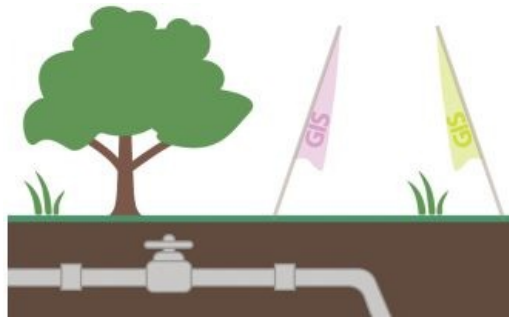# A Focus on Underground Utilities - NWG Innovation Festival 2018

When the Northumbrian Water Group (NWG) held their second Innovation Festival in July 2018, it was an event like no other. The festival's aim was to turn the concept of a typical business conference on its head. By staging the festival in an open field, complete with marquees, teepees and casually dressed attendees, NWG were going back to the roots of why people generally attend a festival: to release themselves from the predictability and routine of everyday business life. In doing so, the festival aimed to encourage a diverse group of people to think differently about innovation, and to share views and ideas from various different viewpoints - both commercial and non-commercial.

Despite the many distractions such as free yoga classes, the festival had a clear structure and focus. The event was geared around 12 distinct themes, with design-focused innovation 'sprints' aimed at addressing selected problem areas. During these sprints, design thinking was used to turn concepts and ideas into real projects, with a Problem-Solution-Execution approach applied to each of the problem areas.

The Importance of Geospatial

As would be expected of any event which is focused on reinventing and redesigning the utilities world, the geospatial industry had a strong presence at the festival. Neil Brammall, the CEO of Utility Survey Exchange, was one independent expert in attendance thanks to his domain expertise in the utilities geospatial sector. Neil, who has worked in the industry for over 17 years, is helping to take one of the projects from the Innovation Festival forward. Introducing why utilities are now an innovative space, he explained to me the current cutting-edge project, which is focused on developing a combined underground infrastructure map for the Northeast of England.

The 'Mapathon' sprint was sponsored by Ordnance Survey and jointly led with NWG. Entitled 'Going deeper underground – can we build an underground map of the UK?', and consisting of a team from utilities, local government, engineering and GIS expertise, the goal of the sprint was to: "Build a Common Infrastructure Map pilot for Newcastle and the surrounding area including water, wastewater, gas, electricity, telecoms and other underground services". The essential aim of the sprint was to create a working system that allowed the demonstration of various use cases around obtaining information about the location of underground assets. These use cases ranged from support for safe working during excavations, through planned construction works to resilience planning.

These use cases actually arise from the supposed lack of a simple and consistent means to access all underground asset records in England and Wales. Considering this, topics such as interoperability and data sharing were high on the sprint's agenda, along with the matter of data quality, accuracy, and how this could be improved.

Not Just a Technology Problem

Three broad streams were defined to progress different aspects of the sprint: Technical, Benefits and Business Case, and Data Sharing Agreement. Each of these streams helped to define the requirements, use cases and constraints for solutions to these different aspects of the central problem - based on insights shared by the participants. Structuring the sprint in this way was an important acknowledgement that the problem under consideration was not simply technological in nature, and that commercial, organisational and behavioural aspects are equally important. The business case development and benefits analysis were given particular focus, with PESTLE analysis (Political, Economic, Social, Technological, Legal, Environmental) being particularly impactful. Of equal importance was the draft data sharing agreement, which will form the basis for ongoing discussions and refinement to find a formulation that will allow organisations to share data - freely and securely.

On the technical side, a working architecture was provisionally agreed based on a 'Hub' model, whereby contributing organisations would upload copies of agreed data on a periodic basis to be served out to authorised recipients. A demonstrator system was developed based on this architecture, with services exposed that allowed the participants to develop proof of concept demonstrators to illustrate potential solutions for some of the use cases identified.

A Wider Agenda – UK Developments

The Mapathon sprint, like the NWG Festival more broadly, was about much more than having a nice collaborative festival experience. The event was a coordinated effort to build a community around the important topic of underground utility mapping for the purpose of safety and sustainability. It also represents a much wider movement in the UK to improve how things are done in this area.

Two of these major developments are recently established initiatives which are geared towards the utilities sector. The first, Project Hades, funded by Transport for London (TfL) and sponsored by Thames Water, is focused on setting up a data sharing exchange between utilities and developing a combined underground infrastructure map for the London area.

The second, Project Iceberg, is a collaborative project between Ordnance Survey (OS), British Geological Survey (BGS) and Future Cities Catapult (FCC) exploring how to better capture, collect and share data about the subsurface in general, including underground assets and geological conditions. This initiative aims to demonstrate the value of interoperable data about the subsurface (including buried assets) and to find effective ways of sharing all this information among a wide range of relevant organisations, going beyond operational use cases of network operators. Phase 1 is now complete and has produced a comprehensive market research report and literature review, and started the work on defining a framework and standards to underpin data exchange (https://bit.ly/2zsbVQe). Phase 2 will consist of a series of research activities based on the use cases defined in Phase 1 and will get underway later this year.

