Geomatics World

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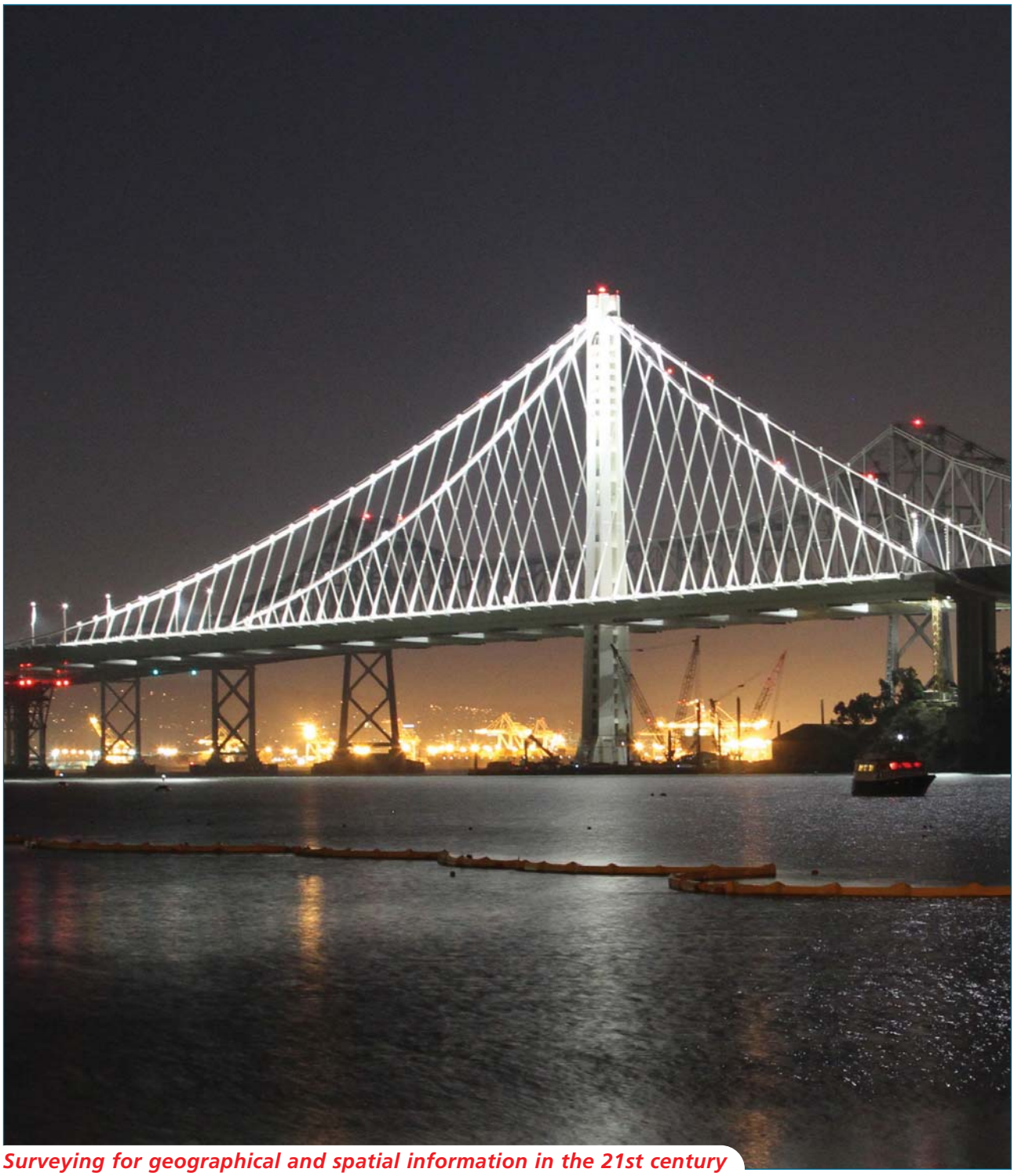
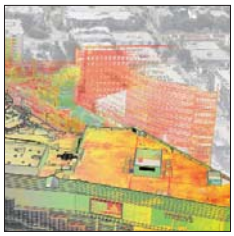


Surveying for geographical and spatial information in the 21st century

Multicopter charts the way for new hyperspectral sensor

Esri's Urban Observatory into 22 world cities

Scan to BIM helps update top Beverly Hills Mall



Rain doesn't stop merging technologies at the Oval

Lost African heritage preserved by 3D scanning

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Editor: Stephen Booth

Technical Editor: Richard Groom

News Editor: Hayley Tear

Advertising & Subscriptions: Sharon Robson

Editorial Board
Pat Collins, Richard Groom, Alan Haugh, James Kavanagh, Professor Jon Mills, Dr Stuart Robson, Dr Martin Smith

Overseas Sources
Roy Dale – New Zealand
Nick Day – USA

Editorial and advertising:
e-mail: editor@pvpubs.demon.co.uk
Web: www.pvpubs.com
T: +44 (0) 1438 352617
F: +44 (0) 1438 351989

Mailing: PV Publications Ltd
2B North Road
Stevenage, Hertfordshire SG1 4AT
United Kingdom

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PV Publications Ltd
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T: +44(0)1438 352617
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COVER STORY

The new East Span of the San Francisco-Oakland Bay Bridge cost $6.4bn, making it the world's most expensive bridge according to the *Guinness Book of World Records*. For more turn to page 30.

© photo Nick Day.

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The Mollenhauer Group has been busy capturing one of the world's largest and most exclusive malls ahead of a redesign. **Chris Gray** and **Jenny Clark** report.

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GW's Digital Extras **You can read more articles from this issue online including:**

The CyArk 500 Challenge a not-for-profit organisation plans to capture 500 world heritage sites in high accuracy 3D. GW's Richard Groom reports from the launch at the Tower of London.

http://www.pvpubs.com/archives.php?titleid=1&issueid=220

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Note: the electronic version can now be downloaded as a PDF.

NEXT ISSUE The next issue of ***GW*** will be March / April 2014.
Copy dates are: Editorial: **10 February** Advertising: **14 February**

Engineering surveying *showcase 2013* ISSUE TWO

Did you get your FREE copy of *Showcase*? 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. Overseas readers can still view the latest issue by going to:
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Promising agenda for 2014

The year ahead offers better opportunities than we've had since the financial crash of 2008. But it does need members to engage in events and in their journal. Tell us how we can improve and how you can contribute to the editorial agenda.

Welcome to 2014, a year for which much is promised. The world economy is showing signs of improvement, led by the US. While here in the UK the coalition government has persuaded itself and most of the media that our economy too is improving. We shall see. Closer to surveying and geomatics we have a new event to look forward to at the end of May in London. GEO Business could be a real game-changer for our business but it requires the engagement of individuals as well as the professional and other organisations that operate across the geospatial sector. More details at **http://geobusinessshow.com/** For the offshore sector there is Oceanology to look forward to in March (**http://www.oceanologyinternational.com/**). Plenty of opportunities there.

Two topics are bound to run through *GW* this year: BIM and unmanned aerial systems (UAS). Both are in this issue, with BIM especially making a strong presence through Mollenhauer's work at the Beverley Hills Center (page 12). For UAS (aka UAVs) we may yet have to bow to popular media and call them drones so our clients know what we're talking about.

Reducing the size of sensors is helping grow the market for UAS. We have already seen a multicopter with a Faro scanner aboard and now the development by Cubert of a light-weight hyperspectral sensor is a sign of opportunities to come in the agricultural and land management sectors (page 20).

In early December last year came the sad news that author **Andro Linklater** had died, just as his latest book was published in the US. Andro's previous book on *Measuring America* was a bestseller, explaining lucidly the connection between the emergence of a modern economy and standards of measurement. His latest work, *Owning the Earth* focuses on how individual land ownership has transformed economies over the last quarter millennia, while economies that have kept communal or monarchical systems have languished. We shall bring you a review in the next issue of *GW*.

Finally, here are some of the themes we want to follow over the coming year in *GW*. Can you contribute with an article? Any style is welcome – a short news story, a brief case study or a longer paper. Drop me a line at **editor@pvpubs.demon.co.uk**

GIS & Geomatics: the role of geomatics in GIS. Perhaps Jack Dangermond's lecture on GIS & Web Cartography (page 18) could be a starting point.

Measured Building Surveys, BIM and Facility Management. This is bound to be a recurrent topic during the year and we shall try to keep you informed on the progress of RICS's own BIM. But there is much more to talk about and to share best practice. Will cheaper scanners be a trigger for as-built BIMs?

EDM & Optics vs. Digital Cameras. This is an opportunity to look at some of the latest data capture tools that rely on photogrammetric solutions as well as the integration of scanning technology in total stations.

Maps, Land Registration and Surveys: can they be reconciled? This is a thorny topic for many practical field surveyors. Your views please.

Measuring and monitoring the seabed: new tools for new datasets. Time to get wet.

Laser scanners: is there anything they can't do? Tell us about your apps and what works and what pushes the envelope just a bit too far.

Data: where to keep it? On your desktop? In your pocket? Or in the cloud? Views on managing and keeping data secure please.

Colliding worlds: remaining professional in a privatised world where profit, sales targets and PR are the drivers.

GIS and mapping in geopolitics. Mapping is often the first resource needed in a time of crisis, whether by the military, NGOs or the media. But do out-of-date or poorly scaled maps influence opinion and critical decision making?

Stephen Booth, Editor

The editor welcomes your comments and editorial contributions by e-mail: *editor@pvpubs.demon.co.uk* or by post:
Geomatics World
PV Publications Ltd
2B North Road
Stevenage
Herts SG1 4AT
United Kingdom

TEN YEARS AGO

GW JANUARY/FEBRUARY 2004

A striking front cover of crop marks in the shape of giant human feet heralded the first issue of 2004. Built by **Erna Reich**, the marks were captured from space by the Ikonos satellite. In other spaceborne news, the Russian Federation had just launched three new satellites for the Glonass constellation, affirming their commitment to the system.

The issue featured forensics with articles by two Australians: the late **Ian Harley** and Prof **John Fryer**. **Spencer Chainey** of the Jill Dando Institute of Crime Science offered the GIS perspective on crime.

Once colloquially known as "Hollwey's Academy" after teacher **John Hollwey**, the University of East London was celebrating 50 years of educating surveyors, first as the South West Essex College, then North East London Polytechnic before university status was granted in 1992.

In the news was the late Rear Admiral **Steve Richie** who had just opened his eponymous building at the Taunton headquarters of the UK Hydrographic Office.

Maptek models for gamers

Late last year Maptek was asked to survey Mount Panorama in New South Wales for a video game. An I-Site 8800 scanner was mounted on a vehicle with a GPS unit to conduct the surveys. Stop-go scanning allowed the operator to remain in the vehicle, while scans were observed every 100 metres. The integrated camera in the I-Site 8800 captured simultaneous photographs, allowing scans to be overlaid by photo pixels for enhanced reality. Game developers required a four-sided polygon to model the track data. Point cloud data was exported from I-Site Studio software for processing. Being able to obtain a high intensity laser return from the black asphalt proved to be the biggest benefit of using the I-Site system. The finished game was released in November so gamers can now experience every bump on the track, as if they were driving it themselves.

Carl Pulfrich Award 2013

Hexagon has announced that the Carl Pulfrich Award 2013 for innovation in geodesy, photogrammetry and earth sciences has been awarded to Prof Dr **Nicholas C. Coops**, Vancouver, and Prof Dr **Norbert Haala**, Stuttgart. Professor Coops has made outstanding contributions to solving mapping problems in biodiversity, especially in using remote sensing technologies for vegetation growth and canopy characterisation. Professor Haala has made huge impacts to further develop photogrammetric restitution, in particular in the areas of 3D city modelling, dense image matching and use of UAVs.

Intel Capital invests in DotProduct

DotProduct's handheld scanning device has received seed funding to accelerate development and sales growth. "3D reconstruction will change the way we capture the world, from objects, people and places," said Mark Yahiro, managing director of new business for Intel's Perceptual Computing Group. "DotProduct is on the forefront of the next wave of computing and we are excited to see their solutions come to the market." DotProduct software runs on widely available, low-cost tablets; uses off-the-shelf 3D camera sensors and connects to well-established design, engineering and capital asset management solutions.

Topcon donates to DIT

Topcon has equipped two laboratories at the Dublin Institute of Technology (DIT) with state-of-the-art equipment. The donation, worth more than $500,000, has been made as part of the company's education partnering initiative. **Ray O'Connor,** a DIT graduate, president and CEO of Topcon Positioning Systems (TPS), and senior managing executive officer with Topcon Corporation, formally launched the two technology labs for surveying and optometry students on Wednesday, October 23, at two DIT campuses.

Leica recertifies

The Quality and Environmental Management System of Leica Geosystems AG has been recertified to ISO 9001:2008 and ISO 14001:2004 compliance for the development, manufacture, distribution, support and service of products, precision tools and systems for geomatics, industrial, machine control and construction applications with zero non-conformities. With the recertification, Leica Geosystems combines its previous certificates under one global certification scheme. "The transition to a global certificate is an important step to further align our internal processes globally," said Gerhard Heimlinger, director quality management of Leica Geosystems.

Unravelling Earth's magnetic field

The Earth's magnetic field can be thought of as a huge bubble, protecting us from cosmic radiation and charged particles that bombard the planet in 'solar winds'. Without this protective shield, the atmosphere as we know it would not exist, rendering life on Earth virtually impossible. Even as it is, strong solar storms have the potential to cause power and communication blackouts, and also to damage satellites orbiting Earth.

'Swarm' is the European Space Agency's first constellation of satellites to advance our understanding of how the Earth works. Harnessing European and Canadian technological excellence, the three Swarm satellites will measure precisely the magnetic signals that stem from the Earth's core, mantle, crust and oceans, as well as its ionosphere and magnetosphere.

The geomagnetic field models resulting from the mission will provide new insights into the Earth's interior. The data, along with measurements of atmospheric conditions around the orbiting satellites, will further studies into the Earth's weakening magnetic shield, space weather and radiation hazards.

Tracking a giant iceberg

Professor **Grant Bigg** from the University of Sheffield has been awarded a £50,000 grant from the Natural Environment Research Council (NERC) for a six-month project to track the movements and melting of a giant iceberg the size of Singapore as it moves through the Southern Ocean. The research collected by tracking its movement, and modelling its trajectory and melting will be used by the shipping industry and associated agencies currently using the Southern Ocean to provide more accurate ice warnings.

Realising the potential of mobile mapping

3D Laser Mapping has signed a reseller agreement with Orbit Geospatial Technologies to turn raw mobile mapping data into manageable, easy to use, GIS-integrated content that empowers companies to utilise mobile mapping information across an organisation. Orbit's mobile mapping products allow for the viewing and management of data captured by systems such as StreetMapper. There are tools for measurement, feature extraction, GIS integration and overlay, organisation wide deployment and sharing as well as publishing, embedding and processing of mobile mapping content.

Situational Awareness standard

A key element to efficiently handling any emergency or operation is a common "situational awareness". The ability to share the same common operational picture between all respondents is critical. The Open Geospatial Consortium (OGC) answer to address this paradigm is the OWS Context specification. In a crisis, when time is of the essence, an emergency responder, a soldier or a geospatial analyst, can create a view of the situation by pulling together feature data, map and imagery data. This data can be supplemented with text or graphics to point out areas of interest. All of this can then be captured in an OWS Context document in order to share a common assessment of a situation with others setting the framework from which all operations will then have a

common understanding. OGC has therefore adopted the OGC OWS Context Conceptual Model and the associated OGC OWS Context ATOM Encoding as adopted standards, along with schemas and examples.

Keep current, licensed and legal

An Ordnance Survey study carried out across Great Britain reveals that approximately 45% of all planning application maps submitted are either unlicensed or incorrectly displayed. This news follows an OS study that showed 40% of land and property professionals, including civil engineers, architects, property lawyers, developers and housing associations, could be using out of date or unlicensed mapping information in their work.

Using out of date or unlicensed mapping data carries the risk of making decisions based on incorrect information, says OS, and means land and property professionals who do this may not be giving their colleagues and clients the full and accurate picture. As well as having the potential for creating delays, conflict and increased project costs, the use of unlicensed copyright mapping data is also against the law. Furthermore, if a practice is a small business, the owners or directors are more likely to know of the unlicensed use, which is more serious in law. Under such circumstances professional indemnity insurance could be put at risk.

