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March 2017 | Volume 16 | Issue 3

Geo:

GeoConnexion International Magazine

This month incorporating Mar/Apr 2017

GEOconnexion^{UK}

SERVING THE GEOINFORMATION COMMUNITY IN THE BRITISH ISLES

GEO:INTERNATIONAL

BIM MEETS VR

SMARTER FARMING

OPEN SOURCE FORESTRY

GEO:UK

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FARMING SMARTER, NOT HARDER

A FARMER'S LOT IS NOT A HAPPY ONE. FORTUNATELY, GEOSPATIAL TECHNOLOGIES ARE HELPING TO MAKING THEIR LIVES EASIER

Farming is not an easy job. Whether working on a small-holding in Ghana or on a large Mexican megafarm, your days will be long, full of hard work and probably not well paid. The elements may be against you, with gruelling weather not just your enemy but the enemy of your crops and animals. Even the animals might be against you, eating your crops or blocking your roads.

Whatever you do to counter your problems might make things worse. Having problems with insects? Sure, you can spray your crops with pesticide, but that can damage the environment and can be expensive. Want to buy bigger, better machinery to make your life easier? No problem, until you start accidentally running over animals that are hiding in your fields.

Fortunately, geospatial technologies can help to alleviate at least some of the difficulties and this issue we look at some of the newest and most innovative. GNSS and satellite communication technologies have been used for many years in Germany, half the land of which is dedicated to approximately 285,000 farms. But a gap exists between the potential of information derived from satellite imagery and its application in practice.

Satellite imagery can provide valuable information for crop management and precision farming. It also offers a perfect overview of field developments and high and low yielding zones. However, until now, this information was mostly available only to experts, since the collection and analysis of data were costly and complicated.

On page 28, Knut Hartmann looks at a new project designed to offer German farmers the benefits of the latest advances in satellite imagery: AGRO-DE. This aims to overcome existing barriers and bridge the gap between satellite data processing and storage, and integrate them into farmers' practice. The objective is to showcase the benefits of up-to-date, spatial information derived from satellite imagery and improve farming efficiency and sustainability.

An insect species that cause a significant amount of damage to food crops, especially in Africa, Asia, Australia and the Middle East, is the locust. The largest swarms of locusts can consume more than 100,000 tonnes

of crops each day – enough to feed tens of thousands of people a year.

Grasshoppers on their own do not constitute a problem, but a small amount of overcrowding can trigger swarming, turning a population of solitary grasshoppers into a marauding mob of locusts with a ravenous appetite attacking vegetation and crops.

On page 30, Lena Nietbaur reports on Foresight Crops, a predictive analysis platform that uses multi-temporal Earth observation satellite data combined with crowdsourced information, historical records and weather data to model the forming conditions for insect swarms that are detrimental to crops. Advance knowledge of insect infestation activity can enable early, targeted and effective use of pesticides or organic mitigation techniques. This protects farmers against loss of income and earnings due to damaged crops, and reduces the costs of pesticide control and other management activities. Reducing the amount of pesticide also benefits the environment and thus the public.

Meanwhile, on page 40, Jakub Karas discusses how a team in the Czech Republic is using UAVs to locate lost drainage systems and even save animals' lives, as well as map crops. An underground drainage system constructed in the previous century sits under most Czech farms without farmers knowing it even exists and there are no documents or maps showing where it is. As well as helping to reveal the locations of these missing pipes, UAVs armed with thermal imaging systems can also map out where animals such as deer may be hiding in fields, to prevent them from being hurt before harvests.

All these projects are designed to be simple and cheap, enabling them farmers to save money and do less work. Truly, geospatial technology is the farmer's friend.

I hope you enjoy the issue and that it inspires you in your own work. *If you have a comment or wish to express your views on anything in this issue or in the world of geospatial information, then please email me at robertbuckley@geoconnexion.com with Letter to the Editor in the Subject line. Please start your email with Dear Editor and the chances are your letter will appear in the Letters to the Editor page*



CONTENTS

CONTENTS

28. **SMARTER FARMING**

A new project hopes to offer German farmers the benefits of the latest advances in satellite imagery. Knut Hartmann reports

30. **CROP WATCH**

A smart agriculture solution is identifying areas at risk of insect swarming activities using satellite data, crowdsourcing and machine learning. Lena Nietbaur reports

32. **A WORLD OF INNOVATION**

Thomas Maschler and Asa Strong explain how their new open source forestry monitoring application has already been used to create Forest Atlases in countries across the Congo Basin

36. **NEW PERSPECTIVES**

The combination of building information modelling and virtual reality has the potential to transform architecture, planning and construction around the world, says Nigel Alexander

40. **MORE THAN JUST FIELD WORK**

Jakub Karas discusses how a team in the Czech Republic is using UAVs to map crops, locate lost drainage systems and even save animals' live

NEWS AND EVENTS

6. **EMERGING TECHNOLOGY**

13. **ANNOUNCEMENTS**

14. **PRODUCT SHOWCASE**

15. **ASIAN SPOTLIGHT**

16. **COMPANY SHOWCASE**

EVENTS

– Listing can now be found on www.geoconnexion.com

REGULAR COLUMNS

3. **EDITORIAL**

23. **FIG UPDATE**

26. **ON LOCATION**

42. **INTERGEO**

43. **TRAINING AND EDUCATION**

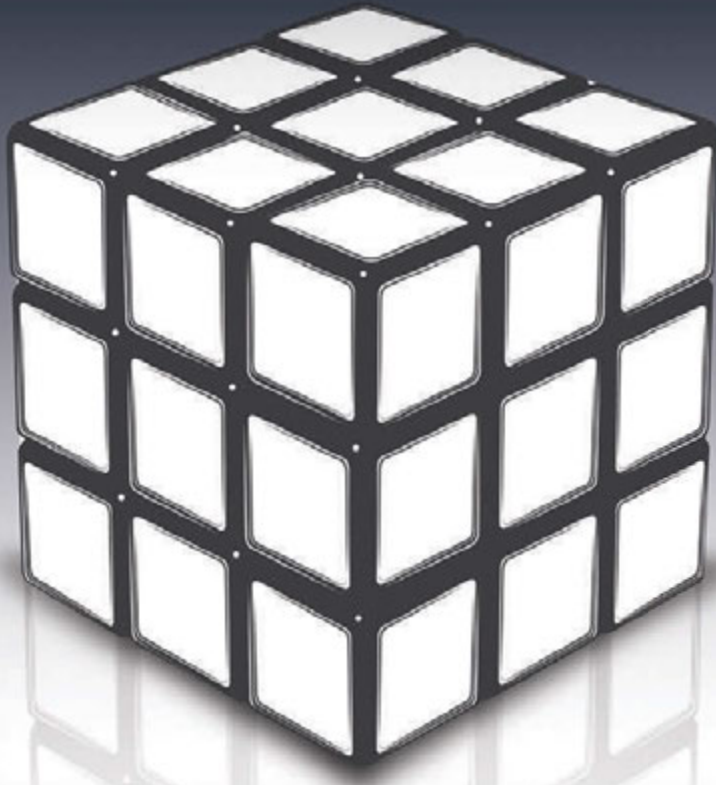
MAR/APR 2017 – PAGE 44

GEOconnexion^{UK}

SERVING THE GEOINFORMATION COMMUNITY IN THE BRITISH ISLES

Cover: If only architects, builders and even city planners could envisage what their work would look when completed, they could prevent mistakes, improve features and save costs. The combination of building information modelling and virtual reality puts that vision within reach (see page 36)

Made Simple



Software Solutions

Surveying is anything but simple. Sometimes, it's a blank slate with infinite possibilities. Sometimes it's a problem with no defined solution. In either case, Spectra Precision is here to help you stay ahead of the job, get the work done, and deliver a professional result to your customers.

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GEOSOF AND MINALYTIX PARTNER TO BRING MX DEPOSIT TO THE MARKETPLACE

Geosoft and **Minalytix** have entered a business partnership to commercially release **MX Deposit**, a new Software-as-a-Service (SaaS) solution for drill hole and sample data management. Cloud-based MX Deposit provides a breakthrough solution that simplifies how drilling data is collected, managed, and shared. Drill hole data can be logged and accessed from anywhere in the world. A mobile data entry application is available for more efficient data collection in the field. According to global survey results, cost and complexity of implementation are among the biggest barriers to industry uptake of data management technologies. MX Deposit targets both – providing an agile and affordable way to manage your drilling and sample data with a solution that's easy to implement and use. "We're delighted to partner with Geosoft on its market release," said **David Peres, President of Minalytix** www.geosoft.com www.minalytix.net

9-1-1 CENTERS EQUIPPED WITH ACCURATE LOCATION FROM SMARTPHONE CALLERS

Hexagon Safety & Infrastructure and **RapidSOS** have partnered to provide public safety agencies that use Hexagon's **Intergraph® Computer-Aided Dispatch (I/CAD)** with accurate location and additional data from the **RapidSOS NG911 Clearinghouse**. Through this partnership, **Public Safety Answering Points (PSAPs)** working with Hexagon will be able to harness data to include accurate handset location from all smartphone location sensors. Millions of smartphones and other connected devices transmit precise device-based hybrid location and additional data to the RapidSOS Clearinghouse when a 9-1-1 call or other request for emergency is made. Through the RapidSOS integration, I/CAD users will be able to query the RapidSOS Clearinghouse when a wireless call is received to retrieve supplementary location and additional data through NG9-1-1 delivery mechanisms. For the first time, PSAPs are able to fully leverage the capabilities of modern smartphones to aid in emergency response, without a need for the caller to use an app. www.hexagonsafetyinfrastructure.com



AGI AND BENTLEY SYSTEMS ANNOUNCE CESIUM CONSORTIUM

Analytical Graphics Inc. (AGI) and **Bentley Systems** are pleased to announce Bentley Systems as a co-founder of the new **Cesium Consortium**. Cesium is an open source, browser-based virtual globe, first developed by AGI in 2011 for the aerospace and defense communities. Cesium's unparalleled performance in streaming very large datasets through a browser to desktops, tablets, and smart phones has enabled it to become the virtual globe of choice for geospatial viewing. The consortium will now

enable AGI and Bentley to collaborate on the Cesium roadmap to better accelerate and support the requirements for building infrastructure modeling (BIM) and for owners of infrastructure assets. The digital engineering models are created with Bentley's **MicroStation** and BIM applications, and the context is provided through reality meshes, created from digital photography and scanning devices using Bentley's ContextCapture. www.agi.com www.cesiumjs.org www.bentley.com

OPTIMIZING PHOTOGRAMMETRY WITH LARGE-FRAME SENSORS

Pix4Dmapper Pro is more than just drone-mapping software. For professional photogrammetrists, the objective of mapping is not just to generate simple 2D ortho-mosaics and 3D visually-pleasant models, but also to create cartography that provides accurate location and precise measurements. In Pix4Dmapper Pro, users can process large-frame images with an additional add-on. This add-on is for processing images larger than 55 megapixels. Metric camera users like UltraCam, can enter pre-calibrated camera interior and exterior parameters in Pix4Dmapper Pro. By choosing either to fix or to re-compute parameters, it is more flexible and efficient to generate accurate cartography in a short

time. Pix4Dmapper Pro supports the input of pre-calibrated camera interiors, such as focal length, principal point of auto-collimation (PPA), and lens distortion coefficients, etc. One recent method to avoid surveying ground control points for every project is direct geo-referencing, giving the six accurate exterior orientations to produce the surface model and ortho-mosaic. www.pix4d.com



BLUESKY ANNOUNCES 2017 FLYING PLANS FOR IRELAND

Aerial mapping specialist **Bluesky** has announced ambitious plans for the forthcoming 2017 Irish flying season. Already dedicated to producing a high quality orthophoto base for the whole of the Republic of Ireland, together with derived and complementary data products such as 3D height models and Colour Infrared imagery, Bluesky has committed additional resources to fulfill existing orders and future requirements. In addition to extra survey planes, camera equipment and state of the art sensors, Bluesky is also expanding its Cork based headquarters and launching an online Mapshop dedicated to serving the rapidly expanding Irish geographic data

market. "Despite often challenging weather conditions and sporadic acquisition windows, our local knowledge and strategically based aircraft have meant that we have been able to capitalise on virtually every flying opportunity in the last two years," commented **Rachel Tidmarsh, Managing Director of Bluesky**. www.bluesky-world.com



THE KULLASOFT ANDROID VERSION IS HERE!



Kullasoft Ltd are pleased to announce the Android version release for the **PGM Manager app**. The PGM Manager app was specifically developed by **CEO Jimmy Pewtress**, to allow surveyors to capture control point data on-site, upload it to a web portal and create witness diagrams at the click of a button. This significantly minimizes time on site and thus increases productivity throughout the organisation. Now with 96 registered users the PGM

Manager app for surveyors can now officially be utilized by Android users too. Pewtress says, "After talking to a lot of surveyors over the past few months, it became apparent that the majority of smartphones used in the geospatial world run on Android. To accommodate this, it gives us great pleasure to unveil the Android version of our PGM Manager app. To anybody who's already used our iOS version, it will look and feel almost identical. www.kullasoft.com

PCI GEOMATICS MARKS MILESTONE IN CLOUD-BASED IMAGE PROCESSING

PCI Geomatics announced that it is six years since it began providing clients with cloud-based processing.

Big data is a challenge that the remote sensing industry has grappled with for several years, given the flood of imagery increasingly available. In 2011, PCI Geomatics was among the first to innovate and embrace the cloud as an ideal processing platform to handle large-volume data sets. PCI Geomatics implemented a cloud-based GXL system with hundreds of parallel-processing compute nodes that would grow and contract based on processing requirements. For example, Esri Inc. needed to produce over 50 million square kilometers of color-balanced, pansharpened ortho mosaics for publication to its web-based mapping platform, ArcGIS Online. Esri used a cloud-based GXL system to process over 350,000 images in just a few months thanks to the power of the system and its cloud architecture.

www.pcigeomatics.com



SENTINEL DATA ACCESS SERVICE (SEDAS)

An online datahub



SEDAS is an online data hub providing all businesses, researchers and students free access to Sentinel 1 & 2 Earth Observation data.

To download data, or to find out more, visit: sedas.satapps.org



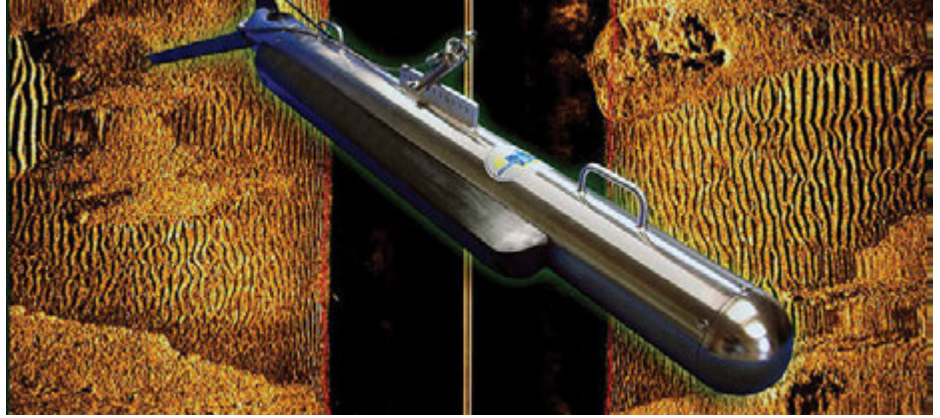
MAPMAKER AND SEES REQUESTS FOR GEOCODING RISING AFTER GOOGLE CHANGES PRICING POLICY

Since **Google's** policy change that has dramatically increased their pricing, **AND** experiences a rise of requests for geocoding services. Geocoding is the process of transforming a postal address description to a geographic location. **AND CEO Hugo van der Linde:** "For years **AND** has provided premium quality geocoding. Of course, we are happy to see an increased demand for our geocoding services as a response to Google changing their pricing policy for heavy geocoding users and are committed to the highest level of uninterrupted service for our users."

Geocoding by **AND** is based on the **AND** proprietary digital maps. The proprietary database of **AND** has street level data up-to house number levels for Canada, the United States and all Western European countries. The rest of the world is offered on neighborhood or city level.
www.and.com

NEW TRIMBLE GIFT EXPANDS TRAINING AND RESEARCH FOR BUILDING DESIGN AND FABRICATION

A significant in-kind gift from will expand the **University of Massachusetts Amherst's** leadership in training and research in 3D building design, digital fabrication and the sustainable built environment. Partnering with Trimble allows **UMass Amherst** to more fully integrate across its curricula the technological tools that are rapidly transforming how building and living environments are designed and constructed. The gift will establish the 1,300-square-foot Trimble Technology Lab in the new Design Building at **UMass Amherst**. The lab will include equipment such as Trimble's laser scanners, advanced robotic surveying systems, imaging rovers, Global Navigation Satellite System (GNSS) receivers and many of Trimble's software packages including RealWorks® scanning software, Trimble Business Centre, Vico Office Suite, GCEstimator™ Suite, Tekla® Structures, Sefaira Architecture and its popular 3D modeling software SketchUp Pro. The gift is part of the successful \$300 million-plus **UMass** Rising fundraising campaign.
www.trimble.com



NEW HIGH PERFORMANCE CHIRP SIDE SCAN SONAR SYSTEM BASED ON DEEP ROOTS

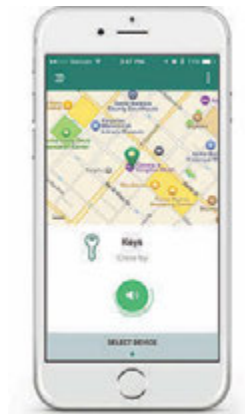
Falmouth Scientific, Inc. (FSI) has reached into its deep well of experience and knowledge to bring you the **HMS-624 digital CHIRP Side Scan Sonar System** which offers dual simultaneous 100/400 KHz frequency operation. "A large percentage of our engineering and production teams, including VP of Engineering Fred Hegg and me, worked at Datasonics developing the first Digital CHIRP side scan sonar as well as their sub-bottom profiling systems," said **FSI's President and Chief Engineer,**

John Baker. "Our portfolio of products and systems are a reflection of that wealth of experience combined with today's advanced technologies." The new HMS-624 leverages these advanced technologies to provide superior imaging capabilities for deep and shallow water applications. The **Tow Fish** electronics incorporate **FSI's CHIRPceiver™ 24-bit CHIRP** signal processing, which results in very high-resolution side scan data at towing depths up to 2,000 meters.
www.falmouth.com

TRACKR LAUNCHES UPDATED FIND MY PHONE SKILL FOR AMAZON ALEXA

TrackR announced the **Find My Phone** skill for **Amazon Alexa**, the cloud-based voice service behind the **Amazon Echo** and **Echo Dot**, which gives people the comfort of always knowing the exact location of their phone. Once the skill has been enabled, customers can say, "**Alexa, ask TrackR to find my phone,**" and Alexa will provide the last known address of the phone, no matter where it is in the world. If the customer is already located in the same place as the phone, Alexa will ring it loudly, even if it is on silent mode making it easy to find a misplaced phone.
Chris Herbert, CEO and co-founder of

TrackR said. "With this new Alexa skill, our customers have the peace of mind of knowing that with a simple request, Alexa will tell them exactly where they left their most frequently used piece of technology, their phone."
www.TheTrackR.com



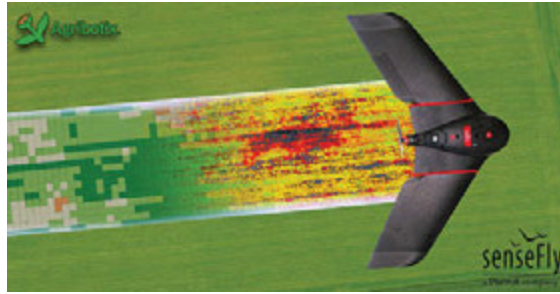
ANITE ENABLES THE CROSS REFERENCE OF CORE NETWORK DATA WITH LOCATION DATA

Anite, now part of **Keysight Technologies**, launched a new module for its **Nemo Xynergy** platform, the **Nemo Xynergy Geospatial Intelligence**. The solution is targeted at RF/performance engineering teams for driveless optimization through correlated analytics, and customer care and service assurance teams for customer experience management, so that they can efficiently prioritize and resolve issues that degrade network quality and customer experience. **Nemo Xynergy Geospatial Intelligence** addresses three main use cases:

(1) Driving cost effectiveness and efficiency through driveless optimization of the network using OSS generated call trace data. (2) Improving customer experience by analyzing and troubleshooting customer specific calls, sessions and events that are accurately geolocated using proprietary geolocation algorithms. (3) Improving the depth and quality of analytics by enabling correlation of multiple data sources to enhance the problem identification and troubleshooting routines.
www.anite.com

AGRIBOTIX™ PARTNERS WITH SENSEFLY

By combining the **eBee SQ**, **senseFly's** advanced, long-range agricultural drone with **Agribotix's** award-winning **FarmLens™** cloud processing platform, the companies have created an easy-to-use solution that is perfectly optimised for the early identification and troubleshooting of crop issues that now offer a new combined solution for professional users. This premium technology solution combines the top drone, sensor and agricultural data processing technologies available today to make collecting and analysing aerial data easier than ever, with several times more coverage, per flight, than is possible with most quadcopter solutions. By adopting the eBee SQ as its new fixed-wing drone platform, Agribotix is signalling



its on-going commitment to sourcing the best hardware on the market to bundle with its award-winning FarmLens™ SaaS platform, a 100% agricultural data processing cloud solution. Having purchased the combined solution, customers will be able to receive full professional hardware support via senseFly's existing network of expert distribution partners.
www.agribotix.com www.sensefly.com

CALTRANS TAKES DELIVERY OF THE RIEGL VMX-1HA

Caltrans, the California state agency responsible for highway, bridge, and rail transportation planning, construction, and maintenance, has taken delivery of the new **RIEGL VMX-1HA** mobile mapping system! The RIEGL VMX-1HA is a high speed, high performance dual scanner mobile mapping system. It provides industry-leading performance and dense, accurate, and feature-rich data at highway speeds. With two million measurements and five hundred scan lines per second; this turnkey solution is ideally suited for survey-grade mobile mapping applications to meet the standards of Departments of Transportation nationwide. The powerful technology of the system comprises of two RIEGL VUX-1HA high accuracy waveform LiDAR sensors and a high-performance INS/



GNSS unit, housed in an aerodynamically-shaped protective cover. Four 9mp cameras, along with a LadyBug 5 camera, complement the waveform LiDAR data with precisely georeferenced images. The proven RIEGL software suite provides seamless workflows for mobile data acquisition, processing, adjustments, and deliverables.
www.rieglusa.com

FREQUENTIS' LOCATION INFORMATION SUPPORTS NASA UAS TEST IN NEVADA

Frequentis' Location Information Service (LIS) provided situational awareness for ground control stations during **NASA's** latest **Unmanned Aircraft System (UAS) Traffic Management (UTM)** flight tests at Reno Stead airport in Nevada. **Drone Co-Habitation Services LLC**, (DCS) partnering with Frequentis, participated in NASA led test to track flight missions and facilitate air traffic management of drones. Multiple teams flew their drones beyond the line of sight of their operators in order to test the planning, tracking and alerting capabilities of NASA's UTM platform. The **Frequentis LIS** is at the core of the company's UTM client software and provided accurate geo-location and telemetry data received from **DCS** drones and other UAS detected by the LIS service. Frequentis is actively

participating in research activities cooperating with Air Navigation Service Providers globally, integrating small UAS into the airspace. The number of drones is expected to exceed the number of aircraft in approximately 5 years.
www.frequentis.com



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with SafeRTK™
& Atlas

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1 cm RTK

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Submeter
& Subfoot GNSS

ARROW LITE



Submeter GPS

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1cm real-time RTK accuracy
iOS/Android/Windows compatibility
GPS/GLONASS/BeiDou/Galileo/QZSS

ORBIT GT RELEASES INDOOR MAPPING SOLUTION WITH FLOOR PLAN BUILDER

Orbit GT releases its premiere **Indoor Mapping** product with a spectacular range of functionalities. It's available for download now. "Indoor Mapping v17 is an awesome new release", says **Peter Bonne, CEO of Orbit GT**. "It's wonderful blend of point cloud and imagery management, floor plan building and advanced feature extraction. On top of that, it supports all major manufacturers of Indoor Mapping hardware systems." **Orbit Indoor Mapping** supports ViaMetris, TIMMS, NavVis, Vexcel Panther, Pegasus:Two, and many more through a generic import interface. Imagery and Point Cloud are perfectly aligned. Using Orbit's extent viewing capabilities, one can easily switch between different views. The standard slice viewer has been further tweaked to make the extraction of a floor plan extremely simple. Furthermore, manual, semi-automated and advanced feature extraction tools are available integrated within workflow optimized procedures. www.orbitgt.com

