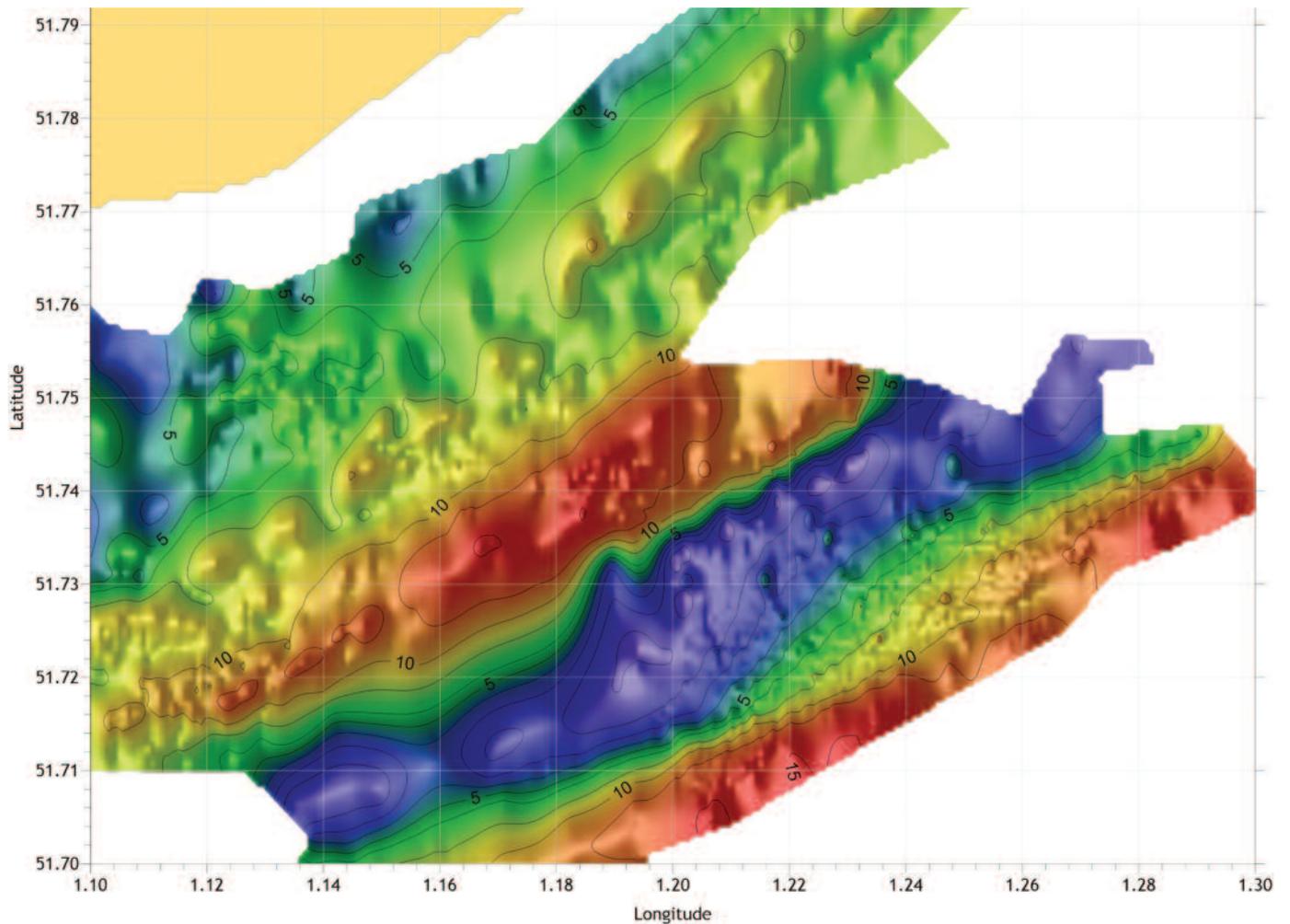


GEO Business Spans the Geomatics Spectrum



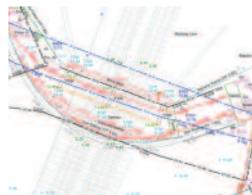
Surveying for geographical and spatial information



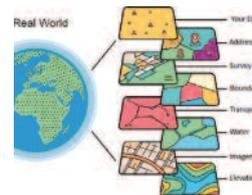
Busy show and conference reflects upbeat mood for industry



How to monitor coastal erosion in north-east England with a UAV



Locating buried services to PAS128 at a busy London roundabout



How Earth observation data is being used daily by policy makers



Time constraints on the tidal Thames calls for multi-sensor instrument



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COVER STORY
High-resolution bathymetry of our seas is the aim of TeamSurv's project to develop an NMEA to Wi-Fi device through crowd funding. Already a Kickstarter campaign has hit the £5000 target. Full story on page 6.

P. 14 GEO BUSINESS SPANS THE SPECTRUM

Conference report plus show floor view and an upbeat mood. Richard Groom and Stephen Booth report.



P. 18 MONITORING WITH SENCEIVE

Senceive transform monitoring while marking their 10 year anniversary. Richard Groom reports.



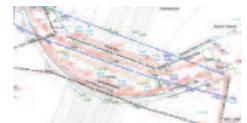
P. 19 UAVS MONITOR COASTAL EROSION

Kerstin Traut of QuestUAV describes how UAV photography and photogrammetry can measure long-term coastal erosion.



P. 23 MANOR CIRCUS: PAS128 CASE STUDY

A detailed case study by Damian Taylor of Site Vision Surveys reveals how buried services should be surveyed.



P. 26 BIG DATA INTO BIG BUSINESS

How Earth observation data is being used daily to inform decision making by policy makers, governments, insurers and security providers.



P. 28 DOWN ON THE THAMES. . .

Tidal time constraints were a challenge for surveyors Greenhatch Group. Lucky they had the SX10 to keep them company.



P. 30 FROM AFGHANISTAN TO AI

Geomatics and GIS are a force for humanitarian disaster relief in disaster zones, explains Joel Myhre.



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Advances a hundred years ago mirror those of today

GW was launched nearly 25 years ago as Surveying World, then as now a joint product of RICS and a Dutch publisher. In between there have been numerous changes, not just to the title but to the style, publishers, editor and above all, the business of chartered land surveyors.

An old land surveyor with a passing nod to allegedly the world's oldest profession, once said, 'I am a professional; I do it for money!' And it has been money that has driven the development of the profession with more than a little help from the military; we should never forget that human conflict has been the key driver for new technology, beginning with more efficient map-making.

I was reminded of this recently at a Defence Surveyors Association symposium which heard a presentation on Surveying Egypt and Palestine 1916-18. That period was barely 15 years after the first manned and powered flight by the Wright brothers, yet by 1917 aircraft were being used for ground bombardment, air-to-air combat and aerial photography for mapping, both on the Western Front and in Palestine. That period too saw rapid advances in wireless communication, used by the Allies in the Middle East to gain advantage over their Ottoman enemy. At the same time the siege of Gaza witnessed the last cavalry charge by the British Army (to be correct it was the Australian Light Horse under British command).

IAN DOWMAN



The new editor of GW, Ian Dowman has spent most of his career working at UCL, retiring as a full time academic in 2010 and is now an emeritus professor. At UCL

he specialised in photogrammetry and remote sensing with research into applications of digital aerial and satellite data to mapping. He has been involved in ISPRS for many years and was President from 2008-2012. Ian is now chair of the ISPRS International Science Advisory Committee and also serves on other committees. He is also chair of the trustees of the Aubrey Barker Fund, a charity supporting surveying and land economy students from any developing country.

The first 17 years of this century have seen equally rapid change but with much wider impact on global humanity, testing its ability to absorb and adopt new digital concepts like Google Earth, smart phones, cloud computing, software as a service and social media, the influence of which, for good or ill, is still unfolding.

RELAX, WE'RE IN AN EXPANDING BUSINESS!

Over the years surveyors have often worried that they were about to be put out of business by the machines (back in 1949 someone predicted the world would only ever need six computers). They have had to contend with and adopt EDM, laser reflectors, GNSS, aerial and spaceborne imagery and laser scanners; all the time with ever more powerful computers to drive measurement technologies like photogrammetry and point cloud analysis. Despite worries that machines would put almost everyone out of work, they have, like the ever expanding universe, continued to grow the market for geospatial applications into areas of measurement hitherto uneconomic or entirely novel (think movies).

I am writing this editorial for once not as an introduction to the issue's contents, much as I commend it to you, but because this is my last as Editor. You will see below a brief portrait of my successor: he will already be known to many of you. I am sure you will be in more than safe hands. Ian will carry forward GW and I am sure introduce new features and authors as our business expands.

In the meantime I want to say thank you to all the hundreds of contributors over the years who have provided such interesting copy, providing at least for me an outstanding education, at least to PhD level (!) in all aspects of measurement and surveying in all its myriad applications, even if as a professional I did it for money! Thank you for your time, patience and knowledge. I wish you all well.

Stephen Booth, Editor



Stephen Booth, editor of Geomatics World.

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AERIALTRONICS PENSAR RELEASED

Aerialtronics has released a fully integrated computer vision platform with deep learning capabilities. PENSAR is a stand-alone twin sensor platform that utilizes the GPU-accelerated computing power to enable real-time video processing and immediate augmented insights.

The product is the first to integrate the FLIR Boson thermal IR camera into a drone application, and additionally contains a 30x zoom Sony daylight camera. It's designed to change the way operators perform aerial tasks in search and rescue, inspections, documenting assets, surveying, mapping and public privacy.

One of the most revolutionary features of the PENSAR is how it leverages deep learning networks in real-time to detect, recognize, track, classify and annotate certain objects or deviations of interest and conversely, to blur out and mask objects for privacy reasons. Users have access to deep learning methods and machine vision developers can automate dynamic decision-making systems quickly and easily.



of ScanLAB Projects Ltd, whose laser-scanning expertise was recently featured in the BBC series, Italy's Invisible Cities.

Following the event, Connor was offered a week-long work placement at ScanLAB's London office and used some of the bursary money to fund his travel and accommodation costs. Connor adds, "Talking to the different members of the team, exploring new software and equipment and practising the industrial processes needed to produce a deliverable was invaluable experience."

Meanwhile Oliver Smith's award will fund research tools needed to create new analytical techniques for his dissertation project. "My project uses telecom network data" he adds "to map and analyse the influences on pedestrian movements in city centres". He also plans to use some of the bursary to attend the International Geodetic Student Meeting (IGSM), a major event offering networking and learning opportunities in geodesy, cartography, photogrammetry and GIS to students from 34 different countries.

MAPS FOR AUTONOMOUS VEHICLES

There is no doubt that autonomous vehicles will need maps to find their way around and to aid navigation. Recent developments include Mapmaker AND's high-definition autonomous vehicle maps of Schiedam, the Netherlands. The road model enables manoeuvre planning and localisation, critical for advanced driving applications (ADAS) and autonomous driving.

The maps includes features such as driving lanes, emergency lanes, parking areas, crossings, intersection areas, intersections lanes, lane markings and traffic signs with an absolute accuracy of 15cm and relative accuracy of 5cm.

CROWDFUNDING FOR CROWDSOURCING BATHYMETRY

TeamSurv is a project to map the depths of our seas using crowd sourcing. For this to succeed they need as many ways of logging data as possible. Last year they started looking at adding an app to their collection of tools, but it depends upon an NMEA to Wi-Fi device to make it work. They have designed the device and to keep costs low have launched a Kickstarter campaign to get as many orders as possible. As of 13th June 80% of

the £5000 target funding had been pledged.

BURSARY FOR GEOMATICS STUDENTS

The Survey Association's £2000 bursary award is set to boost the career prospects of two exceptional Geomatics students at Newcastle University. **Connor Foxall** and **Oliver Smith**, received their cash prize at a TSA conference where they had the opportunity to network with industry professionals and guest speakers including **Matt Shaw**

RADAR VISION FOR DRONES (AND CARS)

Echodyne Corp has announced \$29 million financing to apply the physics of “metamaterials” to deliver radar vision, a combination of high-performance agile imaging radar hardware with computer vision-like software for classification, recognition, and perception. Echodyne’s patented technology, called MESA (Metamaterial Electronically Scanning Array), produces radar orders of magnitude smaller, lighter and more affordable than phased array radar, long the pinnacle of radar technology. The first commercial product is the size of an Amazon Kindle and enables drones to navigate safely as they fly beyond sight of their operator. The sensor can detect and track a Cessna sized airplane or a helicopter at up to 3km, and a DJI Phantom sized drone at 750m. A shorter range system for autonomous cars and trucks is also in development.