Innovation programme for East Midlands

A new project led by The University of Nottingham is aiming to place innovation from the East Midlands at the forefront of the international space industries. The Satellite Applications Business Innovation Programme will be targeted at overcoming the challenges of taking innovative academic research from university laboratories to the marketplace.

The programme at the University's GNSS Research Applications Centre of Excellence (GRACE), a knowledge transfer and business engagement unit based at the University's Nottingham Geospatial Institute (NGI), will also connect local businesses in the region to work taking place at the national Satellite Applications Catapult, based in Harwell in Oxfordshire, which centres on the development and commercial exploitation of space and satellite-based products, services and applications.

Paul Bhatia, general manager at GRACE, said: "The global space sector is predicted to grow to £400 billion by 2030, with the Government driving the UK's huge ambition to increase its share of that from the current £7bn to £40bn."

Among the challenges which the programme will be addressing will be tackling the so-called "valley of death" — the gap which has arisen between the development of technologies through academic research and the ability to transform it into an end result which is market ready. Product development is a costly business and it can often be difficult to attract businesses willing to gamble on its potential success.

Leica HDS Symposium

Leica held its annual HDS users' symposium on 4th December at its new offices in Milton Keynes. Seventy-eight delegates took part in the event which covered a range of topics presented by users, including BIM, scanning surveys of ships, industrial plant and heritage and presentations on calibration and verification procedures at Leica's factory, the new check and adjust feature on the P20 scanner – shortly to be extended to the C10, new licensing procedures for Cyclone, and getting the most out of Truview, which were presented by Leica staff. Participants were also treated to a sneak preview of a series of TV programmes on scanning for heritage which is due to be aired on the National Geographic channel in the new year.

Satellite-derived bathymetric maps

Proteus FZC, has delivered accurate bathymetric and seafloor classification maps for a joint UK-France amphibious military exercise on Corsica. In the pilot, managed by the UK Hydrographic Office (UKHO), Proteus partnered with DigitalGlobe to derive accurate bathymetric measurements and identify four seabed types to a depth of 12 metres from multispectral satellite imagery without ground control. The vertical accuracy of the bathymetry was verified at 10-15% of water depth. "We completed the Corsica coastal marine mapping project in about one-tenth the time and cost of traditional sonar or LiDAR," said Proteus CEO **David Critchley**. For more information see Jan/Feb issue of Hydro International.

Aworth – 50 years in survey

Leica Geosystems has presented a piece of heritage equipment, to Aworth Survey Consultants, to mark the company's 50 years in business. A surprise presentation of a specially engraved Wild /Leica Zenith & Nadir optical plummet, circa 1963, was made to Aworth's managing director John Witherden (above left) during a group discussion meeting of The Survey Association (TSA) at the Imperial War Museum, Duxford. Leica Geosystems' UK direct sales manager Tim Badley, who made the presentation, said, "It is a great pleasure to be able to congratulate John personally on successfully leading Aworth to their 50th year and to wish them many more years of success. It seemed altogether appropriate to present Aworth Survey Consultants with a piece of Wild/ Leica survey history to mark this milestone."

BRIEFS

The Association for Geographic Information (AGI) is the latest organisation to back the GEO Business event, which takes place in London 28-29 May 2014. As a collaborator of the event AGI joins other leading industry organisations including the Chartered Institution of Civil Engineering Surveyors (ICES), the Royal Institution of Chartered Surveyors (RICS) and The Survey Association (TSA).

Ugandan daily, *New Vision* reports that the German government has signed an agreement with Uganda to facilitate the demarcation of its borders with Rwanda. The agreement was signed in Kampala at a ceremony where German ambassador **Klaus Dieter Düxmann** handed over an assortment of equipment to Ugandan Lands, Housing and Urban Development minister **Daudi Migereko**. The project is being undertaken under the African Union Border Programme. The programme runs under the motto 'from barriers to bridges' which underlines that international borders should not be perceived as barriers but rather as bridges. Visit: www.newvision.co.ug

Ordnance Survey International has signed a five-year specialist advisory framework agreement with the Survey and Land Registration Bureau (SLRB) of the Kingdom of Bahrain. The agreement provides an opportunity for both organisations to work together collaboratively on a number of projects, the first of which will be the development of a new long-term strategy, which will support SLRB in continuing to develop its role as the authori-

Awards at London Survey Dinner

In November, a hundred and twenty leading members of greater London's geospatial community gathered at the Dover Street Restaurant in Mayfair for the London Survey Dinner, hosted by the survey equipment company, SCCS. For the first time at the event SCCS made three awards.

The Most Innovative Use of New Technology award was presented to Nigel Drayton and Ian Campbell from Costain's London Power Tunnels project for their early adoption of the Leica MS50 Multi Station for monitoring the thickness and profile of the sprayed concrete lining being applied on the project. The Technical Collaborator of the Year award went to Steven Thurgood of Skanska Civil Engineering for his approach to developing, communicating and sharing best practice whilst working with his Costain Skanska JV engineering surveying team at Crossrail Paddington C405. SCCS Partner Project of the Year was awarded to Michael May (*above left receiving the award from SCCS' sales & marketing director David Price***), representing the Victoria Station Upgrade project currently being undertaken by Taylor Woodrow BAM Nuttall JV.**

tative cadastral and mapping authority for the Kingdom.

The UK's Department for Environment, Food and Rural Affairs (Defra) has designated 27 areas around England's coast as marine conservation zones (MCZs). Also announced are two further phases of MCZs to be designated over the next three years. Factsheets for the 22 inshore MCZs are available from Natural England and factsheets for the five offshore sites are available from the Joint Nature Conservation Committee.

Bluesky is supporting a £1 million three-year research project into the potential costs and benefits of solar energy in the UK. Funded by the Engineering and Physical Sciences Research Council (EPSRC), PV2025 aims to answer a number of questions relating to the production of solar energy through photovoltaics across the UK and how geography, legislation and social factors might impact on the costs and benefits to UK Plc.

The Marine Management Organisation (MMO) has granted permission to the National Renewable Energy Centre (Narec) to build a grid-connected, 99.9MW demonstration offshore wind project off the coast of Blyth in Northumberland. The project is the first large-scale, deep water demonstration site in the UK to be granted both offshore permits and onshore consent. It will provide a facility for industry to test next-generation offshore wind technology in realistic conditions before commercial production.

GNSS developer Altus Positioning Systems has joined the Esri Partner Network, a global community of companies developing and selling GIS using the ArcGIS platform. The network has more than 1,800 organisations doing business in nearly 80 countries around the world.

Trinder leads SSSI

Australasia's Surveying and Spatial Sciences Institute (SSSI) has welcomed Emeritus Professor **John Trinder**, as its new President for the term 2013-15, having been on the board of SSSI since 2011. Prof Trinder, graduated from the University of New South Wales (UNSW) in 1963 and has been employed by UNSW since 1965. He was the President of the International Society for Photogrammetry and Remote Sensing (ISPRS) from 2000 to 2004.

Loughran joins Bluesky

Bluesky has appointed Robert Loughran as international sales manager. Previously with Fugro, Infoterra and BKS Surveys, he joins at an exciting time as the Leicestershire company looks to expand its global operation, maximising on its investment in aerial survey equipment.

O'Connor joins Hall of Fame

Ray O'Connor, president and CEO of Topcon Positioning Systems, and senior managing executive officer with Topcon Corporation, was inducted into the Association of Equipment Manufacturers (AEM) Hall of Fame during its 2013 annual conference held in early November. The award recognises and celebrates outstanding individuals in the off-road equipment industry, and their legacy of innovation, service and leadership.

"I am extremely humbled by the award", said O'Connor. "This honour can't be achieved by an individual but only by a team of people with a passion to succeed. The team of employees and distributors we have at Topcon exemplifies this."

Holcroft & Kedar join OS

Chris Holcroft and **John Kedar** have joined Ordnance Survey International as directors of strategic business development. Holcroft will be responsible for developing long-term partnerships with stakeholders in the Middle East while Kedar will be focusing on the successful relationship with the Kingdom of Bahrain.

Events Calendar 2014

• SEMINARS • CONFERENCES • EXHIBITIONS • COURSES

We welcome advance details of events likely to be of interest to the Geomatics community. Please send details to: editor@pvpubs.demon.co.uk

Defence Geospatial Intelligence 2014
21-23 January 2014, QEII Conference Centre, London, UK *Contact:* www.wbresearch.com/dgieurope/home.aspx

GeoUtilities 2014
28-29 January 2014, London, UK.
Contact: www.geospatialutilities.com

RICS BIM Conference
12 February 2014, London, UK.
Contact: www.rics.org/uk/training-events/conferences-seminars/rics-bim-conference/london/

International LiDAR Mapping Forum (ILMF)
17-19 February 2014, Hyatt Regency Denver, Colorado Convention Center, Denver, Colorado, USA. *Contact:* www.lidarmap.org/international

Esri Partner Conference 2014
8-11 March 2014, Palm Springs Convention Centre, CA, USA.
Contact: www.esri.com/events/partner-conference

Esri International Developer Summit 2014
10-13 March 2014, Palm Springs Convention Centre, California USA.
Contact: www.esri.com/events/devsummit

Oceanology International 2014
11-13 March 2014, London, UK.
Contact: www.oceanologyinternational.com

SPAR International 2014
14-17 April 2014, The Broadmoor, Colorado, USA.
Contact: www.sparpointgroup.com/International

INTERGEO Eurasia
28-29 April 2014, Istanbul, Turkey.
Contact: www.intergeo-eurasia.com

GEO Business 2014
28-29 May 2014, Business Design Centre, London, UK.
Contact: http://geobusinessshow.com

Opportunities ahead for Geomatics

– but we have to explain modern survey techniques

A new year and a chance to meet and greet at GEO Business in May. Meanwhile, we have work to do in explaining to clients what geomatics can offer them, like our key role in BIM.

Chris Preston *welcomes your comments and thoughts so please email on the following address* ***geochair.rics@gmail.com***

At the turn of year we often reflect on the previous year's events, be they good or bad. My family had a wonderful wedding, when my eldest daughter got married. It was wonderful to see everyone in one place and enjoying the time together with one another. This reminds me to think forward to *GeoBusiness14* and the opportunity for all involved in this industry of ours to "meet and greet" at The Business Design Centre in late May. Have you submitted a paper abstract or signed up for the event yet? You can be sure your colleagues, friends and competitors will be there. What about you?

Members worldwide join debate

At the Geomatics professional group board meeting just before Christmas it was terrific to see many of our colleagues from all around the world and we had some interesting debates about the state of the profession worldwide. There are so many issues to address that a clear focus is needed to try not too attempt far too much with the limited resources at our disposal. We had a discussion around the way the RICS can influence the situation on projects in several African countries.

There is an opportunity for RICS corporate to influence the funders of projects to insist upon appropriate standards being applied at all stages within these projects. So often there is not enough attention to for example, the specification. This is often over specified or not appropriate and there is always reference to "the engineer" deciding what is needed. The engineer may often be from a large international consultancy, who may have little understanding of modern surveying techniques, so there is a need for an "informed client" to oversee such matters. An opportunity for us?

It is always interesting to follow up on some of the latest news stories on the internet. One story in particular comes to mind. I can remember many years ago using a presentation slide showing a pizza delivery man using co-ordinates from GPS for the location of his customer which seemed pretty far fetched at the time. Well, fast forward 20 years and we have Amazon talking about delivering parcels using unmanned aerial systems, so I wonder how long this will be before this is the norm?

This also sets me thinking about the future and you will soon be hearing about "RICS futures," building on a paper from Professor **John Radcliffe** on *RICS Strategic Foresight 2030* published in 2011. The RICS futures sets out the so called "7 Pillars": Thinking ahead, Leadership and Inspiration, Sustainability, New skills and Multi-disciplinarily, Networks, Technology, Ethics, values and Standards. For more information visit: **http://www.rics.org/us/the-profession/ rics-futures/brochure/.**

Tell us about your BIM experiences

Some of my contacts are telling us that BIM is beginning to have some impact in providing new opportunities for our members with the larger commercial property companies. These companies are beginning to realise that to unlock the potential of BIM, they need good, competent surveyors from our specialism, so long may it continue. Naturally, I would be keen to hear of the experiences of such surveyors, especially if they are training other colleagues about BIM.

As a final thought, I wonder who actually reads these columns? Is this an appropriate medium to communicate with you or should we be focusing our attention on Tweeting or Linked In?

Changing address or moving on?

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The East's mystic elements define a history of the US

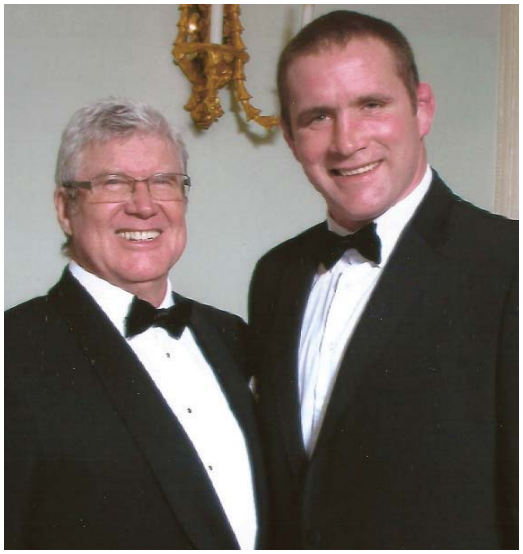
Some good friends remembered amid a fascinating new history of the USA by an author who finds himself in Paradise with the Angels eating cherry pie!

The autumn and winter lectures at RGS have again been outstanding. Perhaps the best to date was Simon Winchester talking (loosely!) about his new book, *The men who united the states*, which he described as 'a plum pudding of a book' before going on to extract some very ripe plums.

He began his talk by asking if any in the audience knew what the pottery town of East Liverpool Ohio was famous for? The Editor and I both had a glimmering of what it might be but of course were too frightened for fear of ridicule to put our hands up. It was the "point of beginning" – the spot where the great land sell-off began in 1785, which defined America with its well demarcated land divisions. It is well documented in Andro Linklater's *Measuring America*, of which more anon.

Winchester's book examines the lives of key people who were instrumental in shaping the US. The subjects include pioneers, explorers, inventors, eccentrics and mavericks arranged not in chronological order but under the ancient eastern elements: Wood, Fire, Earth, Metal, and Water. I will tell you about two of them.

Clarence King founded the US Geological Survey then based in New York. Every fortnight or so he would head out of the office telling his staff he was off to some far-flung corner of the continent. In fact, he was just strolling across the Brooklyn Bridge to spend time with his black wife and children, who thought he was a conductor on a Pullman train under the name of **James Todd**! At that time a mixed race marriage was a rarity. King had convinced his wife in any case that he was part black. His eccentric domestic arrangements were clearly troubling him because just before he died in Arizona (he did get around to some surveying!) he unburdened himself to a doctor before he died. The doctor's death certificate had the spaces for "Black" or "White" crossed through and replaced with the word "American".



Yours truly with Phil Vickery, former English rugby union tighthead prop and member of the England squad that won the World Cup in 2003.

Our next "plum" is perhaps not so colourful but was certainly important.

While **Marconi** is attributed with being the father of radio transmission it was down to **Reginald A. Fessenden** (1866-1932) that we can hear speech on the radio waves. He was the first to devise a complete system of wireless transmission and reception. By using amplitude modulation (AM) of continuous electromagnetic radio waves he was able to transmit speech and music instead of just the dit-dit, da-da of Morse code. In 1906 he announced to a waiting world that just before midnight on Christmas Eve ships and others with wireless sets should tune in. What they heard was not only human speech for the first time but a beautiful recording of Ombra Mai Fu from Handel's opera *Xerxes*. From then on it was only a short time before the first radio stations were broadcasting to the world.

Winchester so loves America that he has become a US citizen. He certainly has a great repertoire of anecdotes about the place. During one of his early visits he set out (on behalf of his English publishers) to visit every town in the US called Paradise. There are eighteen of them. In Paradise Missouri he met a Mr & Mrs Angel who invited him into their home and fed him cherry pie. He thought it was indeed the nearest he would ever get to heaven without dying – eating cherry pie with the angels in paradise!

Questioned at the end of his lecture he was asked what he thought of the deep and acrimonious divisions between the Republicans and the Democrats. He dismissed it as 'a storm in a Tea Party'!