TOMTOM AND MAPPY EXTEND THEIR LONG-TERM RELATIONSHIP

TomTom and **Mappy** announced that they have extended their long-term relationship. Through this new agreement, Mappy has increased its access to TomTom traffic data from 10 countries to now the whole of Europe, matching its coverage access to TomTom maps. Mappy is also positioned to leverage TomTom's next generation map database, leading the way to smarter mobility. Mappy is licensing TomTom map and traffic information to power its Internet mapping site and mobile consumer app via app stores. Mappy leverages traffic information from TomTom when calculating a route. **Bruno Dachary, COO of Mappy** comments, "Our customers rely on dynamic advice for their route planning. By extending our relationship with TomTom, having access to live traffic information displaying incidents and congestion on a map, assures that we are meeting our customers' mobility needs." www.tomtom.com fr.mappy.com



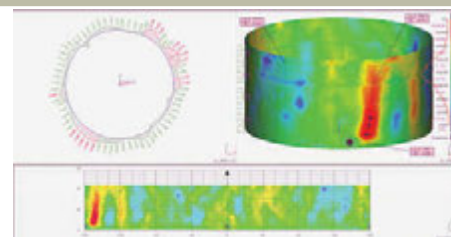
TONGA ADOPTS WHAT3WORDS AS NATIONAL POSTAL ADDRESSING SYSTEM

what3words has been adopted as an addressing standard by **Tonga Post**. The Kingdom of Tonga is the first nation in the region, and the fourth in the world to adopt 3 word addresses to improve its national infrastructure. With 170 islands scattered over 700,000 square kilometres of ocean, delivering anything to anyone is a challenge. 36 of Tonga's islands are inhabited, with a population of approximately 103,000 citizens. By using what3words, every location in the

Kingdom of Tonga now has an instant address. what3words provides an easy-to-use, accurate, and fixed address for every 3m x 3m square in the world. By making this addressing system part of the country's infrastructure, Tonga Post is helping unlock the region's economic growth and social development. Using 3 word addresses for Tonga's Postal system is both practical and user friendly for residents, as well as time and cost efficient for the company. www.what3words.com

3DRESHAPER PLUGIN DEDICATED TO TANKS ANALYSIS

3D scanners are being used more often to analyse storage tanks and inspect their integrity because they allow the fast and accurate acquisition of a large amount of data. The new **2016 MR1** version of **3DReshaper** has an optional module dedicated to tank analysis and processing. The tank inspection plugin allows users to inspect plumbness, create 3D inspections to detect possible problem areas on the tank by creating a 3D colormap to highlight problem areas. This map can be unrolled and displayed as a 2D colormap. It can evaluate roundness and verticality by creating section cuts of the tank and displays the different sections with exaggerated deviations



to allow users to detect the slightest anomaly. Also can compute the differential settlement or localized settlement on the bottom of the tank according to API 653 standard tolerances. Finally, complete reports can be generated at the end of the analysis. www.3dreshaper.com

AIRBUS PROVIDES SATCOM FOR EU SECURITY MISSIONS IN MALI, NIGER AND SOMALIA

Airbus Defence and Space delivers satellite communications systems for EU military training missions in **Somalia** (EUTM Somalia) as well as for the EUCAP (European Union capacity-building mission) Sahel **Niger** and EUCAP Sahel **Mali** civilian missions. Led on behalf of the European Union, these missions aim to support the efforts of the respective governments to strengthen their stability and to respond to the security issues faced by their populations. Airbus Defence and Space teams have deployed C-band satcom systems between Europe and Somalia, Niger and Mali, as well as satellite-based mobile phone terminals to enable communications in Malian and Nigerien territories. Airbus Defence and Space supplies the ground equipment,



communications services and airtime. Around twenty ministries of defence in Europe and EU organisations are taking part in this project, which allows them to equip themselves with satcom solutions and services across the globe. www.airbusdefenceandspace.com

GROUND TRIALS OF VOLCANIC ASH DETECTION PERFORMED SUCCESSFULLY

Elbit Systems and **Nicarnica Aviation** achieved a significant milestone by successfully performing ground trials, demonstrating detection of volcanic ash using the **ClearVision EVS** system. The **Enhanced Vision System (EVS)**, that was modified to incorporate ash detection capability, is one of a kind in the market. During the conducted trials, the system demonstrated unprecedented volcanic ash detection capability. The trial findings verify that the final product will achieve a

successful detection at a range of 100 kilometres in sufficient time to allow pilots to avoid the no-fly zone affected by the presence of volcanic ash. The ground-breaking modified design was funded by the Eurostars™ program. Elbit Systems and Nicarnica's technologies enhance operational efficiency, reduce maintenance costs and prevent delays in the flight schedules of commercial airlines caused by adverse ambient flight conditions.

www.elbitsystems.com



DIAMOND AIRCRAFT INTRODUCES NEW GARMIN G1000 NXI FLIGHT DECK

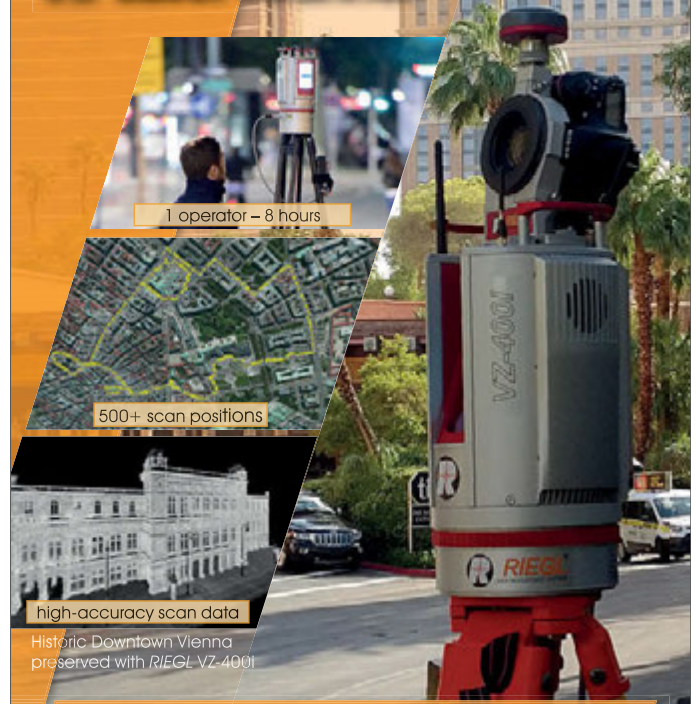
Diamond Aircraft Industries introduces the next generation **Garmin G1000 NXi** integrated flight deck to its piston product line, including the twin-engine DA62 and DA42-VI/DA42 NG and the single-engine DA40 NG. "We are excited to present the all-new Garmin G1000 NXi to our state-of-the-art piston aircraft. In 2001, we were the first OEM to commit to Garmin's then top-secret fully integrated G1000,

selected as an integral key part of the DA42 TWINSTAR and we are happy to offer our customers the latest in avionics yet again," says **Christian Dries, CEO and Owner Diamond Aircraft Austria**. Garmin NXi uses the same basic user interface of the G1000 boasting a number of big improvements further reducing pilot workload and enhancing the flight experience.

www.diamond-air.at



RIEGL VZ-400i Ultra High Performance 3D Laser Scanner



**Farther, Faster, Better:
The RIEGL VZ-400i is Redefining Productivity!**

This evolution of laser scan engine technology is based on its new innovative processing architecture. Real-time data flow is enabled through dual processing platforms: a dedicated processing system for data acquisition, waveform processing and system operations, and a second processing platform to execute on-board data registration, geo-referencing, and analysis simultaneously. Thus, the new VZ-400i is an extremely fast field-to-office Terrestrial Laser Scanning Solution, setting the benchmark in 3D Laser Scanning, again!

Ultra High Speed Data Acquisition with **1.2 MHz laser pulse repetition rate** combined with up to **240 lines/sec scan speed** | up to **800 m range** | survey-grade **accuracy 5 mm** | highly informative scan data attributes | on-board registration with GPS and orientation sensors | Cloud Connectivity via Wi-Fi and LTE 4G/3G | user friendly touchscreen interface | pre-defined workflows for easy operation | advanced flexibility through support for external peripherals and accessories | high end camera option

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April 3 - 5, 2017

Visit us at booth no. 5



Scan this QR code
to watch the RIEGL
VZ-400i video.

www.riegl.com



RIEGL LMS GmbH, Austria | RIEGL USA Inc. | RIEGL Japan Ltd. | RIEGL China Ltd.

NEW PROJECT TO BOOST SAT NAV POSITIONING ACCURACY ANYWHERE IN WORLD

The service, to be developed at prototype level, will benefit safety-critical industries like aviation and maritime navigation, as well as high accuracy dependent applications such as offshore drilling and production operations, dredging, construction, agriculture and driverless cars and drones, just to name a few. The **EU-funded TREASURE** project, will integrate signals from satellite navigation systems such as GPS, launched by the US, alongside Russia's GLONASS, China's BeiDou and Europe's new Galileo system. Combining these different satellite systems to operate together is a new development known as multi-GNSS, which is key to provide instantaneous, high accuracy positioning anywhere in the world. The four-year project will focus on a service that will take the current use of GNSS - normally based on just one or two systems - to the next level, to provide accuracy of a few centimetres in real time, opening up a multitude of new possibilities. www.nottingham.ac.uk

SUCCESSFUL INITIAL LAUNCH FOR ITS SECOND GENERATION REAL-TIME CONSTELLATION

exactEarth Ltd. announced the successful launch of four hosted payloads for its next generation constellation, **exactView™ RT** powered by **Harris**. Launched aboard an **Iridium NEXT** satellite on **SpaceX's Falcon 9** rocket from Vandenberg Air Force Base in California, these hosted maritime payloads are now being commissioned and are expected to be brought into service shortly. **exactView RT** will offer for the first time a continuous, global real-time ship tracking capability, providing an unprecedented view of the world's maritime domain to **exactEarth** customers. Designed to provide significant improvements to current and future customers, the RT satellites will deliver best-in-class vessel detection rates as well as instantaneous downlinking of AIS information. This will enable average global revisit rates of under one minute with the Company's customers receiving data in real time. **exactView RT** will consist of more than 60 payloads aboard the **Iridium NEXT** constellation, scheduled for completion in 2018. www.exactearth.com



PAKISTAN GOVERNMENT CHOOSES FUGRO FOR EXTENSIVE MINERALS EXPLORATION

Fugro has been awarded a multi-million Euro contract for the exploration of minerals in Pakistan. The world's leading independent geo-intelligence provider will plan and supervise exploration of areas of the Punjab – Pakistan's second largest province and the country's most populated region – for iron ore and other minerals. The two-year survey has been commissioned by the **Punjab Mineral Company (PMC)** and the exploration programme will include geophysics,

geotechnics, hydrology, drilling and laboratory testing as well as quality and budget control. The programme will culminate in a detailed estimation report of metal deposits in Punjab. The €10m contract with **Fugro** was signed in Lahore in January. Addressing the signing ceremony, Punjab's Chief Minister, Muhammad Shahbaz Sharif, called the exploration project a 'progressive initiative'. He added that the survey would reveal authentic data on the Punjab's mineral reserves. www.fugro.com

ENABLING A BREAKTHROUGH IN HYBRID UNDERWATER VEHICLES

The Fusion is a breakthrough in hybrid underwater vehicles. In a unique way, it combines AUV and ROV capabilities with diver navigation and propulsion- into just one system. Crafty engineering and high-end bespoke sensors have produced an underwater vehicle with efficient, capable and robust design. The Fusion underwater vehicle has a unique in-line transducer arrangement and **Nortek** has been there to help with this design. **Nortek's** contributions included recommendations and minor tweaks to make the vehicle work optimally. The Fusion breaks with tradition by uniquely combining several underwater systems into a single platform. The specific suite of sensors refers to inclusion of a multi-beam forward-looking sonar, side-scan sonar, USBL,



DVL and AHRS. Most other platforms do not include these as standard and are certainly not integrated as tightly as in Fusion. This design makes the Fusion more efficient, capable and cost effective. www.nortek-as.com

ABP CHOOSES OCEANWISE PORT-LOG

Associated British Ports (ABP) has contracted **OceanWise** to install **Port-Log** across all of ABP's 21 UK ports. The project has not required any of ABP's existing sensors to be replaced. A major benefit of **Port-Log.net** is its ability to accommodate a wide range of sensors from different manufacturers. Consequently, pressing deadlines for installing and testing the system were able to be met. The service utilises **OceanWise's** Smart Telemetry units to transmit data to a

cloud server, providing real-time publishing of monitoring data direct to individual VTS centres at each Port Cluster, as well as to other users and devices at other locations. ABP opted for the **OceanWise** online (aka cloud based) subscription service, **Port-Log.net**, which offers great value and is quick and easy to set up. This enabled an on time go-live date for the Port of Southampton, with the other Ports following on smoothly. www.oceanwise.eu

AWARD

Unify is winner of the 'Best Emerging Drone Company' award

The first **EU Drone Awards** were presented at the European Parliament in Brussels. Out of 50 candidates from 14 countries 9 finalists were selected in 3 categories: Best Drone Manufacturer, Best Drone-based Application and Best Emerging Drone Company. **Unify** was presented with the award of **Best Emerging Drone Company**. This category awards the most attractive European emerging company taking into account market potential, impact of the solution, team, European dimension and technological innovation. "Unify was very honoured to receive the Best Emerging Drone Company award. We see it as recognition of everything we have achieved so far and as extra motivation to continue on the chosen path," said **Marc Kegelaers CEO Unify**. "The EU Drone Awards are a great way to put innovations and new developments in the drone industry in the spotlight and give young entrepreneurs a well-deserved boost." www.unify.aero



PEOPLE

Mark Clarke Joins Geospatial Marketing Specialist

The Marketing Edge has appointed **Mark Clarke**, previously Managing Director of Mayrise Systems and a former client of the geospatial sector PR and marketing consultancy, as **Business Growth Consultant**. Clarke built Mayrise Systems from a fledgling software company to a market leader in asset management and mapping systems prior to sale in 2013. Clarke brings invaluable experience in commercial business management, and will offer advice on how to build a business from start-up all the way through to forming successful partnerships, negotiating mergers or sale of the business. As well as a thorough understanding of the municipal and highways contracted services sector, Clarke brings specific experience in sales and marketing strategy. "Having built a successful software company himself, Mark adds an important new dimension to The Marketing Edge and can offer some highly valuable advice to those looking to grow their businesses" comments **Robert Peel, Founder of The Marketing Edge**. www.market-it.co.uk



PEOPLE

Daniel Behnke Named URISA Young Professional of the Year

URISA is pleased to announce that **Daniel Behnke** has been named **URISA's Young Professional of the Year** in recognition of his outstanding contributions as part of **URISA's Vanguard Cabinet**. Daniel is the **Director of Asset Management Operations** for Data Transfer Solutions in Orlando, Florida. He notes, "It's been an honor to serve on the URISA Vanguard Cabinet the past two years. Being able to interact with such an innovative, passionate, and energetic group of young GIS professionals leaves me very hopeful for the continued growth and development of our profession." Daniel also serves on the planning committee for GIS-Pro, URISA's annual conference and is active locally in the **URISA Florida Chapter**. The Vanguard Cabinet is a URISA initiative which debuted in 2011 to engage young GIS practitioners, increase their numbers and better understand the concerns facing these future leaders of the GIS community. www.urisa.org



AWARD

Leica Geosystems wins prestigious PRISM Award

Leica Geosystems has won both the 2017 PRISM Award for Photonics Innovation and the 2017 Geospatial World Innovation Award. The 2017 PRISM Award for Photonics Innovation was presented to Leica Geosystems in the category of **Metrology by SPIE**, the educational not-for-profit international society for optics and photonics for groundbreaking technology and product inventions based on optics and photonics. The **Leica BLK360** won a 2017 Geospatial World Innovation Award in recognition for innovation and excellence among geospatial technology developers, professionals, end users and policy makers. "It's an honour to be recognised by the industry and our peers for the BLK360 in advance of its official availability to the market," said **Burkhard Boeckem, CTO, Leica Geosystems**. The Leica BLK360 is the world's smallest imaging laser scanner designed primarily for engineers, architects, construction managers and surveyors involved in computer-aided design (CAD) and building information modeling (BIM). www.leicageosystems.com



PEOPLE

Quartix announces the appointments of two new directors

Quartix Ltd. is pleased to announce the appointment of two directors to its board: **Ed Ralph** as **Chief Operating Officer** and **Lynne Austin** as **Director of UK Fleet Operations**. Ed brings to Quartix extensive experience and a proven track record in technology management, digital marketing and eCommerce. From 2001 to 2015 he built and led the technology team at Abcam plc, having joined the company as the 7th employee and at a time when its revenues were just £200k. When Ed left the company in 2015 Abcam had revenues of approximately £140M p.a. Lynne has over 25 years of successful sales and account management experience, selling technical products and services to business clients and channel partners both in the UK and internationally. She has enjoyed a consistent record of achievement in a diverse range of dynamic and highly-competitive environments. www.quartix.net



PEOPLE

USGIF CEO Reappointed as Vice Chair of the National Geospatial Advisory Committee

The United States Geospatial Intelligence Foundation (USGIF) CEO **Keith J. Masback** was reappointed to a second three-year term as a member of the **National Geospatial Advisory Committee (NGAC)**. He was also reappointed as NGAC's Vice Chair. The NGAC provides recommendations to the **Federal Geographic Data Committee (FGDC)**, the interagency executive group responsible for providing leadership and direction in federal geospatial programs. Additionally, Julie Sweetkind-Singer was reappointed as NGAC Chair, along with 14 new and continuing members of the committee. "It's absolutely humbling to have the opportunity to continue to serve with such a diverse and talented group in support of the vitally important work of the FGDC," Masback said. "I eagerly look forward to building on the tremendous legacy of the NGAC's many contributions over time." www.USGIF.org



PRODUCT SHOWCASE

GEOCONNECTION LOOKS AT THE LATEST IN GEOMATICS PRODUCTS

1 ALGIZ RT7 ULTRA-RUGGED TABLET NOW WITH ANDROID 6.0 AND 2 GB OF RAM

Handheld Group announced upgrades to its popular **Algiz RT7** rugged Android tablet. The 7-inch Algiz RT7 now runs **Android 6.0 (Marshmallow)** and has been upgraded to **2 GB of RAM**. The result is a significant boost to processing speed, especially when using memory-intensive applications or running multiple applications simultaneously. The Algiz RT7 is a lightweight and ergonomic tablet that provides a wide range of features and exceptional value to mobile workforces. The change to Android 6.0 adds security features and allows users to expand their internal storage via micro SD. These upgrades will also apply to the **Algiz RT7 eTicket** used in public transportation fare collection and ticket validation. "The Algiz RT7 has been an extremely popular unit since its release, and these upgrades show our commitment to providing the best available features to our customers," says **Jerker Hellström, Handheld Group CEO**. www.handheldgroup.com

2 GSSI NOW OFFERS LINETRAC™ XT ACCESSORY FOR STRUCTURESCAN MINI XT

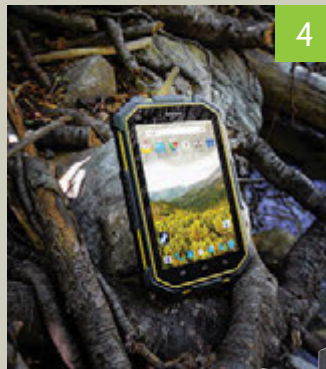
GSSI, the world's leading manufacturer of ground penetrating radar (GPR) equipment, announces the availability of **LineTrac™ XT**, an accessory to the **StructureScan Mini XT**. The combination of the StructureScan Mini XT and LineTrac XT helps concrete professionals locate specific power sources in concrete, including AC power and induced RF energy present in conduits. The new LineTrac XT accessory combines radar data with a magnetometer, delivering accurate, dependable, and repeatable performance. LineTrac XT includes a number of features that make it easy to identify target utilities, including easy integration with StructureScan Mini XT, seamless data fusion with GPR data, a 50/60 Hertz electro-magnetic sensor used to locate powered conduits, and a rugged, IP-65 rated enclosure. LineTrac XT detects extremely low amplitude AC signals associated with difficult to locate conduits. The StructureScan Mini XT now comes equipped with the LineTrac XT software package. www.geophysical.com

3 THE NEW FARO® FOCUSM 70 LASER SCANNER

FARO® announces a new entry price-performance standard for its entire **FARO Focus** laser scanner portfolio. The **FARO FocusM 70** solution provides an ideal entry point for all professional users considering laser scanning in the construction BIM/CIM and public safety forensics markets. Key features include an **Ingress Protection (IP)** Rating of 54 for use in high particulate and wet weather conditions, **HDR imaging**, an acquisition speed of almost 500,000 points per second and extended temperature range. Additionally, users have unrestricted freedom of choice to leverage the software tools most beneficial to their own workflow as data captured by the FARO FocusM 70 can be used with various third party software packages. The FARO FocusM 70 is specifically designed for both indoor and outdoor applications that require scanning up to 70 meters and at an accuracy of +/- 3 mm. The FARO FocusM 70 Laser Scanner solution is available for immediate shipment. www.faro.com

4 JUNIPER SYSTEMS' AFFORDABLE, ANDROID® RUGGED TABLET – THE CT7G

Juniper Systems, Inc., has just released a new Android-operated rugged tablet, the **CT7G**. The tablet is the latest in Juniper Systems' affordable **Cedar™** product line, aimed at providing rugged devices at a lower price for users who may not need the same level of ultra-ruggedness and support that its **Juniper Rugged™** handhelds offer. Running Android 6.0, the tablet offers excellent versatility with thousands of out-of-the-box solutions to choose from, available from the Google Play Store. The CT7G features a sizeable, but not unwieldy, 7-inch display with enhanced visibility for outdoor use, along with more than double the battery capacity of typical tablets, providing users with all-day power. It's also been given an impressive IP68 rating, meaning it provides complete protection against water and dust—an important feature for rugged devices. Juniper Systems does provide outstanding customer service with support that's free, live, and local to users. www.junipersys.com



ASIAN SPOTLIGHT

THE LATEST NEWS AND PRODUCTS FROM ASIA



SUPERGEO'S NEW RESELLER IN PAKISTAN – CHAUDHERY BROTHERS

Supergeo Technologies Inc. is pleased to announce a new partner in **Pakistan**. After close contact for a short time, Supergeo decided to authorize **Chaudhery Brothers** as an official distributor to provide **SuperGIS** series products in the local market. Established in 1987, Lahore, Chaudhery Brothers is an experienced consulting firm focused on GIS, surveying, and civil engineering markets for decades. They have participated in several big engineering projects, including topographic

surveying for the highway in Punjab Province, contouring for the power station in Guddu, the design for sewerage system in Gujranwala City, etc. Supergeo believes the diverse customer base will surely help Chaudhery Brothers promote SuperGIS products in the future. With Chaudhery Brothers, Supergeo hopes more and more Pakistani organisations can enjoy the convenience brought by geospatial technologies.

www.chbros.com www.supergeotek.com

ORBIT GT AND SHANGHAI TOPCON-SOKKIA (STS), CHINA SIGN RESELLER AGREEMENT

Orbit GT announced that **Shanghai Topcon-Sokkia Technology & Trading Co. Ltd.** ("STS") has been appointed as Authorized Reseller of Orbit GT products in China. "We're very pleased to announce Shanghai Topcon-Sokkia as our new Reseller for China", says **Peter Bonne, CEO of Orbit GT**. "To address the growing market in China, STS is a perfect partner. It furthermore strengthens our global relationship with Topcon." "I'm very glad to become a partner with Orbit GT", says **Mr. Chen Xin, General Manager of STS**. "As we know, Orbit GT is a famous 3D Mapping solution provider in the world. To the many Topcon MMS & UAV end users in China, STS will better serve them by providing more powerful mapping solutions with Orbit GT products. At the same time, it will improve compatibility of Topcon IP-S2/ IP-S3 Mobile Mapping Systems and Sirius Pro UAS in the market place." www.orbitgt.com

Notice Board™

A web mapping application which brings mobile-friendly smart searching to community websites.



What day should we put our green recycling bin out?

Find a vet for Patch

Find out more: cdcp.io/nbd/

Who's our local councillor?

Jack's football Sunday 9.30am -Black Park

Where is it?

Call Highways - Yet more potholes!!! ☹️

Where can we recycle our old fridge?

