

What have we started?!

The geospatial future of buried services

Martin Cullen FlntCES, Glasgow Caledonian University



THE subject of where our buried services exist is likely to cause a strong response immediately when brought up in conversation. CES has reported on a number of occasions the Geospatial Engineering Board's (GEB) work over the last three years on developing a co-ordinated approach to the recording of the geospatial data of buried services.

From a very 'rocky' start, with a number of officials within ICE and ICES saying 'What have you started?' the Buried Services Working Group (BSWG) met often to discuss the ways forward. As a direct result of these meetings, it was possible to publish the BSWG's report in February 2005 and it has been noticeable the difference in the approach to the situation by the many participants.

To continue the discussion on the topic, a one day conference entitled 'The Geospatial Future of Buried Services' was held at ICE in Westminster on 13 June 2005. Presentations were made by a number of speakers from varied backgrounds. The event was supported by the GEB, the Engineering and Physical Sciences Research Council (EPSRC), Ordnance Survey

(OS) and UK Water Industry Research (UKWIR).

To begin the conference, James Brayshaw made a commendable keynote speech. James, as a chartered civil engineer and a director of Ordnance Survey, has been a major contributor to the GEB's cause in general, but has also made a significant input to the BSWG. Although it could have been seen as a taking a favoured stance considering his OS position, James provided the keynote speech as a knowledgeable member of UK plc.

James detailed how the direct and indirect cost of the disruption of traffic flow on the UK's highways is significant and he highlighted the ways in which this situation, if not eliminated, could be made less significant. In addition, it was noted that the points being presented at the conference should not be seen as a 'quick fix' solution. Indeed the process of modernising the geospatial data of buried apparatus is a long term task, but there will be benefits for all concerned.

Following on from James, a number of speakers presented an overview of the situation as it is and others gave an insight into what developments are taking place at present. As much as it would be justified to give a full and detailed report here, given the effort put into the presentations by the speakers, only key points of each presentation will be presented here.

The current situation of buried services was clearly stated by Dr Mike Farrimond of UKWIR and Jo Parker (an independent consultant). Indeed it was clear from the research and development projects presented that there is a need for a more appropriate approach to geospatial data for buried services throughout Europe,

with the exception of Germany and Holland. What was pressed home to all attendees was the need to address the unsatisfactory situation regarding the state of the national buried assets collectively, rather than as a series of individual efforts, commendable as they may be.

As with most attempts to standardise systems, there were concerns voiced that the new method is not really much more advantageous than the existing systems. Dr Marc Hobell provided an education to many on the effects of using scaled maps as a means of recording the location of buried apparatus and the advantages of using the digital national framework (DNF). Clearly there are significant advantages of using the DNF, but it will be necessary to convince many more people in industry of what the benefits are.

What can be achieved in mapping the underground maze of buried services was presented by Professor Chris Rogers (University of Birmingham) and Dr Gethin Roberts (University of Nottingham). There have been advances in the techniques used to find those items that already exist, but the records of the geospatial data are less than desirable. Ground probing radar (GPR) has been tried in the past and the results were less than satisfactory, however there have been, and there will continue to be, advances in this technique. In addition, there are more methods currently being investigated at various universities around the UK with funding from EPSRC, such as acoustics technologies (Southampton), quasi-static fields (Southampton), pipeline-ground interaction (Birmingham), mapping and positioning (Southampton),



knowledge and data integration (Leeds) and enhanced methods of detection of buried assets (Oxford). These studies are ongoing and there are scheduled workshops that will be taking place on specific topics between now and spring 2008.

Neil Kitchener, who is on secondment from Laing O'Rourke to BAA as chief engineer for Heathrow Airport's Terminal 5 (T5), presented a very good example of how good quality 3D locational data can be achieved. Being a brownfield site, the situation at (T5) required a detailed 3D survey of all unidentified buried objects and, as construction progressed, it was also necessary to accurately record the location of new buried apparatus. Having presented a paper at the GEB's first meeting on buried services on the work at T5 in April 2002, it was significant to note that the level of accuracy being achieved and being recorded is commendable, but not without problems.

There can be problems about demarcation of who is responsible for the final recording of data and in which format. Is it the surveyors' task or is it the engineers' task? Such situations are possible, but there are individual organisational aspects that should be considered by the management of each utility company.

Despite the perceived value of enhanced geospatial data, there are human aspects that cannot be ignored. As an example, Neil presented a situation where an area of T5 was to be excavated and the machine operator was given precise detailing where two



What lies beneath. The historical problem of buried services.

electricity cables were in the identified digging area. Unfortunately, on finding one cable, the operator forgot about the second cable and it was only by good fortune that there was no major damage caused when the bucket 'found' the second cable. This example reinforces the concept that transition to a common framework is a cultural change for all of those involved in buried services.

