

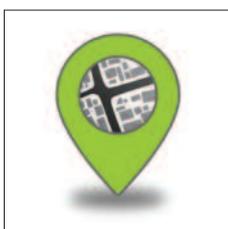
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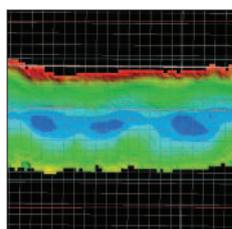
Surveying for geographical and spatial information in the 21st century

Land registration, hydrography and more

Privatising the Land Registry. Is it really a good idea?



Canal & River Trust gets a new custom survey system



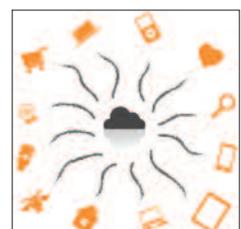
How are the navigation satellites performing?



Adapting to change: do we need one Institution?



The Internet of Things is coming for surveying



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Innovative and superior features

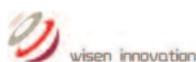
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COVER STORY

Surveying Britain's 2000 miles of inland waterways is specialised work. Surveyors **Kate Rowlatt** and **John Williams** report on how a custom system is improving Canal & River Trust's data collection - full story page 18.

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With new proposals to create a private company for land registration in Britain, former chief land registrar **John Manthorpe** explains why this is not a very good idea.
- p.16 The Internet of Things is coming**
Richard Groom reports from a conference on a hot-button topic which is predicted to be disruptive rather than evolutionary. But are the standards there?
- p.18 The challenge of shallow water hydrography**
Using a new custom system with the latest compact multi-beam sonar and INS, Canal & River Trust is now getting much better results.
- p.20 Adapting to change for the professions**
Two recent reports on the future of the geospatial professions ask us to adapt to change, so do we now need just one Institution, asks **Richard Groom**.
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As we move to Level 2 BIM our QS colleagues are at last engaging with this transformative technology. Prof **Ian Dowman** reports from RICS BIM 2016.
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As we know, they do some things differently in Europe. German chartered surveyor **Julia Stolle**, who practices in the UK, explains the intricacies of the German cadastral system.
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Are you registered for your FREE copy?

Engineering surveying showcase 2016 ISSUE ONE

Issue No 1 of *Showcase* for 2016 was published on 25 April. RICS members in the UK are entitled to receive a FREE copy upon registration or request. Just drop us an email with your full postal address and we'll pop a copy in the post to you.

If you missed *Showcase No 2* for 2015 you can view the digital edition by following the link below.

Overseas readers can still view the latest issue by going to:
<http://www.pvpubs.com/DigitalEdition/Showcase>



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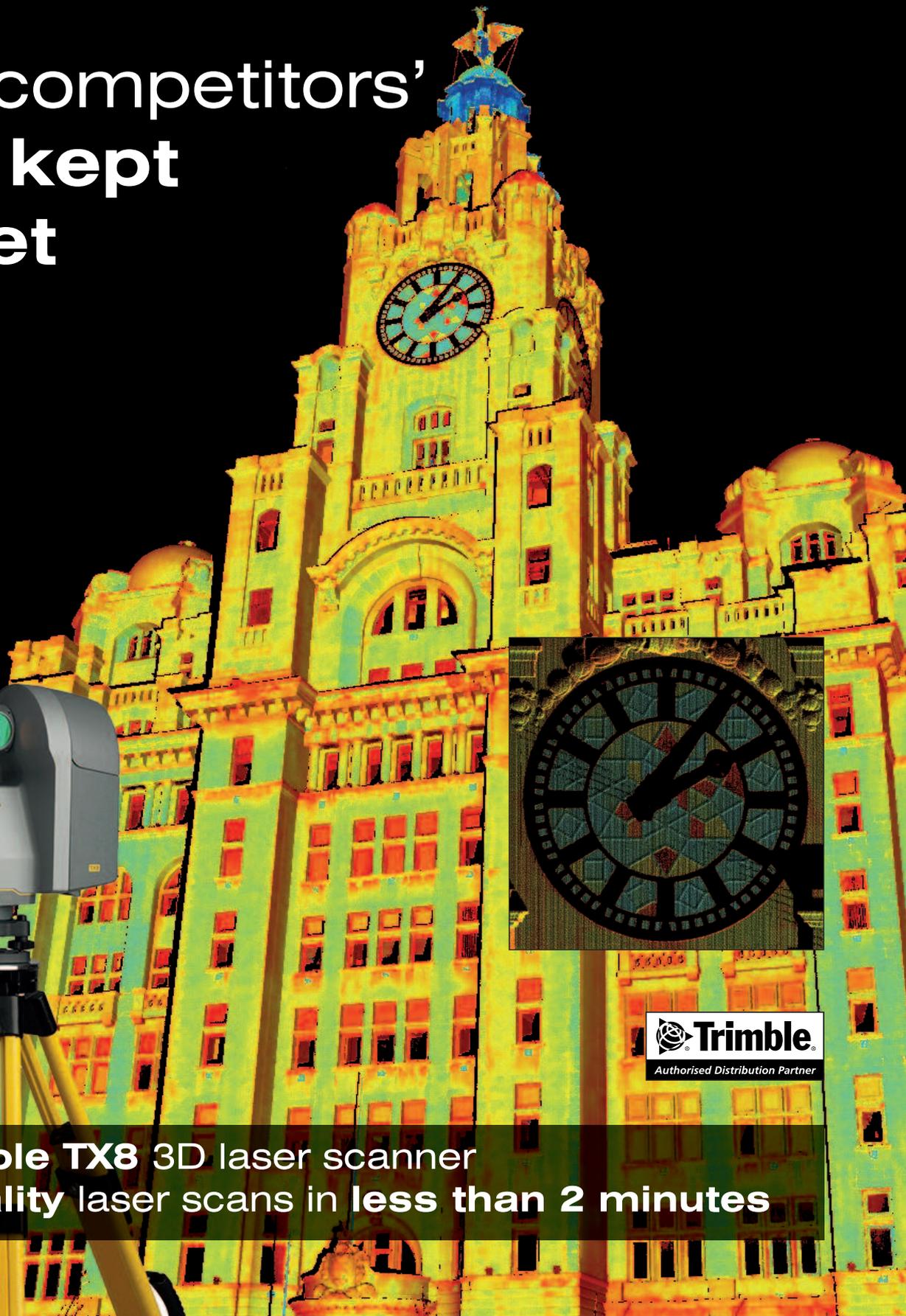
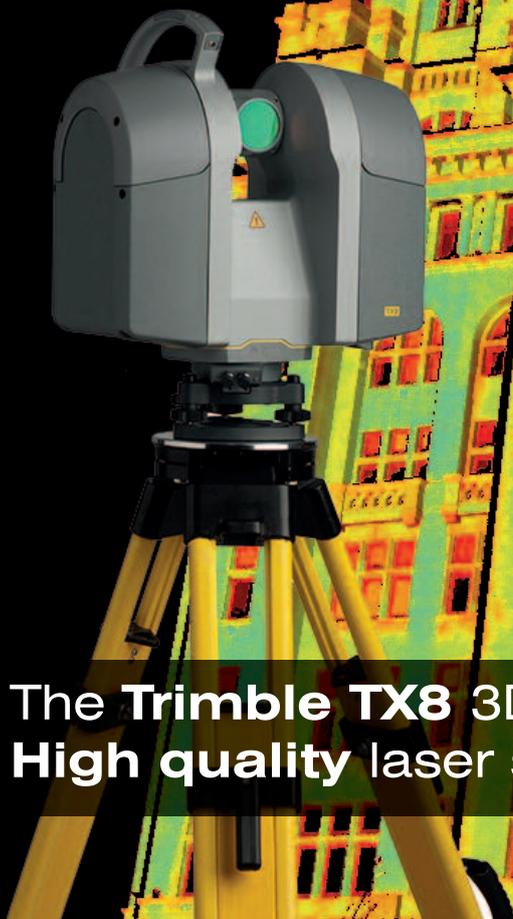
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IN THE NEXT ISSUE of GW...

**GEO Business 2016 conference report
Land registration around the world
plus LiDAR, Smart Cities, Mobile Mapping and more**

Copy dates for May/June 2016: Editorial: **13 June** Advertising: **21 June**

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Overwhelmingly rejected but they press on

Proposals to privatise the Land Registry take centre stage whilst we also examine the latest inshore hydrographic technology, the Internet of Things, BIM and someone thinks 'the times they are a changing'; are we ready?

Two topics are to the fore in this issue: land registration and hydrography. For the latter we have an excellent article (page 18) on successor to British Waterways, the Canal & River Trust's new survey vessel equipped with a custom system based around the latest compact multi-beam sonar and integrated inertial navigation system. The new vessel and its sensors are improving data quality, reducing 'ping to chart' time and providing both more accurate and clearer results in environments that are often extremely challenging.

We also report (page 17) on Oceanology International, the offshore exhibition and conference. Whilst technology continues to advance, especially in the application of photogrammetry and laser scanning, the industry is facing tough trading conditions following the collapse of crude oil prices. Expect some good hydrographers with outstanding data analysis and modelling skills to be heading back to shore and looking for land surveying opportunities.

An act of considerable folly

The fair and just application of both land registration and the rule of law through a politically independent judiciary have been demonstrated as being essential to a modern economy and a stable democracy. Unsurprisingly, around the world both activities are overseen and regulated by government through state-run institutions and organisations, while leaving significant aspects of day-to-day application to competition between professionals. Behind both disciplines there is a bedrock of accepted practice and case law guaranteed by the state.

In Britain the Land Registry has been recording the ownership of land and property in England and Wales since 1862. It doesn't cost taxpayers a penny and has returned money to the Treasury in 19 of the last 20 years. A review in 2001 found that 'privatisation should be firmly rejected' and would be 'an act of considerable folly'. A consultation less than two years ago by the Coalition Government to create a service delivery company was rejected by 91% of respondents with 89% stating they 'would not be comfortable with non-civil servants processing land registration information.' Despite this, it is puzzling that the Government has brought forth new proposals for privatisation.

You can read former chief land registrar **John Manthorpe's** article on why the Land Registry should not be privatised page 26. He has also submitted a formal response to the Government's latest proposals and I quote:

"It makes no sense that one private company (NewCo) would be adjudicating, and granting title, on the land rights of other private companies as transactions take place. It makes no sense that a private company (NewCo) would have the power to adjudicate on the property rights of local and central government, other public authorities, lenders, financial and other Institutions and even the Crown... The proposal does not stand up to any reasoned scrutiny."

You can read the full text of John's response on our website, www.location-source.com In addition I am pleased to include **Julia Stolle's** article comparing land registration practice in Germany with the UK. I hope to bring readers examples of other practice from around the world in the next issue of *GW*.

... and there's more!

We also have articles on the Internet of Things (now abbreviated to IoT) on page 16; a report on the RICS 2016 BIM conference by Prof **Ian Dowman**; and **Richard Groom** has been pondering the future of surveying professionals and finding that there is a lack of professional expertise amongst those who procure survey work around the suitability of those who contract to collect geospatial data. Is Richard's solution the right one? Turn to page 20 to learn more.

We also publish a short article on the state of the satellite navigation constellations which was originally planned for *Engineering Surveying Showcase* but was held over due to shortage of space. If you would like a copy of *Showcase 2016 issue No 1* (the second will be in the autumn) please turn to page 3 for details.

Lastly, I look forward to meeting as many readers as possible at GEO Business; full details on page 35.

Stephen Booth, Editor

The editor welcomes your comments and editorial contributions by e-mail: editor@pvpubs.demon.co.uk or by post:
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Strategic partnership



Dr Christoph Eck, Aeroscout CEO, with an Aeroscout UAV

Laser scanner manufacturer Riegl and Aeroscout, a spin-off from the Swiss Federal Institute of Technology specialising in UAV-based mapping, have entered into a strategic partnership based upon Riegl's shareholding in the company. Both companies expect to benefit by exchanging technology to develop advanced UAV platforms with integrated LiDAR solutions. The partnership reinforces long-term co-operation between the two companies.

Standard for coordinate reference systems

Following **Roger Lott's** article in the last issue of *GW* on Discrete Global Grid Systems (March/April, page 26) the Open Geospatial Consortium is requesting comments on the draft charter for an OGC Coordinate Reference System (CRS) Standards Working Group. The aim of the working group is to revise Abstract Specification Topic 2 - Spatial Referencing by Coordinates to the state of an adopted OGC standard and an identical ISO International standard. This will be achieved by processing comments received during the public comment period and ensuring that the standard is consistent with OGC business plans.

This revision will accommodate advances in modern geodesy, to include the definition of CRSs having a "dynamic datum" - to compensate coordinate changes with time due to tectonic activity, as well as enhanced capabilities for derived CRS definitions (such as a vertical CRS defined through a geoid model). The work will also correct some minor errors. The technical content of OGC Abstract

Specification Topic 2 and ISO 19111:2007 are currently identical. In the interests of interoperability ISO and OGC standards need to remain aligned. The work will be conducted jointly with ISO Technical Committee 211. The draft charter is available for review at portal.opengeospatial.org/files/68188

Hexagon acquires SigmaSpace

Hexagon has acquired SigmaSpace Corporation. Headquartered near Washington, DC with approximately 110 employees, SigmaSpace offers a unique LiDAR technology - Single Photon LiDAR (SPL) - which enables 3D data collection at much higher speeds and resolution than conventional systems. This technology operates in night and day conditions and is able to penetrate semi-porous targets such as vegetation, tree canopies, ground fog, and clouds.

OS takes on Smart Cities

Ordnance Survey is to create a Smart City standards-based technologies business framework for the European Union's ESPRESSO project.

ESPRESSO is being led by the Open Geospatial Consortium (OGC) and OS, working closely with key European bodies, to develop a strategic growth map for Smart Cities.

Supported by PricewaterhouseCoopers, OS will also conduct analysis of existing and emerging economic, financial (including crowd-funding) and procurement models. OS is aiming to gather expert information and advice from commercial organisations and public sector bodies across the globe, and so is appealing to them to input into this framework and become key influencers in determining pan-global standards.

Digimap reaches milestone

The Digimap for Schools service has reached a new milestone with 1,000 secondary schools now signed up. This represents a quarter of schools in England and half the schools in Scotland. It gives hundreds of thousands of pupils across Great Britain access to the latest Ordnance Survey digital data, including OS MasterMap.

