



THE POWER OF DATA QUALITY IN THE FIELD

THE ABILITY TO CAPTURE DATA IN THE FIELD AND PERFORM QUALITY CHECKS ONSITE PROVIDES MANY POWERFUL BENEFITS. GRAHAM STICKLER DESCRIBES THE ADVANTAGES AND HOW THE PROCESS WORKS.

Electronic data capture in the field is performed daily by an increasing number of mobile workers, and now provides organisations with the key data upon which their businesses are built. It is widely recognised that data capture at source with electronic transfer directly back to the 'mother ship' can create substantial efficiencies for organisations since data are only captured once, and are less prone to entry and transposition errors. Such pioneering technology also assists with achieving a fundamental objective of all data collectors and providers: having the most current data available for use and distribution across an organisation as soon as possible, thereby immediately enabling more informed decision-making.

Timeliness

Under pressure to produce timely and business-ready data, organisations have traditionally been faced with a dilemma. There has been conflict between the desire to produce and sustain high quality output whilst simultaneously maintaining the efficiency of fast-moving operations on site. Simplicity and speed are key words out in the field; as a result of this the need for efficiency has prevailed and often the quality of captured data has suffered.

Traditional methods of field data capture involve capture at location

followed by a return to the office to download and edit it. The quality of the data collected could be open to interpretation, in that it could only ever be as effective as the skills of the individual mobile worker carrying out the collection and the tools or instruments that they were using. In the past, field-based computer solutions have been expensive and complicated to use. As a result quality has been difficult to measure in the field, and data could only be cleaned, analysed and designated as fit for purpose once the surveyor was back in the office. If the quality assurance process still could not be completed, a second location visit may have been necessary. This has resulted in a significant time-lag before the captured data became part of an organisation's master data set and therefore available for use.

Use and quality

Capturing data to the highest quality is an essential concept in most industries, but even more so with spatial data because of its structure and importance. The capture of spatial data for manipulation, analysis, making internal business decisions and making it available to other end users is an expensive and time-consuming process. It exemplifies the need to 'capture once, use many times', and puts even further pressure on field users as they strive to maintain their efficiency.



FIG. 2: Field data capture using GPS
http://en.wikipedia.org/wiki/Geographic_information_system#Data_capture

The quality of information from the initial data capture can impact the entire process of data use and re-use. Investment in the initial stages of data collection can provide the advantages of decreased cost, shorter project timescales and increased efficiency further down the supply chain:

"Data capture - entering information into the system - consumes much of the time of GIS practitioners ... When data is captured, the user should consider if the data should be captured with either a relative accuracy or absolute accuracy, since this could not only influence how information will be interpreted but also the cost of data capture."

As a result there have been concerns about the ability of mobile field workers to capture such data and how much trust can be given to non-GIS staff in the field. This has resulted in many mobile workers, experts in their business areas, feeling disengaged and un-empowered. Faced with such a dilemma, organisations are striving to ensure spatial data quality in the field, maintain efficiencies and empower the mobile workforce.

In the field

Becker Geomatics is one organisation leading the way in ensuring quality data capture in the field. Becker Geomatics collect, provide and manage spatial data that can be used as a basis for design and construction, and recognise the importance of the 'capture once,

use many times' paradigm. For the past 2 years Becker Geomatics has been actively involved in the revision of the Ordnance Survey Great Britain's rural 1:2500 mapping series in Scotland. Specifically, their surveyors have been involved in the field verification of photogrammetric plots. This required a rapid turnaround of the data, with very high levels of consistency and quality.

Becker had an immediate need for a system that would allow their surveyors to access an FTP site, download digital photogrammetric plots (multiple 1km tiles) directly onto a ruggedised tablet PC, verify and edit the tiles in the field, and upload them to the FTP site on a daily basis. Real-time editing and checking/verification of these edits before leaving the site were identified as the most important of the process. Drawing on site (or excessive post-survey editing) of the digital data was deemed to be unacceptable, as research and experience showed that this was cumbersome, hampered by bad weather, inefficient, and prone to error.

Fit for purpose

Although perhaps better known for making existing data 'fit for purpose', Laser-Scan also enables organisations to verify data quality at the first hurdle, giving a positive impact further down the supply chain. Laser-Scan's Radius Mobile product forms the key component of their solution for data quality in the field, allowing users to update, edit and analyse data on site. After considering various options Becker Geomatics accepted an invitation from the Ordnance Survey Ireland (OSi) to see their Radius Mobile field system in action. David Crawford, Chief Surveyor of Becker Geomatics commented: *"We considered various systems but were particularly impressed by Radius Mobile's ability to handle all the data formats we use, its extensive mapping functionality, the survey equipment plug-in options, and its powerful scripting options."*

Each mobile worker at Becker Geomatics is now equipped with a Panasonic Toughbook with 3G and/or wireless links. This allows them the option of being able to access their FTP site at any time, and either download new data to be verified with no preparation time, or upload the completed data with no post processing. It enables users to take a copy of the existing database and make real-time modifications using full GIS functionality, including application of corporate rules, as though they were in the office. The data can be fully checked and attributed on location, reducing the chance of errors and the need for a return visit to the data capture site.

Importantly, the verification routines also give Becker Geomatics' surveyors a high level of confidence in the completion of the edits.

Return on investment

Defined customer dictionaries and the script-

ing tools means that users are able build predetermined flowlines to increase the reliability of the survey data. Becker Geomatics has, for example, been able to create flowlines specifically for its current projects that guide the mobile user into working in the 'correct' way. Semi-automating the data capture process to be standard, regardless of an individual user's ability, saves time and increases efficiency, and has a positive impact on achieving the 'capture once, use many times' goal. Such flexibility in creating customised flowlines also means that Radius Mobile can be easily adapted for the needs of future projects, thereby providing Becker Geomatics with a sound return on their initial investment in the solution.

Sophisticated graphic presentations of the data are a key feature of Radius Mobile for immediate on-site validation and verification. Becker Geomatics can apply various customised presentations, for example when working with buildings the user is able to check the building geometries for closed polygons. Any open polygons will be highlighted as errors, with the surveyor able to verify the errors, examine the building and correct the data whilst in the field. Again, such functionality ensures data consistency and reduces the need for a return visit. A second visit to clarify information means that the anticipated cost of the original data capture is doubled and can negatively impact on timeliness, efficiency and processes further down the spatial data supply chain.

Conclusion

Data capture has also traditionally involved issues with data conversion and integration. Radius Mobile is fully integrated with the FME Suite from Safe Software. Combined with an open architecture, Radius Mobile allows users from Becker Geomatics to open, edit and save in any FME Suite supported format safe in the knowledge that rules are being applied to ensure its quality at the point of capture. Where necessary, Laser-Scan's solution allows organisations to send data edited in the field directly to the central database located in the office, giving real-time access to accurate data.

It is worth remembering that, in a wider context, ensuring accurate data at the point of capture does not mean that spatial data quality management is complete; indeed the process has only just begun. Empowering the mobile worker does, however, provide the best possible start to the ongoing data quality cycle of auditing, cleaning, certifying, integrating and analysing spatial data.

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