UNDERWATER LASER MAPPING

2G Robotics and Sonardyne have announced a formal collaboration agreement for the development and promotion of a dynamic underwater laser-mapping solution to significantly reduce the time needed to survey seafloor sites and offshore structures. The new agreement centres on the integration of Sonardyne’s acoustically-aided inertial navigation system for underwater vehicles, SPRINT-Mapper, with 2G Robotics’ ULS-500 PRO dynamic underwater laser scanner.

LIGHTNING FOR AGI GEOCOM

The AGI one-day conference, GeoCom17, takes place on October 26th at the Royal Geographical Society in Kensington, London. The afternoon features seven minute long Lightning Session talks with opportunities to discuss challenges or present case studies

or experience. To submit a topic visit <http://www.agi.org.uk/events/calendar/geocom17>

EARTH-I PLANS SPACE VIDEO NETWORK

The BBC website reports that Earth-i is planning a new constellation which would provide sub-metre resolution imagery from an altitude of 500km. A prototype spacecraft will be launched later this year for testing, with the expectation that a further five platforms will follow in 2019. Earth-i says its train of satellites will deliver rapid, high-resolution imagery of the planet in still and video formats. It could be used to track moving objects such as cars and other vehicles; or, if the scene is held fixed on a specific point, it would enable 3D models of the ground to be constructed.

ENHANCED TRAINING DATA ACCURACY

East View Geospatial (EVG) has enhanced the accuracy of automated feature identification using its newly developed training datasets in supervised machine learning applications. The impressive early results pertained

IN BRIEF

Trimble has announced the acquisition of privately-held Network Mapping Group Ltd (NM Group), headquartered in Knaresborough, UK.

The Sebastian Sizgoric Technical Achievement Award for having made a major contribution in the field of LiDAR bathymetry and airborne coastal mapping and charting has been given to RIEGL, honouring their efforts and developments in this field.

Spheron-VR AG, pioneers in HDR (High Dynamic Range) camera technology and visual collaboration software has appointed VAM-IS as a distributor in the UK.

Descartes Labs Inc., a pioneer in cloud-based geospatial analytics, has announced a global-scale machine-learning platform to the Defense/Intelligence Community at the 2017 GEOINT Symposium in San Antonio.

An international team of scientists has uncovered the amazing story of a 150 million year old fossil ‘squid’ and have digitally recreated the fossil using 3D modelling technology. The fossil is an ammonite, a type of prehistoric cephalopod related to squid and octopuses still found across the globe.

EXPLORING WITH A COLLIDING DRONE

ESA astronauts have used a drone to help explore caverns in Sicily. The Flyability drone was deliberately bumped into walls, to learn how to navigate and to map tight areas that are too dangerous for humans. ESA’s course coordinator, Francesco Sauro, an experienced caver and field geologist, remarked: “The drone used its thermal camera to map how the cave continued all the way to an unexplored area featuring water, impossible to reach for humans. These tests will help us understand which technologies can be used in future exploration of lava tubes on Mars, for example.”





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to automated recognition of building structures in an ongoing pilot project in Papua New Guinea (PNG).

BLUESKY LIDAR UNDERPINS FLOOD MODEL

Working on behalf of Yorkshire Water, as part of a £1bn asset management framework, Mott MacDonald Bentley MMB is working on studies to investigate catchment flooding from the public sewer network. The Bluesky LiDAR data is being used to create accurate models of the terrain and ground features in relation to the network. These models help MMB to understand the potential impact of flooding and replicate reported flood events in order to develop holistic solutions.

AEROSCOUT INTRODUCES SCOUT B-330

Aeroscout has unveiled the Scout B-330 UAV helicopter, which is built with a high payload capacity of up to 50 kg (110 lbs), a flight time of at least three hours and the capability of flying up to 3,000m above sea level in a typical mission scenario. This includes a full autonomous take-off sequence, a mission flight at variable speed, and a landing sequence.

The UAV is specifically designed for LiDAR-based powerline mapping missions. It sets a new benchmark in the long endurance UAV class with its combination of flexibility, quality and very competitive pricing.

GEOSLAM EXPANDS IN ASIA

GeoSLAM has bolstered its presence in Asia by securing two new distributors in China. The UK-based firm has announced partnerships with Beijing Onrol Technology Co. Ltd and Beijing MAG Tianhong Science & Technology Development Co. Ltd.

Onrol, headquartered in the Chaoyang District of Beijing,

is a 3D scanning technology specialist, operating in sectors such as heritage, public safety and building. It will be focusing its efforts in the North and North East of China. Located in the Shijingshan District, MAG Tianhong also supplies mapping

solutions, including 3D laser scanners and BIM systems. Its focus will be eight central Chinese provinces, along with Shanghai. The latest deals mean that GeoSLAM now works with 49 distributors in 40 territories around the world.

PROF DOUG HODGES

GW readers will be saddened to learn of the death of Prof Doug Hodges, formerly of the University of Nottingham. Former GW editorial board member David Wallis provided the following reminiscences and Gethin Roberts adds some of his own.

I first met Doug when he was appointed as a Lecturer in the Dept. Mining Engineering at Nottingham University. His speciality was mathematics with a lasting interest in surveying. The time was the 1950's before instruments were electronic and calculators were cranked by a handle. Doug was keen to introduce more modern instrumentation and techniques, in particular in connection with mining surveying.

In those days the correlation of points underground in relation to the surface was a very primitive task involving two very long wires lowered down the mineshaft. Doug worked toward a better and more accurate technique. He had read essays written by Prof. Rellesman at Bochum University in Germany, who had developed a method using a North Seeking Gyroscope, which produced remarkable results, in a fraction of the time taken by using the wires.

The DMT Institute in Bochum developed a flame-proof gyro instrument, suitable for taking down a coalmine. Doug was very keen to acquire one for the University of Nottingham and persuaded the National Coal Board to cough up about £6000. Doug and I went to collect it in my car, a large Vauxhall saloon and in order to transport the instrument safely I removed the front passenger seat. The instrument came with a large internally sprung frame. When it was mounted, next to the driver, to anyone looking in the car, it all looked amazing, thinking it was a new driverless model!

Doug had a reputation for attracting and developing brilliant students and was able to assist them in achieving successful careers inside and outside mining. Without doubt the number here today is a legacy to Doug's talent as a mentor and an example to be proud of. One of those students was Gethin Roberts who adds: I was an undergraduate student in Mining Engineering 1989 – 1993. Doug was a fantastic teacher and a real gentleman. He would usher us all up to the front of the class to show us a drawing, or an instrument, and being taught by him was a little like having a football coach, in that there was a lot of preparation before the final match, which of course was the field course.

He used the football analogy many times whilst explaining how he was teaching us. He was a semi-professional football player in his day, as well as a lecturer. Doug inspired me greatly, and I am indebted to him for my career path. In my final year, I was very focused on surveying, and even won the surveying prize in year 2. I was investigating the possibility of carrying out a PhD under Doug, but funds at the time were limited, due to the fall of British Coal. He was the one that went to the effort of speaking to a Prof in civil engineering, Vidal Ashkenazi, who opened the door to me becoming a lecturer. I have had a full career at the University of Nottingham since then, all thanks to Doug's initial push, both in the UK and more recently on our China campus for the past six years. Who would have thought that I would have been teaching students in China using techniques and skills learnt from Doug.

ILMS gathers more momentum in Helsinki



The Ghana delegation were delighted to win host for the working week in 2021.

Land Group Director James Kavanagh sums up the FIG working week, which took place in Helsinki in June and found the global surveying profession in good health.

FIG'S annual working week in Helsinki attracted over 800 surveying

delegates from across the world who were treated to, not only sunshine until near midnight (Finland is known as the land of the midnight sun), but also some excellent plenary sessions (from Google, UN Habitat, the Finnish government, amongst others), ten different parallel session programmes, workshops and an extensive social programme.

Helsinki is a beautiful Baltic city with extensive parks, an excellent public transport system, stunning architecture with design by renowned Finnish architect and designer Alvar Aalto. The Finnish organising committee really pulled out all the stops to make this a very memorable week.

Plenary sessions were especially strong, aided by excellent and freely available WiFi, with some stand-out lectures including **Ed Parsons** (Google), who highlighted the coming technological challenges and opportunities from 'machine learning' to driverless cars. It is important to understand the difference between AI (artificial intelligence) and ML (machine learning); multiple surveying related activities, especially geospatial data capture, are very ML friendly but beware an over-emphasis on 'measurement'. Dr **Jolyne Sanjak Landesa** also gave an excellent lecture on land administration, tenure rights and the Sustainable Development Goals (SDG) land indicator 1.4.2 <http://www.landesa.org/>

ILMS FEATURES IN HIGH LEVEL SESSION

International standards were sprinkled throughout the technical programme and RICS was strongly represented by our delegation and our members from around the world. International Ethical Standards (**Gary Strong** - Commission 1), International valuation Standards (**Ben Elder** – Commission 9) and International Construction Standards (See **Lian Ong**

- Commission 10), were presented to full rooms whilst ILMS (International Land Measurement Standards) featured in a high level session with UN Habitat GLTN & UN FAO. UN agencies and the World Bank rightly view land acquisition and fair compensation/taxation as a major global issue and the concept of ILMS as a high level principles-based land transfer and reporting standard has come along at just the right moment to gain momentum.

During this UN session global experts used the ILMS concept as a way of illustrating a new way forward to de-risk and smooth land transfers. I also reported on ILMS at a regional bodies meeting (which featured representatives from all of the world regions including South America). All of the international standards were featured during FIG vice-president **Diane Dumashie** FRICS's summing up during the closing plenary session. The ILMS SSC met during a special session and made significant progress on the scope and remit of ILMS (a critical element on what can be a very emotive subject) as well as the standards themselves.

Timescales are now starting to become stabilised with the consultation draft expected for autumn 2017, global consultation winter 2017/18, 'soft launch' at World Bank 2018 (March) and 'hard launch' at FIG Istanbul 2018. The working week was also successful for our colleagues from GhIS Ghana who were voted in as hosts of the 2021 working week.

FIG Young Surveyors had a strong working week (and a 5km 'fun' run), which got some not-quite-so-young surveyors out into the fresh air of Helsinki. The social programme was very well put together: highlights included a wonderful 'punk' cultural evening – Finns have a great love of hard rock music, an excellent gala event in the Finlandia hall which also featured the music of Sibelius but my personal highlight was the Finnish sauna experience which also included a naked 'dip' in the Baltic (and yes, it was Baltic!).

FIG Helsinki was one of the best working weeks since Kuala Lumpur 2012 with some excellent presentations, a very knowledgeable audience and a renewed focus on some of the major trends (technologies like Blockchain) that will affect the profession's future. The global profession is in good health. Next stop Istanbul, May 2018.

Events, statistics, geospatial data and the UN

– it's all about collaboration

The FIG Working Week in Helsinki was well organised, well attended and achieved by collaboration. So is much else in the geospatial business.

Jointly organized by FIG and the two Finnish members of FIG and the National Land Survey of Finland, the working week was a substantial amount of good technical and strategic papers and presentations, as well as a strong cultural element. Read James Kavanagh's review on page 10 and John Brock's social account on page 33.

In the UK, GEO Business (pages 14-17) demonstrated the diversity, health and general state of our industry and profession. In the UK, there are concerns affecting the industry from austerity to "Brexit". These are ongoing and largely out of our hands but collectively the message is clear: we are open for business and able to develop and sustain activities, whilst adopting and embracing a plethora of new technologies. GEO Business represents a successful collaboration of associations, institutions, societies facilitated by the organisers. Thanks must go to the organizing committee and to organisers Diversified Communications.

Collaboration is also evident at the UK's only commercial training centre for the land survey industry, the TSA Survey School. This year the graduation ceremony celebrated the graduation of students on the TSA Courses 38 / 39 / 40. The school is supported by industry and the profession and so it's a thanks and well done to the teaching staff, supporters and of course all those graduates.

OCEANS CONFERENCE

A new event in June saw the UN's inaugural Oceans Conference in support of UN Sustainable Development Goal No. 14: Conserve and sustainably use the oceans, seas and marine resources. It heard statements from over 1300 organisations as well as notable support from industry, celebrities and governments. Its aim is to stimulate actions and promote awareness of the state of our seas and oceans and to develop plans for sustainable activities to improve and maintain their health. It was attended by over 6000 visitors and delegates and was timely as in early August a meeting of United Nations Committee of Experts on Global

Geospatial Information Management (UN-GGIM) takes place in New York, where a new theme will be discussed, relating to Marine Spatial Data Infrastructure.