In addition to the 1,000 secondary schools, over 1450 primary schools are also signed up to the service. Launched in 2010, the annual subscription costs just £69 for a primary school and up to £144 for a secondary school. Once signed up to the service, pupils and teachers can create, save and print maps at A4 and A3 size. More at: digimap.edina.ac.uk

Bluesky supports Kenya Biosphere

Bluesky is aiding the expansion of the Malindi-Watamu Biosphere Reserve, 100 km north of Mombasa in Kenya. Working with Cranfield University, the UK-based aerial survey specialist will provide financial and technical support for the project that will use aerial photography, satellite imagery and 3D height models, to improve water resource management. The project supports reforestation and sustainable agriculture with a long-term integrated catchment management approach that can be used in other regions.

Drones in the warehouse

Research project InventAIRy is a collaboration between UAV manufacturer Aibotix and Fraunhofer IML, Dortmund, which aims to use drones for warehouse inventory. The first results of the project were presented at CeBIT 2016 in Hanover. Storage boxes provided with RFID chips were built in five areas and scanned using a research version of the industrial drone Aibot X6. The generated information was visualised on a web-based solution. The special challenges lie in the exact positioning of the flight robot, autonomous flight planning and the identification of storage objects. Optical sensors help to identify objects or barcodes. Wireless sensor technologies such as RFID allow the system to identify objects in a batch.

Ben Nevis gains a metre

The BBC website has reported that observations with GNSS have resulted in a 1m increase in the height of Ben Nevis, as shown on OS maps, 1,345m. Following recent restoration of a cairn at the summit, the OS observed the height at 1,344.527m. This was probably only a few centimetres different from the previous observation made in 1949, but it meant the surveyors found themselves having to round the height up rather than down.

Fins buy Topcon GNSS

Topcon is to supply 400 HiPer SR network GNSS receivers to Maanmittauslaitos, the National Land Survey of Finland (NLS). Maanmittauslaitos will be using their receivers to carry out field-based operations connecting to and receiving RTK data from the national network GNSS system and using Topcon's MAGNET field data collection software for seamless field-to-office data interaction. The decision to buy Topcon was made following price and quality evaluation.

Mapping the underground

Building Research Establishment (BRE), in partnership with the Mayor of London, launched a competition in March to give entrepreneurs the opportunity to

submit innovative ideas for surveying and mapping of underground utilities and pitch them directly to organisations involved in providing key infrastructure across the capital, including UK Power Networks, National Grid and Thames Water. The organisations are members of the Smart London Infrastructure Network, created by the Smart London Board in collaboration with the London Infrastructure Delivery Board with the aim of supporting the Mayor of London's vision for 'smart city' innovation. The deadline for submissions has already passed but for more visit: www.bre.co.uk/news/Call-for-Tech-entrepreneurs-to-help-the-capitals-major-infrastructure-providers-map-their-underground-assets--1148.html

CAD trends

Business Advantage has published its annual report on CAD trends. It covers 15 trends - including 3D modelling, 2D drafting, Building Information Modeling (BIM), Cloud Based CAD, Simulation, 3D Printing, PLM, Mobile Access to CAD and Augmented/Virtual Reality. These topics and more are ranked by awareness, importance, current and intended adoption to reveal their trends and growth potential, including comparison to the results of the previous year's survey. Visit: www.business-advantage.com/CAD-Trends-Results-2016.php

PSMA breaks 4000

A record 4,000 public sector organisations have now registered for the Public Sector Mapping Agreement (PSMA), including 150 central government customers, over 400 local government users, nearly 250 NHS organisations, over 100 emergency service customers and in excess of 3,000 local councils. The 4,000th member to sign up to the PSMA was Transport Focus, the independent passenger and road user watchdog.

Innovate UK supports autonomy

A consortium of leading UK businesses has secured funding from Innovate UK to examine the data requirements needed to

support autonomous navigation. The Atlas initiative will study data critical to the efficient operation of autonomous vehicles and how it can be enhanced. The Consortium comprises Ordnance Survey, Satellite Applications Catapult, the Transport Research Laboratory (TRL), Sony Europe Ltd, two leading UK specialist SMEs in autonomous and navigation systems: GOBOTIX and OXTS and the Royal Borough of Greenwich.

OS on Mars

Using NASA open data, Ordnance Survey has created a one-off paper and digital map of the Martian landscape to see if Ordnance Survey mapping has potential use for future Mars missions.

David Henderson, OS director of products, explains: "We were asked to map an area of Mars in an OS style because our maps are easy to understand and present a compelling visualisation, and because of this we can envisage their usefulness in planning missions and for presenting information about missions to the public." The new map covers a 3672 x 2721km extent of the planet's surface and has been produced to a scale of 1 to 4 million.

Bloody date for laser scanners

In forensic science, knowing the point of origin of bloodstains can help to determine the sequence of events in a violent crime. FARO has been deployed in academic research aimed at discerning the accuracy of impact bloodstain patterns on the walls, floors and other surfaces in crime scenes. In laboratory conditions, researchers at the University of Toronto Mississauga used a FARO Focus3D Laser Scanner, FARO Scene software and FARO's Forensic Plugin to assess 30 impact patterns.

Survey4BIM Call to Action

All are welcome to lunchtime sessions at GEO Business (24 & 25 May Business Design Centre, Islington, London) on both days 13:15 to 14:15. Survey4BIM is a survey industry effort to engage with the BIM community to ensure

Measuring forests in Gabon



NASA reports that a package of its airborne instruments together with scientists on the ground joined colleagues from space agencies in Gabon and Europe for a comprehensive survey of carbon storage in Gabon's dense tropical forests. The data will help prepare and calibrate four current and upcoming space-borne missions for NASA, ESA and DLR that aim to, among other goals, better gauge the role of forests in Earth's carbon cycle. Visit: www.nasa.gov/feature/goddard/2016/nasa-partner-space-agencies-measure-forests-in-gabon

that geospatial matters and issues are recognised and solved by the people best equipped to do so.

IN BRIEF

Technics has expanded its business by opening an office in Doncaster as Cardno global infrastructure and environmental services closes its UK surveying company in the region. The Doncaster office will increase

Technics' annual turnover by 20% while giving the company a presence in the north adding to its existing offices in Guildford, Maidstone and Nottingham.

Following a near £1 million investment in new equipment such as robotic total stations, GPS and machine control A-Plant has opened a Survey Hire Express centre in Paisley, Scotland. Just five minutes from Glasgow Airport, the M8

EVENTS CALENDAR 2016

• SEMINARS • CONFERENCES • EXHIBITIONS • COURSES • WORKSHOPS

GW welcomes advance details of events of interest to the Geomatics community. Details to: editor@pvpubs.demon.co.uk

Esri UK annual conference
17th May, QEII Conference Centre
www.esriuk.com/events/

ISPRS Congress
12-19th July, Prague
www.isprs2016-prague.com/

Geospatial World Forum
23-26th May, Rotterdam,
The Netherlands.
www.geospatialworldforum.org/

12d International Conference
24-26th July, Brisbane, Australia
www.12d.com

GEO Business
24-25th May, Business Design Centre,
Islington, London.
www.geobusinessshow.com

GeoDATA Showcase 2016 Scotland
6th October, Edinburgh, Scotland
www.geoaware.info/#!geodata-seminars/c23xn

InterGEO 2016
11-13th October, Hamburg
www.intergeo.de

European Space Solutions
30th May-3rd June, The Hague,
The Netherlands
www.gsa.europa.eu/

GeoDATA 2016 Brussels
19th October, Brussels, Belgium
www.geoaware.info/

HxGN Live
13-16th June, Anaheim California
<http://hxgnlive.com/>

GSDI Conference
28th November - 2nd December,
Taipei, <http://gsdiassociation.org/>

Show order for ASV



The Oceanology International event brought good news for Ohmex and their new HyDrone ASV (Autonomous Surface Vessel). The tiny autonomous vessel has an integrated mission control box and was demonstrated live at the show with Ohmex's larger Echoboat, designed for oceanographic applications. Visiting the show, Muneer Hassan, sales manager of UK Leica distributor SCCS, commented that their existing rental HyDrone "had been busy since its purchase in January" so he placed a forward order at the booth for their second HyDrone ASV due for delivery in May this year.

and a corner kick away from St Mirren FC, the centre will serve Scotland with the latest survey instruments. Hi-tech servicing and calibration will be under manager Stephen Noble.

The Open Geospatial Consortium

(OGC) has announced the recent successful completion of the OGC Incident Management Information Sharing Internet of Things Pilot Project (IMIS IoT Pilot) which demonstrates open system sensor integration for emergency and disaster response.

The Joint 3D Athens Conference 2016 is to be held in that city in October 2016. The conference includes the 11th International 3D Geoinfo Conference (20-21 October 2016) and the 5th International FIG 3D Cadastre Workshop (18-20 October 2016). Calls for papers have been issued for both events with closing dates of May 20th and May 15th. Visit: <http://3dathens2016.gr/site/>

PEOPLE

New chair for UKGeoForum

Alistair Maclean, founder of the specialist geo-focused marketing agency, Quarry One Eleven was recently selected to be the chairman of the UKGeoForum. Maclean takes over from Eric Zeevan of Canary Wharf Group plc. UKGeoForum is an umbrella organisation for societies and associations that represent hundreds of thousands of professionals, academics and students of geography, mapping and geospatial information. Visit www.ukgeoforum.org.uk

what3words lands Coast

Steve Coast, the founder of OpenStreetMap has joined

what3words as chief evangelist. Coast will help to strengthen existing relationships and explore new routes for partnerships in North America.

Förstner wins award

The International Society for Photogrammetry and Remote Sensing (ISPRS) has awarded Prof. Wolfgang Förstner of Bonn University the 2016 Brock Gold Medal Award for his outstanding scientific achievements in the fields of photogrammetry and computer vision. Professor Förstner is an international leading expert in photogrammetry, computer vision, pattern recognition and machine learning. Throughout his exemplary career of nearly 40 years as a researcher, inventor, innovator and educator, he has made exceptionally significant scientific contributions in many areas of Information from Imagery and mentored generations of mapping scientists and engineers.

Ruth Adams moves on

Ruth Adams has left the UKHO after 24 years of service, under a voluntary early release scheme. She reports that her plans are to revert to her surveying roots and undertaking chartered surveying work from April onwards. She can be contacted via LinkedIn.

John Ratcliffe 10th June 1962 – 4th March 2016

Many readers and members of the surveying community will be saddened to learn of the far too early death of John Ratcliffe after a brave battle with cancer.

John graduated in civil engineering from the University of Nottingham and was a corporate member of RICS and was part of the last generation for whom a land surveying career was often a passport to travel the world. He was well known in the industry and was renowned for his attention to detail. Anyone who had the pleasure of working with him would no doubt have learned much from his meticulous approach to a survey.

He started his career in the Middle East, working for Huntings in Qatar, then Longdin & Browning in Bahrain and Kuwait before five years working directly for the Ministry of Housing in Bahrain. After returning to the UK he worked freelance for a number of years before joining Michael Gallie & Partners. He left for awhile but returned after spending six years at Mason Surveys Ltd. In more recent years he worked with 3Sixtymeasurement for five years and finally UTEC.

John had extensive experience in all aspects of Land and Measured Building surveying for projects within the public and private sectors and provided numerous surveys for government, educational and financial institutions, as well as a broad range

of commercial clients including architects, engineers, developers and other professional consultants.

In addition, he also undertook surveys for London Underground Ltd and managed survey work for BAA at both Gatwick and Heathrow. He also surveyed No 10 Downing Street.

Pat Collins recalls John as a great field surveyor. "I think it's fair to say he was really only happy when out in the field on a survey instrument rather than stuck behind a desk. Deeply competitive, he always took a ribbing for his subsequent excel spreadsheet analysis of office days at the go-kart track. This was to prove he was actually the more skilful driver, rather than the less graceful hit-and-run tactics normally employed by the podium winners".

Roland Thompson comments, "Outside of work, John was a keen sportsman who loved and played Cricket. He was also a season ticket holder at Brentford Football Club. Having known John for over 20 years I can safely say he will be missed by all who knew him."

Our thanks to Roland Thompson and Patrick Collins for helping compile this obituary.





Surveyors are identified with the acquisition and measurement of data. But what about its management and curation? We have the opportunities today to influence and engage with our futures. So more of us need to do it, argues **Gordon Johnston**, Chair of RICS's Geomatics Professional Group.

“The UK's Land Registry... is coming under scrutiny again as an assessment is made of its value as part of the government's strategic austerity and expenditure review.”

Gordon Johnston welcomes your comments and thoughts so please email to the following address geochair.rics@gmail.com

What's in a name?

The UK's latest £200m Antarctic scientific research ship, soon to be commissioned, has received many suggestions for names in a public poll. The winning submission will likely not be used as according to the UK government “it fails to reflect the science and endeavour” that the research vessel is meant to be engaged on. Personally the RRS “Aunt Arcica” and the RRS “Usain Boat” were my favourites though also not likely to be accepted.

What about data storage?

So what's in a name? Geomatics is the word that encompasses the concept of the measurement and traditional surveying of our land and seas together with the representation of spatial data through new information systems and visualization technologies. The term from the late 1980s predicted that spatial information would become important and of great value to a great many users and consumers of the data. The information was to be made available via what was then the relatively new technology of GIS.

For many generations surveyors and other members of geomatics groups have been identified with the acquisition, measurement and collection of data; but far less so in respect of the data storage, access and management. On the tightrope of data gravity, the weight of data is shifting away from the data collection end towards data management. Those alert to this have already embraced the challenge and an initiative such as Survey4BIM can act as a vehicle for significant change. Thus it is encouraging to see the wider community recognising the importance of our data.

The *Journal of Map and Geography Libraries* has just completed a short series dedicated to the theme of geospatial data, its management, curation and preservation. Let's hope that our data remains relevant, accessible and contributes to the development of new techniques creating a better understanding of our geospatial future through applications, media and the internet. These concepts get an airing elsewhere in this magazine.

The opportunity to influence

Recent trade and industry events I have attended have re-enforced my view that it's important to contribute in whatever way you can to develop and benefit from our profession. Ours is an ever-changing world and it requires many voices and ideas to develop change that is beneficial to the majority. Not all of us can take the time to write an article, present at a conference or post themed tweets to generate a vast number of

impressions. However there are various opportunities to influence and to be better engaged such as posting comments, questions and ideas on the RICS LinkedIn page.

