

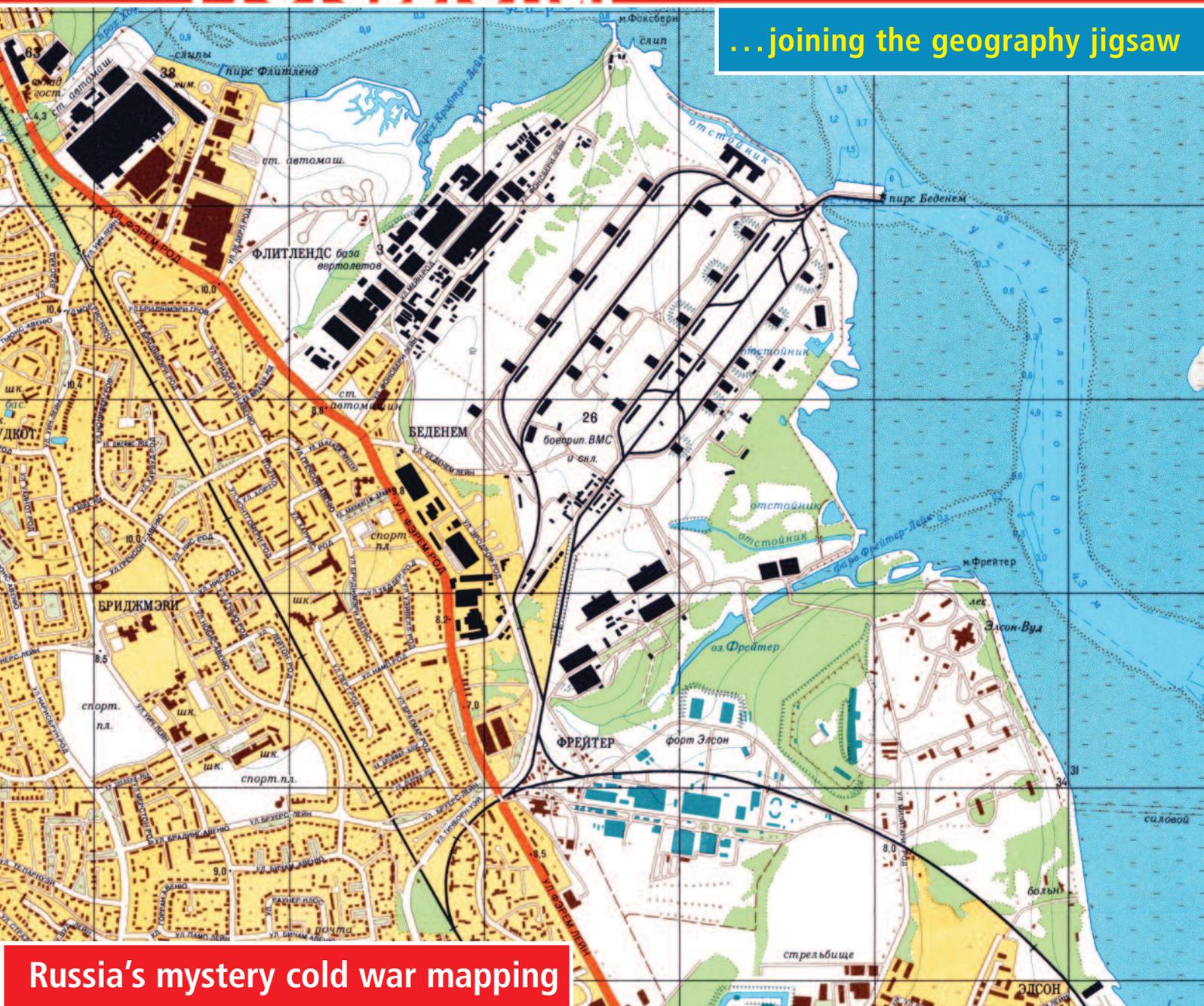
# GIS Professional



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issue 66 : October 2015

... joining the geography jigsaw



Russia's mystery cold war mapping

CORINE: UK land cover change examined

Europe's growing role in geospatial standards

Adena Schutzberg: mapping a sensitive area

Getting to grips with drones

Unravelling INSPIRE ready for Phase 2

The importance of geospatial and the UN

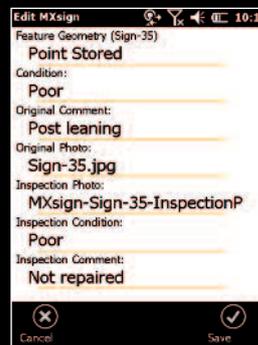
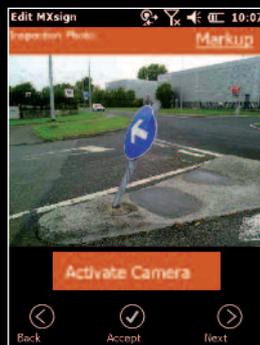
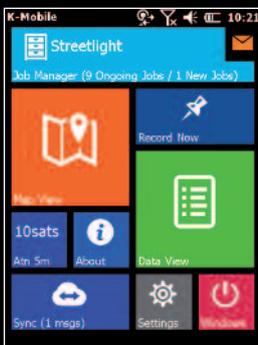
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## Europe's growing role in geospatial standards

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## Influencing change in the future

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## INSPIRE Phase 2

**Benjamin Allan** of miso explains the benefits and complexities of INSPIRE as it moves towards the second phase.



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## The importance of geospatial information at the UN

A crowning achievement of Dr **Vanessa Lawrence** has been to help create the UN-GGIM. **James Norris** reports from the fifth meeting.



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## Getting to grips with drones

AGI members in Scotland, reports **Abigail Page**, have been busy acquainting themselves with the geospatial potential of drones.

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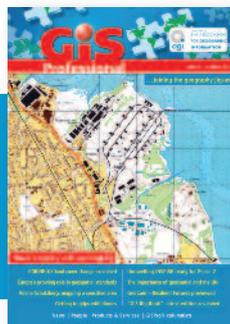
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### Next Issue: DECEMBER 2015

Copy dates **Editorial:** 09 November

**Advertising:** 26 November

**Front cover:** 103 areas of Great Britain were intricately mapped by the Russian military during the Cold War. As the first to digitally capture and geo-reference the maps, Landmark Information Group explores the intrigue and mystery behind them. **Turn to page 10 for full story.**



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read on . . .

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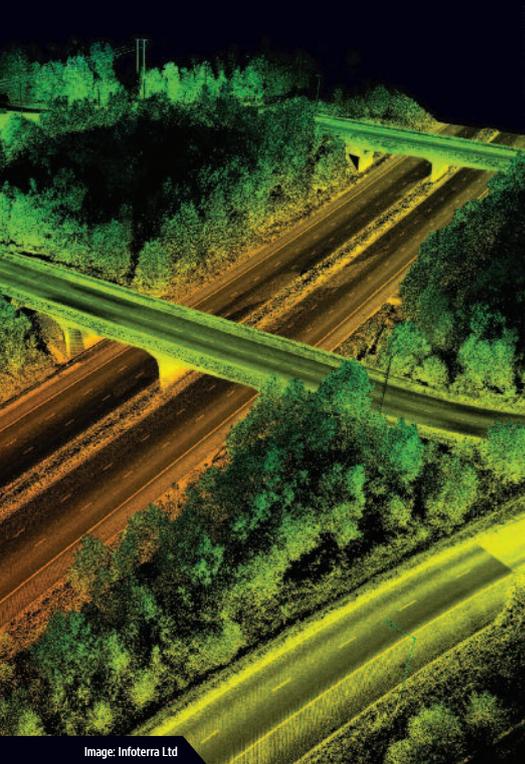
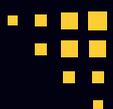


Image: Infoterra Ltd



Image: Topcon Positioning Great Britain

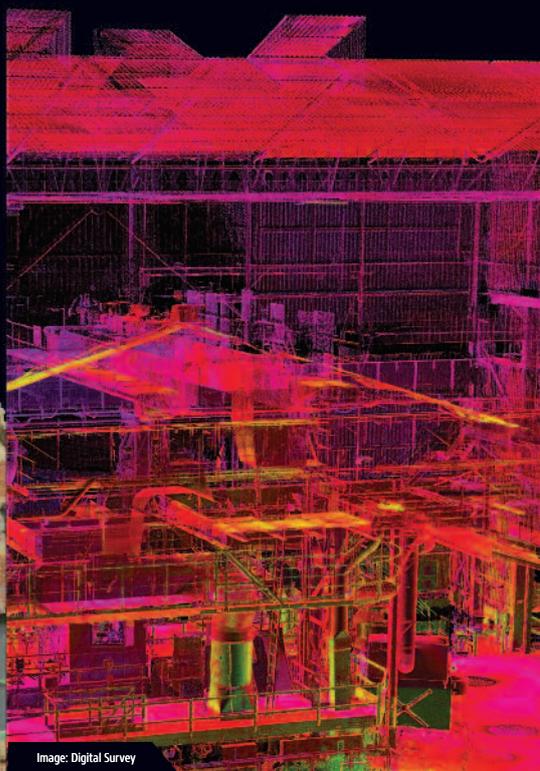


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welcome  
to the October 2015 issue of *GIS Professional* . . .

## GI is not just for the great outdoors

It is always interesting to discover applications of geospatial you'd never even considered. In September I attended a conference organised by GI Standards for companies and organizations involved in the UNCAP scheme. This is an EU initiative to encourage development of technology to assist Europe's ageing population. We learnt about how RFID tags attached to medical equipment in hospitals can help keep track of where they're located and when they need servicing; how an under-floor grid with sensors can be part of a system to track movement and falls of the elderly and vulnerable; how research is progressing on indoor location systems; and how CEP – complex event processing – can be part of a system to keep track of vulnerable people and warn when something untoward happens like a fall. We tend to forget that geospatial is not just for the great outdoors.

We will return to UNCAP and a longer article in the next issue of *GiSPro*. But if you'd like to learn more then please go to [pvpubs.com/GISProfessional/Home](http://pvpubs.com/GISProfessional/Home) where you'll find a one-off special edition of *GiSPro* that was published to coincide with the conference and a meeting of the Open Geospatial Consortium's Technical Committee. Subscribers will have received a printed copy.

