Beyond the Cutting Edge

Advancing technologies in positioning are just the tip of the iceberg. Geospatial professionals are finding opportunities from new approaches in gathering, analysing and sharing spatial information. Trimble's Elmar Lenz explains how

For some time now, you've read about the evolution in working practices of surveyors and other geospatial professionals. That change is continuing — even accelerating — in line with technological advances.

We no longer live in a world where geospatial professionals simply collect data, organise it into a GIS or CAD file, and send it to the end-user. Instead, the modern business world demands that we add further value by turning data into the knowledge needed to make timely, informed decisions. Today's geospatial professionals are quickly moving into the realm of analysis and management support.

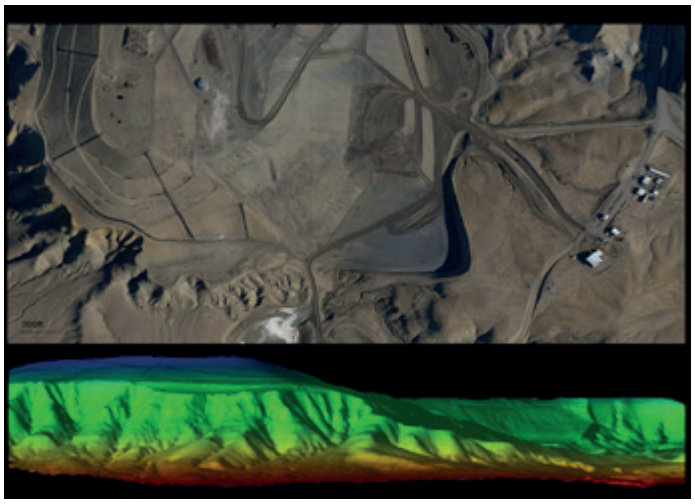
The process starts by understanding the role of geospatial professionals as knowledge workers. They are responsible for supplying their clients with timely, actionable intelligence. This calls for a solid understanding of how the client will apply geospatial information: who will use it, where, and towards what end. With that knowledge in hand, the geospatial professional can select the appropriate solution to assemble, analyse and share the information.

Technologies for change

Advances in optical and GNSS instruments deliver enormous gains in flexibility and productivity for collecting data. New software automates workflows in the field and office. In addition to streamlining tedious tasks, today's office solutions are capable of producing sophisticated deliverables. They offer new tools — and opportunities — with which geospatial professionals can add further value to their client offerings.

For example, new equipment and software are moving imaging into the mainstream as tools for documentation and measurement. For example, Trimble's VISION™ technology (pictured in our lead image) employs Total Stations with in-built calibrated cameras to collect georeferenced photographs. When processed with its complementary Business Center software, the photos can produce individual 3D points, orthomosaic images, and Digital Surface Models.

Similarly, georeferenced panoramic images captured by the Trimble V10 imaging rover can be combined with imagery from Total Stations and aerial cameras, and with positioning data from 3D scanners, GNSS and optical instruments. By merging data from multiple sources, processing software such as Trimble's Business Center or RealWorks® can produce visual deliverables that include point clouds, surface models and photorealistic 3D representations. This information provides significant value to design and engineering processes and enables the geospatial professional to engage a wider range of project stakeholders.



Images captured by a Trimble UX5 aerial rover are processed in Trimble Business Center to produce an orthomosiac (top) and 3D model. Deliverables can be developed for engineering, environmental studies and other applications

Efficiency in the field

In addition to providing new deliverables, imaging can save time and costs. Crews using the Trimble V10 have increased in-field efficiency by 30 percent and more while realising benefits in safety and convenience. Imaging also reduces downtime for measurement, a costly component for many transportation and industrial applications. Inspection on roads and bridges can be conducted from a safe location, cutting or eliminating lane closures or late-night work hours. And when the inevitable request for "just a bit more information" arrives, there's a good chance that the required data is already to hand.