COMPANY SHOWCASE

SPRING 2017

Our regular 'Company Showcase' feature is the opportunity for suppliers of goods and services from all branches of the geomatics industry to acquaint readers with their latest offerings. Innovation is key to success in today's geomatics market place... one where traditional boundaries are being blurred by the latest trends in convergence and functionality, and it is vital that users can take advantage of these technological advances.

Surveying equipment now incorporates GNSS, GIS, Laser-based and communications, as well as optical capabilities to offer ever higher accuracy and greater local processing power at lower cost. Remote Sensing, in the widest sense, achieves new levels of resolution and precision from Laser, LiDAR, satellite, and aerial sensors, including those carried aboard a new generation of UAVs. The huge volumes of geodata captured by these and other sensors and devices are incorporated in ever more innovative information and location based services that support public and private sector decision makers at all levels, as well as citizens.

Look also for advances linked to the convergence between technologies, from CAD and BIM suites now incorporating GIS and decision support tools to smart phones used to collect and disseminate location-tagged data for commercial and citizen-oriented Open Source applications. For field use, consumers are now spoiled for choice with a wide variety of portable rugged and semi-rugged geodata collection devices based on PDA, tablet and notebook computers. And, of course, the advent of data and software as hosted services via the Cloud presents new challenges and opportunities for users everywhere.

This is an exciting decade for all sectors of the geomatics industry, with innovation powered by creativity, convergence and advances in several allied technologies. Watch this space to keep yourself up to date!

**Next Available Showcase:
Autumn 2017
(Published September)
Entry Deadline: July 2017**

ASD

1



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ASD FieldSpec® spectroradiometers generate high-quality field spectra at the required illumination and viewing geometry for accurate correlation to satellite and aircraft sensor data. Available in multiple configurations, FieldSpec spectroradiometers are compatible with popular image analysis software packages such as ENVI, ERDAS Imagine, and MultiSpec, allowing you to create detailed spectral libraries tailored to your application. Bringing a level of device portability that only ASD can provide, the FieldSpec helps provide increased accuracy to your results and optimization of your imagery software.

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CADCORP

2



In web mapping, simplicity is the ultimate sophistication

Cadcorp's flagship web mapping product – **Web Map Layers** – is now even easier to use and includes on-line editing.

Web Map Layers 8.0 features a completely redesigned, responsive user interface; stripping it down to the bare essentials. Don't think for a moment that the product has become less powerful. We think that there is no place for complexity in a user interface.

You can judge for yourself by going to the on-line demonstrator at <http://cdcp.io/g>

Web Map Layers 8.0. Sharing Local Knowledge™ on desktop, tablet and mobile devices.

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Vr Mapping continues to evolve.

The Vr Mapping geospatial products provide fast data collection for engineering mapping. In VrOne®, VrTwo, and VrThree, vector data are collected from photographs, LiDAR, and Point Clouds in 2D, 2.5D, and 3D stereo environments. Imagery and point data sets can be viewed separately and synchronously.

Automatic tie point generation (VrAutoTie) and a new bundle adjustment (VrBundle) extend the capabilities of the aerial triangulation program (VrAt) and VrUAS. The Vr Mapping software can work with complicated geometries including UAS, oblique, high oblique, and close-range camera positions. A stand-alone camera calibration program is available to supplement the integration of UAS and other single lens cameras into the workflow. VrThree integrates LiDAR, point cloud, and DSM data into the VrOne® and VrTwo environments.

The VrOrtho package was rewritten for an easier to use workflow that clients report is 30% faster in production. The new interface is the same wizard style GUI used in the aerial triangulation (VrAt) and the new model set (VrModSet) programs. Orthophoto production is threaded, and mosaic seam lines and balance are automatic. Mosaics are created directly from images. Mosaic boundaries are user drawn and can be rotated which is very efficient for corridor mapping. GeoTIFs and world files are seamlessly compatible with ESRI software.

Cardinal Systems

info@cardinalsystems.net
www.cardinalsystems.net



Carlson Software's new product releases include the Carlson BRx6 – a multi-frequency GNSS Smart Antenna. The lightweight and intuitive BRx6 can be used as a Base or Rover on demand, with multiple wireless options including Bluetooth and Wi-Fi. A state-of-the-art GNSS RTK engine enhances performance, complemented with SurvCE/SurvPC for familiarity and productivity. RTK options include Carlson's Listen-Listen for Base/Rover via GSM, traditional RTK Network via GSM, and local Base/Rover via the integrated UHF transceiver.

Combined with SurvCE/SurvPC and the Esri OEM engine, users work in a GIS environment, with wireless interface to a wide range of GNSS receivers and Total Stations. A seamless presentation of position data and GIS from SurvCE/SurvPC in the field, provides an efficient method for Survey and GIS applications to ensure survey quality. Up to 64 GB of raw data may be recorded for post processing with Carlson's SurveyGNSS.

For more information, visit
www.carlsonsw.com

Carlson Software Inc./Carlson EMEA

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No really, I'm serious!

I know what you're thinking: But Elaine, this is your profession! Aren't you supposed to be persuading me to hand over as much money as possible, so you can work your magic?

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Really?

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EOS POSITIONING

6



Positioning Systems



Eos offers the world's most advanced, palm-sized GNSS receivers for iOS, Android and Windows.

The Arrow GNSS receiver product line is a complete line of high-accuracy Bluetooth receivers from sub-meter to decimeter and centimeter. All of the Arrow receivers deliver accuracy in real-time, anywhere in the world.

The Arrow GNSS receivers are compatible with Apple iPads, iPhones, Android and Windows smartphones, tablets, notebook and desktop computers.

Our products support GPS, Glonass, BeiDou and Galileo for improved performance in difficult environments such as under trees and near buildings.

All Arrow products are built to survive outdoors. They are waterproof and dustproof with an IP-67 rating. The rechargeable battery pack lasts from 9 to 16 hours depending on the model and is field replaceable.

Visit us at: Esri UK 2017 Annual Conference, May 16, London

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GENEQ

7



SXBlue

Pioneer of the real-time sub-meter GNSS Receiver

GENEQ inc. is the developer and manufacturer of the popular SXBlue GNSS family of GPS receivers. With revolutionary technology, these mapping-grade receivers are the first to achieve sub-meter accuracy in real time without post-processing.

The SXBlue receiver connects via Bluetooth to all Smartphones, PDAs, Tablets and Notebooks and is compatible with most software such as ArcGIS, Carlson Surveyor, MicroSurvey FieldGenius, Essri Collector, etc.

The SXPro is an all-in-one professional-grade GNSS and RTK Data Collector. The SXPro RTK all-in-one handheld receiver delivers the quickest and most reliable RTK initializations for 1-2 cm accuracy.

Both the SXBlue and SXPro are specifically designed for mobile survey and GIS users working in the water, electric and gas utilities, transportation, mining, agriculture and forestry fields.

Geneq also offers a new generation of full function GNSS Receivers.

Multi-satellite constellation and 30 degree tilt are just two of the key features of the G10 smart antenna.

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HANDHELD

8

handheld



The all new ALGIZ 8X ultra-rugged tablet comes with an 8-inch capacitive touchscreen and has rain- and glove mode. Learn more at www.handheldgroup.com/ALGIZ-8X

Rugged Computers for Tough Environments

Handheld Group is a manufacturer of ultra-rugged tablets and handhelds that can withstand water, dust, shock and extreme temperatures.

Together with a strong network of reselling partners Handheld supply rugged computers to a wide area of field applications, often in the most demanding environments.



The NAUTIZ X2 is a true all-in-one: a rugged computer, a scanner, a camera and a 4G/LTE Android phone.

Handheld has local subsidiaries worldwide and online product information in several different languages.

Meet us at:

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21-22 March 2017, Telford, UK

ELMIA Wood
7 - 10 June 2017, Jönköping, Sweden

ESRI User Conference
10 - 14 JULY 2017, San Diego, USA



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www.handheldgroup.com

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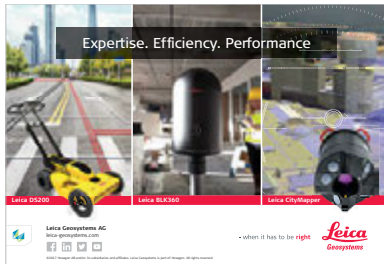
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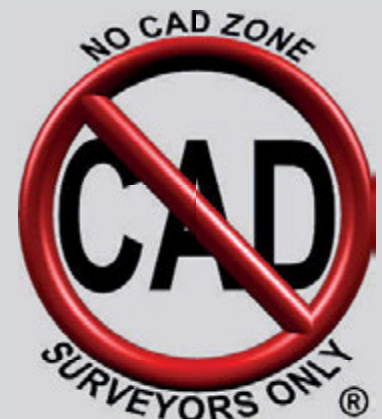
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"Good coordination begins with good coordinates"

SKILLS FOR THE FUTURE

SURVEYORS WILL NEED TO DEVELOP AND REFINE NEW SKILLS IF THEY ARE TO ADAPT TO FUTURE TRENDS. ROB SARIB EXPLAINS WHAT FIG BELIEVES MODERN SURVEYORS NEED TO KNOW AND WHAT IT'S DOING TO HELP THEM IN ASIA AND THE PACIFIC REGIONS

Governments have begun to appreciate geospatial information management and its vital role in decision-making, developing policies and sustainable growth. In particular, they now view geospatial reference systems (GRSs) as essential parts of a spatial data framework that represents the reference layer for land, marine and space based information.

This has progressed with the formation of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), the UN resolution on Global Geodetic Reference Frames, and the UN's endorsement of the use of geospatial data to measure the success of its Sustainable Development Goals.

With encouragement from FIG, emerging and developing economies in Asia and the Pacific regions have used these UN initiatives to establish, maintain or improve their GRSs, and develop the capacity of surveyors for GRS modernisation.

FIG describes capacity development as a process of identifying the challenges or obstacles that impede anyone from accomplishing their objectives, and then developing the necessary abilities to achieve them. FIG also considers that capacity development involves learning to adapt to change, how decisions are made, and that change management is supported by resources and the political commitment to achieve results.

Geospatial activity and the capacity development of surveyors will be influenced by economic, social and technical challenges and trends. By 2050, rapid urbanisation will cause two-thirds of the world's population to live in 'mega cities' serviced by smart technology. This will occur primarily in Asia, along with an expanding middle class and increased economic activity in numerous sectors, and it will influence the way government departments or private sector groups:

- Evaluate and implement urban and land-use planning
- Manage sustainable development of finite resources and the environment

- Administer utilities, services, public infrastructure and assets such as power generation and distribution, water reticulation, waste treatment, and transport
 - Provide affordable and efficient housing
 - Generate, supply and deliver sufficient food for the population
- 'Disruptive' technologies are also a challenge that will affect the capacity development of surveyors. These technologies will transform the way we do our normal business and affect our lifestyle patterns. Those likely to affect the world economy the most by 2025 are:
- Mobile internet-enabled low-cost computing devices
 - Automation of tasks using artificial intelligence
 - The Internet of Things – networks of internet-connected sensors that collect data to assist with processing, analysis, monitoring and decision-making
 - Cloud technology for provision of services or applications using the internet or networks
 - Advanced robots or robotics that can perform delicate procedures or help with everyday life
 - Autonomous vehicles

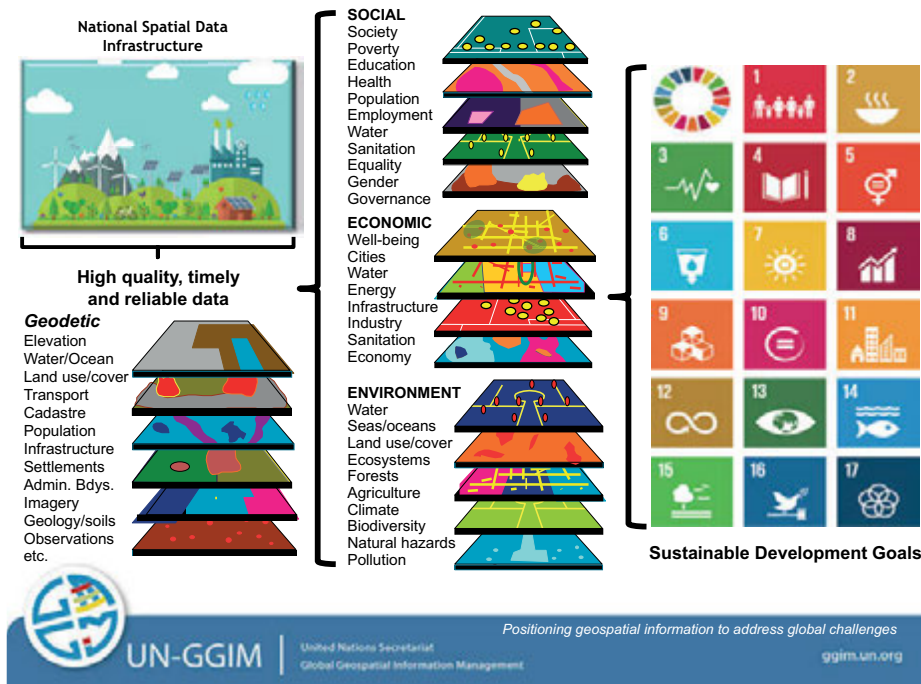
It is expected these disruptive technologies will influence the geospatial industry in several ways. They should enable greater connectivity and access to geospatial data in real-time thus enabling real time monitoring and analysis. They will create business opportunities and innovation that will improve productivity and revenue. They will foster more location-based applications or services and embedded intelligent systems. They will change the way surveyors generate digital information, and visualise and interact with multi-land and geographic systems, in sectors relating to building information modelling, asset management, inventory, tracking, emergency management, and computational and visualisation software.



The FIG Asia Pacific capacity development workshop, held in Malaysia in October



The FIG Asia Pacific capacity development workshop, held in Fiji in November



© Greg Scott and UNGGIM

Environmental impact

It is also important to recognise the significant effects of environmental phenomena, such as climate change, rising sea levels, earthquakes, tsunamis, and cyclones. For example, in 2015, 346 disasters affected 98.6 million people, with an estimated economic damage of US\$66.5bn. Furthermore, Asia and the Pacific are at greater risk of experiencing more natural disasters.

The quality of critical infrastructure, such as communication, transport and utility systems, will determine the effectiveness of disaster response. Consequently, the geospatial industry will be vital to the management and outcomes of disaster relief, reconstruction and the building of resilience, by supplying information for such systems.

From FIG's perspective, the trends and challenges mentioned will reshape the future role of the professional surveyor. Surveyors can be prepared by transforming their attitude towards change, be progressive in their thinking, and consider diversifying or refining their knowledge and ability to:

- Collect, process and deliver reliable, accurate, interoperable, 24/7 geospatial information to decision-makers in real-time using a

combination of 'disruptive technologies' and crowd-sourcing techniques

- Convey professional advice and services to assist in design, risk assessment, investment analysis, asset management and resource deployment.
- Innovate in multi-disciplinary teams to effectively manage diminishing resources and increased data volumes, and resolve legal data matters such as privacy, custodianship, sharing and liability
- Actively lead, negotiate, influence, and permeate collaboration
- Understand and balance commercial influences
- Advocate and communicate relevance to influence leaders, decision makers and politicians, and attract a diverse group of new professionals
- Form and administer strategic plans with a focus on outcomes and output
- Form and administer qualitative and quantitative monitoring and evaluation frameworks
- Sustain 'development' to balance consumption of resources with

environmental needs, and ensure a self-reliant and self-determinate community. It is imperative for surveyors to have several specific capabilities. They should be able to assess the status and condition of their agencies' GRS infrastructure, systems and data, and identify the role and responsibilities of their agencies in the various elements of GRS infrastructure and data management.

They should also be able to strategise and implement operational plans that are aspirational but realistic, achievable, address challenges, and are flexible enough to accommodate a rapidly changing industry.

In addition, they should be able to derive and maintain technical components of modernised GRS infrastructure such as:

- A network of GNSS Continuously Operating References Stations that contribute and are aligned to the International Terrestrial Reference Frame or the subset Asia Pacific Reference Frame
- 'Fit for purpose' survey control networks that are a hierarchy of rigorously propagated coordinates and uncertainties
- Geoid model or defined height system to integrate vertical surfaces for land, water and intertidal zones.

Lastly, they should be able to ensure the GRS or modernised geodetic infrastructure: underpins their nation's fundamental or foundation datasets; adheres to international standards, guidelines and practices (including metadata); uses the multi-GNSS environment and space-based measurement technology; aids interoperability and unification amongst geospatial information and systems via location intelligence; aligns with new mass-market positioning (real time) technology and applications delivered by satellite, digital communications and the internet; exploits the benefits of quality imagery and satellite data, as well as new mapping technologies and products; and supports global observing systems for scientific research modelling, such as tectonic plate deformation, sea level monitoring, climate change and atmospherics.

To guide and assist countries in Asia and the Pacific region to develop surveyors' capacity to modernise and sustain their GRS, FIG has formed the Asia Pacific Capacity Development Network. For more information about this network, please visit https://www.fig.net/organisation/networks/capacity_development/asia_pacific/index.asp

IN 2015, 346 DISASTERS AFFECTED 98.6 MILLION PEOPLE, WITH AN ESTIMATED ECONOMIC DAMAGE OF US\$66.5BN

Rob Sarib is chair - FIG Asia Pacific Capacity Development Network (www.fig.net)

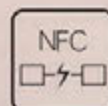
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VIRTUAL INSANITY

SIMULATING THE REAL WORLD REQUIRES MORE THAN JUST SIGHT AND SOUND, SAYS
ALISTAIR MACLENAN

It is hard to open a tech news website without seeing a predication that virtual reality will be 'the' technology of the year. I realise I could open different websites but nevertheless, these futurologists' (not a real job title) pronouncements leave me a little cold.

In its current incarnation and looking at the direction of travel for its development, virtual reality simply isn't striving to recreate reality. Of course, there is nothing wrong with that – apart from the name being misleading.

If the technology giants who are pushing this technology and who want to bet their vast farms on men and women of all ages spending hours of real life 'immersed' in unreal gaming worlds, blasting anything that moves into a computer-generated afterlife, then that is their prerogative. It's their farms, after all.

But it seems to me that the opportunity is being missed for this ever-developing capability to model and explore anywhere without leaving the office, to have a real impact on how many geo-professionals do their jobs.

Current VR (I'm very busy and can't possibly keep typing virtual reality) systems start and end with only two senses: sight and sound. This is, as any schoolboy knows, only 40% of the available sensory inputs an unimpaired human being has.

For me, by ignoring touch, taste and smell, the experience of strapping on a pair of ludicrously large goggles and holding a floating joystick whilst flying around the streets of San Francisco has been uninspiring. Even when I was strapped to a moving table (I'm sure there is a more technical term) the added sensation of diving and climbing simply made me feel unwell. It certainly didn't make me feel more involved in the virtual world I was exploring. In fact, it made me feel that the people in the real world were laughing at a man strapped to a moving table who was trying not to throw up.

Reality is a tough concept to explore in a 600-word column but without entering the metaphysical, it is fair to say that people use all their senses to orientate themselves in their worlds. It seems strange then to try to recreate a world while ignoring three-fifths of the available ways that people will interact with it.

You could reasonably argue that in the geo-industry's applications of VR, seeing and hearing is more than enough for the challenges it has been designed to address. Indeed, it may be an advantage not to be able to smell the streets, particularly in the less attractive parts of a city. Seeing what is there, how the streets are mapped out and so on are enough to make planning decisions or route new utilities.

Except I believe that it really does matter that the person using this technology can experience the reality of a situation, otherwise the connection is no more real than our would-be soldiers reaping carnage from their sofas (if the smells of war and the pain of being shot were introduced to VR gaming I'd guess that chess would see something of a renaissance as a way for people to spend their free time).

People make decisions based on the information they gather and process. In VR, they are being denied the chance to collect it all and so will make decisions with what could be vital information missing.

When town planners, building engineers or farmers say that they have a 'feel' for how a situation should be resolved, they mean that they have, without thinking, collected all the information of their senses, mixed it with the experience they have gained from previous work and created a solution. If a virtual world is only one of sight and sound, it is a poorer place than the real one and so will struggle to provide economic or efficiency savings to industries.

Alistair Maclenan is founder of the geospatial B2B marketing agency Quarry One Eleven (www.quarry-one-eleven.com)

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SMARTER FARMING

A NEW PROJECT HOPES TO OFFER GERMAN FARMERS THE BENEFITS OF THE LATEST ADVANCES IN SATELLITE IMAGERY. KNUIT HARTMANN REPORTS

For about 45 years, various earth observation satellites have been orbiting the Earth. These provide spatial, up-to-date and historical information about the condition of and changes in our environment.

In Germany, agriculture is by far the largest user of land. Approximately half the total area is owned about 285,000 farms. Farmers already widely use GPS, communication and other satellite data in their day-to-day work, but a gap exists between the potential of information derived from satellite imagery and its application in practice.

Information derived from satellite images can provide valuable information for crop management and precision farming. It also offers a perfect overview of field developments and high and low yielding zones. However, until now, this information was mostly available only to experts, since the collection and analysis of data were costly and complicated.

AGRO-DE aims to overcome existing barriers and bridge the gap between satellite data processing and storage, and integrate them into farmers' practice. The objective is to showcase the benefits of up-to-date, spatial information derived from satellite imagery and improve farming efficiency and sustainability.

New regulations such as capped nitrogen fertilisation in Germany and the EU concept of 'greening' for diversification of crops and maintenance of permanent grasslands are among the many items that farmers need to consider. In this, they can be significantly supported by satellite-based services.

In April 2015, the European Space Agency (ESA) started to launch a new satellite fleet which provides image data tailored to support agricultural applications. The European Copernicus programme, under which Sentinel Earth observation satellites are being launched, provides operational satellite data in unprecedented quantity, temporal resolution and technical excellence. For Germany, the new

Sentinel-1A/B satellite acquires information about the development of vegetation, using cloud-penetrating radar technology every two to three days; every three to four days, the multispectral Sentinel-2 systems will cover entire Germany, increasing significantly the chances of obtaining a cloud-free image. In contrast to most existing remote sensing missions, the raw data from Sentinel is available for free. The high temporal, spatial (10-20m) and spectral resolutions will enable completely new data products that are also very interesting for small-scale and organic farms.

"Farmers can benefit from the new era of earth observation satellite data by accessing ready-to-use data, which will be supplied via web-interfaces. Data will be user-ready for farmer's decision making. With ESA's new satellite missions, fantastic datasets will become available that were not accessible before," says Dr Holger Lilienthal, a scientist at Julius Kühn Institute and project coordinator of AGRO-DE.

The project consortium consists of the Julius Kühn-Institut, the German Aerospace Center (DLR), EOMAP GmbH & Co. KG and Hanse-Agro GmbH. The core of the development is embedded in DLR's processing environment, which provides an efficient infrastructure to access, process, deliver and archive satellite image data and derived products. Given the vast amount of data that needs to be processed and delivered in a timely manner, intelligent and robust concepts and algorithms will be developed as part of AGRO-DE. Furthermore, a high level of automation is required to deliver precise and detailed information for large areas such as Germany and beyond.

AGRO-DE enables farmers, agricultural consultants, contractors and service providers to use preprocessed satellite information layers in a timely manner and to integrate them into their operations. Data layers currently provided to the public include the most up-to-date high resolution satellite imagery, relative and absolute crop parameters,

and yield predictions. But more than one dozen data product layers are currently being designed, with some of them being incorporated into, for example, an integrated service solution to aid nitrogen fertiliser efficiency or identify crop phenology and growth status.

The concept of big data processing from space is based on workflow systems that enable the rapid production of large amounts of product data using flexible and scalable computation power. Within each of these workflows, a chain of successively running algorithms enables a standardised operational data processing.

“With the AGRO-DE project, all farmers in Germany can benefit for the first time from the latest satellite information. AGRO-DE will provide access to usable information products, which will stimulate the application of precision farming technologies. We’re looking forward to using the information in our current practice,” says Dr Dominik Gerwers, agriculture consultant at Hanse-Agro

A practical example

The following example provides a high-level insight into the system. A farmer is interested in checking the status of different crop sites and wants to verify if there has been an unexpected change of biomass. AGRO-DE will translate this into a workflow for optical satellite imagery from the Sentinel-2 mission, which includes a processing chain of atmospheric correction, spectral sharpening, cloud and shadow masking and the deviation of vegetation parameters (relative and absolute) and yield predictions. Furthermore, a workflow for the radar satellite Sentinel-1 data allows the identification of significant crop phenology stages, such as flowering, greening or senescence. The derived information will help the farmer to make decisions about fertilisation (for example, site-specific or non-site specific fertilisation), soil and moisture issues (such as drainage planning, maintenance or sowing density). Beyond that, customised support can be provided by the AGRO-DE consortium.

