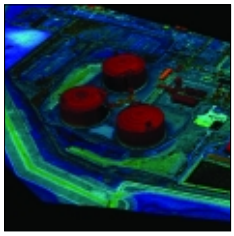
Geomatics World

NOVEMBER | DECEMBER 2010

Issue No 1 : Volume 19

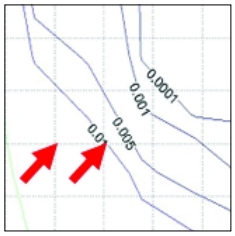
Surveying for geographical and spatial information in the 21st century

LiDAR by helicopter works in the Middle East.



UCL Geomatics at 50. GW raises a glass.

As solar maximum nears, what will happen to GNSS?



Is this the future for scanning? Faro's mini arrives.

57 km Swiss tunnel closes to spec.

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Davy Avenue, Knowlhill, Milton Keynes MK5 8LB
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www.leica-geosystems.co.uk

- when it has to be **right**

Leica Geosystems

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Next issue

The next issue of *GW* will be that for January/February 2011.
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Editor: Stephen Booth
Technical Editor: Richard Groom
News Editor: Hayley Tear
Advertising: Sharon Robson
Subscriptions: Barbara Molloy

Editorial Board
Pat Collins, Professor Michael Cooper, Richard Groom, Alan Haugh, James Kavanagh, Professor Jon Mills, Dr Stuart Robson, Dr Martin Smith, David A Wallis

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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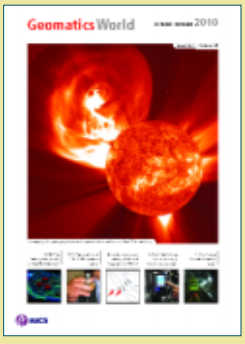

COVER STORY
This amazing picture of the star upon which all life on our planet depends, shows a massive coronal ejection of gas. How may such events affect GNSS? Turn to page 16.
© Image courtesy of SOHO/EIT consortium.

The shortest distance between two points is not a trip back to the tripod.

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Overseas readers need to check whether we have their email and to opt in if they still want to receive the printed version of ***GW***. To stay bang up to date check that we have your current email address.

End of the year heralds change

This autumn has been very busy for us who work on *GW*. A succession of exhibitions, conferences and launches have meant that we've struggled to stay on schedule, so I apologise for the lateness of this issue. On the plus side, if you're an RICS member living in the UK you will also receive with this mailing our annual year planner (sponsored by SCCS) and a copy of *Engineering Surveying Showcase*. Please let us know what you think of the latter and whether you want future copies. The next *Showcase* will be in April 2011 and will focus on sensors – total stations, GNSS receivers, laser scanners etc. *Showcase* circulates not just to surveyors but end users of surveying services – contractors, consulting engineers, utilities, developers and others. Its aim is to raise awareness of the technology that we have available and what it can do for the client community. If you would like additional copies to send to clients please let me know.

Your last copy?

If you're an RICS member living overseas then this issue of *GW* may be your last copy of the printed edition of *GW*. From the next issue – January/February 2011 – unless you have opted to continue receiving the printed edition you will receive the electronic version, provided we know your email. Please make sure that we have this information; we promise not to pass it to third parties. To ensure a printed copy please go online to **www.pvpubs.com** or contact us by email, fax or letter (details on the left-hand side of page 3).

This issue is something of a celebration of the role that University College London and its teachers have played in surveying and photogrammetry for over sixty years. The somewhat eccentric but highly influential EH Thompson became Professor of Photogrammetry and Surveying in 1951, succeeding CA Hart, the first chair appointed in 1946. We mark Thompson's birth centenary and also the retirement of Ian Dowman who has held the chair since 1989 with two reports on the events that marked these celebrations.

Elsewhere, Richard Groom has done sterling work in going through some of the papers presented at the FIG Congress in Sydney in April. His findings are summarised in an article on page 22 and we shall be publishing a further one of these papers in the next issue. The subject is "Promoting the Surveying Profession" and although written from an Australian perspective, the advice and experience are just as relevant to the UK or across most of the rest of the globe. Also in the next issue I hope to bring you an account of the surveying and mapping done by Gertrude Lawrence, one of Britain's intrepid Edwardian explorers who was largely responsible for the geographical shape of Iraq along with much else in the early history of that now benighted country.

I hope also to bring you a review of an excellent book, which I and others are currently reading. *Map of a Nation: A Biography of the Ordnance Survey* by Rachel Hewitt is a very readable account of the events that preceded the establishment of the OS, such as the '45 Rebellion and its aftermath, but also the early trials and tribulations of its first surveyors, their instruments and equipment and the role and influence that mapping has had on Britain. Something that has distinguished the OS from its earliest days was a keen desire on the part of its directors to make the mapping available to all, albeit at vast cost in the early 19th century. Since earlier this year much of the smaller scale mapping of Britain is now available for free. I wonder what Roy, Mudge and Colby would have made of that? If you can't wait for our review make sure it's on your Christmas list.

As this is indeed the last issue of *GW* for 2010 it only remains to wish all readers seasonal compliments and hopes for a more prosperous new year. 2010 has been tough. I know many surveyors have lost their jobs or are surviving on short time. Let's hope the glimmers of improvement that are around (see Malcolm Draper's *Undercurrents*) will ignite into something more substantial.

Stephen Booth, Editor

Ten years ago

The Nov/Dec issue of *GW* for 2000 majored on GIS with four articles. Prof **Manfred Ehlers** was explaining how imagery could be integrated within a GIS, rather than just sitting as another layer. Meanwhile, **Jon Cole** of SDS was explaining how a geo-referenced video camera could capture data for a GIS.

The issue also marked the first day at work of **Vanessa Lawrence**, the new director general of Ordnance Survey. Amongst other things (presumably) she unveiled a plaque at the mapping agency's Southampton headquarters showing its precise latitude and longitude, the first of many such duties.

The issue marked the last meeting of the RICS Geomatics Divisional Council ahead of the move to a faculty structure. Presiding over the move was **Mike Curtis**, the last President and first Faculty Chair.

Business was booming ten years ago with more than 130 companies taking stands at GIS 2000, the AGI's annual show and conference, held at Earls Court 2. This was reflected too in the growing number of recruitment adverts in *GW* at this time.

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

Record tunnel closes to spec

The 57 km Gotthard Base Tunnel, which runs from Erstfeld to Biasca, will be the longest rail tunnel in the world when it is opened in 2017 and will reduce journey times from the north to the south by an hour or more. Miners working from both ends closed the tunnel on 15 October. The project was a showcase for Swiss manufacturer Leica Geosystems' high-performance total stations, digital levels and optical plummets. Tunnelling was continuously checked to ensure that it was within the accuracy required by client AlpTransit Gotthard AG – 10 cm transversely and 5 cm vertically. When complete, the tunnel will have cost £6.5 bn – £800 per person in Switzerland. The scheme will relieve congested Alpine roads and reduce the journey time for trains through the country. To read more about this fascinating project, see Engineering Surveying Showcase 2010 issue No 2.

RICS Geomatics Evening Lectures 2010

RICS Geomatics lectures are CPD relevant and counts 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 11 November
"MapAction – field mapping experiences"– **Naomi Morris** - field mapping coordinator.
CANCELLED

Thursday 18 November
"Railway Survey & National Rail Survey Standards" **Chris Preston**, Network Rail.

Thursday 9 December
Xmas Lecture 2010: "Still the Razor's Edge? Boundary-making challenges in the 21st century" **Martin Pratt**, Director International Boundaries Research Unit, University of Durham. To include the 2010 Michael Barrett award.

Shouldn't you have been here?

The Infrastructure Show is the successor to the Civils exhibitions and took place this year at the Birmingham NEC, writes **Richard Groom**. It is a showcase for suppliers to engineering and construction. Before the show I read through the list of exhibitors and feared that there would not be a single surveying company.

There was however some surveying presence. Faro was there, with their revolutionary new light-weight scanner, Topcon and Korec had stands. But where were the surveying contractors? Surely they should have been taking advantage of this opportunity to present their services to potential clients. For an industry that forever claims to be excluded it seems incredible that we should shun events that would put us right in touch with our customers.

The only company present was **Mason Land Surveys**, who took a stand with PASCO and Mitsubishi. They were selling their mobile laser scanning service with a vehicle bedecked with three GNSS units, four scanners, cameras, IMU and odometer.

For the visitor, the event was organised around "hubs", reflecting the different civil engineering markets – rail, utilities, roads, cities and airports. Each hub had a seminar area that featured talks around the theme of the day, eg "More for less". I attended the rail session on this topic, which revealed some interesting approaches to procurement.

The term "intelligent client" seems to be the phrase of the moment, and about time too, you might say. Some rail network owners seem to be more effective than others. However, all have realised that to be intelligent you need knowledge in-house and consequently now have in-house design departments whilst continuing to rely heavily on consultants. They now claim to be using a little more intelligence and flexibility in selecting appropriate procurement rather than rigidly applying the fashion of the moment.

There was a general atmosphere of optimism about the exhibition hall, which I suspect comes from the "laying it on the line" attitude of the new government. The waste of the past will no longer be tolerated and we are entering a brave new world where all practices and processes, new and old, are being actively challenged.

Rights of Light

An RICS guidance note on Rights of Light was published on 21st October. For those who stayed on after the Leica GeoWorld roadshow at the Emirates Stadium, MBS Software arranged two talks from experts in the field and a Q&A session.

Put simply, the right of light is an easement that is gained through uninterrupted prolonged use – typically twenty years. Legally, adequate light is deemed to be one candle per square foot measured at desk level over 50% of the room, although in practice such light levels would today be considered totally inadequate. Judicial inertia means that this definition remains in use. The measurement technique was developed by Percy Waldram, the inventor of the Waldram diagram in the 1920s. The calculations that go into creating Waldram diagrams are tedious if done by hand but much quicker if 3D building models are available and appropriate software, such as MBS's Waldram Tools.

The audience was partly made up from surveyors from the property sector and partly geomatics surveyors. The opinion of the former is that land surveyors need to sell 3D building modelling more effectively. When they order survey work, architects and others tend to think only of their immediate requirement, not the long-term needs of the project, which may include resolution of rights of light issues. If surveyors are to take on rights of light surveys, they have to become an integral part of measured building surveying.

The RICS guidance note runs to seventeen pages of explanation of the law, Waldram diagrams and the responsibilities of the surveyor. It is straightforward reading with full explanations, but for the

Mapping Maputo

Getmapping in partnership with Geosense, ESRI South Africa and Precision Surveys has recently completed a 500 sq km aerial survey of the Mozambique capital Maputo and its environs including the islands Xefina and Inhaca. The survey was commissioned to create a new base map for the city's new geographic and management information systems. The technical specifications were very stringent, requiring a temporary 5km grid of ground control points. Five GPS ground base stations were also used. The main areas of land were flown in June 2010 using a Vexcel UltraCam D at a GSD (Ground Sampled Distance) of 5cm with the remainder flown at 10cm.

benefit of those left wondering what 'massing' is, it is a noun referring to a 3D model of the outline of buildings without elevation detail. RICS members can download the guidance note from the RICS website. See also March/April 2010 *GW*, *New light on the Flight to Light*.

Network Rail's Standards

Network Rail has published the first three from a suite of topographic, engineering, land and measured building surveying standards, where positional accuracy of better than 100mm is required. The first standard, *Strategy and General* (NR/L2/TRK/3100), is intended to provide some basic principles to project manage and specify survey work across all disciplines and seeks to raise the competency of those involved with specifying and managing surveying activities. The standard creates a role called the Client's Survey Manager (CSM).

The *Track* is a standard (NR/L3/TRK/3101) that enables the creation of a specification for survey works, and spells out processes for surveys of track by total station, hallade and structure gauging.

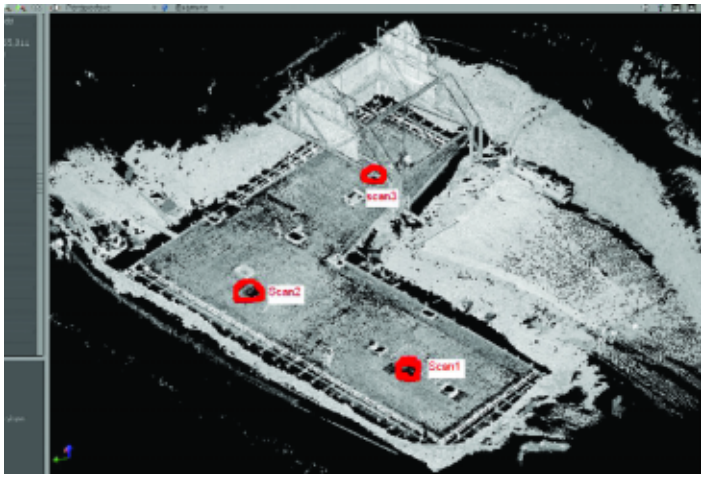
Finally, a *Guidance Note NR/GN/TRK/3103* will enable a general understanding of the techniques that may be used to collect survey data for railway needs.

Further standards will cover Building and Civil, Signalling, Overhead Line Equipment, and Property. Copies of documents are available electronically for those working at Network Rail. Others may obtain copies from HIS: Telephone 01344 328039.

EA moves to V3.1

The Environment Agency has released version 3.1 of the National Standard Contract and Survey Specifications. This version

Measured in minutes



Channel 4's 'Grand Designs' demonstrated how 3D computer models kept a challenging build, seen on the UK TV show, on schedule and error free. The model, created with Pointools and a plug-in for AutoCAD, compared a 3D point cloud model of "just-built" items with architectural designs to identify potential errors. Measured using a 3D laser scanner, the model eliminated the risks usually associated with very tight construction tolerances to keep the project on budget. 'We used the scanner to check all of the formwork just before the slab was poured,' explains Helen Seymour-Smith, the project architect and client. After only 3 seven-minute scans, we had a complete 3D model of the site which enabled us to overlay our CAD drawings to double-check that the formwork was accurately located on site'.

incorporates a major revision of beach monitoring survey specifications. The documents also contain the EACSD channel survey interchange format with a working example. This supersedes the old EEBY format. The intention is that the EA will store data in EACSD and be able to translate to the input format for any of the major flood modelling packages. The specs are moving towards a combination of product and process specification, which gives surveyors the freedom to use whichever method they choose whilst controlling the technical risks associated with those methods. Copies of the specifications are available from richard.groom@environment-agency.gov.uk

CONTRACTS & PROJECTS

New ArcCadastre release

The Swedish National Land Survey and Chaos systems have signed a contract for a survey and field data system. TopoCadastre handles data from field survey systems – total stations and satellite receivers – and stores it in the ArcCadastre system for GIS and map production. The system will be released together with ArcCadastre 3.0 in the beginning of 2011. The value of the contract is estimated to approximately 7 million SEK over a five-year period.

Mapping wind flows

Computer-generated 3D city models from Bluesky are helping to give a better understanding of the wind environment around urban infrastructure projects. By creating engineering models, Mott MacDonald simulates the flow of wind around a site and creates different scenarios based on the project design. The data is first processed using Pointools' Rhino 3D design software for CAD to add or remove structures based on the project design and specialist software for surface modelling, analysis and visualisation. Having created an airtight envelope around the modelled project area, the wind flow is calculated and different design scenarios evaluated.

New Zealand modernises

The Institute of Geological and Nuclear Sciences Ltd (GNS) and Land Information New Zealand (LINZ) have jointly purchased 40 Trimble NetR9 GNSS reference station receivers as part of a project to upgrade the LINZ PositioNZ GPS network to multi-constellation GNSS and real-time data distribution capability. 'With the increased sample rate possibilities, low latency communication options and additional frequency channels that the Trimble NetR9 receiver provides,' says Dr John Beavan, principal scientist at GNS, 'LINZ and GNS will be able to provide even more valuable positioning information, both in support of surveying and geospatial applications and for geoscience and natural hazards research in New Zealand'.

Acoustic technology for N. Sea pipeline bundles

Sonardyne International has won a contract by Subsea 7 to provide its latest sixth generation 6G acoustic technology for monitoring the position and status of towed offshore pipeline bundle systems. The bundles are manufactured at Subsea 7's facility in Wick, Scotland and towed to their final location in the North Sea suspended between two tugs. The first tow will take place in the first quarter of 2011 when a 7km bundle will be towed out to the Bacchus field for Apache North Sea Ltd. Four 7km bundles will follow for BP's Andrew field in the N. Sea.