The RICS, as an international organization, offers each of us an opportunity to engage and influence our futures on a personal level and on a wider more universal level through its standing at the international level. The FIG Working Week (the 2-6th May) is a prime example of our engagement, contribution and influence on surveying policy at the global level.

Policy makers nowadays usually consult with stakeholders on matters of importance and this can often include the public too. Concerns over the delays such a process represents may be valid when we compare the rate of infrastructure development in different countries. The UK's Land Registry, also the subject of an article elsewhere this month, is coming under scrutiny again as an assessment is made of its value as part of the government's strategic austerity and expenditure review. Let's hope the broader picture is maintained and it may be of interest to stakeholders that various nations are actively assessing how best to develop their land management, or cadastre, for coastal seas and marine areas as these areas become more important for our security of food, transport and represent limits of sovereignty. Managing our areas on land or sea requires data and as an asset the data must also be managed, or did I mention that? Perhaps a public poll on the title (pun intended!) of the Land Registry will be required if it were to also manage our sea and ocean areas.

Finally, spare a thought for the London Marathon runner from Israel who was last to start. He followed his computer-based directions which mapped his route to the finish line instead of the start on Blackheath. He had to re-plan his route and dash across London to the start.

CHANGE OF ADDRESS?

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A great exhibition not to be missed by old rockers!

by Malcolm Draper, Rentalength

A filthy mess of burnt and stained lino attracts our columnist at a popular exhibition, we mark the passage of a great Briton and hark back to an age when time was for sale.

Well, it's been a busy couple of months since this column last appeared. I have become a grandfather and so have been rather pre-occupied from the usual social and business whirl. Nevertheless, one of the things *Undercurrents* always tries to do is report on one or two really interesting events. We also have to report the passing of a very great Briton (well Scot actually). More on that anon.

First, have you seen the Rolling Stones Exhibitionism display at the Saatchi Gallery? The building alone is worth a visit. Located off The Kings Road and a short step from Sloane Square Underground, the gallery is a converted barracks completed originally in 1802 for the Duke of York's Regiment. It's a brilliant conversion and set in a smart area with green space, shops and restaurants. London does seem exceptionally clever and imaginative at turning its heritage buildings into useful facilities for the 21st century.

Today, the building is the venue for some fantastic exhibitions and none more so than that celebrating half a century or more of the Stones as one of the world's greatest rock bands. There are galleries devoted to their guitars, films, videos, posters, clothes, recording studios and even models of their incredible concert sets. But what I really liked and made me feel totally at home was a

gallery containing a highly authentic reproduction of the interior of their flat in West London where they lived in the early 1960s. It's so good, right down to a stack of dirty plates, grubby sauce bottles and an absolutely filthy mess of burnt and stained lino around the cooker in the kitchen! Brilliant. Takes me right back.

Underwear uncovered

And talking of brilliant events I must try and get to the Victoria & Albert Museum's fascinating exhibition entitled, "Uncovering the history of pants", a whole exhibition about underwear. The curator says "more than any other clothing, underwear is a mix of the alluring and the utterly practical". Now take a look at the last item in our little examples of lexicophilia.

We shall not see them again

Undercurrents was very saddened to learn of the death of **John Ratcliffe**, a really good top-notch surveyor and all round nice bloke. You can read his obituary on page 08.

We were also sad to hear of the death of **Eric 'Winkle' Brown**, the remarkable RAF pilot who flew more types of aircraft than anyone else in the world (487) as well as, during his Fleet Air Arm days, holding a world record for successful landings on aircraft carriers (2271). You can read much more about this amazing Brit online and in *GW* July/August 2014.



Above: the fabulous Saatchi Gallery, formerly the headquarters of the Duke of York's Regiment.

Left: I couldn't resist being snapped next to the iconic Rolling Stones tongue logo.

Time for sale

Dr **Arthur Allan** writes with news of a fascinating lecture he attended given by **David Rooley** on **Ruth Belville**, known as the Greenwich Time Lady. In the days before radio, the speaking clock or those GPS satellites with their nano-second accurate Caesium clocks, **John Henry Belville** ran a service that involved him visiting Greenwich Observatory each day, correcting his pocket watch and delivering the correct time to subscribers to his service. The family carried on the business after his death until 1940 with **Ruth Belville** at the age of 86 still journeying about twelve miles from her home each day to attend at the Observatory by 9 a.m. She died aged 89. What an extraordinary tale. I hope we get Mr Rooney to lecture at the RGS.

Controversy

Half of London is working itself up into a fine old froth about a highly controversial issue, splitting friends and families alike. No it's not the EU referendum (the 'neverendum' as someone called it) but the proposed Garden Bridge over the Thames. A letter in *The Guardian* newspaper from **Michael Wolff** who describes himself as "Royal designer for industry; Fellow of the Royal Society of Arts", beautifully re-creates how he might have written to a newspaper in 1673 when Sir Christopher Wren was proposing a new design for St Paul's Cathedral. We quote:

"I'm writing to object in the strongest possible terms to Christopher Wren's designs for the new St Paul's Cathedral. It should never be built because it will completely dominate and disrupt the neighbourhood surrounding the proposed site. Since it is clearly a vain whim of a certain clique of aristocrats, an infamous courtesan and a dilettante so-called architect, who are all known to cavort socially, I write to say that if it is actually built it will be an outrage and a long lasting eyesore for all the citizens of London, who have absolutely no need of it."

He concludes by applauding the new Garden Bridge as "a place of solace and to others a fabulous and magical garden. Everyone will win and so, one day, I'm sure that all the suspicious critics and verbose killjoys will enjoy it too."

Miscellany

After retirement, a former Gunnery Sergeant in the Canadian Army took a job as a high-school teacher. Just before the school year started, he injured his back and had to wear a light plaster cast around the upper part of his body. Fortunately, the cast fitted under his shirt and wasn't visible under his suit jacket.

On the first day of class, he found himself assigned to the toughest students in the school. The smart-ass punks, having already heard the new teacher was a former soldier, were leery of him and he knew they would be

testing his discipline. Walking confidently into the rowdy classroom, the teacher opened the window wide and sat down at his desk. With a strong breeze blowing it made his tie flap. He picked up a stapler and stapled the tie to his chest. Dead silence. The rest of the year went smoothly.

For the love of house: from a local newspaper following an explosion at a house in Stevenage: "From what I have seen two houses have gone and my thoughts are with them".

Charging in the rain: from China, a solar umbrella which can charge mobile phones from its solar panel.

Undercurrents loved the squabble over the name for the new Antarctic Survey vessel. While we liked the flippancy of *BoatyMcBoatface* we also rather liked the alternative *ShipyMcShipface*. . . until we tried to say it after a couple of pints.

We also rather like the hitherto unrecognised pursuit of Lexophilia. Lexo. . . what? This is the study for those who love words and the fun of word play, like "You can tune a piano but you can't tuna fish." Here are some more.

The batteries were given out free of charge.

With her marriage, she got a new name and a dress.

A dentist and a manicurist married. They fought tooth and nail.

When you've seen one shopping centre you've seen a mall.

Police were summoned to a daycare centre where a three-year-old was resisting a rest.

The guy who fell onto an upholstery machine is now fully recovered.

Those who get too big for their pants will be totally exposed in the end.

. . . and a few more words of wisdom:

I changed my password to "incorrect" so whenever I forget it the computer will say, "Your password is incorrect."

- Artificial intelligence is no match for natural stupidity.

- I'm great at multi-tasking: I can waste time, be unproductive, and procrastinate all at once.

- If you can smile when things go wrong, you have someone in mind to blame.

Got a tale to tell?

Please send letters for publication by e-mail to the Editor: editor@pvpubs.demon.co.uk or contact *Undercurrents*, in strictest confidence if you wish (we promise to change names, places, etc to protect the guilty!), via e-mail: rentamal@aol.com

Busy agenda kicks off spring at RICS



The year is moving rapidly with the possible privatisation of the UK Land Registry, a significant bill progressing through Parliament, a new edition of an important guidance note, the rise of Survey4BIM, international standards and a revised APC on the agenda reports Land Group Director **James Kavanagh** above.

Is it May already? 2016 seems to be careering forward at an increasing pace with the Rio Olympics, London Mayor and Brexit votes nearly upon us. In the world of geomatics it is just as busy with the FIG working week in Christchurch following hard on the heels of the recent World Bank conference on Land and Poverty and the GeoBusiness 2016 event previewed in these pages. RICS will be there with our fellow collaborators ICE, AGI, TSA and CICES (along with Survey4BIM) on a shared stand and it should be the first you see as you enter the exhibition in Islington. For 2016, we are also delighted to have RICS president-elect **Amanda Clack** FRICS give a keynote speech on the integral role of geospatial technologies in delivering infrastructure and long-term asset management.

No policy related piece can ignore the tumultuous effects of the recent UK Government proposals and consultation on the 'privatisation' of Land Registry.

<https://www.gov.uk/government/consultations/land-registry-moving-operations-to-the-private-sector>

The social media 'ripple' that this consultation has created has moved what is usually something discussed amongst the land and property sectors (RICS, CML, Law Society etc) to platforms like the Huffington Post, Twitter, Reuters news feeds and the broadsheet newspapers.

I am more than sure that we will all have our personal political and ideological views on a consultation, which could have far-reaching effects on a sector that is a major contributor to UK GDP. RICS cannot comment on the mechanics of government be that privatisation or nationalisation but our response has been and will continue to underline the critical importance of the integrity, security and transparency of the land and property registry, the essential building block of market confidence that the registry is and the maintenance of the 'state guarantee of title' that is at the registry's heart. Any changes will require primary legislative changes and once again the House of Lords may prove a decisive battleground.

Property & Boundaries Bill

Related to this the progress of the 'Property Boundaries Bill' continues

<http://services.parliament.uk/bills/2015-16>

propertyboundariesresolutionofdisputes.html

The tenacity and debating skills of several high profile members and boundary experts such as **Andrew Schofield** and **Earl John Lytton** have seen the bill get to the 'committee stages' within the House of Lords; several amendments have been proposed and accepted with the overall premise that we 'resolve and/or determine boundaries as a matter of dispute resolution' being maintained. You never know, you just never know what may happen. The Bill (it is much like the existing Party Walls legislation) has the full support of RICS and could see, what essentially is a civil and technical matter, being taken out of the county court system and into the realms of dispute resolution by qualified chartered surveyors. Say it quietly though, cadastre with a small 'c' and the re-integration of legal skills back into land surveying.

2nd edition for guidance note

Rights of Light – RICS has recently released a new 2nd edition of our *Rights of Light guidance note*. Geospatial surveying and 3d modelling take up a central role within this specialist sector and all geomatics members should download and use it as a reference document. The new 2nd edition has been fully updated with recent case law and industry best practice with an expanded section of the intricacies of Right of Light spatial measurement (3

dimensional modelling), method of assessment (Waldram diagrams), 'loss' evaluation and compensation. The 2nd edition also contains a new appendix explaining Rights of Light and trees. Expanded sections on appropriate procedures, legal issues, research, instructions, insurance and alternative dispute resolution help strengthen this essential best practice guidance note and bring it into line with other 'dispute' related guidance titles from RICS such as *Daylighting and Sunlighting, 1st edition (2011)*, *Boundaries 3rd 2014* and *Party Walls 6th 2011*.

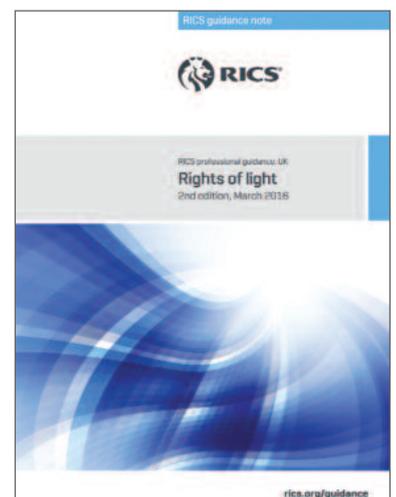
The new 2nd edition also contains in-depth additional appendices that should help the expert practitioner and/or those wanting to learn more. The Appendices contain sample forms, letters (form of release and scope of service), checklists (insurance), survey specifications (measured survey and a RoL customised survey detail accuracy table), notices and agreements (RICS Model Mediation Settlement Agreement).

<http://www.rics.org/uk/knowledge/professional-guidance/guidance-notes/rights-of-light-2nd-edition/> An evening lecture event is being planned for Autumn 2016.

Survey4BIM

The UK industry grouping Survey4BIM will be taking on a central role at this year's GeoBusiness conference and exhibition with a stand and workshop sessions. The geospatial industry has come

RICS has published the 2nd edition of its Right to Light guidance note.



together to give a bit of a geo-reality check on BIM adoption and has developed five big challenges for our industry if we want to help enable BIM level 2 (and 3). This group which contains RICS, Skanska, Network Rail, CICES, TSA, OS, Topcon, Leica, AGI, Balfour Beatty and more has focused its energy on geo-issues around accuracy, interoperability, level of detail, meta-data and generalisation. These are not just spatial data issues of course but our role within enabling them in a BIM context is important and will really help geo move to a much more influential role within BIM. Do come and speak to the Survey4BIM group (they will also be wearing badges) and to the Survey4BIM workshops – Tuesday 24th and Wednesday 25th May at 13.15
<http://www.bimtaskgroup.org/survey4bim/>

International Standards
 2016 is shaping up to be a

defining year for RICS Land & Resources with our recent involvement in the World Bank land and poverty conference and focus on the *International Land Measurement Standard* (ILMS) bearing fruit. The inaugural meeting of the ILMS coalition (which now consists of 24 international and national surveying bodies with a professional, legal and technical interest in the land and resources sectors) is being hosted by UN FAO at their global headquarters in Rome Italy.

This is a real ‘coup’ for the ILMS coalition and in many ways for RICS; it underlines the importance of the initial ILMS concept which in its most basic form is ‘a standardised, principles based global land reporting and measurement framework to enable internal and external investment and exchange’. The meetings and debate on the form, format, scope and focus of ILMS will take place Thursday 09th June and Friday 10th June.

The coalition is confident of a very strong turnout and I and several other RICS members will be there.