But if UNCAP is more about the micro then **James Norris'** report on a recent meeting of the UN-GGIM committee is very much at the macro level. Getting world leaders to understand how geospatial technology can help alleviate so many problems is hard missionary work, which no one has done better than Dr **Vanessa Lawrence**, who has been the driver behind the project for the last five years. Her work was recognised with a special award from the UN's under-secretary-general of the Department of Economic and Social Affairs, Mr **Wu Hongbo** (page 24).

Two of the themes explored in this issue will certainly be revisited again in the coming months. Standards and INSPIRE may be perennially boring but they are essential. Look what has happened to VW when you get them wrong. In geospatial, so many of our systems will not work if there is not seamless interoperability between disparate systems and datasets. OGC does unsung work in this area and I encourage you to read the special article by two of their experts on page 19 along with **Benjamin Allan** on Phase 2 of INSPIRE (page 22).

The second theme is drones, variously known as unmanned aerial vehicles or systems. **Abi Page** reports from Scottish AGI's event (page 15) designed to acquaint members with their potential. There are also several other events coming up to promote this rapidly developing technology. They offer a relatively cheap way of rapidly acquiring areal data or close-range inspection. But there are limitations and the image sensors are often not designed for this purpose.

In the last issue **Robin Waters'** Eurofile column touched briefly on Europe's CORINE Land Cover map. Dr **Geoff Smith** explains this project in much greater detail (page 12) and how it has tracked land use change since the 1980s. In six years alone the UK has experienced habitat loss or change of use to over 225,00 hectares.

November sees our industry's major gathering at Chesford Grange in Warwickshire for GeoCom. I am delighted that former AGI chief executive **Chris Holcroft** has previewed the event for us (page 16). It will be an exciting and eventful few days with some interesting top-line speakers. Don't miss it, for while we can report and give a flavour through these columns there is no substitute for being part of the conversation.

It remains for me only to draw your attention to our extraordinary front cover and the supporting article on page 10 and **Adena Schutzberg's** fascinating insight into how mapping just cannot be avoided once spatial data goes public. I am sure that no *GiSPro* readers were caught in flagrante!

  
Stephen Booth, Editor

“  
**Standards and INSPIRE may be perennially boring but they are essential. Look what has happened to VW when you get them wrong.**  
”

## Solar energy potential mapped for housing associations



Working with Sustain, Bluesky has mapped around 100,000 housing association properties across the UK, measuring their potential for energy generation from solar panels. Using a combination of high-resolution aerial photography, photogrammetry and detailed 3D models, the potential for solar energy generation for individual houses can be accurately predicted based on factors like roof size and aspect as well as possible interference from neighbouring properties or trees. Sustain uses this information to prepare detailed reports for its clients containing cost benefit analysis and, more recently, highlighting potential impact on fuel poverty avoidance.

Using Bluesky's measurements, Sustain calculates the potential yield of each property based on the number of panels and the recorded roof aspect and slope. The algorithms used by Sustain also take into account the location of the property to normalise the calculation from optimum or maximum to a realistic 'expected' or average yield.

### Future cities pilot project

The Open Geospatial Consortium (OGC) in collaboration with buildingSMART International (bSI) is inviting sponsorship in a pilot project to help cities around the world benefit from modern standards for geospatial technologies. The pilot, to be based in Europe, will demonstrate the ability of cities to use diverse, interoperating spatial technologies to deliver improved quality of life, civic initiatives and resilience.

Human, natural, and physical systems interact in space and time, and the digital systems in cities will become increasingly diverse and numerous, with many owners. Cities thus need an open, vendor-neutral standards platform for communicating spatial and temporal data. Many of the longstanding technical

boundaries separating indoor, outdoor, underground and atmospheric information have been overcome. The FutureCities Pilot will show how cities can begin to reap the benefits.

### County boundaries

For 224 years OS has been mapping the changing physical landscape of Great Britain as well as county boundaries which have moved over the last two centuries. As part of a project with the Department for Communities and Local Government (DCLG) OS has created two new datasets of county boundary information: the current ceremonial and historic county boundaries. The new datasets have been released through the OS OpenData portal and can be freely downloaded, as either Shape or Tab files.

### Input for encoding standard sought

The Open Geospatial Consortium's GeoPackage Standards Working Group (SWG) is seeking public input to guide development and prioritization of new extensions to an Encoding Standard. GeoPackage is an open, standards-based, platform-independent, portable, self-describing, compact format for transferring geospatial information, which has already been implemented in a range of products and applications.

The GeoPackage SWG has posted a survey at <http://tinyurl.com/phvjyjk>. Interested developers and users can offer suggestions. The survey is intended to help understand the requirements from different communities and domains. Stakeholders are encouraged to respond and to become involved in development and testing to ensure that this international standard meets their needs.

### Common database specified

OGC has also announced approval of the OGC Common DataBase specification as "Best Practice" specifying an open format and encoding for the storage, access and modification of a representation of the natural and built environment for simulation applications. CDB defines the data representation, organization and storage structure of a worldwide synthetic representation of the earth as well as the conventions necessary to support all of the subsystems of a full-mission simulator. The Best Practice makes use of several commercial and simulation data formats endorsed by the simulation database tools industry. The organization of the synthetic environmental data in a CDB is specifically tailored for real-time applications. It supports applications in which interconnected simulators share a common view of the simulated environment. The OGC Common

Database Volume 1 (Main Body) and Volume 2 (Appendices) are available at [www.opengeospatial.org/standards/bp](http://www.opengeospatial.org/standards/bp)

### Brilliant Maps

After taking a short holiday and writing a few hefty posts Brilliant Maps is back with ten new maps. Here's a sample of the fun:

- The 28 Best Map Based Strategy Board Games You've Probably Never Played
- Best Selling Singer Or Band From Each London Borough
- All The Pubs In Britain & Ireland & Nothing Else

The above is just a selection of the latest. You might also like The European Diaspora: European Ancestry Worldwide; How Bad Are STDs In Your City? The Interactive Unsafe Sex Map of America; Just The World's Time Zones; Where The Woolly Mammoths Used To Roam and for sheer weirdness, Pluto vs Alaska Size Comparison. Lots of fun at <http://brilliantmaps.us10.list->

### DMC3/TripleSat constellation nearing operation

Earth-i expects to begin offering full operational imaging and data services later this year from the DMC3/TripleSat constellation and will place specific focus on fast, easy and convenient access for data users. Founded and run by prominent and experienced individuals from the Earth Observation industry, Earth-i is located in the UK close to the Surrey Space Centre, and the satellites' manufacturer, Surrey Satellite Technology Ltd (SSTL).

Three identical <1m resolution optical satellites make up the constellation with total capacity acquired by Chinese company Twenty First Century Aerospace Technology Co. Ltd (21AT) from SSTL in 2011. Subsequently, prior to the 10th July 2015 launch on an Indian PSLV-XL rocket, Earth-i signed an agreement with 21AT to

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The orbital position of the three satellites means the constellation is able to target any point on the earth's surface at least once per day providing reliable and consistent information to data users, particularly useful for a wide range of applications including change detection. The unique combination of high spatial and temporal resolution, offers data users a wide range of potential applications in sectors like oil & gas, security and defence, agriculture and construction.

**BRIEFS**

**German carmakers Audi, BMW and Daimler, are buying Nokia's Here digital mapping business for 2.8bn euros (£2bn). The company's mapping may help create self-driving cars using cloud technology to build digital maps. "High-precision digital maps are a crucial component of the mobility of the future," said Dieter Zetsche, chairman of the board of Daimler. The carmakers plan to use Here's technology to combine precise digital maps with real-time vehicle data more closely. [www.bbc.com/news/business-33756603](http://www.bbc.com/news/business-33756603)**

From next year Autodesk will no longer sell perpetual licences of most of its design, creation suites and other products. They will only be available as a desktop subscription. Resellers Cadline are running a series of webinars to explain the benefits and address users' concerns. More at [www.cadline.co.uk](http://www.cadline.co.uk)

**Chosen by Esri president Jack Dangermond, 187 organizations worldwide were presented with "Special Achievement in GIS" awards at the Esri User Conference earlier this year. The awards highlight users that have shown vision, leadership, hard work, and innovation in their use of Esri's GIS technology.**

The OGC is requesting comments on a draft charter for a proposed OGC Standards Working Group (SWG). The OGC Temporal Well Known Text (WKT) for Calendars SWG is being formed to adapt existing standards to provide the capability to represent and encode temporal metadata within datasets and protocols that use customised calendars. More at: [portal.opengeospatial.org/files/64317](http://portal.opengeospatial.org/files/64317)

**OGC has also requested comments on a proposed discussion paper "A MetOcean Metadata Profile for WCS 2.0" and the supporting discussion paper "OGC Web Coverage Service Interface Standard - Coverage Collection Extension".**

Natural Resources Canada (NRCan) has raised its Open Geospatial Consortium membership level from Technical to Principal level. Led through the GeoConnections Program at the Canada Centre for Mapping and Earth Observation (CCMEO), NRCan has been an active member in the OGC since 1998.

**Rugged mobile computer manufacturer Handheld Group and SOTI, a provider of enterprise mobility management, have announced a strategic alliance extending SOTI MobiControl's deep management capabilities to Handheld's rugged mobile devices. The move follows certification of Handheld's devices within the SOTI OEM partner programme.**

ESI and Ambiental have announced that they have incorporated ESI's National Groundwater Flood Risk Map into Ambiental's UKFloodMap4. Covering 100% of the UK, with a full range of return periods, and integrating the most up-to-date river flow and rainfall data, the mapping provides the most detailed flood risk maps

**Mapping mobile services**



Europa Technologies has created a unique coverage map service for the UK telecomms regulator, Ofcom. Designed to support consumers in choosing a service that best suits their needs, while promoting competition between mobile operators, the service is based on the Network Insight Pro platform and features up-to-date mapping of all UK mobile network operators (MNOs) for voice and 3G/4G data services as well as signal expectations for both indoor and outdoor environments. Ofcom is inviting users to check their coverage experience and leave feedback, which will help refine and improve the tool. The Ofcom coverage map service can be found at <http://www.ofcom.gov.uk/mobile-coverage>



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**An occasional column where we highlight some of the weird, bizarre, quirky and downright dumb geo stuff that comes over the ether to us.**

Politicians and government officials are always a rich source of gobbledegook. Just read at this model answer of obscurity to an MP's questions: "To ask Mr Chancellor of the Exchequer, what recent estimate his Department has made of the value of the (a) Royal Mint, (b) Land Registry, (c) \*Ordnance Survey\*, (d) Met Office and (e) National Air Traffic Services."

