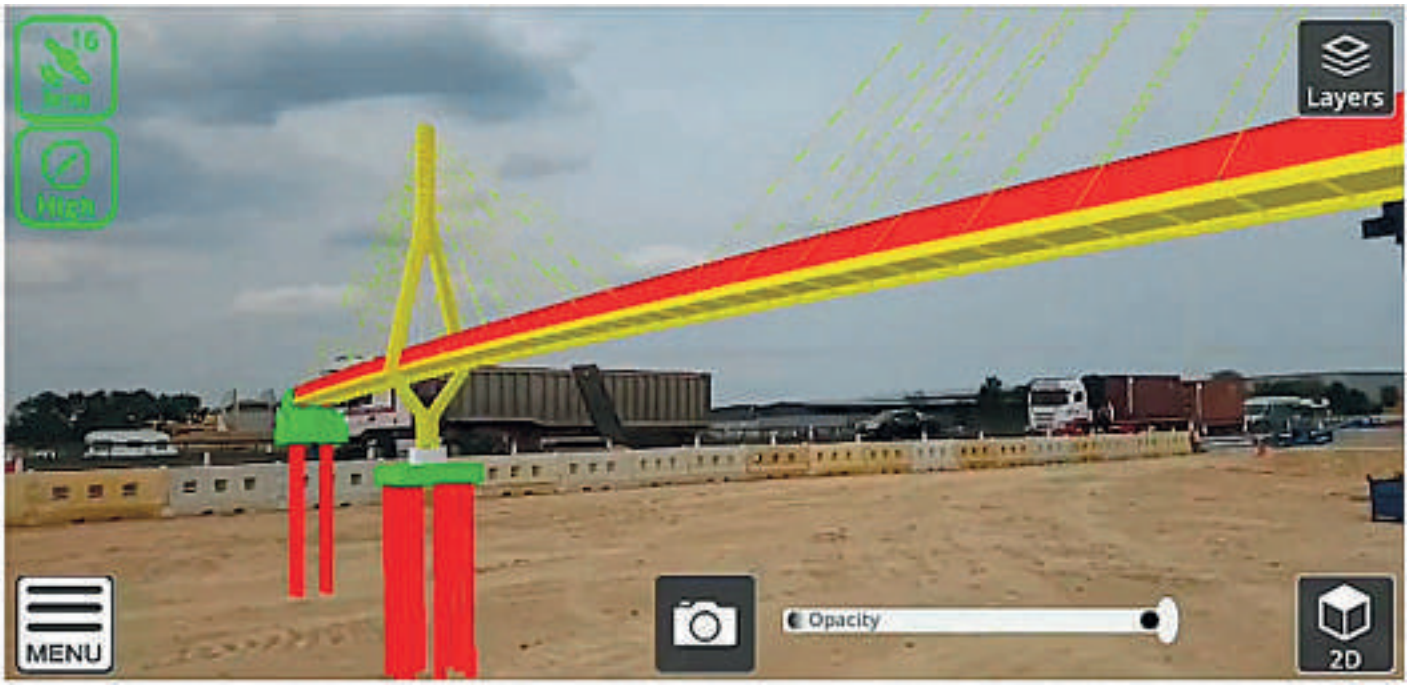
simply because the addition of a third dimension adds even more understanding to a picture. These models are becoming easier to create and share and provide an immersive environment for clients that go way beyond the capabilities of a photograph or 2D plan. Importantly, they will also help change how the rest of the world views our business as it moves beyond what many once regarded as 'for experts only'.

*According to 3M corporation

Helen Gilmartin is Marketing and Operations Director for KOREC Group, based in Huntingdon (www.korecgroup.com)



Cloud-based portals are ideal for viewing 3D data and conducting basic tasks such as cross sections and measurements



Trimble SiteVision: a fast. friendly way in which Augmented Reality can be exploited to share construction site information

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