Andro

I was very saddened to learn of the death of **Andro Linklater**, the author of *Measuring America* and also a good friend. The funeral at his parish church in Markbeech where he had sung in the choir, was a massive turn out. Andro is a big loss. His funeral took place on the day his latest book was published in the US. *Owning the Earth – the transforming history of land ownership* promises to be a fascinating read. It should be available in the UK by the time you read this and I am sure GW will eventually publish a review. So far it is every bit as good as *Measuring America*, to which the editor and I both made a small contribution.

Brian Snelling

The bad news continues I'm afraid. **Brian Snelling** who ran Wild Heerbrugg in the UK,

joining in 1966 as sales manager, died at the end of August. He was a great character and really developed the business that was to become Leica Geosystems. I last spoke to him in March 2013 last year when I tried to encourage him to come to the Jasbeens reunion at Elstree but failing eyesight prevented him.

Huntings lunch attracts 59 – 4 over 90!

My old friend **Ron Craven** writes to report on the annual Hunting's Surveys re-union lunch. This year was the 26th anniversary of the demise of HSL and the lunch was held at Hadley Wood Golf Club on 8th October arranged by John Leatherdale. Fifty-nine former staff attended accompanied by their partners, including four over the age of ninety.

Mr **Richard Hunting**, now chairman of Hunting's Plc attended; he once worked at HSL before going to university. One person who was there for the first time, who most people had not seen for over 50 years, was Edge Green a former navigator, who worked for Hunting Aero Surveys Ltd as the firm was called then. Edge went from there to be an air traffic controller at Heathrow Airport.

London Survey Dinner

Still on the social side of the business, I want to thank **Paul MacArthur** of SCCS for inviting me to his London Survey Dinner at the Dover Street Restaurant held at the end of November. A fantastic gathering of surveyors and a great evening with so many old friends and acquaintances. It was especially good to catch up with **Frances McDonnell,** one of the too few really able female engineering surveyors in our business. She is currently working for a tunnelling consultant at London Bridge and travels in every day from Maidenhead to be at work by 7am. They say people are having to work harder and longer hours these days; it was ever thus for surveyors.

It was also good to catch up with **Tony Beagley**, **Chris Preston**, **Peter Rowe**, **Richard Maltby, David Norris**, **David Price**, **Tim Brennan**, a whole host of **Greenhatch** surveyors and many others plus of course our host, **Paul MacArthur**.

Miscellany

And now, with the Pythons about to reform, for something different. The following are culled from the deep vaults of the rich and the famous who definitely won't want reminding of them.

"The Bomb will never go off, I speak as an expert in explosives."

Admiral William Leahy, on the US Atomic Bomb Project.

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us"

Western Union internal memo, 1876.

"I think there is a world market for maybe five computers."

Thomas Watson, chairman of IBM.

"I have travelled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year."

The editor in charge of business books for Prentice Hall, 1957.

"We don't like their sound, and guitar music is on the way out"

Decca Recording Company. rejecting the Beatles in 1962

"I don't know what use any one could find for a machine that would make copies of documents. It certainly couldn't be a feasible business by itself."

The head of IBM, refusing to back the idea, forcing the inventor to found Xerox.

"There is no reason anyone would want a computer in their home."

Ken Olson, president, chairman and founder of Digital Equipment Corp. in 1977.

The sayings of the ancient Chinese sage **Confucious** (born six centuries before Christ) seems to have far outlived just about any other philosopher on the planet. However I suspect the following attributed to him are a bit iffy:

Confucius say:
A joke is like sex. Neither is any good if you don't get it.

Confucius say:
A drunken man's words are a sober man's thoughts.

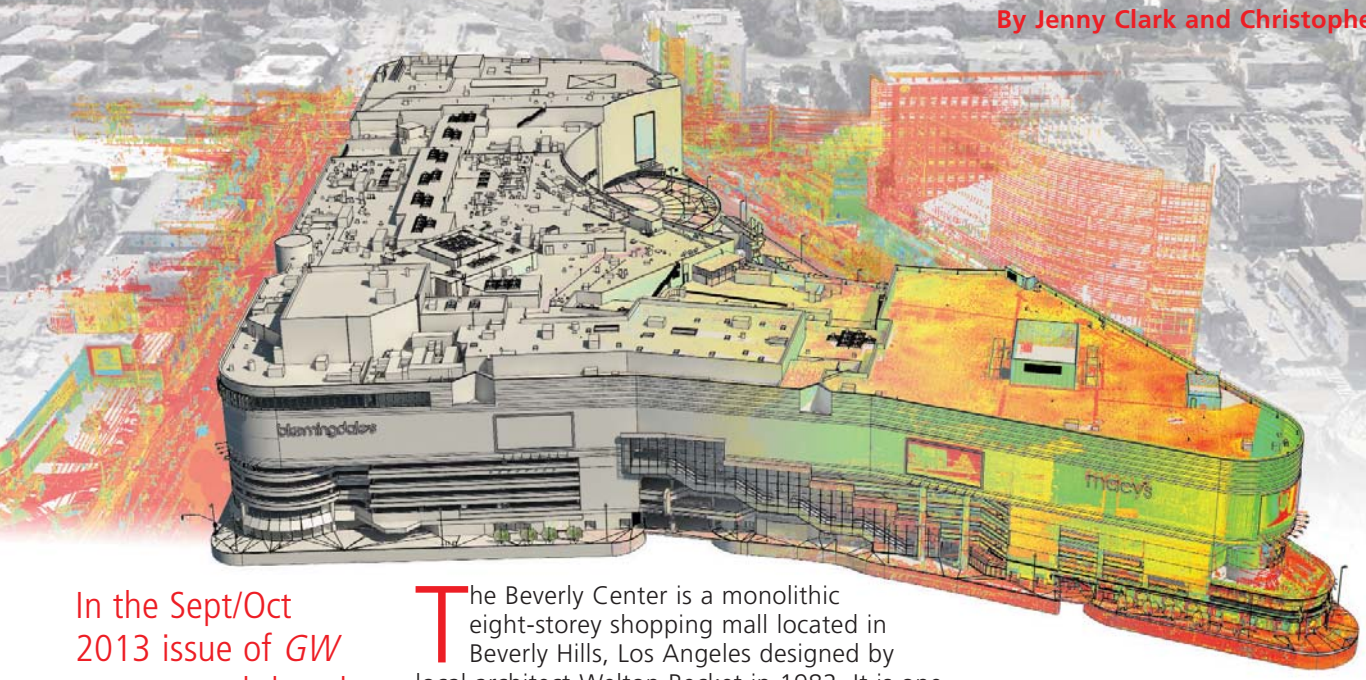
Confucius Say.
It's ok to let a fool kiss you, but don't let a kiss fool you.

The Hunting's annual lunch attracted nearly 60 with four over the age of ninety. Photography by John Leatherdale.

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: rentamalc@aol.com

Scan to BIM – the Beverly Center Shopping Mall, Los Angeles, USA

By Jenny Clark and Christopher Gray



In the Sept/Oct 2013 issue of *GW* we reported that the Mollenhauer Group had been carrying out scanning at the exclusive Beverley Center shopping mall. Here the authors talk in detail about the process of Scan to BIM and the challenges faced in implementing this technology.

The Beverly Center is a monolithic eight-storey shopping mall located in Beverly Hills, Los Angeles designed by local architect Welton Becket in 1982. It is one of the Country's most prestigious shopping malls, showcasing upmarket stores such as Chanel, Gucci, Louis Vuitton and Prada. It has an unusual shape and was built atop the still active Salt Lake oil field. The Center comprises three levels of shopping and five levels of parking, each floor covering approximately 330,000 square feet in area.

Shopping malls are losing their lustre in Los Angeles with people now preferring to shop outdoors. Consequently the mall owner commissioned a team to redesign and update parts of the facility to ensure its popularity and profitability. An important part of this process is the creation of a Building Information Model (BIM) of the existing facility that can be used by all the project team in the redesign process, as well as for future facilities management.

An international team led by Neumann Smith Architects was put together, all of whom were chosen because of their experience with Autodesk Revit. Mollenhauer Group was selected to survey the structure and to generate the as-built survey in Revit format, which would have to include the exposed structure, architectural elements, lighting, electrical fixtures and fittings, and the extensive lines of piping tract.

The project is vast, by far the largest scan to BIM survey undertaken to date by the Mollenhauer Group. The mall was measured using laser scanning (Leica P20 and Faro Focus) controlled via total station and tied to local site control. The site work required considerable strategic pre-planning to avoid unnecessary disruption to the Center even though a considerable amount of work was conducted out of hours. At the end of each scanning session the data was downloaded, registered and subjected to a thorough check. The point cloud data would form the foundation for the as-built Revit model and be viewable in Leica Truview by the Project team.

The initial Mall data collection survey was completed over a three-week period with phase one of the model (showing structural, architectural and electrical components) completed within the very demanding 12-week programme schedule. Phase two took a further month to complete with the total scan survey comprising approximately 750 scans and 800Gb data. The final as-built model showing all exposed structural and architectural features, as well as electrical, lighting and piping proved to be a vital part of the design and project management process.

Mollenhauer's Progression into scan to BIM

The Mollenhauer Group, established over 90 years ago in Los Angeles, was an early adopter of laser scanning; the company was one of the first Survey and Engineering firms to purchase a Leica laser scanner in the United States. This allowed the Group to produce innovative measured surveys of a whole range of buildings, including the Dodger's Stadium, Hearst Castle and the LAPD Academy. Although the team produced detailed, dimensionally accurate 3D models, many clients only had the ability to work with 2D documentation. Mollenhauer's 3D models

tended to be used by clients for visualisations and animations rather than design and construction. The former are still valid uses of the data, but the team was keen to explore a more efficient and usable software which would permit valuable data interrogation and interaction.

In 2003 the USA's General Service Administration (GSA) rolled out a comprehensive and far reaching national management program utilising 3D-4D-BIM to accurately document all capital facilities using laser scanning with the intention of generating a foundation of a BIM for each building. The concept was forward thinking and innovative, especially at that early time, embracing the idea of generating an intelligent model that could be shared by multiple stakeholders throughout the lifecycle of the facilities. At the same time many large American contractors were moving towards the provision of their data in BIM, seeing significant savings using a single integrated management system where the whole project team uses the same dataset and allowing more effective scheduling, management and clash detection.

Recognition

Architects and Engineers began to recognise more and more the value of BIM to design. Mollenhauer Group, seeing the potential of providing surveys in 3D that could be integrated into BIM as an essential component of the redesign and management of existing buildings, decided that this was the critical time to commit. The team invested in the development of as-built surveys in Revit, which was rapidly becoming the AEC industry standard software of choice.

However, the initial uptake of surveys in Revit was slow. Although clients committed to implementing BIM into their workflow, converting entire workforces to work in 3D within a BIM package has been a learning curve for all and a long process. Today, however, the majority of requests are for 3D surveys in Revit format.

In 2009 Mollenhauer Group opened an office in the UK specifically focused on measured building surveys, with an emphasis on surveys in Revit format with all training and development based around this. Mollenhauer carries a range of scanners (Faro and Leica) which are used depending on the site conditions and project specifics. Although the data can be collected anywhere the processing, analysis and modelling is in the most part carried out in the UK office. The team comprises surveyors and architectural specialists who together have the ability to create accurate surveys of the built environment using a combination of conventional and laser scan survey. Moving into the realms of "Scan to BIM" has completely changed the way Mollenhauer

The project was by far the largest scan to BIM undertaken. Because of the size and complexity of the mall considerable work was carried out after hours.

works. BIM is not just a 3D model, but both a new process and a new way of thinking.

Revit and other BIM platforms were originally intended, and have been predominantly used for, the design and construction of new builds. The need to retain and remodel existing buildings however, is an important and growing market. To better understand and analyse the structure, condition and form of an existing building the hidden structural components and foundations, as well as the details of the building fabric need to be known. Although surveyors are limited to providing a measured survey of the visible exposed structure and architectural detail only, the geometrically accurate 'BIM ready' model generated provides a fundamental base level of data for other stakeholders to add their specific information (the 'I' in BIM). When modelled correctly (i.e. as Revit elements) the survey model is the foundation, providing a geometrically accurate base model for the complete project team to design, manage and co-ordinate all stages of the project.

"Although clients committed to implementing BIM into their workflow, converting entire workforces to work in 3D within a BIM package has been a learning curve for all and a long process."

Lessons learnt / critical factors

BIM projects are a collaborative process and good communication with the client right from the beginning is paramount to manage expectations and to ensure a successful outcome. This in part takes the form of a clear and unambiguous specification defining the level of detail required and what will and, possibly more importantly, what will not be included.

It is difficult to generate a survey model based on specifications put together by organisations such as the BSI and AIA which focus on new construction, for example, PAS 1192 and AIA LOD. For example, the Revit elements comprising the Beverly Center as-

"...the main floor slab of the Beverly Center Mall which, when measured, was shown to have a difference in level of 1.8 inches from one end of the building to the other (a distance of just over 1000 feet)."

built Revit model straddled LOD200, LOD300 and LOD350. The specification for this project required constant communication and discussions with the architect and project team with several iterations being refined and produced throughout the life of the project. Even given this level of communication a few misinterpretations during the process by team members were unavoidable. These were only minor discrepancies but highlight the importance of a detailed, succinct specification that can be understood by all, especially on such a large project where a simple misunderstanding can equate to hours of additional work.

A BIM model is made up of a series of elements modelled in 'families', each with similar attributes. Revit contains an existing library of families and many manufacturers now produce Revit files for their designs, mostly with an industry focus on new construction and tend not to be a fit for existing buildings. This leads to the need to have to create a new set of families relating to the existing building, all which have to be built from the ground up resulting in a significant investment in time. Mollenhauer Group is creating its own in-house library of elements. Even though every project and building is very different (including Georgian, Beau Arts, Art Deco, mid-century modern and industrial, to name a few), the in-house library provides a series of easily editable elements which can be modified depending on a project's specific requirements.

Attention also needs to be given to the amount of detail that has to be modelled; for instance a ceiling with a large amount of architectural detail and decoration will take a significant amount of time to be modelled in Revit, which will, of course, add significant costs. It may well be better (and more cost effective) to represent the ceiling using other survey techniques, such as simple rectified photography, that can be linked to the model. It must also be kept in mind that a considerable advantage of using laser scanning is that it facilitates the capture of vast amount of detail, establishing a project database inventory, which will form a valuable resource that can be referred to in the future.

There are of course limitations of the BIM software that have to be made clear with the client and contract team at the offset. As with most CAD packages, Revit is designed to model straight, perfectly vertical walls, and requires significant attention and adjustment when surveying surfaces that are irregular. So it is therefore critical that methods to correctly interpret and present structural elements which are out of horizontal or vertical alignment form an important part of the initial discussions and specification design. An example of this was the main floor slab of the Beverly Center Mall which, when measured, was shown to have a difference in level of 1.8 inches from one end of the building to the other (a distance of just over 1000 feet). A decision was made with the team to model the floor slab as a flat plane, which has implications on how other Revit elements are modelled and joined. It was agreed that 2D plans with a grid of spot levels established across each floor would also be produced which were linked to the model and viewable by all sub-consultants.

Consideration has to be given to the potential uses of the model later in the project lifecycle. It must be clear to all users that the modelled elements are clearly identified as having been generated from survey data. This is especially pertinent when, for instance, data could be limited because there has been restricted access. As usual, good communication is key to success so all end-users are aware of the survey limitations.

Because of the variable level of the floor slab a decision was made with the team to model it as a flat plane, which has implications on how other Revit elements are modelled and joined.

Future/ opportunities

There are still barriers to surveyors entering the world of BIM. Clients still think the process of converting laser scan data to a Revit model is automated. It is essential that there is an understanding that the interpretation of the point cloud needs specific and unique skills combined with a professional knowledge of best survey practice, the technologies used and a good knowledge of construction and architecture. As is common with many techniques in surveying, the tools and the technology have been exaggerated and the skills required to correctly interpret the data typically undersold.

Although there are still many unknowns, there are also many opportunities for the survey community. The long term management of data is one such opportunity. It is unclear who

will ultimately be responsible for the management, maintenance and updating of data. To ensure long term validity of the data it would be prudent to carry out repeat laser scan surveys after the planned renovations have been completed. This data could be then incorporated into the final model for future management and maintenance of the project. This of course relies on the capacity of the project owner to invest, which in part relies on the geomatics' community to make a solid case for this venture.

There are also opportunities for surveyors in new construction. A programme of scanning throughout the construction process will provide an accurate and fast record of the actual development at different stages of construction. Although the initial upfront costs are high, the cost savings in the long term have been proven. This is still a difficult concept to sell to a client, but some are now beginning to recognise the benefits.