Came the answer, "The Government is committed to ensuring the effective and efficient management of publicly owned assets and keeping ownership of all assets under review. Where there is no longer a strong policy reason for continued public ownership or where there is potential for an asset to operate more sensibly and efficiently in the private sector, the Government will continue to look into the potential sale of public sector assets." Source: [theyworkforyou.com](http://theyworkforyou.com)

The BBC's Today programme, searching for something interesting on a very slow news day recently, alighted upon a story about mountain rescue teams helping more people lost because they can't read a map and their not-so-smart phones having died up for want of a convenient charging point on Scafell Pike or the onboard mapping not showing enough detail of hill and moorland. Eventually the customary experts were found. The Nokkia rep sensibly agreed that a smart phone is not the ideal tool for hill walking and recommended a GPS and an Ordnance Survey map. There then followed an interview with a mountain rescue expert who reported around the same number of people had had to be helped this year as last year.

Meanwhile it is reported that The Guardian online carried a headline "Syrians entering Hungary at Syrian border". Were they catapulted over Turkey, Bulgaria and Romania, or possibly they tunneled under Serbia?

Searching on Google for other geographic cock-ups the search engine obligingly offered as No 1 hit the parcel delivery service UPS. Not perhaps what their e-commerce whiz kids intended.

- All examples of geographic and mapping ignorance welcome at [editor@pvpubs.demon.co.uk](mailto:editor@pvpubs.demon.co.uk)

# news & people



*Above: thinkWhere's new management team.*

currently available, greatly improving the way insurers assess flood risk at the individual address or building level.

## PEOPLE

### New management team

Independent GIS consultancy thinkWhere has announced three new members of staff, who will form its new management team. **Andy Morris** is commercial manager, **John MacLeod** is product manager and **Moira Woods** is business support senior administrator. With continued growth in the GIS and location-based services market, they join the company at an exciting time to progress development of thinkWhere's cloud GIS platform, products and services.

Andy Morris, formerly with STV Group, has extensive knowledge, experience and expertise in digital media and e-business. He will be responsible for the continued growth of thinkWhere's commercial strategy. Meanwhile, open source technologies and architecture are a speciality of John MacLeod's, having worked across multiple sectors and channels in a number of roles including product architect, consultant, software engineer and project manager. He has responsibility for the company's technical strategy and product development.

Moira Woods has an extensive background in project

support with over ten years' experience of working in contract administration, and also running her own successful business abroad.

**Alan Moore**, chief executive, adds "I am delighted to have our new management team in place. . . We have an ambitious business plan defined with many goals and aspirations to achieve over the next five years. With many talented employees our new appointments are aimed at speeding up the company's movement to its next phase of innovation and growth."

### GeoPlace joins National Apprenticeship Scheme

"Taking on an apprenticeship has been a life changing experience and the right decision for me" says **Firaz Iqbal**, an IT support technician who recently joined GeoPlace under the Government's Apprenticeship Scheme. Faruz and colleagues **Luke Sisterson** and **Lee Smith** have joined GeoPlace,

which was looking to expand its team and wanted committed, ambitious people who realised the value of combined theoretical and practical training to progress their careers. The formal training received as part of the government funded scheme helps develop both technical and soft skills, with regular assessor visits to keep things relevant and on track.

### New faces at Carter Jonas

Carter Jonas has strengthened its GIS and mapping team with the appointment of **Andy Williams** as partner, head of GIS and mapping, and the addition of five new recruits. A fellow of the Royal Geographical Society and chartered geographer, Andy joins from the British Army where he served for 18 years, most recently at the Royal School of Military Survey in Thatcham as a senior instructor. He was also chief geographic officer for the MOD's support in the 2012 Olympics.

Also appointed are **Gemma Young**, **Michael Lelliot** and **Laura Witherford** as mapping technicians. **Lucy Wenzel** has joined as land referencer, and **Jess Hall** who has relocated from the Shrewsbury office to join as land referencer. They join **Ian Macey**, associate, who will continue to run the land referencing and boundary surveys, and **Kathryn Upson**, mapping technician, to bring the national GIS and Mapping team to eight.

*Below: GeoPlace's national apprenticeship scheme members.*





*Adena Schutzberg has worked in geospatial technologies for 25 years and is principal of ABS Consulting Group, [www.abs-cg.com](http://www.abs-cg.com). [adena@abs-cg.com](mailto:adena@abs-cg.com)*

SINCE THE DATA INCLUDED LOCATION DETAILS a few teams started mapping. After a good deal of searching, I found just a few maps. Clearly, the nature of the site and the challenges of accessing the database kept the wary away. Tecnológica, an IT shop based in Spain, took on the challenge and made what turned out to be the viral and highly-referenced map on the topic.

I have to give the Tecnológica team members credit: they mapped the data with care and chose themes that were interesting enough, but not too interesting. The map included just two layers: the gender ratio and number of users for each included city. The creators stripped out identifying information and omitted cities with fewer than ten users. There are 50,000 points reflecting the roughly 30 million AshleyMadison accounts in the database. Tecnológica reports the mapmakers spent eight hours building the online map, using CartoDB technology.

It turns out the locations of members could be determined in two ways. One was from the location information used when they signed up. While they may be accurate, those city and country names may well have been consciously mis-represented. A second location for each

be spoofed, too. Tecnológica chose to use IP address locations.

The map became widely popular and Tecnológica CEO Jorge Gutiérrez was quoted around the world. He noted he didn't expect such an interest in the map and confirmed how most people used his company's map: they looked at their location. News outlets did the same. Here's a headline from Lansing, Michigan, USA: Website: 28K Ashley Madison users in the Lansing area. And, here's one from a paper in India: Adultery Site Ashley Madison Had Thousands of Members from India. And, one from a regional UK paper: Cheshire names in Ashley Madison hack. These three articles, and some 2000 other stories, referenced the Tecnológica map.

I watched carefully to see if CartoDB, would make any comments. Best I can tell, it did not. To its credit, it did not censor the map either.

### What can we learn from the Ashley Madison data mapping efforts?

- If there are interesting data with location information, someone will map them. Even with a touchy subject, if the data are open, someone will create and share a map.

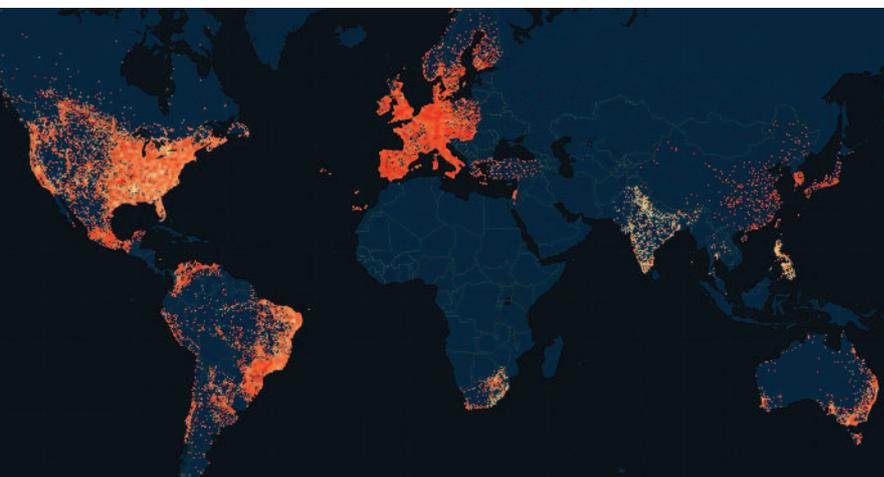
## Mapping what no one else wants to map

In July and August of this year the world was pre-occupied with the Ashley Madison data breach. Hackers broke into the adult focused site and threatened to leak details of the membership if the parent company did not shut down both Ashley Madison and a companion site. The demand was not met and the hacking team made the data available in August, reports **Adena Schutzberg**.

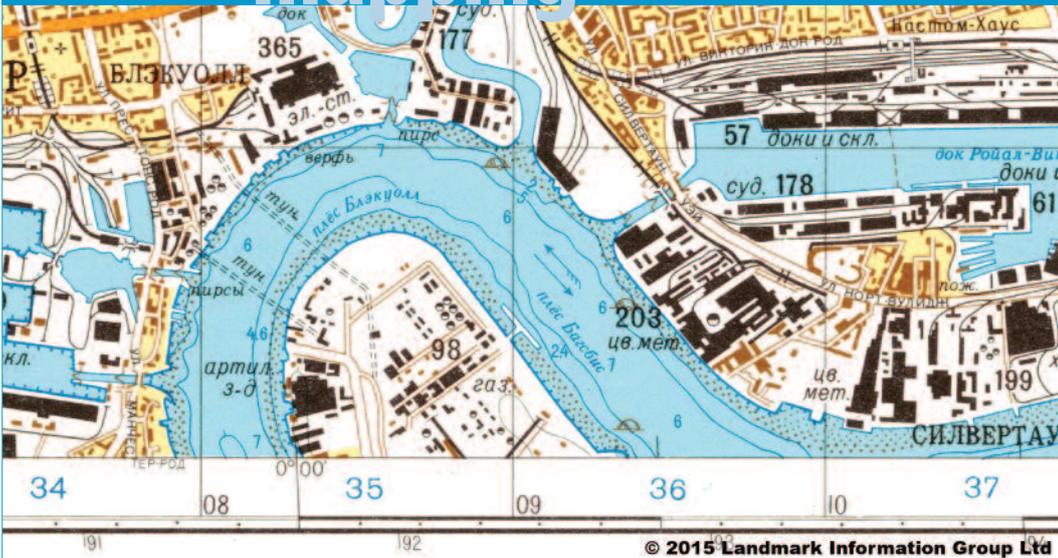
registrant could be pulled from the IP address of the device from which they signed up. Those can

- One of the maps will win. Tecnológica's map was prettier and perhaps more interactive than the others I saw. The timing of publication, very close to the date of the corrected second data dump, likely gave it a head start.
- The media will offer more large scale maps than large scale ones. All news is local!
- If the topic is a flash in the pan, the maps will be, too. Comments on the map's website and links to it in news stories peaked in the week of the data dump. Both then fell off quickly.
- Technology providers will chose to associate themselves, or not, with the topic or map. I suspect, even this risqué topic helped get CartoDB's name out.
- Map makers do not have to explain why they decided to make the map. Tecnológica did not. It did however tag a blog post about the making of the map with "crazy projects."
- Maps are a way to talk about a topic without really talking about it. The articles about the map allowed the media to address a risqué topic in a safe and analytical way.