NZ Aerial Mapping has won a contract to map the 25-kilometre border between Kuwait and Saudi Arabia. The project involves replacing all 150 markers along the border with new and more substantial monuments. Ground surveying will be carried out by UK-based company Merrett Survey.

BRIEFS

Laser technologists Measurement Devices Ltd (MDL) are to accelerate a drive to become a world-class laser manufacturing business after raising finance by selling a 29 per cent shareholding to global metrology and healthcare products manufacturer Renishaw plc.

Trimble MRM has won the UK's Telematics Supplier of the Year at the Fleet Van Awards 2010 and was also commended as a finalist for the IT Innovation prize at the Green Fleet 2010 Awards.

RapidEye has announced that GEOSYS has been chosen by the French research institute Cemagref to provide complete coverage of France with RapidEye's ortho-rectified satellite imagery at 5m pixel resolution, taken over the period from May to September 2010.

Trimble has acquired Punch Telematix with a cash bid worth around 13.5 million euros (£12 million) and has now rebranded the company as Trimble Transport and Logistics.

Veripos has extended the Baltic sector of its European multi-source differential GPS service network with new reference station facilities in Stockholm. A new station has also been added to the Americas regional network, serving offshore users in North, South and Central America as well as the Caribbean with the installation of similar facilities in San Diego for enhanced coverage of eastern sectors of the Pacific.

Chaos systems has changed its name to Adtollo (Latin for "to lift the level") to put focus on its two business areas: consulting services and systems. The company's software system names Topocad and Chaos desktop remain.

PEOPLE

Johnson heads for Lesotho

Sean Johnson, MRICS, formerly with COWI A/S, has been appointed by the Millennium Challenge Account - Lesotho to be the first director general and chief executive of Lesotho's new Land Administration Authority. Bringing together the department of Lands and Surveys and the Deeds Registry into an autonomous executive or public agency, the authority will be responsible for land leasing, deeds registration, cadastral surveying, topographic mapping and national spatial data infrastructure. The appointment is until mid-2013 and the end of the Millennium Challenge Compact being funded by the United States Millennium Challenge Corporation which is helping to modernise and strengthen land administration and to regularise land tenure in peri-urban areas across the small southern African Kingdom of Lesotho.

Experienced hydrographer

Ian Holden is now senior project manager for Blom's bathymetric LiDAR survey team. A IHO/FIG Category A hydrographer of considerable experience, Holden's first assignment has been to oversee the remaining production of data recently surveyed in Europe, USA and the Indian Ocean.

Vice president of products

Pointools has appointed a vice president of products to its board of directors. **Joe Croser** joins the company with over 20 years of sales, marketing and product experience in architecture, engineering and construction (AEC) industries. Previously, Croser was global marketing director with Bentley Systems and also technology strategy director for Parkview International London PLC, a Hong Kong-based property developer. He has also studied architecture in Oxford where he gained a bachelor of arts degree.

Korec expands team

KOREC is expanding its sales team with the appointments of **David Orde**, **Robert Hudson**. and **Andrew Blogg.** Orde will be looking after the Central Southern area of the UK with Hudson in the North West. Hudson meanwhile is a familiar face having been with the company for over 9 years and an internal move sees him shifting to the survey sales team.

Glasgow appoints honorary professor

The University of Glasgow, School of Geographical and Earth Sciences (College of Science and Engineering) has appointed **Hugh Buchanan** as honorary professor of geomatics. Since 2007 he has been secretary of the Scottish Boundary Commission. Prior to that he was with Ordnance Survey, representing the organisation at the UK, European and international level. As well as a doctorate from the University of Newcastle, Buchanan has an MA in mathematics from the University of Cambridge and a post-graduate diploma in surveying from the University of Glasgow. He now hopes to lead research in the field of boundaries and national spatial data infrastructures.

Dane gains RICS Fellowship

RICS Geomatics was delighted to

Events Calendar 2010/11

• 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

Leica Geosystems' GeoWorld 10 Roadshow
Multiple dates and venues
Contact:
www.geoworld10.co.uk/

Leica Geosystems & McCarthy Taylor Systems LSS Training
11 November, Northern England.
Contact:
www.leica-geosystems.co.uk

GeoDATA 2010 Seminar
16 November, Hastings Stormont Hotel, Belfast.
Contact:
www.training4gis.com

Leica TPS for Land Surveying Training Course
26 November, Scotland, UK.
Contact:
Email, rekha.voralia@leica-geosystems.com or www.leica-geosystems.co.uk

GEOTUNIS International Congress 2010
29 November-3 December, Tunisia.
Contact:
www.geotunis.org/2010/

European Lidar Mapping Forum
30 November - 1 December, World Forum, The Hague, Netherlands.
Contact:
www.lidarmap.org/ELMF/

Leica Viva & 3D Laser Scanning Seminar
30 November, Thistle Hotel, Altens, Aberdeen, UK.
Contact: Email, rekha.voralia@leica-geosystems.com or www.leica-geosystems.co.uk

StreetMapper 2010 International User Conference
2 December, The Hague, Netherlands.
Contact:
www.3dlasermapping.com/uk/index.htm

SPAR Europe 2010
7-8 December, Amsterdam RAI Convention Centre, The Netherlands.
Contact:
www.sparllc.com

2011

GIS in Mining & Exploration 2011
18-19 January, Grand Hotel Stockholm, Sweden.
Contact: http://gisinmining.com

Defence Geospatial Intelligence (DGI) 2011
24-27 January, QEII Centre, London, UK.
Contact:
www.wbresearch.com/dgieurope/home.aspx

SPAR International 2011
21-24 March, The Woodlands Waterway Marriott Hotel and Conference Center**,** Houston, Texas, USA.
Contact:
www.sparconference.com

Esri International User Conference 2011
11-15 July, San Diego Convention Center, CA, USA.
Contact:
Email, uc@esri.com or www.esri.com/events/user-conference/index.html

The Remote Sensing and Photogrammetry Society Annual Conference 2011
13-15 September, Bournemouth, UK.
Contact:
Email, Dr Ross Hill, rhill@bournemouth.ac.uk or www.rspsoc.org

For more events, visit our online calendar at www.pvpubs.com

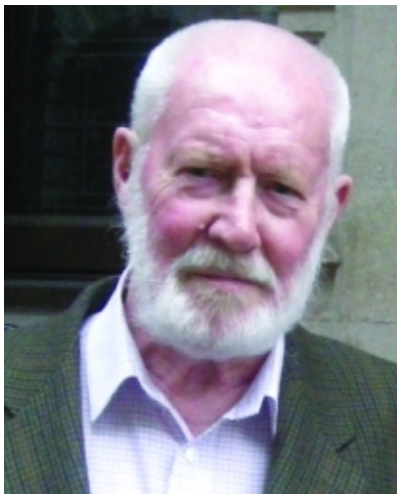
present eminent Danish chartered surveyor **Henning Elmstroem** with his FRICS certificate of membership at the recent CLGE conference in Varna, Bulgaria. Elmstroem is the immediate past president of CLGE, a pan-European professional surveying body which encompasses cadastral and national/regional licensed professional bodies, more on CLGE and the work that it does can be found on www.clge.eu. RICS is the UK representative surveying body on CLGE council.

Landinspektør Henning Elmstroem FRICS is acknowledged to be one of the most experienced Land Re-allotment experts in Denmark. Since the early 1980s he has represented the Danish Licensed surveyors organisation on national commissions and been active in developing new Danish legislation. He has carried out more than 30 major projects. He has also been active in the field of Agricultural legislation. As an assistant professor at Aalborg University from 1988 to 2004 he taught land law. Since 1997 he has been president of the Association of Danish Licensed Surveyors in Private Practice and since 2006 he has been president of the Danish Association of Licensed Surveyors.

RICS was also delighted to see Elmstroem receive honorary membership of the German professional licensed surveyors body DVW at InterGeo in Cologne recently.

Eric Radcliffe, MBE 1928 - 2010

In a departure from our normal obituary style, Nick Day recalls a great engineering surveyor and good friend.



Eric Radcliffe, MBE, died September 1, 2010, after a short illness. A real gentleman, who eschewed pomposity and faux sentimentality, he would not approve of me uttering such words as "sad news" or "great loss." He felt he'd had a wonderful life, accomplished more than he could hope for in his 82 years, and fully accepted the final closure.

Born October 7, 1928 in Emneth, Norfolk, his parents were farmers growing mustard and strawberries. They moved to Hastings in 1929, where he later attended elementary and grammar schools. Eric recalled loving maths, science, and French. His least favourite was history but a subject he relished later in life. He noted that his main out-of-school activity was scouting, where, as he put it, "I really enjoyed trekking, and camping in leaky tents, and cremating food on damp wood fires. I also played some football and cricket, but not terribly well." These pursuits stood him in good stead in view of the wide variety of projects he was to work on, and countries visited. He counted climbing Demavand and Alvand (the highest mountains in Iran), Kilimanjaro (highest in Africa), and Kenya (second highest in Africa) among his many achievements. His only regret was not learning a musical instrument.

Eric studied surveying in Brighton from 1945-47 before a stint in the Royal Artillery from 1947-49. He joined the Ordnance Survey in 1949, before moving on to the City of London in 1952. During his time there he studied surveying at SW Essex Tech College (now the University of East London). His next move in 1955 took him to Rayleigh, Essex, where he worked for the urban district council. Eric's first overseas assignment came soon after when he took a job on a highway project in Iran, but with no family accommodation available, he switched to East Africa in 1957, before working on the Kainji Dam project in Nigeria where I first met him and he was chief surveyor. Further projects in Iran and Saudi Arabia followed.

Eric loved East Africa and the people, and many of his reminiscences, set out in autobiographical letters to great granddaughter Jess, reflect that. In one, he notes that while working near Jinja, Uganda, surveying for a power line, he crossed the Equator eight times during one day's work.

A complete change of career saw Eric and his wife Geraldine running a small bar/restaurant in Mallorca. But due to Geraldine's ill health they returned to the UK in 1986, settling in Deal, Kent. A fortuitous choice, as, after a year of more freelance work, the Channel Tunnel started up. Eric worked on this as chief surveyor, from 1987-91, before retiring at the pinnacle of his profession. Sadly, Gerry could not share in his success, dying in 1989.

I stayed with Eric for a few days when he showed me around the Chunnel site, not long before the "holing out". Eric was somewhat nervous as to the result. Of course, meticulous in everything, he had nothing to worry about, and the alignment accuracies were a surveying triumph. On a later visit, he was more relaxed, and able to relate the factual details, not those muddled by the media. He referred to this project as "the daddy of them all", and paid tribute to his French counterparts in their organizational and surveying skills.

An aspect that impressed me was the amazing colour-coded chart he had in his office, wrapped around all four walls to denote progress of the surveys; an idea I took back to my own survey office. However, things hadn't always gone so well. Eric was not one to suffer fools gladly, especially those who should know better, or those in over-elevated positions of authority. The engineers felt they knew best as to how the surveys should proceed (nothing new there, right?), and pooh-poohed his insistence that more needed to be done to counter lateral refraction in the tunnel. They maintained only vertical refraction was a problem, and he was just trying to inflate the surveyors' work and get more money. After all, many had worked on tunnel projects in the past. Standing his ground, Eric enquired of the longest tunnel they'd ever worked on – about 2km at best, it transpired; a far cry from the over 50km Chunnel. Game, set, and match. He got his way and designed special wall tribrachs for zig-zag traversing.

Highly intelligent and well read, Eric was an avid *Guardian* reader and would regularly solve the cryptic crossword over breakfast. For a while he was active in the ICES, then turned to local politics, becoming a councillor and he might have gone far. However, integrity, fairness, empathy, and honest treatment for working people were vitally important to him, and he became disillusioned with the corruption and back-stabbing.

He was awarded an MBE in the 1992 New Year's Honours' list for work on the Channel Tunnel, daughters Josephine and Sally accompanying him to Buckingham Palace for the presentation. All had not quite ended there as various consulting and teaching jobs came up for him in the UK, South Africa, and USA after 1991, notably as an advisor on the Superconducting SuperCollider in Texas. But this was short-lived when the project was abruptly ditched.

Eric died at home in Deal, Kent with Josephine and Sally at his side.

James Wilson (Jim) Cruickshank
1946 - 2010

Former colleagues from NELP and Clyde Surveys, Geodetic and Fugro, not to mention Prudential and Western Geophysical, will be saddened to hear that Jim Cruickshank passed away on the 25 August after a losing battle with oesophagal cancer.

Jim was an archetypal Scotsman from Dumbarton who arrived at North East London Poytechnic in Walthamstow in 1966 to train as a Land Surveyor. He had a breezy personality, almost unintelligible Glaswegian accent and, like his fellow Scot and best College friend Doug Lloyd, an enthusiasm for fitness and soccer. He progressed through the five-year course to pass RICS Finals and in 1972 joined the Jamaican Survey Department alongside several others from NELP and other survey schools. Most moved on after one or two tours and Jim joined Clyde Surveys (formerly Fairey Surveys) of Maidenhead, who at that time were well to the fore in dimensional control surveys for the construction of oil drilling rigs and platforms at shipyards around the world. Jim spent some time on such projects in Japan where he met his wife Hideko. They have two sons, Andrew and Kenneth, both History students, one at University College London and the other at King's College London. About this time Jim was also successful in becoming a Chartered Surveyor and was later to participate on examining panels for aspiring members of the Institution.

On his return to Britain, Clyde was sold and in 1985 he joined Geodetic, a Swiss company with a UK office in Swindon, which undertook much surveying work for the world's oil exploration industry. After a period of trading difficulties Jim, as General Manager of the UK office, was instrumental in improving Geodetic's fortunes but in 1994 the company was swallowed up by the ever expanding Fugro.

Unwilling to relocate, Jim decided to enhance his employment prospects by taking a year to study for an MBA. Armed with this he went to work for the Western Geophysical Company, mainly in Norway, where he was able to apply both his surveying knowledge and management skills to quality assurance of their seismic operations.

One of the periodic downturns in the seismic business saw him move yet again and he secured a training management role with the Prudential Insurance Company in Reading. But he missed the technical worldwide challenges of surveying so when the opportunity arose he rejoined his former chief at Geodetic, Kobi Ruegg, who was now technical director of Fugro's surveying group. He was engaged on several challenging projects with Fugro in Brazil and elsewhere before the diagnosis of oesophagal cancer brought his career and hitherto fitness regime to a sudden stop. There followed an initially successful major operation at the John Radcliffe hospital but complications of wound infection and pneumonia followed, and the more recent shattering news that the cancer had spread and that his days were numbered. Throughout this period Jim retained his optimistic, positive and cheerful demeanour which was such an ongoing feature of his personality, always expecting that he could resume his work with Fugro. The condolences of his many friends in the surveying business go out to his wife and sons of whom he was immensely proud. We shall all greatly miss his light hearted but nevertheless completely dedicated approach to his life and work.

Alan Hugh

From Richard Groom and Peter Arthur

Between about 1981 and 1984, Clyde Surveys hived off their land survey section into an offshoot company - Clyde Surveying Services. Jim, Alan Wild and John Brownlee were the directors. At that time Jim's responsibilities were the highly successful dimensional control business and included some prestigious contracts for North Sea oil rig construction. It was the Hutton Tension Leg Platform (TLP) that took him to Japan. He returned full of praise for that country and its people.

Jim was always very conscious that no-one owed him a living and so there was a constant pressure to maintain his exacting standards. He was not always an easy person to work for, but for all the right reasons - he demanded and usually got the very best out of people. He was always super enthusiastic and an inspiration to others, certainly to us.

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RICS Update and Policy Watch

By James Kavanagh, Director of RICS Land Group

A raft of new and updated client guides and guidance notes for members plus recent initiatives reflect a busy time by RICS Geomatics on behalf of members, explains **James Kavanagh**.

As we wave UK PM David Cameron 'bon voyage' on his rebate hunt to the EU commission in Brussels, we in RICS Land Group wade through another round of policy-related documents, guidance notes and the ramifications of the UK spending review. Geo members with a political interest can keep up to date with developments @ www.rics.org/policyandinfluencing

Members can, as always, keep up to date on RICS related news with the Land e-brief, *Land Journal* and through the website www.rics.org/geomatics and www.rics.org/land

Before delving into the minutia of Scottish Land Registration, Marine Policy and Rights of Light et al, a couple of important geomatics specific updates:

Many of you will have read the Geomatics Professional Group chairman's piece by Dr **Stuart Edwards** with interest (see page19). We are engaging in the process of restructuring the Geomatics Global PG board. All further information, deadlines and applications details can be fund at www.rics.org/geomatics Applications for PG membership are encouraged from the substantial international RICS Geomatics membership.

