Lighting up the Enterprise - Esri User Conference 2016

May saw Esri UK's biggest yet user conference. Held in the QEII conference centre in Westminster, the event attracted over 3,000 preregistrations drawn by the opportunity to attend a choice of 60 individual sessions spread over seven tracks from keynote presentations, special interest groups and workshops.

Launching the event under the banner "Lighting up the Enterprise", Esri UK MD Stuart Bonthrone spoke on change driven by the technology of GIS. Robust websites, rich libraries of content are all helping to personalise information for users. We are seeing the consumerisation of IT. The challenge, said Bonthrone, is to spatially enable the rest of the enterprise. He cited the National Grid where connecting the workforce is reported to save £35m a year.

Sustainable Design and GIS

There followed a series of keynotes before we broke out into individual sessions. Bruno Moser and Theo Malzieu of the design practice Foster & Partners, which specialises in tailored and sustainable design solutions for anything from a great bridge to a table lamp. They have even worked with NASA on inflatable pods and 3D printing robots to sustain life on Mars (fortunately for Foster a map is on hand to locate it, as we shall see).

Foster 'thinks big' on urban design through interdisciplinary cooperation on projects which puts people at the heart: projects like the Reichstag, British Museum and Swiss Re (aka the Gerkin). Moser spoke about their roles as "urban designers". They first map the topography and environmental patterns to analyse land use. As an urban designer, he focuses on the space between buildings, the public realm. A typical example is Trafalgar Square in London where the solution was to close the traffic lane in front of the National Gallery. To do all this Foster use GIS to create a spatial representation of the design. In London, 3D spatial analysis is essential in a city where a third live within a ten minute walking time of a tube station.

His colleague Malzieu contrasted London with the Saudi port city of Jeddah, which has grown substantially since the 1970s to the point where it now spans 50kms from north to south encompassing 3.5m people. Although the dense central area of alleyways in the old city of Al Balad remains mainly unchanged, the rest is large blocks with wide sprawling roads. Foster analysed the metro network and found that only 12% of the population lived within 10 minutes walk of a metro station. Their solution is to attract people away from the roads (96% of all journeys are by car) by extending the stations into the road space to create shaded areas where commerce and other activities, above and below ground, can flourish. Jeddah does not have identifiable street names or building numbers so mapping of local land use and the road network was essential ahead of development around the metro stations, which could be at a higher density than hitherto in the city.

Mapping Everywhere

A keynote from the event's Platinum sponsor heard Ordnance Survey CEO Nigel Clifford talk about "the changing face of geospatial". The nation's mapmaker is launching a series of APIs and is involved in autonomous vehicles, smart cities, 5g, asset management as well as initiatives like "Innovate UK" which is behind Manchester's City verve, a project looking at how it can be made smarter. OS has even been mapping Mars!

Esri UK chief technology officer Charles Kennelly then took the stage and began by showing us a rather depressing map of mass shootings in North America. The map, of course, really just tells you where people are. But by overlaying demographic data it is possible to reveal shootings per head of population or the relationship between access to guns and mass shootings. The map went on the Internet and generated 530k hits within a few days. For Kennelly, it was an interesting moment because as they created the map they were talking about GIS, mapping and spatial relationships rather than technology, which is what they normally talk about. Indeed Esri are now looking to employ GIS people rather than IT people.

Kennelly believes we're living through a "Golden age of GIS", a change from systems of record to one of engagement. During the last year, activity for ArcGIS Online saw year-on-year subscription growth of 31% (from 24,000 to 31,000) and activated users grow by 71% (from 250,000 to 367,000). Background base maps have grown from 22 to 34 billion.

Drone App

Next, we moved to the rapidly emerging world of drones. Carmel Connolly introduced us to Drone2Map, an Esri app which exploits the opportunity of cheap data capture by converting aerial imagery from a UAV to 2D and 3D products in the ArcGIS environment. Following a striking video captured by a drone of Waddesdon Manor and its surroundings, Esri staffers Sarah Lewin and Richard Mumford demoed the

capabilities of the app using a handheld iPhone as the image capture device; and the scene. . . ? A doll's house! Mumford wandered around the model capturing images with his phone then downloaded them to Drone2Map which mosaiced them into a georeferenced TIF file. The app runs under Windows and has three modes: rapid for quick, low-res output; a high-res professional mapping mode; and an inspection mode.