Conclusion

Key components for success are good communication at the outset and the agreement on a specification that meets the needs of all stakeholders whilst remaining within the project costs. Reviews and assessment throughout the project are critical to ensure the modelled components meet the needs of all.

BIM is not just a new way of modelling, it is a new way of working. There is a significant role for Geomatics Surveyors in this burgeoning market but we need support from advisory bodies such as the RICS to ensure that we all adhere to clear guidelines and specifications, allowing us to provide a coherent service.

About the Authors

Jenny Clark MRICS, Director of Mollenhauer Group Ltd

Jenny graduated with a Masters in Surveying from UCL in 2000 and has over 10 years' experience of laser scanning and 3D modelling in both the USA and UK. She spearheads the development of Mollenhauer's Revit surveys and has worked on an array of scan-to-BIM projects across many sectors.

Christopher Gray FRICS, Director of Business Development

Chris is a Fellow of the Royal Institution of Chartered Surveyors and an international expert with over 30 years of experience in the measurement of complicated buildings both in the USA and UK. His career includes head of survey procurement at English Heritage, and head of survey at the Getty Conservation Institute.

"...opportunities for surveyors in new construction. A programme of scanning throughout the construction... will provide an accurate and fast record of the actual development at different stages of construction."

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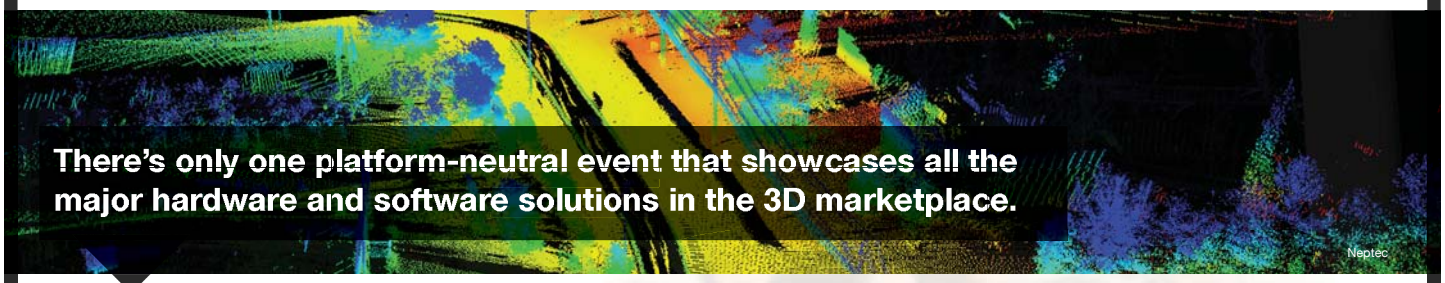

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Web GIS set to transform Cartography – Esri's Jack Dangermond

As part of the British Cartographic Society's 50th anniversary celebrations, Jack Dangermond, president of Esri, called in to London on his way home from the Esri European User Conference to address the society on the next phase in the development of GIS. **Stephen Booth** and **Richard Groom** report.

Cartography has long been a solitary craft. Ptolemy, who first mapped the known world in the second century AD, relied on reports and descriptions from travellers. No originals of his maps survive. Instead we have to rely on medieval copies provided by Arab sources, which in turn are believed to have copied originals of Ptolemy's works. A translation of a translation of a . . . That other great cartographer Mercator also relied on reports from travellers and surveyors. It is said that he never travelled more than a few kilometres from his home in what is now Belgium.

One thing that characterises mapping and continues to this day is that cartographers rely on what has gone before. At small scale the shape of most areas of the world today is a given. It is only when you begin to drill down to the local that an accurate survey may be required to inform the theme of the map.

Today cartographers have so much information at their disposal via the web; but web mapping has brought with it new challenges to stretch the cartographic imagination. GIS & Web Cartography was the theme of an inspiring lecture by Jack Dangermond, founder of Esri. Mr GIS himself.

Held in the historic and stirring aviation surroundings of the RAF Club in Piccadilly, Dangermond acknowledged that cartography is central to GIS. But in very short order GIS has moved from relying on a single underlying database to that of multiple products generated on demand, with data coming from social media, crowd sourcing and a myriad other sources. The challenge today is to integrate it and extract actionable information. Web GIS will transform cartography, Dangermond believes.

In the early days of GIS, products tended to be analytic and maps basic. The objective was to collect data once and use many times. At first it did not really work, but now the tools available are sophisticated and automated map generalisation is possible. Dangermond cited as examples the recently completed SwissTopo 1:25,000 scale mapping, as an entirely automated process. Likewise the Dutch cadastre has just completed 1:50,000 scale mapping of the whole country, through generalisation of the 1:10,000 scale mapping. GIS has also enabled 3D representation of map data and thereby extended the cartographic product range.

GIS enables mapping to connect data from many sources including the crowd and the web platform is extending the reach of GIS so that any device can be used. GIS is a means of understanding and communicating. The better the cartography, the more effective GIS will be.

Esri has a GeoMentor programme, which adopts schools and takes geography into the classroom. It should, of course, already be there, but Esri can bring resources and ideas that enhance the experience. A vivid example illustrates what GeoMentor can do. The inspiration was will.i.am of Black Eyed Peas fame, who grew up in a deprived part of East Los Angeles. He invited Dangermond to arrange a visit by Esri's GeoMentors to his former secondary school. GIS was quite a hit. One pupil discovered that in her area pupil spending was $3300 per pupil per annum compared to $15,000 in nearby Beverley Hills. She vouched to fight this kind of inequality. A leader of the future, thought Dangermond, observing that 'understanding precedes action!'

He is a firm believer that we have the practical technology to help relieve and guide the world as it grapples with climate change, migration, terrorism and other 21st century blights. 'GIS and mapping are changing how we think and act by measuring, analysing, deciding, acting and managing problems'.

GIS has traditionally been the preserve of a small number of geeks working at a few expensive workstations. Dangermond sees WebGIS as the vehicle for scaling up to a larger contextual setting. WebGIS will make GIS easier, it will be real-time, always available and to everyone and it will look more like social media. The transformation is already happening. Shell used to employ 400 specialist GIS people but now it is rolled out to 10,000 users across the company. Esri's ArcGIS Online is already producing 120 million maps per day.

By transforming GIS into Web GIS, almost anything can be integrated – organisations, people – all helping to break down barriers so that leveraging traditional geocentric mapping enables the location community like Google, Bing, Facebook, etc. Web maps are distinct, integrated data for social media. The web model means disparate databases in the cloud. Visual overlays enable mash-ups to drive the emerging world of spatial analytics.

WebGIS can integrate anything through dynamic linking between an object and associated mulitimedia, visual overlays of data using mashups and through spatial analysis modelling from distributed datasets. It will break down barriers and work towards a common operating picture and situation awareness. It will need a new kind of cartography and will be powered by services.

"WebGIS will make GIS easier, it will be real-time, always available and to everyone and it will look more like social media."

Portals, powered by new, light-weight metadata tags, which could include user-ratings, will help users to search for and organise content. It will allow sharing between 'friends' in the cloud. It will be able to select content from various interchangeable sources. For example base mapping could come from the Ordnance Survey, satellite imagery or StreetView and by switching between these sources the user will be able to gain maximum benefit from each.

WebGIS will bring 3D and real-time mapping. We are familiar with 3D but real time is a new data type which will need cartography to bring impact. Bringing disparate data together reinforces the need for standards and for this Esri has been developing solution 'templates'.

No where are these skills and technologies emphasised better than in emergency response. Back in 2005 the response to hurricane Katrina was at times poor because people didn't share information. There was a lack of joined-up government. Since then the National Information Security Center has been formed in the US. The result could be seen in the much better response to Hurricane Sandy that hit New Jersey, a bigger storm than Katrina but with far less lethal human impact.

Organised through new portals, web GIS is accessible from any client web-enabled device – phone, laptop, tablet, desktop – enabling sharing through the cloud. But we need a new cartographic standard for this architecture, argues Dangermond. Online base maps are necessary, directing us to ArcGIS online, where after only a year there are now one million maps shared in the cloud. Web GIS can also integrate real-time information with a move to 3D web scenes from video feeds and to 3D renditions. This is now a multi-device world for cartographers, where already web GIS is integrating with Microsoft Office. Using Excel, maps can be imported to 'geo enrich the enterprise' asserts Dangermond. GIS by stealth!

New cartographic concepts include solution templates to manage the many types of maps. In Los Angeles, where there are better standards, there are less than 100 types. But not all cartography should be templated, cautioned Dangermond. Typical are story maps: a multimedia mesh of GIS with photographs, text, music and so on, in a 'spatialised' social media. An Esri research project aimed at improving cartographic standards, the Urban Observatory, is a portal where you can compare 22 major world cities through 16 layers of information criteria and statistics. 'It's a free app', explained Dangermond, but alas 'there's no standard symbology yet!'

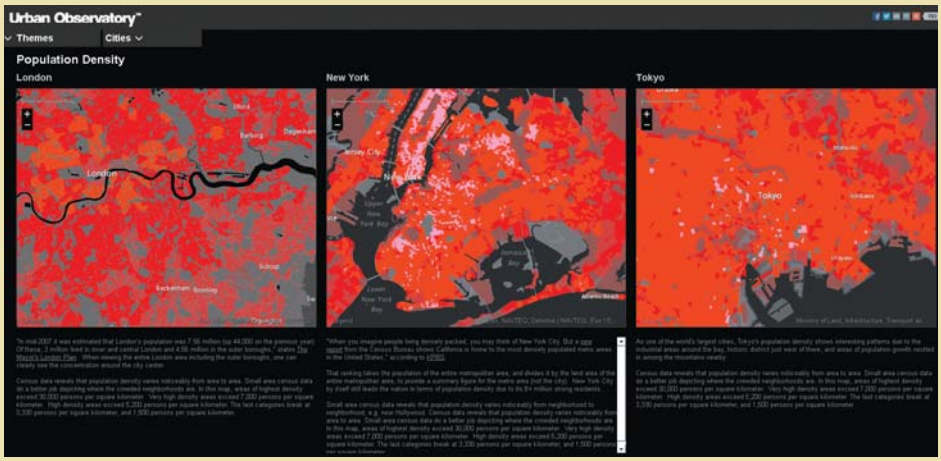
Initiatives like the UK's transparency agenda and open data help point the way ahead. Driven by smarter searches and the semantic web, Dangermond sees metadata as the key. As Web GIS evolves, new methods and best practice for websites will develop; He cites the five-star Amazon website as a benchmark (too darn easy for this book-buying reporter!).

After his talk and questions, Dangermond was presented with the BCS Medal. It has only been awarded eleven times and usually after lengthy deliberations at a council meeting. This time is was unanimous and almost instant. During the citation, one fact stood out above all others. Esri was founded in 1969! Seldom are visionaries able to see through their visions as has Jack Dangermond.

Jack Dangermond receives the BCS Medal from President Peter Jones.

Photo by Martin Lubikowski.

Esri's Urban Observatory



This is my idea of a "cool app". The focus of the Urban Observatory is on the people who live in cities, the work they do there, their movement through transportation networks, the public facilities needed to run the city, and the natural systems which are impacted by the city's footprint.
The project's aim is to become a crowd sourced, cloud based portal. Backed by Jack Dangermond and Richard Wurman (founder of the TED series of conferences and talks). They see the venture as not being so cities can rank themselves but so they can compare qualitative understanding through applying comparative analysis.

Already there are maps and data for 22 world cities enabling comparison across a whole range of different criteria, from themes like libraries, green space, youth and senior populations distribution, income and many more demographics. Some layers will be static like land use and major facilities, whilst others could be dynamic like traffic and weather. As Dangermond says, 'it's about leveraging ideas from one city to another'. Go check it out at http://www.urbanobservatory.org

Rain doesn't stop Topcon at the Oval

– *"the surveyor can see who is where at any time."*

The home of Surrey County Cricket Club at the Kennington Oval in London was the final stop on Topcon's Hybrid Roadshow and a chance to see merged technology in action, reports **Richard Groom**.

Dave Bennett, Topcon GB's recently appointed business manager, opened proceedings by stating that Hybrid technology is about moving data between instruments and up to the cloud. Central to the concept is the integration of GNSS and total station technology but Hybrid also extends to scanning and mobile mapping from vehicle and aerial platforms, as demonstrated by a stunning video featuring data recently captured of Bamburgh Castle in Northumberland for CyArk.

Merging GNSS and total station

The morning was all about applying Hybrid technology to Topcon's DS robotic total stations combined with the HiPer GNSS: a receiver and a 360° prism sit on top of a detail pole, with the GNSS connected by Bluetooth to a Tesla data logger running MAGNET Field. The total station can be up to 300m away from the detail pole and communicates with the Tesla via long-range Bluetooth.

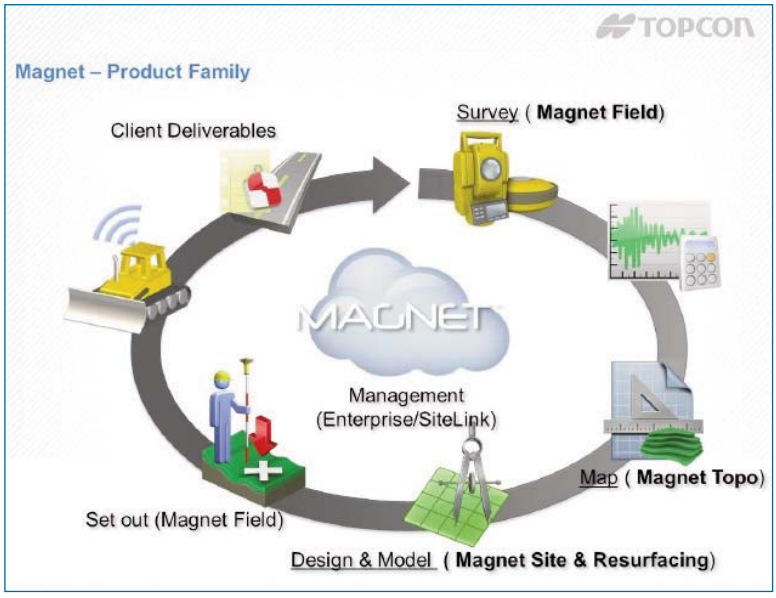
The purpose of this set-up is to be able to observe detail points using whichever of the instruments is most appropriate. Where there is a sky view, GNSS can be used. Where it is obscured, observations can be made using the total station. To position and orientate the total station, the surveyor observes network RTK or base and rover RTK and total station observations to at least two ground points with suitable geometry. The surveyor can then start capturing detail using either instrument. Should the total station lose lock onto the prism, it is easily regained because the position of the prism is always known either via RTK or, if RTK is not available, using navigation grade data, so that the Tesla can tell the total station to rotate towards the prism. At present surveyors observe control at the start of the instrument set up but the next release of MAGNET Field will allow surveyors to add control at any time and will recompute the position and orientation of the set-up with each new observation.

The delegates went outside to see it all work in practice, whereupon a steady drizzle began. The equipment has a higher IP rating (total station: IP65, GNSS: IP67) than the delegates, but we persevered. The MAGNET Field user interface is chunky, which is good news for those of us who need ever more powerful reading glasses, and is also intuitive. The software can communicate with the cloud for transfer of files either between teams on a particular site or with the office and there is a "chat" facility, enabling the surveyor to communicate with other members of the field team, or the office.

MAGNET is the glue that holds this system together but to use network RTK or to store data to the cloud demands a mobile phone signal. So what do you do if there is none? The answer is probably to observe some static GNSS control points and then use base and rover RTK for the detail survey.

MAGNET also comes in Enterprise and Office forms. The office variant now features seamless integration with AutoCAD Civil 3D, reflecting the ongoing collaboration between Topcon and Autodesk. Unfortunately, in a half-day session it was not possible to see more of the technical functionality of MAGNET Office.

Below: *The MAGNET software environment.*



Keeping an eye on things

The Enterprise software is essentially a management tool. The survey manager can see who is where at any time. This might seem intrusive, but perhaps it should not be seen as such. Certainly, it should concentrate the mind of the surveyor, but if there is a productively problem, the system brings it to the attention of the manager as early as possible, so that he can investigate and put things right quickly. How successfully he does that is more a question of his management skills than of the software that flagged the problem. Productivity data from MAGNET should also be invaluable for estimators.

With Hybrid, Topcon appears to have caught up with other suppliers, who have been marketing similar technology for some time. Based upon the half-day session, it is worth taking seriously.