Geomatics Evening Lecture series 2010-11

Due to unforeseen circumstances (namely a major cholera outbreak in Haiti) we have had to postpone the November lecture from **Naomi Morris**, MapAction. However, Naomi has agreed to do the annual Xmas lecture next year. **Chris Preston**, Network Rail has very kindly jumped into action and will deliver the Thurs 18th Nov lecture on Railway Survey & National Rail Survey Standards. The annual Xmas lecture features the 2010 recipient of the Michael Barrett award, **Martin Pratt** IBRU - *Still the Razor's Edge? Boundary-making challenges in the 21st century* - on Thursday 9th Dec 2010 17.30 for 18.00. Please do remember to let cmallett@rics.org know if you intend on attending.

New edition of important Guidance Note

RICS Geomatics has released *Vertical Aerial Photography and Derived Digital Imagery – 5th Ed 2010*. This is fully updated Guidance Note (GN) from the 2001 4th edition. This new fully international publication recognises the shift in demand from panchromatic film and photographic products, including digital imagery derived from those products, towards the increasing use of digital cameras and sensors in the capture of vertical photography used in mapping projects and the use of Global Navigation Satellite Systems (GNSS) as navigational aids.

It is intended to assist all those connected with the requesting, purchase and production of surveys and mapping material by advising best practice and seeking to avoid duplication of effort. This document is intended for use in drawing up clear "specifications" for aerial photography and digital imagery obtained directly from digital cameras and sensors or derived from analogue aerial photography using digital scanners. The specification may be prepared by the client (the individual or organisation requesting information) or by the contractor (those who will be tendering or undertaking the provision of information).

This document is also designed as a specification for vertical aerial photography typically required for:

- *photogrammetric mapping and digital data collection*
- *production of orthophotography and digital mosaics*
- *environmental information gathering and general interpretation*

It is not a specification for remote sensing, except in the context of vertical aerial photography and derived digital products. Part 1 of the document is a survey brief. Part 2 is a combined standard specification and guidelines and covers the following:

- *Project information*
- *Camera equipment – including calibration and digital camera specifications*
- *Flying and photo coverage*
- *Navigation and ground control*
- *Digital photographic output including scanning of 'film' products*
- *Digital imagery*

This GN can be read in conjunction with the RICS Geomatics client guide *Applications of aerial photography and imagery – using 'off the shelf and commissioned products'* and is available to all RICS members @ www.rics.org/geomatics

Statue's silver pen draws too many

A plethora of entries made me quickly realise that we should have added the text "A free draw" when asking if any member could locate the statue on the cover of the new RICS Geomatics guidance note *Use of GNSS in surveying and mapping 2ed 2010*. Several dozen members where correct in locating the statue as "Newton" by **Eduardo Paolozzi** outside the British Library,

The 5th edition of RICS' Guidance Note on Vertical Aerial Photography and Derived Digital Imagery is now available.

London, UK. The lucky winner is Michael Moseley Land Registry, Coventry Office.

RICS releases Rights of Light 1st ed GN 2010

Over 100 RICS members from a variety of practice areas recently attended the official launch event for the new 1st edition Rights of Light GN. This GN focuses on what might be for many RICS Geomatics members a new area of potential practice but one that also relies heavily on the measurement, scanning and 3d modelling expertise of geomatics. Indeed, chapter 2 focuses on measurement issues and I would urge all RICS Geomatics firms engaged in any kind of urban building survey and/or laser scanning to consider this a potential business opportunity. Not words too often heard in the current economic climate. The focus is on mediation and negotiation issues and I'm sure many of you will be aware of the very high profile RoL cases currently in the news (Leeds). RICS is also running a series of roadshows focusing on the legal and technical issues behind Rights of Light. More @ http://www.rics.org/site/scripts/events_info.aspx?eventID=1826

The full 1st ed GN can be downloaded from www.rics.org/standards and completes the Boundaries & Party Walls Practice Panel's triumvirate of neighbour dispute guidance notes on boundaries, party walls and rights of light. All available to RICS members @ the url above.

RICS releases new GN on Practice management guidelines: the management of surveying businesses (3rd edition) 2010

This guidance note focuses on the processes and procedures which practitioners will face when managing and leading a surveying practice, be it in the private or public sector. It is designed to provide advice to surveyors on the many different dimensions of practice management, from setting the strategic direction and effective financial management and marketing, to developing effective client relationships, shaping an effective team and motivating staff in the delivery of exemplary client service.

Coming out of recession usually results in a plethora of new survey companies and older ones evaluating their business models. Hopefully, geomatics members will find this new GN of interest and take on board some of the suggestions of moving from "firms" to professional practices. Dr **Tom Kennie** FRICS, a long time FIG representative, is lead author.

Scottish Land Registration Consultation

Much has been made of the mere mention of the term "cadastral map" and "cadastre" within the wording of the in-depth and lengthy consultation on prospective changes to the Scottish land registration system as contained within the full consultation document @ www.ros.gov.uk/lrbillconsultation

Chapter 5 contains the "mapping" section and underlines that the term "cadastral map" in this context does not relate to the beast of "measured boundaries" but is in effect a replacement for the Scottish Index map. On reading and discussing the document with various officials, it seems that it is essentially putting legislative weight behind many current RoS practice but for those of you who would like to really see the wholesale land law differences between Scotland and England/Wales this document should be of great interest. RICS will be responding in due course.

UK Marine Policy Statement response

RICS recently responded to the latest marine (MPS) consultation and again reiterated our policy stance on a number of issues. This UK policy statement will eventually become the primary policy driver behind the implementation of the new marine planning regime. RICS underlined the need for consistency across the marine policy framework with regards to training, marine and land based data capture, planning evidence and the links between the terrestrial and marine based planning frameworks. The full response can be found at www.rics.org/land Interested members can also join an online marine virtual community of like minded RICS members from the geomatics, planning, construction and environment areas of practice. Contact jkavanagh@rics.org for more information.

The Marine Management Organisation (MMO) now seems to be bedding into its position and recently announced the first two English marine plan areas. In consultation with partners and stakeholders, the MMO has selected the sea areas off the coast between Flamborough Head in East Riding of Yorkshire to Felixstowe in Suffolk (known formally as East Inshore and East Offshore) as the first two that will be developed from April 2011.

These two area plans will be the first in a series that will, over the coming years, grow to become a comprehensive marine planning system around England, enabling the effective integration of economic, social and environmental factors and promoting the sustainable development of our seas.

The MMO is the first organisation in the world to develop an integrated planning system for the marine area, mirroring the terrestrial planning regime, which has, over 60 years, become an established and trusted mechanism for integrating and balancing land use. All issues related to the MPS can be found @ http://www.defra.gov.uk/environment/marine/

And finally some latest releases

New RICS consumer guide on Flooding www.rics.org/flooding. This focuses on flood resilience and is aimed primarily at the general public. Several thousand have already been distributed ahead of this year's floods to regional UK Citizens Advice Bureaux and kindred organisations such as the Flood Forum. If you would like any hardcopy versions of this guide please contact cmallett@rics.org

A new edition of a GN for Practice management guidelines: the management of surveying businesses (3rd edition) is now available.

". .for those of you who would like to really see the wholesale land law differences between Scotland and England/Wales this document should be of great interest."

Rooney, conkers and random promotion!

By Malcolm Draper

A trip to Italy finds more than ancient maps, while we say goodbye to an old friend and the RGS begins a new season.

During the late summer I was in Italy staying with friends. We visited Caprarola and the Farnese Palace where there were some fantastic maps decorating the walls and ceilings. The Farnese family were an extremely wealthy and powerful family in Renaissance Italy. Their members included Popes and Dukes and they built some magnificent palaces for themselves.

Inside the Palace we visited there is a map room – the *Sala del Mappamondo* – where all the walls are painted with maps including one large map of the world showing Antarctica (see below). These maps are really quite breathtaking and well worth a visit if you're ever there.

Whilst in Italy we also visited Orvieto. I couldn't resist snapping the window of a football trophy shop with an interesting juxtaposition of the shirts of **Messi** and **Rooney**. Very appropriate, given the latter's recent problems.

Bubbling but not boiling

Back home, it was interesting going to one of Leica's autumn roadshows and seeing their latest total station with a camera. I went to the one at Mercedes Benz World ay Weybridge and caught up with several old friends. There seems a little more optimism about, especially amongst the more specialist bits of the business. One surveyor told me he had work until Christmas. 'Things are bubbling but not boiling' another told me, while my overseas friend **Ian Waller** in Dubai reports that they're 'hiccupping' back into profit.

I was very upset to learn of the death of **Eric Radcliffe** (see obituary on page 10). Eric was not just a great site surveyor but a great bloke to have a drink with down the pub. After he retired he tried local politics and was elected as a councillor but he soon gave it up, describing it as 'like tap-dancing in treacle'!

I recall the kindness Eric showed to my son and his school friend in showing us around the work on the Channel Tunnel, including one of the enormous crossover tunnels. I also recall that Eric had wanted to use wine from his French counterparts instead of water for the final "water levelling" when the two sides met, but Customs & Excise refused.

A messi pair indeed!

An early map of the world showing Antarctica.

Autumn season kicks off

The autumn season has got off to an excellent start at the RGS. So far we've had Mapping the Globe: from Greeks to Google Earth (might have been more imaginatively titled "From Greeks to Geeks"); Eruptions that shook the world; and Just deserts. But far and away the best so far was **Simon Winchester** talking about his new book on the Atlantic Ocean ("Atlantic: an ocean of a million stories"). He spoke for nearly an hour and entertained us with great stories. As the director general Dr **Rita Gardne**r said, 'Simon is the ideal dinner guest'.

Several of Winchester's epic tales seem incredible. For instance, on the rocky and northerly Spitzbergen islands each year men scale cliffs up to 2000 feet high with lambs wrapped around their necks, which they then deposit on isolated patches of grass to allow them to fatten over the spring and summer. Later they climb back to get them, invariably chucking them into the sea below from where they are recovered by boats for onward slaughter (assuming they survived the fall). A grim business but man's search for food has always had its raw side.

Other tales recounted why he's banned from the island of Tristan da Cunha and how a Frenchman is busy restoring a lighthouse on the tip of South America. But perhaps the most remarkable concerned Dr **Chaim Weitzman** and the Balfour Declaration, which promised "a national home for the Jewish people in Palestine". Apparently this historic (and controversial) promise, made in 1917 by the British Foreign Secretary, has its origins in conkers. Yes, those bright shiny brown nuts we all used to collect and fight with back in

the school playground.

It seems that the Navy was losing the battle of the Atlantic during the First World War because of a shortage of acetone, an essential ingredient of the fuses in warships' high explosive shells. Before 1914 Germany had been the primary source of acetone. Weitzman, a chemist, developed a new method for making acetone from horse chestnuts – conkers. Weitzman was quickly whisked down to London to the war office and in no time every boy across the country was busy collecting conkers to help the war effort. So grateful was the nation that the foreign secretary asked him if there was anything they could do to thank him for his contribution. That was the point when Weitzman asked if something could be done to secure a home for the Jews in Palestine. The rest, as they say, is history.

An ignoble world

We've mentioned before the "Ig Nobel" prizes awarded to those scientists whose research triggers the question, "Why do that?" This year's crop has some real screamers:

The Engineering Prize to Karina Acevedo-Whitehouse (UK) and colleagues for perfecting a method to collect whale snot, using a remote-control helicopter.

In Physics, the prize went to Lianne Parkin (New Zealand) and colleagues for demonstrating that, on icy footpaths in wintertime, people slip and fall less often if they wear socks on the outside of their shoes. I'll try and remember that one when the snow comes.

The Peace Prize went to Richard Stephens (UK) and colleagues for confirming the widely held belief that swearing relieves pain. I'm glad that's been finally proved.

I'm not sure if there really is a Nobel Management Prize but this hasn't stopped the organisers from creating one. It went to Alessandro Pluchino (Italy) and colleagues for demonstrating mathematically that organisations would become more efficient if they promoted people at random. I really like that. So much time and effort is wasted on tests, targets, interviews and micro management of people these days, with tick-box management and far too many procedures that it's really nice to have someone prove that it's all a waste of time!

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

The Hunting Lunch 2010 *by John Leatherdale*

Below: 'Time for Lunch'. Right:'Several generations of surveyors at table'

Another year has gone by and an even older group of sixty people who once worked for Hunting Surveys gathered to talk and have lunch together. Ironically 23 years after the company closed down, we could have had more participants than ever, but illness, bereavement and overwork forced ten to cancel in the last week. Aircrew and photographers, photogrammetrists and cartographers, land and sea surveyors, administrators and secretaries, and their loved ones, gathered at Hadley Wood Golf Club, a late 18th century house built by **Francis Russell**, the Duchy of Lancaster's surveyor of Enfield Chase. For some it was quite a challenge to make it, helped by spouses, sons and daughters, sticks and wheelchairs. Some had joined Hunting Aerosurveys in 1947 after service in the army, navy or air force and have enjoyed many years of retirement. Some only worked for Huntings for a few years but come to meet old friends. Conversation never faltered and most went home realising there just had not been enough time to talk to all their old colleagues. Have to come again next year!

Inevitably our numbers are declining. **Ian Matheson** received a lengthy obituary in the *Daily Telegraph*. David Herriott joined Huntings when he left the army and worked for many years in the Niger Delta and the Middle East. **Harry Glennie** also joined Huntings from the army to work on the geodetic survey of Saudi Arabia (see ***GW*** Sept/Oct for a full obituary)..

Besides the lunch we usually lay on some kind of diversion such as a slide show or surveyors' reminiscences. This year the theme was 'Life after Hunting'. **Chris Allen** described how he moved from the estimating department to selling Aerofilms photographs for publication and then joined the *New Scientist* as a picture researcher. When it became possible to scan and transmit images by internet, a process which could take weeks suddenly happened in a few hours. **Martin Curran** explained how a group of cartographers set up Cosmographics as a partnership providing high quality graphics for the *Times Atlas* and other publishers. Despite their love for traditional draughtsmanship they soon realised they had to go digital and invested boldly in computer graphics systems.

After Hunting Surveys closed down in 1987, several groups and individuals set up on their own, many transferred to other employers and some moved out of surveying and mapping. We were all particularly pleased to hear that the National Monuments Record at English Heritage, which now owns the Aerofilms collection of oblique aerial photography started in 1919, has obtained a Lottery Fund grant to scan and catalogue all the negatives and make the images freely available on their website. One of our photogrammetrists, **Rose Ogle**, will lead the workstream.

Lionel Williams wound up the proceedings with a vote of thanks to **John** and Moira **Leatherdale** for organising the event, confidently predicting that next year they will do it even better. If any readers used to work for Hunting Surveys, Hunting Aerosurveys or Aerofilms and would like to be put on the mailing list for next year's reunion, please e-mail *johnleatherdale@o2.co.uk*.

Heading for Halloween 2? – ionospheric scintillations threaten GNSS

A recent question in the European Parliament triggered fears over the effect of geomagnetic storms on global infrastructure during the next solar maximum. **Marcio Aquino** and **Biagio Forte** look at the possible effects on GNSS.

The behaviour of the ionosphere, the ionised upper layer of the Earth's atmosphere, depends on the combination of geomagnetic and solar activities, referred to as space weather. The impact of space weather on signals crossing the ionosphere is critically enhanced during the solar maximum and may lead to severe degradation and service disruption at a range of frequencies, including those employed by satellite based navigation, telecommunication, and Earth observation systems.

Signals from GNSS satellites can be badly affected by geomagnetic events as they cross the ionosphere. Scintillations, which are rapid fluctuations in the amplitude and phase of the signals caused by irregularities in the ionosphere arising from geomagnetic disturbances, may lead to complete loss of signal lock on satellites.

The concern is that GNSS is now a technology that is fully embedded in modern society, from in-car navigation to the timing of the world's financial transactions. It has really taken the world by storm, and reliance on it has become the norm for several daily life applications. Space weather related phenomena, such as scintillation, can be very disruptive, with consequential effects as damaging as those observed during the 'Halloween' event that took place in Oct/Nov 2003, when one of the most intense solar flares ever was recorded[1]. During that event companies delayed high-resolution land surveying, postponed airborne and marine surveys, cancelled drilling operations and resorted to back-up systems. The US Wide-Area Augmentation System (WAAS), counterpart of the European Geostationary Navigation Overlay System (EGNOS), was seriously affected and commercial aircraft were unable to use it for precision approaches. Air traffic control centres reported degradation of service, leading to rerouting of polar flights and HF communications suffered a range of problems, including complete blackout.