UN-GGIM comes under the UN Statistics division. We surveyors are deep into data collection, QC and delivery of data products. The majority of people come across geospatial data when it is served up for them as part of a service. An increasing number of support and service-related businesses are connecting geospatial data by integrating with big data. For example, Enterprise Relationship Planning (ERP) and Customer Relationship Management (CRM). This is potentially a disruptive factor for traditional businesses and so adopting and integrating geospatial data is becoming an ever more important part of data analytics. For the policy people this will mean statistics.

Interestingly, a recent industry study found that developed countries have good spatial data policies and industries able to benefit and provide services and solutions. For less developed nations there will have to be support and aid to develop geospatial awareness and capacity. Interesting was that geospatial data is most readily available in North America, whilst in the Asia Pacific region they have the highest level of geospatial services.

So there are opportunities. We live in a globalised world but when it comes to foundational information and sustainable use of our land and sea resources there is a lot to be done to create well managed resources based on consistent, reliable and sustainable geospatial data and policies. Collaboration will be vital if we are to play a part.

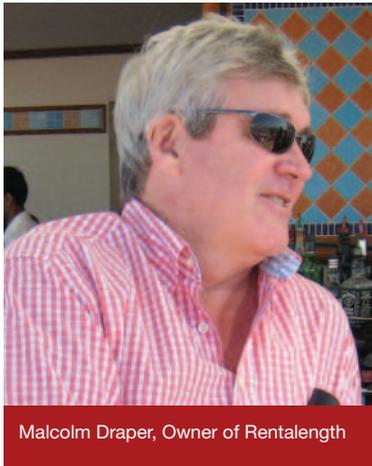


Gordon Johnston, Chair of the RICS Geomatics Professional Group. Gordon welcomes your comments and thoughts so please email to the following address geochair.rics@gmail.com

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Business buzzes at GEO Business, real or virtual!



Malcolm Draper, Owner of Rentalength

It's been a blindingly hot summer so far; just watch it rain all week when Wimbledon arrives! It's also been a busy couple of months since I last shared my thoughts and visits with readers.

The GEO Business event was really buzzy with lots of new companies and everyone I spoke to positive about the industry's future. It was also a great opportunity for catching up with old mates, acquaintances as well as Downunder Currents columnist **John Brock**.

John arrived from Australia that morning and settled himself down in front of **Paul MacArthur's** SCCS stand to enjoy several free Fosters lagers. He later claimed not to touch the stuff back home, preferring another local brand of amber nectar unavailable to us Poms. John, bless him, had taken the time to visit the Wright-Draper collection of early electronic surveying equipment in Ghent and was conducted around it by Professor **Alain De Wulf**, whom we met last year when the Editor and I were invited to the opening of the collection.



I used to be a real one!

A tour of the many and busy stands revealed just how out of touch I am with tiny UAVs, scanners, services in the cloud (I am a member of the Cloud Appreciation Society but that didn't seem to entitle a discount); and something called "Virtual Surveyor". It turned out to be a high-tech Belgian company whose website states, "Work with UAV data. Become a Virtual Surveyor". Does it qualify for RICS membership?

Overall it was a brilliant show and more importantly, great to catch up with **Derry Long**, **Hugh O'Reilly** and **Bill Smoker** (London Borough of Hammersmith & Fulham), **Robert Brassington** of M.J. Rees, **Dave Norris** of Plowman Craven, **Andy Goodwin** of XYZ Surveys, **Alan Barrow**, **Brian Cootes** (another antipodean over from New Zealand), **James Kavanagh**, **Jim Woodhams**, now with Topcon, David and Richard **Maltby**, **Mike McKay** and **Andrew Beardsley**. It was also great to see Leica's **Mark Concannon** looking fit and healthy and colleague **John Fraser**. I was sorry to see **Versha Carter**, director of organisers Diversified, recovering from a hamstring injury but gamely hobbling along with one leg on a wheeled tricycle aid. That's quite a list of people I spoke to but just in case, apologies to anyone I've missed.

The Gala Dinner was splendid and the food finer than usual and all the better for the absence of post-dinner entertainment, always a challenge for organisers as our Editor used to experience when he ran the World of Surveying/Geomatics events with near-the-knuckle comedians bound to offend someone. Far better, as organiser **Caroline Hobden** decided, to put the money behind the bar for the after-dinner crack (or the craic, as my Irish friends say).

I must apologise to **John Brock** and his partner **Kerima-Gae** who got bumped off our table to an adjoining one. We Brits do too many things on a relaxed ad hoc unplanned basis, indeed it brings to mind an acquaintance who used to boast that he only drank to relax; the problem was he often got so relaxed his friends had to carry him home.

ANOTHER BRICK IN . . .

London continues to have plenty to offer to daily visitors like me or to tourists, despite isolated terrorist horrors and the appalling tower block fire – I'm just glad I'm not a building surveyor. We recently visited the V&A Museum's amazing exhibition, "Pink Floyd, Their Mortal Remains". Not quite as good as last year's Rolling Stones "Exhibitionism" but nonetheless interesting. Pink Floyd evolved over more than five decades from a way-out sixties weirdness to being able to stage concerts with budgets of many thousands of pounds for animations, graphics, visual displays and other special effects, inflatable floating

pink pigs, Junkers dive bombers and other strange ephemera, like photographing over a hundred beds on a beach (and in the days before Photoshop and all the other tricks of the virtual world). Apparently just as the photo shoot was about to begin it rained and they all had to be taken back under cover.

I must give a shout out to the Royal Geographical Society which is releasing films of some of the scientific explorations it has sponsored over the last nearly hundred years. There is magnificent footage of the first flight over Mt Everest shot in 1933 by the splendidly named former WW1 fighter pilot Major **Latham Valentine Stewart Blacker**, a man truly in the Biggles tradition. There is also footage of Ralph Bagnold's 1932 motorised expedition across the Libyan desert where the cars often got stuck in the sand and the team had to improvise ways of getting them out, only for them to get stuck in again a few yards further on. Bagnold, an engineer, later became quite an expert on the movement of sand dunes with published papers in learned journals. Check it out at <http://www.bbc.co.uk/news/science-environment-40050593>

CATCH UP FROM BARBADOS

It was very pleasant to catch up recently with Brian Hart of Barbados Surveyors Hart Hutchinson & Field in Barbados and his wife Janice. They are lovely people whom I've got to know quite well through visits to the island and enjoyed their hospitality. This time I was able to reciprocate as they were visiting the old country from which Janice's ancestors left in 1630, Brian's a few decades later hence she calls him a newcomer! Brian



Old chums catch up, Kingston Bridge in the background.

tells me that his business has slowed a little but so far he hasn't had to lay anybody off.



"It's behind you!" Justin Marshall at work on building control for scan data at Longleat. Let's hope he didn't get stung!

MISCELLANY

The current state of Britain's road network is notorious for potholes. Now one wag who calls himself "Wanksy" is roaming the network with road-marking spray cans turning assorted potholes and cracks into penises. If he keeps at it and avoids arrest he might just get one of his creations into the Tate Modern art gallery.

The fact that there's "A Highway to Hell" and only "A Stairway to Heaven" says a lot about traffic numbers.

We thought readers would enjoy the following two items of news:



Apparently Mac does now support Windows.

And this one from the land of the brave, armed and free:



A police officer called the station on his radio. "I have an interesting case here. An old lady has just shot her husband for stepping on the floor she has just mopped." Have you arrested her?, asks the super back in the station. "Not yet" came the reply, "The floor's still wet."

GEO Business: Spanning the Spectrum

How do we sell the message?

The industry's leading event took place once again at the Business Design Centre in London and attracted a bustling crowd of geo-people. It is not possible to attend every conference session, associated meeting, workshop or visit every stand but it was possible to discern the mood of the industry and that is upbeat.

This would be a conference “spanning the spectrum of geospatial activities” announced conference chairman **Steven Eglinton** (Geo-Enable and the AGI) in his introduction. The first session spanned national mapping, remote sensing and GIS. Ordnance Survey CEO, **Nigel Clifford** opened with his keynote, ‘Geospatial: Innovation, integration and impact’, with the comforting thought that ‘geospatial’ in Britain is actually in pretty good shape.

The modern economy has to be geospatially enabled and Britain's

means focusing on applications. The goal is to make data as widely used as possible and, by working with local authorities, the mapping agency is starting to see true value being extracted from their data.

OS's geospatial innovation hub, GeoVation promotes the development of new applications and now supports 700 – 800 individuals in turning their bright ideas into businesses. Other areas include the mapping needed to support the coming 5G phone network, a system which is even more sensitive to obstructions than

earth observation (EO) satellites with a resolution of 30cm and radar sensors that ‘see through’ cloud. The future is full of new constellations with fifty planned over the next ten years. The most significant result will be a step change in the temporal resolution of data from the current revisit period of a few days down to daily or hourly.

Martin sees the catapult's role in bringing together stakeholders to develop applications through examples like a global network for detecting illegal fishing (one in five fish are caught illegally) using the AIS (the automatic identification system aboard shipping) driven by GNSS and Bird.i (<https://www.hibirdi.com/>) both of which make current EO data accessible and affordable on mobile devices.

“Geospatial World Forum's geospatial readiness index places the UK in second place behind the USA.”

is through projects initiated by OS like GCIP, the geospatial content improvement programme, the Highways MasterMap and Smart Future Projects like CityVerve. Geospatial World Forum's geospatial readiness index places the UK in second place behind the USA. Clifford sees the role of OS as facilitator for geospatial development in the UK. Data has to be accessible, so OS partners with others to generate value and that

its predecessors and CityVerve which is putting the Internet of Things (IoT) into practice in Manchester.

STEP CHANGE COMING

Stuart Martin from the Satellite Applications Catapult looked into the future for satellite data for positioning, earth observation and communications. We can expect instant positioning to decimetre level soon. We already have

Esri UK's **Charles Kennelly** addressed, ‘What the market needs from national mapping agencies and the space industry’. He asked, “what do we need them for?” His thought processes concluded that NMAs do have a role in producing and maintaining a national “geospatial fabric” of authoritative data with complete coverage – not just the profitable bits. “If you're sued and you used NMA data then you're safe” (Not so sure on that one Charles, talk to some surveyors whose clients have relied on OS data to plan housing estates and other projects, especially smaller ones.) Surveyors will concur with his advice to NMAs to concentrate

on “core innovation” and “ease of licensing”.

He does not see technology as a problem. His crystal ball sees increase using of artificial intelligence (AI) to keep the database up to date and greater use of remote sensing. Above all, he urged a move from cartographical representation of features to machine readable GIS

“. . . he urged a move from cartographical representation of features to machine readable GIS. . .”

representation. He argues that autonomous vehicles don’t need accurate maps, they need intelligence just as buildings should be able to “self-survey” and broadcast their data. AI is also becoming important in change detection.

His parting shot was to argue that OS as the nation’s mapper, their data should be free. It will drive more business and he cites Esri’s experience of 20 billion requests in one month to download free mapping.

HIGHLIGHTING GEOSPATIAL

A panel chaired by **Andy Coote** (ConsultingWhere) brought speakers together. He started by asking about the future for NMAs. Clifford said that the OS has just been through an independent general review, with the objective of keeping it relevant. Geospatial has become mainstream and political. As evidence Coote pointed to page 82 of the Conservative Party manifesto for the general election, which proposes “to release massive value in our land” through a “comprehensive geospatial data body within government”. Not sure if that made it to the Queen’s Speech.

There were mixed thoughts on the impact of Brexit. One speaker

reckoned we were better off without INSPIRE, whilst another pointed to EU support for earth observation. Would we still have access to this data? Another question concerned underground utilities – is this the last frontier for remote sensing? The panel’s view was that EO could not make an impact. Should utilities’ records be held by a central body? The view was that this

aspect of national mapping should be federated – the gas company should be responsible for its own records.

Not for the first time, questions of privacy and security were raised. How are we going to protect private data in an environment where combining datasets can reveal so much about individuals? The OS has appointed a chief data officer with this conundrum in mind. The current resolution of satellite imagery is 30cm, so people can be counted but not yet identified.

How do we encourage the use of geospatial data? Clifford said that there are pockets of geospatial awareness in government and particularly by chief scientific

“He showed examples of flagrant geospatial insecurity, such as a 3D model of HMP Cookham Wood displayed proudly on line. . .”

officers. He sees this as an opportunity. Solve problems in the UK and they then become an export opportunity. The panel emphasised the need to focus on applications rather than data. “Are we just train-

spotters?”, said one panellist. And finally how do we sell the geospatial message? The panel’s answer was: find friends and promote recognition of the spatial ingredient in data. As an example Martin said that they had approached an admiral with the illegal fishing application. This opened up a world of contacts that made the application happen.