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Hyperspectral imaging for agriculture ready for take-off

– lightweight package is mounted onboard octocopter

A German company has developed a lightweight hyperspectral sensor suitable for mounting on a UAV with applications in agriculture, reports **Richard Groom**.

Hyperspectral and multispectral imaging is usually associated with satellite or aircraft imaging platforms, but German company Cubert has developed a sensor that, at 470g, is so light that it can be carried by a UAV. The combined system uses an Optocoptor platform and is called Firefly.

Cubert's UD-185 sensor uses full frame imaging technology, which captures each frame in a millisecond and avoids the complications introduced when using scanning technologies for digital imagery. The data can be transferred to the ground station during the flight, making it possible to start analysis before leaving the site. It is also possible to view the data as hyperspectral video, in real time.

Each frame is 1000 pixels square and is able to record spectral properties for blocks of 20 × 20 pixels at a spectral resolution of 4 nm in the wavelength range 450 – 950 nm, using 125 channels. The result is what is known as a hyperspectral 'cube'.

CubeWare has the answers

The camera is controlled using Cubert's Cube Ware software. This enables the operator to make all the necessary camera settings and calibrations, control the camera and carry out basic data analysis. It also includes an applications programming interface and source code for Mathlab and Python applications and there are filters enabling data to be output to envi, xls and text files. Operation of the helicopter is through separate controls.

***Left**: The UHD 185 records one image per second until the whole area was captured. The octocopter flies in an altitude of 30 – 100 m with a speed of 5 -20 km/h.*

The Firefly octocopter with a hyperspectral camera could one day enable farmers to design their own crops.

Agricultural Revolution

It is possible to use photogrammetric techniques to produce 3D hyperspectral models from cube data and thence to calculate plant biomass, which is an area of active research for a number of Cubert's customers. Precision agriculture is the area that holds most potential for this technology and the company sees UAVs as central to development. It enables capture of spectral information over large areas, which gives chemical information about the plants, crops and the soil.

By comparison with aircraft and spacecraft platforms, the combination of high-resolution camera and UAV gives scientists a cheap and especially flexible tool for acquiring hyperspectral data. The data can be used for research projects such as phenotyping, the study of plants, crops and their environment throughout the growing cycle. Cubert foresees that in a few years this will lead to farmers being able to design crops.

Crop design

For crop design it will be necessary to monitor frequently, different test breeds of a crop by analysing many test plots and a large number of plant properties, such as chlorophyll, lignin content, growth, water and so on.

In a few years, farmers will be able to order a detailed field analysis, which will give information about soil quality, fertiliser strategies, plant health, plant disease, biomass, yields, irrigation, etc. This analysis will be performed by a specialised service provider and will be cost effective for large agriculture field sizes as well as higher value crops, such as vines and tree nurseries, over smaller areas. First trials are expected to take place next year.

For this technology to become

commonplace in the agricultural community, Cubert believes that three points have to be addressed:

1. **The UAV technology has to become autonomous; ideally a self-working device is needed, which samples data without user interaction.**

2. **Both, the UAV and the hyperspectral technology have to become more affordable.**

3. **Regulation of UAV operation for agricultural use has to be relaxed and permitted.**

The company sees great advances in UAV technologies and automation. It is currently being used by pioneers and the cost of the technology will reduce as there is greater take-up and more systems are deployed. Agriculture is a vital field and feeding of the next billion people on earth is one of the world's greatest challenges. It is not just a question of more mouths to feed, but also there will be competition, due to depletion of oil resources, between growing crops for agriculture and for biofuel. As a result, food prices rise.

Agriculture is already changing and will have to change further to meet these challenges. Cubert believes that the current scheme of UAV regulation is holding agricultural development back: it should be realistic for the actual risks involved.

In summary, agricultural fields will become our new oil fields, so using the available agricultural areas to the maximum is absolutely vital. Cubert believes that they have the right sensing technology for precision farming when it is needed.

High-tech start-up

Cubert GmbH is a high-tech start-up company which was founded in 2011 as an offshoot from the University of Ulm. Their work on the hyprespectral full-frame imager was done in in collaboration with Prof. **Bareth** and his workgroup from the University Cologne. Spectral imaging is a highly interdisciplinary field so the founders of the company came from very different fields. **Rainer Graser** has developed the core technology since 2005. Dr **René Michels** joined the project in 2010 after finishing his PhD studies on scattering influences in spectroscopy and Dr **András Jung** then joined the team as an expert in remote sensing applications.

• *For more information, visit:* **www.cubert-gmbh.de**

"... this will lead to farmers being able to design crops."

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Leica's move goes the whole hog

Over two days, several hundred Leica Geosystems' customers visited the company's new EMEA headquarters in the UK (above). They were treated to a tour of the building and technical sessions to bring them up to speed with the range of products currently on offer. Each day was rounded off with a hog roast, reports the ever hungry **Richard Groom**.

The event was managed with Swiss precision timing from a marquee in the car park where visitors congregated between sessions. The tour started with a briefing from **John Fraser**, Leica GeoSystems MD, on the reasons for the move and the opportunities afforded by the new building. He stressed the value of the new customer area. Leica will be focusing on helping its customers to get the most out of their equipment by putting more emphasis on education and training. They are also welcome to make use of the space to hold their own events.

UAVs and mobile mapping

Visitors were split into groups for technical sessions. The session on UAVs, aerial sensors and mobile mapping was presented by **Simon Mears**. The session featured some serious technology with serious price tags. Top of the list is aerial cameras: Leica produce two models (one formerly manufactured by Intergraph). Slightly further down the list are three models of LiDAR equipment for corridor, high altitude and high precision applications. The company has recently acquired Swedish company AHAB, which produces bathymetric LiDAR equipment, one of which can penetrate 60m of water. There is also a medium format camera the RCD30, which comes as single nadir sensor or as a penta version with a nadir and four oblique sensors, which is intended for modelling vertical building faces in city models. The RCD30 comes with forward motion compensation in x and y which is effective for all sensors in the penta version.

Leica is in partnership with SwissDrones to develop a heavy-duty helicopter UAV designed to carry the company's larger cameras and sensors. At 76kg, this is the heaviest UAV on the market and will be subject to stricter controls by the CAA if, as must surely be the case, it is to be used beyond line of sight from the ground based pilot. Leica is going to offer CAA-approved pilot training to its customers. Leica's other UAV is produced by Aibotix. This is a whole lot lighter, at 2.5kg and able to carry a digital SLR camera and other light-weight sensors. The Aibot is suitable for all sorts of inspection work outside but can also be used inside, as proved by a test flight in the foyer of the new building!

Leica has also moved into mobile mapping with its Pegasus:One system, which was on show in the car park. Presenter, **Stuart Woods**, stressed the need to manage the vast quantities of data that can be produced by mobile mappers. Leica aims to limit data collection to 1Gb of data per kilometre and for a ratio of one day in the office to process one day's worth of field data. The Pegasus:One carries one laser scanner, the Z+F Profiler 9012 and several 2MPx low distortion cameras, as well as GNSS and an inertial measurement unit. The system has only one profiler in order to avoid problems with noise between points observed on the same surface when two scanners are used.

The hardware is backed up by some sophisticated software. For example it allows features to be traced on one photographic image which simultaneously appear on the others. The company is working on automatic feature extraction and already has a function that can recognise and calculate the area of billboards. Woods also suggested a workflow that involves adding ground control to the survey after initial processing, which will identify sections of the scan that are out of specification. The photography makes identification of control points easy but GNSS is unlikely to be the best way to observe them, given that they will be in places that confounded the GNSS in the first place.

Precise Agriculture

Simon Mears sees precision agriculture as a potential growth area for UAVs. Indeed farm machinery is already being equipped with GNSS that can process network RTK corrections. In conjunction with GIS, the result is that farmers can save money by targeting insecticide and fertilisers more effectively. There is also potential for automated weeding and to reduce tillage by drilling the year's crop between last year's plants. Farmers will need to know about surveying, or perhaps there is an opportunity for surveyors to advise farmers.

Disto and GeoMos

In other presentations, **Graeme Laing**, Leica's HDS account manager for Scotland described how the company's equipment is used for dimensional control in the industrial environment and **Stephen Cox** described Leica's 3D Disto and the new D810 Disto touch. With the latter, you can sketch the

continued on page 24

***Below right**: EMEA president Mark Concannon at the opening ceremony.*
***Below**: Hexagon client Red Bull loaned one of their winning F1 cars.*

room (or object) to be surveyed and then add dimensions to the sketch to watch the survey build before you: surely a 'game-changer'.

In a session on laser scanning and deformation monitoring **Paul Burrows** and **James Whitworth** covered the options available. It has been fascinating to watch laser scanning move from a niche to universal technology.

Meanwhile, we shall be reporting more on laser scanning from Leica's annual user conference, held this year on 4th December at Milton Keynes. On the monitoring side the new version of GeoMoS has the capability of modelling deformation of surfaces by defining the surfaces using 'patches' and then computing movements normal to each patch: another problem solved.

New hq marks growth expectations

By Stephen Booth

"The move brings together Leica's EMEA team – covering over 150 countries..."

On Tuesday 12 November Leica Geosystems formally opened its new headquarters in Tongwell, Milton Keynes. The ceremony was performed by **Brian White**, Mayor of Milton Keynes with **Alan Peasland** of Red Bull Technology. The new facility expands by more than 50% the available office, warehouse, service space and includes a striking new conference and seminar suite. The move brings together Leica's EMEA team – covering over 150 countries – led by **Mark Concannon** plus the UK operation under John Fraser and Hexagon Metrology under **David Brown**.

Presiding over the event, Mark Concannon reflected on the 49 years that Leica had been trading in the UK, beginning with Wild Heerbrugg in 1964. In the UK Leica currently turns over around £40m. 'We intend to grow this business to £50m over the next few years' said Concannon. Talking to him afterwards he sees this growth across all segments of the company's business but especially civil engineering, machine control, agriculture, mining and GIS. The company is also keen to expand its training operation and has added considerably to its facilities to do this. More anon.

Smart city with pods

Milton Keynes is a city of 260,000 and one of a small number advising the government on becoming "Smart Cities", explained Mayor Brian White. 'We are bigger than Southampton and in a few years we shall equal Bristol'. The city is a nexus for high technology partnerships and recently announced a £1.5m plan for driverless pod cars between the rail station and city centre. 'The skills needed by your company are what we're trying to encourage in the city', he said, adding that an engineering degree from the city's technology college is now available. This is good news for Leica which foresees further local recruitment.

One of Hexagon's key customers is Red Bull Racing. The F1 championship winners for the last four years rely on metrology products and services provided by Hexagon to maintain quality in the complex engineering of their cars. Alan Peasland, head of technology partnerships, admitted he was an engineer who rather liked champagne – and there's been plenty of that for Red Bull in recent years. He reflected on an eleven-year partnership with Hexagon, which he endorsed as 'best in class'.

More test and maintenance facilities

The new facility is impressive for both companies. Mark Concannon and David Brown, director and general manager of Hexagon Metrology, took us on a brief tour. For Geosystems, the repair and service section has doubled capacity with 14 benches equipped with the latest testing rigs and calibration instruments. For Hexagon, which needs considerable space for its test and inspection equipment, the new facility provides much more space – it is even possible to get an F1 car in. Their testing and measurement kit is impressive and measures at the micron level: robot arms with tips that can be comfortably directed by hand around an object to record its dimensions; large rigs that stride above weighty granite beds (think fancy kitchen worktops but half a metre thick!); test chambers. All a far cry from engineers in overalls with handheld micrometers and callipers.

The building, previously the European hq of a Japanese printer manufacturer, is perhaps not as striking as that previously occupied in the Knowlhill area of Milton Keynes, which won awards when it was opened in 1989 by MP and cabinet minister Cecil Parkinson (seen as Margaret Thatcher's successor until he disgraced himself with his secretary). Nevertheless, the new building obviously offers the room for Leica and Hexagon to expand. Perhaps the most impressive aspect is the purpose designed conference suite with seating for a 120, which can be divided into two separate units, each named after the engineering Stephensons, father and son: George and Robert. Concannon is especially proud of this facility and said that it was not just for the company: he wanted the industry to use the facility too. Don't miss an early opportunity to visit the facility, you will not be disappointed.

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App tracks athletes performance in real time

With a €1 million prize pot, the 10th European Satellite Navigation Competition (ESNC) awards attracted many interesting applications for satellite navigation technology including a mobile app that provides online training analysis for athletes.

Online analysis of athletes' tactical, technical, and physical capability is playing an increasingly important role in modern sports training. The underlying idea - known as the Hawthorne effect – is simple: if you can measure your performance, you can also improve it. Following this principle, two research assistants from Technische Universität München (Germany) founded the company Kinexon GmbH at the ESA Business Incubation Centre, Bavaria and developed a cloud-based solution for analysing and visualising training data on mobile devices.

The solution kits athletes out with a small, portable location sensor and feeds the resulting data into the cloud by means of a stationary base antenna. This enables users to track and analyse performance parameters and tactical movements down to the centimetre - all in real time. But it was the solution's user-friendliness during training and relatively low cost (compared to the camera-based systems commonly seen today) that won over the international jury of experts in the European Satellite Navigation Competition (ESNC). So far, the high price of such systems has limited their use to professional sport; Kinexon's system will now give amateur clubs the chance to benefit from adding online analysis to their training activities, as well.

Dr Gerd Gruppe, member of the Executive Board, German Aerospace Center (DLR), conferred the EUR 20,000 grand prize on Kinexon GmbH founders Dr **Oliver Trinchera** and Dr **Alexander Hüttenbrink**. 'DLR sets great store in technology transfer,' explains Dr Gruppe, adding, 'innovations form the basis of economic success and hold considerable potential for society. The ESNC has developed into a driving force behind the innovative use of satellite navigation technologies and a starting point for numerous successful start-ups in Germany, Europe, and the rest of the world.'

***Left**: Drs Oliver Trinchera and Dr Alexander Hüttenbrink with their prize certificate and cheque.*

Team tactics

Other winners in the special category included JOHAN, an application also aimed at the sports market, which uses GNSS to track team members during a game and transmit their position, heart rate and so on, to coaches' computers. From this they can derive much more information, such as maximum acceleration, total distance travelled etc, which is useful during matches as well as for post-match analysis.

Amongst the regional winners a French app monitors physical activity with a predictive element.

Another winner was the GNSS Performance Monitoring System (GPMS) used by airports and governments to monitor and record GNSS signals in support of aviation operations. Recorded data can be used to investigate accidents, and real-time monitoring allows air traffic control to detect unavailability through natural interference, intentional and unintentional jamming and will alert users.

Ampido was another special category winner that has already bagged several other awards. It sets out to find the next free parking space. The idea is that people with unused parking spaces can advertise them and connect with those looking for spaces. On-line payment is made when the deal has been done.

The winner from Spain was 'BIMOn!'. This application uses augmented reality to provide the user with a dynamic view of a building design whilst on the site. The app developers say that BimOn! will help to improve the construction management process by facilitating decision making and enabling users to detect problems at an early stage, which ultimately leads to significant savings of time and financial resources. The app uses IFC BIM data.

The UK regional prize went to ManagePlaces and its app that helps managers to manage dispersed teams by taking the position of each team member from his / her smartphone.

ESNC 2013 gave participants from all around the world the chance to vie for any one of 25 regional prizes. In addition, topic-specific special prizes were sponsored by the following partners: the European GNSS Agency (GSA), the European Space Agency (ESA), the German Aerospace Center (DLR), and - for the first time - the European Patent Office (EPO) and Metaio GmbH. Students and research assistants were also encouraged to submit their ideas to the ESNC University Challenge.

For more visit **www.galileo-masters.eu.**

Scan2BIM or Scan2Model?

In November, **Mark Coombes** and **Mark King** gave the first in the winter series of RICS evening lectures to a packed lecture hall at Great George Street.

"...it is a problem for the modelling process to turn the point cloud into geometrical surfaces."

This fascinating talk covered the recent project to survey the RICS headquarters building using laser scanning. The topic was introduced by **Mark Coombes** of the Severn Partnership and largely presented by **Mark King**, the partnership's scanning guru. The first Mark (Coombes) asked for a show of hands to see where the audience came from. It was split roughly in thirds between geomatics, construction and property. BIM is now of interest to everyone.