I’m sure that ILMS will feature strongly in future issues of *GW*. RICS Land Group has been producing several ‘commentary’ pieces to help non-land members and others to understand the enormous and often critical issues that lie at the heart of the ‘land’ issue. So far we have looked at: Land and corruption — the tip of the iceberg -

<http://www.rics.org/uk/news/news-insight/comment/land-and-corruption-the-tip-of-the-iceberg/> *Corruption and social unrest: coping with rapid urbanisation* -

<http://www.rics.org/uk/news/news-insight/comment/corruption-and-social-unrest-coping-with-rapid-urbanisation/>, Refugees, stress and paradigm shifts: issues for COP21 -

<http://www.rics.org/uk/about-rics/responsible-business/rics-at-cop21/issues-for-cop21/>

And just to finish on a very welcome return for Survey Ireland 2016 which takes place on Thursday 19th May in Dublin - fáilte ar ais, tá muid chaill tú!
 Contact
eugene.mcGovern@dit.ie

New APC

APC, Apprenticeships and Education - The LRGB has also been pushing forward on a radical overhaul of the RICS APC and has already moved forward with trailing a new combined Land & Resources APC pathway (South East Asia).

This new APC pathway is an evolution of the successful AssocRICS combined land pathway, it bring together the five pathways that currently make up the land and resources sectors into one holistic pathway which we hope will be soon market tested in the UK with firms and academics to help RICS produce the well-rounded, professional chartered surveyors of the future.

RICS EVENING LECTURE

Does Size Matter? The International Property Measurement Standards

Richard Groom reports on a recent lecture at RICS on this new standard which is gaining international support.

TOM PUGH, formerly of Plowman Craven and now with Malcolm Hollis gave an introduction to the International Property Measurement Standards (IPMS) to a room full of surveyors in the council chamber at the RICS on 25th February.

Pugh argued that the roles of measurement and valuation had been confused and that the IPMS brings with it a chance to separate the scientific process of measuring area from the art of valuation. The measurement and area referencing process is straightforward and logical but carries with it responsibility. The consequences of getting it wrong can be grave and yet the task has too often in the past been left to the graduate in the office – sometimes leading to costly mistakes. IPMS should help to put geomatics surveyors at the centre of property measurement. As Pugh put it “You would not ask your GP to do open heart surgery, so why ask GP surveyors to do geomatics?”

Before IPMS, building area measurement was subject to different standards in almost every country. This may have suited local property markets, but the property market is now global and so there is a demand from international property owners and lenders for

standardisation, so that they can compare the performance of their properties around the world.

IPMS is the result of eighteen months work by a standards committee formed from a coalition of professional bodies involved in property. The ‘office’ variant of IPMS became mandatory for RICS members in January 2016. Versions for residential, industrial and retail area measurement will follow.

Pugh urged surveyors to ‘sell’ measured building surveys to their clients not just for area calculations for IPMS but as assets that can also be used for contracts, energy performance, development and lease agreements. This is another example of survey once – use many times. He stressed the value of having provenance from professional measured building surveys

In questions following the talk, there was some discussion about resistance from the property profession but Pugh stressed the importance of the banks as lenders. They have been positive about IPMS and will require IPMS surveys to support their loans.

The standards can be downloaded free of charge from <http://ipmsc.org/>, and are well worth an hour or two of CPD time.

Why privatising land registration is wrong

The Government's Annual Spending Review, announced by the Chancellor of the Exchequer last November, included a proposal to: "consult on options to move operations of the Land Registry to the private sector from 2017". This intention was confirmed in the House of Lords on 2nd February. **John Manthorpe**, former Chief Land Registrar, explains the background and why it's a bad idea.

"It would not be possible for actual or perceived impartiality to be maintained or public confidence sustained, if a private corporation or institution. . . were to assume responsibility. . ."

Less than two years ago a similar and wide ranging government consultation was conducted by the Department of Business, Innovation and Skills (BIS). This led to an overwhelming rejection of such a proposal from a wide range of stakeholders. Consultees made clear that the Land Registry must remain as a public department of Government. Despite this informed response, the government are now to renew the consultation – presumably disregarding the clear views expressed last year from those who use and depend on the Land Registry's services.

Constitutional position in government - Land registration 'an act of sovereignty'

Land registration is the exercise by government under statute of the impartial control and development of an adjudicatory system which enables the ready creation, extinguishment and exchange of private interests in land under the law. It is the positive choice of the government to provide and create certainty and security for the citizen, for business, and for public authorities and financial institutions. By establishing trust and confidence in title it promotes private ownership, secured lending and economic development. It does this by reserving to itself, on behalf of the Crown and under the law, the power to grant, and to rectify, title and to maintain a single authoritative and guaranteed register of legal interests in land. Where land is registered, the register forms the only title to land recognized by law.

The act of registration has been described as an "act of sovereignty" inasmuch as it is in exercise of its sovereign power that the State declares title after examination to be absolute and makes it valid against the world.

The Registry's independence from commercial or specialised interests is essential to the trust and reliance placed on its activities. It would not be possible for actual or perceived impartiality to be maintained or public confidence sustained, if a private corporation or institution (particularly if such a body had conveyancing, financial or land holding functions) were to assume responsibility for the granting of legal estates in land and the maintenance of a public register.

The new consultation can be said to fall into a continuous series of Royal Commissions, Inquiries and Reviews that have been conducted over three centuries. This includes the land registration statutes

enacted by Parliament since 1862 (most recently the Land Registration Act of 2002) but also specific government sponsored reviews of the Civil Service which have included reviews of the organisation and financing of HM Land Registry. All of these reasserted unequivocally that the Land Registry must remain as a public department of government.

Background

The Land Registry has been a public department of government since its establishment 153 years ago in 1862. For 149 years it was a legal department of the Ministry of Justice (and its predecessor departments). The Chief Land Registrar, as Head of the Department and full Accounting Officer, was directly accountable to the Lord Chancellor. In 2012 it transferred to (BIS) with the Chief Land Registrar now accountable to the Minister at BIS.

What the Land Registry does

In understanding why successive administrations have been so clear about the Land Registry's position as a public department of government, it is helpful to restate what the Registry actually does - as set out in the following paragraphs.

There is, every day, a massive movement across the country in interests in land. These can arise from sale and purchase, inheritance, mortgage, discharges, leases, restrictions, matrimonial and family matters. In addition bankruptcies, repossession, the protection of third party rights and Orders of the Court relating to land rights require protection by registration. The Registry handles all house sales activated by Estate Agents, all sales and purchases handled by conveyancers and every secured loan generated by banks, building societies and other lenders. Because it is constantly maintained, and records the priority of all pending land transactions in England and Wales, the land register stands to give authoritative and guaranteed notice to all. This includes those who deal with land occasionally (e.g. purchasers) and those who deal regularly (e.g. lending institutions). It is the maintenance of the national land register which enables vendors to demonstrate proof of ownership, and purchasers and lenders to carry through their intentions to contract and to completion safely and simply.

None of this massive and daily movement of guaranteed interests in land,

between citizens, business, public bodies and financial institutions, on which the market economy depends, could function without an impartial and trusted system of land registration.

The input to this dynamic land register is the constant flow of agreements, contracts, deeds and documents - freely made between people, banks, institutions, local and central government and the Crown - in any combination and at any time. Decisions are made, contracts are agreed, registration is effected. The ever changing legal relationship of land and people is constantly and instantly reflected in a public place. What would otherwise be hidden is synthesized into a common, guaranteed and public record open to all. Security, confidence, transparency, choice - all become possible. Publicly registered land rights are 'good against the world'. Individually they protect the interests of the registered owner; together they constitute the underwritten record of the collective wealth of the country. Around the world a trusted system of land registration is central to social stability and economic success.

The secured credit activity of banks, building societies and other financial institutions depend on the guarantees provided by the Land Registry. These guarantees and reserved priorities are essential before any decision can be made to generate a secured loan or to go to contract. All lenders secure their power of sale in the event of default by substantive registration of their mortgages.

On every transaction the Registry is responsible, on registration, for the validation of documentation and for ensuring that conveyances, transfers, mortgages etc, are properly executed and legally effective. The Registry must verify that an owner has the power to sell and that the transaction is made having regard to any prior claims by third parties affecting the property. This constant curative process ensures, before the legal estate passes, that the interests of all

parties affected by the transaction are properly considered and that any necessary notices have been served on those entitled to receive them. Quite apart from ensuring that any legitimate interests are protected the Registry is able to resolve potential problems, disputes or ambiguities at an early stage so avoiding, as far as possible, future dispute and litigation.

It is this which is the core and dominant work of the Land Registry. It is this which ensures the continuing existence of an up to date, trusted, register of legal interests in land. It is this central task of the Registry that employs the majority of its staff, many with highly developed professional and specialist skills. It is this that provides the essential and statutory machinery that enables a massive, and continual, movement in land interests to take place with confidence.

Land Registry and its specialist staff

Maintaining the land register in the fluctuating and sometimes complex, competitive property market requires the exercise of sound risk taking judgement by the Registry's staff drawing on long standing practical experience and the interpretation of primary and subordinate legislation. Their decisions have to be visibly impartial and free from conflicts of interest, dealing as they do with the sometime competing and contrary interests of individuals, neighbours, financial institutions, private companies and public bodies.

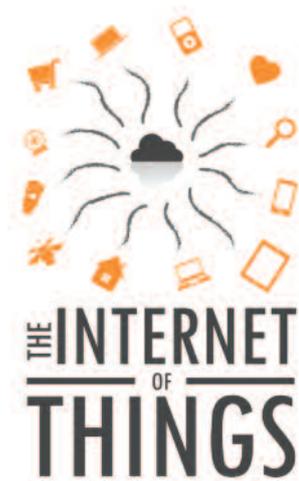
Self financing - no cost to the exchequer

The Land Registry is self-financing operating at no cost to the public purse. It has an excellent record of holding and reducing its costs, and its fees to customers. It pays an annual dividend to the Exchequer. It is highly regarded by those who depend on it as a provider of trusted, prompt services.

Land registration is not an activity that any responsible government can transfer to the private sector.

“Publicly registered land rights are ‘good against the world’. Individually they protect the interests of the registered owner. . .”

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GW takes a look at a hot button topic which is predicted to be disruptive rather than evolutionary. Backed by corporate equity, the IoT is held back by standards but developers are urged to think holistically.

“... market growth is reported to be 20 – 30% year on year.”

The challenge of the Internet of Things

According to the blurb, the Westminster eForum provides ‘the premier environment for policymakers in Parliament, Whitehall and regulatory agencies to engage with stakeholders in timely discussion on public policy relating to technology’. To this end, the forum offers numerous seminars on a wide range of topics (www.westminsterforumprojects.co.uk).

On March 15th the subject was the Internet of Things. As it turned out the only parliamentarians present were an MP – **Matt Warman** and the Earl of Erroll from the House of Lords, who also happened to be chairs of the two sessions. There were a number of representatives from government departments, including a contingent of eight from the Department for Culture, Media and Sport, some academics and the rest from the private sector. The event only lasted the morning, but it was a full morning of short talks and question and answer sessions.

Rapid growth

Emerging technologies always seem to attract large numbers when it comes to predicting the eventual size of the market. The revenue from IoT is still considered small, at £2bn last year, but market growth is claimed to be 20 – 30% year on year, reported **Tom Rebbeck**, research director, Digital Economy at Analysis Mason. He observed that the technology is currently at the stage of solving existing problems more efficiently, thus saving money. Development is being held back by the lack of standards. For example there are four standards for low power wide area networks. Going with the wrong standard could be costly.

The challenges

Gary Barnett, chief analyst, software at Ovum set out five challenges, or as he termed them – mountains to climb: the things (sensors), communications, security, integration and the fact that the IoT is pointless if it doesn’t provoke action. Developers have been tending to use silo thinking to focus on the mountain with which they are most familiar, rather than taking a holistic view. He stressed, for example, the importance of embedding security into devices early in the design process, rather than trying to retrofit as an afterthought. No-one, he suggested, wants their oven to be under the control of a hacker. The IoT is being fuelled by dramatically falling prices of sensors, following the patterns that we have seen elsewhere. Barnett said that today there are sensors costing just £1 that can do the same job as a sensor which cost £5,000 a few years ago.

Financing

So the technology is there – what about the money? **Roger Bickerstaff** is a partner at Bird & Bird and offered some insight. He drew parallels between the stage of development of the IoT

with that of ‘cleantech’ seven to eight years ago. For those of us who have never heard the term cleantech, it refers to the renewable energy industry. Currently, in Britain, the funding for IoT projects comes from corporate equity, whilst in other countries, such as South Korea, there is public sector money involvement. For investors, the issues are security of the revenue stream – cleantech in Britain was boosted by feed-in tariffs, regulatory compulsion and standards. Standards, or lack of them, was a common theme throughout the morning.

In the question and answer session following these talks, the importance of energy harvesting was stressed, and likewise the need to minimise sensor power consumption. There was also concern that government regulation is needed but that it has to be proportionate.

Enabling the Smart Home

The second batch of talks came under the heading “Enabling IoT: connectivity, infrastructure and utilising commercial networks”. **Howard Benn** from Samsung R&D pointed out that not only is there a multiplicity of standards, but there’s also a multiplicity of standards bodies! Samsung manufactures white goods and so is focusing on the ‘smart home’. Their solution to the standards problem was to invent a new one via the Open Connectivity Forum, a body with 200 members. They are currently writing standards for 5G communications.

Enabling IoT in cities

Paul Wilson is managing director of ‘Bristol is Open’ (www.bristolisopen.com/) – a joint venture between the University of Bristol and Bristol City Council. He described how the city is taking a leading role in providing the infrastructure for the IoT, to develop a “super connected city”. He has been fortunate because Bristol was able to purchase existing conduit to install its own fibre within the city, which they have supplemented with a mesh bouncing between lampposts. There are few cities in a similar position of being able to install their own network.

Bringing services and sensors together

Following a much-needed break, the seminar resumed with sessions on standards. The chairman, the Earl of Erroll, noted that standards help innovators avoid getting locked-in to proprietary systems. **Nick Chrissos**, head of innovation technology at Cisco UK and Ireland is working on bringing sensors and services together. One example was flood prediction, where Cisco is working with Scottish Water, the Met Office and Glasgow City Council. On the subject of security, he mentioned the difficulty of incorporating security on a sensor costing \$2, which may remain operational for twenty years.