Suitable delivery formats will be developed, tailored to the needs of farmers and service providers, such as a web app, web map services (WMS), which can be used in a GIS, FTP or an email attachment. These allow easy visualisation, analyses and integration into farming software.

The project will be backed by farmers, who will use and evaluate AGRO-DE products over the next few years to increase service readiness and portfolio. Currently, 19 farms will be involved but the service will be made available to all German farmers this year.

“Through environmental policy requirements and economic concerns, we farmers in Germany are forced to use a very efficient use of production resources, such as fertilisers. The data from AGRO-DE will help



Real colour image in 10m resolution of a rural area in northern Germany



Multi-temporal pseudo-colour image of a rural area in northern Germany. Colours enable the identification of crop types and variability of soil properties and crop vegetation



Multi-temporal pseudo-colour image at 10m spatial resolution

us to apply these scarce resources even more efficiently to the partial areas on our fields,” says Andreas Bertram, a farmer and owner of the domain Bahrdorf, as well as a member of the AGRO-DE experiment farms.

In addition, information products from AGRO-DE can assist research institutions, federal and state agencies in their work. Thinking ahead the AGRO-DE infrastructure can be upscale to include further regions or countries in Europe or worldwide. Copernicus will also be extended after 2020 with new satellites, which will make the development of a data and analysis cluster

with operational processing chains interesting in the longer-term.

THE DATA FROM AGRO-DE WILL HELP US TO APPLY THESE SCARCE RESOURCES EVEN MORE EFFICIENTLY TO THE PARTIAL AREAS ON OUR FIELDS

Knut Hartmann is director client service at EOMAP GmbH & Co.KG (www.eomap.com)



CROP WATCH

A SMART AGRICULTURE SOLUTION IS IDENTIFYING AREAS AT RISK OF INSECT SWARMING ACTIVITIES USING SATELLITE DATA, CROWDSOURCING AND MACHINE LEARNING. LENA NIETBAUR REPORTS

Insect infestation of farmland constitutes a significant risk to global food security. One insect species that cause a significant amount of damage to food crops, especially in Africa, Asia, Australia and the Middle East, is the locust. The largest swarms of locusts can consume more than 100,000 tonnes of crops each day – enough to feed tens of thousands of people a year.

Grasshoppers on their own do not constitute a problem, but a small amount of overcrowding can trigger swarming, turning a population of solitary grasshoppers into a marauding mob of locusts with a ravenous appetite attacking vegetation and crops. Factors that can cause locusts to swarm are changes in the pattern of soil temperature; weather conditions affected by sea temperature, clouds and wind; and the intensity and duration of the wet and dry seasons.

Advance knowledge of insect infestation activity can enable early, targeted and effective use of pesticides or organic mitigation techniques. This protects farmers against loss of income and earnings due to damaged crops, and reduces the costs of pesticide control and other management activities. Reducing the amount of pesticide also benefits the environment and thus the public.

Foresight Crops is a predictive analysis platform, created by Dr Oluropo Ogundipe and developed by her company GGIS, that uses multi-temporal Earth observation (EO) satellite data combined with crowdsourced information, historical records and weather data to model the forming conditions for insect swarms that are detrimental to crops. It identifies potential breeding grounds and tracking conditions that enable the development of the larva and the trigger for locusts to swarm.

This will provide a platform to enable risk prediction mapping. The more factors that are analysed, the more detailed and reliable

the prediction model will be. Thus, data from various data sources are integrated into the platform. These are automatically analysed and formed into prediction models.

EO data is used to model and predict causal factors and triggers for insect swarm activity. The focus is on computing differences in indices such as the normalised difference vegetation index (NDVI) and the soil moisture index (SMI) between peak wet and dry periods, as well as long-term changes at different scales. For the NDVI, EO data from the MODIS 16-day NDVI composite product at 250m resolution are used for historical data analysis. MODIS data ranging back 10 years was downloaded from the USGS website (<https://earthexplorer.usgs.gov/>) to train the prediction algorithm based on historical parameters. The NDVI is calculated based on the reflections of visible and infra-red light off vegetation. Healthy green leafy vegetation absorbs light in the visible spectrum and reflects a good part of the infra-red light. Unhealthy or sparse vegetation reflects more of the visible light and less of the infra-red. The resulting measure of the vegetation's greenness combined with the SMI provide relevant indices to identify areas of risk for locust swarming.

Soil moisture data will come from the Soil Moisture Active Passive (SMAP) service from NASA's Jet Propulsion Laboratory, providing soil moisture data based on radar data at up to 3km gridding resolution level. In addition, GGIS has tested the use of Arduino-based soil sensors that can be deployed in the field to measure and transmit soil moisture and temperature data.

Based on the analysis of historical satellite data records, the platform can compute and model long-term trends in locust swarming patterns. GGIS has also integrated data provided by the Food and Agriculture

Organization of the United Nations (FAO) Desert Locust Information Service (DLIS) going back to 1985. This data has been gathered in the field concerning the location of desert locust swarms and their stage in their lifecycle. By matching this data with the relating areas of risk identified through the satellite data analysis concerning time and location, the prediction algorithm is trained and the risk prediction models are validated.

For near real-time monitoring of active swarms, additional high-resolution data will be used from the Copernicus Space Component Data Access (CSCDA), especially Sentinel-2 data. Furthermore, weather data from the EUMETSAT service, which provides additional indications of areas of high risk for triggering swarm activity, will be used in the platform.

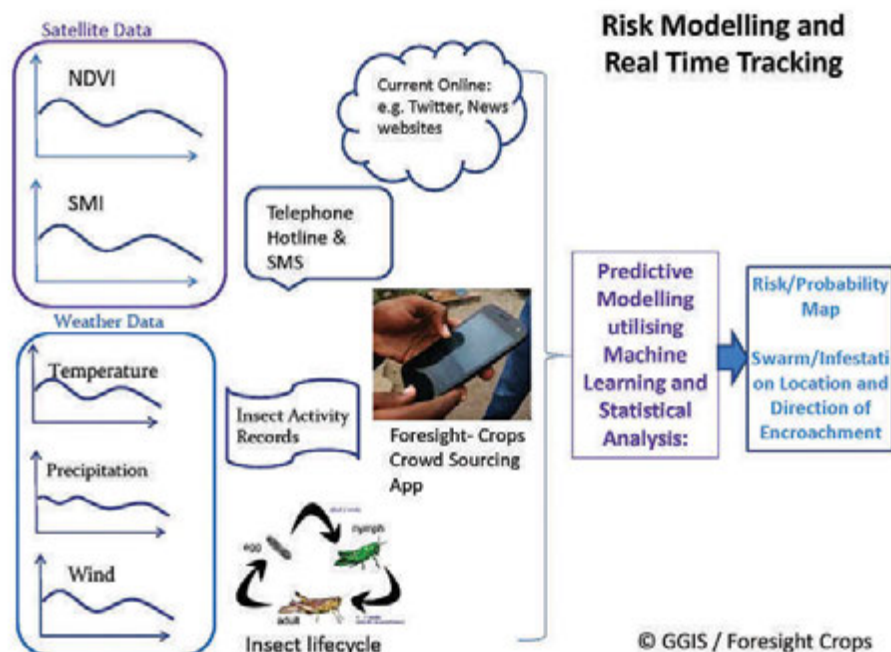
This satellite data is then combined with crowdsourced ground data and local observations from farmers and local communities. Smartphones and tablets are now being used widely, to collect field data in agricultural development projects with remarkable positive results, so GGIS has created a Foresight Crops mobile app, which provides information such as risk prediction mapping to the users and feeds the platform crowdsourced information from farmers and local communities in the form of geo-tagged comments and pictures.

Proof of concept

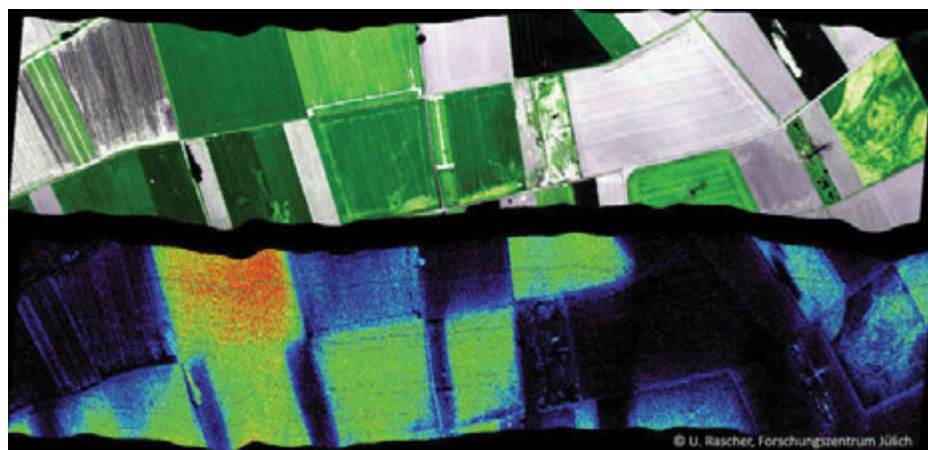
Madagascar has experienced severe locust swarms in recent years. From 2013-16, the FAO and the government of Madagascar started an anti-locust programme, focused on identifying areas of risk and dealing with the locusts using pesticides. This involved ground observations and aerial surveys from helicopters, which requires considerable financial and time resources (US\$37m).

The concept of Foresight Crops was first tested in January 2015, based on the FAO Madagascar programme. Oluropo used NASA MODIS data in her initial program to analyse NDVI and SMI data for the peak dry season and the peak wet season from Madagascar for the previous two years. From these datasets, a difference image was computed. The output image showed areas with significant change in NDVI values, which matched up with the risk map developed by FAO. FAO had required 1,025 hours of using three helicopters and one fixed-wing aircraft for its survey, but using EO data, Foresight Crops achieved comparable results within two days.

The software is still being developed and tested, but a strong working prototype that will provide services to consumers by the third quarter of 2017. When in use, it will provide advanced warning and information on the risks of insect swarm or infestation activity occurring at a given location and time. In addition, where there is swarming in progress in a location of interest, this will be tracked and monitored and its probable travel path



The Foresight Crops data flow



Fluorescence from different types of vegetation



The food security of 13 million people was threatened in the Madagascar locust crisis

predicted. It can also be incorporated into a farm's integrated pest management system and will be relevant to a wide range of public and private sector organisations around the world, such as governments, farmers, food companies and the insurance sector.

Lena Nietbaur is the head of marketing and communications at AZO (www.space-of-innovation.com)

AZO EARTH OBSERVATION ACTIVITIES

AZO's mission is to boost the user uptake of data provided by the European space programme by aiding visionary entrepreneurs in bringing their innovations to market. For the European Copernicus programme, on behalf of ESA and the European Commission, AZO conducts the Copernicus Masters competition, the Copernicus Accelerator, the Copernicus App Lab, the Space App Camps, and supports several EO start-ups in the ESA Business Incubation Centre Bavaria.

Foresight Crops conducted its first proof of concept an Appathon in line with a Space App Camp and subsequently participated and won the Copernicus Masters University Challenge in October 2015. Encouraged by this success, GGIS was formed to build, develop and exploit the Foresight Crops application.



A WORLD OF INNOVATION

THOMAS MASCHLER AND ASA STRONG EXPLAIN HOW THEIR NEW OPEN SOURCE FORESTRY MONITORING APPLICATION HAS ALREADY BEEN USED TO CREATE FOREST ATLASES IN COUNTRIES ACROSS THE CONGO BASIN

Open data enables citizens and communities around the world to engage in important societal and environmental issues. Besides stimulating innovation, entrepreneurship and scientific discovery, open data democratises decision-making by increasing transparency. It enables citizens to comprehend their leaders' actions and hold them accountable when the information doesn't add up.

But simply making data 'open', or freely available to everyone, doesn't guarantee accountability. To make data actionable for the average user, it needs to be put into context and packaged into the right tools.

Global Forest Watch (GFW) aims to turn big data into action. One of the go-to platforms for the most up-to-date forest information, it enables users to perform complex analyses with a few simple clicks, monitor deforestation globally in near-real time, calculate carbon emissions from land conversion or even evaluate the impact of companies' supply chains on forests to measure their progress toward zero-deforestation commitments.

National forest agencies in the Congo Basin have used GFW perhaps better than anyone. The Congo Basin is home to some of the largest undisturbed tropical rainforest on the planet, with thousands of tropical plant species and hundreds of endangered mammals. Approximately 75 million people live there, many of whom directly depend on resources provided by forests such as food, water, fuel wood and income.

The Congo Basin Forest Atlases, first released in 2005, were created in partnership between World Resources Institute (WRI) and the forest ministries of Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Equatorial Guinea and Gabon. These atlases were made using data and analysis featured on GFW, customised to include local data and fit the needs of the ministries responsible for managing their national forest estates. They contain information on land allocation, management practices and logging statistics, as well as a collection of official documents such as decrees, by-laws and management plans.

Before the Forest Atlases, this information was scattered across various departments and agencies, so was often inaccessible for officers deciding about land-use, resulting in double allocation of land, insufficient assessment of cases or conflicts of authority. Making everything available through the Forest Atlases helped the ministries to streamline their internal processes to avoid mistakes, and to implement and better communicate their sectoral programs.

The atlases also opened access to national forest data to the broader public. For the first time, forest stakeholders could validate the information they got from the ministries and draw their own conclusion. Suddenly, maps and spatial statistics on forest- and land-use found their way into reports and publications across the entire community of forest stakeholders, including national agencies, development organisations, NGOs and private companies.



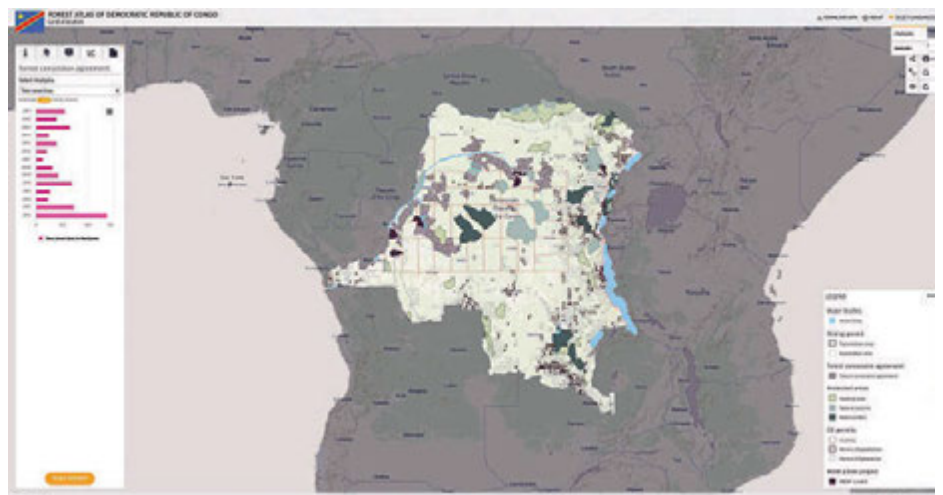
The various Forest Atlases of the Congo Basin

Better management of estates

The atlases have made tangible improvements in the management of Congo Basin forests. For example, Cameroon's Ministry of Forestry and Wildlife (MINFOP) used its Forest Atlas to pinpoint potential illegal logging activity, by overlaying maps of logging roads with logging and mining permit boundaries to reveal activity that extended beyond what was legally permitted.

The Democratic Republic of Congo's Ministry of Environment and Sustainable Development used its Forest Atlas to evaluate forest concession contracts for renewal, and ultimately suspended 91 permits covering 12.7m ha for violating legal requirements.

MINFOP has also established a community and council forest in central, based on forest loss detected using data and recommendations from GFW.



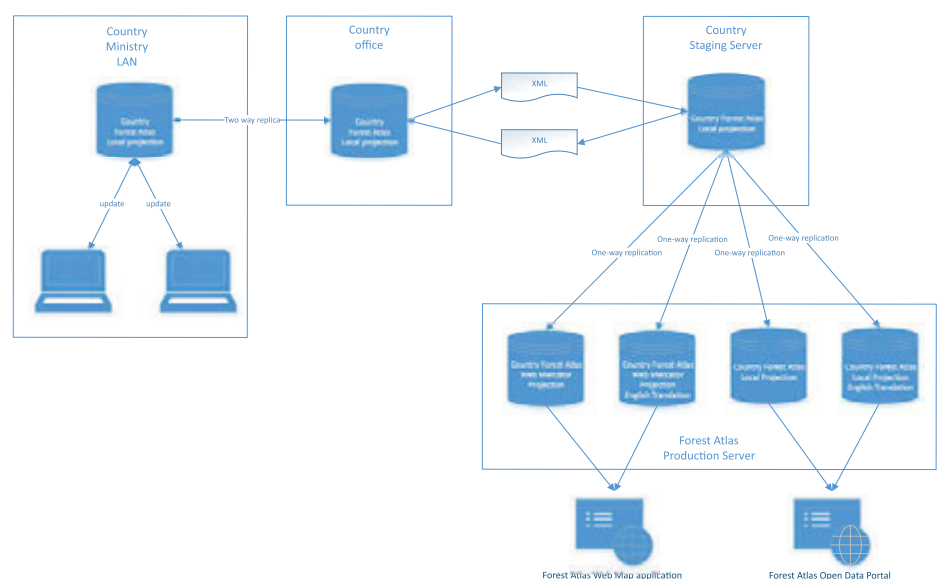
The Democratic Republic of Congo's Forest Atlas. Like most of the Forest Atlases, it is available in both French and English

Forest Atlas features

The Forest Atlases contain some key features that have improved forest management in the Congo Basin.

GIS tools help decision-makers to work with maps that highlight different aspects of forest and land-use management, including logging, mining, agriculture and conservation. With one click, users can run complex analyses on land-cover composition and above-ground biomass as well as forest-cover dynamics such as loss, gain and bushfires. Near real-time forest cover monitoring systems such as weekly GLAD and monthly Terra-i alerts are available through Global Forest Watch's Open Data Portal.

Users can also browse through the attributes of every feature on the map to learn more about what they represent. For example, users can learn when and how conservation areas were created, as well as who manages them and how. They can also download



The Forest Atlas application architecture



PDFs of any relevant documents, such as management plans, decrees or by-laws.

In addition to the web-map tools, the Atlases enable the public to access more forest sector information. Each Atlas has a corresponding Open Data Portal where anyone can find and download data they see on the platform. The data is maintained in both English and French, the official language spoken in most Congo Basin countries. Since data are published directly by each government agency, they are considered an authoritative source. An additional module providing in-depth analysis for key indicators has just been released for the different atlases.

Under the hood

Deploying and managing the different Forest Atlases, each in multiple languages, requires strong technical architecture and capabilities.

To ensure that data on each Forest Atlas could help influence national decision making, we introduced spatial planning and spatial thinking across the ministries. To familiarise the officials with spatial data and analysis, existing forest and land-use titles for each country were digitised and published as both printed and interactive maps. The maps showcased the current land allocation, change in land cover as well as interdependencies between the two, and helped staff to understand the power of these types of analytics. The staff were then further trained in GIS and data management, allowing them to produce maps and analyses themselves.

With increased capacity, more complex systems were introduced using central servers, enterprise geodatabases and online geodata portals. While ministry staff now manage and update data on their own, in-country WRI staff still support the cartography units and provide training on the job to assure continuity and a stable system.

However, designing a robust system that enables an entire organisation to share its data in the context of the Congo Basin countries is challenging. Things that are taken as granted in the western world, such as a stable electricity network and broadband internet, are not a given in Central Africa. Although there are many champions, overall computer literacy is still very low.

ArcGIS provides solutions that work even in this challenging environment. Cartography units in the ministries are equipped with a central ArcSDE database. Technicians replicate the geodatabase onto their local machines and can access and edit the data even when the network is down or they are working off side. Versioning enables projects to remain isolated until they are ready for publication. Distinct topology rules help the team to quickly identify inconsistencies in the data. Regular synchronisation with the central database ensures that everyone on the team always has the latest data.

To give non-technical staff access to the maps and other information, data layers of the geodatabase are registered with an ArcGIS Server instance and shared across the ministry using ArcGIS Portal for Server. This is configured for disconnected environments and works independently of an internet connection. Forest Atlas applications are hosted on ArcGIS Portal for use within the ministry. Field offices out of the network receive regular delta file updates of data by email or USB stick.

The public version is hosted on Amazon Web Services and ArcGIS Online to assure high availability. The technicians keep the system up-to-date using delta files to synchronise the online replica of the central geodatabase. Once in the cloud, data are further replicated into live geodatabases that hold copies of the geodatabase in different projections and languages.

By translating domains and subtypes within ArcSDE, the Forest Atlases can display layers in different language (usually French and English) without needing to alter the underlying data. The data used in web applications is re-projected during the synchronisation and directly stored in Web Mercator projection to render faster and reduce the load on the server, while a separate copy in the local projection is kept for distribution via the Open Data Portal.

To distribute Forest Atlas data publicly, forest ministries rely on ArcGIS Open Data. Each ministry using a Forest Atlas has its own Open Data Portal where it publishes its geospatial data for public access as well as additional resources such as forestry

contracts, reports and other publications. Data distributed through the Open Data Portals are published in their original projections together with comprehensive metadata. Data in English and French are curated using separate open data portals. Users can search data by keyword, full text or location and download the desired dataset. Web developers can find the necessary API endpoints for use in their applications. If not specified differently, all data is licensed under the CC-by-4.0 license, allowing users to use and redistribute the data.

The success of each Congo Basin Forest Atlas demonstrates how capacity-building coupled with powerful GIS analysis can improve the management of forests at the national scale. With open source tools like GFW Map Builder (see Box), these applications can be scaled faster and easier than ever. So what's the wait? Get started building your own GFW today!

GIS ANALYSIS CAN IMPROVE THE MANAGEMENT OF FORESTS AT THE NATIONAL SCALE

Thomas Mascher is GIS Associate for the Food, Forest, and Water Program and Asa Strong is GIS Research Assistant for Global Forest Watch within the Food, Forest and Water Program at the World Resources Institute (www.wri.org)

GFW MAP BUILDER

Forest Atlases are published using Map Builder, a tool that GFW recently released publicly. It enables anyone to create their own forest monitoring website using their own data, coupled with geospatial analysis features from GFW. GFW worked with Blue Raster to develop this web application template based on ArcGIS Online, and it is published under the MIT licence, so any organisation can create its own forest monitoring platform with custom data, at any geographic scale, for free. Users can use Map Builder with both ArcGIS Online and ArcGIS Portal for Server.

Users can customise the web applications by changing logo and branding, plugging in custom data, focusing the map on a unique area of interest or styling data for a specific topic. Different apps can be linked between each other to form a comprehensive atlas.

To view the application, visit <http://my.gfw-mapbuilder.org/v1.latest/>. To learn more about how to use GFW Map Builder, visit www.globalforestwatch.org/howto/tags/map-builder/. The source code is available <https://github.com/wri/gfw-mapbuilder>.

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NEW PERSPECTIVES

THE COMBINATION OF BUILDING INFORMATION MODELLING AND VIRTUAL REALITY HAS THE POTENTIAL TO TRANSFORM ARCHITECTURE, PLANNING AND CONSTRUCTION AROUND THE WORLD, SAYS NIGEL ALEXANDER

Building information modelling (BIM) is the process of generating and managing digital representations of the physical and functional characteristics of places. Originally created to help improve the way we design and construct buildings and infrastructure, it enables everyone involved to understand a building or space using accurate digital modelling that draws on a range of data assembled before, during and after construction.

While the concept has been around since the 1970s, take-up has been inconsistent across the globe. The Nordic countries have shown the most advancement in the use of BIM, where it has been in use for the past 10 years. In Finland, for example, almost every building has some BIM elements attached.

In Europe, progress is varied. Spain and Italy are only at the beginning of introducing BIM requirements. By contrast, in the UK, it is already a legal requirement to use BIM in all centrally procured public sector projects and France is expected to introduce a similar public-sector requirement this year. Germany has a 2020 target for BIM-use across all construction projects.

There's also increased take-up in the Middle East thanks to the UAE making the use of BIM a legal requirement for all large and public sector projects. There is also significant adoption in Korea and Australasia, although we're only now starting to see a rise in the use of BIM in China

and Singapore. In the US, BIM is only now growing and its impact is starting to increase.

Despite its ability to benefit the construction industry, BIM is not seen by everyone as a positive. Many in Europe view it as more regulatory red tape and in a move to counter this, substantial effort has been made to educate the industry about BIM's value, including EU-funded initiatives to promote BIM in public sector procurements.

However, the reality is that it could become a major asset in building and infrastructure construction, with virtual reality (VR) offering a powerful route to unlock that power across the board. One of the key things that VR brings is the ability to better visualise and display exactly what buildings and environments will look like. We've had this before with 3D modelling, but by combining VR with BIM, the visualisations become immersive, interactive and completely accurate. This gives us the opportunity to move away from traditional modelling, towards something that is more user-friendly and accessible.