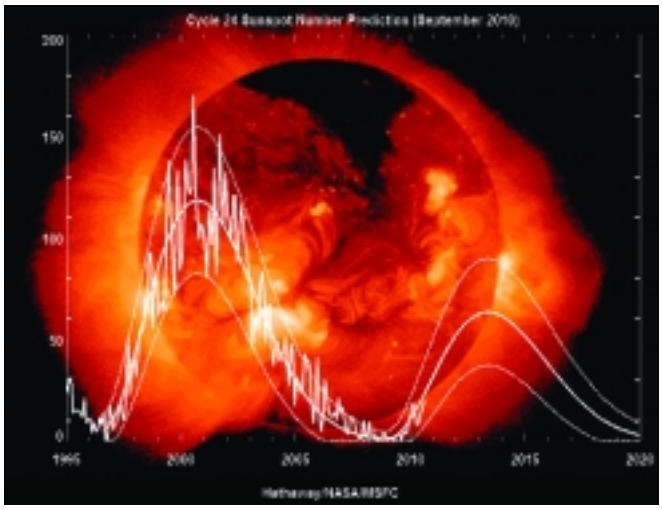

Figure 1: Diagram showing projected activity for the coming solar cycle. Courtesy: NASA

Although some of these systems can resume full operation quite quickly, the damage is irreparable for those requiring a demanding level of availability or accuracy. Crucially, safety critical as well commercial applications may fall into this category. For instance, when talking about implications for the oil industry, Lee Ott from OmniSTAR quoted[2]: "Once [the platform] is on station and sitting in maybe a thousand feet of water and drilling a hole, the cost of that rig is about a US$ 1m a day. If they lose their positioning, they have to do an immediate disconnect which leads to the loss of production time, but more importantly it may require over two days to do the reconnection and get back into production."

The effect on GNSS

At Nottingham we have been studying the effects of scintillation on GNSS for over a decade, having started during the last solar maximum. Our research has shown the correlation of increased positioning errors with geomagnetic activity and with the occurrence of scintillations, as well as degrading effects on the ability of augmentation systems such as EGNOS to provide timely and accurate corrections under severe ionospheric conditions. Analysing long-term historical data, statistics of scintillation occurrence and probability of serious disruption were also calculated.

Figure 2 shows the effect of scintillation on GPS satellites during the "Halloween Storm". The probability curves reveal that for about 3% of the time within those two days, the phase scintillation index of two satellites went over the 0.5 rad threshold simultaneously (left red arrow) and that this occurred during 1% of the time for three satellites (red arrow on the right). If exceeding this threshold in the scintillation level leads to loss of lock or severe accuracy degradation, then highly demanding applications could be significantly affected. 3% of a two-day period of time translates into about 1½ hours of a degraded or even non-existent service – inadmissible to most safety-critical applications. A greater number of satellites in space, with the advent of new systems such as Galileo, may help mitigate this situation, but there are no reports in the literature of similar analysis for these new signals and their receivers, as yet.

Clearly, for a GNSS dependent community,

although of significant concern, this is not to say that the world is going to stop. Alarmist reports on potential disruption should therefore always be treated with caution. However, to put things into the right perspective, it must be noted that reliance on GNSS has grown so much since the last solar maximum (i.e. in the last ten years or so) that without doubt disruption to systems essential to society as a whole could be much greater this time round.

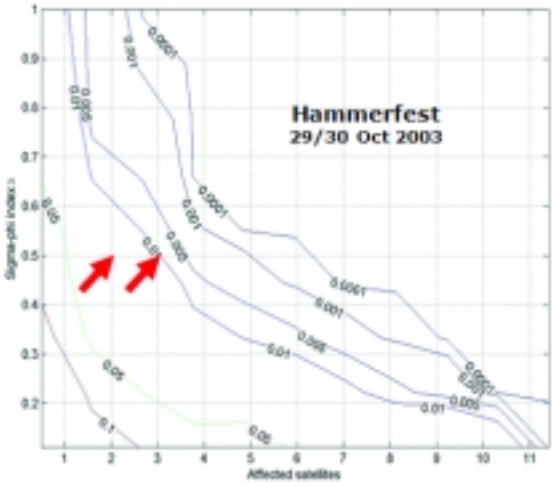

Figure 2: Plot depicting a real scenario where the probability of a number of GPS satellites being affected simultaneously by scintillation (in this case given by the phase scintillation index, referred to as sigma phi) over a certain threshold (0.5 rad) is shown for 29/30 October 2003 – the "Halloween Storm" – observed at Hammerfest (71° N geographic latitude).

Forecasting and mitigation

In this article we focus on ionospheric scintillation, which is the phenomenon that can lead to the most serious problems. Developments on two main fronts are relevant to GNSS users if they are to counter ionospheric scintillation: forecasting and mitigating their effects.

On the forecasting front, the dynamics of scintillation may be analysed; for instance using data from a network of specialised GNSS Ionospheric Scintillation Monitor receivers. There is currently an ongoing four-year project funded by the EPSRC (Engineering and Physical Sciences Research Council) in the UK whereby the Universities of Bath, Nottingham and Newcastle have teamed up to implement a large scintillation detection and monitoring network covering Northern Europe, parts of the Mediterranean region and Africa. Also, climatological studies based on data collected at specific geographical regions can help characterise the probability of scintillation occurrence and their intensity. The regions of greatest interest are the high latitudes and equatorial regions, where scintillation is more likely to occur and with greater intensity.

On the mitigation front solutions have been proposed that rely on an improved ability to model scintillation levels and occurrence so that users can work with predictions to counter or at least prepare for the effects. Additionally, efforts have been directed towards devising countermeasures at the receiver level, therefore aiming at developing tracking techniques and firmware based models that will lead to more robust receivers. These are covered by the EPSRC funded project, but Nottingham also participates as technical leader in a specific additional effort through a GSA (Galileo Supervisory Authority) funded project called CIGALA (Concept for Ionospheric-Scintillation Mitigation for Professional GNSS in Latin America), led by Belgian multi-GNSS receiver manufacturer Septentrio Satellite Navigation. CIGALA's specific goal is to develop a receiver that is robust to scintillation under the demanding conditions of the equatorial ionosphere.

Network for detection and monitoring

At a COST 296 MIERS (Mitigation of Ionospheric Effects on Radio Systems) workshop held at Nottingham in 2008, the establishment of a sophisticated Ionospheric Perturbation Detection and Monitoring (IPDM) network (http://ipdm.nottingham.ac.uk/) was proposed by major European experts and supported by the European Space Agency (ESA) as the way forward to protect the range of essential systems vulnerable to ionospheric threats. The concept behind this network is to consider research and services currently ongoing at national level in Europe, and then develop and integrate them into a European service. A direct development was the subsequent funding by the EC of an application for a Marie Curie Initial Training Network within the FP7 People programme. The 4m Euros four-year project, entitled TRANSMIT (Training, Research and Applications Network to Support the Mitigation of Ionospheric Threats), is led by Nottingham and will start in Feb/2011. It is set around a consortium of some twenty-five academic and industrial partners in Europe, Brazil and Canada. It aims to train young researchers to create the critical mass necessary to support the realisation of the IPDM network through the development and implementation of a prototype service.

> *". . efforts have been directed towards devising countermeasures at the receiver level. . ."*

Research on countermeasures

Another related project funded also through FP7 and currently running at Nottingham is the Marie Curie Intra-European Fellowship entitled ICARUS (Ionospheric threats and suitable Countermeasures Applicable to satellite Radio systems Under next Solar maximum). This is another important boost to ionospheric research in Europe, and at Nottingham in particular, which sees the authors of this article collaborating on ionospheric research for a period of two years.

Last but not least, Nottingham is also being funded by the Royal Society through two International Joint Projects to help liaise and develop collaboration in the area of ionospheric

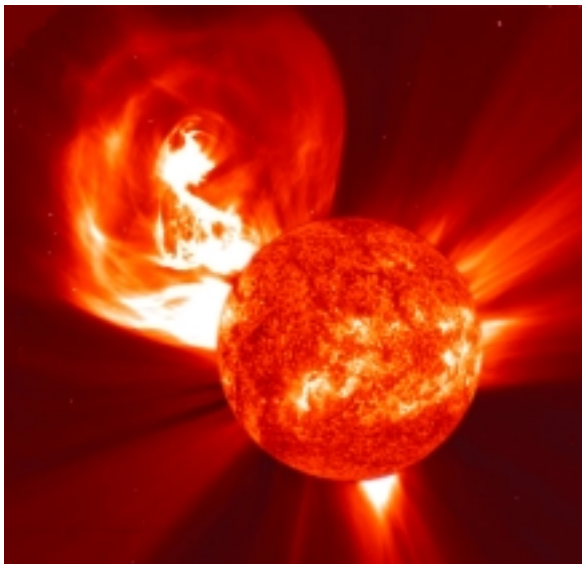

Figure 3: Coronal mass ejection from the sun. Courtesy of SOHO/EIT consortium. SOHO is a project of international cooperation between ESA and NASA.

research with Brazil and Italy respectively, and by Banco Santander for connections with Brazil in the same research area. At Nottingham we have the solar cycle covered!

Experts needed

In parallel with the current development of Galileo, in Europe there is a need for a new generation of experts who are trained with ionospheric expertise directly connected to their GNSS knowledge. TRANSMIT will provide this integrated programme of academic and industrial training, which is particularly timely for Europe as we build Galileo whilst also approaching the next solar maximum. And associated with the training in TRANSMIT there is of course the development of the IPDM network prototype.

Pressing need to co-ordinate academia and industry

Not only GNSS signals but any others operating below 10 GHz are extremely vulnerable to ionospheric phenomena. This formidable multibillion Euro, fast growing community lacks robust counter-measures to deal with these ionospheric threats. Activities embedded in this community range from civil aviation, marine navigation, land transportation, construction, mining, agriculture and surveying, to communications, remote sensing and Earth observation systems. Furthermore the European Parliament resolution of 19 February 2009 on European Security Strategy (2008/2202(INI)) explicitly recognized the need for Galileo to serve the EU's defence and security. The flawless operation of these systems and a full consolidation of the GNSS market depend on a proven ability to neutralise their vulnerability to ionospheric threats: there is a pressing need to co-ordinate academia and industry in Europe to tackle this problem.

"...there is a pressing need to co-ordinate academia and industry in Europe to tackle this problem."

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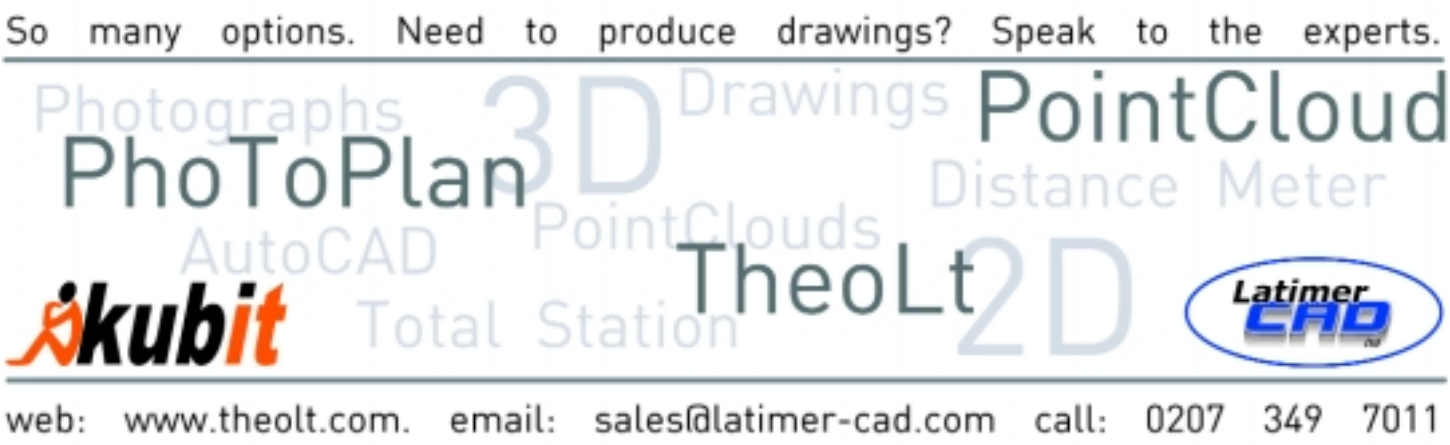
About the authors

Marcio Aquino has a degree in Geodesy Engineering and worked for several years with geodesy, surveying and satellite positioning for Petrobras, the Brazilian National oil company. He has an MSc degree from Nottingham University and a PhD in Space Geodesy in the field of Wide Area DGPS. For the last twelve years he has worked at the IESSG of the University of Nottingham. His current research interests include ionospheric error modelling, effects and mitigation for different space geodetic techniques, climatology of ionospheric scintillation and implications for GNSS positioning, and GNSS receiver tracking performance, in particular under ionospheric scintillation conditions.

Biagio Forte holds degree in Physics from the University of Trieste (Italy) and a PhD in Geophysics from the Karl-Franzens University of Graz (Austria) . He has worked at the Abdus Salam International Centre for Theoretical Physics (Italy), at Imperial College (UK), and at the University of Nova Gorica (Slovenia), which is his permanent Institution. Currently, he is a Marie Curie Fellow at the IESSG at the University of Nottingham. His main research area is ionospheric radio science. In particular, he studies ionospheric physics, radio wave propagation, ionospheric scintillation, and atmospheric remote sensing.



With all members of Professional Group Boards having to reapply for membership next year, now is just the right time to consider your application, says current chair of the Geomatics Global Professional Group Board **Stuart Edwards**.

Join in and get involved!

Whilst reflecting on the various topics I might have chosen for my first column I had pondered that a good way to begin might be by asking a number of open questions. My overall aim being to find out from fellow geomatics colleagues (yes, that's you!) answers to questions like: What do you want from the professional group? What would you like to read in GW? And, what do you see as the major challenges facing the Geomatics profession in the next five years?

All good questions I hope you would agree, but very recently overshadowed by a more pressing matter, namely the requirement by RICS Governing Council for the Board to review its membership. Thus, I give over the rest of this, my first and potentially my last column (I too am required to reapply!) to a pitch seeking potential new members to join in and get involved.

Some Background

From reading the articles of the previous chair, I am sure that many of you will have seen changes during the past two years that have already reshaped us from a faculty into a Global Professional Group Board (c.f. *GW* Nov/Dec 2008, May/Jun 2009 and Aug/Jul 2009).

For those still in the dark the RICS, as part of its drive to advance professional practice and technical standards worldwide, has established UK World Region Boards and Global Professional Group Boards. These sit alongside the other World Regions of Europe, MENEA (Middle East, Near East and Africa), India, the Americas, Oceania and Asia. Within this framework our now established Geomatics Global Professional Group Board, or more simply Geomatics Professional Group (GPG), is required to review the current membership during 2010 and where necessary reconstitute to reflect the internationalism and breadth of knowledge of RICS Geomatics practitioners worldwide.

It is worth remembering that Geomatics has the largest percentage of non UK resident members of any professional group and a long history of international practice. As per current practice, the reinvigorated GPG will work closely with RICS executive staff and will be accountable to RICS Management and Knowledge Boards for the development and delivery of a Global business plan. My predecessor Ruth Adams put this very succinctly in a recent column saying the overall aim of the Board is "to represent geomatics surveyors globally, both RICS and potential RICS members" (*GW*, May/June 2009).

Size of the GPG

The exact size of each Professional Group Board is determined according to the range of skills and knowledge required to fulfil the strategic goals of the group. For the GPG this has been set at 13, including our Group Director (James Kavanagh) so there is plenty of opportunity to get involved and we need representation from all of the World Regions.

Selection Process

The selection process is skills based as the GPG requires a broad cross section of skills to fulfil its role in all areas of Geomatics practice. Enthusiasm and a willingness to devote serious effort and time are, of course, essential. A selection panel, comprising myself, James and members form the Knowledge Board will consider all applications matching them against a predefined 'skills matrix'. Selection will be based on an objective assessment of the requirements of the Board against the expertise and experience of the applicant and occasionally interviews may be undertaken. The nominal term of office will be three years.

