

# Delivering Survey Results Faster in The Digital World

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**Key words:** Survey Tools, Survey Deliverables, Data Capture, Data Communication

## SUMMARY

In today's fast paced society, in both our business and personal lives, we are always trying to find ways to get things done in the most efficient manner and gain a competitive edge. This is no different for the surveyor who is always under pressure to stand apart from their competition and provide the appropriate deliverable to the client under tight deadlines. This paper examines some of the tools and techniques which are available to help the surveyor be more productive. Three areas are addressed:

- Faster data capture
- Sophisticated deliverable creation
- Enhanced communication between field and office

Data capture techniques are faster than they were even a few years ago. For example, with the availability of multiple satellite constellations, today's receivers can provide real time positions almost instantaneously; total stations, capable of rotating 115 degrees per second, measure angles and distances faster than ever before and field software gives you a toolbox of functions to capture and analyze data in a variety of different ways. Traditional methods of surveying are also being complemented by laser scanning technologies where, with just one scan, you can capture millions of points and image information to digitally represent the scene.

At the same time, the deliverables that the surveyor can readily generate, in both the field and the office, are becoming more sophisticated. With less manual data processing and analysis, rich data can be provided to the client.

Connectivity is another area in which a surveyor can save time. There are a range of solutions on the market that allow the surveyor to transfer data directly between the field and the office. The benefits of such systems are that field crews can readily gain updates to critical job information while in the field.

This paper explores ways that surveyors can stand apart from their competition and deliver results to their customers as efficiently as possible.

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## 1. ABSTRACT

In today's fast paced society, in both our business and personal lives, we are always trying to find ways to get things done in the most efficient manner and gain a competitive edge. This is no different for the surveyor who is always under pressure to stand apart from their competition and provide the appropriate deliverable to the client under tight deadlines. This paper examines some of the tools and techniques which are available to help the surveyor be more productive. Three areas are addressed:

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## 2. FASTER DATA CAPTURE

Data capture techniques are faster than they were even a few years ago. There are several areas where data capture is improving:

- Advances in technology
- Addition of new technologies
- Integration of technologies

Surveying equipment is constantly evolving through advances in technology. For example, the traditional total station is able to turn faster, the Electronic Distance Meter (EDM) can measure distances more quickly and directly to regular surfaces, which allows setups to be completed faster. With robotic systems, decisions are made at the measured point, removing the need for time consuming communication between the instrument and the rod person. Robotic systems have also become smarter with faster reacquisition times after losing the target due to improved search software and additional unique devices like Trimble's GPS Search technology (Lemmon & Van Der Loo, 2006).

In order to streamline the capture of information in the field, field software and the devices that capture this information have also been advancing. The surveyor in the field has total control of the information that they are capturing. Data collectors now also have many integrated features, such as digital cameras, modems and GPS receivers. So no matter what information the surveyor wants to collect, if they have the technology, the data is at their fingertips. For example, no longer do you have to take the time to get out a digital camera and capture the image that you want record and later associate with the appropriate point that you have collected. Surveyors can seamlessly associate images with a point. The introduction of ruggedized tablet devices means that the surveyor has more computing power and a large, high-resolution screen. This can allow the surveyor to better visualize the site data.

Traditional methods of surveying with GNSS receivers and optical instruments are also being complemented by laser scanning technologies where, with one scan, you can capture millions of points and image information to digitally represent the scene. The key benefit of this richer data is that surveyors are able to create more sophisticated deliverables for their clients. An additional benefit is that the surveyor has the flexibility to return to the dataset and extract additional information at a later time if necessary, removing the need to return to the field.

Integrated solutions of both optical and GNSS technology has been available for several years and has enabled surveyor's to collect information at a faster rate. Lemmon and Wetherbee (2005) performed a case study using different survey methods to illustrate the benefits of Integrated Surveying techniques and found that the best workflow efficiency was achieved

using the Trimble IS<sup>®</sup> Rover. More recently, other technologies are being combined. The combination of optical, video and scanning technologies in an instrument is available in the Trimble<sup>®</sup> VX<sup>™</sup> Spatial Station. Scanning speeds up data capture and the introduction of video gives the surveyor the power to see everything the instrument sees without the need to look through the telescope. This allows them to speed up data capture by being free to capture measurements to prism or a reflectorless surface with a point and click.

As a surveyor, it is imperative to stay competitive and stand apart from your competition and one way to do this is to keep up to date with advances in data capture techniques to make the most of the productivity improvements.