VR models enable you to explore entire environments and buildings in much greater detail and with increased flexibility. They allow you to move into a space that doesn't yet exist and to interact with that space in ways that no other modelling technique will let you. Indeed, how you interact with a VR space is where the major advances in technology will occur in the next few years.

This is where we begin to see the power of VR and BIM to drive benefits in everything from building construction to space-planning. The accuracy of the modelling thanks to BIM can become a game-changer for space-planning and flow-management, as you can move around VR environments freely and understand in detail how they fit together and how a space really works – even though it may not be built for another two years, say. This means issues can be spotted and ironed out early in the process, which removes the need for expensive reworking and redesigning. For construction, this has a huge impact not only on reworking costs but also in potential wastage.

Beyond buildings

There is also significant application outside solely construction-based projects, expanding into landscape and larger environmental area planning. While 3D modelling for entire cities and areas due for development is starting to become more prevalent, fully immersive and interactive VR environments bring a far greater ability for everyone to be aware of the geospatial impact of any construction.

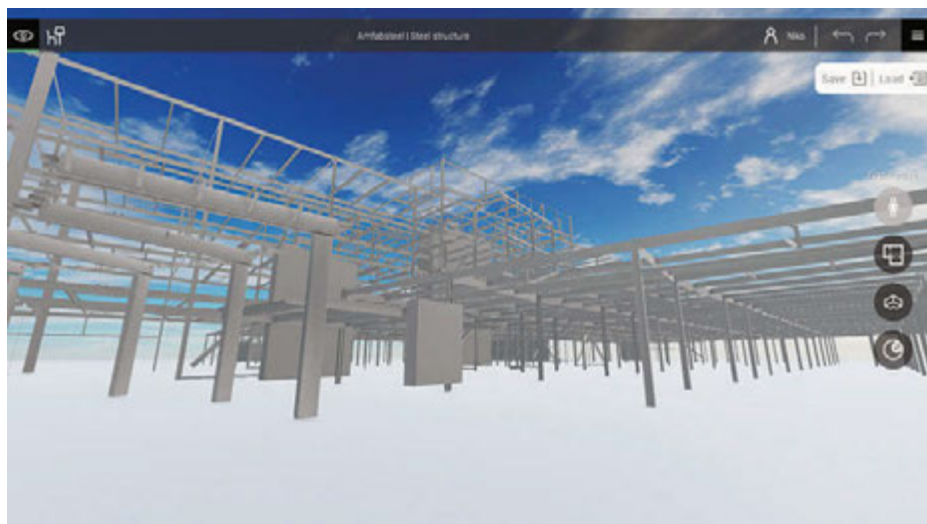
If we take the placement of a wind farm as an example, the integration of BIM and VR can allow you to position views from specific co-ordinates and accurately display how the individual turbines will look and affect their surrounding environment. Integrating other data – such as, for example, the position of the sun based on the coordinates of the location – you can track in real-time how the structure will affect the landscape throughout the year, without having to resort to generating new and expensive 3D graphics. While there have been no test cases yet, the level of accuracy provided by BIM and VR might allow you to meet legal requirements for positioning of views.

Being able to clearly visualise the scale of any construction relative to what is around it, means that even non-technical stakeholders can understand the effect of any structure on its local environment. Looking at something like the building of a dam, a single narrative 3D image will not allow the average layman to explore the impact of losing a valley in anywhere near the detail of a VR environment, whereas BIM and VR can.

We tend to think of the impact of construction purely in terms of the negative, but we should be looking at what the positives are as well. Modelling a brownfield site and then placing new infrastructure in it has a very positive impact. VR allows us to represent that environment in a way that's much easier to understand.

Bringing developments to life

There are several techniques being used to bring planned development to life, from physical landscape modelling to 3D imagery. As an extension of 3D modelling, we're seeing



BIM and VR could become a major asset for building and infrastructure construction



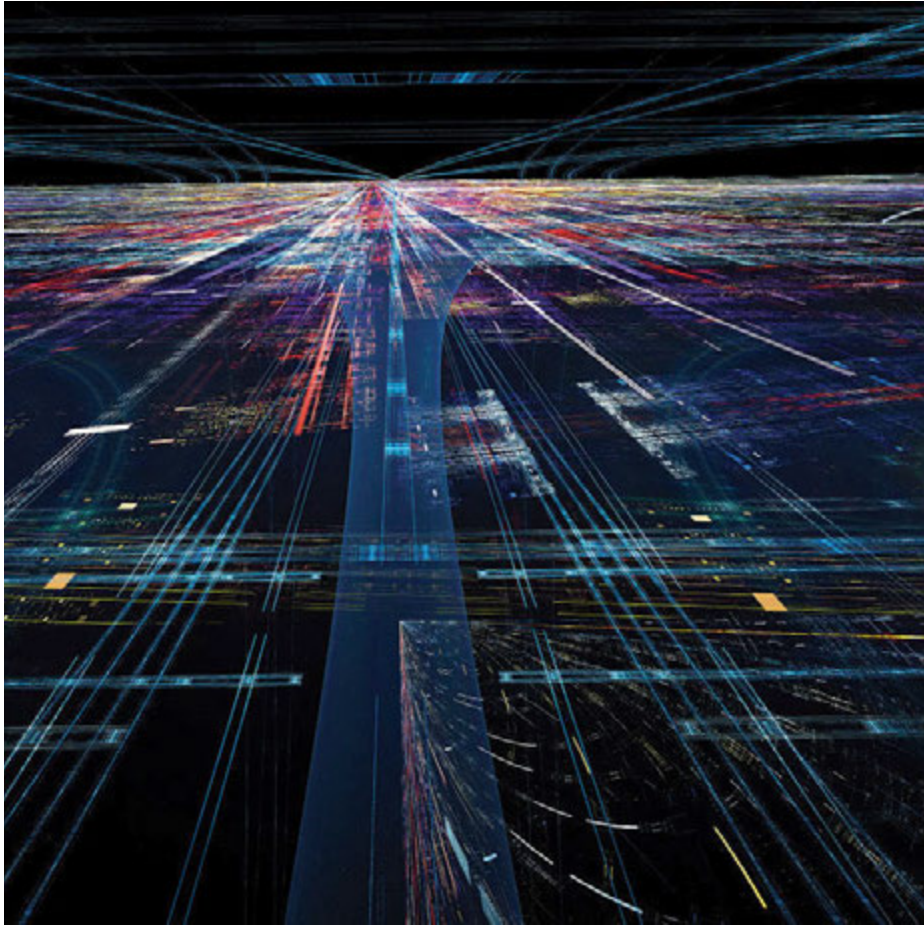
VR enables you to better visualise and display exactly what buildings and environments will look like



VR brings a flexibility not seen in other modelling methods



Advances being made in VR technology will make the process of remodelling and rebuilding easier



The integration of BIM and VR can allow you to position views from specific co-ordinates and accurately display how it will look



A building 'constructed' using BIM and virtual reality, and the resulting building in real-life

some companies creating hi-resolution building models from stereo imagery. A typical example of this might be where they have a satellite picture of an area that then has a 3D model built on top of it. Bringing these models together can produce many benefits, such as understanding traffic flow, urban planning and even flood mitigation.

Using the open interoperable format IFC, BIM data can be used on VR platforms such as Tridify, ensuring that the landscape or the structure and envelope of a building are accurate and enabling a true portrayal for the VR interactive environment. A key task is optimising and transforming the BIM data to enable it to be rendered on the VR platforms.

VR should be available on ordinary devices such as tablets or smartphones without requiring dedicated high-specification workstations that manipulate the CAD files. However, access to the underlying BIM data that provides detailed specifications may still be maintained through API access.

This whole process is resource-intensive and incredibly expensive, as well as requiring high degrees of expertise to create. Of course, on top of that, it's only as good as the data you're putting into it. There is also the issue that as soon as you make any modifications, you hit a new problem – the model becomes redundant and it is an expensive process to recreate. However, the advances being made in VR technology will make the process of remodelling and rebuilding easier.

The impact of new VR technology

There are big changes afoot in how VR models can be created and displayed. The VR companies currently creating building models are doing so on a project-basis and this can be very labour-intensive. They're also building environments on huge VR computers and these must be viewed on those computers with VR headsets, so the whole end-user experience becomes very static and limited.

By combining cloud-based technology with VR and BIM, the creation of these models will become automated. A move away from project-based VR creations to a SaaS-based approach will produce big savings in both time and money. And in a sector where projects need to be completed as quickly as possible, these factors can prove critical.

This same technology also enables these models to be modified and adapted easily, such as increasing corridor width, moving access points, adding furniture, moving lighting, colouring walls and changing flooring. But probably more importantly, these VR experiences can be viewed on any platform, including mobile devices such as smartphones and tablets.

However, this vision of how VR can change the industry is not without its challenges. This is a heavily disruptive technology that challenges areas in the architecture and construction industries across the board. The reality is that combining BIM with an automated and scalable VR platform can allow you to create plans and models faster, smarter and with higher quality. Above all, the combination of BIM and VR is a real enabler for change in the sector.

THE COMBINATION OF BIM AND VR IS A REAL ENABLER FOR CHANGE IN THE SECTOR

Nigel Alexander is business development UK at Tridify (<http://tridify.com/en/>)

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MORE THAN JUST FIELD WORK

JAKUB KARAS DISCUSSES HOW A TEAM IN THE CZECH REPUBLIC IS USING UAVS TO MAP CROPS, LOCATE LOST DRAINAGE SYSTEMS AND EVEN SAVE ANIMALS' LIVES

One of the greatest potential uses of UAVs worldwide is in agriculture. Their main advantage is the ability to deploy drones almost instantly to survey agricultural land as soon as is needed in certain weather conditions, during and after calamities such as floods and landslides, or to monitor phenophases.

UAVs also brings opportunities not only to map in the different spectral bands but at very high resolution, which was not previously not possible. These detailed maps can be used for various purposes, including landscaping projects.

Other benefits include the ability to plan flights in the field according to the situation and to explore data and imagery several minutes after landing. Surveyors can then react immediately to any discoveries from the air, and plan further mapping and monitoring from both the UAV and the ground.

In the Czech Republic, my company Upvision is collaborating with several research institutes to test new possibilities for using UAVs in agriculture. We are working with a variety of UAV types with different sensors for different applications, using unmanned planes for mapping large areas and multicopters to map and monitor smaller areas and for special applications.

In particular, there are several potential applications of UAVs in the Czech Republic for mapping and monitoring for unusual purposes in agriculture, which in the future will continually increase.

One such use is mapping the extent of damage to crops on agricultural land from wild animals or after disasters such as heavy

rains and storms. This applies particularly to large agricultural lands, where lately there has been frequent devaluation of crops by frequent storms and persistent rain. The easiest way to identify the extent of such damage is to map the exact area from a UAV and determine its status and area from a current high-resolution orthophoto.

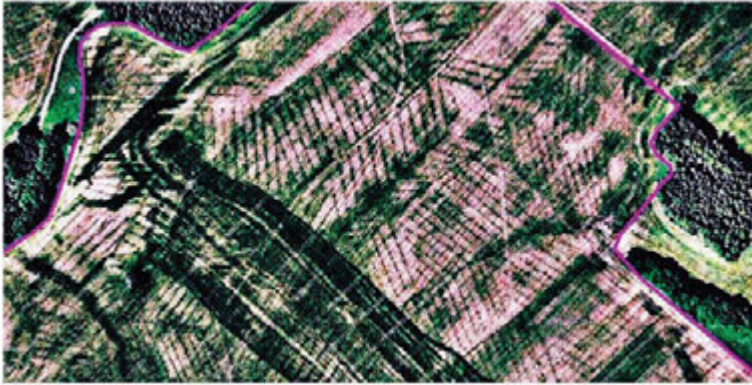
A similar application is identifying the damage to maize crops from wild pigs, where it is possible to map the area from a UAV and measure the damaged area for insurance purposes and so on.

Identify and protect animals before harvest

An interesting application is the use of UAVs to protect animals before intensive harvest, mainly of grasslands. Nowadays, modern harvesting equipment is huge and its speed is high. As a result, increasingly frequently, hidden animals are killed, mainly deer roes, which are not self-sufficient.

For more than two years now, early in the morning before the full sunrise and the harvesting of larger areas begins, we have been successfully testing the use of a UAV with a thermal camera to identify animals and record their exact GPS positions. After we've identified the animals, the farmer or gamekeeper startles them from their locations or transfers them to a safe zone.

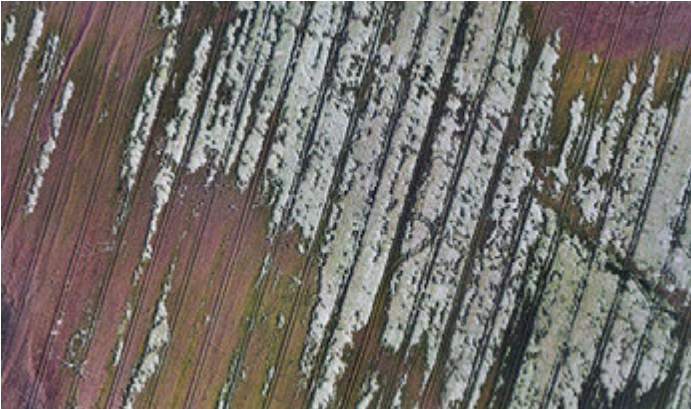
It turns out that this method is one of the best solutions for larger areas – much better than the land monitoring from a thermal imager on the ground, which isn't possible for larger areas; even preventive scaring didn't bring about the expected results.



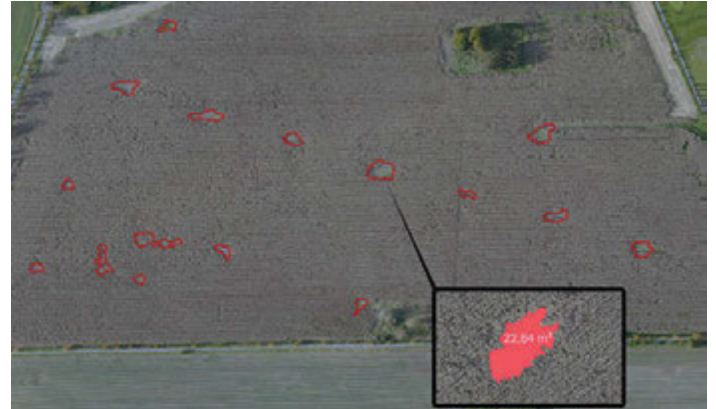
Identification of underground drainage systems from a UAV (© Upvision)



A UAV for mapping larger areas launched from the hand (© Upvision)



Agriculture land damaged by heavy rain (© Upvision)



Measuring damage to an area by wild pigs from an orthophoto taken from a UAV (© Upvision)



Thermal identification of animals from a UAV before harvest (© Upvision)



Using a UAV early in the morning to identify animals before harvest (© Upvision)

In the future, the use of UAVs to monitor fields before harvesting could save many animals' lives.

Identification of underground drainage systems

A large part of the agricultural area in the Czech Republic is on top of an underground drainage system. This system was introduced in the last century and the pipes are already at the ends of their lives, which is leading to disorders that manifest themselves directly on farmland.

Unfortunately, there is no precise documentation or maps showing how and where the system is under the fields. This means no one can maintain the system, and many owners are unaware that they even

have a drainage system under the land, even though by law they are its owners.

For the past five years, Upvision and the Czech Research institute for Soil and Water Conservation have been establishing a methodology to identify these underground drainage systems using remote sensing. We have determined that the best way to identify the system is to use UAVs to map agricultural land in certain climatic conditions. By creating an orthophoto at a specific resolution and coordinates, it is possible to create a high-resolution digital surface model on which are visible lines indicating the positions of the underground drainage pipes. By vectorising these lines in a GIS, you can obtain exact map locations of the drainage pipes several feet underground.

Conclusion

It is possible to collect geospatial data from a UAV at a lower price than from a piloted aircraft. This has resulted in the expansion of the use of remote sensing in agriculture, into areas previously no one could have imagined. In future, we can also expect a greater use of UAVs by small farmers.

THE USE OF UAVS TO MONITOR FIELDS BEFORE HARVESTING COULD SAVE MANY ANIMALS' LIVES

Jakub Karas is co-owner of Upvision (www.upvision.cz)

INTERGEO 2017 UPDATE

INTERGEO: SHAPING-UP WITH SMART TECHNOLOGIES

THE WORLD IS GETTING SMARTER BY THE DAY ... A TRANSFORMATION THAT WILL COME UNDER THE SPOTLIGHT AT THIS YEAR'S INTERGEO EXPO IN BERLIN. DANIEL KATZER REPORTS



The growing influence of the geoICT sector is clearly apparent at INTERGEO, the leading international trade fair for geodesy, geoinformation and land management. After notching up 531 exhibitors from 37 countries, more than 17,000 visitors from over 100 countries, and an international INTERGEO conference attended by 1,300 delegates in 2016, the organisers are preparing for the next stage in Berlin.

INTERGEO is where the geo IT sector meets its users. Covering the entire process chain, from data collection and analysis through to presenting and displaying results, INTERGEO is the world's number one customer event. The cross-industry dialogue, state of the art topics such as BIM, Smart Cities, UAS and Open Data and its focus on the future, make it a "must" for visitors.

Smart cities as a key topic in 2017

At the heart of the exhibition, and within the conference programme, presentations will explore how geoinformation in the Internet of Things (IoT) will shape our urban spaces. The Smart City SOLUTIONS (SCS) Forum launched last year as a vehicle for the transfer of knowledge will again highlight solutions for the smart economy, for smart governance, smart mobility, smart environment, smart people and smart living.

BIM: Digital construction and the role of geodata

The topic of Building Information Modelling/

Management (BIM) is also high on the agenda for INTERGEO 2017. BIM transfers the processes involved in planning, constructing and operating the built infrastructure into the digital world. The German Federal Ministry of Transport and Digital Infrastructure (BMVI) has adopted BIM as the standard method for infrastructure projects as part of its multi-tiered Digital Planning and Building plan. With industry bodies pressing for rapid change, BIM will be well represented, both in the exhibition halls as well as in the conference programme.

Geospatial 4.0 – information adds value

The concept of Geospatial 4.0 that emerged in tandem with Industry 4.0, has really been pushed to the fore. This year's INTERGEO shows not only that smart geoinformation and services are proving to be motors of innovation but also that more and more industries are basing their business models on the intelligent use of geoinformation.

interaerial SOLUTIONS: the sky's the limit!

The UAV sector is looking exceptionally dynamic. INTERAERIAL SOLUTIONS (iaS) that was introduced at last year's INTERGEO as a free-standing platform, attracted more than 130 exhibitors – from start-ups to global corporations.

With a burgeoning market and increased competition, a growing number

of businesses are jostling to find their own niche. In covering the entire spectrum of UAV applications, INTERGEO's IaS is the perfect medium for those companies to present their skill, whether in core tasks such as surveying, inspection and aerial photography, or in highly specialised tasks for, say, change detection or environmental monitoring.

Next stop Berlin

This year's INTERGEO will be held at Messe Berlin from 26 to 28 September 2017.

INTERGEO's continuing aim is to showcase how the potential of geo-IT can facilitate process optimisation in numerous target markets. As well as this year's event in Berlin, forthcoming venues will include the internationally-renowned exhibition cities of Frankfurt am Main (2018) and Stuttgart (2019).

DVW – German Society for Geodesy, Geoinformation and Land Management is the host of INTERGEO.

More on INTERGEO can be found at: www.intergeo.de and www.intergeo-tv.com



Daniel Katzer is

Director Trade Fairs and Conferences and project manager of INTERGEO with HINTE GmbH (www.hinte-messe.de).

TRAINING DAYS

THE LATEST EDUCATIONAL INFORMATION ON TRAINING COURSES, DISTANCE LEARNING, COMPANY TRAINING DAYS, SEMINARS AND WORKSHOPS CURRENTLY AVAILABLE. THIS SECTION WILL ALSO INCLUDE COMPETITIONS, AND STUDENT OFFERS AMONG OTHER EXCITING OPPORTUNITIES

NAZARBAYEV UNIVERSITY TO ADD MICROMINE TRAINING

Micromine Central Asia and the School of Mining and Geosciences at Nazarbayev University in Kazakhstan have signed a memorandum of understanding which aims to incorporate Micromine's mining solutions into the education and training for students at Nazarbayev.

Established last year, the School of Mining and Geosciences aims to be the premier school for earth science education and research in Kazakhstan, and wants to develop Kazakhstan's natural resource industry to be internationally recognised as safe, efficient and environmentally responsible through the education of the next generation of students.

Micromine business development manager, Erick Kanaev commented: "Our agreement with Nazarbayev University is exciting and we look forward to

educating students using our software.

We hope that through this partnership the students will learn to develop Kazakhstan's natural resource industry to become internationally recognised."

Through this academic agreement, Micromine plans to deliver training to students and provide their mining solutions for use in various resource projects conducted by the university. The next part of the agreement involves a class being taught at the university using the Micromine software. The class is expected to be opened for participation in late 2017.

"We are pleased to be bringing a class to the university as we believe it will provide students with a higher level of education that they can use for research in their projects," added Kanaev.

NEW TRIMBLE TECHNOLOGY LAB GIFT TO UMASS AMHERST

A significant in-kind gift from Trimble will expand the University of Massachusetts Amherst's leadership in training and research in 3D building design, digital fabrication and the sustainable built environment by establishing the 1,300-square-foot Trimble Technology Lab in the new Design Building at UMass Amherst.

The lab will include equipment such as Trimble's laser scanners, robotic surveying systems, imaging rovers, GNSS receivers and software including RealWorks, Trimble Business Center, Vico Office Suite, GCEstimator Suite, Tekla Structures, Sefaira Architecture and SketchUp Pro.

The Trimble Technology Lab will tie into existing 'makerspace' on campus to encourage experimentation, rapid prototyping, entrepreneurship and fabrication spaces.

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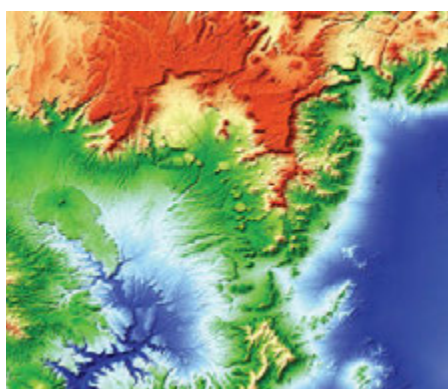
Contents

March/April 2017
VOLUME 15 // ISSUE 2

SATELLITE IMAGERY

48. The right imagery for the job

There has never been such an abundance of satellite imagery and elevation data. It can, however, pose challenges in knowing where to start in selecting the right imagery for the job. NPA Satellite Mapping's Charlotte Bishop reviews the evolution of the market and the options now on offer



HIGHWAYS

51. Working together for a better roads network

The challenges facing those who manage our highways infrastructure are already immense and continue to grow. So how can collaboration make a difference? Nick Smee is confident it can, and explains why



Departments & listing

- 45. Top Ten News
- 52. Modern Surveying
- 54. AGI News

VEHICLE TELEMATICS

56. Putting the brake on 'Britain's most unloved drivers'

Alan Plumley takes to the road to find the nation's most disliked motorists and how vehicle telematics can change their behaviour



SPATIAL DATA COLLECTION

58. The rise of the mobile cartographer

In today's connected world, we are all producers and disseminators of cartography, often without realising it. How others use it could well improve our experience as consumers and our quality of life as citizens. Jordi Estrada addresses the benefits ... and the pitfalls



EVENTS

61. Our roundup of this year's Defence Geospatial Intelligence (DGI) event and the Yotta Customer Conference, plus a preview of the upcoming Ocean Business event in Southampton

Events listing can now be found on
www.geoconnexion.com



ENVITIA Launches MapLink Pro 10.0

ENVITIA is proud to announce the release of the next generation of **MapLink Pro** centered around the theme of **speed**. Speed in visualisation of dynamic data, speed in the manipulation of complex spatial data and speed to market. **MapLink Pro 10.0** is a powerful suite of SDKs that provides users with the ability to embed high performance mapping and visualisation capabilities for mission critical systems. MapLink Pro is a toolkit optimised for visualisation of and interaction with geospatial data. It provides support for a range of mapping capabilities, specialising in Terrain Analysis, 3D Visualisation, Track Object and Geometry Manipulation, and Cloud-Based GEOINT Delivery. MapLink Pro has more than 10,000 deployed systems worldwide and is the geospatial toolkit of choice for the world's leading System Integrators. www.envitia.com

1Spatial & National Trust Streamline Agricultural Grant Process

When the **National Trust** migrated to ArcGIS recently, **1Spatial** supplied **Geocortex Essentials** as a solution for creating custom applications on top of the ArcGIS platform. With consultancy services from 1Spatial, the National Trust created a solution that has significantly streamlined its data collection and validation process for agricultural grant applications. **Conservation Core Data Lead, Chris Cawser**, says "We are placing total control of data verification in the hands of the staff who have the knowledge about what is being collected. The whole data collection experience has improved massively for site monitors and it's been really positively received. The use of Geocortex Essentials means we now avoid the 'Are you sure this is correct?' phone calls, which saves everyone's time and reduces frustration." www.1spatial.com

RGS-IBG and AGI announce strategic alliance

The **Royal Geographical Society** (with **IBG**) and the **Association for Geographic Information** announce a strategic alliance, working closely together to advance the understanding and use of geographic information. Together they will provide a stronger voice for professional geography in areas and with audiences who can benefit from a better understanding of the roles geographic information and associated technologies, and from using location intelligence, geospatial data analytics and data integration. The approach will be one of championing the increased use of geographic information to raise awareness, change behaviours, influence market growth, and inform business, policy and community decisions. www.rgs.org www.agi.org.uk



Peter
Fitzgibbon,
Editor

Ready for a new reality?