Technicians can use office software to extract new points and deliverables from existing images. It's a fast, efficient solution that often eliminates the need to send a crew back to the site.

While imaging is an important new approach to gathering spatial data, the full value of the information is often not realised until it is in the hands of the person who will use it. The ability to share information is at least as important as the ability to gather it.

The expanding cloud

Many organisations use the Internet to share information among employees, contractors and stakeholders. Common data formats and tools enable access to project data from a central location, typically an in-house or cloud-based server. In addition to data storage, these solutions bring sophisticated data processing to more users, even those in remote locations. As a result, cloud-based systems for geospatial information management and analysis are poised to provide new flexibility in the field and office.

For example, Trimble InSphere™ geospatial information management is a cloud-based platform of software, data and services. Focused on surveying, engineering and GIS, the system uses the cloud to support geospatial data management, field data collection and transfer, equipment management and spatial data catalogues. The system combines cloud services with positioning, communications and data analysis to provide customised, point-of-work information to the field and office.

With InSphere's TerraFlex™ software component, GIS field technicians can create simple, task-specific forms and workflows for collecting positions and attributes. It automatically syncs information from multiple field crews to the server, where it is accessible to other crews and office technicians. Field information is quickly checked, merged with other project information, and shared with project teams and management. Mobile solutions ranging from rugged field computers to smartphones can utilise TerraFlex to support specialised needs in collecting and sharing geospatial data.

Gather, Combine, Deliver

The new sources of data — cameras, scanners, GNSS and aerial imaging — can pose some interesting challenges in producing and managing useful information. Historically, organisations needed separate software to import and compute positioning information, conduct image processing or manage point clouds. That's changed as well.

Rather than using multiple software packages to handle the various data types, technicians can now assemble information in a single software system. Trimble RealWorks uses positions from GNSS and total stations to register multiple point clouds into a single 3D model. Images are then draped over the model to produce photorealistic 3D visualisations, and detailed information can be measured directly in the model. Automated modelling functions produce deliverables including 3D surfaces and objects such as pipes and tanks for use in Building Information Modelling (BIM), engineering and related applications.

TerraFlex handles GIS information in a similar manner. Here, points and features, together with their attributes, are automatically placed into the appropriate layers for insertion into a master geodatabase.

Data lies at the centre of geospatial processes. Rich, accurate spatial information can provide value in unexpected ways and in new parts of an organisation's business. By enabling geospatial professionals to efficiently capture and utilise multiple types of information, integrated technologies are rapidly becoming an essential part of the daily workflows of data collection, processing, modelling and analysis. The results of these efforts — geospatial data models and actionable knowledge — enhance efficiency and effectiveness throughout an organisation.

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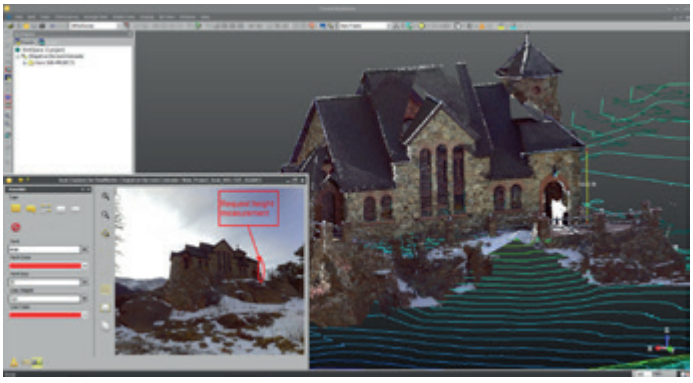

Combining images with data from a 3D scanner, Trimble RealWorks produces photorealistic models for visualisation and analysis. Measurements can be taken directly from the point cloud or model.

Using a Trimble V10 imaging rover with Trimble R10 GNSS receiver, a technician captures georeferenced panoramic images for bridge inspection. The system enables capture of comprehensive information while working a safe distance from traffic or other hazards