The RICS interest in BIM is educational as well as practical. The organisation has recognised that BIM will be central to the future of building and infrastructure and so its employees and members have to understand what it is about. The scan of 12 Great George Street was seen as an excellent way to achieve this as well as putting BIM into practice on its own building stock. The scanning and modelling has been completed but the learning is continuing, with the assistance of the Severn Partnership, as the full potential of the project is explored.

King went through the scanning procedure from the installation of plenty of survey control points around and within the building to collection of point cloud data. At the request of the client, some rooms were scanned in great detail – like the library, whilst others were scanned from outside of the door, looking in. It is worth noting that there are still places where a handheld Disto EDM and tape are more practical and economic techniques than expensive (and heavy) laser scanners.

Dating from the mid 1800's and having undergone many changes over the years, the RICS headquarters building is one of the more complicated buildings that one is likely to come across and King summed it up as a structure where there are no vertical walls and no horizontal floors. Whilst this is of no consequence for point cloud data collection, it is a problem for the modelling process to turn the point cloud into geometrical surfaces. Modelling is a time-consuming business and for the RICS building it took six weeks.

Autodesk Revit is rapidly emerging as the software that will be used to create BIM 3D models. But Revit likes right angles and throws up interesting questions about how to represent an uneven, imperfect real world. As King says, it is possible to model non-vertical and uneven surfaces but the process takes longer and therefore costs more. The sensible solution is compromise, but the client and contractor must be clear on what exactly is going to be done, and for this purpose, close interaction with the client and a sound specification are essential. The purpose of the model is to simplify reality, but that begs the question – how simple. To help reveal the effect of generalisation, Severn Partnership can reveal the 'errors' in the model by colouring the point cloud to show how far each point deviates from the modelled surface.

The talk closed with an introduction to Seeable, an interesting new product offered by Severn Partnership to help release the power of laser scanning on to any platform using games technology.

In questions following the lecture, one member of the audience asked about the cost of BIM. Yes, the speakers said, there is a larger up-front survey cost, but projects already carried out have demonstrated that the savings can be hundreds of thousands of pounds – in the construction phase alone.

"Are we now at the point of observing scans anyway?" asked another. "Yes" was the response. "Scanning equipment is now a standard survey tool." It is becoming clear that the surveyor's role in BIM is to produce the 3D model on which others hang the attributes that turn it into BIM. In other words, the 3D Model is ready for BIM – BIM ready.

***Below**: getting control in the Library.*
***Centre**: external scan of building*
***Far right**: BIM model of exterior.*

• *All images courtesy of The Severn Partnership.*

Great changes can happen quickly?

The Michael Barrett Award is an impressive silver medal, which is presented annually to an outstanding practitioner in the field of land administration, in return for which the recipient delivers a lecture to RICS. This year's recipient was Gavin Adlington, who works for the World Bank. **Richard Groom** reports.

Did the title of Gavin Adlington's talk really end in a question-mark? Perhaps not, because the thrust of his argument was an emphatic 'yes, they can'.

Adlington is Lead Land Administration Specialist, Program Team Leader for the Europe and Central Asia (ECA) Region with the World Bank. He joined the organisation in 2005 having started working in the ECA region a decade earlier, shortly after the collapse of the communist eastern bloc countries in 1989-91. The political collapse in turn caused the eastern bloc economies to collapse. Private enterprise came in its wake and with it the need for a change of mindset. The population were unfamiliar with the concept of land ownership – a fundamental hurdle to clear. Furthermore, the value of land was only considered in terms of the agricultural output it could generate. So a city centre plot suitable for an urban building, like a hotel, would command a lower value than an agricultural plot in the countryside.

The World Bank is involved because land markets can contribute up to 15% of GDP and they come hand in hand with stability. But for land markets to work effectively land tenure has to be secure and there has to be an efficient land transfer mechanism.

Adlington went on to list the attributes of a successful project, one of which is the need for a primary focus on the client. Here was another hurdle, because he found that there was no concept of 'customer service' in the former eastern bloc. "We call them applicants", was the response when he had raised the question! His focus was therefore on quick access to the system and reduced turnaround times and costs. Routine registration of property should not cost more than $10 per parcel and be completed in minutes rather than days. The land registration authority should also be self-financing.

Adlington offered a list of lessons learned from the reform of land administration in the eastern bloc. The following can be applied to other projects too:

- **projects need active champions at the decision-making level,**
- **it is better to have a single agency for cadastral surveying and land registration,**
- **support services for valuation and legal services will develop naturally if private sector involvement is allowed,**
- **allow plenty of time for piloting, testing and training before 'roll-out',**
- **encourage sporadic registration from day one and for systematic registration, do it quickly and worry about errors later, and**
- **if you put the results on the web, 'the crowd' will report the errors.**

Perhaps not so applicable elsewhere was his assertion that where IT is concerned it is better to develop capacity in-house by using local software solutions rather than to buy in from expensive international suppliers and consultants.

There was just time at the end of the talk to mention the Land Governance Assessment Framework (LGAF). This is a tool for dynamic monitoring of land administration systems and is based on a scoring system that assesses what has been done and helps analyse what still needs to be done.

"... land markets can contribute up to 15% of GDP and they come hand in hand with stability."

RICS Policy Watch: Winter 2013

Guides, standards, lectures, consultations. . . The nights may be dark but RICS staff and member consultation teams have been busy, reports Land Group Director **James Kavanagh**.

THE DARK WINTER NIGHTS are upon us with only the thought of Christmas and the holiday season bringing cheer. Still, we at RICS have been doing our best to lift your spirits with a very well attended and well received annual Christmas lecture and Michael Barrett award held on Thurs 05th December. **Gavin Adlington** – Land Program Team Leader, Europe and Central Asia Division World Bank – gave a wonderful lecture on the trials, tribulations and ultimately successful land reform programmes within the former Soviet Union and Eastern Bloc countries. We are making some of the RICS Geomatics Evening Lecture resources available on **https://communities.rics.org/connect.ti/Wikigeo/groupHome**

The Evening lectures continue on Thurs 23rd Jan 2014 – UK geo forum lecture – RICS lecture hall, 17.30 for 18.00 Title: *Weaving a new mapping genre* - **http://www.rics.org/uk/training-events/conferences-seminars/weaving-a-new-mapping-genre/london/**

The big Geo event for 2014, *GeoBusiness* May 28-29 continues to gather pace and RICS was delighted to welcome our colleagues in the AGI on board. The GeoBusiness website is live @ **www.geobusinessshow.com** open for registration and stands are booking up fast. The call for papers @ **http://geobusinessshow.com/conference/call-for-papers/** continues until late Jan.

As always, I'll reiterate the following: RICS members should make to update their details on the main **www.rics.org** with particular attention being paid to selecting 'geomatics' as your primary area of practice. This is very important for your professional group; geomatics membership is expanding but we want to make sure we have all of you under our PG wing.

RICS is continuing with the 'big push' for 'Online CPD' recording. It's very easy to use, free and can be accessed at **http://www.rics.org/uk/about-rics/what-we-do/continuing-professional-development/** CPD is a major pillar of the RICS Regulatory system and its importance should not be underestimated. I would encourage all geomatics members to 'log' the mandatory 20 hours by 1st Jan 2014. Have a wonderful start to 2014.

Michael Barrett award winner Gavin Adlington (2nd from left) with James Kavanagh, RICS Geomatics Chair Chris Preston and RICS HonSec Rob Mahoney.

Best practice guidance and output

Our specialist panels have been very busy of late with the *Boundaries guidance note - 3rd ed 2014* online consultation recently coming to a close (several hundred downloads) and *Measured surveys of land, buildings and utilities 3rd ed 2014* (a complete update of the industry standard *1:500 measured surveys specification*) going into online consultation. The Boundaries 3rd ed 2014 will be launched (in conjunction with the new 4th ed *GN Surveyors acting as expert witnesses*) during a multi-date UK roadshow in early 2014. These events are already booking up and full details can be sourced @ **http://www.rics.org/uk/training-events/conferences-seminars/neighbourhood-disputes—expert-witness-seminars/** It is a really comprehensive programme and brings boundary dispute knowledge together with expert witness expertise; a powerful and necessary combination.

Measured surveys of land, buildings and utilities 3rd ed 2014

This is probably the most important guidance note to be produced by RICS for 2014 and it is wonderful to see all of the hard work of the specialist working group come to fruition. I would fully encourage all interested members to either comment online or download a copy for reference. The final post consultation GN is due for release in spring 2014 and is on the agenda for GeoBusiness and the lecture series.

This important document represents a complete review of the 1997 edition and supersedes Surveys of land, buildings and utility services at scales of 1:500 and larger, 2nd edition and contains a number of significant changes such as:

- The user guide and best practice elements are now fully incorporated within the text of the document using "grey boxes". This should allow both clients and surveyors to directly connect "best practice" to specific sections and/or tasks
- The Project information section has been expanded and fully revised
- The primary use of the "survey detail accuracy banding table", which although it still references "scale accuracy" also takes into consideration client requirements and technology changes
- A renewed emphasis on "Grid & survey control"
- Deliverables are also given a separate section highlighting the importance of client-surveyor agreement on defined deliverables and survey outputs
- Another change is the integration of the feature detail annexes into the main specification document according to application. This underlines the fact that decisions on what to include in the measured survey are critical to the success of the project and to the agreed measured survey specification
- Numerous aspects of this guidance are international in nature; comments are especially encouraged from geomatics surveyors working outside of the UK.

The third edition is future proofed to emphasise classical surveying and measurement best practice and methodology, and is not connected directly to any emerging technology although the advent of Building Information Modelling (BIM) and specified measured building surveys is mentioned in section 5. The advent of the International Property

Measurement Standards (IPMS) initiative is also highlighted within section 5. Members can access the document @ **http://www.rics.org/uk/the-profession/how-you-can-contribute/consultation-listing/standards-consultations/measured-surveys-of-land-buildings-and-utilities/**

RICS has also released a new updated suite of public guides for distribution at Citizens Advice Bureaus and general download. *The Neighbour Dispute* suite features geo relevant titles such as Boundary Disputes, Rights of Light, Party Walls and Compulsory Purchase (CPO), the full suite of titles can be accessed @ **www.rics.org/consumerguides**

RICS, ICES and TSA have long pursued a policy of cross endorsement when it comes to client guides and guidance. This policy continued in December with the release of the TSA client guide on *Small Unmanned Aircraft Surveys (SUA)* – an excellent document on an emerging and increasingly important survey platform. The TSA client guide can be sourced @ **http://www.tsa-uk.org.uk**

RICS BIM manager certification gathers momentum

RICS has developed the first building information modelling (BIM) Manager Certification in response to industry need for a universal standard on which to assess the skills of construction professionals in using BIM. As BIM continues to dominate processes across the built environment, employers and clients are increasingly struggling to find industry accepted criteria on which to base knowledge of practitioners' BIM skills. Several hundred professionals have already signed up to the RICS certification scheme and RICS was delighted to have this new ground-breaking qualification highlighted in the UK and international construction media. Interested RICS members and non-members (it's open to all who can fulfill the application criteria) can find out more @ **www.rics.org/bimmanager**

RICS has also recently launched a new Infrastructure pathway to chartered membership, although primarily focused on the cost estimation and related project management aspects of infrastructure delivery, the new pathway also included competencies on BIM and construction. The new pathway was released at an opportune moment, just as the UK government released its Infrastructure policy agenda. More @ **http://www.rics.org/uk/knowledge/news-insight/news/rics-launches-infrastructure-pathway/**

Just to tie up BIM for 2013, a reminder of the RICS BIM Conference 2014 London, 12 Feb 2014. Book your place online now.

RICS has joined forces with our colleagues in ICES, TSA, Ordnance Survey, Leica and others to form a Survey4BIM group under the auspices of the UK Government BIM taskforce **http://www.bimtaskgroup.org/**

International Property Measurement Standards

The IPMS initiative continues to gain significant momentum with the recent launch of a new web resource **http://ipmsc.org** and more new entrants to the coalition and supporters of the concept. The latest support came from Jones Lang LaSalle (JLL) and underlines why common international standards in property measurement for valuation are essential. The coalition expects the online consultation on the first incarnation of IPMS (office space) to go 'live' in early 2014.

Geomatics is at the heart of IPMS as we tend to be the experts doing the spatial measurement. With the advent of laser scanning, 3d modelling and more accurate measured survey techniques it is now incumbent on geomatics professionals to provide our valuation and commercial property clients with the spatial information they require. IPMS has the potential to be quite a business opportunity for geomatics companies as commercial property companies start to adopt a more rigorous approach to spatial measurement of office space to aid their cross border comparisons. Geomatics is fully engaged in the coalition and elements of the "detail accuracy banding table" from the *Measured Surveys of land, buildings and utilities 3rd ed 2014* are being used to firm up measured survey requirements within the IPMS global standards. Watch this space…

EU Policy

It's been quite a busy late autumn period for Brussels and a couple of geo-relevant policy items are worth noting. The European Commission has begun a public consultation about the implementation of the INSPIRE Directive to assess whether the actions currently under way are still on course. Full details can be found at **http://ec.europa.eu/environment/consultations/inspire_en.htm** Those of you looking to work as surveyors across the EU should be interested in how the "mighty" professional qualifications directive has been developing of late. A major step forward occurred in Dec 2013 with the results of the call for expression of interest in the introduction of the *European Professional Card (EPC)*. On 18 October 2013, the Commission published a call for expression of interest inviting representative professional organisations and associations at national and EU level to express an interest in the introduction of the EPC. The 1st tranche of professions **http://ec.europa.eu/internal_market/qualifications/docs/policy_developments/131206_results-call-for-interest_en.pdf** does not include surveyors but does include estate agents, mountain guides and engineers. The Commission has also started researching how "regulated professions" work within the EU (Evaluating national regulations on access to professions). RICS does seem to be in quite a strong position due to our self-regulatory model (used as an example of good practice by the EU within the discussion paper). RICS will be feeding into the consultation in due course.

RICS partners Class of Your Own

RICS is partnering with A Class of Your Own (COYO), to help deliver the secondary school curriculum based programme Design Engineer Construct! to a school in Clacton, Essex. This initiative was set up by former land surveyor Alison Watson and architect Dan Gibson to help young people and their teachers to learn more about the wide range of careers available to them in the Built Environment sector and give hands on experience of working on projects.

COYO provides practical learning solutions for secondary school students, giving them the opportunity to build a virtual 'eco' classroom. Professional Groups Director James Kavanagh, alongside fellow employees Joe Martin and Matt Saunders, who are all also RICS members, led a day of surveying activities at Clacton Coastal Academy, Essex, which saw 100 school children undertake a full day hands-on session to design their own eco-classroom. **http://www.rics.org/uk/the-profession/how-you-can-contribute/adopt-a-school-for-the-design-engineer-construct-programme/**

RICS Geomatics Evening Lectures 2013-14

RICS Geomatics lectures are CPD relevant and count towards your CPD/LLL quota as specified within RICS regulations. All lectures are free and open to all (especially students) unless otherwise specified. All lectures take place at RICS Great George Street lecture hall and are timed at 17.30 for 1800 unless otherwise stated.

Thursday 23 January 2014
Geo Forum annual Lecture

Thursday 27 March 2014
Engineering Surveying - tbc

Californian construction update

An update on the Golden state's mega projects and burgeoning business economy plus some thoughts on social media from our US columnist **Nick Day**.

Two tunnels for the price of one? Hardly! Or tunnel vision, perhaps? And, do I have an old bridge to sell you! Well, it's been a big and successful construction year for California's San Francisco Bay Area, and I've reported on all three of the projects below in past issues of *GW*.

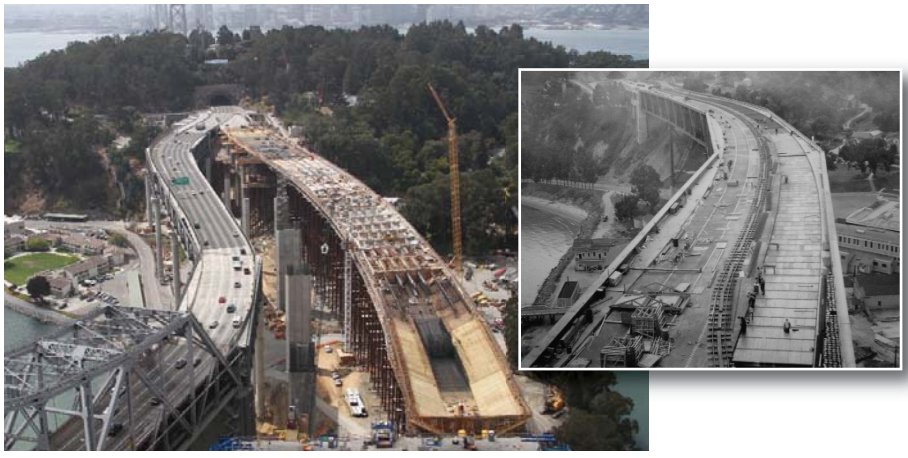
First up, March 25, 2013 marked the opening of two parallel tunnels at Devil's Slide on Highway 1, bypassing a steep, winding portion of coastal road between the towns of Pacifica and Half Moon Bay, long susceptible to rockslide-related closures. The final project came in at $439 million. I almost managed to drive it mid October, on my way back from Santa Cruz, but my poor timing coincided with the annual Halloween pumpkin weigh-in at Half Moon Bay, and I had to take a diversion.