More seriously Esri has cooperated with the National Trust and the Animal Health & Plant Agency. Both organisations see the potential for using drones to capture data of their assets and for inspections.

Choice, Choice, Choice. . . But Where to Go?

As the day moved on choice loomed large and your reporter settled for sessions in the "Gain Insight" and "Lighting up the Enterprise" tracks. Situational Awareness is essential today to any active service, security or military organisation. The UK Hydrographic Office has adopted what older readers might call the Martini approach – anytime, anywhere it's. . . situational awareness on the high seas.

Simon Hampshire of UKHO introduced Future Maritime Geospatial Concepts (FMGC), a system with eight layers of imagery, charts showing seabed features, underwater features, land mapping etc that includes activities as diverse as volcanic, hurricanes to piracy. This is a serious Big Data application. It also records the traffic density of shipping around the world in near real time including keeping an eye on suspicious vessels and navigational warnings.

Rondalyn Northam is Gloucestershire Constabulary's GIS manager. She is responsible for something called the "Local Policing Dashboard" which maps vulnerable communities. The dashboard can call up geographical datasets like income deprivation, burglary, employment levels amongst 1624-year-olds, the location of recent crimes and educational attainment demographics. They use methodologies prescribed by the Jill Dando Institute such as VLI, the Vulnerable Localities Index.

Retail GIS Analysis

The use of GIS in location planning for the retail and business sector has been used by a few brave pioneers for years. But today, can any large retail chain seriously operate without it? James Nolan of Knight Frank explained his role as a survey analyst in seeking prime locations for hotels, offices, retail parks and supermarkets. Drive times are mapped, existing (and likely competing) facilities located and linked to open data from the census and other sources. Demand for this data will vary between clients. A premium coffee shop operator will want to know nearby places of work and staffing opportunities while a furniture retailer will want to know the postal geography for typical market spend, geodemographics of target customers, etc.

Nolan explained how a rule-based GIS approach was used for a German food discount retailer keen to mitigate risk in his investment. They needed a population of at least 10k within a 1-mile radius of the proposed location but also travel times in the area. The final analysis comes down to street level. All of this can be done from Nolan's desk in Baker Street, London!

Scary Stuff in the Hills

It's always surprising just how many diverse and odd applications GIS can be used for. The Ministry of Defence retains a unit within the Royal Air Force Police to look into complaints from the public about noise from low flying aircraft. Retired geography teacher Derek Allen is part of the unit; he showed us an awesome video of low flying through hilly terrain from the cockpit viewpoint; scary stuff indeed.

Our military pilots have to train for flying down to 500 feet and they do this in areas like the Lake District and other wild and mountainous places, which may not be very densely inhabited but nevertheless do attract plenty of visitors ready to have the pants scared off them by low-flying jets. The unit's 2000 or so complaints a year are assiduously investigated by Derek and his team and in some cases compensation is paid. A new camera purchased for a walker who was so frightened he dropped his in a lake; a koi carp that jumped out of a tank was also compensated for, though not a trip to Japan which the owner claimed was necessary to source the replacement!

Crime and Forensic Analysis

Another unusual application came from Durham Constabulary where Detective Superintendent Adrian Green was heading up an inquiry into a spate of thefts from museums of rhino horn, jade and other Asian valuables. An international crime gang was at work hiring local villains to break into the museums to steal to order. Eighteen pieces lost from Cambridge's Fitzwilliam Museum are believed to have been worth as much as £57 million.

Green set to work with his intelligence analyst David Worsnop and his ArcGIS system under what was titled 'Operation Griffin'. Some 200 phone numbers were carefully tracked along with data about 20,000 vehicle movements connected to 30 incident locations across the UK some 360,000 map points. Eventually, 24 arrests were made and 14 people convicted and are now serving a total of 72 years in gaol. Result, as they say.