The arrival of Microsoft's HoloLens Development Edition headset for the UK market takes us a step closer to making Augmented Reality (AR) a practical proposition for the enterprise - as distinct to consumer games - market.

While some have commented on the restricted Field of View of this first self-contained, holographic computer, there is general agreement that the quality of the wearable device and its freedom from a trailing umbilical (thanks to an inbuilt custom GPU) represents a breakthrough in both form and function.

A pre-order price tag of £2,719 may limit its uptake, but for AEC and GIS professionals the HoloLens opens up a world of possibilities for exploring part-real, part-virtual physical environments, whether cityscape, engineering design or elevation model. It may not have quite the same wow factor as entering a room-sized immersive 3D visualisation system such as that pioneered at the University of Illinois in the early 1990s. But it is certainly more usable - and several millions of pounds cheaper.

Of course, its commercial success will depend on content and some go largely free holographic applications are already on offer via the Microsoft Store. In the AEC sector, Trimble and Hexagon have been quick off the mark to exploit and demonstrate the technology, the former for its lifecycle Design-Build-Operate solutions and the latter for Intergraph's next-generation Process, Power & Marine modelling software.

Leica, too, has been busy with a joint HoloLens and Autodesk Fusion 360 project that targets engineering and industrial design, while Esri demonstrated the use of ArcGIS Runtime with HoloLens to an appreciative audience at last year's World User Conference. As Esri's Adrien Meriaux noted, the technology is not simply about the personal experience of interacting with a model, but rather its potential for sharing and collaborating with others.

Analysts forecast that AR revenues will hit US\$120 billion by 2020 and this could be down to the finding of one report that 67% of businesses are considering using AR in the future, while 47% are considering VR for the future. It looks like it will change everything in our lives in a few years' time, but it's starting now.



Lorry drivers must use commercial satnavs, say councils

All lorry drivers who use satnavs should be compelled to use commercial models say councils – following a fresh catalogue of chaos on the nation's roads. The **Local Government Association (LGA)**, which represents more than 370 councils in England and Wales, says that while the majority of lorry drivers are reputable and responsible, a minority cut corners by using cheaper satnavs designed for cars. Villages and rural communities across the country have been blighted by a recent spate of lorry smashes. Lorry satnavs are like normal car satnavs, but they include bridge heights, narrow roads, and roads unsuitable for trucks. In addition, they allow the driver to enter the lorry's dimensions - height, width, weight and load – so they are only guided along suitable roads. www.local.gov.uk

Surrey Heath Council Explore the Versatility of the Arrow 100.

Surrey Heath Borough Council has found their current GIS kit is proving to be more versatile than expected! The team at based in Camberley in Surrey has been successfully using the **Eos Positioning Systems Arrow 100** to capture grounds maintenance data after it was recommended by Eos's exclusive UK distributor **MGISS** just over a year ago. They wanted to be able to manage their grounds maintenance more effectively and finding new ways of achieving this in a way that saves money and manpower is always advantageous to local authorities many of which now share services with other councils which have to consider the spend comes out of the taxpayer's pocket. www.mgiss.co.uk

Bluesky and Bird.i Join Forces to Widen Access to Aerial Imagery

Bluesky has signed a strategic partnership agreement with **Bird.i** to provide online, instantaneous visualisation of its high-resolution aerial imagery. Bluesky has created and maintains the highest resolution, most up to date and accurate nationwide archive of aerial images in the UK. Established in 2016, Bird.i has developed a unique platform for accessing satellite, airborne and UAV imagery with a plug and play API that works within mapping and location based applications. The agreement between the two companies will give subscribers to Bird.i's easy to use API the ability to integrate Bluesky's high quality aerial images within their existing mapping applications and location based services. www.bluesky-world.com www.hibirdi.com



3D Repo BIM App helps Crossrail Digitally Manage Assets

3D Repo has started development on a unique mobile platform for **Crossrail** designed to manage maintainable assets. The cloud-based innovation by 3D Repo brings together previously disparate databases and information sources to provide on-site, instant access, to both historical and real-time information. Working with Crossrail, 3D Repo has demonstrated integration between information already held within asset lifecycle information management software. 3D Repo's mobile platform will also let project managers, maintenance personnel and stakeholders access different 3D views of an asset allowing them to select information that is most relevant to them for the purposes of installation, snagging and commissioning. www.3drepo.org

New Ordnance Survey Champion, Ben Fogle, urges nation to GetOutside

Adventurer, author and broadcaster **Ben Fogle**, is **Ordnance Survey's** newest **Champion**, and is supporting OS in tackling the challenge of helping Britain become a more outdoorsy and adventurous nation. Ben links up with current OS Champion, the endurance adventurer **Sean Conway**. Ben's not the only new face to OS's campaign. He and Sean are joined by 35 regional OS Champions, who are also tasked with motivating the public to GetOutside. Ben, chosen by OS for his obvious love for the open-air, says: "There are some truly remarkable and inspirational people in this group, and it is an honour and delight to be joining them for what I think is an important campaign, making the outdoors enjoyable, accessible and safe." www.os.uk



Masternaut appoints Olivier Mansard as Vice President of Global Sales

Olivier Mansard has joined **Masternaut** from SAP France, where he was Head of Cloud and Line of Business. Olivier's appointment comes at a time when Masternaut is rapidly expanding its customer service, sales and marketing teams by promoting internally and attracting top international talent from outside the business. Masternaut also boasts the largest R&D team in Europe, which has doubled in size over the last year in order to create new, innovative telematics developments ahead of the rest of the industry. **Dhruv Parekh, CEO, Masternaut** commented, "Olivier is an exciting addition to the Masternaut family who brings with him a wealth of experience in leading international sales organisations, at a time when we are aggressively expanding." www.masternaut.com

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The right imagery for the job

Mountain peaks and valley floors across the globe can now be seen with an accuracy of just one metre thanks to a new 3D map created from radar imagery as part of the TanDEM-X satellite mission. Approximately 150 million square kilometres of land surface were scanned from space by two satellites orbiting in close formation. Imagery © DLR

There has never been such an abundance of satellite imagery and elevation data. It can, however, pose challenges in knowing where to start in selecting the right imagery for the job. NPA Satellite Mapping's Charlotte Bishop reviews the evolution of the market and the options now on offer

When NPA Satellite Mapping was founded 45 years ago it initially focused on the application of satellite imagery for geological exploration before growing to become a leading independent supplier of satellite data and derived solutions to a global client base across a range of market sectors including oil & gas, mining, engineering, environment and defence. It is therefore a fitting moment to look back and consider the numerous 'revolutions' that have occurred within the satellite imagery market and how these changes impact the decisions we can now make in selecting and exploiting the optimum data set.

Lift-off

Most specialists would agree that the first revolution was the launch of Landsat-1, initially known as ERTS-1, in 1972, which was the first commercially available satellite mission.

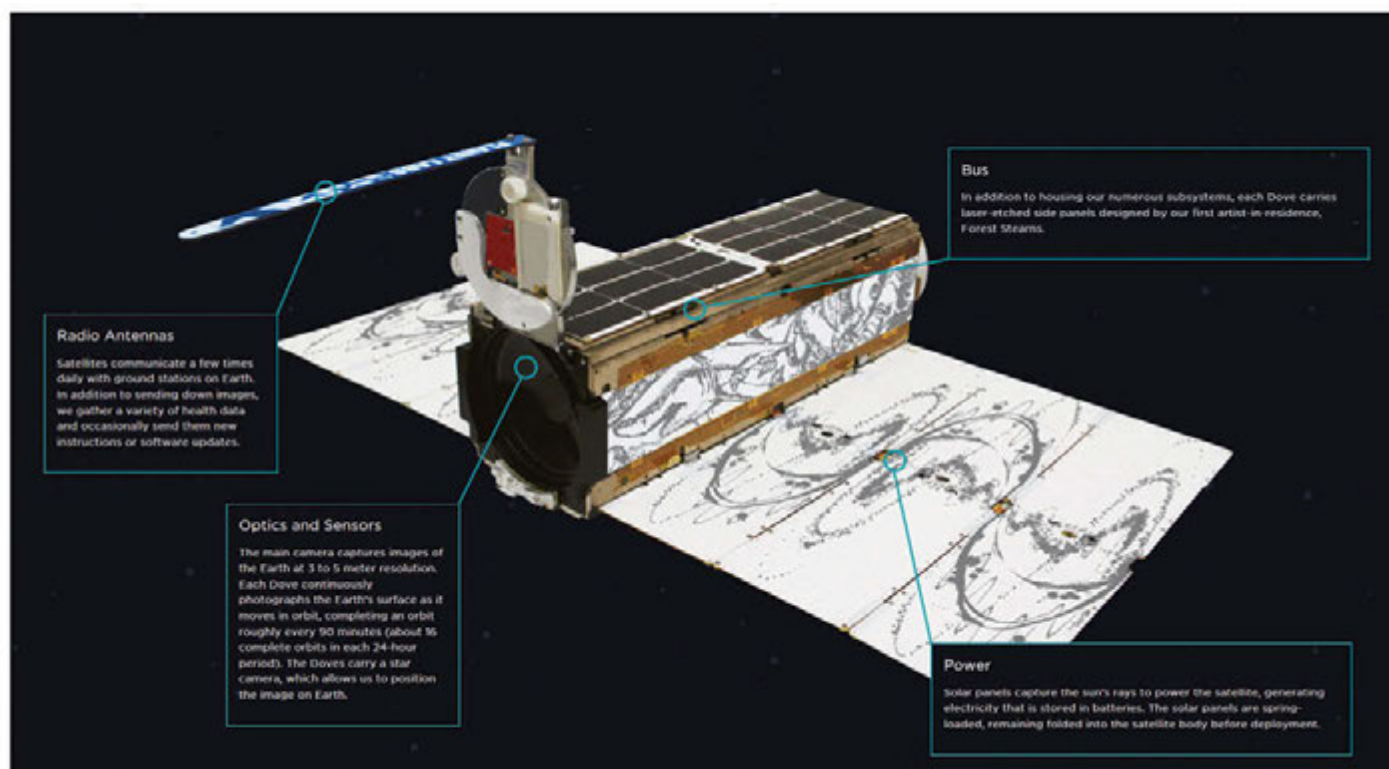
The series is now on its eighth satellite and, with plans for the launch of Landsat-9 in 2023, continues to highlight the value of its medium spatial resolution multi-spectral imagery that is now publicly available. To this day, Landsat still provides the backbone to numerous remote sensing applications thanks to its unrivalled historical archive and fixed 16-day revisit period.

The next revolution was the launch of the first operational Synthetic Aperture Radar (SAR) satellite mission following the success of SEASAT in the 1970s. SAR had the advantage of providing all-weather, day/night imaging capabilities. ERS-1, operated by ESA (European Space Agency), was launched in 1991 and its data acquisition strategy resulted in a significant global archive that continues to be exploited as part of historical assessments. Long-term C-band radar continuity was subsequently provided by ERS-2 (1995), ENVISAT (2002) and, more recently, Sentinel-1A/1B (2014/2016).

Aiming higher

At this early stage, the skies were largely dominated by lower spatial resolution satellite missions but diversity was creeping in with the availability of both optical and radar systems. It wasn't until 1999, and the launch of IKONOS-2, that the first commercial Very High Resolution (VHR) optical satellite successfully reached orbit and imaged the world at a resolution better than a 10 m pixel.

A ground-breaking satellite of its age, it acquired imagery at 80 cm (panchromatic) and 3.6 m (multispectral) spatial resolution and became a workhorse for detailed mapping for the next 16 years.



Planet's constellation of Dove CubeSat small satellites are launched in Flocks to provide a whole-Earth dataset. Image Planet

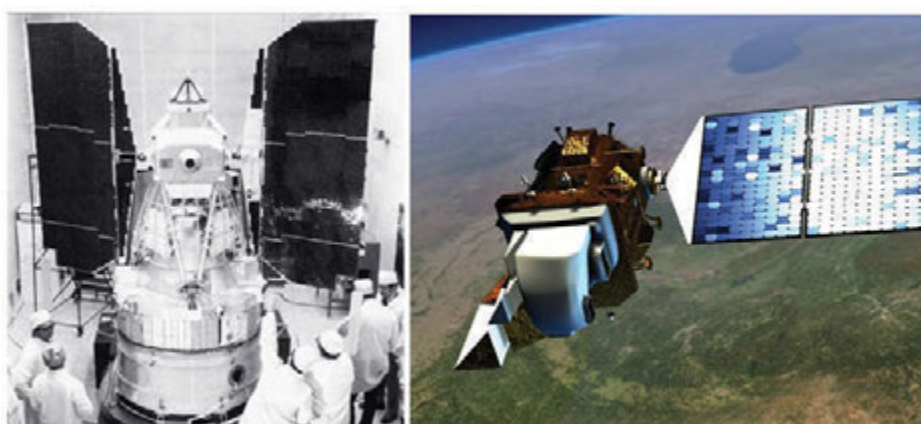
IKONOS-2 marked the start of many similar missions including Quickbird-2, Worldview, Kompsat, and Pleiades, to name but a few.

Another revolution, occurring in parallel with IKONOS-2, focused on increasing the spectral resolution (more spectral bands) of satellites to widen the range of information that could be discriminated from an image. ASTER, launched by NASA in late 1999, was the first satellite with this increased spectral range. Building on the Landsat spectral resolution, it had increased capabilities in the visible, short-wave and thermal portions of the electromagnetic spectrum and is, to this day, unmatched by any other spaceborne multispectral sensor.

Not all the advances were in the optical domain. TerraSAR-X and COSMO-SkyMed, launched within days of each other in June 2007, were the first X-band SAR missions capable of acquiring high spatial resolution data. This technology not only led to daily SAR acquisition capabilities as part of the COSMO-SkyMed constellation but also the generation of the WorldDEM global elevation product with a 12m grid derived from TerraSAR-X and its twin, TanDEM-X.

Relaxing the rules

For optical satellites, the next challenge was to improve spatial resolution still further. Worldview-3 was the first - and currently the only - satellite capable of collecting imagery at 30-cm spatial resolution. Launched in 2015, it prompted a relaxation of US Government restrictions by giving the commercial market access to 25 cm resolution imagery (the previous limit being



Left: The first Landsat satellite - ERTS-1 and, Right: an artist's impression of the next satellite in the series - Landsat-9. Imagery: NASA

50 cm). Coupled with the increased spectral capabilities of its visible and shortwave sensor, it offers the balance of highly detailed mapping and increased feature extraction capabilities.

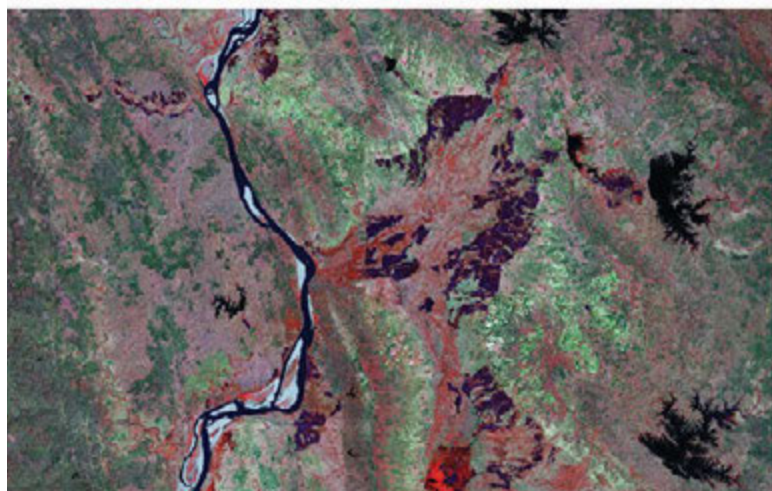
Although not a direct technological advancement, open access data is a revolution in itself and one that has brought significant benefits. The United States Geophysical Survey was the first to make all of its data freely available in the late 2000s leading, in turn, to an exponential increase in the usage of its data. Subsequently, the European Space Agency, with its extensive archive of Synthetic Aperture Radar data, followed suit, setting the baseline for Sentinel. This satellite constellation, with various capabilities, is now providing data quickly and robustly to support the European 'Copernicus' programme. Making data open access not only makes it more accessible, but

also encourages research and development. This, in turn, encourages new products and services into the marketplace.

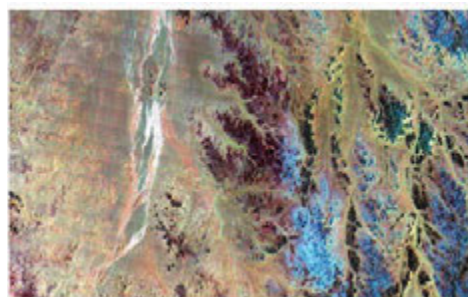
Smallsat boom

The current revolution is the boom in constellations of small satellites such as Planet's Doves. These missions, typically flown by innovative new operators, seek to improve temporal collection to never-before-seen levels at a fraction of the cost of the larger commercial missions, while also challenging how we ingest and use that data in new and novel ways.

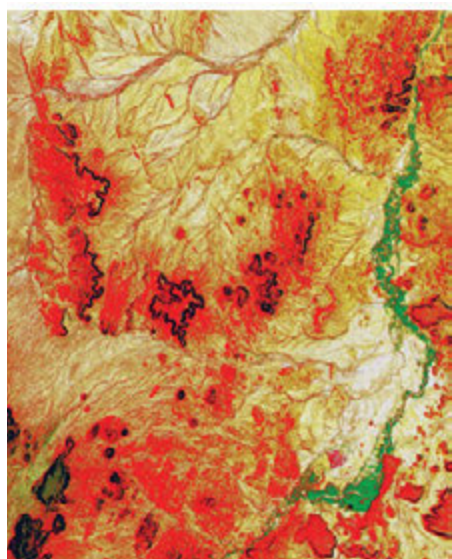
These historical and contemporary satellite imagery revolutions now put us in an enviable position, with many missions, offering numerous, varied capabilities. However, this diversity of options makes for a complex landscape where determining the optimal image purchasing solution can be



Pleiades 50 cm resolution product (left); SPOT-6 1.5 m resolution imagery (right). Pleiades products ©CNES 2013, distributed by Airbus DS and SPOT6 Imagery ©Airbus DS 2013.



Landsat colour composite to highlight geological features in Yemen (left); SIR-C SAR composite imagery over the same area (right). Landsat Imagery ©USGS and SIR-C ©NASA.



Combining optical, SAR and elevation data to assess trafficability. Interpretation ©CGG | NPA Satellite Mapping. Landsat and SRTM Data available from the U.S. Geological Survey, ALOS-1 Palsar data ©JAXA/METI 2009

difficult. It invariably involves a compromise between multiple factors, both technical, economic and intended end use. However, some key considerations can help with the selection. These include the following:

Image timing and date

For some applications, the most recent image may be the most important requirement. In others, a time-series may be required whereby satellite constellations can be exploited for both historical and ongoing monitoring. This can be particularly important in areas that are variable due to seasonal change or undergoing extensive development. For such applications, using a single image may not provide a truly representative view or provide sufficient context for analysis.

Spatial resolution

A 30-cm image will provide an extremely high level of detail but the tradeoff is that it covers only a small area and can be a costly

Above left: Dry season imagery over an area showing the variability in land cover. Right: wet season imagery showing the increased extent of vegetation (shown in red). Landsat Imagery ©USGS

option. Depending on the required mapping scale, a slightly lower resolution, even down to 1.5 m, can provide sufficient detail to derive a 1:10,000 map with the advantage that it covers an area three times the width of a 30-cm image.

Sensor type

Deciding whether to use an optical or SAR sensor, or a combination of both, comes down to a number of factors. An optical sensor, which relies on the reflectance properties of surface features, only operates during the daytime and its applicability can be severely limited in some areas due to cloud cover and haze. SAR, an active sensor, is capable of imaging through clouds during both day and night. In certain situations, SAR can provide some ground penetration, which may also provide useful information on shallow subsurface features.

The 'textural' information from SAR and the 'spectral' information from optical has specific value for different types of projects, and combining them can provide additional insight beyond that available from either used in isolation.

Exciting prospect

Today, we can do far more with satellite data than we ever imagined possible 45 years ago, so what tomorrow could bring is a very exciting prospect. With its extensive applied satellite remote sensing experience, long-term relationships with satellite operators, and independent supplier status, NPA Satellite Mapping offers a simple, impartial entry point into the increasingly complex world of satellite imagery. Selecting the right imagery is the critical first step to unlocking actionable information.

Charlotte Bishop is Remote Sensing Projects Manager with, NPA Satellite Mapping, CGG (<http://www.cgg.com/en/What-We-Do/GeoConsulting/NPA>)



Nick Smee is CEO of Yotta, the Leamington Spa-based infrastructure asset management specialists (www.yotta.co.uk)

Working together for a better roads network

The challenges facing those who manage our highways infrastructure are already immense and continue to grow. So how can collaboration make a difference? Nick Smee is confident it can, and explains why

The challenges are legion: funding is in general decline; investment in repairs and maintenance looks unlikely to increase for the foreseeable future, and a sizeable proportion of the public feel their local road network is in decline. And all against a backdrop of increasing vehicle numbers and road usage.

To counter these trends, we are seeing the introduction of new technologies such as strategic asset management, an increasing willingness to embrace innovation, and a growing use of predictive analytics. These are positive developments. However, maximising their value could involve a step-change in thinking for those managing our highways.

Making more sense

Instead of going it alone, it would make more sense for them to work collaboratively. They need to start tapping into the expertise and enhanced operational efficiencies that working closely with the supply chain, technology solutions providers and academic research departments can bring. This might be to share new concepts and technologies, or to develop formal working partnerships.

While better communication with road users is vital, collaboration and engagement with the wider supply chain and third party technology providers could be just as important in achieving this critical end goal.

Unfortunately, the way that government funding is allocated frequently works against this. The 100% retention of business rates by local authorities means that many councils will be operating in their own devolved areas raising their own money and using it how they see fit.

Broader engagement

At the same time, collaboration is still in its earliest stages across the sector. Providers working with consultants, clients with contractors, contractors working together – these relationships remain patchy and inconsistent. There is a need for broader engagement between councils and the wider supply chain – with asset management technology providers and indeed with academia in the form of university research departments.



The Government's five-year programme of work to deliver the £15bn Road Investment Strategy will call for ever-closer collaboration between all those involved

The collaborative approach needs to start at the project planning phase. Typically, there is a tendency to first select the team and then decide on the project objectives. But, doing this in reverse is more logical and encourages better collaboration. So starting with the end objective and then selecting the cross-organisational team best placed to achieve the required outcome could be a more sensible move.

Untapped talent

Often, today's asset management projects fail to tap into a broader ecosystem of expertise that draws on talent pools outside the main team. Much can be gained by making use of the expertise and understanding being developed in university research departments; or by working with other authorities to share technology and ideas, or even by closely engaging with government to gain a better understanding of how to tap into new funding sources.

Of course, this all needs a catalyst to make it happen – and this must involve increasing investment in training, finance and skills. But in turn these can be shared out across a selection of councils, all helping to build up best practice across the network.



Andy Beckerson is Director of Business Development at KOREC (www.korecgroup.com) and can be contacted by email at andrew.beckerson@korecgroup.com

Broadening Horizons 2

In making the case for customised workflows, Andy Beckerson concurs with the argument that 'If you can't get the best possible result, get the best result possible'



Towards a single source of truth. Customised workflows aid collaborative working. Photo: Syda Productions / Shutterstock

In my last column 'Broadening Horizons' it seemed fitting to start 2017 with something as fresh and new as the year itself: a look at how a GNSS (GPS and Galileo) receiver built out of software is poised to make GNSS data collection a mass market reality. Continuing with the theme of broadening horizons, I'd like to use this month's column to take a closer look at how customised workflows can bring new business.