### **3. SOPHISTICATED DELIVERABLE CREATION**

Surveyors are always working for customers that want to solve some kind of problem and want data in a certain format. This may be a list of coordinated points, a topographic map, stakes in the ground, comparison of design versus as-built or the deviation of positions on a monitoring job. Paiva (2009) states that “Modern Surveying tools such as robotic total stations, GNSS, laser scanning and mobile mapping have made the measurement, or field, part of surveying so much easier that the surveyor’s emphasis now is to find new and innovative ways to provide the data in useable forms to the consumers.”

The deliverables that surveyors can generate are becoming more sophisticated due to the availability of very rich datasets. For example, millions of points can now be collected with a laser scanner and then combined with images, optical and GNSS data. Online collaboration tools such as Google Earth can also assist in the representation of final deliverables to the customer whether that be 3D models or a 2D/3D point and line overlay onto the Google Earth imagery.

In order for surveyors to work with such comprehensive datasets, office software tools which process the data have become more sophisticated. Surveyors, by taking advantage of these software packages can reduce the time spent on data processing and analysis. Instead, they can focus their attention on finding innovative ways to generate more sophisticated deliverables for their client.

#### **4. ENHANCED COMMUNICATION BETWEEN THE FIELD AND OFFICE**

In any work situation, communication and sharing of information are key elements that make an effective team. For the surveyor, communication and access to information is sometimes a challenge because they often work away from the office or in remote environments. Expanded cellular networks allow regular communication to the office, but delivery of necessary information or field data is often limited to when the surveyor returns to the office, home or nearest hotel. Modern surveyors may very well benefit by being equipped with laptops and broadband connections at home, but there are additional benefits by utilizing field collection devices effectively and maintaining a connection in the field.

There are a range of solutions on the market that allow the surveyor to transfer data directly between the field and the office. These include simple utilities like MicroSurvey®'s OfficeSync®, Applied Answers FileGenius™ and more integrated survey tools like Trimble's AccessSync. Trimble® Access™ software and its AccessSync functionality offers survey teams an integrated, secure way of transferring the data. The software operates transparently, only transfers the changes that you need and allows you to maintain a near real time connection without impacting field data collection.

The benefits of such systems are that field crews can readily gain updates to critical job information while in the field. In some situations, particularly large development sites, surveyors may be required on another part of the project at a moment's notice. Accessing the data immediately allows them to continue with the job, rather than having to return to the office trailer; or in a worst case scenario wasting time heading back to the head office during peak hour traffic.

The time taken to produce client deliverables can also be reduced, by removing downtime spent traveling back to the office, home or hotel before field data can be sent to the office. By transferring field data in near real time, surveyors can be assured that their data is secure and allows office crews to begin processing data immediately, streamlining the time taken to generate client deliverables.

An additional benefit for managers of field crews is the ability to perform quality checks or review summary reports prior to field crews leaving the job site. If additional information is required field crews can be redirected immediately, thereby improving the overall quality of data collected and reducing the potential for rework through additional trips to the field.

Consider a surveyor that spends an hour a month either commuting between the field and office, returning to the office to obtain critical updates or the delay taken to obtain data to produce the final client deliverable. Assume that the charge out rate is \$100 per hour, with a

one hour saving per month there is a potential time saving of \$1200 per year, just by keeping field crews connected and allowing them to share information more readily.

Maximizing the use of field data collection devices and internet services allow surveyors to improve communication, share information and deliver results more efficiently.

## **5. CONCLUSION**

This paper examined some of the tools and techniques which are available to help the surveyor stand apart from their competitors, complete their surveys faster and generate the deliverable their client needs in the most productive manner. Three areas were addressed:

- Faster data capture
- Sophisticated deliverable creation
- Enhanced communication between field and office

Data capture techniques are constantly improving and being complemented by the addition of new technologies. As described, laser scanning techniques are also improving data capture as well as enabling surveyors to generate more sophisticated deliverables for their clients. Additional productivity gains can be made by maximizing the use of field data collection devices and internet services which allow surveyors to improve communication, share information and deliver results more efficiently.

The surveyor needs to keep up to date with the latest data collection tools and techniques and continue to explore new productivity solutions to keep up with the demands of their clients.

## **REFERENCES**

Lemmon, T & Van Der Loo, C, 2006, Trimble GPS Search Technology for the Professional Surveyor White Paper ([www.trimble.com](http://www.trimble.com))

Lemmon, T & Wetherbee, L, 2005, Trimble Integrated Surveying Techniques White Paper ([www.trimble.com](http://www.trimble.com))

Paiva, J.V.R., 2009, Dumbing Down Surveying, Point of Beginning, November, pp 36-37.

## **BIOGRAPHICAL NOTES**

Dr Lucinda Coombe completed a Bachelor of Land Information (Surveying) with Honours and Doctor of Philosophy in Applied Science from RMIT University in Melbourne, Australia. She has worked for Trimble Navigation for over 10 years, working in both New Zealand and the United States.

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