EMPreSS is also an example of what can be achieved geospatially when the various parties involved work together. James Harris, of Jacobs Babbie, and Derek Herbert, of Derbyshire County Council, showed how the project to provide citizens access to matters that interested them and that were not influenced by 'arbitrary' political boundaries. The project, funded by the ODPM, has proven to be a success by showing that local authorities can work together for a common goal and has provided a means of access to data that would otherwise be difficult to achieve. Such an example of cooperation is proof that different organisations, with perceived different objectives, can provide accurate, up-to-date information to many interested parties. Also, in such situations the number of interested parties increases as the access to reliable data is made more convenient.

Until recently, the cooperation between utility companies was maintained at a minimum level, but the BSWG brought various organisations together to discuss the common framework. An indirect result of the BSWG's efforts was two experiments of collaboration in mapping buried services using modern techniques; one in Yorkshire and the other in London. In both experiments TRANSCO worked with the appropriate water company to share information; Yorkshire Water and Thames Water respectfully. John Meehan outlined the efforts involved in ensuring a clear common objective and the aims of the two experiments. The Thames Water representative, Phil Bailey, who, like John, has been a stalwart member of the BSWG since the earliest meeting, pressed the point that geospatial data and a good GIS are an asset that should be valued as any other tangible asset. Phil also pointed out that the need for absolute accuracy is an important move forward, rather than the current relative accuracy. However, Phil pointed out that though the use of DNF has advantages, there are inherent errors that exist in the system that can show items having more than one actual location. An example of a pipe showed the DNF location on OS MasterMap to be 34cm different to that measured on site. In many ways such discrepancies are being addressed and are likely to be reduced with the increased ease of data transfer between all interested parties, including OS.

Perhaps one of the most significant points raised at the conference came from Yorkshire Water's representative, David Owen. Although David was not part of BSWG until the latter stages, through research he has been able to identify a significant time reduction to have accurate geospatial data available to all interested parties, including in-house, from a potential six months to 24 hours. In addition, the tests, using a range of methods from basic traditional to the most modern (using Leica's Smartstation), showed the overall cost of the latter to be significantly less than the 'tried and tested' method. This finding has laid to rest the frequently voiced claim that the use of modern, high technology systems would be difficult to justify financially. Indeed, it established a position where it would be difficult to financially justify not modernising the means and methods of the geospatial data collation and recording. One other significant point that the experiments showed was the need for a change in the culture of utility companies in regard to what is recorded and by what means, e.g. the geospatial data should be recorded by appropriately qualified personnel — surveyors.

Trenchless technology (TT) has been raised on a number of occasions as the most suitable method of reducing traffic delays due to buried services, notably none of the claims were made by officials of the UK Society for Trenchless Technology (UKSTT). Steve MacKellar has been a member of the BSWG and, as such, was well aware of its aims and objectives and what affect the findings would have on the UKSTT. Steve presented a paper that provided a detailed explanation as to what TT can do and what it cannot do. Perhaps the most significant point is that TT needs accurate 3D geospatial data of all likely buried apparatus more, not less, than surface excavation techniques.

To progress this matter, it would be appropriate to consider if there is an alternative to adopting a common framework for the geospatial data of all buried services. Martin Giel, of South East Water, made clear in his presentation that the solution to many problems can seem

more complex than they really are. By considering the lowest common denominator of all concerned, the most desirable objective in the task of sharing information is effective communication. Effective communication can only be achieved if there is a common language that does not require translation or interpretation. Use of DNF is a common language and, with an increasingly specific set of demands in law, there really is no choice.

As chairman of the BSWG and of the conference, I concluded the event by pointing to examples of how the common framework for geospatial data would be beneficial to many. There are numerous good examples of research and development that should be welcomed by the industry. Additionally, we should not regard any change to standard practice to be the norm for the next generation. As stated in the BSWG report, a 'champion' is needed to continue the current momentum for change and to ensure efficient communication between all concerned is maintained. It is crucial for the success of the system that the champion is commercially and politically independent — to ensure freedom of discussion and development. The BSWG report avoids the specific use of OS MasterMap due to the perceived cost implications and use of the DNF was recommended. However, not denying there are concerns for smaller organisations, support from central government, in the form of grant assistance for those in need, should be seen as a major factor in motivating a 'culture-change' and making a positive move forward.

Throughout the conference there was interaction from the audience. One of the many factors centred on the feeling of exclusion from the work of the BSWG. On each occasion when discussions were based upon this topic, the panel members emphasised that at no time were any volunteers excluded and, even now, input from any interested party would be most welcome. Discussions also raised a number of points that add to the areas for development; with perhaps the most notable being from Russell Broad, of JCB Research, when he suggested that the solution to accidental strikes could be in the form of an 'intelligent' bucket fitted to the excavator — and why not?

Overall the event was successful in bringing more people from a wider background into the drive to modernise the means and methods used to map the buried assets of UK plc.

Martin Cullen FInstCES, Glasgow Caledonian University



A screenshot from EMPreSS.