Working together

Sensible workflows enable you to manage a process better, specifically by involving all those concerned in a project. If we asked a number of people how they currently work and collaborate on a project, many would be utilising email for making comments and

suggestions to improve delivery or resolve a problem and, of course, for sending large files in different formats via some file sharing application. Indeed, email and file sharing systems are very useful, but when working on a project that has several stakeholders, all working in various file formats, are they the best solutions available?

If we think about the construction industry where a typical project might involve engineers, architects, structural engineers and contractors all working with different file formats and different software programs, all with the aim of delivering the best possible result for the client, email and file sharing don't work – they don't help collaboration.

When collaborating, a perfect workflow could eliminate rework or site revisits; it will probably eliminate paper; it will save time in

both the field and office, and it makes for a more motivated workforce and a more engaged group of stakeholders. But how do we develop a perfect workflow?

Single source of truth

One description of a workflow might be “a single system that breaks down industry, application and professional ‘silos’ to produce a ‘single source of truth’”.

This ‘single source of truth’ should come about by the various stakeholders on a project being able to collaborate, publish, view, comment and communicate, using a bi-directional approach where everybody’s input is visible to everybody else. The involvement of all the parties on a project is the critical collaboration required to reach the end goal, or the best possible result for the client.

But what do we need to build this ‘system of collaboration’ and what are the requirements?

- It must be agnostic because data can come from many sources
- It must be secure because nobody will trust a workflow that allows others to compromise ‘the single source of truth’
- It must be simple otherwise it won’t get used
- The technology that accesses the workflow must be current and recognise that not everybody involved is a technology expert

- It must be accessible by all stakeholders, wherever they are, therefore it has to be in the cloud.

A useful example would be something like Trimble Connect, an easy to use tool designed to improve construction project collaboration. It can be accessed with desktop, mobile or web to view, share and access project information. It provides clarity to the work at hand and can be used anywhere, anytime.



Business builder

So how does a perfect workflow bring you more business? Well, simply, it serves your clients better. You demonstrate technology leadership by using technology that allows

you to bring projects in on time and to budget reinforcing client confidence. You can share budgets, schedules and contingencies and it allows you to identify potential risks and take corrective action if required before the risks become problems. Access to the workflow enables you to make better business decisions and to ‘work’ a problem not guess at it.

In addition, a workflow allows team members to focus on effectively delivering the project with the most current information - ‘the source of truth’. With more time focused on the project, managers can more effectively manage the project rather than manage the data and better project management should improve customer delivery and heighten customer expectation.

Improved delivery will add value to your customers and heightened expectation will distinguish you from your competitors. Within your own organisation, by standardising on workflows, you reduce costs and training requirements which, in turn, further speeds delivery to your customer, saves you time, makes you more competitive, allows you to win more work, and improves your ROI.

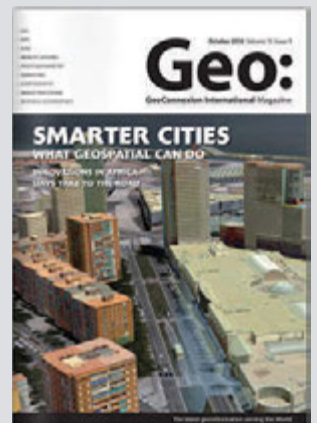
So that’s a perfect workflow in a perfect world, but whoever said “If you can’t get the best possible result, get the best result possible” had a wise head indeed!

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Graham Wallace is Business Strategist at ESRI and recent Vice-Chair of the Association for Geographic Information (www.agi.org.uk)

Collaborative working and the implications for GI business models

Graham Wallace looks at how the AGI's Foresight Report 2020 provides the sector with both challenges and opportunities

The purpose of the report (five years on from the last Foresight study 'The UK Geospatial Industry in 2015' published in 2010) is to act as a reference document. It both observes – and as necessary – challenges the current role of GI in relation to these key issues. It promotes the future role the GI sector should play in these areas and what needs to be done to realise this.

Collaboration was a theme which was examined in many of the submissions. There was broad agreement that in order to become more effective, GI practitioners need to extend their reach into organisations and move beyond being a specialist.



Foresight Report 2020 both observes and challenges the current role of Geographic Information on issues that the AGI believes will have a significant impact on our economy, environment and society over the next five years

Operational reality

Sarah Hitchcock's (GeoLytx) assessment of the potential for GI in the Retail market holds good for many other sectors. Her view is that "Retailers have long acknowledged that a web based system with one version of data that can be accessed by all is a key requirement." She goes on to suggest that, "By 2020 most of the largest retailers will have established a web portal that allows access to all users, effectively linking property, marketing, on-line and location planning colleagues." In other words collaborative working will have become the operational reality within large organisations.

The implications of this are perhaps more far-reaching than many people would expect as her conclusion is that "The majority of colleagues will use web-based systems and a dedicated resource will have the full blown desktop or advanced ETL tool". So her view is that in 2020 there will still be a place for desktop GIS, but the reasons for buying them or using them will be limited.



'A web-based system with one version of data that can be accessed by all is a key requirement' – Sarah Hitchcock

This point was emphasised by Gareth Smith of Exprodat in his assessment of the use of GI in the Oil & Gas industry over the next five years. Gareth endorses the view that the way forward is a Platform led approach where data capture from multiple sources, covering web, mobile and ERP systems can and should be shared

in line with agreed security permissions to maximise the benefits of “One source of truth” supported by web based access for large numbers of users, with a core of super users responsible for assembling, analysing and distributing information.



Endorsing the platform-led ‘One source of truth’ approach – Gareth Smith

Datamart

A market development that may well come to fruition within the GI industry over the next five years is the emergence of a “Datamart” led business. A wide variety of mobile apps already deploy the technology to support this type of business model.

For example, entertainment guides that combine restaurant guides, film schedules, details of concerts and community events are all underpinned by programmes that “split” or apportion revenues from each customer visit depending on the services accessed. Although each visit may only be worth pence and the apportionment to each vendor may be measured in fractions of pence, the key to the business model lies in driving traffic to the site and maximising usage and return visits.

Our many contributors considered different dimensions of “collaborative working”, spanning data sharing, organisational collaboration and trends in procurement, data monetisation and SaaS solutions. When we consider that the latest Plimsoll Report on the GI industry¹ highlights that around one third of the GI companies analysed are either generating low growth or delivering low profitability then it’s likely that all of these factors will shape our industry over the next five years.

The net result is that these are likely to encourage changes in the business models of a significant proportion of GI companies: riding the wave of change may appear to be an option – but it’s more likely that developments in collaborative working will re-shape the industry – with some companies struggling whilst others embrace progress.

To see a summary of the report or to download the full version, please go to www.agi.org.uk/foresight

‘The latest Plimsoll Analysis – Geographical Information Systems, was published last month (February) and assesses, values and rates the 89 largest companies in the industry on their attractiveness for takeover. (https://www.plimsoll.co.uk/market-reports/geographical_information_systems)

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182D, 183D, 184D, 185D, 186D, 187D, 188D, 189D, 190D, 191D, 192D, 193D, 194D, 195D, 196D, 197D, 198D, 199D, 200D, 201D, 202D, 203D, 204D, 205D, 206D, 207D, 208D, 209D, 210D, 211D, 212D, 213D, 214D, 215D, 216D, 217D, 218D, 219D, 220D, 221D, 222D, 223D, 224D, 225D, 226D, 227D, 228D, 229D, 230D, 231D, 232D, 233D, 234D, 235D, 236D, 237D, 238D, 239D, 240D, 241D, 242D, 243D, 244D, 245D, 246D, 247D, 248D, 249D, 250D, 251D, 252D, 253D, 254D, 255D, 256D, 257D, 258D, 259D, 260D, 261D, 262D, 263D, 264D, 265D, 266D, 267D, 268D, 269D, 270D, 271D, 272D, 273D, 274D, 275D, 276D, 277D, 278D, 279D, 280D, 281D, 282D, 283D, 284D, 285D, 286D, 287D, 288D, 289D, 290D, 291D, 292D, 293D, 294D, 295D, 296D, 297D, 298D, 299D, 300D, 301D, 302D, 303D, 304D, 305D, 306D, 307D, 308D, 309D, 310D, 311D, 312D, 313D, 314D, 315D, 316D, 317D, 318D, 319D, 320D, 321D, 322D, 323D, 324D, 325D, 326D, 327D, 328D, 329D, 330D, 331D, 332D, 333D, 334D, 335D, 336D, 337D, 338D, 339D, 340D, 341D, 342D, 343D, 344D, 345D, 346D, 347D, 348D, 349D, 350D, 351D, 352D, 353D, 354D, 355D, 356D, 357D, 358D, 359D, 360D, 361D, 362D, 363D, 364D, 365D, 366D, 367D, 368D, 369D, 370D, 371D, 372D, 373D, 374D, 375D, 376D, 377D, 378D, 379D, 380D, 381D, 382D, 383D, 384D, 385D, 386D, 387D, 388D, 389D, 390D, 391D, 392D, 393D, 394D, 395D, 396D, 397D, 398D, 399D, 400D, 401D, 402D, 403D, 404D, 405D, 406D, 407D, 408D, 409D, 410D, 411D, 412D, 413D, 414D, 415D, 416D, 417D, 418D, 419D, 420D, 421D, 422D, 423D, 424D, 425D, 426D, 427D, 428D, 429D, 430D, 431D, 432D, 433D, 434D, 435D, 436D, 437D, 438D, 439D, 440D, 441D, 442D, 443D, 444D, 445D, 446D, 447D, 448D, 449D, 450D, 451D, 452D, 453D, 454D, 455D, 456D, 457D, 458D, 459D, 460D, 461D, 462D, 463D, 464D, 465D, 466D, 467D, 468D, 469D, 470D, 471D, 472D, 473D, 474D, 475D, 476D, 477D, 478D, 479D, 480D, 481D, 482D, 483D, 484D, 485D, 486D, 487D, 488D, 489D, 490D, 491D, 492D, 493D, 494D, 495D, 496D, 497D, 498D, 499D, 500D, 501D, 502D, 503D, 504D, 505D, 506D, 507D, 508D, 509D, 510D, 511D, 512D, 513D, 514D, 515D, 516D, 517D, 518D, 519D, 520D, 521D, 522D, 523D, 524D, 525D, 526D, 527D, 528D, 529D, 530D, 531D, 532D, 533D, 534D, 535D, 536D, 537D, 538D, 539D, 540D, 541D, 542D, 543D, 544D, 545D, 546D, 547D, 548D, 549D, 550D, 551D, 552D, 553D, 554D, 555D, 556D, 557D, 558D, 559D, 560D, 561D, 562D, 563D, 564D, 565D, 566D, 567D, 568D, 569D, 570D, 571D, 572D, 573D, 574D, 575D, 576D, 577D, 578D, 579D, 580D, 581D, 582D, 583D, 584D, 585D, 586D, 587D, 588D, 589D, 590D, 591D, 592D, 593D, 594D, 595D, 596D, 597D, 598D, 599D, 600D, 601D, 602D, 603D, 604D, 605D, 606D, 607D, 608D, 609D, 610D, 611D, 612D, 613D, 614D, 615D, 616D, 617D, 618D, 619D, 620D, 621D, 622D, 623D, 624D, 625D, 626D, 627D, 628D, 629D, 630D, 631D, 632D, 633D, 634D, 635D, 636D, 637D, 638D, 639D, 640D, 641D, 642D, 643D, 644D, 645D, 646D, 647D, 648D, 649D, 650D, 651D, 652D, 653D, 654D, 655D, 656D, 657D, 658D, 659D, 660D, 661D, 662D, 663D, 664D, 665D, 666D, 667D, 668D, 669D, 670D, 671D, 672D, 673D, 674D, 675D, 676D, 677D, 678D, 679D, 680D, 681D, 682D, 683D, 684D, 685D, 686D, 687D, 688D, 689D, 690D, 691D, 692D, 693D, 694D, 695D, 696D, 697D, 698D, 699D, 700D, 701D, 702D, 703D, 704D, 705D, 706D, 707D, 708D, 709D, 710D, 711D, 712D, 713D, 714D, 715D, 716D, 717D, 718D, 719D, 720D, 721D, 722D, 723D, 724D, 725D, 726D, 727D, 728D, 729D, 730D, 731D, 732D, 733D, 734D, 735D, 736D, 737D, 738D, 739D, 740D, 741D, 742D, 743D, 744D, 745D, 746D, 747D, 748D, 749D, 750D, 751D, 752D, 753D, 754D, 755D, 756D, 757D, 758D, 759D, 760D, 761D, 762D, 763D, 764D, 765D, 766D, 767D, 768D, 769D, 770D, 771D, 772D, 773D, 774D, 775D, 776D, 777D, 778D, 779D, 780D, 781D, 782D, 783D, 784D, 785D, 786D, 787D, 788D, 789D, 790D, 791D, 792D, 793D, 794D, 795D, 796D, 797D, 798D, 799D, 800D, 801D, 802D, 803D, 804D, 805D, 806D, 807D, 808D, 809D, 810D, 811D, 812D, 813D, 814D, 815D, 816D, 817D, 818D, 819D, 820D, 821D, 822D, 823D, 824D, 825D, 826D, 827D, 828D, 829D, 830D, 831D, 832D, 833D, 834D, 835D, 836D, 837D, 838D, 839D, 840D, 841D, 842D, 843D, 844D, 845D, 846D, 847D, 848D, 849D, 850D, 851D, 852D, 853D, 854D, 855D, 856D, 857D, 858D, 859D, 860D, 861D, 862D, 863D, 864D, 865D, 866D, 867D, 868D, 869D, 870D, 871D, 872D, 873D, 874D, 875D, 876D, 877D, 878D, 879D, 880D, 881D, 882D, 883D, 884D, 885D, 886D, 887D, 888D, 889D, 890D, 891D, 892D, 893D, 894D, 895D, 896D, 897D, 898D, 899D, 900D, 901D, 902D, 903D, 904D, 905D, 906D, 907D, 908D, 909D, 910D, 911D, 912D, 913D, 914D, 915D, 916D, 917D, 918D, 919D, 920D, 921D, 922D, 923D, 924D, 925D, 926D, 927D, 928D, 929D, 930D, 931D, 932D, 933D, 934D, 935D, 936D, 937D, 938D, 939D, 940D, 941D, 942D, 943D, 944D, 945D, 946D, 947D, 948D, 949D, 950D, 951D, 952D, 953D, 954D, 955D, 956D, 957D, 958D, 959D, 960D, 961D, 962D, 963D, 964D, 965D, 966D, 967D, 968D, 969D, 970D, 971D, 972D, 973D, 974D, 975D, 976D, 977D, 978D, 979D, 980D, 981D, 982D, 983D, 984D, 985D, 986D, 987D, 988D, 989D, 990D, 991D, 992D, 993D, 994D, 995D, 996D, 997D, 998D, 999D, 1000D, 1001D, 1002D, 1003D, 1004D, 1005D, 1006D, 1007D, 1008D, 1009D, 1010D, 1011D, 1012D, 1013D, 1014D, 1015D, 1016D, 1017D, 1018D, 1019D, 1020D, 1021D, 1022D, 1023D, 1024D, 1025D, 1026D, 1027D, 1028D, 1029D, 1030D, 1031D, 1032D, 1033D, 1034D, 1035D, 1036D, 1037D, 1038D, 1039D, 1040D, 1041D, 1042D, 1043D, 1044D, 1045D, 1046D, 1047D, 1048D, 1049D, 1050D, 1051D, 1052D, 1053D, 1054D, 1055D, 1056D, 1057D, 1058D, 1059D, 1060D, 1061D, 1062D, 1063D, 1064D, 1065D, 1066D, 1067D, 1068D, 1069D, 1070D, 1071D, 1072D, 1073D, 1074D, 1075D, 1076D, 1077D, 1078D, 1079D, 1080D, 1081D, 1082D, 1083D, 1084D, 1085D, 1086D, 1087D, 1088D, 1089D, 1090D, 1091D, 1092D, 1093D, 1094D, 1095D, 1096D, 1097D, 1098D, 1099D, 1100D, 1101D, 1102D, 1103D, 1104D, 1105D, 1106D, 1107D, 1108D, 1109D, 1110D, 1111D, 1112D, 1113D, 1114D, 1115D, 1116D, 1117D, 1118D, 1119D, 1120D, 1121D, 1122D, 1123D, 1124D, 1125D, 1126D, 1127D, 1128D, 1129D, 1130D, 1131D, 1132D, 1133D, 1134D, 1135D, 1136D, 1137D, 1138D, 1139D, 1140D, 1141D, 1142D, 1143D, 1144D, 1145D, 1146D, 1147D, 1148D, 1149D, 1150D, 1151D, 1152D, 1153D, 1154D, 1155D, 1156D, 1157D, 1158D, 1159D, 1160D, 1161D, 1162D, 1163D, 1164D, 1165D, 1166D, 1167D, 1168D, 1169D, 1170D, 1171D, 1172D, 1173D, 1174D, 1175D, 1176D, 1177D, 1178D, 1179D, 1180D, 1181D, 1182D, 1183D, 1184D, 1185D, 1186D, 1187D, 1188D, 1189D, 1190D, 1191D, 1192D, 1193D, 1194D, 1195D, 1196D, 1197D, 1198D, 1199D, 1200D, 1201D, 1202D, 1203D, 1204D, 1205D, 1206D, 1207D, 1208D, 1209D, 1210D, 1211D, 1212D, 1213D, 1214D, 1215D, 1216D, 1217D, 1218D, 1219D, 1220D, 1221D, 1222D, 1223D, 1224D, 1225D, 1226D, 1227D, 1228D, 1229D, 1230D, 1231D, 1232D, 1233D, 1234D, 1235D, 1236D, 1237D, 1238D, 1239D, 1240D, 1241D, 1242D, 1243D, 1244D, 1245D, 1246D, 1247D, 1248D, 1249D, 1250D, 1251D, 1252D, 1253D, 1254D, 1255D, 1256D, 1257D, 1258D, 1259D, 1260D, 1261D, 1262D, 1263D, 1264D, 1265D, 1266D, 1267D, 1268D, 1269D, 1270D, 1271D, 1272D, 1273D, 1274D, 1275D, 1276D, 1277D, 1278D, 1279D, 1280D, 1281D, 1282D, 1283D, 1284D, 1285D, 1286D, 1287D, 1288D, 1289D, 1290D, 1291D, 1292D, 1293D, 1294D, 1295D, 1296D, 1297D, 1298D, 1299D, 1300D, 1301D, 1302D, 1303D, 1304D, 1305D, 1306D, 1307D, 1308D, 1309D, 1310D, 1311D, 1312D, 1313D, 1314D, 1315D, 1316D, 1317D, 1318D, 1319D, 1320D, 1321D, 1322D, 1323D, 1324D, 1325D, 1326D, 1327D, 1328D, 1329D, 1330D, 1331D, 1332D, 1333D, 1334D, 1335D, 1336D, 1337D, 1338D, 1339D, 1340D, 1341D, 1342D, 1343D, 1344D, 1345D, 1346D, 1347D, 1348D, 1349D, 1350D, 1351D, 1352D, 1353D, 1354D, 1355D, 1356D, 1357D, 1358D, 1359D, 1360D, 1361D, 1362D, 1363D, 1364D, 1365D, 1366D, 1367D, 1368D, 1369D, 1370D, 1371D, 1372D, 1373D, 1374D, 1375D, 1376D, 1377D, 1378D, 1379D, 1380D, 1381D, 1382D, 1383D, 1384D, 1385D, 1386D, 1387D, 1388D, 1389D, 1390D, 1391D, 1392D, 1393D, 1394D, 1395D, 1396D, 1397D, 1398D, 1399D, 1400D, 1401D, 1402D, 1403D, 1404D, 1405D, 1406D, 1407D, 1408D, 1409D, 1410D, 1411D, 1412D, 1413D, 1414D, 1415D, 1416D, 1417D, 1418D, 1419D, 1420D, 1421D, 1422D, 1423D, 1424D, 1425D, 1426D, 1427D, 1428D, 1429D, 1430D, 1431D, 1432D, 1433D, 1434D, 1435D, 1436D, 1437D, 1438D, 1439D, 1440D, 1441D, 1442D, 1443D, 1444D, 1445D, 1446D, 1447D, 1448D, 1449D, 1450D, 1451D, 1452D, 1453D, 1454D, 1455D, 1456D, 1457D, 1458D, 1459D, 1460D, 1461D, 1462D, 1463D, 1464D, 1465D, 1466D, 1467D, 1468D, 1469D, 1470D, 1471D, 1472D, 1473D, 1474D, 1475D, 1476D, 1477D, 1478D, 1479D, 1480D, 1481D, 1482D, 1483D, 1484D, 1485D, 1486D, 1487D, 1488D, 1489D, 1490D, 1491D, 1492D, 1493D, 1494D, 1495D, 1496D, 1497D, 1498D, 1499D, 1500D, 1501D, 1502D, 1503D, 1504D, 1505D, 1506D, 1507D, 1508D, 1509D, 1510D, 1511D, 1512D, 1513D, 1514D, 1515D, 1516D, 1517D, 1518D, 1519D, 1520D, 1521D, 1522D, 1523D, 1524D, 1525D, 1526D, 1527D, 1528D, 1529D, 1530D, 1531D, 1532D, 1533D, 1534D, 1535D, 1536D, 1537D, 1538D, 1539D, 1540D, 1541D, 1542D, 1543D, 1544D, 1545D, 1546D, 1547D, 1548D, 1549D, 1550D, 1551D, 1552D, 1553D, 1554D, 1555D, 1556D, 1557D, 1558D, 1559D, 1560D, 1561D, 1562D, 1563D, 1564D, 1565D, 1566D, 1567D, 1568D, 1569D, 1570D, 1571D, 1572D, 1573D, 1574D, 1575D, 1576D, 1577D, 1578D, 1579D, 1580D, 1581D, 1582D, 1583D, 1584D, 1585D, 1586D, 1587D, 1588D, 1589D, 1590D, 1591D, 1592D, 1593D, 1594D, 1595D, 1596D, 1597D, 1598D, 1599D, 1600D, 1601D, 1602D, 1603D, 1604D, 1605D, 1606D, 1607D, 1608D, 1609D, 1610D, 1611D, 1612D, 1613D, 1614D, 1615D, 1616D, 1617D, 1618D, 1619D, 1620D, 1621D, 1622D, 1623D, 1624D, 1625D, 1626D, 1627D, 1628D, 1629D, 1630D, 1631D, 1632D, 1633D, 1634D, 1635D, 1636D, 1637D, 1638D, 1639D, 1640D, 1641D, 1642D, 1643D, 1644D, 1645D, 1646D, 1647D, 1648D, 1649D, 1650D, 1651D, 1652D, 1653D, 1654D, 1655D, 1656D, 1657D, 1658D, 1659D, 1660D, 1661D, 1662D, 1663D, 1664D, 1665D, 1666D, 1667D, 1668D, 1669D, 1670D, 1671D, 1672D, 1673D, 1674D, 1675D, 1676D, 1677D, 1678D, 1679D, 1680D, 1681D, 1682D, 1683D, 1684D, 1685D, 1686D, 1687D, 1688D, 1689D, 1690D, 1691D, 1692D, 1693D, 1694D, 1695D, 1696D, 1697D, 1698D, 1699D, 1700D, 1701D, 1702D, 1703D, 1704D, 1705D, 1706D, 1707D, 1708D, 1709D, 1710D, 1711D, 1712D, 1713D, 1714D, 1715D, 1716D, 1717D, 1718D, 1719D, 1720D, 1721D, 1722D, 1723D, 1724D, 1725D, 1726D, 1727D, 1728D, 1729D, 1730D, 1731D, 1732D, 1733D, 1734D, 1735D, 1736D, 1737D, 1738D, 1739D, 1740D, 1741D, 1742D, 1743D, 1744D, 1745D, 1746D, 1747D, 1748D, 1749D, 1750D, 1751D



Putting the brake on 'Britain's most unloved drivers'

Alan Plumley takes to the road to find the nation's most disliked motorists and how vehicle telematics can change their behaviour for the better

So who are our most unloved drivers? From a report published in 2013 by motor dealer, ColinAppleyard.com, certain types of drivers and drivers of certain makes of vehicle were identified as qualifying for this unflattering description. The report also included comments from a sample of the 1100 people canvassed across the nation, with some amusing results. There have now been further developments so, this is an updated report into why particular drivers are viewed as Britain's most unloved.