Another crime related use of GIS heard from Alastair Vannan of Cellmark Forensics Services. His presentation had the catchy title of "Forensic remote research: GIS, UAVs and the search for the missing presumed dead" – in fact, this turned out to be presumed murdered. Vannan is a specialist in forensic archaeology so he is familiar with technologies like lidar, hyperspectral analysis of soil and vegetation and importantly: integrated data analysis using GIS. The project was to locate what was believed to be the grave of a missing person believed to have been murdered. A UAV survey and a micro topographic analysis and anomaly interpretation were all applied in this fascinating account.

Survey by Tablet

Developing an integrated approach to asset management was the title of a presentation from Paul Hart, GIS manager Europe for Black & Veatch. This was all about locating and creating an asset management system of London's numerous cable pits; 47,000 approximately at the last count. These innocuous features covered by reinforced concrete or steel covers may seem perfectly safe and inert but there have

been a number explosions caused by gas building up within them.

The first task for Hart's surveyors was to visit the pits, inspect and categorise them from medium, low to high risk as well as judging their condition. It was a huge undertaking as every one required a permit to access. The first task was a simple risk prioritisation exercise from the desktop. Threeman inspection teams spread out across the capital equipped with old maps and drawings and tasked with capturing the data within six weeks. A tall order. They found that 20% of the pits no longer existed or were buried beneath pavements and tarmac and presumably redundant. A lot of time was wasted in sending teams to these locations.

A traditional data capture approach was used initially based on GIS maps as printed paper PDFs. This method is very labour intensive – two people were needed to sort and allocate the maps before they were couriered to site. Once they were used on site and information updated they had to be passed back to the office for interpreting and data entry. In all, 23 people were involved in capturing the data. 'We were paid on a per pit basis'

The next move that Hart took was to become Esri licensed partners enabling them to have access to all Esri's software so they could trial applications. Next, a tablet was purchased, trialled and then inspection begun of the low risk pits using data that published to the cloud. As there were only 23 people on the project and time was of the essence a subcontractor was engaged. But they didn't have the Esri software so Esri for Excel was used, which gave the user's tablet a map and a database of pits for updating.

Hart explained that they also used Esri Dashboard and tracker enabling them to see where surveyors were at any given moment as well as showing pie and bar charts of the survey's overall progress. Using this approach reduced the manpower to just three roles and 10 people compared to 10 roles and 23 people. After a few days of using this method, the project manager said 'we're never going back!' We no longer do paper surveys within Black & Veatch, concluded Hart.

Getting Around London

The London Marathon has been run since 1981 and is one of the capital's signature events. But it does cause considerable disruption to the lives of Londoners and those who still want to get around the city. Adem Besim, a keen sportsman and road user, is a GIS officer for Transport for London and had an idea to help people get around the capital when major events are on. He presented his idea – a simple data stream to a satnav – to a "Dragon's Den" type event run by TfL's management to hear proposals for ideas from employees that could help manage the road closures and lessen their impact.

Besim's TfL Events to Satnav Project aimed to integrate GIS data captured from road closures during major events in London and transfer this knowledge to satnavs and smartphones to alert Londoners of the closures. Working with TomTom, the data was distributed and helped lower the impact of the 2016 Marathon by 2%.

Mapman's Great Age of Geography

The day concluded with a series of awards for customer success and a great presentation from TV's "Mapman" Nick Crane, currently president of the Royal Geographical Society. Crane has done some spectacular walks: from Santiago de Compostela in Spain to Istanbul and the line of Ordnance Survey's cartographic meridian for Britain. He argues that the great age of geography began 500 years ago with European explorers visiting Asia, the Americas and Antarctica. It was also an age of young techies like Frisius who first used triangulation for mapmaking and Mercator, who he described as "the prince of modern geographers" for inventing the atlas and the ubiquitous projection still in use today.

'Today, geography has maps hanging from every branch and is even on the National Curriculum. The world has been revealed as never before". Nevertheless, he had encountered naysayers in his travels. His travels and TV programmes caused The Daily Mail to call him a "prat" while the Daily Telegraph praised him as a "genius".

The final address came from Kennelly who updated delegates on Esri's product roadmap and the changes expected. They vary from moving a button on the display to better analytics for Big Data and Smart mapping in 3D. Watch this space.

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