Smart power

Perhaps the most interesting talk of the day came from **Lucy Symons**, policy manager at Open Energi. Her company is looking at the potential for the internet of things in the electricity supply industry. The industry requires real-time action to match supply and demand, and to make use of the increasing potential for storage. Not only is the IoT the missing piece in the renewables industry, with its changeable patterns of supply, but it also has the potential to reduce the need for power stations which are currently needed to supply peak demand. Smart Power exploits the flexibility that the IoT brings and the savings are obvious.

Legal issues

Emma Wright, a partner in law firm Bond Dickinson mentioned spectrum but concentrated on data. There was an assumption that much of the data for the IoT would be open and so could be affected by privacy issues. Also, whilst it is easy to persuade government to make its data open (having overcome the data protection thing), private companies tend to be more reluctant, and like to be paid. There is also the question about who owns the data and one way to avoid the problem is not to store it, apparently.

Disruptive tech

In an excellent talk, **Dan Byles**, chair of SmarterUK and vice president, corporate development at Living PlanIT contributed to a session on policy, regulation and business practice. He believes that development will be disruptive rather than evolutionary because the IoT is predicated on dramatic changes in costs to make new processes and systems viable, very quickly. For example, he took the Uber business model: the company is now the world's largest taxi company but it does not own a single taxi. As other speakers had suggested, the technology will move from solving existing needs more efficiently towards dealing with emergent needs.

Telemedicine

Chris Francis, director, government relations at SAP, reckoned the origin of the IoT was 1874 with an 'app' for predicting avalanches. This was taking things a bit too far! Back down to Earth and he mentioned telemedicine. This subject had arisen earlier in the context that apps that seem trivial can end up being world-changers. Imagine, for example, the potential impact on the NHS if everyone wore monitors for bodily functions.

This was a useful seminar in pleasant surroundings at Glazier's Hall near London Bridge. For map lovers there was the bonus of an historical map of London on the wall which was well worth perusal.

“... development will be disruptive rather than evolutionary...”

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Underwater photogrammetry and laser scanning are the latest technologies for the hydrographic business, as **Richard Groom** discovered when he visited a somewhat quiet Oceanology International at London's Excel.

Oceanology 2016 took place at London's Excel conference centre on 15th – 17th March. All exhibition space was taken and there were plenty of delegates on the stands. Largest stand award went to Teledyne, as it continues to dominate offshore surveying, whilst the most bizarre stand award went to a consultant who had dispensed with any form of decoration! Excel is ideally situated next to King George V dock, where survey vessels were available for demonstrations. Feedback from exhibitors was that the exhibition was 'quiet' reflecting the effect of low oil prices on the offshore industry. There were also rumours of redundancies from a major survey company.

Underwater photogrammetry

Oceanology is more than 'just' survey, attracting exhibitors for anything connected to investigation at sea. This was reflected in the conference sessions of which only one stream on the first day was devoted to hydrographic surveying. Almost every seat was taken for the two sessions that GW dipped into. These focused on technologies that have been transferred from land to sea.

Photogrammetry is now being used to model structures on the seabed, in much the same way as it is used on land, with large photographic overlaps. Automated image matching is used to compute the

camera calibration parameters and relative orientation of the photography. One system presented had the cameras mounted on a fixed bar to determine scale whilst another used a scale bar in the imagery.

... and laser scanning

The use of underwater laser scanning has also developed since 2014, the last Oceanology exhibition. Static laser scanning was presented, but there was also a presentation on mobile laser scanning. The platform for this was a remotely operated vehicle, with control for the trajectory coming from acoustic transponders on the seabed, tightly coupled with data from an inertial measurement unit (IMU) on the ROV. The accuracy claimed for this mobile mapping solution was 31mm RMS.

Turbidity which, perhaps surprisingly, can change day by day, affects the range of the lidar and sometimes the most critical part of the structure is covered by a cowling. The plea was still therefore, to treat as-built data seriously so that the overall structure can be registered with the observed scan and used to derive the position of the critical part of the structure. It was also suggested that spheres could be welded onto seabed structures, which would be scanned as part of the as-built and then form an unambiguous link with the as-built data.

The challenges of shallow water hydrographic surveying

Surveying Britain's 2000 miles of inland waterways is specialised work. **Kate Rowlatt** and **John Williams** show how a new compact custom system aboard a bespoke survey vessel is capturing cleaner data even under difficult conditions.

Hydrographic surveying on inland waters can often be extremely challenging as there may be many risks to both personnel and equipment or perhaps factors which compromise the survey methodology resulting in poor data quality. Risks may come from ultra-shallow regions where the survey vessel and/or equipment may touch the riverbed; fast flowing currents in and around weirs, dams and intakes or, as seen more recently, due to flooded regions where submerged debris may be deemed too hazardous to survey. Other environmental factors such as poor GNSS positioning around bridges and under tree canopies; high turbid waters, fluid mud or even bubbles in the water downstream of weirs may all have a significant impact on data quality. The solution is therefore to try and mitigate these effects by using correct survey methodologies with proven equipment.

Evolving technology to meet new demands

The Canal & River Trust (C&RT) manages and cares for over two thousand miles of canal and river navigations. With a variety of users from pleasure boaters, through commercial craft to the needs of the environment and aquatic life, it is sometimes hard to meet everyone's expectations. In 2007, C&RT's predecessor, British Waterways, adopted the strategy that every kilometre of waterway would be surveyed on a cyclical basis rather than when required.

To address this challenge, the C&RT had to come up with more efficient and reliable methods for surveying its inland waterway

system. Single beam echo sounding evolved into a system using four single beam echo-sounders rigged onto contractible booms, allowing four run-lines to be surveyed in one pass linked to four individual data loggers, and with position offsets applied to each run-line of data.

In 2003, a new system called GeoScan was launched which used a Tritech Super SeaKing dual-frequency profiler linked to a vector hemisphere GPS and MDL micro tilt sensing. The profiler incorporated a mechanically rotating head with varying scan step intervals so that data could be captured to meet the required survey needs. This changed the output of data from four longitudinal run-lines to cross sectional data captured every 6 to 7m along the navigation route.

In 2014, a group was established within the Trust to review dredging and survey techniques. As part of this process a new multi-beam sonar system was deemed necessary to further improve the data collection process. Instead of single or multiple run-lines, where cross sectional data could then be extracted, the multi-beam sonar could offer a swathe of 256 soundings with a very high repetition rate at a user-selectable frequency. This would provide very high-resolution data along both the vessel route as well as across the width of the canal covering significantly larger areas in less time than previous systems. The continuous 'picture' of the river bed would give the Trust greater confidence in the condition of the navigation channel and detail exactly where dredge activities would need to be performed. Additional changes to the presentation of data were also required so that information could be accessed via survey drawings, cross sectional data, spreadsheets and GIS, which

Below and inset: Figure 1 - Canals & Rivers Trust shallow draft MBES survey vessel.



will all be managed internally through the Trust's hydrographic survey team.

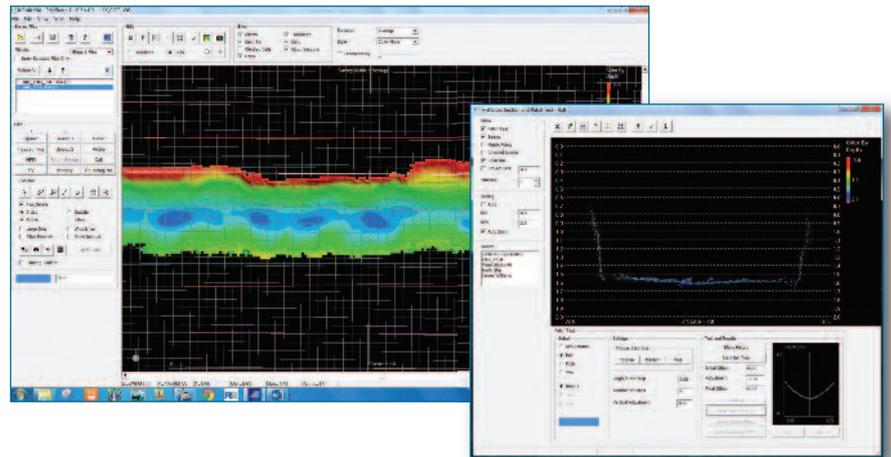
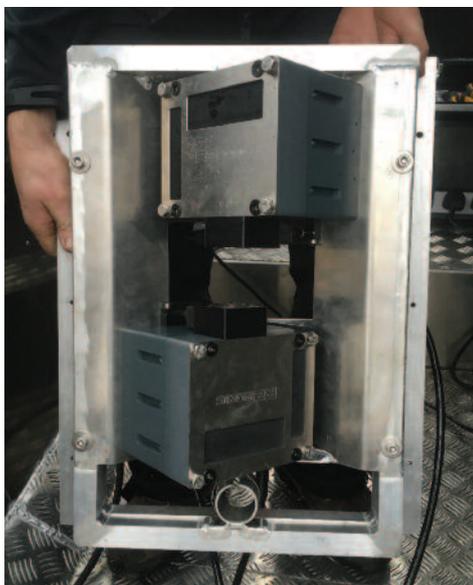
Customised MBES

C&RT decided to procure from Swathe Services a dual-head R2SONIC SONIC 2020 multi-beam (MBES) Sonar with Integrated Inertial Navigation System (INS). This MBES system was installed on a new vessel for ultra-shallow survey operations and met all of the C&RT criteria.

The SONIC 2020 is a small compact MBES and offers a range of operating frequencies from 200 to 400 kHz; variable swathe sector from 10 to 130 degrees; 256 beams with a NADIR beam size of 2 x 2 degrees at 400 kHz; 1.25cm range resolution from 60 kHz signal band width and simultaneously bathymetry, back scatter and water column data acquisition capability. When operated in the dual-head configuration up to 60 Hz of simultaneous pinging can be achieved, ensuring extremely high along - and across-track resolution. The integrated INS, which is an Applanix WaveMaster OEM component, provides accurate position, heading, heave, pitch and roll data and is combined with the sonar data using the HYPACK/HYSWEEP data acquisition and post-processing software. A Valeport MiniSVS is also used to measure changes in speed of sound which may vary due to temperature and salinity or in some cases may also be due to turbidity variations. This equipment was installed on the new bespoke designed survey vessel (See figure 1 on previous page).

The installation of the MBES was of paramount importance to ensure the widest swathe widths whilst maintaining operational efficiency and at the same time protecting the equipment from any submerged debris. To achieve this, the C&RT survey team designed a bespoke moon pool mount for the dual-head sonar and INS sensor in the centre of the vessel (figure 2). The sonars' heads were mounted at

Below: Figure 2 - Bespoke moon pool housing for MBES transducers and INS sensor.



Inset: Figure 3a - Cross section of MBES data and figure 3b.

Above: Figure 3b - Plan view (digital terrain model – DTM) of canal bed

30-degree angles to ensure minimal overlap whilst maximising swathe width. The INS was mounted directly over one of the sonar heads so that accurate motion values could be observed.

Cleaner data

This installation was both rigid and repeatable, reducing the need to re-calibrate the system for every survey, and with clean MBES data obtained during acquisition this has reduced lengthy manual cleaning experienced with the previous profile scanning sonar. Consequently the 'ping to chart' time has been reduced by a considerable margin allowing for much greater efficiency within the survey department.

Initial data acquisition has shown bank-to-bank capability with high across-track resolution (figure 3a) and much greater along-track resolution (figure 3b) highlighting features on the canal bed that have not been seen before.

About the authors



Kate Rowlatt B.Eng (Hons) MCInstCES has worked for the Canal & River Trust – formally British Waterways – since 1998. Kate is currently the senior hydrographic surveyor, managing a small team who cover the

hydrographic surveying requirements for the Trust throughout England and Wales.



James Williams MSc IHO/FIG CAT A MHydSoc is the managing director of Swathe Services which offers equipment rental and sales support to the marine hydrographic survey industry in the UK and Ireland. Throughout

his career James has gained a broad set of skills from offshore exploration within the hydrocarbon industry to inland waters hydrographic surveying in the Canadian Arctic. James has extensive experience with multi-beam sonar technology and he has an MSc in Hydrography from Plymouth University. He is also chairman of the Hydrographic Society (UK), South West region.

“... clean MBES data obtained during acquisition... has reduced lengthy manual cleaning experienced with the previous profile scanning sonar.”

Professions: 'the times they are a changing!'

Adapt to change is the message from two recent reports, one into Geomatics in Canada and the other into the professions associated with construction in the UK. **Richard Groom** tries to make sense of it all.

It is natural for professionals to be concerned about their profession. After all, they, their parents and the state, will have invested time, effort and money for them to become experts in their field and they will want to protect their investment.

Push button mentality

The decision to embark on a career in surveying was probably based on the state of the profession at that time. For example, for those starting out in the late 1970s/early 80s, observing and computing was a time-consuming, skilled and labour-intensive exercise. Yet developments in computing, equipment and the infrastructure of living – mobile phones, the internet etc, has been explosive. Most of the skilful stuff is now taken care of by technology, leaving us wondering if surveying is now so simple that anyone can do it after a day's training.

The simplification of instruments and software is clear to see but unfortunately there are many outside the geomatics profession who do not see beyond surveying as fieldwork. Did we really go to university or college just to learn how to observe and compute detail surveys? The answer should be a resounding 'No!' Professional survey education was always about more than that. The equipment and computing merely helped us to produce geospatial products.

Professionals still needed

Those geospatial products are still needed. Indeed the demand today is orders of magnitude greater than it was forty years ago. The effect on surveyors is that we now have to collect far more data more quickly and in a much more organised way. We now have to be able to turn that data into a greater range of more complex products that can be used to answer more demanding questions from our clients. This is a challenge to which people with a geomatics education are ideally suited.

The popular view is however that surveying is now a job for technicians and the need for competent professionals to write survey specifications and briefs, commission, supervise and check surveys is not recognised.

The truth is that there a lack of professional expertise, not so much amongst survey contractors, but amongst the organisations that procure survey work. The world is heavily populated with civil engineering consultants yet, despite the fact that they commission most surveying work in the UK, possibly without exception, none of these firms

employs a single professional land surveyor in a consultancy capacity. No one with the same status as the firm's more senior engineers.