International Examples Show the Way

Despite the growing interest in the issue of accessing underground utility data, a number of issues remain which are holding back data sharing and interoperability developments in this sector. These include concerns around data security, and uncertainty around the location of buried assets. After all, utilities can be high risk and anyone sharing information needs to have a high degree of certainty about their location.

There is a growing recognition in the UK that the problems arising from a lack of accessibility and interoperability are not going away, and examples of how the situation can be improved can be found internationally. Examples of effective sharing of underground asset data can be found in the Flemish region of Belgium with the KLIP system and closer to home in Scotland with the Vault system. Both of these initiatives were driven by legislation. An overview of the initiatives and can be found at http://docs.opengeospatial.org/per/17-048.html.

A Sprint to the Finish Line

Unlike most UK summer festivals, wherein the attendees are more often than not in need of recovery after the event, the overall feeling from the NWG festival was that the attendees, and in particular the sprint participants, left in an energised and enthusiastic mood. Amongst the delegates of the Mapathon sprint, the feeling is that excellent progress was made during the week.

The spirit of cooperation between all participants, and in particular between the organisations who shared data for the event was incredible and, in Neil's experience, unprecedented.

A number of demonstrations in response to use cases were developed "in the tent" during the week, including incorporation of Combined Infrastructure Map data in a third party web viewer and a demonstration of the availability of offline data. As an example, Neil Brammall was able to implement a link between the Utility Survey Exchange platform and the Combined Infrastructure Map, allowing feedback from the field to be uploaded and displayed in real-time.

This concept of the feedback loop is of particular interest to utility data managers, and the ability to easily and quickly report unknown and incorrectly recorded assets from the field is seen as key to long term data quality improvements. The same applies to high quality survey data captured according to the standards outlined in the PAS128 standard.

In short, there is a great deal of useful information which is not finding its way back to the asset owners, and an opportunity is being missed to improve the quality and accuracy of the authoritative record of underground assets. It is expected that completing that circle by providing utilities with validated data from a wider variety of sources - giving a fuller understanding of data quality in different locations - will yield tangible operational benefits. Bringing these additional data sources into play is what the Utility Survey Exchange system is all about.

The Hard Work Starts Now

Now that the festival is over, the real work begins in overcoming the technical, commercial and cultural challenges of designing and implementing an operational data sharing hub. The priority will be to define a mechanism that will allow asset owners to share their data in a manner that is simple yet comprehensive and secure, and will then allow stakeholders with a legitimate requirement to access that data in a straightforward and usable manner.

There is no "one size fits all" solution to these requirements, so building in flexibility to suit a wide variety of existing business processes and systems will be key. Different organisations are at different points of their geospatial journey - some are raring to go with this proposition, while others will need a little help along the way.

Neil therefore advocates for a "hybrid" architecture with a low barrier to entry that will allow organisations at different stages of technological evolution to gain benefits from the system which will be crucial for widespread adoption.

Going forward, architectures other than the 'Hub' model will be evaluated, with particular consideration being given to the benefits of real-time access to 'live' versions of data rather than periodic snapshots. This approach would represent a significant step forward from previous initiatives.

Also of critical importance will be the need to find practical ways to improve data quality and accuracy. If utilities and other organisations are communicating and sharing with each other more effectively, the more opportunities there are to improve the authoritative record of the underground by sharing observations through online platforms.

Technological advances in machine learning, augmented reality, advanced survey techniques and AI may all help to improve our understanding of what lies beneath our feet, but that information still needs to find its way to the people who are responsible for maintaining the authoritative record. Otherwise, it gets isolated in a silo and provides no long-term benefit.

Having already demonstrated the feasibility of the real-time view of feedback from the field during the week of the Innovation Festival, Neil is confident that this can be a crucial element of any longer term development.

On the Cusp of Change

Neil Brammall is optimistic about where the "Mapathon Sprint" will lead. The week "in the tent" laid the groundwork for genuine progress, and now the challenge is to maintain the momentum needed to overcome the technical and business challenges. This momentum appears to be plentiful. Ordnance Survey have been appointed to provide technical leadership for the ongoing project, with members of a steering group consisting of regional utilities, local authorities and technical experts already being identified and formed into a steering group. The spirit of cooperation so evident during the Festival has continued, with follow-up meetings being held, and a collaborative and achievable implementation plan already under development.

Clive Surman-Wells said "We had a winning formula which laid bare the problems in existing methods and that allowed us to focus on solutions, but the real secret to the success of the Mapathon was in getting all the key organisations, and the right people, into the tent face-to-face for five days working together on one solution".

It feels like the UK may be on the cusp of a significant step forward in making information about the subsurface more easily available to those who need it. Support from the bottom-up from utilities and other stakeholders becoming more open to data sharing is amplified by support from the top-down in the form of the National Infrastructure Commission and the newly-formed Geospatial Commission. Initiatives like those arising from the NWG Innovation Festival, along with Projects Hades and Iceberg, embody this desire for improvement and will lay the groundwork for solving the technical, commercial and cultural challenges ahead.

This article was published in GIS Professional October 2018

---

https://www.gim-international.com/content/article/a-focus-on-underground-utilities-nwg-innovation-festival-2018