**Below: World wide distribution of AM users and male to female ratio. (Red: More than 85% are male. Yellow: More than 85% are female). To view the map online visit <https://tecnologica.cartodb.com/maps>**



# cold war mapping



*A well known part of London mapped by the Soviet Union's military.*

AS EVERY GIS PROFESSIONAL WILL CONFIRM, the basis of any successful project is founded on the quality of the mapping data used. As a nation, we are fortunate to have access to a huge repository of Ordnance Survey maps that range in detail, complexity and age.

Here at Landmark, our geographical information database has become one of the largest of its kind in Europe, holding approximately one billion active features and receiving updates to over four million

Having obtained the images, we were impressed by the exacting level of detail included. Available in 1:5,000, 1:10,000 and 1:25,000, it begs the question as to not only why the maps were created, but how they were developed. It is the level of exacting detail that really has created the intrigue.

They include many features that are simply not present on Ordnance Survey maps from the same eras. In fact, at the time, Ordnance Survey was not obliged to include over 5,000 'nationally sensitive' features. In

## The mystery of Russia's Cold War mapping

During the cold war period the Soviet Union created highly detailed mapping of the UK, often including features omitted from contemporary large scale OS mapping. But why did they do it? Today this enigmatic mapping remains a useful resource in tracing the history of sites prior to re-development. **Martyn Lufkin**, data team leader at Landmark Information explains.

features every month. One set of historical maps, which Landmark was the first to digitally capture and geo-reference, stand out from all the others due to an incredible sense of intrigue and mystery that surrounds them: Russian Military Maps of Britain.

Recently profiled as part of a documentary on BBC's *Timeshift* series, the Russian Maps originally came to light in the late 1980s. Mapped between 1950 and as recently as 1997 during the Cold War by the Soviet Union military, 103 areas were mapped, covering 80 towns and cities. It was during this time that Britain's security was considered to be under potential threat from the Soviet Union.

**A by-product of research** Landmark's involvement with the Russian maps started as a by-product of some research that had originally been undertaken to source and capture Goad Fire Insurance Plans. We discovered that Russian maps existed and so investigated further to identify a source. Initially we were looking for paper maps, but found a supplier who could source high resolution digital images.

obvious contrast, the Soviet maps included such details.

Look-out points, military installations and sensitive industrial sites are all visible. They were plotted with exacting measure, with specific military buildings clearly on display, through to the inclusion of precise details even down to prominent trees or other landscape features.

The maps also include data related to energy and infrastructure networks, including road width information, road surface materials, load-bearing bridge capacities and even details of underground networks, gasworks and more.

Move off-shore and the precision continues with information recorded relating to the depth of channel clearance, speed of flow and whether the river is tidal.

**Anecdotes abound** Whilst we can all speculate as to what the maps would be used for, we are not aware of the original plans for the maps, or how the information was actually gathered. There are anecdotal stories of Russian's being based on-the-ground to capture information, including stories of

“

*... it begs the question as to not only why the maps were created, but how they were developed.*

”

them pretending to be fishermen on the coastlines in order to measure sea depths, or having picnics close to military sites pretending to be sightseers, whilst all the while plotting key data. This is, of course, anecdotal and no proof has ever been identified. There are also suggestions that data was taken by the Luftwaffe during World War II, as well as aerial imagery from satellites. This however is again speculative and not proven.

The maps are written in the Cyrillic alphabet with town names transcribed phonetically. While the maps are accurate, there has been some translation issues that have come to light over the years. Some 'lost in translation' instances include 'Her Majesty's Theatre' on Haymarket in London being incorrectly listed as the 'residence of the Queen and Prime Minister'!

### No grid so geo-referencing a challenge

Looking back, there were some initial obstacles in digitally capturing the full maps. For example, they weren't projected onto National Grid tiles, meaning Landmark had to geo-reference the maps using a combination of current mapping, and, where this proved difficult, using mapping of a similar age.

Finding points of similarities, such as corners of buildings or road junctions, all helped in positioning the maps accurately and in line with other mapping.

Once quality assessed, the more arduous process of capturing all numbered points and coloured polygons took place. This included translating them into English using the key supplied, before they were categorised into broader groups to assess contaminative risks.

The geo-referencing process took approximately three months from start to finish, and a further six months to run the contaminative points and polygon capture.

Today, the maps play their part: they help to complement other maps that are available, by providing a wealth of information that land, property, environmental professionals can use to compare or make judgements relating to the history of a site and its impact on current projects. It is possible to cross-analyse all map data together, and build a really clear picture of the land's past use in order to determine or manage any risks related to the site, for example.

For map fans like me, the Russian creations really are hugely interesting. Landmark is in a privileged position of having the unique access to the digitised maps, and as such our clients are able to benefit from the exacting details – as well enjoy sharing the intrigue and swapping stories on exactly how they were made and came to light.

• For more information go to [www.landmark.co.uk](http://www.landmark.co.uk)

**“**  
**Today, the maps play their part... by providing a wealth of information that... professionals can use to compare or make judgements relating to the history of a site...**  
**”**

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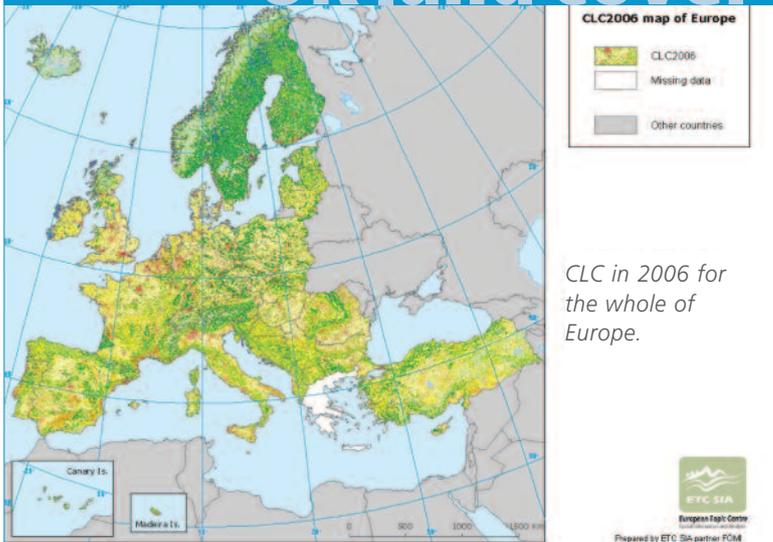
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**11**

# mapping UK land cover change



OVER THE LAST 30 YEARS THE CORINE Land Cover (CLC) map has become the de facto standard for land monitoring across Europe. CLC was born out of the Coordination of Information on the Environment (CORINE) Programme proposed by the European Commission (EC) in the mid-1980s. CORINE overall aimed at gathering information relating to key environmental issues and thus supporting priority topics for the European Union (EU), such as land take, coastal erosion, biotope definitions, etc.

The land cover component of CORINE was designed to provide consistent localized geospatial information on the land cover and land use of the Member States (MS) of the EU based on Earth Observation (EO) data. The CLC map specification has remained relatively fixed since its establishment and provides a pan-European

## UK land cover change and CORINE

Keeping track of land cover change is essential for governments and planners in the EU. For the UK this can only be done through Earth Observation techniques. Dr **Geoff Smith** explains how a land cover map has been continually updated for more than three decades.

inventory of land cover and land use, using a hierarchical nomenclature with 44 classes at its third level.

The map product is made up of vector polygon features with a minimum mapping unit of 25 ha and minimum feature width of 100 m which roughly equates to 1:100 000 scale. Over the last three decades there have been four CLC maps representing the status of the European landscape in 1990, 2000, 2006 and most recently 2012. To improve the estimation of change the CLC maps have been accompanied by a CLC-Change product since 2000, which uses the same nomenclature, but records features as small as 5 ha. The CLC is produced by each MS, the project is overseen by the European Environment Agency (EEA) and technical support was provided by the European Topic Centre on Urban, Land and Soil systems (ETC-ULS).

**Adapting to change** Over such a time period the CLC has adapted to both developing technology and changing organisational structures. In 1990 CLC was produced by a hand-drawn interpretation of printed Landsat 5 ~ 30 m spatial resolution multi-spectral images onto large acetate sheets, which were later digitised into a GIS system. By 2000 this approach had been superseded by computer-aided on screen interpretation, which was developed further until in 2012 when a dedicated software system became available including links to GoogleEarth and the use of multiple layers of satellite imagery and ancillary data to support the interpreters.

Once the initial products (e.g. 1990 status) had been prepared in a conventional mapping sense, change-only updates were the main approaches to revision. In this way the updated product was generated by combining the previous map and the changes. Alongside this change-only update some MS also developed bottom-