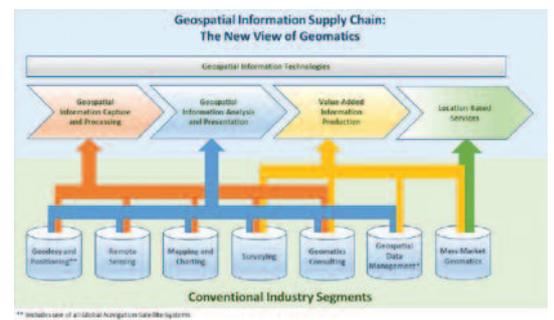
There is no one in these organisations who, for example, can provide trusted independent advice on the pros and cons of a proposal to carry out a dimensional survey of a river channel using a UAV – a real situation faced by one consultant in February 2016. The firm did not appear to think it needed advice to evaluate the efficacy of the new method and believed everything written in the contractor's proposal. They also appeared to believe it was more important to complete the work by 31st March than make sure that the product would be fit for purpose.

Geomatics in Canada

A recently published report from Geomatics Canada gives a Canadian perspective on the future for geomatics in that country. There are a number of parallels with the UK experience, as well as some differences. The report firstly views Geomatics as the wider geo business – in fact anything that involves 'place'. The report does not mention measurement of boundaries, the traditional business of land surveyors in Canada and that chimes with personal experience when discussing geomatics with a geo professional last year in Newfoundland.

The report also states that the collection of data is no longer the sole preserve of the geomatics professional. Because data collection is a lower level of skill, the report urges geomaticians to acknowledge that others can collect the data and to move up the 'value chain' (see Figure 1), but this begs the question as to whether the management of data collection is a task for geomatics professionals? Surveyors of a certain age would almost certainly say 'yes', but there are companies out there collecting data - some of them quite large - which do not employ geomatics professionals.

Below: Figure 1 - The 'value chain' widely used in Canada.



“... the need for competent professionals to write survey specifications and briefs, commission, supervise and check surveys is not recognised.”

Engineers in denial

Employment of geomatics professionals to manage the collection of survey data should give the client confidence that the product will be fit for purpose. For this to be effective, the qualifications of the geomatics professional have to be recognised by clients. In Britain this is clearly not the case. Furthermore, the lack of surveying professionals within civil engineering consultancies implies that civil engineering professionals believe that they can fulfil that role. Luckily, there are still a few of us employed in positions further up the chain where we see on a daily basis that this is simply not true, that there is a desperate need for surveying competence in civil engineering consultancy. Indeed the situation is so dire that there are even occasions when we are asked to provide advice to the consultants who should be advising us! The irony of this situation is completely lost on anyone else and, more seriously, any attempt to oblige consultants to become competent is strenuously resisted.

We cannot move up the 'value chain' because the path is blocked. This is a difficult nut to crack for which we need the support of respected professional institutions.

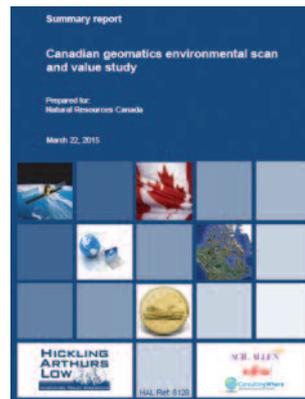
Whilst the CICES is seen as a lesser associate to the ICE, it seems inevitable that this situation will prevail. If civil engineers see surveying as a technician's job it will suit them well to have surveyors corralled into an organisation which they can oversee. Meanwhile, the RICS which, it could be argued commands similar respect to that enjoyed by the ICE, appears unable to influence.

Collaboration for change

News of another document arrived by email recently via the CICES. 'Collaboration for Change' is a report by 'The Edge Commission' which was published in April 2015. The commission is composed of representatives from the Chartered Institution of Building Services Engineers, Chartered Institute of Building, ICE, Institution of Structural Engineers, Landscape Institute, Royal Academy of Engineering, RIBA, RICS, Royal Town Planning Institute, Society for the Environment and the Construction Industry Council. Given the range of organisations involved, we should be asking ourselves why geomatics appears to have been excluded.

The chairman of the commission is **Paul Morrell**, who has been active in the BIM world, and the report has a BIM flavour. It finds reassurance in the traditional values of the professions: to set standards of competence and conduct, regulate, confer status, be a professional lead and protect the public interest. But the commission also noted that the standing and perceived value of the professions is being challenged, with charges of protectionism, resistance to

Right: Canadian Geomatics Report Cover.



Far Right: Edge Commission Report Cover



change, reinforcement of silos and preservation of hierarchies. If that was not worrying enough, it then goes on to suggest that they are at risk of losing control over the very things that differentiate their members from those operating outside their institutions. These threats are not seen as a death knell for the professions but challenges to get things back on track. The message is to modernise, whilst retaining and reinforcing the qualities that make the professions worthwhile.

Common professional standards

The collaboration in the report's title refers to those qualities which all professions champion, with a proposal to agree common standards, and enforce those standards with equal rigour across the professions. It is also proposed that education should be interdisciplinary to break down silos and that membership of an institution should 'guarantee' the quality of an individual, in return for which there have to be sanctions for those who do not measure up. On another level, collaboration is seen as the means of dealing with common issues of public interest that would benefit from a common stance from all professions.

The report notes, among the forces affecting professions, "a shift in authority and control in the industry away from professionals towards contractors and managers". It is not clear if this has been caused by a decline in respect for the professionals or a perception that work is now less demanding.

Ethical questions

The stakeholders in modern professional businesses are the owners, employees, clients and the wider public. Striking a balance between their differing interests is a challenge which is discussed at length. The report does not however consider the question of professional behaviour of businesses – which will always override that of individual professionals. However, it does note the rise of multi-disciplinary consultancies and acknowledges the difficulty

“... it surely makes perfect sense to consolidate the many professional fragments into one recognised authoritative body...”

in “maintaining authority in the face of market power”.

The report acknowledges the need to attract young people and that failure to do so could potentially be terminal, for the institutions but also warns about lowering the standards of entry. It urges the institutions to demonstrate leadership and vision and proffer a working environment that offers “purpose and meaning and the potential to make a difference”.

The report discusses at length: “what do you do, as a professional, when your principles point one way, and a clients’ needs or wants point in another?” There is a similarly lengthy examination of the requirement for professionals to work in the public interest. Both discourses are worthy of serious study.

Evidence was also given to the committee concerning professionals working outside their area of expertise. As one who regularly receives tenders from companies working outside their capability, this is certainly a problem and undermines those precious professional values. Should they be kept in line by referral to their institution only from the client, having gone through the internal complaints procedure, or should lapses be handled more openly and transparently? One

suggestion mentioned is to have TripAdvisor-style public feedback.

One Institution

Another suggestion was raised: that a single professional body should be created for professionals working in the built environment, but the report, despite its emphasis on breaking down silos and promoting collaboration, dismisses it as a non-starter, without offering a very convincing counter argument.

If we acknowledge that ethics and competence are at the core of all professions, it surely makes perfect sense to consolidate many weak, fragmented professional bodies into one strong, recognised and authoritative organisation containing groups representing the specialisms, on equal levels of status. Is that really a step too far?

References:

Canadian Geomatics Environmental Scan and Value Study can be downloaded from: www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/cgdi-initiatives/canadian-geomatics

Collaboration for Change can be downloaded from: www.edgedebate.com

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More laws? Well, maybe, or maybe not after 23 June 2016

By Carl Calvert

The impending UK referendum on whether to remain a member state of the EU presents a difficult and complex decision for those who are not just following their instincts or are overwhelmingly consumed by a single point of conjecture. Our legal correspondent unravels some of the laws that will have to go or change if we do leave.

I thought that with the debate about remaining in, or leaving, the EU I would take a look at the mechanism for leaving and some of the laws which would either need repealing, revising, or left as they are. I had the good fortune to find a 37-page summary from the solicitors Bond Dickenson LLP and I have picked some of the points which may be of more interest to surveyors, and survey companies.

Of course the best place to start is the Treaty of Lisbon, Article 50 which deals with exiting the EU. There are five sections: the first says that any Member State may decide to withdraw according to that state's constitution. The second requires notification to the European Council of that state's decision and negotiations between the state and the EU on the process of withdrawal and the framework for that state's future relationship with the EU.

The EU Treaties will cease to apply to the state from the date of entry into force of the withdrawal agreement, or, if agreement is not reached, then two years after notification of withdrawal, or even later if the parties unanimously decide.

This third section seems to imply that if there is no unanimous agreement then withdrawal will occur after two years and in section four there is an embargo on the withdrawing state participating in any discussions within the Council on decisions concerning the withdrawing state. The final section provides a mechanism for rejoining the EU.

Rome I and II

On exit the conflict of law rules currently set out in the Rome I (contractual obligations) and Rome II (non-contractual obligations) Regulations would not apply in the UK courts. However, the old rules governing non-contractual obligations do not allow parties to choose the law that applies to non-contractual relations, which may lead to a different conclusion than that under Rome II. There would probably require new legislation on contractual and non-contractual obligations.

The impact of a Brexit would be less apparent and certainly less immediate on construction matters. Although EU legislation can be directly effective within the UK it is almost always implemented by way of UK legislation. The UK, being one of the most compliant states in the EU

would need to repeal or amend UK legislation implementing EU legislation. An example given by Alex Hiron of Bond Dickinson is the Work at Height Regulations 2005 which implements European Council Directive 2001/45/EC.

VAT is an EU tax imposed in the UK since accession in 1973. It is subject to EU directives, and although there are a number of individual state derogations, treatments and rates, the underlying system and alterations to it are EU in origin. Due to its revenue generation it is unlikely that VAT would be abolished but its operation for importers and exporters could be affected. How UK exporters would deal with VAT applying to both business and end consumer customers in the EU would need re-consideration.

UK pensions' legislation would no longer be required to be interpreted by reference to EU law or be subject to the jurisdiction of the ECJ. This would lead to greater autonomy for UK to re-frame such legislation in a post Brexit.

As a member of the Council of Europe, the Government is a signatory to the European Convention for the Protection of Human Rights and Fundamental Freedoms. Under the Human Rights Act 1998 (HRA 1998), public authorities and other organisations when they are carrying out functions of a public nature have a duty to comply with the Convention. Brexit does not mean that the UK would cease to be a member of the Council of Europe nor cease to be a signatory to the Convention so the repeal of the HRA1998 is a separate issue to that of exiting the EU. The duty on public authorities will remain in one form or another if the UK remains a signatory to the Convention.

So whilst some laws would remain, others would need re-drafting or repealing. How long this would take is unknown, certainly by me. Likewise, whether additional recruitment of legal draftsmen will be required is a question best left until after 23 June 2016.

• *The RICS is due to publish a paper giving their analysis of the potential impacts of either decision upon the various parts of our industry.*

In the meantime RICS reminds members to be careful in any public statements they make. They say: "The RICS has an international reputation and we must all guard it closely – in the politically charged debate on EU membership RICS must hold to the politically neutral course demanded by our Royal Charter."

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RICS BIM Conference 2016: Realising the benefits of BIM in practice

Qs are at last engaging with BIM as we move to Level 2 BIM being a requirement for government contracts. Meanwhile others are already using iPads to manage site and FM issues. Prof **Ian Dowman** reports.

Modelling/Management (BIM) has featured in *Geomatics World* in a number of issues lately. In September/October **Stephen Ward** emphasised the importance of geomatics companies collaborating with other disciplines and in January/February **Stephen Booth** reported on the TSA's BIM day, which concentrated on the role of geomatics in BIM.

The RICS Conference, which had the theme of 'Realising the benefits of BIM in practice', recognises the shift of BIM from a good idea to a practical tool. One speaker characterised this as moving from Building Information Modelling to Building Information Management. It was noted that from 4th April government contractors should be working to Level 2 BIM, and this gave rise to discussion on what Level 2 actually is.

Data capture now mature in BIM?

The RICS meeting looked at the whole process of BIM covering the life cycle of a building or infrastructure. The data capture side was hardly touched upon as this now seems to be regarded as a mature procedure in the BIM cycle, particularly for refurbishment, but also for as-built surveys. Several key issues ran through the meeting which are important for the geomatics profession to understand and act upon.

The opening session was a panel discussion during which the panelists addressed a number of issues put to them by the chair. The discussion emphasised a number of advantages of BIM which included a competitive advantage, reduction of risk in the delivery and operational stages, and reduction of waste in the construction stage. Moves to ensure standards were also stressed. Two points arise from the discussion, first that large organisations are moving to the use of BIM and have the resources to allow time for the learning process and to overcome problems, whereas SMEs are not moving so quickly, and second that there is still a barrier to moving fully to digital and understanding the value of digital data and information.

Data analysis a key skill

The issue of attracting new recruits to the industry was also covered and it was stated that data analysis is the key skill, a skill that many young people are attaining, but in order to attract young people who can use data we need to look outside the construction industry. It was also pointed out that everyone in a team should be able to use BIM tools and it should not be necessary for everyone to be BIM experts.

Tolis Chatzisyneon, CEO of Nomitech, gave a talk on 'BIM – changing the way we think and the way we price' which showed how quantity surveyors can work from, and with, a model. He gave an example of designing a highway based

on Google maps while **Andrew Pryke** from BAM spoke on 'Managing risk with BIM: A contractor's perspective'. BAM operates in the construction, property, civil engineering, public private partnerships, mechanical and electrical contracting and consultancy engineering sectors. Pryke showed how BIM helped in realising significant benefits in the design and planning stages. Predicting challenges and building in solutions, ensuring engagement across the whole supply chain are key advantages. He showed how an asset model helps to sell a building and attract tenants, de-risks construction and demonstrated that visualisation is very useful for marketing.

Pryke stressed the role of BIM in asset management and showed how the use of an iPad on site, with the model loaded, saved an immense amount of time through helping plan and speed the response to FM (facilities management) problems. He also stressed that collaboration is necessary for taking quantities from the model. A key lesson learned here is the need for early engagement with FM. The use of tablets in managing FM was discussed in the 2014 BIM conference and now appears to be taking hold in the profession.

Virtual BIM

Two sessions on either side of lunch were based on a Knowledge Transfer Project (KTP) which has the aim of delivering a virtual BIM Level 2 Project. An essential component of this is the involvement of groups from different disciplines to help facilitate the interfacing of different processes. The idea of this session was the sharing of lessons learned and finding out the major problems to be addressed.

