



REALITY CAPTURE

ALTHOUGH NOT AS PRECISE AS PROFESSIONAL EQUIPMENT, LOW-COST CAMERAS HAVE THE POTENTIAL TO TRANSFORM THE USE OF VIRTUAL REALITY BY THE GEOSPATIAL INDUSTRY, ARGUE WILL TOMPKINSON AND CHRIS DRYDEN

The term 'reality capture' is proliferating in the geospatial industry. An increasing number of users are realising that they can collect their own 3D data. The geospatial industry has been fixated on specifications of accuracy and precision, but it is increasingly recognising the value of a wider user-base capturing, managing and delivering realistic visualisations that help to achieve a better understanding of locations and the assets they contain.

Virtual reality (VR) is making a resurgence in a range of professional communities to help users experience what they have captured. VR is a computer-rendered representation of another environment enabling it to be experienced, without needing to be physically present, whether overlooking the Grand Canyon or walking up to the Taj Mahal, showing the interior of a new house that has just been put on the market, or the construction site for a new hospital. VR can also be used to inspect a facility, collect auditable records of site conditions at a point in time, or provide a view of a vehicle production line.

VR experiences provide an immersive view, whether through a headset, projected onto the walls of a room, or by viewing panoramic images through a browser window on a smartphone or desktop computer. Regardless, the VR representation will fill a field of view, providing a sense of scale that will allow the viewer to experience the virtual environment almost as if standing within it.

The gaming and movie industries are well-known for providing virtual experiences of real or make-believe environments. Immersive photography has been widely used in real estate to sell properties. NCTech's first 360° camera was designed to help the military to train troops and plan missions, and for police services to quickly document crime scenes. Construction firms such as Ledcor and Balfour Beatty use 360° photography to document builds at each phase of construction. VR is now ingrained in the design and development activities of firms such as the Ford Motor Company, where specialists responsible for different elements of the design are invited to inspect the product from the perspective of the customer, before it hits production.

In the geospatial sector, survey practices such as 3D laser

scanning and mobile mapping capture near-exact representations of environments and structures. With high data volumes and specific functionalities to validate measurements, the geospatial community has been progressing with developments that one might not immediately consider to be 'VR', but in the sense of the experience they provide, they are.

Geospatial technology influences on VR

The geospatial industry is often considered niche, producing deliverables that are accurate to the true x,y,z coordinates of objects in the real-world. Rarely concerned with visual aesthetics, a surveyor wants to know where an object is positioned to the nearest centimetre, not the nearest metre. Systems used to collect survey data are typically considered 'high-end' relative to mass market cameras and can be expensive and necessitate specialist training, too. There has, however, been a trickle-down effect where technology born in the geospatial market enters, or at least influences, more consumer-based VR capture and visualisation systems.

An example of this trickle-down can be seen in the Google Street View project. In 2007, Google used vehicles equipped with a singular dodecahedral camera to capture panoramic imagery, which was then viewed in an immersive manner over the web. The first high-end mobile mapping vehicles in the survey industry, such as the Lynx Mobile Mapper, where 3D laser scanners were combined with cameras, were announced the same year.

By 2010, Google Street View vehicles incorporated both cameras and laser scanners. Google's vehicles still may not be 'survey-grade', but Google Street View was probably most people's first experience of virtual reality. This connection shows the value of structured 3D data to consumer and commercial VR environments.

The impact of technologies for geospatial applications is further seen in the new line of Street View workflows announced earlier this year. New developer specifications require knowledge of subjects such as mobile mapping and geolocation practices, and Street View partners

such as Matterport and NCTech are further bringing structured 3D data capture to the 'Street View VR Ready' experience.

Impact of VR on the geospatial industry

The trickle-down of geospatial technologies into wider VR markets might simply be perceived as a one-way 'dumbing-down' of high-precision technologies that will appeal to the mass market. However, the wider market not only drives the adoption of user capture technologies, but also the development of VR environments that can use them. Both points can only be good for geospatial technology brands.

- Lowering cost barriers to 3D capture technology dramatically increases awareness of 3D capture and will also further drive use of the traditional high-end scanning systems.
- Adopting widely used and accessible cloud computing platforms to upload, manage, share and visualise data from any type of VR or 3D capture technology will help to eliminate barriers and enable VR to be accessible in any market.

Some practitioners in the geospatial community might scorn the increased use of cheaper, less accurate capture systems or software platforms that use specialist tools for manipulating the 3D data collected. In the geospatial market, data processing

tools are already well defined and there is a knowledgeable user base. Wider and repeat use of expensive laser scanning systems is relatively limited, though, as related software is highly expensive and scaled across the comparatively small number of users. Removing capture barriers can potentially make a radically different model possible for software vendors.

Changing the mindset among traditional geospatial service providers also results in securing opportunities for projects that do not always require measurement, but do require logical data capture in order to provide the most complete experience to the user. An example of a firm that has embraced such a change is Canadian-based survey firm, Underhill Geomatics, and its online Photodocufy service for delivering immersive site documentation experiences to the construction industry.

Construction improvements

To take the construction industry context further, lower technology costs mean that every site foreman can be equipped with a VR camera to capture immersive imagery for their project management team located on the other side of the country to view build progress and identify risks. The means now exist for project teams to experience site conditions as though they are there every day. Increased reliance on these VR experiences also means that the project management teams now understand where

the 3D data fits in the wider context and are more likely to bring in a specialist laser scanning service provider to scan a specific installation to check its alignment or update CAD for the site.

Perception is now the barrier

VR experiences are intense – both for the user and the computational resources required to deliver them. As 3D reality capture devices deliver increasingly better technical capabilities and improved usability at lower costs, almost anyone outside of traditional application silos can populate their own VR experience. Priorities are changing among users, and there is wider appreciation of experiences that are not always driven by accuracy and precision.

Geospatial technology vendors have the opportunity to provide interfaces that enable use of their data to be used across general purpose VR and cloud-based platforms. Equally, geospatial service providers can build service offerings around what might have been perceived as lower-quality capture technologies to bring value to markets that do not always require precise measurement.

Open integration with multiple industries and platforms not only grows markets for all types of 3D capture and VR visualisations, it increases market share for those who have invested in it.

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