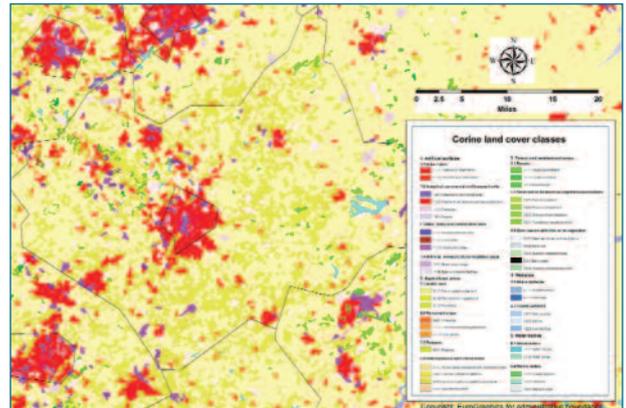
Corine land cover classes	
Table showing classes for the CLC map 2012	
<b>1. Artificial surfaces</b>	
<b>1.1 Urban fabric</b>	
1.1.1. Continuous urban fabric	
1.1.2. Discontinuous urban fabric	
<b>1.2 Industrial, commercial and transport units</b>	
1.2.1. Industrial or commercial units	
1.2.2. Road and rail networks and associated land	
1.2.3. Port areas	
1.2.4. Airports	
<b>1.3 Mine, dump and construction sites</b>	
1.3.1. Mineral extraction sites	
1.3.2. Dump sites	
1.3.3. Construction sites	
<b>1.4 Artificial, non-agricultural vegetated areas</b>	
1.4.1. Green urban areas	
1.4.2. Sport and leisure facilities	
<b>2. Agricultural areas</b>	
<b>2.1 Arable land</b>	
2.1.1. Non-irrigated arable land	
2.1.2. Permanently irrigated land	
2.1.3. Rice fields	
<b>2.2 Permanent crops</b>	
2.2.1. Vineyards	
2.2.2. Fruit trees and berry plantations	
2.2.3. Olive groves	
<b>2.3 Pastures</b>	
2.3.1. Pastures	
<b>2.4 Heterogeneous agricultural areas</b>	
2.4.1. Annual crops associated with permanent crops	
2.4.2. Complex cultivation patterns	
2.4.3. Land principally occupied by agriculture	
2.4.4. Agro-forestry areas	
<b>3. Forests and semi-natural areas</b>	
<b>3.1 Forests</b>	
3.1.1. Broad-leaved forest	
3.1.2. Coniferous forest	
3.1.3. Mixed forest	
<b>3.2 Shrub and/or herbaceous vegetation associations</b>	
3.2.1. Natural grassland	
3.2.2. Moors and heathland	
3.2.3. Sclerophyllous vegetation	
3.2.4. Transitional woodland shrub	
<b>3.3 Open spaces with little or no vegetation</b>	
3.3.1. Beaches, dunes, and sand plains	
3.3.2. Bare rock	
3.3.3. Sparsely vegetated areas	
3.3.4. Burnt areas	
3.3.5. Glaciers and perpetual snow	
<b>4. Wetlands</b>	
<b>4.1 Inland wetlands</b>	
4.1.1. Inland marshes	
4.1.2. Peatbogs	
<b>4.2 Coastal wetlands</b>	
4.2.1. Salt marshes	
4.2.2. Salines	
4.2.3. Intertidal flats	
<b>5. Water bodies</b>	
<b>5.1 Inland waters</b>	
5.1.1. Water courses	
5.1.2. Water bodies	
<b>5.2 Marine waters</b>	
5.2.1. Coastal lagoons	
5.2.2. Estuaries	
5.2.3. Sea and ocean	

up generalisation approaches where more spatially and thematically detailed national land cover / land use datasets were transformed into the CLC specification. In this way a large pool of experience and best practice has been compiled to support the development of future European land monitoring concepts.

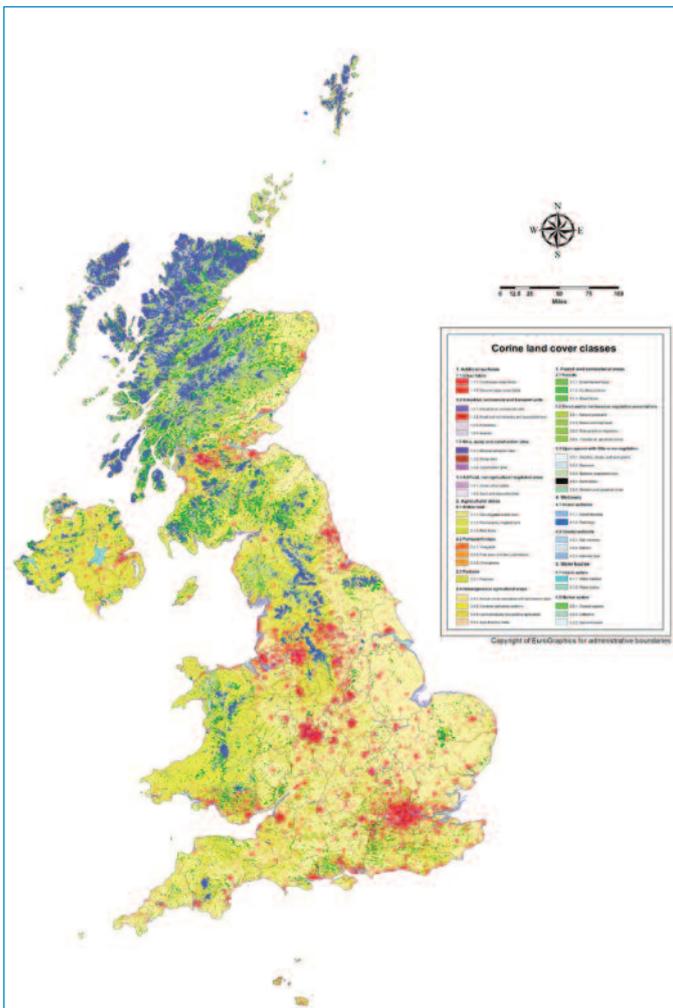
**More countries today** As well as technological developments, CLC has undergone a number of organisational changes. Primary amongst these has been the increase in the coverage of the product as more countries joined the EEA, which now has 33 member countries and six cooperating countries. This has required the development of sophisticated documentation and guidelines and the establishment of a dedicated support team for the large number of production teams and operators involved in the process.

The CLC production has also developed and adopted a number of centralised activities such as the provision of satellite imagery for all MS and the pan-European aggregation and validation of products into a seamless end result. In 2012 CLC was taken under the wing of the Copernicus Land Services. The Copernicus programme is

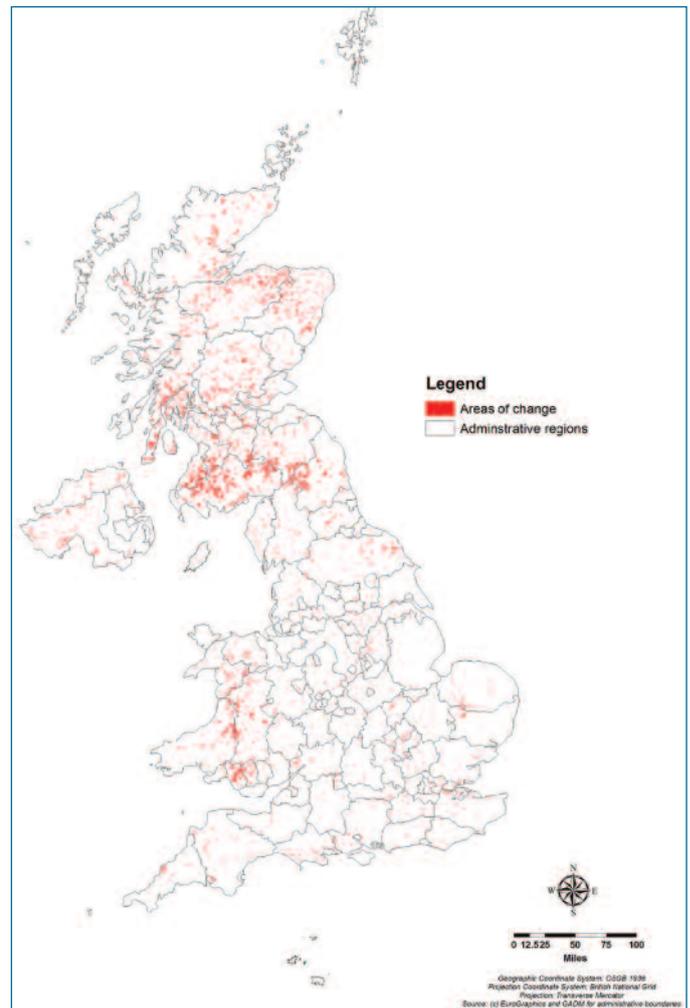
*Right: extract from CLC2012 showing the landscape around Leicester.*



the European EO programme involving both the provision of satellite images, through the Sentinel constellation, and information products, through a series of services. CLC is now part of the continental land services along with a set of other complementary land surface products. CLC therefore continues to be a key database for integrated environmental assessment and support for EC policy and is likely to remain so in some



CLC map for 2012.



CLC map showing change from 2006 to 2012.

# mapping UK land cover change



## About the author

Dr Geoff Smith is a director at Cambridge-based EO consultancy Specto Natura. He has been involved in EO for almost 30 years within academic, government and commercial environments including blue-skies research and applications. He is now heavily involved in the Copernicus Programme with a particular focus on land applications.

form for the short to mid-term.

A team at the University of Leicester, supported by Specto Natura Ltd, have recently completed the most recent update of CLC of 2012 for the UK. The interpretation of satellite images took two years and was carried out by a small team led by Prof. **Heiko Balzter** with funding from the European Union and the UK Department of Environment, Food and Rural Affairs (Defra). For the reference year 2012 the CLC status layer represents the only land cover information available for the UK and at the scale of 5 ha the CLC Changes map provides an important source of land cover and land use change information between 2006 and 2012.

**Habitat loss highlighted in UK** The most dominant land cover type in the UK in 2012 remained agricultural land, followed by forest and semi-natural vegetation. Artificial surfaces represent only 8% of the country with the majority being urban settlements. The results from the CLC-Changes showed an area of 225,200 ha (or 1 % of the total area of the UK) had experienced a change in land cover or land use from 2006 to 2012. Although a total of 167 different types of change were seen from the satellite images, the UK changes are dominated by forest management, therefore their concentration is higher in Scotland and

Wales, following the general distribution of managed forest. On a much smaller scale than the forest changes, the key finding of the update was an apparent loss of semi-natural habitats, agricultural land and wetlands nationally, much of which is being converted to urban development. An interesting change was a significant amount of conversion of upland coniferous forest to industrial areas mainly in Scotland related to the development of windfarms. Also, over the whole CLC time series it appears the rate of conversion of land to sport and leisure facilities – mainly golf courses at this scale – continues to decline.

Although not always considered a first choice resource at the UK level with other competing products, the CLC time series of status and change information is now becoming a powerful record to support environmental assessment and policy development within a European context. The adoption of CLC within the Copernicus Land Services will open many more opportunities for the development of applications based on European products with relevance at the UK level and below. The Copernicus Land Services will be officially launched at the 'New horizons for European and Global land monitoring' event in Copenhagen in October demonstrating the long term commitment to the CLC and Copernicus Land Services in general. More at:

<http://land.copernicus.eu/event>



**FOLLOWING THE RECENT LAUNCH of Eircodes, the Republic of Ireland's new postcode system, an enhanced dataset has been released by Mapmechanics allmapdata team, including map coordinates for all addresses plus free boundary data for principal post towns.**

The new dataset is ideal for any business delivering to homes or businesses in the Republic, and is also invaluable for business intelligence activities, insurance premium calculation, rural service provision and mailing for marketing applications.

Until this year there were up to 600,000 street addresses in the Republic (more than a third

of all addresses) that were duplicated. This made it difficult to automate delivery scheduling, and to use address data in computer-based business planning and analysis or GIS. The new codes, developed by the Irish Government, has tackled this problem by allocating individual codes to all 2.2 million Irish addresses. Their use is not compulsory, but the expectation is that they will be adopted quickly throughout the business community.