The Skills Matrix

- For the GPG, Board membership will need to cover the following range of skills, employment sectors and expertise:
- Academia (including technical training)
- Cadastre, Land Administration and registration
- Development and management of Geographical Information Systems, such as property/land information systems
- Digital terrain/elevation modelling
- Engineering Surveying and construction
- Geodesy and GNSS
- Hydrography and marine (offshore)
- Mapping and Charting
- Measured Building Survey and laser scanning
- Neighbour dispute
- Remote sensing (aerial, terrestrial and space) and photogrammetry
- Specifications, quality control and guidance

Join in

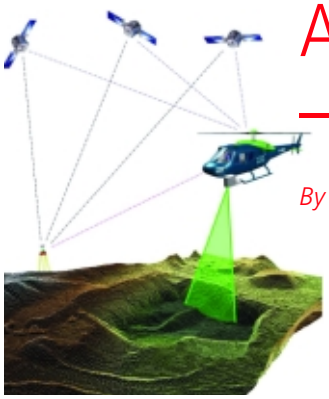
If you think you could assist in answering my initial questions above and help shape the future of Geomatics both nationally and internationally, I would urge you to apply. The closing date for applications is 18th February 2011. Further details on the application process can be found on our website (www.rics.org/geomatics) or by contacting James Kavanagh (jkavanagh@rics.org).

Finally, notwithstanding my own need to reapply for chairmanship of the GPG, I look forward hopefully to serving you in the coming months. To this end I would be very interested to receive mail on any topic related to the GPG and the wider Geomatics profession. Please email me on the following email address: geochair.rics@gmail.com Perhaps you have some views on my initial questions.

Footnote

In researching this column I found the newly established *GW* archive facility available at www.pvpubs.com/index.php extremely useful*.

**Members can get a user name and password by using their address details as recorded on the mail carrier sheet with GW. You must use this address as the system needs this to recognise you as a bona fide RICS member.*



Aerial LiDAR surveys for civil engineering – a Middle Eastern perspective

By Nicholas Ferguson and Samuel Verth, Network Mapping

Above: A helicopter-based LiDAR system.

LiDAR data from helicopters has become a practical tool for route visualising and creating DTMs to help design linear civil engineering projects.

In a cartographic sense, the Middle East can generally be characterised by varied and extensive topography, rapid infrastructure development, small scale, absent or out-of-date mapping in many locations, and a consequent requirement for up-to-date high quality geospatial information to manage change.

Over the past year, Network Mapping has been engaged in several high resolution surveys throughout the Middle East for civil engineering applications, which have included the new design or upgrade design of highways, roads, electricity transmission, water transmission, dam design, airport upgrade, and oil and gas facility management.

The technology

Aerial Light Detection And Ranging (LiDAR) technology represents one of the biggest step changes in surveying in recent decades. An infrared laser scanner measuring elevation and brightness of objects, together with photography for recording colour, are mounted on a helicopter that flies at a speed of 25 metres a second. This largely automated technique allows millions of individual points to be surveyed, creating vast 3D point clouds that accurately and indiscriminately portray landscape topography and above ground objects.

The point cloud is georeferenced by determining aircraft trajectory using an onboard kinematic GPS system and Inertial Measurement Unit (IMU), which is post-processed with ground-based differential GPS base station data. Survey point densities are dependent on project requirements, but typically vary between 5 and 40 points per square metre. The absolute accuracy of a single georeferenced point depends on acquisition parameters and ground control, but is typically 5 to 10 cm, and the relative accuracy between two points will be even better. The imagery acquired during survey has a set pixel size ranging between 5 cm and 20 cm.

For aerial LIDAR surveys on helicopter platforms, progress rates are typically 75 – 100 km of linear route per day, and only one member of staff is required on the ground for each 25 km radius of survey area to operate the differential GPS base station.

Right: A system deployed in the Middle East.

Working in the Middle East

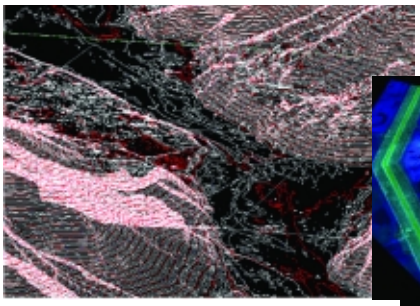
Working in the Middle East brings a range of challenges, operationally and logistically, and these must be overcome before a successful survey can take place. For aerial surveys, the high temperatures and warm air reduce helicopter endurance, as do requirements for a security official to be onboard the aircraft at all times. Additionally, it is necessary to go through the process of applying for operating permits for the airframe, and for the equipment that is to be mounted on its exterior. Following this process it is then a requirement to obtain flying and photographic permissions for each survey project undertaken.

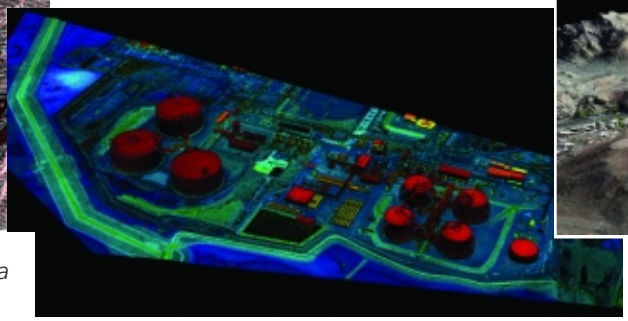
Point clouds to engineering design

Network Mapping's approach to the civil engineering industry stems from a history with its former parent company, National Grid, and the knowledge that can be transferred from providing high-end surveys for electricity transmission to other industries such as highways and roads, oil and gas, and water. In all cases the survey is tailored to the individual application of the client.

Following close liaison with the national mapping agency in the country of operation, the mapping deliverables are created at Network Mapping's Technology Centre in Knaresborough, UK. In the case of infrastructure design projects, one of the most requested deliverables is a bare earth Digital Terrain Model (DTM). In this instance an automated routine is applied to the LiDAR point cloud that filters out vegetation from the ground surface. The dataset it then manually classified to enhance the quality of the model. The LiDAR returns that represent bare earth are used to create a range of DTMs, including contour models, gridded raster products, and Triangulated Irregular Networks (TINs). These products, for example a 0.25 m gridded bare earth DTM, are used for infrastructure projects by consulting engineers to determine the horizontal and vertical alignment of the new infrastructure in a way that minimises construction costs through the accurate determination of cut and fill quantities.

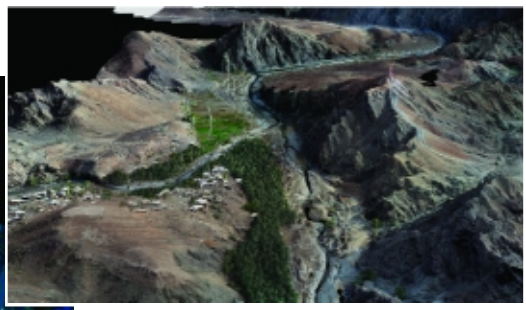
Topographic mapping, whereby man-made and natural features are denoted by their perimeter shape, is produced using the high





Left: *A contour model generated from the LiDAR data.*

Right: *Oblique view of LiDAR data for a Liquid Natural Gas facility.*



Above: *LiDAR data coloured by photography.*

resolution orthorectified imagery and LiDAR point cloud in tandem. A technician will refer to a schema developed in consultation with the client, and work through the dataset capturing all listed features. The final drawings are usually presented as a CAD or GIS file for direct import into various computer software packages such as MicroStation, AutoCAD, or ArcGIS.

In addition to these deliverables, it is now increasingly common for engineering firms to request a rapid visualisation tool for the LiDAR point cloud. This is used to gain an initial appreciation of the landscape before detailed design work takes place. For example, in the case of flood prevention, rapid visualisation of a colourised point cloud can allow a hydrological engineer to assess the landscape and wadi (valley) systems from the comfort of the office and at a range of angles in order to make an informed decision on dam placement.

Case study: a new highway in Oman

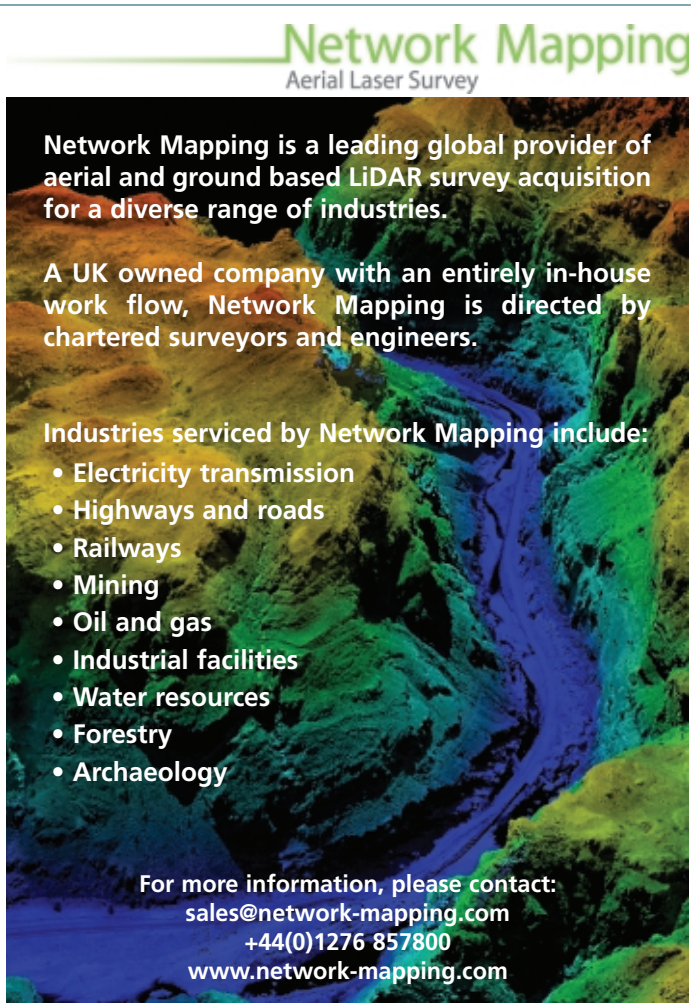
Network Mapping has recently completed a survey project for Parsons and BOTEK-Ace, two engineering firms appointed for the project as design consultants by the Ministry of Transport and Communications in Oman. The current coastal road system becomes very congested during peak hours, and the purpose of the new highway, which lies inland from the coast, is to take pressure off this coastal region. The main alignment for the route and the link roads, which totalled some 600 km in length, were surveyed from the air in just one week, as opposed to several months using conventional survey technology. The broad coverage of the dataset, combined with high resolution mapping of the topography and surface features, provides the consulting engineer with a wealth of information from which to optimise the vertical and horizontal alignment of the road in a way that minimises cut and fill requirements and impact on the local infrastructure, environment, and population. The dataset was used to determine the preliminary and final detailed designs for the infrastructure route within the surveyed area, which was 1 km in width.

In addition to the LiDAR dataset, Network Mapping Ground Survey personnel added further value to the survey by providing verification data for culverts and underground utility marker posts, the construction of permanent ground markers, the calculation of a close loop control network, and the staking-out of the alignment centreline following the detailed design.

Conclusion

The use of aerial LiDAR as a methodology for providing high accuracy and high resolution surveys for expansive civil engineering applications continues to grow worldwide, with knowledge of and an appreciation for the technology spreading beyond the traditional US and European demand sphere. In most cases the aerial LiDAR system is deployed in order to expedite a project, improve survey quality and reduce costs.

> *"...provides the consulting engineer with a wealth of information from which to optimise the vertical and horizontal alignment of the road..."*



Boundaries, Borders, Bathymetry, Mega Cities, the Profession. . .

It was all at FIG 2010, says Richard Groom, who has been browsing through some of the papers presented at Sydney earlier this year and has come up with several that readers might like to follow up. All are available for download from www.fig.net/pub/fig2010/papers/ against the session numbers.

In Session TS01I, **Arsana**, **Yuniar** and **Sumaryo** presented a paper on the delimitation of the maritime (territorial water) boundary between Singapore and Indonesia. The first boundary agreement, covering about a third of the boundary, was signed in 1973 but the accompanying map did not state the geodetic datum on which the boundary points were based. In 2009 a new treaty was signed between the two countries that defined the boundary on WGS84 and extended it a little further west.

The paper goes into the issues that need to be resolved next. These include agreeing between Indonesia, Malaysia and Singapore, two three-junction points where their maritime boundaries meet to the south east and south west of Singapore island. However, it will perhaps be more difficult to agree the boundary in the area of Pedro Branca, Middle Rocks and South Ledge. In 2008, the International Court of Justice determined the sovereignty of this group of three geographical features that lie east of Singapore and between Malaysia and Indonesia. Pedro Branca was awarded to Singapore, Middle Rocks to Malaysia and it was decided that South Ledge, which consists of rocks that are only exposed at low tide would belong to the nation in whose territorial waters it sits. The route of the maritime boundary and extent of Exclusive Economic Zone will depend upon whether Pedro Branca is classified as an island or a rock and on the weights that will be attached to the influence of these features on the boundary.

These are problems that take decades to resolve and so delimitation of the boundary is a long drawn-out process. The paper explains the principles used to determine the baselines from which the boundary itself is determined. Indonesia is, of course, an archipelago and can therefore use archipelagic baselines that reach across the sea between islands to connect the outer headlands. Singapore and Malaysia, on the other hand, use normal baselines. The paper demonstrates the effects of using archipelagic or normal baselines on the maritime boundary and the possible boundaries that could arise depending on the status of Pedro Branca and concludes that there is plenty of negotiation ahead.

International Borders

Moving on to land, **Bill Robertson**'s paper "Challenges for Surveying in the Establishment of International Borders" (session TS2A) acknowledges the importance of survey as an integral component of a complex political / judicial / professional process. The surveyor's role during delimitation of international boundaries involves gathering and examining map and other evidence; and perhaps the more straight-forward role of demarcating the agreed boundary, involving accurate and equivocal determination of the boundary as previously delimited. The essential starting point is the definition of a sound and accepted boundary datum. As well as providing mapping and imagery, the surveyor may well be involved in helping the boundary commission to visualise the terrain by draping imagery over digital elevation models.

The author gives four examples of international boundary work in which he has been involved. The Iraq/Kuwait border was defined in 1922 and had the boundary running northwards up the centre of Wadi al Batin, which is wide and shallow to "an old signpost" about a mile south of an old Turkish fort. Needless to say the signpost was removed and the location had to be determined from a variety of historic maps, building plans, aerial photography and local knowledge. Two possible positions were identified and the average presented to the two parties with transparent acknowledgement that the boundary could not be determined exactly.

As part of the peace agreement following a 35-year war between the north and the south of Sudan, a boundary commission was set up to determine the boundary. The terms of reference required the commission to determine the extent of the Ngok Dinka people as in 1905. The Ngok Dinka were herders who moved their cattle with the seasons and the boundary also happens to fall in an area of significant oil resources. In this case the Sudan government objected to the report of the commission and Robertson was involved with the subsequent tribunal hearing.

Validating multibeam bathymetry

Royal Australian Navy (RAN) hydrographers, **Dean Battilana** and **Geoffrey Lawes**, presented a paper on validation of multibeam bathymetry (session TS21). For a landlubber, it was interesting to see data from a hydrographer's point of view. We (land surveyors) think nothing of redundancy in data, in fact we feel very uneasy when there is none, but for hydrographers, the redundancy that comes with point clouds of multibeam data is still something new. In fact, they traditionally distrust their data to the extent that they use shoal biasing to make sure that ships don't run aground.

The authors go through the process that the navy used to introduce the Combined Uncertainty and Bathymetry Estimator (CUBE) which uses the a priori uncertainty

". . .the redundancy that comes with point clouds of multibeam data is still something new."

assessments provided by a software derived Total Propagated Uncertainty (TPU). But in using their Atlas Hydrographic Fan Sweep 20, the authors wanted to make sure that the TPU computed by the Hydromap suite of programs was applying the correct a priori uncertainty assessments when used with Caris HIPS and SIPS for post processing of multibeam data. All this is necessary in order to run statistical area based tools to remove outliers from multibeam datasets.

This paper includes a useful comparision between beam forming and interferometic multibeam systems and there are a stack of perceptive quotes from the authors of the CUBE users' guide. It is tempting for once to read the manual for literary reasons alone!

Mapping Mega Cities

In session TS1B, **Anthony Adeoye** presented a paper on geoinformation infrastructure policy in Lagos State. Any city of over 10 million population is a mega city and Lagos certainly falls into that category. The paper describes the creation of an enterprise GIS database and requirement for mapping to support the venture. First and second order control stations have been established along with a geoid model and a GPS active network. Base mapping is crucial to the venture. The work is 80% complete but when finished there will be aerial photography over the whole state at 1:4000 scale which will be used to produce 1:500 scale maps for the urban metropolis and 1:1000 scale plans for surrounding rural areas. To complete the picture there will be a DTM on land and bathymetry in the major waterways.