GNSS, CLOCKS, SECURITY AND BIM

In the following session **Brent Jones**, global manager land records / cadastre at Esri asked “Where is the disruption. . . ?” He took the development of clocks as his analogy and argued that the Casio watch had the same degree of disruption on time as GPS had on positioning, and that this has to be powered by standards to make data interoperable. GNSS is now cheap technology and bringing cadastral surveying within the reach of the poor. He gave an example from Kenya where cadastral surveys have been carried out as a community exercise. Neighbours survey their boundaries together and the results are presented to the community where they are effectively adjudicated.

An intriguing presentation promised to delve into cyber security with a “UK Government Security Engineer”. This was not to be however. Due to the terrorist bomb

in Manchester the previous day his services were needed elsewhere. His shoes however were ably filled by a security consultant, **Hugh Boyes**. He showed examples of flagrant geospatial insecurity, such

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as a 3D model of HMP Cookham Wood displayed proudly on line, as an example of how to do BIM Level 2. There were similar documents showing floor plans for police stations and 3D renderings of underground stations, all of which give the criminal a helping hand. It is ironic that the purpose of BIM is to promote collaboration and yet the BIM product, in the wrong hands, could cause immense damage. Boyes urges BIM projects to have a security strategy. There is help in the form of PAS 1192-5 which can be downloaded free of charge from: <http://shop.bsigroup.com/forms/PASs/PAS-1192-5/Confirmation/>.

Jos Creese argues that the term Smart Cities is too restrictive – what about the rest of us! It got me thinking that like ‘BIM’, ‘Smart Cities’ is one of those terms that, whilst concentrating the mind on a topic, at the same time blinkers our vision.

QUESTION TIME

A ‘Question Time’ session with a panel of experts (**Mike Hopkins**, from TSA, **Ed Manley**, lecturer

in Smart Cities at UCL, **Miranda Sharp**, Head of Smart Cities practice at the Ordnance Survey and **Ed Parsons**, Google) moderated by **Antony Oliver** examined the future of the geospatial industry. Debate was lively and ranged from Smart Cities to careers, Brexit, underground utilities and OSGB36. Here are a few snippets from the discussions:

- Ed Parsons warned against over engineering products. Google’s approach is to develop the minimal viable product. It is just adequate for its purpose, because anything more is waste.
- What should people in their early years focus their development on? The general view was data processing and analysis rather than data collection. Manley suggested that learning to code was a good start and stressed the importance of keeping up to date. Parsons advocated ‘making things’ as a good way to understand and develop, while, Hopkins suggested that data collection was not the done deal that others sometimes claim

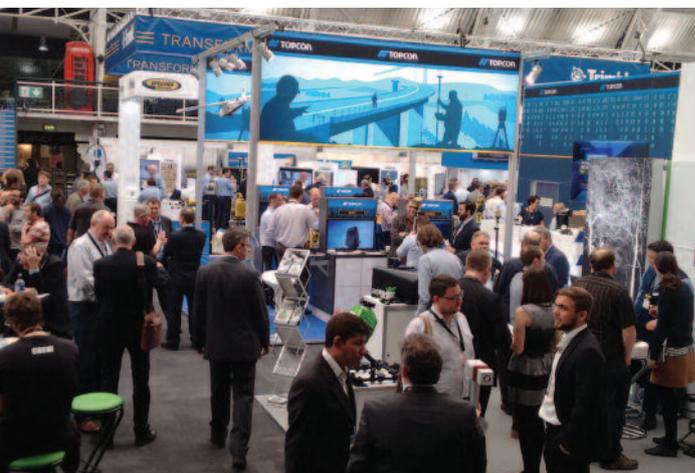
and Parsons agreed. Google operates, he said, in the mass consumer market, a world apart from professional surveying.

- There was some discussion about the adoption of PAS128 for survey of underground utilities and how to get it implemented.
- The OS policy of distorting reality to fit OSGB36 was questioned. The view was that eventually there will have to be a change, but not immediately because of the work involved in converting data.

The panel concluded that there will be more automation to which geospatial will have to adapt, Brexit will result in opportunities and that we should take heart from the fact that geospatial is now and will, for the foreseeable future, be at the core.

And so two days packed with things to see and hear once more came to an end. GeoBusiness has matured into an old friend who we visit each year, have a few beers with (aided by the organisers delightful “Ale Trail”) and then arrange to meet next year. And so we will.

GEO Business show floor



Here’s a quick round up of what caught the Editor’s eye at this year’s show.

Like Intergeo in Germany, this event has become the UK’s No 1 unmissable geospatial event. With 150 companies it would be quite impossible to review all their wares, product launches and innovations but here are just a few. Apologies to those I’ve overlooked.

For Trimble critical new products were the sensor-fusing SX10

total station with hi-res scanning and Catalyst, an entry-level data collection system based on a smart phone or tablet (Android currently but watch out for Apple) plus GNSS from a lightweight antenna that plugs into the phone’s USB port. Add a detail pole, a subscription to Trimble’s VRS Now correction service and you’re ready to go to work.



Gareth Gibson from Trimble New Zealand demonstrates Catalyst.



No, it's not a pixelated image of Trimble's SX10. Just get yourself a whole heap of grey Lego!

Topcon had a full range of technologies on show, from UAVs (fixed wing and rotary) to the new Delta Deformation Monitoring System. This combines hardware and intuitive software in one workflow, integrating high-precision measurement technology and software. The system includes the Delta Link unit, the Delta Log programme and Delta Watch software package.

SHRINKING SCANNERS

Laser scanning is not just ubiquitous nowadays; the scanners are shrinking and turning up in mobile mapping systems as well as UAV systems. Typical was DotProduct's new handheld 3D scanner, the DPI-8X, while readers of GW will already be familiar with 3D Laser Mapping's ROBIN system.

Leica Geosystems were of course showing the tiny Leica BLK360 imaging laser scanner. Anyone who can operate an iPad can capture the world around them with full-colour, high-resolution 3D panoramic images overlaid on a high-accuracy point cloud. It can scan in high, standard and fast resolutions, and perform a full-dome scan in less than 3 minutes. Older surveyors

may notice a startling resemblance of the scanner to the carrying case of a T2 theodolite, part of the design brief I am told!

Competitors FARO now offer the Road Scanner C, a collaboration with Siteco to produce what they describe as a "Compact Edition". In fact this is an advanced mobile mapping system weighing 50kgs with two Faro Focus scanners, GNSS, a Ladybug 5 spherical camera and a Gigaethernet camera. Plug-ins for Autodesk, Microstation and ArcGIS are available for the post-processing software.

Another laser scanner manufacturer with a long pedigree for high quality products is Zoller & Frolich, Z+F.

Their new Imager 5016 is much lighter in weight than previous models (apologies by the way to Z+F for misreading the weight units listed in our recent *Engineering Surveying Showcase* publication: with batteries it weighs 16.5lbs (7.5kgs) and not 16.5kgs).

The new scanner features a much sleeker and compact case, rapid image capture (full HDR panorama of 80MPx), a range of 360m and is eye-safe Class 1. Control is via a tablet and new software, LaserControl Scout offers a new approach to the workflow by keeping a constant link to the scanner open until the tablet has checked registration to ensure no further scans are required.

ROBOTIC STAKE OUT

Perhaps the most interesting device on show, given the conference's interest in AI and machine learning, came from Denmark. **Jens Peder Kristensen** of TinyMobileRobots demonstrated his autonomous robot for outdoor stake out. Now, okay this little cart was not bashing pegs in, but it could mark out a large area like a car park or outdoor show field with spray paint – three times faster says Kristensen than a manual surveyor. Precision is sub-cm and onboard sensors include a wheel encoder, accelerometer and GNSS. Battery power lasts for 8 hours. The shape of surveying to come?



Far left: Faro's Road Scanner C. system
Left: From Denmark, a robotic setting-out system.

Senceive marks ten years with launch of triaxial tilt sensor node

The monitoring fraternity met at the London Transport Museum in early May to hear about a company that has transformed deformation monitoring, reports Richard Groom.

Antony Oliver, formerly editor of *New Civil Engineer*, welcomed participants to an evening of digital technology surrounded by the history of London's buses and tubes. He opened with an appreciation of the achievements of Senceive before handing to **Graham Smith**, the company's CEO.

COMMS REVOLUTION

The event, Smith said, had started as a product launch and then morphed into a celebration of the company's success over the past decade, along with a 'thank you' to customers who had believed in and championed the company. Flatmesh is at the heart of Senceive's success. It is a wireless communications system connecting sensors to a hub and then to the outside world. The company's big break came ten years ago to provide a solution for Network Rail and led to the growth of the company to its current staffing level of twenty.

"What's so hard about wireless?" Smith asked. The answer is that it's hard if you want it to be good, and it is this ethos of continuous challenge and improvement that has driven the company. Smith offered

Antony Oliver introduced the event.



three lessons, which could apply to almost any industry:

- Listen to customers and adapt needs and requests to evolve the product
- The product has to be reliable
- You need the right mix of skills and people.

For monitoring, the challenges of installing automated systems have traditionally been communications and power. Senceive solves the communications problem with wireless, the sensors typically having a fifteen-year battery life and the system can be set up for solar and other power generation.

TOWARDS PREDICTIVE MAINTENANCE

Mark Morris is director of asset management, railway operations for HS2 Ltd. The new railway is being designed for the people who will use it and so the focus is on optimising how it will operate. He said that for HS1 (the Channel Tunnel Rail Link), Japanese railways were taken as the gold standard, but after HS2 is built, his aim is to see the world looking to Britain for the benchmark.

He needs sensors to be built into the infrastructure to provide monitoring data in real time and for software to analyse the vast quantity of data and ultimately to predict the need for maintenance. Maintenance inspection could then move from the current practice of cyclical site visits to a more risk-based approach. He is acutely aware that the pace of technological development could render equipment obsolete before the railway is built and so his focus is on innovation. "Digital technology is to us as coal was to the Victorians", he concludes.

Oliver then chaired a panel discussion with the theme: How can asset owners benefit from the changing digital landscape? Participants were **Adam Bradley** – TSA President, **Malcolm Taylor** – Crossrail, **Tim Chapman** – Arup and CLC smart technology working group and **Graham Smith**.

Several chains of thought emerged:

- The need to collaborate and for the right people to be involved in projects from the start (including surveyors)
- Concentration on STEM education.
- Encourage a climate of innovation and tease out proper business cases.
- Deal with the data more effectively and add value to it by using it more widely; predictive maintenance, for example.
- The problems for small businesses in dealing with big businesses.
- Owners need to have the right skills, and these are not just the preserve of the young.
- Contract terms and conditions are too strict for SMEs.
- Whole life business cases are needed, combining CapEx and OpEx to recognise later benefits from early costs.

NEW NANO

But what of that product launch? Hitherto the evening had entirely focused on communications – that's what Senceive does, but the new product is the Nano Triaxial Tilt Sensor Node. It has a resolution of 0.0001° (0.0018mm/m), with repeatability of ±0.0005° (±0.009mm/m) and has a battery life of five years. If that does not get surveyors excited, nothing will!

UAV Monitoring of Coastal Erosion

In this case study, Kerstin Traut of QuestUAV describes the use of UAV photography and photogrammetry to measure long-term erosion of the coast of north-east England.

The British Geological Survey states that across England and Wales 113,000 residential properties, 9000 commercial properties and 5000 hectares of agricultural land are within areas at risk from coastal erosion. Mitigating the effects of climate change requires coastal protection studies and coastal protection measures. As every planner knows however, this increases the burden of allocating ever reducing financial resources.

Accurate evaluation of the change, gleaned from historical studies, combined with best practice from

“ . . . a great platform for monitoring the stability of a coastline. . . ”

current studies and environmental factors allow the most effective and efficient decisions to be taken for coastal protection.

DRONES FOR COASTAL SURVEYS

Drones or Unmanned Aerial Vehicles (UAVs) are a great platform for monitoring the stability of a coastline and for carrying out a rapid initial survey after a storm. They can be used to quickly survey potentially difficult and dangerous large sites with a very high level of detail. Erosion monitoring, assessment of cliff stability, monitoring coastal



Kerstin Traut demonstrates the lightweight QuestUAV.

vegetation and changes in land volume or coastline state are only a few examples of the applications for UAVs in coastal areas.

Other coastal applications include rapid pre- and post-storm assessments to quantify storm

impacts, property monitoring for insurance purposes, monitoring coastal sand mining activities (cement), habitat monitoring through sea colour surveys, breakwater inspections and geological cliff and rock surveys.

QuestUAV has always had a special interest in using drones for coastal applications. Their main facility is located in a port town in North-East England on the shore of the North Sea. The environment there is harsh – wind and weather re-shapes the coast daily. The conditions in which UAVs have to

perform are challenging, but have guided the company in creating one of the most stable fixed-wing UAV platforms on the market.