Simon Longstaffe, Head of Programme Estimating and Cost Management for HS2 talked about BIM and infrastructure and discussed the now familiar themes of BIM enabling the streamlining of planning and design processes and increasing clarity of a project's purpose and desired outcomes amongst all stakeholders, informing decision making and reducing risk; but his main point was ensuring data accuracy and continuity across the lifecycle of a project and that having the right data structure is the key to success. The same database should be used for all processes and this needs to be accessed quickly from many entry points. There is a need for consistency across all sectors as different contractors use different ways of doing things.

Historic dimension

Peter Folwell, director at Plowman Craven, gave a presentation on BIM and the historic environment. This topic was covered in *Geomatics World* in the November/December issue and is clearly an

“... an asset model helps to sell a building and attract tenants, de-risks construction...”

important application of BIM. Folwell described the work done on several projects, including Kings Cross, Bristol Temple Mead and Leicester Cathedral. He noted that in order to capture all the detail it was necessary to combine laser scanning and photogrammetry. He also stressed that contractors must always consider the requirements of their clients when capturing data.

In the final paper of the day **Andy Green**, director, Faithful+Gould showed how BIM can facilitate whole life costings and can enable accurate predictions of future running costs, which can maximise benefits to the client, the design team, contractors and the resultant occupier.

There was an exhibition at the conference which included Korec, Faro, Trimble and Plowman Craven, as well as QS and FM companies.

Collaboration remains key

The conference gave a good perspective on the current status of BIM and of the problems and bottlenecks. The key issues were the need for collaboration, the need for good long term planning, the need to satisfy client requirements and for government contracts to be Level 2 BIM compliant. QSs are still struggling with efficient use of BIM, and complain that modellers do not understand their requirements, but FM is realising the advantages.

There were some interesting looks into the future. The link between BIM and smart cities was noted, particularly in monitoring how buildings

Right: Figure of the H2S BIM philosophy as explained by Simon Longstaffe at the conference.



perform. The use of drones to undertake quality checks was mentioned as were potentially useful technologies such as programmable robotic cubes and 3D printing. There was also discussion on increased automation in collecting information and identifying assets such as valves in pipework, windows etc. Excitech, who are working with Plowman Craven, have a plant modelling tool which is linked to Revit and again clearly should link to FM in the maintenance cycle.

In conclusion it was clear from the conference that there is a good future for geomatics professionals in BIM provided that we embrace collaboration and are prepared to educate other surveyors and engineers on the value of digital data and life-cycle involvement.

The 50-year history of WILD and LEICA GEOSYSTEMS in the UK

Written by the editor of *Geomatics World*, Stephen Booth, this book is a history of a UK company that established its reputation through supplying accurate and reliable surveying and mapping products. An introduction traces the origins of the companies that became Leica Geosystems, together with short articles with simple explanations to Leica's technologies. The narrative is set against the changing infrastructure and times of Britain. Containing over 350 photographs, *when it has to be right* tells the history of the company, its products, applications and the people who've played key roles in its success.

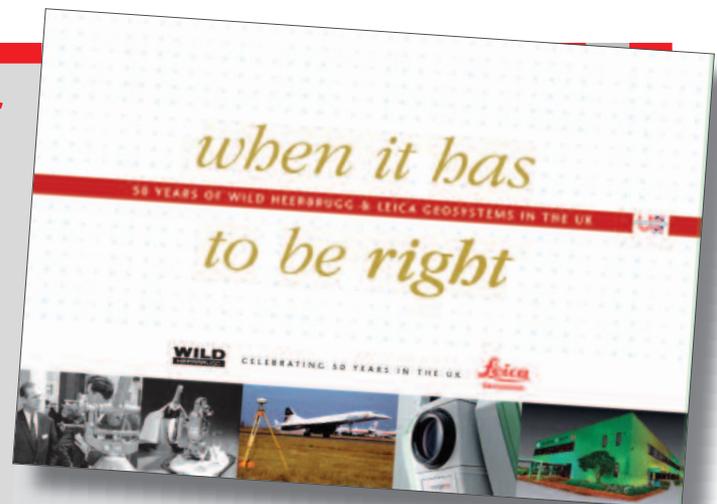
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The future of land registration in the UK – how do we compare with other European countries?

With the prospect of privatising the Land Registry for England and Wales, *GW* turned to someone with experience of a cadastral system. **Julia Stolle** is a chartered surveyor from Germany with experience of both systems. So does accuracy trounce our old friend general boundaries?

Land administration and registration provides security for property rights and tenure and is an important element in a country's development, eventually contributing to economic growth and social stability. It is based on a complex legal framework, impartiality and has to remain completely independent from any possible commercial interests.

Land administration can be implemented in many different ways. In the UK the Land Registry (LR) records property rights, land transfers and first registration. LR uses Ordnance Survey mapping for the demarcation of the land. We are all more than familiar with the LR title plans that show the extent of a piece of land edged in red. The LR title plans are subject to the "General Boundary Rules" and the general boundaries shown on the Title plans may or may not coincide with the legal boundaries. A conveyancing solicitor might recommend to a potential buyer to check the general boundaries, shown on the title plan, against the existing physical features on the ground.

The process of buying a property can be very stressful and proper checking of the physical boundaries of a property against the registered extent is probably the last thing the potential buyer will do. The lack of accurate boundary demarcation is often the cause of boundary disputes between neighbours. However, this problem does not lie with the

Land Registry but with the principal of the general boundary system. So how is it done in other countries?

Land registration in Germany

Most European countries use a cadastral system instead of a general boundary system. The origin of a cadastre is based on the idea of taxation on land ownership (from the Latin word "capitastrium").

In Germany, the extent of a piece of land or property is shown on a cadastral map. The cadastral map shows, what is often called "the invisible line", the legal or true boundary. Ordnance Survey maps are topographic maps, showing physical features on the ground.

At first glance a cadastral map looks similar to an LR title plan. However, we can identify small dots on the plan at each bend or kink in the boundary line. Those points can be determined by coordinates and angle & distance measurements between the points. If one point goes missing, the system enables the reconstruction of this point by using the surrounding boundary markers. In Germany land registration is regulated at state level with each state having slightly different rules and regulations. However, the main idea is the same.

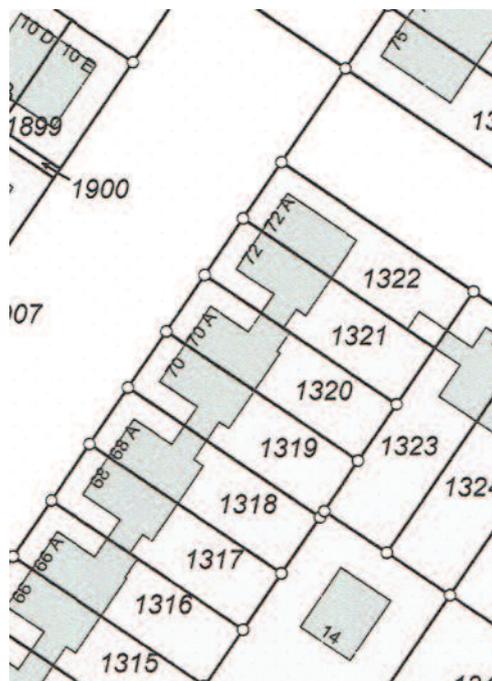
Ideally the dots will be marked by permanent markers in the ground – the so called "Grenzstein". The old permanent markers will often be buried in the ground and the surveyor will need a spade to find them. The old system sometimes used additional underground demarcation, often in the form of a pipe or bottle, placed underneath the marker. Should the actual boundary stone be lost, the pipe or bottle, buried further in the ground, might still exist.

The cadastral map is produced and maintained by a public body, called "Katasteramt". The actual registration of change of ownership of a property is recorded within the "Grundbuch", which might best translate as the "property book". The "Grundbuch" is not part of the "Katasteramt" but is under the control of another public body, the so called "Grundbuchamt". The process of entry or record of transfer within the "Grundbuch" is handled by a specialised lawyer, similar to a conveyancing solicitor in the UK. The "Katasteramt" and the "Grundbuchamt" work closely together and will update each other's records on a regular basis.

The chartered surveyor in Germany acts, when instructed by a public body, as a civil servant who is bound by the regulations set out within the county land administration law. The

Right: The cadastral map used in Germany defining the boundary of a property.

Below: A physical permanent marker representing the boundary of a property.



German chartered surveyor can also be instructed by a private landowner, for example to locate the boundary markers or to undertake a land partition. However, the surveyor will have to log any changes to the cadastral map with the public body and will have to complete the work under strict rules and guidelines set out by the public body. The chartered surveyor does to a certain degree therefore, implements the land registration law.

In many ways, this is similar to the LR requirements for transfer, first registration or boundary agreement plans. However, the German system is far more rigorous and is probably one of the most accurate and well organised in Europe. As the Germans like to be organised, this does not really come as a surprise.

Summary

There is no right or wrong in one system or the other and what works in one country might not work in another. The concept of general boundaries would probably be inconceivable for most Germans and the German cadastral system would be regarded as too much paper work and hassle for the British.

However, if we in Britain want to keep up with the challenges that land management

and the property market hold in the future, we will have to invest in maintaining and improving the system we have in the UK. The Government, the Land Registry, the Ordnance Survey and the surveyor will play a crucial part in forming the future of land administration in the UK.

The current plans by the Government to privatise the Land Registry will certainly not help in forming a progressive system and might even threaten the fundamental basis on which the land registration system is founded – impartiality and freedom of any possible conflict of interest.

About the Author

Julia Stolle MRICS MAE, is the director of Stolle Surveys Ltd, specialising in boundary demarcation and boundary dispute resolution.



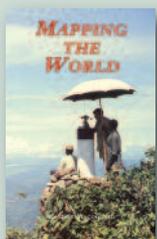
She graduated from the Technical University of Berlin with an MSc in Civil Engineering (2000). Her further work experience include projects in Cambodia, Germany and the UK.

Email: julia@boundaryconsultancy.co.uk

“... the German system is far more rigorous and is probably one of the most accurate and well organised in Europe.”

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GNSS: Galileo (finally) on the horizon

This article was originally intended for *Engineering Surveying Showcase** but was held over due to shortage of space. **Richard Groom** runs a health check on the satellites in orbit and patiently awaits the long-delayed Galileo constellation. Meanwhile China, India and Japan are forging ahead with their regional and global services.

*See page 3 for details of how to obtain a copy of *Showcase*.

THE STATUS of the GPS and GLONASS constellations are best described by referring to the tables. Both constellations are fully operational and when used together, the precision of positions is 2.4m to 4.6m in navigation mode. The constellations continue to provide the backbone for global GNSS navigation and for surveying.

Galileo has been an altogether more depressing story with the project's early history marked by delays and squabbles over funding. However, 2015 did see the launch of eight satellites, bringing the total number in orbit to sixteen. Two Ground Control Centres were also commissioned last year. This year two launches are planned in the first part of the year and there is a four-satellite launch scheduled for October. 'Initial services' should be available towards the end of 2016 and the full constellation should be operational by the end of the decade.

And so the dream of an operational third constellation providing global coverage is now close to becoming reality, bringing with it improved accuracy and reliability for surveyors, engineers and others who rely on GNSS for accurate positioning.

There has been a steady sequence of satellite launches for the Chinese COMPASS system over the past year and into 2016. The



Scientists check over a Galileo satellite prior to launch. ©Moog Bradford.

system has been providing a service for China and neighbouring countries since late 2012 and is due to have global coverage by 2020.

There are two other local navigation constellations. The final two satellites in the seven-satellite Indian IRNSS constellation are due for launch this year and will provide an independent navigation and positioning service over the subcontinent. The Japanese QZSS system will be a constellation of four satellites, designed to augment the GPS constellation. It is interesting because it was designed so that there will always be one satellite overhead in Japan, which will enhance GNSS services in 'urban canyons' in that country. QZSS should be operational in 2017.

GPS satellite constellation

	Legacy Satellites		Modernised Satellites		
	Block IIA	Block IIR	Block IIR(M)	Block IIF	Block III
Operational Satellites	0	12	7	12	In production
Launched	1990-1997	1997-2004	2005-2009	Since 2010	From 2016
Signals	C/A code on L1, P(Y) code on L1 and L2	C/A code on L1, P(Y) code on L1 and L2	C/A code on L1, P(Y) code on L1 and L2, L2C and Military M code	C/A code on L1, P(Y) code on L1 and L2, L2C, L5 and Military M code.	C/A code on L1, P(Y) code on L1 and L2, L2C, L5, L1C and Military M code.
Design lifespan	7.5 years			12 years	15 years
Features		On-board monitoring	Flexible power levels for military signals	Advanced atomic clocks. Improved accuracy, signal strength and quality	Enhanced signal reliability, accuracy and integrity. No selective availability. Laser reflectors

GLONASS constellation

	GLONASS-M	GLONASS-K1	GLONASS-K2	GLONASS-KM
No. of Satellites	22 in operation	1 in operation		
Launch date	2003-2016	2012, 2014	2015-2024	From 2024
Signals (FDMA)	L10F, L1SF, L20F, L2SF	L10F, L1SF, L20F, L2SF	L10F, L1SF, L20F, L2SF	L10F, L1SF, L20F, L2SF
Signals (CDMA)		L30C	L10C, L1SC, L20C, L2SF, L030C	L10CM, L30CM, L50CM

O' indicates open signal, 'S' indicates obfuscated signal, 'F' = FDMA, 'C' = CDMA, 'M' = interoperability CDMA signals

Source: Wikipedia February 2016

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• *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.*

A social whirl for our columnist sees him dining, cruising and hobnobbing with the stars of screen and field.

Below: with batsman Doug Walters.

Centre: Miss Fisher's Constable Hugh Collins, played by Hugo Johnstone-Burt.

Far right: with Rt Hon David Hurley, Governor of New South Wales.

Tours, trips and fine dining

Just returned from a Topp Tour to Wallarobba in central NSW where we visited Camelot Lavender Farm with llamas, mules (male donkey/female horse), hinnies (female donkey/male horse) and large brown floppy eared goats. Devonshire tea with lavender scones was sumptuous. Then on to St Peter's "church" at East Maitland (built 1886), which was as big as most cathedrals while being just as spectacular with numerous stained glass windows and a Willis organ played for our delight.