This infrastructure paves the way for property valuation and revenue collection, population and housing census, planning of settlements, transportation and communications and flood and erosion control. This is an ambitious project by any standards but in a sense Lagos is following the lead of Nigeria's new capital city, Abuja, for which GI was collected as it was constructed and now the data brings in a revenue of over $10 million per year.

Surveying Body of Knowledge

Finally for this review, **Joshua Greenfield** presented a paper entitled "Surveying Body of Knowledge" in session TS3G. He opens by expressing his concerns, along with many of us, over the popular perception that "everyone can do surveying". This is a concern not only because it is a public perception but also because it is a widely held view within the geospatial community. Establishing the body of knowledge is essential; in order to take the focus away from the belief that anyone who has the equipment can do the job and to focus back on the core skills, attitude and knowledge that are essential to being a professional surveyor.

There are, he says, two approaches to considering the surveying body of knowledge. Firstly, in general terms, the body of knowledge can be the skills, attitudes and knowledge that enable an individual to become and remain a professional expert. This can be seen at a macro level, conceptual long-term definition. Secondly, it could be defined by a detailed list of theories, methodologies, technologies and procedures that the professional surveyor needs in order to be able to practise. Greenfield sees this as a micro level approach. In this way both approaches can coexist.

At the macro level, Greenfield lists the following knowledge base and skills:

- *A technical core of knowledge and breadth of coverage in maths, science and technology.*
- *Law, ethics and professionalism.*
- *Communication, history, social science and contemporary issues.*
- *Business, economics, management*
- *Plus at least one in-depth speciality*

At the micro level, the American Congress of Survey and Mapping (ACSM) is working on subsets of bodies of knowledge for surveying in areas of positioning, imagery, law, GIS and land development. Greenfield chooses to look at the GIS subset in detail, which may seem disconcerting because in Britain we tend to think of GIS as a specialism practised by GIS people. On the other hand, Greenfield argues that GIS uses the same macro level knowledge as wider surveying. However, not every surveyor has to know everything about GIS but every surveyor should have a minimum knowledge of the subject. He therefore establishes the knowledge base as a function of the surveyors' involvement in GIS, which he classifies as 'user', 'specialist' and 'scholar'. He then applies three levels of competency (recognition, understanding and ability) to the knowledge areas of GIS to build up a capability matrix for each function. So, for example, knowledge of query operations and query languages has to be at 'understanding' level for a user but 'ability' level for specialists and scholars.

Finally, Greenfield produces another matrix that identifies the educational requirements for surveyors in the micro level GIS body of knowledge. Thus, we have the routine user, who must have an undergraduate degree and professional education whereas the scholar does not need a professional education but does need a post-graduate degree.

Why spend so much time on this? I suggest that this is a better way to establish status for surveyors than simply saying we are the best. It identifies what a surveyor does, the body of knowledge required to be a surveyor and the education required to get there. The full paper is well worth reading.

• Watch out in the next issue of GW for an abridged version of another paper presented at FIG on promoting the surveying profession.

"Establishing the body of knowledge is essential in order to take the focus away from the belief that anyone who has the equipment can do the job..."

Symposium marks 40 years for quiet intellectual giant

A few days after the ISPRS conference in Newcastle, University College London (UCL) hosted a half-day symposium to mark the retirement of Professor Ian Dowman. **Richard Groom** and **Stephen Booth** report.

Ian Dowman has been associated with UCL throughout his working life and on the full time academic staff for forty years. The event featured speakers who expressed their warm affection for Dowman as a colleague and friend and who paid tribute to his intellect and teaching skills. There followed technical expositions of the state of the technologies and projects with which he has been involved and some glimpses of the future.

Prof **Paul Cross** welcomed the participants with a brief history of UCL, photogrammetry and remote sensing and Dowman's role within it. It is perhaps not well known that in terms of research, the university is just as successful as Oxford and Cambridge, attracting funding for many leading edge research projects. However, unlike those institutions, UCL was founded from the beginning on the philosophy to provide education irrespective of race, gender or religion.

The department of "Photogrammetry and Surveying" was established by Professor **EH Thompson** and, in his capacity as ex-head of department, Cross was able to produce the carbon copy of a personal letter from the great man welcoming Ian Dowman to his department as a student together with a photograph of him sporting an Elvis quiff! Following a spell with the Tazmania Hydroelectic Commission, Ian returned to UCL in 1970 to take up a full-time position on the academic staff, working with Thompson. In 1985 he became director of the remote sensing course and has seen over 500 students graduate. He was secretary general of the International Society of Photogrammetry and Remote Sensing (ISPRS) between 2000 and 2004, president between 2004 and 2008 and is currently first vice president (until 2012).

The symposium was chaired by Prof **John Trinder**, another past president of ISPRS, and included presentations from speakers working in various fields of research that have been Dowman's interest over the years.

Global perspective

Prof **Christian Heipke** from the Institute of Photogrammetry & GeoInformation at the University of Hannover described Dowman as 'a scientist and dedicated teacher with global perspective and clear focus' who had been the UK face of ISPRS for 20 years. Heipke then spoke about automatic techniques for geo-referencing and exploiting digital images, noting that digital photogrammetric workstations now provided an 'active window into a GIS database'. Heipke argues that automation is the key to processing the vast quantities of data that come from multiple sensors with ever higher resolutions. It is needed on two levels: firstly to handle the geometry of the imagery and secondly for interpretation of features.

Microsoft Photosynth is the popular manifestation of the advances that have been made in handling camera geometry to the point that we can now compile a 3D image from hundreds of individual photographs. Great advances have been made in identifying features in imagery and this is hugely valuable for monitoring and surveillance. The future could be in real-time georeferencing and tracking. The symposium took place the day after a certain football match in South Africa, so Prof Heipke suggested an application, perhaps tongue-in-cheek, could be the resolution of those goal-line football controversies that seem to characterise matches between England and Germany!

Ian Dowman has been involved in the development of synthetic aperture radar (SAR). **Brian Mercer** from InterMap Technologies talked about "Advances in InSAR: technologies, applications, products and opportunities." InterMap used airborne single-pass inSAR to produce the NextMap DTM of Britain. Having both radar antennae on one aircraft avoids the problems of temporal de-correlation that arise when you try to combine data from two passes. This latter technique was used to produce a global 30m resolution DEM using C-band Shuttle Radar Topography Mission (SRTM) and now X-band SAR is being using by TerraSAR-X and TanDEM-X to produce a higher resolution global DEM. For the future, Mercer sees a role for SAR in calculating rainforest biomass. It is estimated that rainforest destruction is responsible for 20% of CO_2 emissions.

Tourists can provide the raw data

Prof **Wolfgang Förstner** reviewed cartographic feature extraction from images, citing a paper from as far back as 1970. He considers that this activity has passed through three phases. Before 1985 image classification was developed along with basic techniques such as road following. Between 1986 and 1999 more complex models were used. Edge detection was used to extract buildings and processes became semi-automated. Since 2000 complex models have taken over with integration of data from multi-sensors. It is also now possible to produce 3D models from historical imagery

> *"...Prof Heipke suggested an application... could be the resolution of those goal-line football controversies that seem to characterise matches between England and Germany!"*

with the intriguing prospect of producing 4D city models. Analysis of the imagery can even be used to help sequence undated imagery. Today it is even possible using crowd-sourcing from tourists' photos to create a bundle-adjusted image. Semantics are for the future and this photogrammetrist wanted to be 35 again so that he could take part in thirty more years of research!

Prof **Armin Grün** spoke on the current status of image matching, which he still believes has high potential by concentrating on 3D surfaces, feature recognition and extraction. He described multi-image matching through work on the Cathedral of Notre Dame in Paris but also mentioned the problem of large datasets that, from the standard error statistics, may appear to be very accurate but in reality hide large significant errors. The bell curve has a long tail. This is a particular problem for InSAR and, to a far lesser degree, with lidar. The large errors are manifest – not throughout the dataset – but localised; for example, in forest areas or steep-sided valleys. Image matching, Grün argues, has high potential and work continues on use of multi-sensors and image understanding using the context of the neighbourhood.

Dr **Daniela Poli** was one of Ian Dowman's PhD students. Her presentation burst with infectious enthusiasm – a credit to herself and her mentor. She reviewed current sensors and imagery, focusing on geometric modelling for satellite sensors; it is, I suspect, a subject that those of us who graduated in the pre-digital age tend to take for granted. The geometry of the sensors is of course a fundamental part of the processing chain – particularly now that we are dealing with sub-50cm resolution sensors. Dr Poli discussed the pros and cons of rigorous modelling against the RPC-based approach. It sounds as complicated as no doubt it is, but this 'Joe Surveyor' should know a bit more and will be looking up Daniella's paper in Photogrammetric Record.

With Dowman's colleague Prof **Jan-Peter Muller**, the focus of the symposium shifted towards CEOS – the Committee on Earth Observation Satellites. CEOS is leading activities in calibration and validation (cal/val) of Earth Observation and for development of a global DEM. Prof Muller took over the chair of the CEOS terrain mapping sub group of the cal/val working group from Dowman in 2001. Looking to the future, there will be a new global DTM from TanDEM-X in 2013 but Prof Muller also suggested that bathymetry could potentially be surveyed using SAR.

Detecting when earthquakes will happen

Dr **Tim Wright**, another of Dowman's former students, is now Reader in Satellite Geodesy at the University of Leeds. He demonstrated the use of differential InSAR for measuring deformation in the horizontal as well as the vertical. The technique can be used to survey the gradual deformation of fault lines as tension builds up and can aid prediction of the subsequent earthquake that comes with the sudden releases of the tension. Current InSAR technology can only detect a single component of movement perpendicular to the flight path of the satellite. The future is SuperSAR, a proposed system that will detect deformation in three dimensions. Also in development is a system called DESDynI, which will result in geosynchronous satellites covering the earth.

Prof **Peter Woodsford** spoke about EuroSDR and its predecessor organisation, OEEPE. Founded in 1953, OEEPE had five member nations with the objective of increasing the use of photogrammetry by speeding up development. It changed its name to EuroSDR in 2003 and now concentrates on spatial data research with a membership of 16 countries. It provides a link between science and national mapping organisations. Woodsford also spoke on the changing remits and challenges to national mapping agencies but the research challenge, he thought, focused around database updating and refinement.

The current president of ISPRS is Prof **Orhan Altan**. He spoke on the future of the organisation, which is celebrating its centenary this year. He felt that in the past it had been technology-led while the future would be about providing solutions to specific problems. He closed with the thought that forty years ago no-one would have thought that radar would be used for mapping and yet the technique is now key.

Winding up this fascinating afternoon, Prof **Stuart Robson** paid personal tribute to Dowman, whom he described as a 'quiet intellectual giant' who would leave a big hole at UCL. Robson reminded us that photogrammetry and remote sensing was now part of the university's Department Civil, Environmental & Geomatic Engineering before listing some of the many disparate projects they are engaged in from heritage to space, Solomon Islands war canoes, to disposable UAVs and volcanoes.

Responding to the many speakers, Prof Dowman observed 'a whole life had flashed before me in the last few hours!' He commented on several technologies that he had been involved with over the years including radar, which he had never thought would one day be used for mapping. He also admitted that the Elvis quiff was indeed an act of homage!

A presentation to Dowman included an exquisitely made geodesic cardboard sphere upon which we had all signed our names.

• The event was sponsored by Leica Geosystems, Erdas, Infoterra, Ordnance Survey, BAE Systems and Intermap Technologies. The full proceedings will be published in a special edition of The Photogrammetric Record.

"He commented on several technologies that he had been involved with over the years including radar, which he had never thought would one day be used for mapping."

Celebrating E H Thompson's Centenary

The centenary of the birth of the renowned photogrammetrist E H Thompson was marked at University College London (UCL) by an afternoon seminar with recollections from those who knew him and reviews from others of his influence on modern photogrammetry and remote sensing. **Richard Groom** reports.

As related by **Roy Wood**, chairman for the first half of the proceedings, and also by the first speaker, Ian Dowman, Thompson had an army career before joining UCL. In 1930, after leaving Cheltenham, he was commissioned into the Royal Engineers and then sent to Cambridge University where he was awarded first class honours in the Mechanical Science Tripos.

Before the Second World War, he was a research officer for the Air Survey Committee at the War Office where he developed the Cambridge Stereocomparator for measuring image coordinates for aerial triangulation and then the Bar & Stroud Plotter in 1939.

Posted to the Western Desert, he invented the Astro Clinometer as a navigation aid and the pinhole plotter. He was instrumental in producing mapping of the battlefield at El Alamein. But he was, according to **Stanley Osbourne** the most unmilitary soldier he had ever met who would leave secret papers lying around. Were it not for his assistants, who would do the clearing up for him, he could quite possibly have ended up in gaol rather than UCL! After the war he worked for a while at the Ordnance Survey on analytical aero-triangulation.

The Professor

Thompson joined UCL in 1951 and stayed till his death in 1976. Whilst there, he developed the Thompson-Watts Plotter – Models 1 and 2, the CP1 and the independent model method of aerial triangulation. He published a book 'Algebra of Matrices' and **Ian Dowman** was able to produce evidence at the seminar that he intended to write a text book on photogrammetry. Another contributor from the floor was able to reveal that Thompson started work on his textbook of photogrammetry but stopped because he realised that the 'Algebra of Matrices' had to be written first. Unfortunately the textbook remained an unfinished work.

Below: Roy Wood introduces Hamish Ross.

It turns out that, not only was Thompson an unmilitary soldier, but he was also an unconventional academic. Prof Dowman related the casual nature of his interview with Thompson when he applied to become a lecturer. This same point was echoed by a later speaker, **Ernie Wickens**, who said that when he joined the department no one welcomed him, so he tidied the lab and endured the lack of communication for a week before deciding to see the Professor. Thompson's response was to tell him to just carry on as he was. What might have appeared to be disinterest was actually a vote of confidence that he did not need the boss's interference. Such an approach is, of course, completely at odds with the distrust of today's earnest micro-managers.

Thompson may have been an unconventional academic but was the archetypal absent-minded professor who engaged in long periods of thinking, as distinguished from what others would call work! Would he have survived in today's academia? Prof Dowman thought not. The administration and competition for grants would not, he thought, suit Thompson's temperament. Indeed, another speaker noted that Professor Thompson believed that universities should be free from commercial pressure.

The Thompson-Watts Plotter

The Thompson-Watts Plotter was produced by Hilger & Watts at their factory in Camberwell. **Hamish Ross** worked on the plotter and gave a fascinating insight into the project. On 3rd December 1950, Thompson wrote to Hilger and Watts to ask if they were interested in producing a plotting machine. At the time the company was kept busy making theodolites and had no experience of larger instruments. Ross now believes that the decision to take on the plotter was a recognition on the part of the management that they should look to the future and diversify. There was however a Thompson family connection with the company which no doubt helped. It took twelve months to obtain government funding for the project but eventually, in 1952, a factory order was raised to build three instruments. There were a couple of amusing (in hindsight) quirks of the first instrument. They decided it needed a headrest system for the eyepieces which left red marks on the operator's forehead after each plotting session and the hand wheels were painted but black dye would come off on the operator's hands.

To reduce the company's reliance on Thompson for sorting out routine problems, Ross went off to study at Delft and returned a year later with, he informed us, an increased capacity for Heineken draft! On his return he was faced with "a monster" of a design for a new model of the Thompson-Watts Plotter. Thompson had also been away and returned with a new design for parts of the instrument. Unfortunately, due to lack of time, we had to fast-forward to 1968 and the end of Hilger & Watts and Thompson's plotters, an event that Hamish Ross found upsetting even after many years.

Mutual respect

Ernie Wickens worked in the lab at UCL between 1964 and 1989. For him Thompson was greatly respected, a tireless worker, a perceptive man and purveyor of delayed-action jokes – the sort that have you laughing out loud on the train home in front of a compartment of bemused fellow passengers. Thompson always assumed that Ernie knew more than he did, which whilst giving a sense of equality also meant that he had to take care, as anything said was automatically accepted as truth.

He would not let paperwork get in the way of the important things in academic life and administrative documents would have a habit of disappearing into thin air. On one occasion he invited a visitor to tea at the department and confided in Ernie that he would just put one biscuit on the plate "to see if he takes it". Maybe there was an undercurrent of almost schoolboy mischievousness in the man. On another occasion Thompson asked Wickens to buy a Chinese cabbage from a local greengrocer. The greengrocer remarked "That'll be for the professor!" There could only be one with a regular order for Chinese cabbages. Perhaps most telling was the sense that he was working with Professor Thompson – not for him.