In some respects Eircodes are more precise than the UK's postcodes, which mostly apply to groups of properties. Each seven-character alphanumeric Eircode is unique to a single premise. In

blocks of flats, each individual flat has its own code. This makes the codes particularly accurate for delivery management, and for very precise business analysis and planning.

The allmapdata Eircodes dataset includes location information in both Irish National Grid reference and latitude and longitude. Addresses are included in both English and Irish, and the data identifies the DED (district electoral division) in which it lies, together with other details for each premise. Not only is the data invaluable in its own right; it also enables users to link addresses with other Irish datasets held at different levels of geography. The data therefore represents both a compelling aid to delivery scheduling and an effective analytical tool.

The first three characters of each Eircode make up a "routing key", containing details of the post town applying to the address, while the final four digits represent a unique identifier for each property. A typical code looks like A65 F4E2.

However, Eircodes do not include any equivalent to the sector, district and area information incorporated in UK postcodes, which positions groups of addresses within their broader geographical context. To make the new codes more effective in thematic mapping and analysis (for instance, for shading the areas covered by groups of codes), the allmapdata team has created boundaries for each of the 3-digit routing keys. These created boundaries represent 139 principal post towns. This makes it possible to shade the mapping thematically at principal town level. These polygons have been included in the dataset free of charge.

• Details of the Eircodes from allmapdata dataset are available on the allmapdata web site, [www.allmapdata.com](http://www.allmapdata.com), and the allmapdata team can advise and assist customers on the most effective way to apply the new Eircodes in their business.



THE STATISTICS ARE STARTLING. Almost half of all humans now live in cities and by 2050 this will be between 65-75% of us. Worldwide, the urban population is growing by the equivalent of the population of Birmingham a week. The population of London is growing by one full tube train every three days. These statistics were presented by keynote speaker and former MP **Dan Byles** (Living PlanIT), at the AGI Geo:The Big 5 Future Cities Security event in London on 9 July. Set in a workshop-style

individual data be utilised, while at the same time offering protection and security?

There was a recurring reference to the citizen or social aspects of urban design throughout the event, which was very thought-provoking and refreshing for what could have been a very technology-driven agenda. While **Dan Byles** and others urged those running our cities using this technology to understand the citizen and develop efficient and resilient services, others spoke of the importance of a bottom-up approach.

**Liane Hartley** (Urbanistas UK) made the case that the role of the community as the "client and commissioner" in the Future City was vital but often missed. Dr **Wallis Motta** (London School of Economics) described work to explore differences between asset perceptions using digital connectivity within multicultural London. A deep

## A path to resilience: the "Geo" in Future Cities

A recent event in London as part of AGI's "Big 5" debate series heard a stimulating line-up of speakers issue some stark statistics and warnings for cities, reports **Abigail Page**.



... recognise the opportunities of using the connectedness of the city and disruptive technologies to bring vital improvements. . .



• **Abigail Page** is an elected member of AGI Council and AGI Honorary Secretary 2015. In her day job, Abigail is a Senior Business Consultant for global IT firm CGI.

atmosphere, the event allowed for deep debate and contribution from a diverse audience.

Delegates were certainly of no doubt that, whilst there is an enormous challenge facing all of us, the potential for us to exploit geospatial technologies to form part of the solution is huge. Event chair **Doug Specht** (University of Westminster) programmed presentations reaching well beyond a niche of geographic information professionals and into a far range of applications to demonstrate the potential for the industry arising from the future development of our urban places.

**A need for a virtual infrastructure?** Urban living has intrinsically many infrastructure challenges – demonstrated on the day by the disruption caused by a tube strike! But, many of the speakers encouraged delegates to recognise the opportunities of using the connectedness of the city and disruptive technologies to bring vital improvements to our city infrastructure. This ranged from the need for a virtual infrastructure to match the physical (**Timo Tuukkanen**, Bentley) to subsurface interactions (**Stephanie Bricker**, BGS).

**Gary Grant** outlined the momentum around Green Infrastructure with inspiring examples from rain gardens to green roofs. The initiatives, assisted by detailed spatial analysis, not only provide resilience against warming and flooding but also create an attractive place for living. The point made on the use of attractive terminology (rain garden vs sustainable urban drainage system) also prompted me to think about the wider importance of communication in adopting new technology.

**Engaging the citizen** Marginalised groups always pose challenges – and perhaps more so now. How can the individual be encouraged to contribute, and

debate followed on the need to consider not only the physical side of geography in our work, but also social geography. This particularly focused on the needs to provide the tools to engage positively (sometimes "by stealth"! ) in addition to the opportunities.

**The city is alive** In his closing notes from the event, Doug Specht outlined the perceptions in literature of cities as "an extreme of crumbling society". Perhaps George Orwell's 1984 is now less fiction and increasingly moving further into reality. The ability to geo-locate and use intelligent technology to track and follow is with us.

How we use this to build resilience however is still developing. Doug picked up a key theme from the day: the "living city" – the ability for the city to provide something for everyone and be resilient in an ecological sense as well as being a great place to live. His appeal for us to continue to be critical while strategically optimistic, with geospatial at the heart has the potential to find solutions.

Personally, I feel that the opportunity to take a step back and reflect on the potential within a bigger picture was incredibly helpful. The themes from the day will continue to feed and stimulate industry discussions which will also be evident in the forthcoming AGI Foresight Report. As the series now begins to pull towards a finale, with the AGI annual conference in Warwickshire, key points from the five debates will lead us to meet and challenge our "Resilient Futures". What does geographic information have to offer and what are the opportunities we should be reaching for?

• The presentations and audio from this event are available to all AGI members through our website, <http://www.agi.org.uk/>

## AGI GeoCom 2015



THERE ARE FIVE MAJOR CONSTANTS in the AGI's flagship annual conference formula. First, the vast majority of attendees get a lot out of the event both professionally and socially. This is confirmed by delegate surveys, anecdotally in discussion and by fact that the series is now over 25 years old. Secondly, since its inception over 25 years ago, it has evolved with the trends and expectations of the time. Thirdly, it is shaped by individuals within the GI community who volunteer their time and effort to work with AGI staff to shape the event. Fourthly, it has always been carefully crafted to offer diverse content which is current. And finally, it has

never actually performed what I have been asked to do, which is to review the 2015 event as a third party. What now follows aims to set-the-stall-out for 2015 and I'm very grateful to **Claire Gilmour**, AGI event manager and Rollo Home, this year's GeoCom chair for providing useful information to help build this article.

**The role of GeoCom in 2015?** Throughout the year AGI has been running what it calls "The Big 5" event programme, an approach that was trialled successfully in 2014. The concept has been in the words of the AGI: "to offer a forum for the diverse (and sometimes insular) geospatial industry to come together and share innovation and solutions across disciplines".

This year the five-way focus has been on Smart Energy; BIM – the next level; Sensors and Mobile; Future Cities – Security and finally Big Data & You. Whilst each subject has merited a day's events somewhere in the UK, GeoCom offers a two-day collective residential gathering to focus on Resilient Futures, a theme that has appeared throughout the 2015 programme and is central to the Big 5 listed above.

GeoCom tends to base itself around a successful

## GeoCom - Resilient Futures: a preview

**Where:** Chesford Grange, Kenilworth, CV8 2LD **When:** Monday, 23rd to Wednesday 25th November 2015  
Former AGI chief exec **Chris Holcroft** introduces this year's event and talks to GeoCom chair **Rollo Home**.

always aimed at offering good value for money with low delegate fees. This is enabled by the sponsorship and support of businesses within the GI market.

Today the event is simply and succinctly called 'GeoCom'. I've been involved with the conference on and off since 1995, as an exhibitor, as part of the organising committee and finally between 2007 and 2013 as the senior responsible officer tasked with ensuring the event was as much a success as could be achieved for all involved.

But having seen it from without and within, I've

delivery venue for a number of years before moving-on. This year's return to Chesford Grange Hotel in Warwickshire will be the 2nd year the venue has been chosen to help maximise the opportunities for debate, engagement and collaboration.

### Who's been putting the programme and conference together?

The high quality of the conference programme shaped by the AGI has been through the use of a committed group of volunteers from diverse backgrounds. As a team, they work throughout the preceding months along with the permanent AGI staff who focus on logistics and delivery. This formula has been around for many years and has the strength of largely retaining volunteers who then develop great conference running experience by volunteering for more than one conference (in some cases many conferences), but also there is sufficient churn of places to bring new enthusiasts in to the team alongside the veterans.

This year sees a good mix of keen veterans and new faces and they all deserve recognition. Note that being a New AWG Volunteer may not mean an individual hasn't volunteered extensively in other areas of the AGI's work (See table opposite)

What now follows is a structured series of questions I put to GeoCom 2015 Chair, **Rollo Home**, with his answers.

Name	Organisation	AWG Vet / New AWG Volunteer
Rollo Home	Ordnance Survey	AWG Vet
Emma Bee	British Geological Survey	AWG Vet
Zoe Briggs	Canal & River Trust	AWG Vet (returning after a break)
Anne Campbell	Land and Property Services	New AWG Volunteer
Jeremy Hilderly	AECOM Ltd	AWG Vet
Duncan Hill	Europa Technologies	AWG Vet
Andy Murdock	APMgeo	AWG Vet
Jeremy Murfitt	Everything is Somewhere Ltd	New AWG Volunteer
Abigail Page	CGI	AWG Vet
Mark Percival	David Lock Associates	AWG Vet (returning after a break)
Conor Smyth	EDINA	New AWG Volunteer
Doug Specht	VOZ Geographic Information Systems	New AWG Volunteer
Derek Tate	Warwickshire County Council	AWG Vet
Matt White	Ordnance Survey	AWG Vet

### What is the thinking behind the conference theme 'Resilient Futures'?

We live in a time of unprecedented change, and put simply, Resilience is the ability to maintain continuity through disruption, while also increasing our capacity to adapt. So in this world of increasing populations and urbanisation, diminishing natural and financial resources, and a backdrop of a changing climate, our ability to maintain, and even improve, our quality of living will depend entirely on our ability to adapt to these changes.

The role of geospatial sciences in understanding and managing these phenomena are apparent. But new technologies, in particular in data capture (Internet of Things & Sensors) and analysis (Big Data), offer us new opportunities to work and manage our infrastructure. Nonetheless, these same technologies are also disrupting our industry, and opening-up new opportunities to existing as well as new players in the market. New business models will inevitably impact our markets, and that impact could be in a negative way unless we learn to be resilient, and adapt. Resilient thinking therefore needs to be at the root of everything we do going forward – for our clients and ourselves.