QuestUAV's sound airframe design includes a sensor gimbal to ensure high quality sharp images, even in turbulent conditions of wind speeds up to 65 km/h. With the latest PPK (post processing kinematic) technology on board, the drone enables survey mapping with a spatial accuracy of 2cm without the need for ground control points. PPK is particularly valuable for coastal



Figure 1: Some applications for coastal aerial imagery (left to right): Sea colour mapping along Druridge Bay, England. Art project at Elie Beach, Scotland. Rock survey at Hauxley, England.



Figure 2: Left - Orthomosaic of the survey site (January 2017). Right - Zoom sections of orthomosaics from different years.



Figure 3: Coastline changes between 2013 and 2017 at the Low Hauxley coast.

work where it is not easy to find good positions for ground control.

NORTHUMBERLAND COAST

QuestUAV started monitoring the local coast of Northumberland

“... the high water mark receded by up to 2.2 metres at the most critical point.”

between Alnmouth and Cresswell, designated an Area of Outstanding Natural Beauty in 2008. Since then, the coastline has been hit by two exceptionally strong flood events – one in November 2013 and one recently, on the 13th of January 2017.

ABOUT THE AUTHOR

Kerstin Traut is a Geoinformatics Specialist and Drone Operator at QuestUAV Ltd. She entered the drone world five years ago after working for a couple of years in research on forestry and satellite remote sensing. She has a Master’s degree in Geoinformatics and Remote Sensing.

Immediately after the latest storm, a QuestUAV crew flew the local coast, assessing the impact of the floods on the basis of the long-term image series. The assessment workflow involved a correlation of information from historical sources, satellite imagery and 3D modelling. The survey concentrated on the less protected dune land, especially to see how much property owners had lost from erosion.

The flight crew flew the site with a Q-200 PPK drone at 400 feet and the subsequent photogrammetry achieved centimetre-level accuracy without the need for ground control. The imagery resolution was 2.9cm, GSD (ground sampling distance).

TIME-SERIES IMAGES

Figure 3 shows images of a dune property before the flood in November 2013, in 2016, and after the January 2017 flood. This is a representative section of a much larger survey area. The time series shows that the latest flood changed the frontline of the dunes by one to two metres. Rocks and previous coastal erosion measures became exposed. Large volumes of sand and grass were

eroded and slumps occurred within hours of subsequent high tides.

Calculations showed that approximately 850 tonnes of dune and dune-foot were lost along an eighty metre stretch of coastline and the high water mark receded by up to 2.2 metres at the most critical point. The expected slumps that will happen as a result of erosion at the toe are estimated to carry a further 300 tonne loss within 12 months. To see the long-term development of the coastline a flight from January 2013 was also included in the analysis. The storm event in November 2013 had an impact comparable to the latest flood, but fortunately, sand, stones and

organic matter deposits along existing structures and the coastline are replaced, to an extent, over the years.

PPK OR RTK?

Generally, there are three ways to achieve high spatial accuracies:

1. Combining image data with Ground Control Points (GCPs)
2. Correcting position information by means of post-processing kinematic (PPK) systems
3. Correcting position information by means of real-time kinematic (RTK) systems

The great advantage of PPK over RTK is that PPK systems do not require a real-time data link with a fixed reference station while still guaranteeing centimetre-level position accuracy. This simplifies the entire set-up, and reduces the requirements and power drain of the GNSS receiver on board the drone.

PPK systems eliminate the risk of losing data due to unreliable radio links between drone and base station, which often plague drone operations based on RTK workflows. The base station may be a receiver set up on a tripod at the site to record data during the drone flight or, for many countries, data downloaded from a national CORS network station can be used instead.

With both RTK and PPK, when the receiver on the drone loses lock, a new integer ambiguity resolution procedure must be initiated. The advantage with PPK is that the search can proceed from previous and future data relative to that instant, whilst RTK solutions cannot use data that has not yet been recorded.



Figure 4: Parachute landing.

Ethical?

Or just point scoring?

Chris Mills responds to the last issue's article on ethics by our technical editor Richard Groom with some pithy and illuminating comments drawn from experience.

Richard asks, "How can bidders score points in tender evaluation as reward for their ethical standpoint?" and answers, "They cannot, unless those standards are stated in the tender documentation." In reality that last sentence should terminate at the first comma. Professional firms spend a great deal of time preparing tender responses with regards to H&S, ethics and working procedures only to be told that the contract has been awarded on the basis of price.

Here we have the first conundrum. The awardee is duty bound to their employer to ensure the overall cost is a minimum, but using the criteria set by the employer. Whether private or public, the criteria is almost always biased heavily on short term considerations of price. One only has to look at the measures taken by public bodies to spend "residual" money at the end of each year to realise this.

A recent contract involved the tenderers each spending several days on detailed preparation of criteria documents, only for the job to be awarded to a tenderer half the price of the other bids (all of which were within a couple of thousand pounds of each other).

Is it ethical to waste so much tenderers' time? Will the cost-obsessed client make any meaningful checks on the finished product? Checks cost money. Even

when the job is eventually found to be inadequate it is very rare for any public sector body to take action to recover monies.

CAUSE OF THE DILEMMAS

An underlying cause to the dilemmas is the division of the market participants, with irreconcilable approaches. There are the professionals and there are the businesses, many of whom should more honestly be termed market traders. Professionals try to behave ethically. Market traders have one criteria - the bottom line - and how they achieve a satisfactory figure is largely immaterial.

Many years ago The Survey Association had the bright idea of publishing a "Work Matrix" in its handbook, which showed the types of work that each member was

"Will the cost-obsessed client make any meaningful checks on the finished product?"

competent to undertake. For a few years it worked well but within a couple of years the market traders realised that they could tick all the boxes and cream-off additional work; the start of the one-stop shop. This relied on their knowing "a man who could" (or in many cases could not).

In itself sub-contracting is a respectable approach, but only if

those at the head of the chain know what they are promising to do. Making promises, which cannot be kept is unethical, especially when the client has little option other than to continue with the work even when he finally realises the real situation.

SOFTWARE SAYS "IT WILL"

Rapid advances in technology are again bringing similar scenarios to the surveying industry. Many non-surveyors end up owning pieces of equipment, which can be used for survey purposes. The software says "It will" so they do.

Sometimes the results are potentially disastrous; more often the results are just a gross waste of the client's money. We have all seen site surveys, which have clearly been done with a scanner, where large areas are labelled "unable to survey" when a conventional method would have had no difficulty in providing adequate coverage. Floor surveys done in a similar

manner, showing a million points on a single A1 sheet with contour lines more reminiscent of an oscilloscope: totally incomprehensible to most clients.

ENTER THE MAN WITH A DRONE

The most extreme example seen in recent times might well be a site of several hundred hectares of

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farmland with power lines and a sea wall. A “man with a drone” offered to map the site for a price equivalent to around £6.50 per hectare. The client

owners the opportunity to obtain a survey qualification after a week’s course, stressing how many weeks it took old-fashioned surveyors

little or no charge, ostensibly as sales pitches. Quite often such projects later appear on the websites of commercial operators as “work we have done”. Is it ethical to claim work done by another as “your work” if you have not purchased that equipment subsequently? Should your website advertise your expertise in any particular activity when that expertise is limited to sending out an e-mail request?

“Is it ethical to claim work done by another as “your work” if you have not purchased that equipment subsequently?”

couldn’t believe his luck! Just as long as the nearest metre or three will do. You don’t want to know the subsequent story.

to undertake any task compared with the few hours it would take the drone surveyor, who could still charge the same price.

BE A SURVEYOR IN A WEEK

Dubious ethics also extend to the training provider sector. Recent advertisements offered drone

Finally, we come to the manufacturers. It is all too apparent that a number of projects are being carried out by manufacturers at

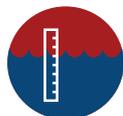
Richard finished his article by stating that “The professional has to distinguish himself (sic) from the ‘others’ by not working outside their area of expertise. . .” In a world where so many claim to be experts at everything that is the real dilemma.

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Manor Circus: PAS128:2014

A recent project at the A316 Manor Circus Roundabout, Richmond, Surrey by Site Vision Surveys involved detailed topographical surveys and locating buried services to PAS128 requirements. A full arsenal of survey equipment, including ground penetrating radar, was used reports surveyor Damian Taylor.

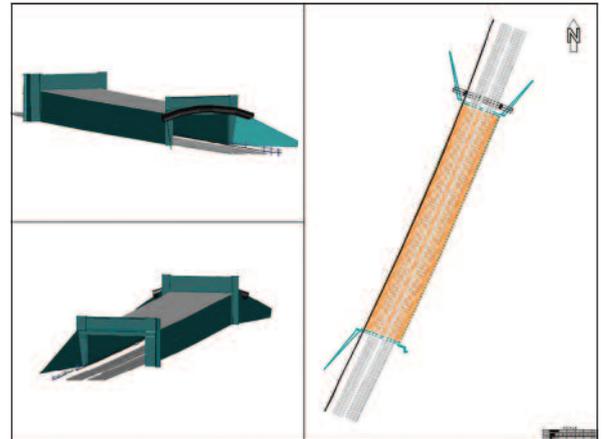
Site Vision Surveys were tasked with carrying out a variety of surveys and services in order to represent Manor Circus, Richmond. The site consists of a four-way roundabout over the top of an existing rail tunnel; next to the site was a large supermarket, petrol station and national grid gas site. The survey work and drawings were required to assist in the generation of a structural report for the rail tunnel and roundabout and to help generate a methodology for replacing the waterproofing of the structure.

Topographical surveys were needed of both the topside and the rail structure running underneath the

roundabout, a PAS128 QL-B survey of the utilities across the topside of the roundabout and then PAS128-QL-A service verification trenches within the footways at either end of the bridge.

SCANNING THE RAIL UNDERPASS

For the first stage, the survey of the rail tunnel below the roundabout, a weekend track possession was required for the work and was to be carried out in conjunction with other tunnel inspection works. Due to access restraints it was imperative that all information was obtained during this visit, therefore we made the decision to laser-scan the tunnel



3D AutoCAD model of laser scanned underpass

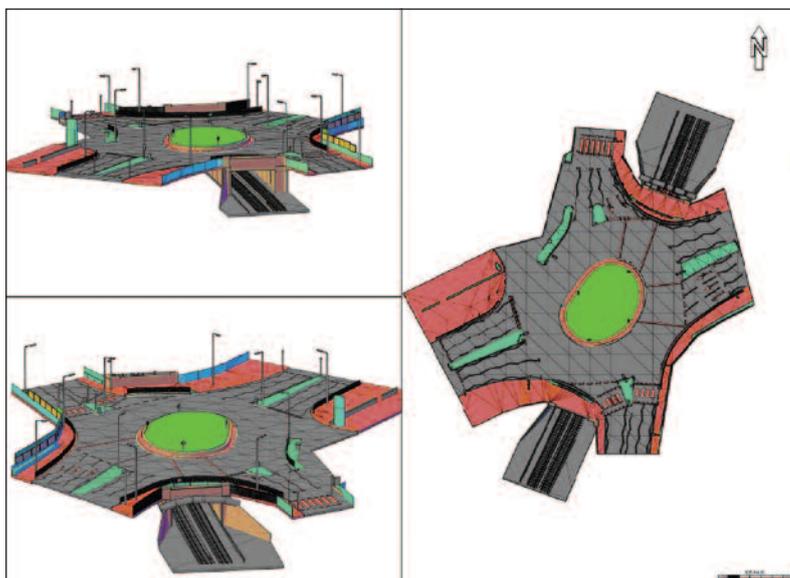
to ensure all required information and more could be obtained in a very short period of time.

Prior to scanning, survey control was installed on the topside of the roundabout and referenced to OS grid coordinates via GPS using a Leica GSO8; then a total station survey control was referenced at either face of the tunnel through checkerboard targets which could be easily referenced in the scan data. Once the survey control was in

Due to access restraints it was imperative that all information was obtained during this visit. . .

place the laser scanning was carried out using a Faro Focus 3D X 330 and completed by way of 13 scan set-ups at 10-15 metre intervals to ensure all overhead beams were captured in sufficient detail.

The processing of site data took approximately one day to register



3D AutoCAD model of topside added to rail underpass

>



2D PAS 128 QL-B-M2 utility survey

the scans and position on to the survey control; the drawing was then modelled in 3D through AutoCAD.