From left to right: Professor Ian Dowman, Stewart Walker, Peter Woodsford and Alistair MacDonald.

Conversion to block adjustment

Professor **Fritz Ackermann** viewed Thompson as, in a way, a child of his time. He did not believe that block adjustment would be important and therefore concentrated his studies on perspective geometry. On a personal level Ackerman recalled fondly the ISPRS Congress in 1971 when Professor Thompson commended all the foreign visitors on their English and the locals on their understanding the multiple spoken variations of the language. Thompson could speak French fluently. He was also an expert on South African furniture and porcelain and was admired well beyond his scientific achievements. In March 1976 Thompson recognised the role of photogrammetric block adjustment and invited Ackerman to UCL to give a series of lectures on the subject. This was typical of his open mind but unfortunately he died just before the visit took place.

After a break for tea, three experts from the current remote sensing and photogrammetric world presented their views of the discipline today, Thompson's influence on it and what he would have made of it all.

"...there was an undercurrent of almost schoolboy mischievousness in the man."

Student legacy

Stewart Walker from BAe Systems looked at the "Application of Thompson's work to Modern Photogrammetry". He did not know Thompson but attended his last public lecture. Photogrammetry has passed through dramatic

UCL Geomatics @ 60

As well as marking the centenary of E H Thompson's birth, UCL celebrated sixty years of Geomatics with an hour of talks followed by a reception.

Digging deep into the archives, the first speaker **Jonathan Iliffe**, managed to unearth a plethora of current or pending anniversaries. The UCL Geomatics @ 60 event was actually a celebration of the first awards in surveying but the chair had been founded 13 years previously. It was also 20 years since the inauguration of the MSc in GIS and 96 years since the establishment of a readership in surveying. So there could be another party in four years time! Jonathan had been delving into the archives and discovered some entertaining photographs of student groups through the ages. All looked rather formal except for a photo taken in the 70s when formality gave way (almost) to flower power.

A relatively informal department photograph from the 1970s.

Most laughs were however reserved for a photo of five students being taught astronomy by **Arthur Allan**. The teacher and the subject were not the source of amusement but, of the five students, three had gone on to complete PhDs, one was running a survey company and the destination of the third was unknown. However, thanks to Google, people with unusual names cannot hide, and it turned out that he had been presented with an award for being regional pub manager for SE England. A very satisfactory outcome!

There then followed talks on the department's work in three key areas by **Paul Groves**, **Tao Cheng** and **Stuart Robson** covering Geodesy and Navigation, GIS and Photogrammetry and Scanning. Many programmes involve collaboration across different departments within UCL and with other parts of the University of London.

The general conclusion is that the future looks promising. It is perhaps particularly encouraging that there has been a surge in undergraduate entrants to the department's engineering courses to which the geomatics group contributes surveying and GIS modules.

"... his students and their students are his legacy."

Toasting Thompson: Carl Calvert raises a glass.

changes since 1976 including the digital revolution from cameras to plotting machines and in the rise of remote sensing and satellite photogrammetry. Thompson did not foresee these developments because at the time they were not practical. In fact his students and their students are his legacy. Indeed, Stewart had been employed by a number of Thompson's graduates, and all were influenced by him.

Change is now the driver

Andy Garratt from ERDAS reviewed the major issues facing remote sensing today. He identified the major change: there is now very little new mapping to be done, so the focus has shifted to revision. Change is the driver and the challenge. Mapping does not involve just photogrammetry. It is fused with remote sensing, GIS and IT in general as part of a wider system and this has extended and enhanced the value chain. Automation has also permitted non photogrammetrists to do photogrammetry. A very different landscape from 1976.

From the Western Desert to Afghanistan

Finally, Major **Tish Gauci** from the Royal Engineers spoke about military mapping. Again, the changes have been dramatic and IT has been at the heart of it. The UK has been at war every day since 1990. But improvements in technology have not prevented some strange decisions. She mentioned the Dayton Accord, which was the basis for peace in the Balkans. The boundaries were based upon lines on a 1:600,000 scale tourist map. Naturally, problems followed. Move forward to the Gulf Wars and Afghanistan and there was a huge demand for paper maps – 13 million in the first Gulf War. Today there is a greater focus on larger scale, bespoke maps for particular operations.

Following the talks there was a short session of open forum during which **Arthur Allan** related a legal case in which Thompson was asked to use photographic evidence to determine the position of a buoy in the Suez Canal. A ship had run aground, caused havoc with the shipping and the captain had been taken to court. The lawyers did not like Thompson's answer so they asked Allan to check it and sure enough the answer was the same, within a certain tolerance. The judge asked Thompson to explain propagation of errors to the court. He did so but the judge clearly did not understand and, at the end of the explanation said "I am none the wiser", to which Thompson retorted "That may be so, but you are better informed"! It transpired that the wrong buoy had been photographed.

• The *Photogrammetric Record* published articles and reminiscences for the Thompson Centenary in Vol 25 No 129, March 2010

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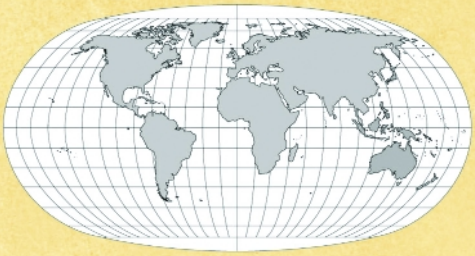

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What would the reasonable man of business say?

By Carl Calvert

IT and IP law is in rude health, says our legal correspondent. But do consult a lawyer before terminating a contract, whatever the circumstances.

Well, it has certainly been busy this last month or so. There was a paper with two French colleagues given at the RICS conference on legal research (COBRA) at the University of Paris Dauphine; IT and IP Crammers given by Field Fisher Waterhouse in London and, as reported elsewhere, various anniversaries at UCL as well as Professor Marek Ziebart's inaugural lecture. The latter has nothing to do with law except that arriving early I spent a few hours in UCL's law library.

Looking at the IT and IP Crammers (some 6½ hours of law) it seems that it would be impossible to cover all the papers in any depth or even to mention them all, so I shall cherry pick those which are probably most relevant to us.

The paper by **Andrew Dood** on *BSkyB v. EDS* proved an object lesson in the cost (£318 million) of a salesman misrepresenting what his firm (EDS) could do for BSkyB. The case was one of fraudulent misrepresentation in that he, Joe Galloway, knew his representations were untrue, or was reckless as to whether they were true. EDS intended BSkyB to rely on what Joe Galloway said, to their detriment.

The points that this case raises are fourfold:

1. Fraudulent misrepresentation is a very high legal hurdle to clear, but if cleared there is no limit on the damages.
2. BSkyB also succeeded with a breach of contract claim for which damages are limited but the legal hurdle is lower.
3. The effect of a rogue salesman is inherently perilous, and
4. The company should consider what they are offering and ask themselves, 'If things go wrong, how would we fare in open court – and would you reasonably believe them to be true?'

Key IT cases presented by **Belinda Doshi** are of importance to all of us in that each case, whilst not necessarily new law, reinforces some existing points of law. Firstly, in *RTS v. Molkerei Alois Müller GmbH & Co KG (UK Production) 2010 (Supreme Court)* – The Yoghurt Case – the question arose of when is a contract not a contract; and if it was, what were the terms? A letter of intent was followed by another letter stating "Subject to Contract." The Court of Appeal said, no contract, whilst the Supreme Court said that there was a binding agreement. So the message is clear – the test is, what would the reasonable man of business say?

In *Shell Egypt v. Dana Gas Egypt 2010 (High Court)* there was a matter of termination of a contract. Dana broke a contract with Shell Egypt, who then sought termination of the contract rather than claiming fundamental breach. That missed opportunity meant that Shell Egypt missed out on a potential $25 million in damages. The point is that if a contract looks as if it had been broken then speak to a lawyer before acting,

In *Infopaq International A/S v. Dansk Dagblades Forening (ECJ Judgement 16 July 2009)*, a case explained by **Hamish Porter** in which the manipulations of text by Infopaq was considered to be an infringement of the Database Rights of Dansk Dagblades Forening. This was an interesting case because the original text had been the subject of transformation by various programs but the fundamental flaw, as far as the law was concerned, was that five words prior to and five words after the elected word were included by hand and not by program.

IT and IP law are in rude health and I would like to thank **Michael Chissick** and **Nick Rose** of Field Fisher Waterhouse for inviting me to the Crammers.

• *Carl Calvert MA MSc PgDLaw MRICS CITP MBCS, is the sole principal of Calvert Consulting, specialising in Boundary litigation. He also lectures part-time in GIS law. www.calvertconsulting.co.uk Email: carlcalvert@aol.com or 023 8086 4643.*

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Above: GW's favourite Brocky pic, Kylie and the koala.

DUC at 50 but not out yet!

Our columnist marks his 50th edition for *GW* and reflects on the characters and events he has brought to our notice.

There is no doubt that time flies but it is hard to believe that this is my 50th DUC column since I started writing it way back in 2002, just after the FIG Congress in Washington. Our editor and the legendary *Undercurrents* writer **Malcolm Draper** had a vision of a regular report of events with an Aussie flavour. I have asked the editor to allow me a touch of nostalgic indulgence as I try to reflect on the last eight years in this back-to-the-future trip. But first I must engage in a bit of politics for the unencumbered after our recent Federal poll. Please read on. . .

Is there humour in politics?

Usually the answer to such a rhetorical question is most affirmatively No! But, hey, we folk from the upside part of the world always do things just a little bit differently and to do a drover's dog act on our home country our recent Federal election has left us with a hung Parliament and the only decision still remaining is to find the appropriate place from whence they can all be hung! On a more "serious" matter there can be very few on this planet who would be aware that had our former Treasurer **Peter Costello** under prime minister John Howard taken a position on the front bench alongside his leader **Tony Abbott**, there is a very real likelihood that the Australian Government would have been run by. . . Abbott & Costello!

Dining with VIP's

Over the last eight years you have been party to my celebrity sojourns with the likes of cricketers Sir **Donald Bradman** and Aussie cricketers **Steve** and **Mark Waugh**, **Mark Taylor** (a Bachelor of Surveying from UNSW), **Len Pascoe**, **Steve Rixon**, **Richie Benaud**, **Glenn McGrath** and **Mike Whitney** with his gorgeous co-host of Sydney Weekender **Erica Davies**.

Joining this illustrious line-up were famous singer **Frank Ifield**, historian Prof. **Geoffrey Blainey**, NSW Premier **Nathan Rees**, star of sexy seventies soap opera "No. 96" **Lyn Rainbow**, US astronaut **Mark Lee**, round the world yachtswoman **Kay Cottee**, middle-aged Arctic adventurer **Helen Thayer** and beer brewing legend Chuck Hahn. Author **Gavin Menzies** added to by three of my favourites **Ted Sly** (great great grandson of Sir Thomas Mitchell, NSW Surveyor-General), **Bob Lasseter** (son of Harold Bell Lasseter, alleged discoverer of a fabled giant gold reef never found again?) and Madame **Suzanne Debarbat**, Paris Chief Astronomer. However my absolute pick of the bunch is our NSW Governor Professor **Marie Bashir** and her husband Sir **Nick Shehadie**, former Captain of the Australian Wallabies Rugby Union side.

We remember them. Below, from top right clockwise, with singer Frank Ifield; with NSW Governor Marie Bashir and husband Nick Shehadie and with Astronaut Mark Lee.

Legends of surveying history

During the last 49 columns I have introduced you to some surveying characters such as **Thomas Mitchell**, **James Cook**, **George Evans**, **John Oxley**, **Augustus Alt**, **Edward Albin Amphlett** (surveyor of the Sydney Harbour Bridge), **Michael Elfick** (surveyor of the Sydney Opera House), **Jan De Graeve** (Chairman of the FIG International Institution for the History of Surveying and Measurement), **William Matthew Flinders Petrie** (father of modern archaeology) plus some of the ancient Egyptian New Kingdom Scribe Surveyors Menna, Amenhotpe-si-se, Djeserkereseneb, Khaemhat and Nebamun. One controversial member of the surveying profession highlighted to you was Jesus Christ, the son of God.

Surveying and other curiosities

Giant metal surveying transit-like sculpture in Texas called "Measurenome" by me and "Proverb" by its creator, king size plumbbob models in Sydney, the Great Zig Zag Railway in NSW, a solar eclipse, photographs of the Transit of Venus through a theodolite, 360-million year old fish fossils at Canowindra in NSW, discovery of the original large scale map of eastern Australia at the British Geological Survey at Keyworth UK drawn by Polish explorer Sir Paul de Strzelecki 160 years previously are just a handful of the fascinating stories I have covered.

Uniquely, in an area near Parliament House, Surveyors' Park was dedicated in the Australian Capital Territory, while I took you on voyage with me on the replica of the *HMB Endeavour*, then on my fiftieth birthday edition I shared my mummification on a Nile Cruise with everyone. Many readers will be familiar with my particular fanaticism towards Hollywood movies containing surveyors and surveying.

International visits

Along our eight-year journey we visited FIG

conferences in Cairo, Paris, Athens, Indonesia, Hong Kong, Munich, Stockholm, Washington DC, Israel and most recently Sydney. I made presentations at the American Congress on Surveying and Mapping annual conferences in Spokane (Washington state), Phoenix (Arizona), St Louis (Missouri) and Orlando (Florida) as well the Land Surveyors Association of Washington in Seattle. Attendance at South East Asian Surveyors Conferences in Western Australia, Hong Kong, Brunei and Christchurch were enhanced by participation at the International Cartographic Conference in Santiago, Chile before which I visited Tahiti, Easter Island, Machu Picchu and Cuzco in Peru.

International Map Collectors Symposia saw us in Amsterdam and Guatemala to view the Mayan pyramids. It was indeed my honour to give a presentation in the prestigious halls of the RICS in London in 2003. Other places passed through have been Darwin, Chicago, Norfolk Island (three times), San Francisco, Thailand, Finland, Estonia, Latvia, Lithuania, Austria, Canada, Poland and China where we climbed the Great Wall just outside Beijing plus the pleasure of going to The Alamo in Texas, host of the famous siege against Santa Anna's Mexican Army in which five land surveyors took part.

Survey books

Books of mainly surveying history which I have brought to your attention include:
Sails To Satellites – The Surveyors-General of NSW
The States of a Nation (Australia)
1788 – The Brutal Truth of the First Fleet
Surveying America
An Unlikely Leader – The Life and Times of Captain John Hunter
James Meehan – A Most Excellent Surveyor.

. . . and now for the next fifty!

My experience with *GW* over the last eight years has been most enjoyable. Undercurrents man Malcolm Draper and our editor Stephen Booth have even been able to teach me how to speak like Michael Caine! I am not totally sure as to whether or not the learning curve has been a bell curve or sinusoidal but whatever may be the case I look forward to hopefully providing DUC readers with some useful information sprinkled with light-hearted comments for another fifty issues of this most excellent magazine.

By the way, for all of those interested in the statue of the Irish emancipist surveyor **James Meehan** (GW Sept/Oct 2010), I have been informed that his figure will be placed into the façade of the Old Lands Department building in Bridge Street Sydney in November; the first such placement of a statue since 1902!

Getting an appetite for lunch.

• *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.*

3D Imaging & Data Management for Engineering/Construction/Manufacturing/Security

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Faro's mini debuts at Intergeo

With dimensions of 24 x 20 x 10cm and a weight of 5kg, the new Focus3D laser scanner was a big talking point at Faro's stand at Intergeo this year. The scanner is four times lighter and five times smaller than its predecessor with an intuitive touch-screen control panel. With millimetre-accuracy and scan speed of up to 976,000 points/second, the scanner is suitable for documentation of large environments, quality control of components and reverse engineering. Two versions are available, one for close range work up to 20m; the other will scan up to 120m. The Focus3D is entirely self-contained with no additional devices, cables or laptop needed. You can read more about this scanner in the October issue of *Engineering Surveying Showcase* **(www.pvpubs.com).**

A multispectral camera

Leica Geosystems' recent product launches include the new Viva TS11 manual total station and the robotic imaging total station, Viva TS15. Both total stations provide imaging functionality and feature the SmartWorx Viva onboard software. Plus, the new Leica RCD30 series 60MP medium-format airborne camera can acquire co-registered, radiometrically-calibrated, multispectral imagery in RGBN (Red, Green, Blue and Near-Infrared).