Then, over the Labour Day weekend, the new East Span of the San Francisco-Oakland Bay Bridge (SFOBB) opened to traffic. At a final cost of $6.4 billion, the Guinness Book of World Records notes it as the world's most expensive, the reasons for which will be explored in a future column. The same day the single-level new bridge opened, dismantling of the 1936 double-deck iron bridge started.

Already a huge success, impressing even long-time critics, the East Span has become something of a tourist attraction. Bikers and walkers have been almost queuing up to try out the bike/pedestrian path, and enjoy the Bay views and majestic 525-feet high single anchored suspension tower. Because the new bridge is so close to the old one, on the south side as it enters the tunnel bore through Yerba Buena Island, the bike path will not be completed until early 2015 when demolition should be complete. So, at the moment, bikers and pedestrians have to turn around after two miles. When finished, they will be able to reach Yerba Buena and Treasure Islands, and enjoy unparalleled 360-degree views. Beyond the tunnel, the largest transportation bore in the world, is the seismically retrofitted West span of the SFOBB, consisting of two double-deck two-tower suspension bridges with a common central anchorage. Soon to be completed is the special aesthetic lighting. Designed by a team that lit up the Statue of Liberty, Yankee Stadium, and The White House, thousands of LED lights will illuminate the span's 200 cables, giving the bridge a cathedral-like appearance.

Finally, the new westbound 4th bore of the Caldecott Tunnel officially opened to the public early Saturday morning, November 16, 2013. It's wider, taller and brighter than the other three tunnels, and features a 10-foot-wide shoulder and walkways. It has modern ventilation, air and traffic monitoring systems, safety passages into the 3rd bore, traffic lights, and electronic message boards. Many of these devices have been required in US tunnels as a consequence of the fiery 1982 crash in the 3rd bore that killed 7 people, an event I well remember.

***Below**: Looking down from atop the 525 feet high SAS tower on the old and new bridges. The giant bore road tunnel on Yerba Buena Island is in the mid distance, with San Francisco in the background. Coastguard station is bottom left. Inset shows construction underway of old 1936 bridge.*



Mergers & acquisitions—the sequel!

In my Sept/Oct 2013 column, I noted that earthmine, the citywide street-level mapping company, had been acquired by Nokia. No sooner had GW hit the presses than Microsoft announced it was buying Nokia. It's hard to keep ahead of the game when one just relies on a bi-monthly journal, so fast does change happen. Somehow, though, I don't think I'll be reporting anytime soon that, say, Amazon has swallowed Microsoft!

So, the innovative minnow is swallowed up by the giant sea bass with dwindling s(c)ales, which in turn is devoured by a whale that is hard to turn around. I still regret having upgraded my desktop PC with Windows XP to the awful Windows 8, obviously designed by kids in a sand pit with a colouring book for their play buddies. Swiping my grubby, greasy fingers across a 22" monitor was somehow less appealing than using a keyboard from my lap, not to mention the ridiculous interface. Although Microsoft never really acknowledged the problems, it quietly listened to its users and eventually came out with version 8.1.

Meanwhile, I graciously allowed my dear wife control over the desktop, while I happily stuck with my lightweight laptop, and quick and easy-to-use Windows 7. I often wonder if techie groups at Microsoft or Facebook sit around in meetings deciding what they can do next to keep their jobs, and tinkering with what

already works. They must have learned from the Japanese, whose motto was not, "if it ain't broke, don't fix it," but, "if it ain't broke, now is a good time to improve it." Often they make silly changes, for example, in photo editing software, one version uses "Crop", and the next one "Trim." Or, a pull-down item that was under "File" is now under "View."

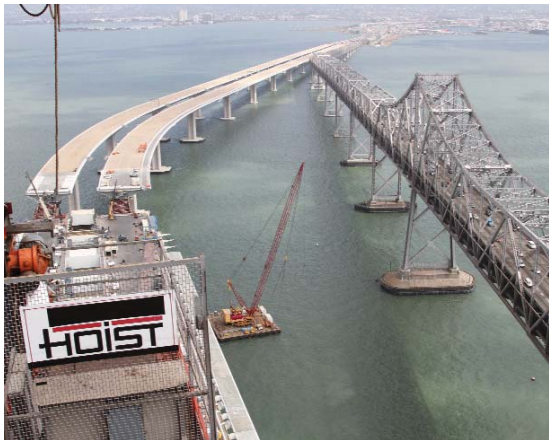
One might assume these acquisitions to be a good vertical fit. Like Blackberry, and the poor little lambs, Nokia, had lost its way. Microsoft, a mobile phone wannabe, which lagged Apple's iPhone and Android's smartphones' dominance, and Google's leadership in its Earth and Street View mapping, saw an opportunity to metaphorically kill two apps with one acquisition. With earthmine under its wing (or is that fin?), it has the temporary (?) advantage over Google of accurate 3D mapping, although Google has made great strides in moving from relative accuracy (I wouldn't call it precision!) to accurate accuracy!

Google maintains it has much wider coverage, which includes rural areas, whereas Microsoft will have better coverage in many urban areas. So, is it horses for courses? What is the ultimate purpose? Where are they all going with this? Do they know? I have a hunch, not!

Social media — Part Deux

Staying with this issue's Californian theme, I'd like to continue the social media debate from my last column. Emails are better than Facebook in that you post a question in the evening in California, and wake up the next morning with the answer from a UK friend or business associate. However, emails only reach targeted people. There are so many currently undetected uses for social media that are changing communication. Commuters are now using Facebook and Twitter to catch a ride to work in the morning. A recent article found that social media is now the best place to land a job or contract, HR departments preferring to surf them for good candidates rather than rely on résumés/CVs. Today's résumés are too manufactured and samey, with jargon chosen to impress, such as: excellent communication skills or self-starter. What you naturally post on Facebook, along with your profile, says a lot more about the real you – how you actually communicate, and what you do, not forgetting that you're also demonstrating computer skills. So, are you a Tweeter or a Twit?

Well, it must be working, because all the social media companies were founded and located in the San Francisco Bay Area, and business all the way down the coastal areas from SF to LA is booming including hi-tech, bio-tech, and medical/healthcare. House prices are back up to pre-2007 recession values, and there's not enough stock to meet demand. The University of California, Santa Barbara, has expanded dramatically recently to accommodate demand for critical jobs in the bio-tech field, and for every four workers coming into the area there is only one house. Houses go on the market and are immediately bid up by 10-20%. Likewise, even rental properties are seeing numerous interested parties willing to bid up monthly rents. The top three cities in the USA which will see the greatest revenue growth for rental properties over the next three years are: Oakland, San Jose, and San Francisco. What's more, California's $19 billion budget deficit has shrunk to zero since Arnie "The Governator" Schwarzenegger left office!



***Above**: Looking down from atop the 525-feet high SAS tower on the graceful sweeping lines of the new East span, as it stretches towards the cities of Berkeley, Emeryville & Oakland. It may not look it from so high up, but the barge crane in the Bay below, is one of the largest on the West Coast.*

California, then and now

Anyone who has visited the USA will no doubt have seen a Motel 6 and even have stayed at one. When I first visited the USA in 1975, I certainly stayed in my fair share of Motel 6's as I drove the length and breadth of the West Coast up to Canada, and back down through the Rockies to Mexico. The reason for the name was that a basic room was $6.95 a night, a bit of a nightmare for surveyors used to rounding up or down, and who would probably refer to it as Motel 7. In fact, a slightly more upscale version, the Motel 8, appeared later on at, you've guessed it, $8.95 a night. Gas (petrol) was 35 cents/gallon (US gallon is 20% less than an Imperial gallon); a regular cup of Joe (coffee) at a roadside café was 10 cents, with unlimited refills. No cappuccinos or lattes. You'd have been laughed out of town asking for one of those back then! In a "how things have changed" moment, I stayed at a Motel 6 in Santa Barbara, about three years ago, and was told I got a special deal at $122/night. Gas is now around $3.75/gall there, and a regular coffee ranges from $1.25 to $1.75. Perhaps interestingly, stats show that real wages, adjusted for inflation, have actually gone down since about 1977, the year I arrived to stay in the USA. Back then, Silicon Valley was not even a glimmer in someone's eye.

Naturally, as an economist, I get a little miffed by those who should know better, announcing monthly that the average unemployment rate across America is 7%, average house price is $212,000, and average salary $47K a year. With 50 entirely different states, spread over an area just slightly smaller than China, averages, and even medians, are meaningless. With about 50 countries in Europe (27 in the EU), lumping together California and Mississippi, is like comparing Germany with Romania. Or, one particularly stupid average I like to quote is putting a billionaire in a room with a guy who has $20k in savings, and stating the average wealth is just over $500k!

"A recent article found that social media is now the best place to land a job or contract, HR departments preferring to surf them for good candidates rather than rely on résumés/CVs."

About the author

Nick Day, FRICS, FRGS, PLS, is retired from the California Department of Transportation (Caltrans). He can be reached at feasibility.nick@gmail.com

Celebrating 150 years of Torrens

By John Brock

Our columnist reports from a seminar to mark the establishment of Australia's land registration, which came near to being adopted in the UK too, stopped only by that old duffer "General Boundaries".

Since my last column I have attended an invitation-only FIG workshop in Melbourne, convened by Commission 1 chair **Leonie Newnham** to re-evaluate the role of the Surveyor. I have also been on a Topp Tours to the shale oil ghost town of Joadja (south of Sydney); The Paragon Café in Katoomba then the NSW South Coast where we saw whales with calves together with seals. Our hotel was a great opportunity to get up really close and personal with the local birds (not the kind you're thinking blokes!).

150 Years of Torrens Title in NSW

This is the 150th year since the Torrens Title system of land registration was introduced in NSW. Organising a full-day history seminar to toast the occasion, over 50 attended at the Institution of Surveyors NSW Sydney office on 27 September. Former NSW Registrar-General **Kevin Nettle** opened the day with a keynote address on the evolution of the great titling innovation right up to the joint projects between NSW and Western Australia to introduce modified models into overseas nations such as Thailand, Vietnam, Indonesia etc.

Wollongong Uni Law lecturer **Michael Devitt** told us about Old System Title in "The Land Before Torrens" followed by me after morning tea with "Torrens of Australia – A World First in Land Titling" with an example of a survey by me on Lot 4 Section 11 in Deposited Plan number 1 (1863) at Sydney suburb Stanmore. Straight after me **Margaret Hole**, former NSW Law Society President and icon to all surveyors, colourfully detailed "Torrens Title from the Legal Perspective" with Strata expert surveyor Denny Linker regaling us on Strata Plans from "Doing Strata Plan Number 1."

Our current Surveyor-General/Registrar-General **Des Mooney** gave everyone a short update on the proposal to sell off the NSW Land Titles Office. Next the Land and Property Information doyen **John Waldon** amazed the crowd on the huge task of "Automating the Land Title System (ALTS) 1983" then **Bob Veitch**'s paper on "The First Community Title Plan – DP 270001", which I presented due to Bob's illness which took his life just two weeks later.

For the final session, we heard two LPI reps. **Mark Deal** told us about "E-Plan – The History and the Future" and **Leanne Hughes** gazed into the future in "Torrens Title in the 21st Century." The perfect end came with drinks and snacks to toast the world's best title scheme!

Cumberland Group's 50th

To celebrate the 50th year of the Cumberland Group of Surveyors we went to the superbly refurbished 1882 Carrington Hotel in Katoomba. On Friday night 26 delegates enjoyed dinner at The Paragon Cafe with a personal tour of the building by exciting owner **Robyn Parker** including the chocolate factory with samples. Saturday's sessions in the Carrington Ballroom were managed impeccably by all day chairman **Kerima-Gae** with a welcome by CGS Chairman **Mark Gordon**. All presentations were first class both in content and images with a brilliant keynote address by Prof. **Ian Jack** about getting over the mountains barrier with the next speaker **Andy MacQueen** making a graphic illustrated route map of all prior attempts to scale the Blue Mountains. Author of the *James Meehan* book **Tony Dawson** told us of the lives of the three explorer/surveyors Gregory Blaxland, Williams Lawson and Wentworth, along with the reaction to their conquest of the mountains – a tale supplemented by **Paul Brunton** OAM with a firsthand account from the original diaries of those three men, which are held by the Mitchell Library in Sydney.

I spoke on "George William Evans – The Forgotten Surveyor Hero of the Mountains Crossing" before surveyor **Bill Ivin** elaborated on the "Footsteps In Time" project which has installed 16 pillars bearing plaques near to where Evans had survey stations on his reverse traverse of the new mountains route.

Next was history guru **Paul Innes** letting us in on some secrets of The Carrington, me showing original 1823 field notes done by surveyor James McBrien for his traverse of the mountains road at that time together with Robert Hoddle's survey for the new alternate crossing found by Archibald Bell junior the month before, NSW Deputy S-G Paul Harcombe relating how S-G Thomas Mitchell out-muscled Governor Darling to build his route down the Pass of Victoria which is now the current road.

Before afternoon tea on the historic balcony I took the audience on a "Tour de Foresight" which showed the original 16 watercolours done by artist John Lewin during the crossing of the Blue Mountains made by Governor Macquarie in 1815. After refreshments we heard about the fascinating project to relocate the 1815 Bathurst flagpole erected by Macquarie on 7 May 1815 by Land Dept man **Joel Haasdyk** followed by a rollicking round of historical folksongs by **Jim Low**, finished off by **Keith Cadogan** telling the known history of The Cumberland Group. The only fitting way to cap off a brilliant weekend was to relax in the salubrious setting of The Carrington dining room at a black tie dinner.

• *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.*

Topcon's new scanner has 360° capability

Trailered at Intergeo in October, Topcon has now announced the release of its new laser. The GLS-2000 combines high speed, long range and data accuracy and is operated by a colour touch-screen that provides for one-touch scanning utilising pre-set parameters. The GLS-2000 has a full-dome 360° scanning capability and can operate at ultra-high speed so that full scans can be completed in under three minutes, including digital images. The user can also select between two separate lasers according to the project, providing an option to use a Class 1 eye-safe laser where the situation demands complete safety for the general public.

Products merge

With the release of Leica Cyclone 8.1 comes Cyclone BASIC, a comprehensive point cloud utility for both field and office that combines the former Cyclone SCAN and Cyclone VIEWER Pro products into one application. In the field, Cyclone BASIC controls Leica scanners that can be operated via laptop. In the office, Cyclone BASIC provides users with numerous options for viewing and navigating point clouds and 3D models, as well as working with them for measurement and markup/redlining.

EdgeWise BIM Suite

ClearEdge3D has released EdgeWise BIM Suite for as-built Building Information Models. The platform, which consists of EdgeWise MEP and EdgeWise Building software, automatically extracts piping, conduit, round ducting, walls and windows from point cloud data. The software is fully integrated with Revit, creating a powerful as-built modelling toolset within the Autodesk environment. With EdgeWise, walls can be exported to Revit plumb and square and best fit to the point cloud or converted to their exact as-built condition. Users have already reported dramatic workflow savings.

GeoCalc 6.7 SDK

Blue Marble Geographics has released GeoCalc 6.7 software development kit (SDK) featuring enhanced speed and memory handling. The release of also features speed and memory enhancements for performing coordinate transformations as well as added support for the NGS-VDatum system allowing for tidal vertical references along the US coast. The release includes new support for Vertical Datum references EGM 2008, Geoid 2012a and Finnish 2000/N60 height models.