TOPOGRAPHICAL AND LASER SCANNING

The next stage was to survey the topside of the structure; this was undertaken at night under traffic management control to enable survey and access into manholes within live carriageways. The topographical survey was undertaken using a Leica TS15 robotic system and tied into the previously installed survey control. The survey was undertaken to a 3D specification requiring much more information to be picked up at lesser intervals to enable a more accurate

depiction between points. To assist in the 3D modelling we also carried out laser scanning across the topside of the structure. The topographical survey was processed and modelled using AutoCAD.

UTILITY INVESTIGATION AND MAPPING

Whilst undertaking the topographical survey, we also had a team of utility surveyors undertaking a full utility survey in accordance with a PAS128 QL-B-M2 survey specification.

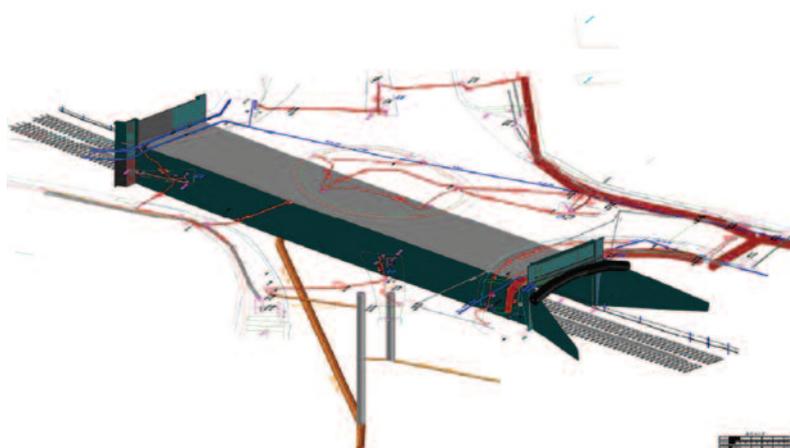
By working in accordance with PAS128:2014, Site Vision Surveys were able to clearly and openly declare confidence ratings in the quality levels depending on how the utility had been detected

on site and the quality of the information received. This develops a great line of communication and understanding between the surveyor and client; the end user can clearly identify any areas of concern such as low confidence service quality levels such as a B3 and B4. By being able to easily identify areas of concern appropriate measures can be put in place to both design out any associated risks and also manage them safely whilst on site.

SITE PROCESSES

All manhole and inspection covers and lids were lifted measured and documented, and connections between drainage manholes and surface features were confirmed using acoustic sound testing, EML Flexi trace and EML sonde techniques, which were subsequently documented through the creation of digital manhole and IC reports undertaken at the same time as they were opened, photographing and documenting service type, pipe sizes, materials, depth and in some cases condition.

Once all covers were lifted electromagnetic locating (EML) was used to locate the utilities that contained conductive properties. In line with the specifications of a PAS survey the position of the service was located every 2 metres and marked on the ground. The quality level associated with the location marked was determined by the accuracy of the information received; a good locate with a valid depth reading is marked as B2, any ok/poor locates with varying depth or no depth reading were marked as B3; anything where no signal or where a bad signal was received and the position or route has had to be assumed we marked as a B4.



3D Model PAS128 QL-B-M2 utility survey

The electromagnetic location survey process starts with locating the route of electrical and telecom cables. These are located first

as they prove to be the most conductive and often whilst locating pipelines the electrical current induced into them 'follows the path of least resistance' and jumps onto cables; therefore by locating these services first the location and depth provides a process of elimination and location check further down the line when locating any pipelines.

CHECKS FOR THE UNKNOWN

Once all known services have been located checks are made for any additional or unknown services by carrying out handbag or box sweeps in a grid format across the site to confirm the position of the known marked locations and utilities and to check for any unknown conductive utilities that may be present in the area. This process was followed by a passive sweep across the site through radio and power mode. Radio mode searches for natural airborne radio frequencies that travel through metallic objects within the ground; power mode works through scanning for a natural field generated when electricity travels through the cable (50Hz). If a potential target was located it was then induced with the transmitter in an attempt to locate the target to a logical end point or off site.

Once the electromagnetic locating (EML) was complete we used Ground Penetrating Radar (GPR) to scan the site. Using GPR we first scanned over the previously electromagnetically located site in

Test Trench Report Card

Client: Manor Circus, Richmond, Surrey
 Test Trench No: TT02 Surveyor: Damian Taylor Date: []

ASSET OWNER	TYPE	MATERIAL	SIZE	DEPTH	EASTINGS (X)	NORTHINGS (Y)	LEVEL (Z)	NOTES
Thames Water	Water	Cast Iron	150	0.25	518095.83	175663.55	10.77 TOP	Both pipes have protective coating so actual diameter may be smaller than measured.
Thames Water	Water	Cast Iron	250	0.20	518094.78	175662.77	10.82 TOP	

A typical Test Trench Report Card.

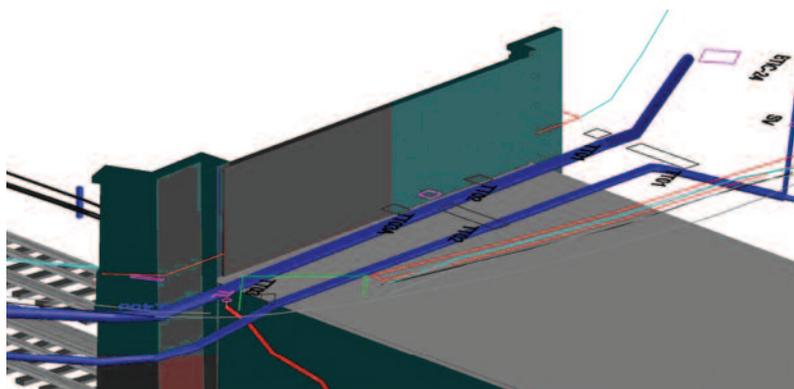
order to both confirm and calibrate the equipment, the site is then scanned in a 2-metre orthogonal grid format in order to locate any nonconductive utilities such as clay, concrete and plastic ducts/pipes and any additional unknowns that may be present. Again like the EML process, the quality of the information received allows application of appropriate quality levels: a good GPR imagery reflection that corresponds with a previous EML locate mark can be upgraded to a B1, a good reflection without any previous marks B2, a poor reflection B3.

All on-site markings were then surveyed to their true X, Y, Z position using a total station tied in to the onsite survey control. The utility information was then added to the existing topographical survey and model and delivered in 2D and 3D.

SERVICE VERIFICATION SURVEY

Following the issue of the QL-B Utility survey drawing, SVS returned to the site in conjunction with their civils team to carry out six slit trenches within the footpaths at either end of the rail underpass to expose all utilities that cross the underground structure. Three trenches at each end were excavated and services exposed, and once surveyed the previously issued quality levels upgraded to QL-A. Digital trench reports were also created detailing service types, material, size and condition along with photographs. The six trenches were successfully undertaken over a two-night period.

The previously issued QL-B drawing was then revised and trench information added and produced in AutoCAD 2D and 3D.



3D AutoCAD Model

RESOURCES AND EQUIPMENT UTILIZED

- Topographical PTS accredited surveyor 1 weekend shift
- Topographical surveyor 1 night
- Utility surveyors 1 night
- Civil crew and survey engineer 2 nights (QL-A)
- FARO Focus X 330 laser scanner
- Electromagnetic location equipment (RD8000)
- GPR (IDS Opera DUO) ground penetrating radar
- Total station (Leica TS15)
- GPS (Leica GSO8 GNSS)
- Traffic management was carried out by a sub-contractor.

Turning big data into big business

– Earth Observation offers opportunities for innovation

Professor Ian Dowman of University College London reports from an event that heard numerous examples of how Earth observation data is being used daily to inform decision making by policy makers, governments, insurers and security providers.

Engage is the latest in a series of conferences organised by DigitalGlobe, the company operating the Worldview constellation of satellites and providing services based on the data they capture. A key component of the business is the archive which goes back to 1999 and contains 90 petabytes of data.

The latest conference was billed as a two-way exchange between data supplier and user and had the theme of 'turning big data into big business'. EO data was just one of the data sources discussed. There

“... a growing application of Earth observation to serve the public good. . .”

was an emphasis on end-to-end systems involving data acquisition and geospatial analytics using machine learning and artificial intelligence, with many references to big data, the cloud, and crowd sourcing. The presentations showed that the range of disciplines using geospatial data is very wide, encompassing transport, crime, health, insurance, management of refugees and others, all with the theme of data for decision making.

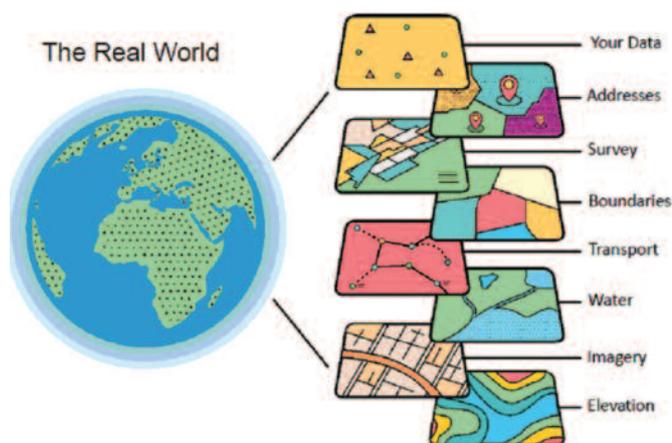


Figure 1: Opportunities lie in using multiple data sources and collaboration across disciplines to exploit the data and provide services.

The conference covered developments in Earth observation with the main trends being the development of small satellites operating in constellations. The principal company is Planet which operates a constellation of cubesats collecting images with around 3m resolution. Clear trends to come out from the speakers were the maturity of software with positional accuracy being high and DEMs being widely used.

MOVE TO GEOSPATIAL ANALYTICS

Companies like DigitalGlobe have moved from being data providers to being service providers, offering geospatial analytics which use artificial intelligence to provide information to users. DigitalGlobe puts great store on its archive of images that offers multiple coverage over time of almost the

whole globe. Within government organisations the European Sentinel satellites collect 8 terrabytes of data a day, which is used to generate products for the European Copernicus programme. The Copernicus services are aimed at policymakers and public authorities who need the information to develop environmental legislation and policies or to take critical decisions in the event of an emergency, such as a natural disaster or a humanitarian crisis. This reflects a growing application of Earth observation to serve the public good and includes job creation through new companies offering value added services.

The main user of EO data is the defence sector, but a number of interesting applications were discussed. The insurance industry is using geospatial data for risk

assessment, 3D data is becoming useful in order to know which floor of a tall building an asset is on or whether an object is on the sea or in the air. A presentation from the Bill and Melinda Gates Foundation showed how it is essential that location of settlements is known to ensure that Polio vaccination programmes, which need to cover everybody, can be complete, and also that access routes are well defined. The same presentation showed that settlements destroyed by Boko Haram should be identified so that teams do not waste time and take risks in visiting them.

Other applications include mapping the incidence of crime and identifying routes of refugees and people smugglers, georeferencing census data and bathymetry. Precision agriculture seems to be talked about more than implemented although one case study was presented for a vineyard.

In the conference a number of different data sources were discussed. HERE, a company which provides mapping for in-car navigation and which collects vast quantities of data each day from the vehicles using its systems. The telephone companies, which have a huge consumer base, offer connectivity; persistent data with location; and they can map movement and behaviour in real time. This can be used to map population density, the flow of people and vehicles, location and routes of users; all of which can be used to carry out risk profiling and dwell time. Telco companies are becoming data companies, but success depends on partnership: Earth observation and geomatics are necessary components.

KEY TRENDS

Other speakers discussed the use of imagery from drones and from terrestrial cameras. Stuart

Martin, CEO of the UK Satellite Applications Catapult proposed learning from nature, saying that we need to adapt to environment, evolve, build healthy partnerships and become resilient in diversity. He noted the key trends in geospatial data as being feature extraction, classification, 3D reconstruction, change detection and forecasting. He suggested that a future use would be artificial intelligence to control satellite operations, for example to find tankers, and cited the use of many types of geospatial data to detect illegal fishing.

An inspirational presentation came from Jeff Jonas, a data scientist, and former IBM Fellow, entitled 'Big Data. New Physics. And Geospatial Data Is Analytics Superfood'. He stressed the importance of context in order to interpret big data but defined the superfood as the 'when/where' provided by geospatial data, and this put together with telco data and satnav data could provide a very personal profile which would include routes and information on who you meet.