### Tell me more about the keynote speakers and why they were invited?

As it is a world of change - we're delighted to have the new CEO's of Esri UK (**Stuart Bonthron**) and Ordnance Survey (**Nigel Clifford**) presenting their future visions for their respective companies. It is exciting times for both these principal sponsors, companies that, I'm pleased to add, have long supported GeoCom. In addition we have **Mark Bew**, Chair of the Government Task Group on BIM and author of the Digital Built Britain Strategy (DBB). The Level 3 DBB project is a joint Government – Industry programme designed to define and deliver a catalyst for a digital economy in the built environment. As such it's one of the largest examples of market adaption currently with annual savings to UK government in the region of £1.2bn per annum already. Sir **Alan Wilson**, the Chair of the Government of Science committee on the Future of Cities will also be providing a contextual overview. And, as we had last year, there are some more unexpected speakers, which are to be announced shortly... but I can tell you that **Peter Gibbs**, Met Office and popular BBC weather man will be providing us with a unique insight into weather adaption.

In addition to the key notes, we also have a wide range of invited speakers. Most, if not all, of the conference sessions are being hosted by one of the AGI Special Interest Groups (SIG) that will be presenting a range of speakers, or panel debates on the key issues relevant to their areas of interest. There are also sessions from the Eclipse Foundation, The Standards Forum and the Defra Network.

**What general conference content and activities are available (for example, conference streaming, hands-on sessions, etc)?** The main

conference covers two days, with the first focused on some of the relevant 'ingredients' needed by the geomatician of today. This includes sessions on Big Data, Internet of Things and Earth Observation, where we examine the changes that these new types of sensors will inevitably bring to the data landscape. We will also look at the role of Visualisation and effective ways to communicate the new complex datasets that we are now all collecting. Policy is a continuing theme as we look at the context that our industry has to operate within (for example, can we really continue to ignore INSPIRE as we near the next Phase 2 milestone?), as well as the influence we can have on informing decision makers. There are also some perennial issues such as core referencing geographies (hosted by the AGI Addressing SIG).

The second day is where we examine the resultant 'cake' from these ingredients with tracks focused on the Smart Citizen (Privacy, Risk), Smart City (Infrastructure and Energy Management) and Smart Environment (Marine and Land & Property). A number of the themes identified from the GeoBig5 events held throughout the year will be explored in these sessions.

A number of the sessions will be active Big Debates where a chair will seek the views of panel members on specific topics. We're hoping for some lively discussion and lots of audience participation. And to keep the pace up, there are a number of lightning pitches – 15-minute slots (the perfect length of a presentation according to TED – [www.ted.com](http://www.ted.com)). In addition to the conference sessions, there are hands-on training opportunities from Esri UK, Ordnance Survey and we're really pleased to welcome back Kingston University. People will be able to book their place on the training on the day.

### What networking and social opportunities are there?

In a word? Lots! In response to direct delegate feedback we have extended the refreshment periods and lunch – not because people want more coffee or food, but because they want to talk. In addition there are three more formal evening sessions that people are encouraged to meet old and new colleagues:

- Monday night is the official launch dinner of the AGI Foresight 2020 Report that examines the key issues which AGI considers will have a significant impact on the economy, environment and society – providing both challenges and opportunities – over the next five years. The evening will be a chance to hear from the editors and some of the authors and to discuss the findings and their implications. It's the perfect start to the conference theme!
- Tuesday night is our Gala night where we're asking delegates to test their wine and chocolate tasting skills!
- And Wednesday night is our Annual Awards Dinner (<http://www.agi.org.uk/componentcivicrm/?task=civicrm/event/info&Itemid=238&reset=1&id=29>) which we're really pleased to be able to announce



*"... new technologies, in particular in data capture (Internet of Things & Sensors) and analysis (Big Data), offer us new opportunities to work and manage our infrastructure."*

Rollo Home,  
GeoCom 2015 Chair.



**... there are a number of lightning pitches – 15-minute slots (the perfect length of a presentation according to TED. . .)**



# AGI GeoCom 2015



*In response to delegate feedback lunch and coffee breaks have been extended to allow more time for networking and to meet up with colleagues old and new.*

that Professor **Iain Stewart** (@Profaiinstewart) will be hosting again for us.

Additionally, there are some excellent spa and fitness facilities which are available to those staying on site (see <http://www.qhotels.co.uk/our-locations/chesford-grange/> for details). Finally if you're a runner, bring your kit as there will be an early morning 'meeting' on the track (something that started last year possibly under the influence of our guest speaker **Mara Yamauchi**).

**Who should attend and why?** There is literally something for everyone at GeoCom. From those starting out in their careers to the seasoned professionals, the content is wide enough and diverse enough to offer new insights and perspectives on the industry. We have also worked to generate content that might appeal more broadly to those outside our immediate industry, but have an interest in what geospatial can offer to manage this ever increasingly complex world.

**How many delegates is the conference aimed at?** As a residential event the intention has always been to keep the delegate numbers at a level where networking and engagement is maximised. As numbers grow it becomes harder for that sense of dialogue to be maintained. As Chair I am very keen that the conference is not just a place to be lectured at, but that there is active participation and a sense of purpose and outcome from the two days (the Big Debate sessions should really help us in that regard). But having said that we are able to accommodate 500 before our events manager starts getting too nervous!

**What would you like delegates to get from the event? Are there any fundamental messages the conference wishes to articulate?** What I would personally like people to take from the event is a sense of excitement about the future of this industry. Change is inevitable; with disruption touching just about every walk of life, there is no reason to assume that our world will not be rocked by new technologies and a changing set of contexts. But with that change comes real opportunity and I hope that as an industry we can identify the positive and work collaboratively to meet the challenges.

**Can attendees get CPD points?** We are very keen to support our members in their Continuing Professional Development, so the conference is eligible for 4 points/day, 7 for the whole conference (and an extra point for hands-on training sessions). However, in addition to that we are working with the recently formed AGI Early Career Network (ECN:) to provide additional opportunities for people to present at conference. A number of 15 minute 'lightening talk' slots have been reserved for ECN members to present

(on any GI related topic of their choosing). The speakers will then be able to receive feedback and advice on their presentation style from a trained instructor. If any readers want to know more about the ECN please visit: <http://www.agi.org.uk/news/agi/800-calling-all-early-career-professionals>

Finally I'd like to remind people that there are numerous opportunities to get involved with the conference by volunteering for a wide range of roles (see: <http://www.geobig5.com/index.php/conference/volunteer.html>). This is an excellent way for anyone to get to meet a wide range of people and get truly engaged with the discussions in and around the event.

**I see there's an exhibition, are exhibitor places still available? What would you like to say to anyone thinking of exhibiting?** We have been working hard with the Suppliers SIG and Sponsors (<http://www.geobig5.com/index.php/conference/list-of-sponsors.html>) to ensure that the event offers the best opportunity for our delegates to meet and talk to our exhibitors. To that end we have increased the area given over to the exhibition, as well as introduced an 'Innovation Theatre' stream. This integrated conference stream is a space for exhibitors to focus on their products and demonstrate the commercial and technical advantages they offer. Both the Innovation Theatre and the exhibition itself are accessible for free, but you will need to register (see <http://www.geobig5.com/index.php/conference/booking.html> for details)

**Is AGI still helping potential delegates with communicating the ROI of attendance to employers?** We fully understand that two days out of the office for a conference is a big ask and for that reason we've focused very hard on the relevance of content to anyone working in the geospatial industry, from those that seek to understand the seismic industry changes occurring, to those that want to get to grips with the latest functionality being offered by the leading GI vendors. There really is something for everyone. And to that end we are providing useful tools to help delegates make their case to their line managers (see: <http://www.agi.org.uk/about/resources/category/84-2015?download=117:geocom-justification-letter>). At a time when all our costs are rising, the conference continues to offer exceptional value for money above and beyond anything else in the market.

**And finally. . .**

Just reading the AGI website, depending on which option to attend, prices range from free passes to enter just the exhibition through to rates (depending on status) for part of the conference, to very good value all-in packages to access everything the conference offers content wise, plus the social programme, food, refreshment and two night's accommodation.

To stay ahead, keep an eye of the conference details at the AGI website: [www.agi.org.uk/events](http://www.agi.org.uk/events)



**... we have increased the area given over to the exhibition, as well as introduced an 'Innovation Theatre' stream.**





Above: Smart City figure. Image courtesy Steve Liang.

OUR ABILITY TO COMMUNICATE, integrate and use “where” information has steadily improved during the last 20 years of advancement in geospatial standards. European standards experts have played an increasing role in this progress, and Europe is taking advantage of these standards, often ahead of other world regions.

In 1994, the same year that ISO/TC 211 began its international standardisation efforts with a strong European leadership and a multi-nation de jure process, the not-for-profit Open Geospatial

organizations chair a number of OGC Domain Working Groups and Standards Working Groups and are leading international efforts in the OGC to advance interoperability in these areas. European members provide leadership in OGC’s MetOcean and Aviation communities. Important international standards such as the OGC 3D Portrayal and CityGML Encoding standards and Web Coverage Service Interface Standard are largely being advanced by the European community.

OGC’s newest Strategic member (Ordnance Survey) is very interested and active in Future Cities. The OGC Smart Cities Spatial Information Framework includes standards being developed to further integrate IoT, sensor feeds, augmented reality, models and forecasts into city management, planning and futures forecasting. Among other European goals,

## Europe’s growing role in geospatial standards

Bart De Lathouwer, director, interoperability programs OGC & Athina Trakas, director of European services OGC, explain the growing role of geospatial standards in Europe.

Consortium (OGC) was founded with principally North American membership. The OGC began working with industry to directly address geospatial interoperability needs of industry and government. The two organizations have worked together and with other standards organizations since then to grow a consistent international standards platform that maximises opportunities for development of interoperable geospatial products and services.

Europe is now heavily represented in the OGC, with 208 of the OGC’s 518 members. European and UK

these standards relate directly to the goal of achieving energy conservation and alternative energy alignment to meet the 2030 European Commission targets.

The British Geological Survey (BGS), which in September hosted the OGC’s Technical Committee meeting, is a long time member of the OGC. BGS has been a leader in international efforts such as OneGeology to advance interoperability across the world’s national geologic surveys, leveraging open standards and encodings to align geological data across different data models and languages.