Next generation

Trimble has introduced the next generation of its Trimble GeoExplorer handheld data collectors. The Geo 7X includes an integrated laser rangefinder module, extended GNSS capabilities and improved hardware performance. Together with robust field and office software, the device can enhance productivity in difficult physical conditions and challenging GNSS environments. For times when occupying a position is simply not possible, users can easily capture offset measurements from the inbuilt rangefinder module. The Geo 7X also includes technology to deal with situations when heavy overhead cover obstructs satellite signals.

New Topcon data controller

Topcon has announced the FC-336 data controller, designed for the construction industry. In addition to providing field crews with access to the company's MAGNET Enterprise cloud solution to send and receive data files, the controller operates with MAGNET Field, Site and Layout software. The controller is dust and waterproof (IP68 rating), has a Windows 6.5 operating system and built-in Bluetooth and WiFi connectivity plus a 1GHz processor, 5Mpx camera, 512Mb RAM, 8Gb of data storage, E-compass and altimeter.

RTX correction service

Trimble has announced that its CenterPoint RTX correction service will be available across its entire airborne mapping portfolio. The RTX service is a PPP solution offering an accuracy of better than 10 cm RMS horizontal after convergence, which takes up to 30 minutes to gain full accuracy. The service offers speed and low cost because there is no need to set up base stations and there is no need to wait for delivery of public-domain ephemeris data.

Setting out revolution

Topcon has announced the LN-100, a robotically-operated instrument with which the surveyor can select the point or line to be staked out by clicking the feature on an electronic design drawing on the controller. The LN-100 then immediately points to the exact location. It will also lock onto a prism and guide the operator to the design point.

Data assistant

Exprodat has released Data Assistant, an addition to its Team-GIS suite of oil and gas software to provide the tools needed to transfer data between commonly used oil and gas data formats and ArcGIS. Supported input formats include; Petrel, KINGDOM, SeisWorks, OpenWorks, Geographix, CPS3, IESX and UKOOA P1/90.

iSTAR sees in the dark!

iSTAR has just announced the new "IR" version of iSTAR that can take panoramas in zero light conditions. The new product is attracting attention from the special operations and law enforcement markets. The company has also launched an iSTAR SDK for all existing Pulsar owners. The SDK allows integration with existing third party software applications and allows iSTAR to be controlled or communicate directly with systems such as remote monitoring or face detection.

BRIEFS

Trimble's Quantm technology integrates geospatial data along with engineering, environmental, social and economic factors into a simultaneous analysis of alternatives, delivering alignment options and lower build costs.

Chronos has announced a range of GPS interference and jamming detection and monitoring products and services for critical infrastructure, law enforcement and services dependent on GPS and (in the future) Galileo signals.

A new version of ARES Commander includes a full set of features to create and modify 2D or 3D drawings directly in DWG (any version up to DWG 2013). Graebert sees the software as a wake-up call for Autodesk in the CAD market.

Sabre Land & Sea, of Deeside, Aberdeenshire, has ordered twelve Faro Focus scanners. The company will offer them for rental and sale along with its SABRE-SCAN mobile mapping system, which comes in two versions: CAR-POD, a ground/marine vehicle-mounted scanning system and SKY-POD, a multi-copter-mounted scanning system.

GW RECRUITMENT

Geospatial Technical Support Analysts

We are currently looking for two graduates to fill permanent roles of Geospatial Technical Support Analysts based at our Liverpool Head Office & Huntingdon Operations Centre. Working in the Geospatial Technical Support Team, the principal duties of the successful candidates will be supporting customers with queries arising from the use of Trimble Survey (GPS/GNSS receivers & robotic total stations) & Mapping products and software solutions.

In addition to providing support, the roles also involves providing on site and classroom based training courses to our customers. The roles give the successful candidates a unique opportunity to learn new geospatial positioning technologies as well as substantial career development through Trimble led training programmes.

Candidates will need a degree in the Geomatics/GIS (or similar) field with relevant industry experience being desirable. Recent graduates in Surveying/GIS/Geomatics are welcome to apply. You will be organised, motivated and confident with excellent client facing and presentation skills. You will also have the ability to work as part of a highly skilled and dedicated team.

Knowledge/experience of GPS is desirable, in particular Trimble Survey and/or GPS Mapping products would be an advantage, however full training will be given.

A full driving license is essential.

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We are looking to recruit surveyors for both offices.

Knowledge of AutoCAD and experience with Leica instruments is preferred. Also the candidate must demonstrate flexibility, self discipline, drive & professionalism. We are also using Leica laser scanners for surveys and are looking into BIM and 3D CAD modelling, any experience in these areas would be beneficial. We are primarily looking for experienced surveyors, but would consider recent graduates. The successful candidate's package will reflect their experience and knowledge.

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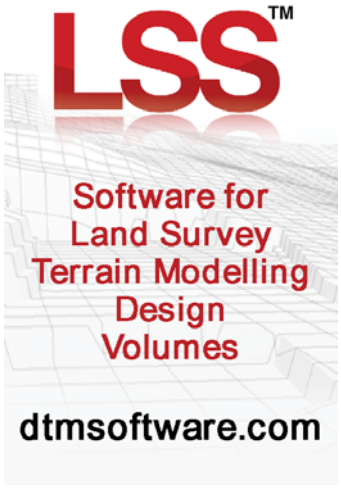

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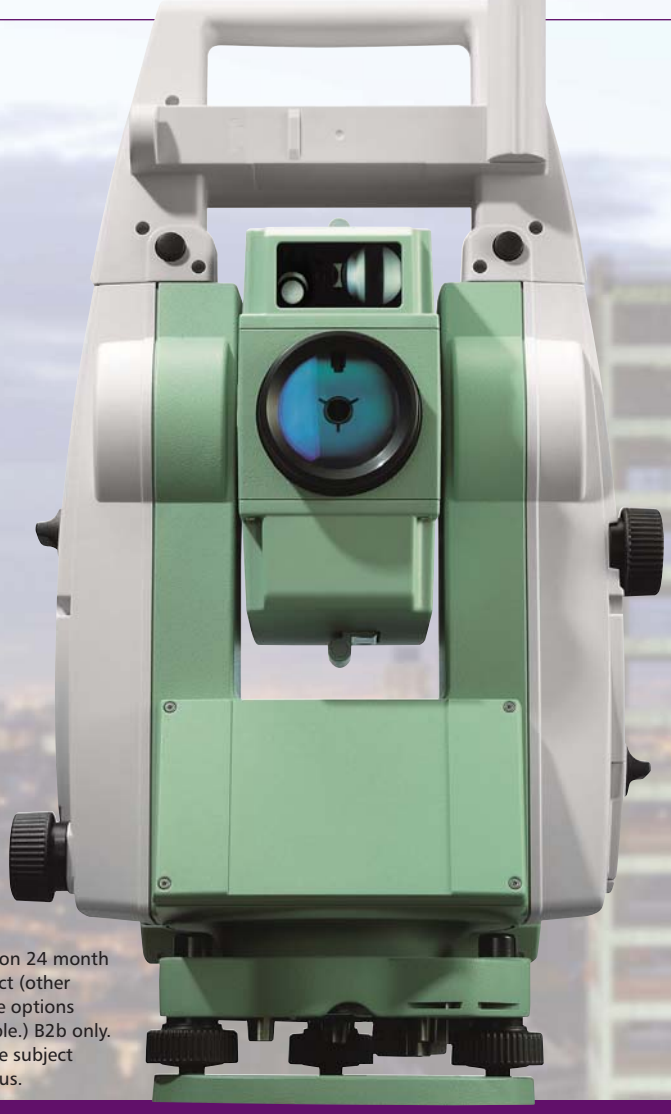

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January / February 2014 issue

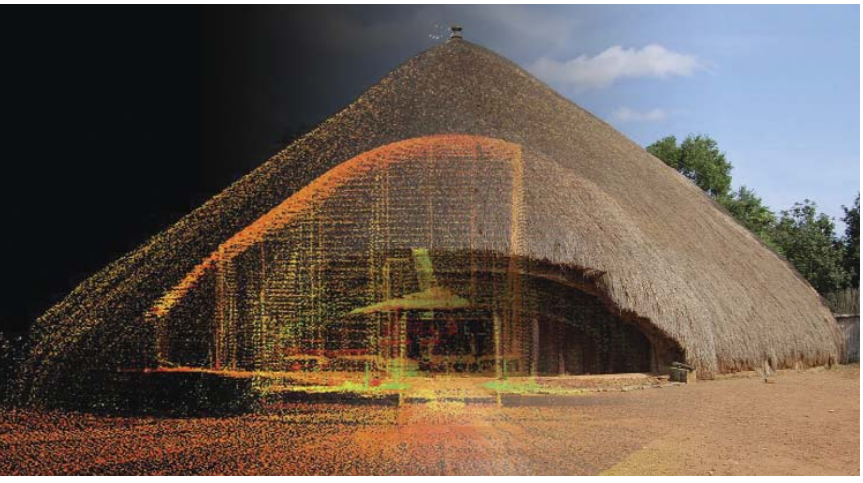
The CyArk 500 Challenge

The CyArk 500 Challenge

Several hundred people with a passion for heritage gathered at New Armouries in the Tower of London for the launch of the CyArk 500 challenge on 21st October. **Richard Groom** reports.

> *"Physical remains are the cultural memory which makes history real..."*

Below: *Destroyed by fire in 2010, the Kasubi Tombs in Uganda were fortunately scanned ahead of the disaster and could be rebuilt.*



The challenge is ambitious: to record in 3D five hundred heritage sites within five years. The five hundred is actually a second challenge following on the heels of the "Scottish 10", and there was a distinct Scottish theme to the event which was attended by representatives from thirty or more countries. **Fiona Hyslop**, Cabinet Secretary for Culture and External Affairs in the Scottish parliament, having reminded the English of their human rights records concerning Scottish visitors to the Tower, described the origins of the Scottish 10 at the Glasgow School of Art, the support of Historic Scotland and links with CyArk.

The Scottish 10 consists of five heritage sites in Scotland, paired with five sites from other parts of the world – nine have been completed whilst one overseas site has not yet been announced. Far from being a drain on scarce resources, Hyslop believes that there has been a significant payoff for the Scottish taxpayer both in terms of national expertise in recording heritage, as well as forging valuable links with the overseas counterparts.

Cultural memory

Ben and **Barbara Kacyra** are well known within the laser scanning industry. They founded Cyra Technologies in the late 1990s and produced the first terrestrial laser scanner. They sold out to Leica in 2001; the same year that they and the rest of the civilised world, were horrified when the Taliban blew up the Buddha statutes in Bamiyan Valley, Afghanistan. This act of cultural vandalism prompted the Kacyras to found CyArk. But the roots of Ben's interest in heritage extend much further back than that. He was born in Mosul, the centre of the 3000 year old Nineveh civilisation in northern Iraq and recalled visiting the ancient sites with his father as a boy and marvelling at the ruins and the stories that went with them. Physical remains are the cultural memory which makes history real and he sees 3D laser scanning as a way to preserve this cultural memory for future generations, should the physical remains be lost. Ben makes the point that these sites are of international importance and so have to be protected by the international community.

Following the Bamiyan outrage, Ben carried out some research and discovered that, in a world of rapidly increasing urban population, far from enjoying greater protection, historic sites are disappearing at an accelerating rate. In addition to support for the Scottish 10, CyArk has encouraged third parties to submit scan data for monuments to the CyArk archive. One hundred and fifty sites have been delivered and part of the Tower of London event was devoted to acknowledging those contributions. Each project representative was invited to place a glass plaque into a notional ark whilst brief details of the project were presented to the audience.

These sites are distributed all over the globe. They include well known monuments, such as Rapa Nui (Easter Island) and ancient Thebes as well as a fort in Bahrain, Regensburg bridge in Germany and, closer to home, the Harmondsworth Barn, which is under threat from the expansion of Heathrow Airport. Two sites, one of which is the Royal tombs of Kasubi in Uganda, are notable because CyArk collected data before they were destroyed by fire and the scan data has been used to aid in their reconstruction.

Heritage at risk

The CyArk 500 sees the venture ratcheted up a notch. Participants at the launch event were invited to nominate sites for inclusion in the programme. There are 850 UNESCO World Heritage sites, so there will be competition. To assess the sites to be recorded, CyArk has assembled an advisory council of thirteen of the leading lights in the field. The high profile council demonstrates CyArk's determination to be noticed and reckoned with. Chairman of the council, **Gustavo Arraoz**, President of the International Council on Monuments and Sites (ICOMOS), spoke of the criteria that the council would be using for this process. Priority will go to those site that are at greatest risk of destruction. War and natural disasters are the commonly recognised factors, but monuments also deteriorate through natural decay. The council wants to have a balance of projects from all the continents including inaccessible sites: Britain has contributed a scan of the Scott Huts in the

Antarctic – the base for the ill-fated South Pole expedition.

Heritage at war

In the afternoon conference session, Professor **Peter Stone** from Newcastle University spoke on the threat to heritage posed by war. It should not happen because the 1954 Hague Convention aimed to protect heritage during conflict by setting up The Blue Shield – a sort of blue light service for monuments, which aims to prevent heritage becoming a victim of conflict. Unfortunately neither the US nor Britain have signed up to this Convention. Bad news during the Iraq war, although Iraq had signed on the dotted line – but then ignored it.

From the British point of view, the protection of Iraq's heritage from US/UK bombing was down to a chance meeting between the MoD and a man who knew a man who knew about heritage. The intermediary said he would have a word with his acquaintance at the weekend, and that is how Prof Stone became involved. When asked for a list of sites that should be protected he tore a sheet from his notebook, took out a pen and wrote "Iraq". No doubt he made his point, but he subsequently drew up a more useful list and was able to show examples of situations where the Iraqis had used monuments as shields but fine targeting had resulted in burnt-out military vehicles with the monument almost unscathed, unlike the looted National Museum of Iraq.

Stone is now chair of the UK and Ireland Blue Shield Committee, which sits under the international committee as part of UNESCO, but has virtually no resources with which to do its work. The committee liaises with the armed forces with a view to building long-term awareness and training before deployment as well as advising during conflict and reviewing the consequences when it is all over.

Heritage at risk

Dr **Rohit Jigyasu** is UNESCO Chair Professor at Ritsumeikan University, Kyoto, Japan. His emphasis was on risk. He showed photographs of a church in the Philippines and a monastery in Bhutan that had recently been destroyed by earthquake. But climate change is also increasing the risk. He pointed to Ayuttaya in Thailand, which was flooded in 2011. However, all monuments suffer gradual deterioration through weathering and other natural factors. It is important to keep an eye on them before it is too late. Rapid urbanisation is another problem as sites that were in a rural landscape become enveloped within towns and can be put at risk by the development around them, as well as losing their historic context.

Who funds CyArk?

The capture of scan data of monuments is an expensive business and involves storage of terrabytes of data. CyArk has a two petabyte archive which is backed up onto tape and stored by the Iron Mountain archive facility. It is funded by a combination of public and private sources, government and research grants and financial contributions from individual donors, foundations and corporations.

The CyArk 500 launch event was sponsored by Iron Mountain, Topcon, Leica, Faro, Riegl, 3D Laser Mapping, Dot Product and Trimble. All had stands in a small exhibition area, but Dot Product particularly caught the attention, through its innovative handheld scanner. The DPI-7 collects data via a PrimeSense Carmine 1.08 red, green, blue (photogrammetric) and depth (infrared) sensor and displays the results on a Google Nexus 7 tablet in real time using Dot Product's Phi.3D software. Point cloud accuracy at 1m range is 2mm (RMS) which increases up to the maximum range of 3.5m, where it is 10mm RMS. The user simply moves the scanner over the object to be scanned to collect data, which appears on the screen in green in real time when the point cloud has been processed. It could be particularly useful for scanning occluded parts of objects which would otherwise involve additional static scanner set ups. The DPI-7 is based upon Kinect technology, which was the subject of a news item in the last GW. It has been available since October and costs less than $5,000.

The 500 challenge is not the end of CyArk's ambitions. It is intended to build momentum towards the next 500 and more. As well as asking for financial contributions, CyArk is looking for nominations of sites for the 500, help with gaining access to heritage sites, partners for scanning projects and for contributions of heritage documentation projects to the CyArk archive.

Right: *Scanning part of the ancient remains of Merv in Turkmenistan.*

Above, from left to right: *Barbara Kacyra with Acting Indian High Commissioner Dr. Virander Paul, Scottish Cabinet Secretary for Culture and External Affairs, Ms. Fiona Hyslop and Ms. Vivian Allimonos.*

> *". . . asked for a list of sites that should be protected he. . . took out a pen and wrote "Iraq"."*