Parliamentary luncheon

Once again I felt at home in the Strangers Dining Room at NSW State Parliament House at the ISNSW Seniors Group Luncheon. A descendant of our first Governor, farmer Henry Dodd, **Patrick Dodd**, gave us a colourful insight into our greatest Governor Lachlan Macquarie's vast activities in our nation from 1810 to 1822. The event was hosted by MP **Scot Farlow**.

Hawkesbury river cruise

Being a passenger on the recently created history cruise on one of our greatest waterways, we were taken to various historic spots along the river while viewing footage on a big screen of underwater videos and a recreation of a funicular railway operating during WWII from one of the defensive posts protecting our shorelines. During WWII this section of coastline was considered vulnerable to enemy raids due to the nearby steelworks at Newcastle.

Great sports lunch with great sportsmen

At the end of February we attended an excellent sports lunch at NBC Sports Club in Parramatta with Kiwi international **Gary "The Wiz" Freeman** as MC interviewing VIP guests former First Grade Rugby League referee **Greg**

McCallum along with current Rabbitohs players **Adam Reynolds** and **Chris Grevsmuhl**. To my great excitement I was also gifted with a one-on-one talk with one of our best batsmen, **Doug Walters**, who had arrived at 11am for a 12.30pm start to reinforce the legend of his iconic sociability! Two weeks after this choice encounter we travelled by heritage train to Doug's place of birth Dungog (just past the Lavender Farm) with the *3801 Limited* with which we join regularly to venture to most interesting destinations by rail.

Miss Fisher gets her clothes off again!

I was invited to Old Government House (erected in 1799 by Governor Hunter) in Parramatta where the National Trust of Australia launched the latest Miss Fisher Costume Exhibition during a gala cocktail party with special guests **Marion Boyce** (costume designer) and **Hugo Johnstone-Burt** who plays Constable Hugh Collins in the series. Both Marion and Hugo were most personable, mixing with everyone for most of the evening.

Congratulations on 50 Years

As a life member of Parramatta and District Historical Society I was immensely proud to witness the plaque dedication of our heritage house headquarters at Hambledon Cottage (built by John Macarthur in 1824) for its fiftieth year as a house museum by the Governor of NSW The Right Honorable **David Hurley**. The Governor, who is patron of the NSW Surveyors Institution, and his most exceptional wife Mrs **Linda Hurley**, spent most of the afternoon mingling with our brilliant group of volunteers and members while partaking of the exceptional home cooking on offer for which the ladies have become renowned. Our society, founded in 1913, is second only in age to the Royal Australian Historical Society (1901).



LiDARs for UAVs

Velodyne LiDAR has unveiled the Puck LITE, which at 590 grams, is claimed to be the world's lightest 16-channel LiDAR sensor. With a 30° vertical field of view and a range of 100 metres, Puck LITE builds on the success of Velodyne's VLP-16 LiDAR Puck whilst being 250g lighter.



Meanwhile, YellowScan has also launched a LiDAR UAS surveying solution. The French company claims an accuracy of 3cm, 30,000 points per second and a weight of 1.5 kg. The system uses the Applanix APX15 single board GNSS-Inertial solution for positioning and orientation.

RIEGL unveils MMS systems

RIEGL has launched two new High-Speed Mobile Mapping Turnkey Systems featuring its high performance VUX-1HA kinematic LiDAR sensor. The VMQ-1HA High-Speed Single Scanner Mobile Mapping System uses one VUX-1HA scanner mounted on a swivel plate, enabling the measuring head to be set to different predefined mounting angles. It is also possible to integrate up to four cameras. The VMX-1HA MMS has two scanners and can record two million points per second. The roof-carrier mounted measuring head integrates an Applanix INS/GNSS unit.

Geodetic antenna from Topcon

Topcon has released a new full wave geodetic antenna — the G5-A1. The portable antenna is designed to provide improved multipath mitigation for use with a mobile base station site or network reference station. "When paired with the Topcon NET-G5 receiver, the zero-centred geodetic antenna provides a powerful and cost-effective entry-level solution" said **Charles Rihner**, vice president of the Topcon GeoPositioning Solutions Group. The antenna weighs 0.5 kg and is 17.9 cm wide.

4D Control – new version

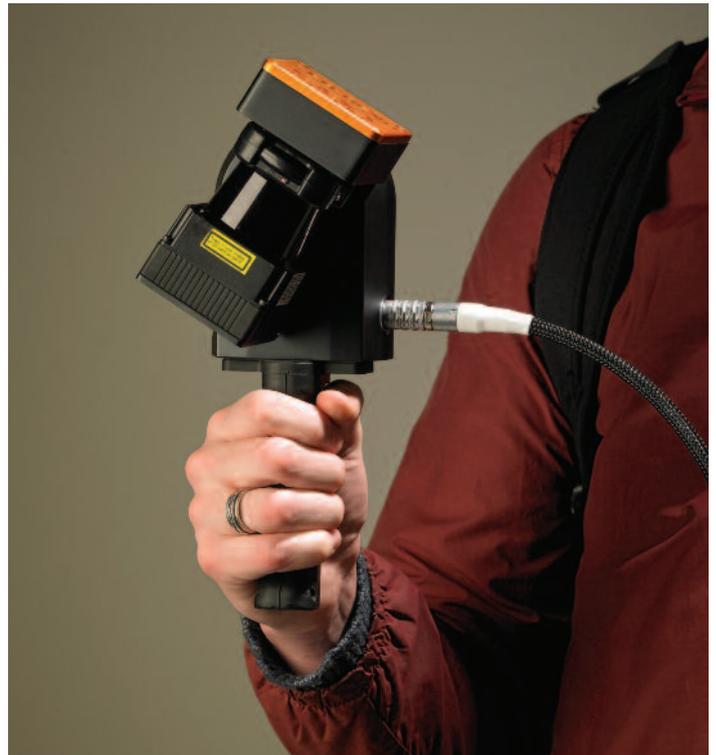
Trimble has introduced the latest version of its Trimble 4D Control monitoring software that supports the IBIS-FM radar device, which is manufactured by the GeoRadar Division of Ingegneria Dei Sistemi (IDS). IDS pioneered radar technologies for a variety of applications such as slope stability and structural monitoring in open pit mining. The device continuously scans in all-weather conditions and detects movements with sub-millimetre accuracy for distances up to 4 kilometres.

Accurate positioning at all depths

French high technology company iXBlue launched the ROVINS NANO, a state-of-the-art inertial navigation system designed for ROV navigation at Oceanology International. Based on fibre-optic gyroscope technology, ROVINS NANO has been designed for ROV pilots performing maintenance and construction operations. It offers the unbeatable stability and accuracy of the inertial position, outputting true north, roll, pitch and rotation rates. **Paul Wysocki**, iXBlue ROVINS NANO product manager, comments: "ROVINS NANO is able to directly transmit the ROV's position with extreme accuracy thanks to its integrated INS algorithm capable of collecting acoustic data. This is now possible regardless of the depth at which it is located: it is therefore not just an evolution, but rather a revolution for the Middle Water Station Keeping".

Where the Doppler Velocity Log (DVL) has limitations, especially when operating in middle water, ROVINS NANO is now there to guarantee optimal navigation safety. Product manager Paul Wysocki adds: "In the future, it will no longer be necessary to use a DVL: even in 'sparse array' LBL fields, with the presence of only one or two beacons, the combination between ROVINS NANO and our RAMSES acoustic system enables extremely accurate positioning data." iXBlue thus provides more flexibility to its customers: by avoiding the use of DVL, operators undeniably reduce their operational and associated calibration costs.

New ZEB



GeoSLAM has announced the ZEB Revo, a successor to the ZEB 1 handheld 3D laser scanner. The new model has a faster scanner, simpler operation and greater versatility. At its core is GeoSLAM's industry leading Simultaneous Localisation And Mapping (SLAM) algorithm, which facilitates rapid mobile mapping of enclosed environments without the need for GPS.

Similar to the ZEB1, the REVO captures 43,200 points per second. However, the sensor line speed has been increased to 100Hz, producing 2.5 times the number of scan lines. When combined with the auto rotation of the sensor head, there is a marked improvement say GeoSLAM in the resolution, cleanliness, and structure of the resulting point cloud. In addition to facilitating the identification of smaller features, the improved resolution also gives better quality SLAM registration results. In operation, the REVO now automatically revolves at the press of a button, making the scanner more discrete and adaptable for use in different environments.

Besides its high level of performance, ROVINS NANO adapts itself to its user: the configuration, installation and product's use have been considerably facilitated, while incorporating a system as complex as the INS. The ultimate goal? The pilot forgets the very existence of the product when manoeuvring.

Scalable GNSS receiver

Trimble has added a scalable GNSS receiver to its geospatial portfolio. The Trimble R9s is built on a sleek, modular GNSS platform and users can add functionality according to their workflow demands. **Jonathan**

Davis, GNSS marketing director of Trimble's Geospatial Division, adds "An important aspect of this receiver is scalability—it can be tailored to the exact needs of a customer's workflow. This could include being deployed as an RTK base station to an RTK rover mounted on a rod, in a backpack or even on a vehicle."

The Trimble R9s provides access to multiple GNSS constellations, wide-band 450 MHz internal radio, Ethernet connectivity and is easily configurable via the front panel. The solution also offers scalability from an entry-level receiver for post-processing, to a full-featured

triple-frequency GNSS base and rover. The R9s also supports corrections services, including Trimble CenterPoint RTX (better than 4 centimetres delivered via L-band satellite) and enhanced xFill technology, which allows surveyors to continue collecting data with centimetre level accuracy indefinitely when RTK or VRS connectivity is lost. Options such as Trimble Access field software, Trimble DL Android app and web user interface or front panel allow the receiver to be configured for optimal performance.

VR App helps keep workers safe

Arithmetica has created a fully interactive virtual reality simulation of a hazardous working environment using a SphereVision 360° video recording and production system. Designed to support health and safety training at Cape plc, an international provider of critical industrial services to the energy and natural

resources sectors, the immersive training presentation is intended to improve hazard awareness, increase perception of risk and support decision making. The Spherevision solution includes 360° video of a coal-fired power station with commentary from Cape, and is delivered using specially developed Spherevision presenter software (app) for controlling multiple Samsung Gear VR headsets.

Scanning solution changes road resurfacing workflow

Topcon Positioning Group announces a new vehicle-mounted resurfacing solution for paving and milling projects, the SmoothRide system. It uses a combination of core Topcon technologies designed to deliver the smoothest surface possible, while efficiently managing the quantity of material for each project. The workflow consists of a vehicle-mounted road scanner, existing and finish surface design, and machine control using GNSS with sonic tracker sensor guidance.

Surphaser Model 10

Basis Software has announced the first in a new product line of compact light weight scanners. The Surphaser Model 10 provides sub-millimetre accuracy with an integrated camera, internal battery, onboard control and a weight of 5kg. The Model 10 uses a Class 1 laser to capture a 360° x 270° field of view with a 3D error of <0.7mm (at 15m) and range noise of <0.12mm (at 15m/90% albedo). The two integrated 5MPx cameras provide automatic colour texture mapping with the included software.

SurphSLAM high precision mobile mapping system



Basis Software and GeoSLAM Ltd have launched SurphSLAM, a trolley-based mobile mapping system that combines the Surphaser 10 laser scanner and GeoSLAM's new RealTime SLAM registration software. The system can be used for extremely accurate high resolution 3D mobile mapping without the need for GPS by using the 3D SLAM algorithm.

New scanners from FARO

FARO Technologies has announced the new Focus3D X Series laser scanners with High Dynamic Range (HDR) capability. The Focus3D X 130 and 330 HDR scanners now capture HDR photographic overlays of scans for life-like picture quality and details, even in challenging lighting conditions. Critical details within a scene or structure are documented with colour, ensuring optimal point cloud visualization.

Predefined HDR profiles increase the quality of pictures recorded in challenging lighting conditions such as direct sunlight, overcast skies, interior conditions, and dark shadows

Increased camera resolution of the Focus3D HDR acquires life-like colour overlays for scanned point clouds and improved dynamic

imaging capabilities.

Faro has also released SCENE 6.0 of its software with new and improved automated workflows. A new solid surface rendering engine presents point cloud data with unmatched clarity and detail. Intelligent algorithms reduce gaps in the point clouds to a minimum, and the new full colour detail functionality provides best detail even on low-resolution scan data.

Monitoring partnership

Topcon has announced Topcon Delta, a deformation monitoring solution for construction, tunnelling and mining. A system of software and hardware components, it delivers accurate and reliable monitoring measurements and associated reporting to provide protection of assets during works. Topcon Delta is the result of a partnership formed between Topcon and deformation monitoring and tunnelling specialist VMT GmbH. The partnership is designed to bring the fusion of each company's respective products and technologies to provide customers with a complete monitoring solution.

IN BRIEF

Following the announcement of a partnership, Leica Cyclone point cloud software can now combine with DotProduct's handheld 3D scanner and SpheronVR's imaging solution to deliver end-to-end and integrated workflows. Using DotProducts' handheld scanner, professionals can augment their 3D views of the world and capture/integrate hard-to-reach or obstructed objects.

Topcon Positioning Group has released a new excavator system with local positioning system capabilities — the X-53 LPS, for use in sky-obstructed areas. The system can provide positions using a total station or, when available, GNSS.

Leica Geosystems has announced the launch of a Live Chat function enabling users to speak instantly in real time, to one of their technical support team. All you will need is a valid CCP and myWorld account.

SURVEY REVIEW

Survey Review is a leading and prestigious journal published bimonthly by Taylor & Francis Group on behalf of Survey Review Ltd. The journal brings together an unrivalled body of knowledge in the land and engineering surveying professions, publishing papers on research, theory, practice and management. All papers are peer reviewed and are drawn from an international community, including government, private industry and academia. The Journal is invaluable to practitioners, academics, researchers and students who are anxious to maintain their currency of knowledge in a rapidly developing field.

Further information and abstracts of recent issues can be found at www.surveymagazine.org. Orders and requests for inspection copies should be sent to: subscriptions@tandf.co.uk.

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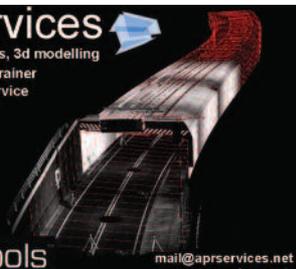
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