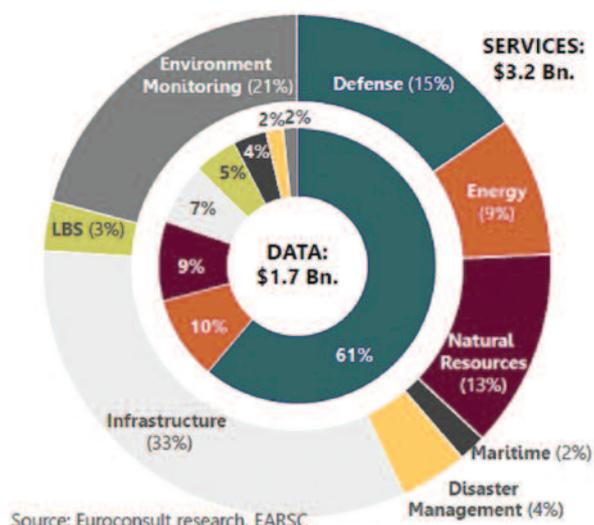
The message put over by most of the speakers was that there are vast amounts of geospatial data and that this is increasing, and that there is a demand for information for decision making, which could only be met by the use of artificial intelligence and collaboration through partnerships. Geomatics professionals are already familiar with this trend through BIM, but the additional ingredient which came from this meeting, is innovation.

BETTER DEMS FOR CLIMBERS AND SKIERS

Many of the presentations came from start-up companies, one of particular interest is FATMAP, a UK company set up to provide high-resolution DEMs of mountainous areas used by climbers and skiers. Finding that existing DEMs were

not good enough and could not be displayed adequately on handheld devices, FATMAP used the basic DEM data and computer gaming engines to display it. In order to access the necessary new data a partnership was established with DigitalGlobe using Software as a Service (SaaS) through the cloud.

Here is an example of entrepreneurship taking very basic geospatial data and techniques but using software and business models from outside of the geospatial industry. Maybe the big opportunities for geomatics could come from looking at how geospatial data can be used with other data and software for new and innovative applications, these could include aspects of virtual reality, augmented reality and BIM. Operating autonomous vehicles requires very accurate geospatial data and artificial intelligence is a key component of their software, so there are significant opportunities in this area. Funding for innovative projects using Earth observation is available through the UK Satellite Applications Catapult.



Source: Euroconsult research. EARSC
 Figure 2: The value added service market is expanding in many areas and offers opportunities for innovation.

Tackling time constraints: Tidal Thames challenge for Trimble

Providing a high quality service within tight time constraints is an on-going challenge for surveyors Greenhatch Group. Their survey teams value reliable performance from their instruments and regularly review how they can be more productive through the adoption of new technology.



Greenhatch was one of the first in the UK to invest in the Trimble SX10, a scanning total station combining high speed 3D laser scanning, high accuracy total station measurements and enhanced imaging.

On a current project, the forces of nature in the shape of the tidal River Thames meant a limited period of access for the Greenhatch surveyors, providing just the sort of challenging site conditions ideal for the multi-functional SX10.

A routine laser scan on a building alongside the river found brickwork on an abutting property was bowing. The leaseholder contacted Greenhatch to undertake monitoring annually over a five-year period. Whilst the leaseholder had proposed undertaking the work with a traditional approach,

Establishing control and scanning in one hit!

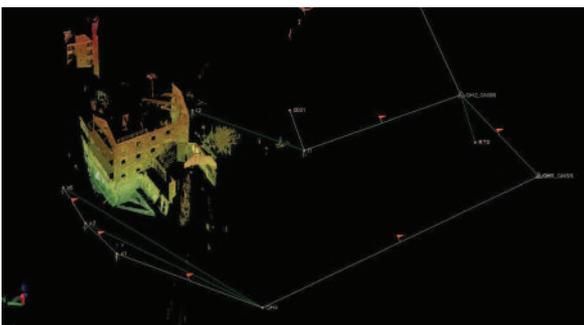
monitoring by total station was ruled out because there was, as yet, no indication as to where the targets should be placed. Greenhatch engineering manager **Jordan Knight** suggested a 3D laser scan as the best methodology with the initial scan used as base data. Work would have to be undertaken from the river's beach which presented new challenges. Access was by slippery steps and scan time on the beach was restricted by the tide so control had to be established outside the river's zone of influence. Jordan's solution was to use the SX10 in two key areas: establishing control and making best use of scan time on the beach.

Using the SX10, Jordan was able to establish external control from outside the zone of influence so that each time he returned to the site he can go directly to it, saving time as well as giving better accuracy and repeatability. Without the SX10 a separate scanner and total station would have been required, taking much longer and increasing the probability of errors.

Control stations were statically positioned using a Trimble R10 GNSS and would be used for gathering further monitoring observations on each return to the site. An added bonus was less equipment needed on the beach.

Laser scanners often capture significantly more data than needed. Jordan therefore scanned selectively to speed up the process. The SX10 is driven by Trimble's Access software on a tablet, which means no eyepiece for targeting. He could also draw a polygon over the tablet's live video feed enabling him to define the scan area and scan density. The tablet also gave him a clear visual of the scans captured so he did not need to go back to the office to register them and check that nothing was missed. Instead, whilst still on the beach, he was able to spot immediately that on the east side of the building more data was required due to a overhanging balcony obscuring brickwork behind.

Back at the office the registered scan was dragged and dropped into Trimble Business Center software where it was coordinated to an OS grid and Jordan drew the client's required contours to show the deviation and reflection on each accessible façade.



Scan data sitting on top of the site photography

Match-making at Ocean Business!

Ocean Business returned to Southampton between 4-6th April and Joost Boers was there for readers.

This year's Ocean Business marked the tenth anniversary of the event - and there was even birthday cake to celebrate. The trade show attracted more than 340 exhibitors and there were 180 hours of training and demonstrations in classrooms, in a test tank, on the water and on board of survey vessels. The sessions were well attended, often with standing room only. Dockside demonstrations also attracted many to the viewing area. These sessions were used to present new products and to explain their use. Product launches and updates were scheduled on many stands, including Teledyne CARIS HIPS and SIPS Essential, the Eelume snake-like AUV/ROV at the Kongsberg stand, and Planet Ocean launching the new ecoSUB Robotics micro AUVs. These launches were a good incentive to invite new and existing customers and provide updates!

MATCHMAKING

Host of the event, the National Oceanography Centre, also provided part of the lecture



Cake cutting to celebrate 10 years of Ocean Business.



On-water boat demos to see equipment and software in action.

programme. This brought science closer to the business and enabled the sharing of innovations and insights of the research performed at the centre. As a business event, in addition to traditional formats like the stands, lectures and workshops, the event hosted a match-making session, in which participants were encouraged to talk to each other during short discussions - and to find out if they could help one another. These sessions were also well attended and participants indicated that they had had interesting conversations.

MEETING UP

In a way, the most important aspect of Ocean Business is meeting



The matchmaking event brought businesses and professionals together.

people and talking with them. The traditional buzzing welcome party in the Pitcher & Piano bar was well attended - and it was a good place to see all the professionals again. The Wine Trail with no less than 24 stations proved to be another appreciated attraction that gave visitors an incentive to have a casual chat. The traditional Gala Dinner included entertainment and the presentation of the AMSI Business Person of the Year award, presented to Dr **Mike Osborne** (OceanWise).

So, is the breaking up of stands and going home the end of the event? No - that's when the real work starts! After the show, most exhibitors and visitors will have plenty of leads to follow up and ultimately, that is what will make participation a success.

For more information visit:
www.oceanbusiness.com

Joost Boers is Content Manager for Hydro International:
www.hydro-international.com/

From Afghanistan to Artificial Intelligence:

Humanitarian Information Management Innovations saves lives

With its powerful and evolving technologies, Geomatics and GIS are a force for humanitarian relief in disaster zones. Joel Myhre offers some reflections on his recent work with WHO and One Concern.

It is always surreal leaving Kabul, with Blackhawk helicopters clearing the tarmac as the Emirates flight climbs above the Koh-e Paghman, Koh-e Qrough and Koh-e Shirdarwaza Mountains. . . and 15 hours later to descend into the Lac Lemman valley and Geneva with Mont Blanc soaring above to the south.

Geography is an inspiring, often compelling, and decisive force from the Himalayas to the Alps, and the tools we humanitarian technologists impart to help save lives amidst these strikingly and austere environs have undergone a veritable revolution over the past decade. Here are some reflections on the ongoing geospatial and



Artificial Intelligence (AI) revolutions as they've evolved during my tenure at WHO during H1N1 (swine flu) and Ebola, with UNOSAT at CERN <https://unitar.org/unosat/>, and in Kabul with UN partners helping to ensure that refugees are welcome.

From the beginnings of Geomatics and GIS in the 1970s, to GPS and publicly available high-resolution satellite imagery in the 1990s,

to Social Media for Emergency Management (e.g. SMEM) and #Drones4Good in the mid 2000s, the recent convening of the #AlforGood Summit by the International Telecommunications Union and XPRIZ in Geneva, (<http://www.itu.int/en/ITU-T/AI/Pages/201706-default.aspx>), heralds the ongoing '10x Moonshot' growth of AI, Machine Learning (ML) and cloud-based 'Big Data' innovations that will revolutionize our daily lives and help the world strive to attain the UN's Sustainable Development Goals (SDGs) <http://www.sdgstories.com/en>

ONE CONCERN

In concert with the now-requisite public-private partnership ethos to bolster sustained innovation and stakeholder engagement at UNICEF Innovation (<https://www.unicef.org/innovation/>) and UN Global Pulse (<http://www.unglobalpulse.org>) in NY, One Concern Inc. has emerged from a collaboration

The holy grail of Humanitarian Response, Preparedness, Resiliency and Sustainability has always been the following 'What if's ..?

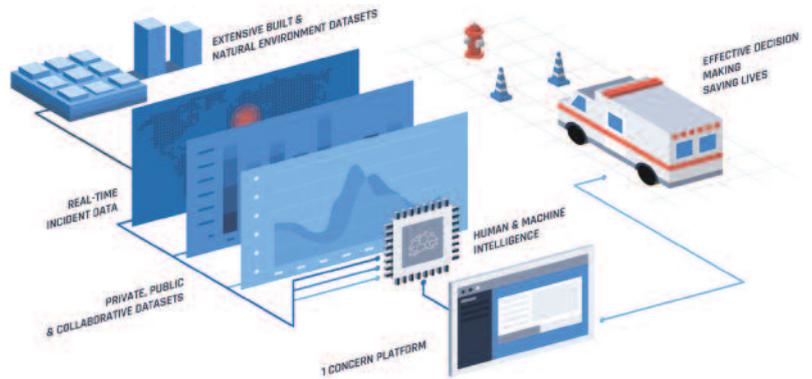
- What if we could 'shine the digital flashlight' of all-hazards, multi-jurisdictional situational awareness further down the preparedness path?
- What if EOC administrators, Public Health analysts, First Responders and International/NGO/UN partners could train together and simulate real-world response scenarios BEFORE they happen and accurately replay the events with digital After Action Reporting and Exercises?
- What if we could leverage a resilient global network of millions of cloud-based servers to have actionable Search & Rescue, EMS, Fire, etc. plans not in Days or Hours but in 15 Minutes?

...simply put, the power of #AIforGood brings 'What If' dreams into reality

The Holy Grail of humanitarian response.



History of Humanitarian Technology Disruption.



The data and technology workflow for rapid disaster relief.

between Stanford University seismic scientists Ahmad Wani, Tim Frank, and computer scientist Nicole Hu's collaboration with Professor Andrew Ng, the creator of the Google Brain AI (<http://www.andrewng.org>) and founder of Coursera.

Crafted via a singular 'one concern', i.e. to help save lives during rapid-

... our One Concern flood analytics platform is an important capability for the full-spectrum. . .

onset disasters such as the floods and earthquake events that Wani experienced in his native Kashmir, our team of Palo Alto-based data scientist and globally-recognized humanitarian responders, who have held strategic roles in managing the Fukushima nuclear emergency, Hurricane Sandy in New York, etc., are looking to answer the following 'What if' possibilities that have always seemed a mere chimera to first responders the world over.

LEVERAGING SERVERS

Moving beyond traditional 2D and 3D geomatics, which may offer powerful yet static and usually archival views of geospatial phenomena, the transfer learning employed via One Concern's AI and machine learning can not only capture important knowledge from experts during training exercises but literally leverage millions of cloud-

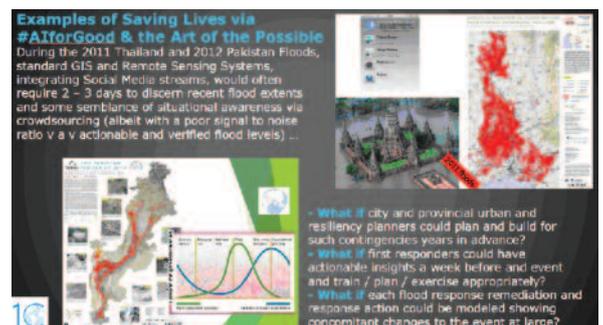
based Amazon servers – which also support our UN and NGO humanitarian colleagues (<https://aws.amazon.com/government-education/nonprofits/>) to analyze hundreds of thousands of data layers and trillions of individual building characteristics to help Urban Search & Rescue and other First Responders understand fragile

buildings and at-risk populations within minutes of an earthquake, and not hours or days later.