Improved control

New "SP technology" for bulldozers is a machine control upgrade from Leica Geosystems that aims to improve the way contractors move material and fine-grade. The technology provides improved hydraulic control that allows faster grading with smoothness and precision at high speeds. Equipped machines can reduce the need for rework and increase machine uptime during poor GPS/GLONASS coverage or temporary interruptions of correction signals. The technology is also an available upgrade or option to the PowerGrade platform.

Juno with voice capability

The Trimble Juno SD handheld is an addition to the pocket-sized Juno series of field computing devices with integrated GPS technology. All models include integrated GPS, wireless LAN (Wi-Fi) and Bluetooth connectivity, a 3-megapixel camera, a 533 MHz processor, 128 Mb onboard memory, a MicroSD/SDHC memory card slot, an all-day battery and a 3.5 inch display. The SD handheld also features an integrated 3.5G high-speed downlink packet access (HSDPA) cellular SMS and voice capability.

3D Measuring stations

Intergeo was the launch pad for a range of new total stations from Topcon. The MS05A and MS1A measuring stations are high-precision automatic total stations. The MS05A features 0.5" angle accuracy. A sub-millimetre EDM measures up to 3,500m to a single standard prism with 0.8mm + 1ppm precision and typical measurement speed is 2.4 seconds. EDM and angle accuracy make these instruments ideal for monitoring in 3D.

New from Sokkia

The new 50X series of total stations from Sokkia extends measurement range to 4,000m with a single prism and up to 5km with three prisms. The series incorporates five measurement signals with the highest modulation frequency of 75MHz. The unit's new dual-axis tilt sensor also increases the compensation range to ±6'. The 2" model is equipped with an independent angle calibration system (IACS) to increase measurement stability. Other features include: Class 1 safe laser output; built-in laser plummet option for quick instrument setting; SD or SDHC card slot and USB flash memory slot; built-in Bluetooth module option for wireless communication with a data collector; password protection and IP66 environmental protection.

New features for Rhino

Pointools has released the latest version of Pointools 4 Rhino. Rhinoceros 3D is a standalone modelling tool developed by Robert McNeel & Associates. Pointools 4 Rhino enables users to benefit from Rhino's design toolset within a point cloud context and is ideal for visualising, modelling and drawing. Working with laser points, Rhino users can now utilise different point shading settings in each viewport to optimise each view. Rapid viewport sections allow the user to make any orthographic view into a section view, choose its thickness and update its position by grabbing the section in another viewport. The Pointools plug also enables the construction plane to be linked to the section view so the user is always drawing in the right place. Also included are region tools for selection and manipulation of the data.

XPro enhanced

The latest version of Leica's line sensor workflow, XPro 4.4 now supports RGB and multispectral 4-band orthophoto generation, including near infrared (NIR) from data acquired with the company's ADS Airborne Digital Sensor HiRes mode, which offers a swath width of up to 24000 pixels. With a new L0 data delivery and export option, users can now transfer ADS high quality image data to their preferred photogrammetric workflow solution and easily perform aerial triangulation and product generation in an environment

Avalanche and glacier studies in range

The ILRIS-LR (Intelligent Laser Ranging and Imaging System-Long Range) from has greater range and higher point density capability than any other tripod-based terrestrial scanner, say developers Optech. 'With the ILRIS-LR, we will see a significant increase in avalanche and glacier studies, along with the traditional geological and mining applications," adds product manager Dave Adams.

familiar to them. Other new features include: an option Data Preparation for creating L2 Quickviews; optional viewing of cross-eyed stereo in QC Viewer; and an option for datum estimation per session in the triangulation module.

Updates for Zeno series

The Zeno Office v1.1 and Zeno Field v1.1 software updates are available for Leica's Zeno series of GNSS/GIS products. The Zeno GIS provides a one-click automated workflow between field and office to enhance productivity and ease-of-use. The Zeno Field software is an OEM version of ESRI ArcPad 8. New features include: the support of several radio devices to receive RTK GNSS data; CDMA phone support for internet connectivity and receiving RTK GNSS data; and Italian language support in Zeno Field.

Meanwhile, Zeno Office maintains, manages and post-processes GIS, GNSS and surveying data. New features include: software is now based on ArcGIS 9.3.1; Zeno Office v1.1 databases are 100% compatible with v1.0 databases; support of 64-bit operating systems; and support of SQL Express databases in Zeno Office on ArcGIS.

Intergraph's 3D capability

Intergraph has introduced new 3D capabilities for its GeoMedia software line, integrating advanced spatial analysis and data capture with the 3D 'virtual earth' style of presentation popular in today's mainstream mapping applications. In GeoMedia 3D users can navigate with freedom of movement in all dimensions to evaluate geospatial assets and analytical results. The GeoMedia suite is a set of integrated applications that provide a wide range of geospatial processing capabilities. GeoMedia 3D provides the ability to visualize, navigate, analyze, manipulate and display 3D data natively in GeoMedia while still leveraging the power and precision of Intergraph's core geospatial solutions.

BRIEFS

Autodesk has announced AutoCAD for Mac software, which runs natively on Mac OS X, increasing the choice of hardware for users. The company has also announced the AutoCAD WS mobile application, a new app for iPad, iPhone and iPod touch that will allow users to edit and share their AutoCAD designs in the field.

New ScanMaster 2.0 software from Topcon Europe Positioning introduces improved features, including: enhanced performance – visualisation and rendering of billions of points with no lag; automatic edge extraction; volume computation; automatic noise filtering, scan registration and CAD extraction, direct from the cloud; no mesh is required for sections, contours and profiles.

Leica's GeoMoS v5.1 software now features the company's new M-Com series, compact plug and play solutions for stable monitoring communication. The software also supports the latest Windows 7 operating system and is protected with a new licensing system no longer requiring a dongle.

Trimble's news from Intergeo included a forward motion compensation (FMC) capability for its aerial camera and the latest option for its medium-format, directly georeferenced aerial imaging system, the DSS (digital sensor system) WideAngle.

Trimble also introduced its GPS Pathfinder ProXRT receiver: a decimetre receiver

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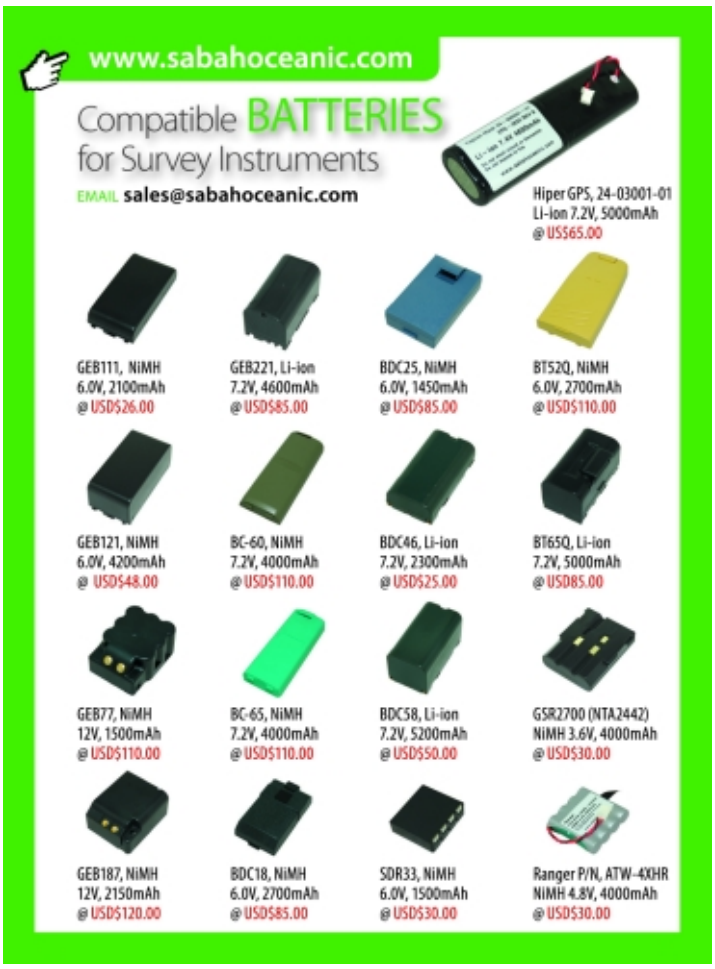
Enhancements in the latest release of Trimble's TerraSync data collection and asset management software include: intelligent data capture based on conditional attributes; customisable user interface; and faster raster map display. Also announced were updated versions of Trimble's GPScorrect extension for Esri ArcPad and the GPS Analyst extension for Esri ArcGIS Desktop. These tools now support the latest Esri technology, including ArcPad 10 and ArcGIS 10 Desktop software.

At Intergeo, two additional total stations were announced for Trimble's Spectra Precision Focus 30 brand: the LockNGo and StepDrive models, available in 2", 3" or 5" accuracies and controlled by the company's Survey Pro field software using an onboard Windows CE touch-screen interface. In addition, Nikon-Trimble introduced the Nivo 1.C one-second angle accuracy, reflectorless mechanical total station and the Nikon DTM-322 prism-based 3" dual-faced total station.

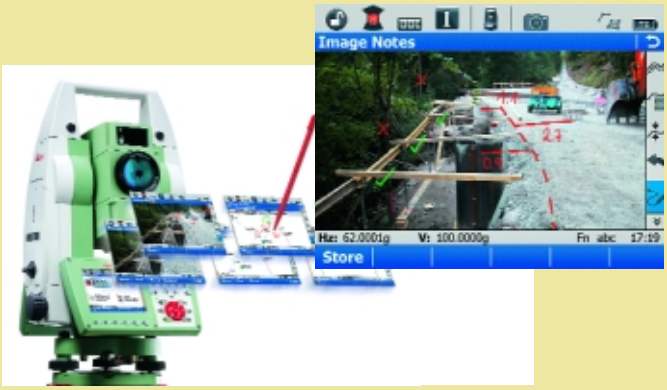
Ashtech has announced the availability of Web Mission Planning: a self-contained, automatic web-accessible GNSS survey planning tool. Log-in at www.ashtech.com and use the survey-planning tool free of charge to determine satellite visibilities. The tool uses uses Google Earth mapping and is inter-active.

Softcover has announced Version 8 of its Scan2CAD raster to vector converter with near-instant automatic conversion of vector PDF files into DXF format suitable for editing in AutoCAD. V.8 can convert the full range of PDF files.



Mirror, Signal, Manoeuvre!
– new mantras at Leica's GeoWorld

Held at 11 venues across the British Isles, Leica's roadshows were a chance to see the latest technology and hear about the latest GNSS developments. Richard Groom reports.



Three-word mantras are snappy ways to convey simple messages and we were introduced to two more by Leica at their Geoworld events in October.

"Tap, turn, measure" and "Capture, sketch, link" are the routines for their new imaging total stations. As with other imaging instruments, the image appears on the keyboard screen and the instrument will turn to any point tapped on the screen. Then, if the point to be surveyed is a prism and the total station has target recognition, it will find the centre of the target and measure. If it is a detail point you can zoom in and tap again for fine pointing followed by a measurement. The surveyor can take a photo at any point in the process, sketch comments on the photo and then store it linked to a detail point. The sketching is not confined to photos; you can also sketch on a screen grab of the site in plan or just write notes on a plain white screen. There really is no longer any need for paper in the field. It also means that the entire raw survey data can be archived simply.

Imaging is an option with the new, manual TS11 total station and its motorised counterpart, the TS15. The camera is 5Mpx and operates at a 20 Hz frame rate when viewed on the instrument or 3–5 Hz when viewed from a controller at the pole. The camera is offset above the telescope but parallax is removed from the image as soon as a distance has been measured to the object being photographed. It is hard to see how this can be better than coaxial optics even though it seems simple enough to remove the parallax. Leica have also tried to keep costs down by not fitting to the TS15 the piezo motor technology used on the TS30 and TM30 instruments launched last year.

The TS15 can also do grid scanning to a plane target or a surface such as a spoil heap. With the latter, volumes can be calculated on site. It observes points at a rate of about one per second. When scanning a plane target, the scanning routine can be made to scan points on the boundary of the polygon used to define the scan area.

Leica's C10 scanner has a new firmware version - v2.0. This permits control data to be imported into the scanner, and it is now possible to produce a fully registered scan dataset in the field.

On GNSS Leica has been concentrating on providing reliability for its SmartNet service, for which there are now 1500 reference stations across Europe. At the receiver they are not content to carry out an initialisation and then assume it remains correct. They run confirmatory checks continuously and advise the user if things go awry. The delivery of corrections will shortly be improved by the installation of a leased line between Ordnance Survey and Leica's data centre in Docklands, reducing latency and eliminating third-party comms problems.

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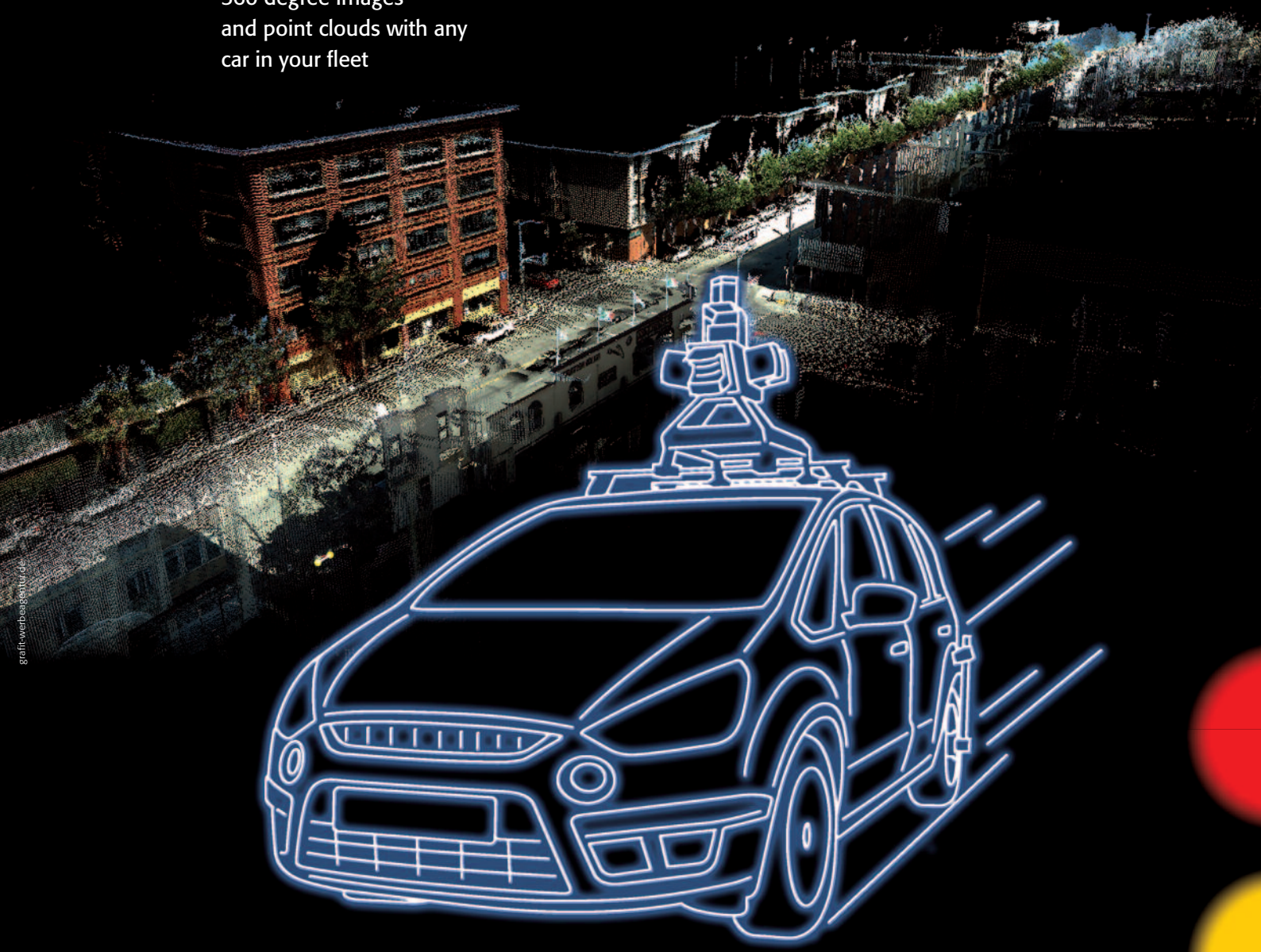

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