From the survey feedback, it seems that most of those interviewed regarded the following careless or downright dangerous behaviour as among their pet hates: drivers following too close; not indicating; overtaking and cutting in front; pulling out of side streets right in front of them, and hogging the middle lanes on motorways. Of these, drivers who tailgate were top of the list.

Road to ruin

When it comes to the types of vehicle driven, those in charge of the ubiquitous white van or commercial vehicle were seen by many as major culprits. As we are well aware, this is due largely to the number of daily deliveries that many such drivers are assigned and which have to be completed within a certain timeframe. Recent reports indicate that crashes have risen as delivery vans rush to fulfil orders placed online: a 19% increase in such incidents in south-east England alone over the last five years.

Other complaints from road users about 'white-van man' included that of following too close, especially when the driver in front is driving at the designated speed limit. One motorist mentioned that when she was caught in a traffic queue, the white van behind was tailing her so closely it set off her rear parking sensors. A failure of white van man to give way, especially when approaching traffic calming measures such as chicanes, was another issue to which motorists objected.

White van man also took stick for speeding, especially along narrow country roads that are unsuited to large vehicles. Perhaps inevitably, the common use of mobile phones for voice calls and texting was a common complaint, as was the lack of indicating: one person surveyed asked if indicators were optional extras on white vans! Intimidation was also seen as an issue, particularly by those being tailgated. Countermeasures included slowing down, hoping the van will either take the hint or overtake and be caught by a speed camera!

Changing behaviour

However, all this may be changing because organisations are now adding vehicle telematics to their delivery fleets. The technology - a fusion of telecommunications and informatics - has evolved to send, receive and store data relating to vehicles via telecommunication links. The telematics umbrella also embraces the integration of Global Positioning System (GPS) technology, computers and mobile devices. With this resource, the location, movement, status and driving behaviour of a vehicle or fleet of vehicles can be remotely monitored



White-van-man finds himself the target of most complaints from road users

in real-time. Such information can help businesses optimise vehicle routing, control fuel costs, reduce labour costs and boost overall safety and productivity. Telematics provides complete, up-to-the-minute knowledge of fleet activity via a centralised, web-based interface.

There are a number of organisations manufacturing and supplying telematics solutions including GreenRoad, Intelligent Telematics, Masternaut and Ctrack. Such solutions will typically monitor vehicle performance, delivery status and driver behaviour and tell the fleet manager if a driver is exceeding the speed limit, or braking/accelerating too harshly. By using these and other indicators, companies can encourage drivers to improve their behaviour. This has had a remarkable impact on fuel and maintenance costs. In fact, reports from users claim that the cost of installing telematics to their vehicles can be recouped within a year. Needless to say, more and more businesses are investing in the technology for both economic and safety reasons.

The future of the technology looks bright, with Ernst & Young predicting that 88 percent of all new cars will feature embedded telematics by 2025, a figure that amounts to 3.5 million new cars in the UK alone. With the advent of driverless vehicles, telematics will play an increasingly important role in making them smarter, safer and better-connected. Vehicle condition monitoring and diagnostics is another area that will benefit from telematics and help fleet managers anticipate and plan downtime.

Biggest challenge

Driverless cars, fleet vehicle optimisation and lower insurance premiums are just the beginning: the opportunities for telematics innovation are truly limitless. Right now, the industry's biggest challenge is to create



Smart Motorways, such as that currently being engineered between Junctions 2 and 4a on the M3 (pictured) will increasingly utilise telematics to optimise traffic flows. Photo: Highways England



Speeding along unsuitable country roads can prove a costly business

new platforms to manage the enormous volume of real-time data generated by telematics reporting, then develop effective systems for translating such data into actionable intelligence.

Such systems could feed into those that gather and monitor the condition of road networks in real-time. Currently, drivers use smartphone apps such as Waze for traffic alerts and alternative route planning, but with the wider use of telematics connected to smart highway systems, HGV drivers will be able to locate roads suited to their vehicles and be advised of safe, congestion-free routes.

While 'white van man' currently remains at the top of 'Britain's most unloved drivers' list, his tenure may be short-lived as more and more organisations adopt telematics. Will he be replaced by others on the list such as sales execs rushing around in their BMWs and Audis? School run mums with screaming kids in the back? Or taxi drivers looking for more fares?

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(www.geoconnexion.com)

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This continuous deluge of information is further bolstered by data flowing from the growing number of IoT devices that we are adopting in our everyday lives. When this is combined with robust digital connectivity plans, we have the fundamental building block of smart cities and towns. Wifi and 3G/4G mobile connectivity are essential to remain connected through our portable devices, while Low Power Wide Area Network (LPWAN, e.g. LoRa, Sigfox or LTE Cat-o) will prove essential for infrastructure-related IoT needs.

Other cities have developed their own platforms to better connect with residents by giving them the opportunity to report problems and concerns. The My Glasgow app, developed by Glasgow

Go with the flow

Geographical data also can also be derived from interactions with social media sites. Trending topics across platforms such as Twitter, Facebook and Instagram can reflect the public mood in a more accurate and faster way than traditional survey methods ever could. Each and every time an individual posts to or checks a social media, a geotag is associated with the action. This means it can be

allocated and aggregated spatially and then analysed, with the results potentially re-used in other applications.

Actionable insights

From political campaigning to news reporting, and from highlighting commercial opportunities to predicting problem hotspots, real-time social media information provides real insight and allows analysts to devise more proactive responses. The predictive analytics field is on the rise, with current methods able to classify and segment the population of a constituency with high accuracy, which can be then utilised for political purposes.

Companies such as Cambridge Analytica are said to have played an important role in the recent US Presidential election campaign, gathering profile data from multiple sources and applying advanced data modelling methods and psychometrics to identify target audiences in each state. The resulting communication strategy derived from this geospatial analysis often focused on identified undecided voters. By pushing a tailored message that ticked the boxes of particular profile groups, candidates sought to gain that extra edge in their campaigns.

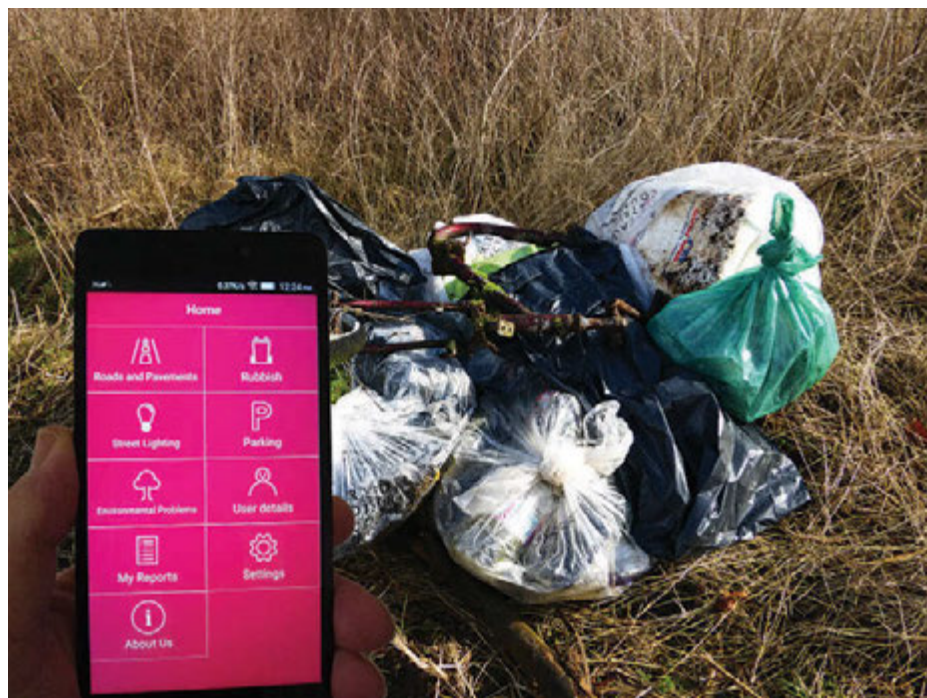
But it's not only for electoral purposes that geographical data is currently being used. Our mobile devices can also contribute towards causes for the public good. Initiatives such as the Humanitarian Open Street Maps Team have played a key role in natural disaster situations, providing accurate, reliable and current cartographic information for emergency response teams.

In parts of the world where such data is not easily available, the Humanitarian Open Street Map (HOTOSM) project (<https://hotosm.org>) enlists a huge network of volunteers to fill the gap. These volunteers use satellite imagery to update or compile mapping on terrain, transport networks and other vital infrastructure that teams on the ground can then access. These crowdsourced maps have helped to save lives in events such as the 2011 earthquake in Haiti, the 2014 Ebola epidemic in West Africa and the 2015 earthquakes in Nepal.

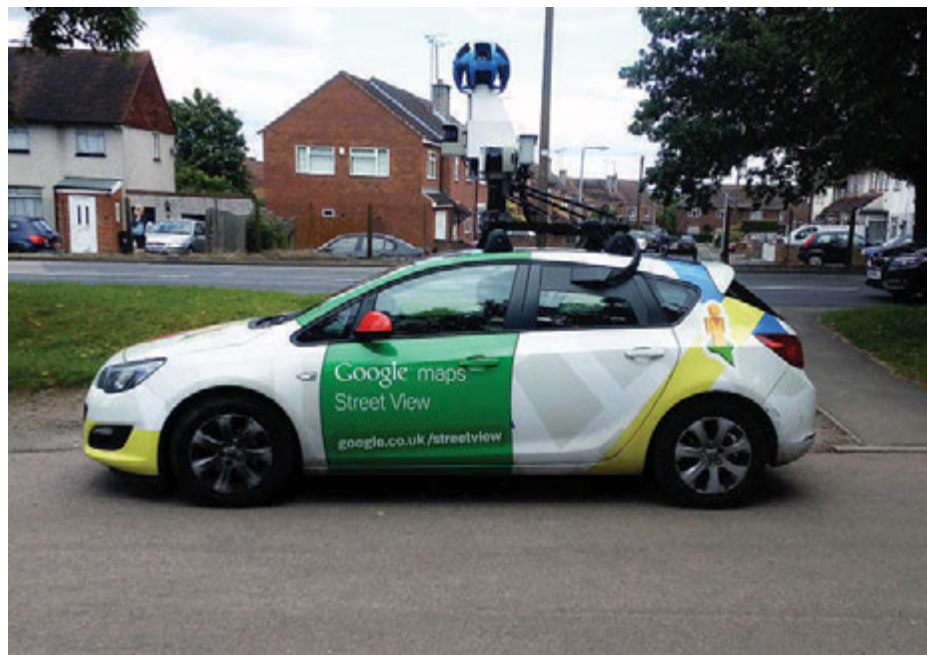
Data avalanche

The avalanche of data we generate can be difficult to process. The complexity of getting specific insights from these huge swathes of information has been likened to trying to take a sip of water from a fire hose. The term Big Data was coined to describe and frame these large volumes of digital information, both structured and unstructured, which can be very hard to analyse using traditional statistical methods and tools.

It's not only the sheer volume that represents a challenge, but also the speed at which this constant stream of information



Using the mapping-enabled My Glasgow app, citizens of Scotland's largest city can keep the Council informed of incidents of fly tipping, potholes, overhanging trees, street light failures and more



As well as capturing its own data, Google makes use of information from users to improve its mapping service. Photo: GeoConnexion

is coming into organisations. This makes it particularly challenging to process and integrate within corporate systems. Businesses and public bodies are trying to adapt and integrate data analysis into their decision-making processes.

Summarising and visualising patterns and insights from datasets is critical. Most of us are much more comfortable reading a map than we are deciphering a spreadsheet. Geographical information system applications play a key role in processing this spatial data into maps that we can then interact with to make informed personal and commercial decisions.

There are multiple initiatives to make

more datasets open and available to public and businesses alike. There are many benefits to be had from sharing information, from informing customer choices to keeping residents up to date with local news.

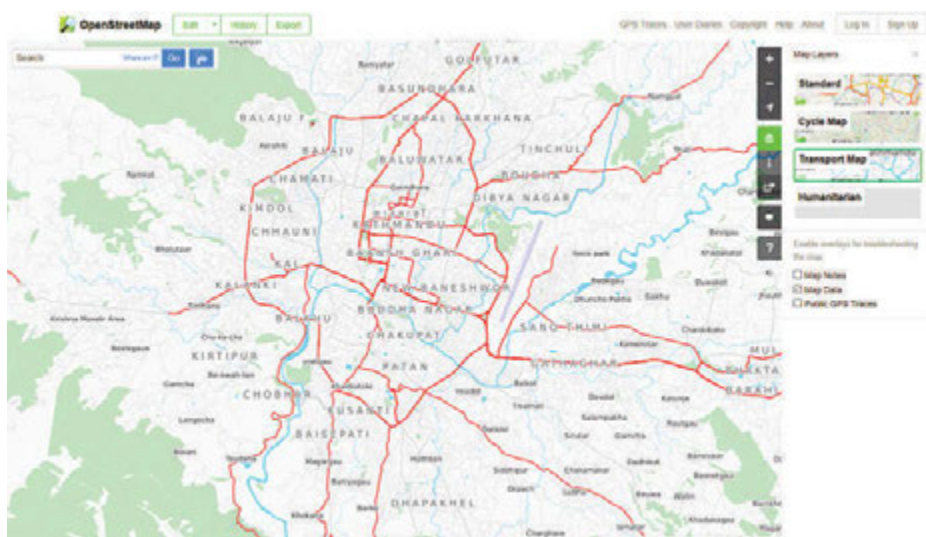
Commercial potential

There are numerous commercial uses of real time mapping data, from exploring consumer behaviour to identifying buying patterns and trends, all of which can help companies more effectively target their products and services.

For example, shopping centres can produce heat maps of footfall, identify areas that are more attractive to customers and,



On the trail in Arizona. But did Donald Trump's victory in the presidential campaign owe more than a little to data modelling and psychometric profiling to sway voters? Photo: Gage Skidmore



Mapping compiled and provided by the HOTOSM project helped with aid delivery and reconstruction efforts in the aftermath of the 2015 earthquakes in Nepal. Image: HOTOSM Team



The use of retail and office space can be optimised by exploiting real-time mapping data. Photo: GeoConnexion

just as importantly, areas that are being avoided. This can be used when selecting the best location for a particular kind of retail outlet. Using technology such as Bluetooth beacons within premises, mapping can be taken down to a more granular level, even to recording which shelves in a shop are most popular and the typical routes taken through a shop by customers

The mobile data we generate as consumers and as residents of towns and cities already has an impact on how our surroundings are being shaped. Our spatial behaviour is analysed by business planners when looking for new premises. Data-generated maps that depict a high footfall, when coupled with geodemographics and consumer-generated data for an area of interest, can identify the ideal location for, say, a restaurant, hotel or business hub.

Citizen engagement

These kinds of datasets also encourage citizens to engage with urban planning and local authority initiatives. If we are given access to information in a form we understand, such as a map, we are much more likely to interact and give informed opinions on what is happening, or indeed should happen, and keep us involved with the development of our towns and cities. If local authorities continue to make information available through open data initiatives, then it is only a matter of time before the public sees the benefit of it, uses it, and adds to it.

The information we are sharing can also be captured and used for malicious purposes. Each mobile phone has a unique identifier which can be traced to the data being collected, regardless of the network being used, so there is potential for data breaches. Hence the emphasis on data privacy and concern that the right policies are in place to protect us from the misuse of data. While all released information should be aggregated to protect individual identities, adherence to digital best practice is still the way forward.

We are all producing cartography without even realising it. Whenever and wherever we use a cellphone or wearable device we are helping to create a map. If this is used wisely, our data could improve our experience as customers and our quality of life as citizens.

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EVENTS

Defence Geospatial Intelligence Europe (DGI 2017)

This 14th annual conference for military, civilian and industry geospatial intelligence experts convened over three days at London's QEII Conference Centre in late January against a distinctly uncertain political backdrop. And while the elephant in the room was not mentioned by name, few of those engaged in the event's opportunity for transatlantic dialogue will have taken comfort in tweets that branded NATO as 'obsolete' or dismissed the US intelligence community as 'incompetent'.

Certainly not this year's keynote speaker Robert Cardillo, Director of the National Geospatial-Intelligence Agency (NGA) who, at the time, was being tipped for the post of Director of National Intelligence in the Trump administration following the resignation of James Clapper. In the event, Senator Dan Coates secured the nomination, leaving Cardillo free to focus on implementing the NGA Strategy unveiled in 2015 with its focus on international collaboration, accountability and openness.

His keynote presentation to a 550-strong audience largely echoed that delivered at last year's GEOINT Symposium in Florida in stressing the step change needed in the way NGA goes about its business.

Needles in haystacks

The advent of Big Data no longer sees analysts searching for the proverbial needle in a haystack, said Cardillo, but in a haystack full of needles, most of them broken. "The GEOINT systems built in the past to gather, collate and analyse data were complex, expensive, proprietary and poorly equipped to serve our new team-based way of working." He conceded that while this model had achieved some success, it had also encouraged bad habits and was no longer fit for purpose. "The NGA will continue to take responsibility for the systems it acquires, but must reclaim the flexibility to modify, adapt and upgrade them as it sees fit," was his message to industry.

At the same time, he envisaged an increased role for public-private sector partnerships and cited the example of an unclassified web application for the Arctic (access via <https://www.nga.mil>) as one where industry and academia had collaborated with the NGA to good effect. Similar applications to support humanitarian relief efforts had been evolved and, most recently, the Agency had agreed a landmark deal to acquire commercial satellite imagery from Planet Labs for time-critical missions.

Fact or fiction?

Cardillo suggested that one thing the GEOINT community needed to collectively improve upon was in differentiating fact from fiction. "In a world where everyone has access to imagery and geospatial intelligence and the news is full of claims and counter-claims, how do you know when adversaries, hackers or terrorists are altering or spoofing the GEOINT on which we depend? Given the hyper-abundance of data we now receive, you think it would be easier to prove or disprove such claims. I would suggest the opposite is true."



Robert Cardillo. Photo: GEOconnexion

In responding to this problem, Cardillo said the NGA was working with Silicon Valley and other tech hubs across the US to reinforce its role as an honest broker and trusted clearing house for GEOINT. He added that similar partnerships were now being extended world-wide. "I see viable public-private ventures as a necessary part of our successful future," he concluded.

This will have been good news for the 35 companies that exhibited at DGI 2017. And while they included household names such as IBM, DigitalGlobe, Lockheed Martin, Textron, BAE Systems and Esri, one could also find rising stars such as Washington-based First Mile Geo which was promoting its unified platform for collecting, visualising, and sharing data in any language and without the need for a tech team.

For the delegates from 40 nations, the three day event offered some 90 sessions, with topics ranging from new paradigms in space-based maritime situational awareness to how cyber intelligence is evolving to meet threats to national security, and from training future geospatial analysts to exploiting radar imagery for actionable intelligence.

Next year's DGI Europe will, again, be hosted at London's QEII Conference Centre, 22-24 January 2018. More on the event from the organisers at <http://dgi.wbresearch.com/>



550 delegates from 40 countries attended this year's event. Photo: GEOconnexion

Yotta Customer Conference 2017

Around 300 asset managers, highways engineers and transport professionals made their way in early February to the Hilton Metropole Hotel at Birmingham's NEC for what is undeniably the largest event of its kind in the UK. Hosted by infrastructure asset management specialists Yotta (www.yotta.co.uk), its international appeal continues to grow, with visitors from Germany, the Netherlands, Spain and Australia being welcomed to this year's gathering.

Rising expectations

To kick-off the proceedings, guest speaker Sir Nicholas Cary, Head of Digital Transformation and Open Data at the Department for Transport, spoke of the changes that are underway both in government and industry to exploit the digital ecosystem and meet the rising expectations of the travelling public.

Cary pointed to a blurring of public-private transport systems and to Mobility as a Service (MaaS) as examples of the way things are going. A subscription-based MaaS – a concept borrowed from the mobile phone market and one Cary likens to a “season ticket on drugs” – would give people an entitlement to travel anywhere, anytime based on their subscription level. It would, he said, polarise the market and propel service providers into a dominant position. “You can't buck a trend”, said Cary, who urged the market to embrace an innovative and collaborative culture that would help it thrive in this new paradigm.

Alloy unveiled

The surprise of the day – and a well-kept secret for sure – was the unveiling of Alloy, a fusion of Yotta's Mayrise highways asset management modules and its Horizons web GIS and strategic asset

management platform. But this was no welding together of two legacy systems; rather, a two-year development from the ground up to create an Enterprise-level, IoT-ready platform that, according to Yotta CEO Nick Smee, “Provides the ideal solution, future-proofing organisations by allowing connectivity between a range of assets and data types and helping them harness the resulting insight for their competitive advantage.”

For any doubters, scepticism turned to admiration as Yotta CTO Manish Jethwa put the cloud-based system through its paces. Gone are the nested menus and assorted toolbar icons of the conventional user interface. In their place, a neat, uncluttered screen suitable for all modern web browsers (no plug-ins needed) where assets – and their relationships one to another – are presented in the form of an infographic. Simply clicking on the graphical representation of an asset invokes a window that specifies its installation and maintenance history and (if fitted with a 3G sensor or feedback loop) its ‘live’ operational status.

Two sidebars flank the main screen, that on the left being a dashboard that is pre-configured for each Alloy module, whether for Highways Management, Street Works, Waste Management, Grounds Maintenance or Street Lighting. This gives fingertip access to relevant information and KPIs based on real-time data. The sidebar on the right is used to access network layers and basemaps. For those seeking a specific basemap, either as a backdrop, to provide context, or to visualise a dataset, it is sufficient to type in a URL to download one of their choice via a WMS server.

Gone are SQL queries. Instead, database searches are performed using free form text inputs. Alloy's speech recognition function also makes querying a breeze, and while this did require some prodding into action during the presentation, it nevertheless showed its utility for those toting mobile devices and, for which, Alloy offers seamless integration.

Smee confirmed that while Alloy will absorb Mayrise and Horizons over time, there will be ongoing support and development of these products for a minimum of five years. The first Alloy modules – Highways Management and Street Lighting – will ship this summer and the roll-out of all modules meeting UK and international requirements will be complete by 2019. He also said that those with existing support and maintenance contracts for Mayrise or Horizons will receive equivalent licenses for Alloy at no extra charge.



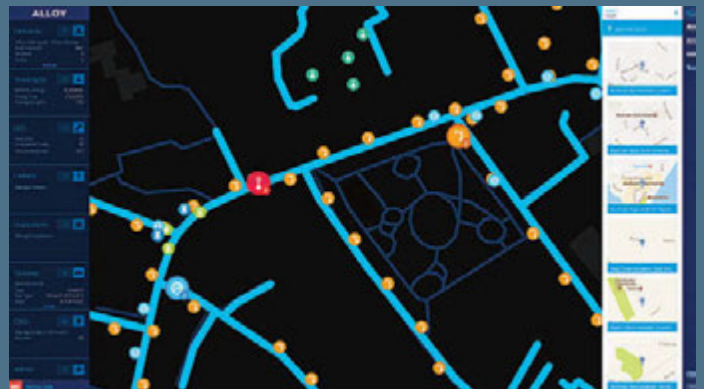
Sir Nicholas Cary addresses conference. Photo: GEOconnexion



Yotta CEO Nick Smee unveils Alloy, “the ideal solution.” Photo: GEOconnexion



Yotta CTO Manish Jethwa, puts Alloy through its paces. Photo: GEOconnexion



Developed from the ground-up as an IoT-ready, cloud-based platform, Alloy will make it simpler for users to manage vast volumes of data. Screen image: Yotta

Ocean Business 2017 preview

Your starter guide to this year's hands-on ocean technology exhibition and training forum

Join more than 5,000 visitors from 60-plus countries at the unmissable ocean technology event, to be held at the National Oceanography Centre in Southampton, UK, 4-6 April 2017. Firmly established as one of the most important international events in the ocean technology calendar, visitors are encouraged to register online for FREE.

At the very heart of Ocean Business is a three-day exhibition of more than 300 companies, bringing together the world's leading ocean technology manufacturers and service providers. More than just a static exhibition, Ocean Business 2017 provides visitors with an opportunity to test-drive equipment and systems with more than 180 hours of live, free to attend, training and demonstration sessions aboard dockside vessels, in the test tank, and in seminar rooms.

In addition, Ocean Business offers: a cutting edge technical conference focusing on autonomous systems and satellite applications; a selection of associated events from several key organisations in the industry; a social programme providing invaluable networking opportunities including welcome drinks, a wine trail on the exhibit floor and the ever popular gala dinner, and Ocean Careers - a three-day event providing advice on career opportunities within the ocean technology, marine science and offshore industries.



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