Cognizant that earthquakes are often high impact and low occurrence events in most geographies (<https://www.newscientist.com/article/mg22830412-800-earthquake-artificial-intelligence-knows-where-damage-is-worst/>), our One Concern flood analytics platform is an important capability for the full-spectrum of requirements from preparedness to response, and recovery to strategic planning for resilient cities on a warming planet. From Katrina in the US to the Pakistan and Thailand floods, One Concern's insightful technologies join in concert with the allied and compelling revolutions in smaller 'cube' satellites (<https://www.planet.com>), humanitarian #Drones4Good

(<http://werobotics.org>), and social media for emergency management (#SMEM). And note the partnership between the World Food Program, International Federation of the Red Cross and Facebook (<http://mashable.com/2017/06/07/facebook-disaster-maps-humanitarian-aid/>)

The logarithmic challenges of climate change, current unprecedented global refugee crises and ever increasing urbanization require that we have concomitant technological 'moonshots' and advances across the humanitarian response ecosystem to help ensure a healthy and sustainable future for all.



Examples of Saving Lives.

ABOUT THE AUTHOR

Joel Myhre is a humanitarian technology practitioner, RICS Member, and passionate disaster relief innovation advocate, helping to save lives via #AIforGood at One Concern Inc. (<http://www.oneconcern.com/aboutus>)



Tours, conferences and Secrets of the Mummies revealed!



John Brock is a Registered Surveyor in Australia and is a stalwart of FIG and its Permanent Institution for the Art and History of Surveying.

Dissecting six Egyptian mummies, talks and conferences, tours of historic homesteads and field days (well someone has to do it!)

The Topp Tour "On the Buses" saw us inspect some public transport then ride on an old double-decker to the edge of Sydney Harbour near the end of Gladesville Bridge. After viewing some nostalgic vehicles from UK and earlier years of Australia, we were beguiled in the Egyptian Room of the Masonic Temple at Petersham, a startling feature in an inner city suburb.

EGYPTOLOGY SYMPOSIUM

The aptly titled "Secrets of the Sands" symposium was held by the Australian Centre for Egyptology to coincide with the Egyptian Mummies exhibit at the Powerhouse Museum. Six mummies have been "dissected" using cat-scan techniques to uncover what lies under the wrappings of these ancient cadavers to reveal fascinating detail of their possible ages and causes of death along with amulets, bracelets and other jewellery adorning the deceased. With them are artefacts of the same areas and periods from which the individuals came. UK experts **Nigel** and **Helen Strudwick** joined with Macquarie legend Prof. **Naguib Kanawati** et al to bring to life many topics of the afterlife and highlight recent revelations rewriting ancient Egyptian history in a brilliant day of lectures.

EARLY SURVEYORS FEATURE IN TWO TALKS

Called upon by Brush Farm and Willoughby Historical Societies, I gave presentations on first NSW Surveyor-General **Augustus Alt** and Governor **Arthur Phillip** then **William Dawes**, our First Fleet Surveyor and Astronomer at their invitations.

TOUR OF HISTORIC HOMESTEADS 1822-30

We bussed past our oldest inland town Bathurst (1815) to Macquarie (built in 1822) on **William Lawson's** first land grant with adjacent convict barracks (maybe slightly older) and Westham (1830) now owned by yachting celebrity **Ian Keirnan** were much enhanced with guided tours of each by owner **Paul Hennesey**



The FIG Commission 4/5/6 Dinner (see opposite page) was held in the Zetor restaurant, named after a Czech!

and architect **Henry Biaslow** respectively. When it comes to rural estates these two rank among the oldest that far west of Sydney and are a credit to their owners for dedicating so much time and money to saving these treasures of heritage with no support financial or bureaucracy from the cretinous mobs of fools who steal rate money and land tax without any thought of the vast cost of historic restoration!

CSA EASTER CONFERENCE

Mixing with our rural surveyor brethren in town for their Easter Country Surveyors Association Conference in Sydney is also most enjoyable while catching up with the latest legislation reviews along with refresher talks on roads and easements. Their idea of a "Happy Hour" of drinks went for 2 hours so these are my type of numbers people.

FIELD DAY VS. SYDNEY SHOW

When it comes to country shows it is very hard to top the Field Day put on at Tocal Agricultural College. However I did venture to Sydney's equivalent exposé of rural achievement with my daughter Jaime during Easter. It does not matter where Australian country folk gather you are always guaranteed an honest display of quality produce and entertainment. Sydney's Show exhibited the wonderful rural produce for which it is renowned and there was fresh fruit to eat as well. Viewing six critically endangered colourful little birds, a red bellied black snake and greyhounds, which have been under siege from the dopey State government, was most enjoyable as well as appreciating the threat that humans are to all of our wildlife. We also got some bargain showbags with plenty of goodies in them.

FIG 2017 Helsinki: Land of the midnight fun!

Self-appointed chair of the FIG FUN Commission, John Brock reports on the highlights of this year's working week where he found just the right hotel and that the sun never sets on Finnish lager!

After paying the registration for two deserving Finn students, **Olga** and **Tommi**, I found the perfect accommodation for an Aussie at the 4-star Hotel Katajanokka, a former prison where the staff had black & white striped uniforms with the phone number across the front, while breakfast was off tin plates and cups in the basement solitary confinement block. Just the place for a colonial Irish convict far from home!

Before Finland I spent three nights in England studying the wall erected by Roman Emperor Hadrian from 122-136 to delineate the northernmost limit of the Empire. After researching this example of boundary demarcation my subsequent paper about this ancient edifice was chosen to be FIG Article of the Month for April 2017 (you can read it here: www.fig.net/resources/monthly_articles/2017/brock_april_2017.asp).

Next I flew to Belgium to view the wonderful Wright-Draper Collection of survey instrumentation at Ghent University. Head of School Prof. **Alain De Wulf** kindly showed off his newest acquisitions. Next stop was GEO Business 2017 for two days of a brilliant show along with the customary fellowship accorded a long distance traveller by my English compatriots ably led by editor **Stephen Booth**, Fenian brother **James Kavanagh** and fellow GW columnist **Malcolm**

Draper with whom dull moments are inconceivable.

SURVEYING HISTORY SYMPOSIUM

Arriving early Saturday morning in Helsinki my first assignment was to chair the full day Surveying History Symposium. We were privileged to have FIG vice president **Mikael Lilje** meet us after procuring several books by one of his fellow Swedes, **Anders Celsius** (a surveyor who worked on the Struve Arc) and 500 Years of Nordic Mapping. Our chairman **Jan De Graeve** officially opened our event with an audience of twenty eminent and eager participants. Our first presenter was Director General of the Survey of Finland **Arvo Kokkonen** enlightening us about the history of surveying in Finland then Jan talked of the Struve Arc with its possible extensions to and across Africa, which have been thwarted by lack of funds in the poorer nations. Monday saw the General Assembly (GA) where changes to the constitution and the venue for the 2021 Working Week were the main concerns. The final day saw a close vote chose Ghana over Poland for the 2021 Working Week. The Opening Ceremony was futuristic with 3D viewing and ending with a classic Sybelius recital with piano and cello.

TRACTORS AND NAKED WHAT, WHERE?

The Commission 4/5/6 Dinner was held at the '50's décor Restaurant

Zetor, which is the name of an old Czech tractor formerly used in Finland some examples of which stand within the premises. With a men's convenience lined with photos of naked women it was the first time that I have seen a long line for this facility! Just before The Gala Dinner some of us took part in the Charity Run/Walk around the picturesque Lake. The lavish event took place around Finlandia Hall, a masterpiece of famed Finnish architect **Alver Aalto** built in 1973.

My personal thanks to our superb hosts, the LOC led masterfully and cheerfully by Congress Director **Pekka Halme**, a man I proudly call my friend along with his great team of Finns including **Paavo, Martti, Heli** and **Kiirsikka**, who know how to put on an incredible show (Helsinki's 1990 FIG Congress is still mentioned as one of the best). Our unstoppable FIG Secretariat **Louise** and **Claudia** ably assisted by **Maria** and **Wu**, must be revered for such an amazing feat of organisation led by the Executive Committee of President **Chrissy Potsiou**, Prof. **Rudolf Staiger** and Dr **Diane Dumashie**.

Making friends with two members of the Ghana delegation, hosts for the 2021 working week.



DEMOCRATISING VR

NCtech has announced a 360° camera for mounting on any vehicle to capture and generate virtual street-level imagery. It has a 360 × 300 degree field of view and captures data at five frames per second to produce 60 Mpx spherical images and will be available towards the end of the year. Google is set to trial the new camera for Street View capture.

The company has also announced a second Street View compatible product, the VRC (Virtual Reality Camera) for 3D virtualisation of interiors, capturing 360° images and depth, allowing viewers to explore immersive VR. Their aim is to help democratise virtual reality by encouraging the capture of user generated 3D VR content. The VRC's Street View API compatibility will enable anyone to share their virtualised places on Street View.



NCTech StreetView camera

GALILEO BOOSTS TRIMBLE RTX

Trimble's RTX-based correction services now supports the Galileo constellation. As a true five-constellation technology using GPS, GLONASS, BeiDou, QZSS and Galileo satellites, Trimble RTX delivers improved real-time positioning performance to users who gain improved accuracy and reliability of corrections, improved positioning integrity, better performance in urban canyons and reduced multipath interference.

VEXCEL BACKPACK

Vexcel Imaging's new UltraCam Panther is a portable platform that

carries complementary sensors to capture full-spherical imagery and video, dense 3D LiDAR point clouds and precise trajectory information in both indoor and outdoor environments.

The system has 26 very high-resolution cameras for stills or video with a 360° field of view and a multi-beam rotating LiDAR sensor. A 'visual odometry' sensor offers custom-built software that delivers uninterrupted trajectory data in challenging environments where no GNSS signals are present.

POINTSENSE 18.0

FARO has a new version of its PointSense AEC-specific software for point cloud and as-built data processing. Included is seamless integration with the latest 2D and 3D design tools; compatibility with AutoCAD and Revit 2018; flexible data processing across various platforms and industry applications; intelligent feature extraction for scan to BIM and deformation analysis for construction QA/QC assessment. New USIBD integration in PointSense for Revit

provides AEC professionals with level of accuracy (LOA) standard analysis.

ONE-BUTTON IMAGE PROCESSING

Icaros Inc. has released version 5.0 of its OneButton Standard and Professional image processing software for UAVs. The release includes a new 2D and 3D map and model viewer; provision of both traditional and true orthomosaics; maintenance of original pixel values for multi-spectral and thermal analysis and creation of composite imagery for urban areas and tall structures.

GEORIVER AUTOMATES MODELLING

Storm Geomatics has further developed their GeoRiver river channel surveying software. With Version 5.0, to be released towards the end of the summer, modellers will be able to populate third-party data files with structure geometry, which can be read directly from the Environment Agency's EACSDv3.2 format. GeoRiver is a software partnership between Storm Geomatics and JBA Consulting.

IN BRIEF

Juniper Systems has announced that their Mesa 2Rugged Tablet now runs on the Android operating system.

Datamate says that its DatuSite suite - an aerial mapping and 3D modelling solution for field construction sites - will be offered at Datamate's online store.

Blue Marble has announced an update to the GeoCalc Geodetic Registry, the online coordinate geometry repository. Version 2.0 introduces a mobile friendly interface along with more flexible login requirements, and a new Getting Started Guide.

Aeroscout has introduced its Scout B-330 UAV helicopter with a payload capacity of 50kg. It has at least three hours flight endurance and the capability to fly up to 3,000m.

Hasselblad has introduced a 100 MPx aerial camera system. The A6D includes a feature that allows up to eight cameras to be synchronized within 20 µs. Nine H System lenses are available in aerial versions with secure locking mounts to minimize vibration and flexing.

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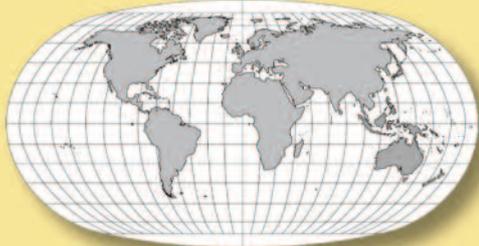
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