## Future Cities Pilot brings OGC Interoperability Program to Europe

The OGC in collaboration with buildingSMART International (bSI) invites organizations to join Ordnance Survey in sponsoring a Future Cities Pilot to catalyze urban progress in Europe through better location information sharing.

Pilot sponsors establish requirements in areas such as:

- **Citizen services: optimization of municipal services using spatial information made available to all platforms: home, office, mobile.**
- **Disaster and emergency management: through response centres equipped with a geospatially enabled Common Operational Picture**
- **Energy and utilities management through open standards based implementations for smart energy and smart water management.**
- **Urban maps using the richest 3D city models; sharing data through CityGML and IndoorGML open standards; convergence to a standard for indoor venue maps; interoperability with BIM**
- **Sensor Webs providing ready access to dedicated, operational sensors and contributed citizen sensing. Increased situational awareness from fusion of sensor observations.**

Future Cities Pilot participants will then demonstrate how

the sponsors’ requirements can be met using existing standards and, in many cases, off-the-shelf products.

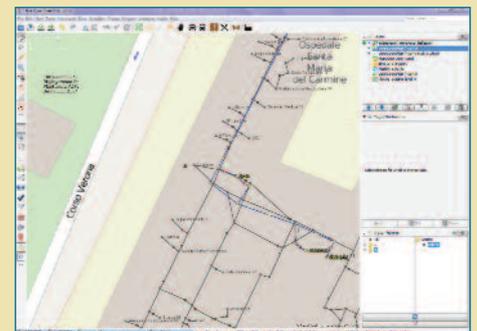
OGC’s 208 European public sector, private sector and academic members look forward to this pilot and other OGC Interoperability Program testbeds, pilot projects, and interoperability experiments in Europe in the future.

The OGC has for many years participated as a project partner and advisor in EU funded projects and in international projects, such as the GEOSS Architecture Interoperability Pilot, in which Europe has played a leadership role. In one current project, for example, the UNCAP advisory board consists of two OGC members and an OGC staff person.

Through OGC interoperability initiatives, EU funded projects can be made more persistent and reusable. Project results are well documented and preserved online as a resource for follow-on activity. With the support of the OGC, a well established public-private partnership, EU funded project results are positioned to be taken up by a much broader group of organisations and businesses, regionally and internationally.

The OGC works with many other international standards organizations. bSI is working with OGC on the Future Cities Pilot as well as on bSI’s recently announced

IFC Alignment – their first open BIM (Building Information Model) standard for infrastructure such as roads, bridges and tunnels. bSI is also collaborating with OGC on a new candidate standard – the OGC InfraGML Encoding Standard – that provides a use-case-driven subset of LandXML functionality but which is implemented with the OGC Geography Markup Language (GML).



Above: The i-locate portal, which implements the OGC IndoorGML Encoding Standard – see recent OGC Blog posts and the i-locate site: <http://www.i-locate.eu/>

# GI insider **Dave Lovell**



*Left: David Lovell, Executive Director of EuroGeographics.*

AT THE END OF A CAREER when asked to 'reflect' it's quite normal to look back. Forty nine years, which is how long it has been since I started working as a surveyor for Ordnance Survey, gives plenty of scope for that! During that period I can think of a myriad of exciting and rewarding experiences working with countless wonderful people. Looking back however would be a wasted opportunity, unless of course it gives some insight to and guidance for our future. None of us can change the past, but we each have the opportunity to influence change in the years to come.

unexpected if not unintended consequences: its greatest achievement is the cooperation it has stimulated between national public bodies and the coordination of related geo-spatial activities within EU Member States, EFTA and many more countries who have voluntarily adopted similar measures.

But, whilst providing a vital contribution, INSPIRE does not go far enough in delivering what users, including the UN and its Member States, need - a single source of dependable geospatial information. Europe is therefore fortunate to have EuroGeographics and the European Location Services, which I expect them to launch soon. These will be based upon the developments of the [www.elfproject.eu](http://www.elfproject.eu), which delivers a single online point of access to INSPIRE compliant, Europe wide, up-to-date, authoritative, interoperable, cross-border reference geoinformation on harmonised licensing terms.

I may be leaving EuroGeographics but with such exciting developments, and so many opportunities for the geospatial community, I think I will just be moving on.

#### About the author

Dave Lovell is Secretary General and Executive Director of EuroGeographics, representing 60

## Influencing change in the future As Dave Lovell

retires from heading Eurogeographics he reflects on a career that began 49 years ago as a surveyor for Ordnance Survey GB and an important date for the geospatial community.

There are many important dates in the history of mapping, cartography, cadastre and related sciences and activities. In the future, I think 2nd August 2015 might just be seen as one of the more important dates in the continuous progression of the geospatial community. That is the date on which the Member States of the United Nations agreed the wording of the report Transforming Our World: the 2030 Agenda for Sustainable Development. In it, at paragraph 76, you will find the following:

*"We [the UN] will promote transparent and accountable scaling-up of appropriate public-private cooperation to exploit the contribution to be made by a wide range of data, including earth observation and geo-spatial information. . ."*

Note carefully, whilst the UN will promote the data; it is the geo-spatial community which will have to deliver!

**A good foundation** In Europe, of course, we have a good foundation for the delivery of geo-spatial information with the INSPIRE directive. INSPIRE, it seems to me, started a chain reaction with

national mapping, cadastre and land registry authorities in Europe and is President Elect of the Global Spatial Data Infrastructure Association.

He started his career with Ordnance Survey (Great Britain) and spent 40 years with them in a variety of roles in surveying and sales & marketing. He concluded his time with OSGB as head of public affairs. This role incorporated delivery of the Corporate Social Responsibility programme, including support for formal education, and developing a positive profile of Ordnance Survey with its many stakeholders in parliament, government, the private sector and wider community. He has been on the Council of the Association for Geographic Information (AGI) and was a member of the Steering Committee of the Intra-governmental Group for Geographic Information.

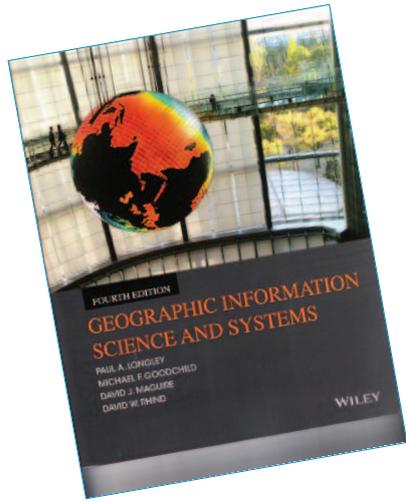
He is an Officer in the Order of the British Empire (OBE), a Fellow of the Royal Geographical Society (FRGS) and a Chartered Geographer (CGeog). He is a volunteer with The War Graves Photographic Project

Dave is married with two sons, one currently studying for a Masters degree in International Politics at Queen Mary University of London the other, one of two founders of Hillbreak.



**. . . its greatest achievement is the cooperation it has stimulated between national public bodies and the coordination of related geospatial activities. . .**





## Well written and evidenced update for the "GIS Big Book"

THERE'S A LOT OF GOOD HISTORY behind this weighty, but welcoming and colourfully presented text. A media review 14 years ago earned the first edition of *Geographic Information and Science* the perceptive quote: "Once in a generation a textbook appears which redefines its field and becomes the standard for years to come. This is such a book." This effort was built on solid foundations. The 2001 text's four already highly acclaimed expert authors – Longley, Goodchild, Maguire and Rhind – had previously co-authored the classic *Geographical Information Systems* from 1991. This text was so well recognised that at the time it was dubbed the "GIS Big Book".

Four editions later, (the last being published in 2010), widespread recognition, plus sales of over 80,000 copies (according to four-time foreword writer, Joe Loble) have cemented this text as the defining reference work on the scientific principles behind the use of GI Systems in a multi-disciplinary environment. The fourth edition seeks to maintain that position, but also to bring things up to date and re-structure the layout of the book to better serve readers five years on, where factors like attention to Open Data and Big Data have developed, the use of mobile devices has exploded and crowdsourcing has become well established.

Eagle-eyed readers and pedants

will observe the shift in part of the title from "*Systems & Science*" to "*Science & Systems*". The authors convincingly say the deliberate shift echoes the revision of the layout. Loble wittily calls it a "goof" and reckons publishers Wiley wouldn't shred the print-job on the strength of it. I think the former is the truth and the latter will fuel the 'down-the-pub' version that will endure in GI trivia chats over a 'geobeer'.

On to more serious things. The Wiley website literally gives chapter and verse on the extensive content of *Geographic Information Science and Systems*, so repeating that here at length isn't necessary. That said, the high level structure is one of the book starting with an introductory section on *Geographic Information: Science, Systems, and Society*; followed by a section on Principles, namely: The Nature of Geographic Data; Representing Geography; Georeferencing and Uncertainty. The next section Techniques, sweeps in GI Software; Geographic Data Modeling; Data Collection; Creating and Maintaining Geographic Databases and The GeoWeb. A section on Analysis includes Cartography and Map Production; Geovisualisation; Spatial Data Analysis; Spatial Analysis and Inference and Spatial Modelling with GI Systems.

That content alone, which is well written and evidenced, makes for a superb overview of what *Geographic Information and Systems* are all about and justifies the popularity and appeal of the book. However, the final sections Policy, Management and Action and Epilog: GISS in the Service of Humanity really round off the book well and firmly place it as a 'go-to' source of information and insight across the whole GI Systems spectrum. The Epilog is forward ranging, but not in the sense of technology, rather in indentifying how and where the GI community can use its skills,

knowledge, data and technology to help broader societal challenges. Big issues like population growth, poverty, hunger; environmental problems, security and so on. As the book stresses on p.452, war-fighting for example, has often been triggered by competition over access to food, drinking water or boundary disputes. It's extremely geographical stuff. To my mind, this section helps answer the 'GI? So what?' questions that those outside our profession can and will ask when we, as GI practitioners, wish to demonstrate our value and purpose.

The penultimate section on Policy Management and Action covers Managing GI Systems; Information and Decision Making along with Navigating the Risks. The latter being things such as legal, regulatory, media, trust, privacy and ethical matters. Essential stuff; GI is not all route-optimization and coordinate transformations. There is also an amusing, yet highly important, section therein on Coping with Spatial Stupidity. I won't spoil the read, but couldn't resist pulling just one quote out: ". . . spatial stupidity exists everywhere and is manifested without the help from technology" (p432).

The book can be used for reference, being well indexed, as well as featuring a useful glossary (intrigued to see MIDI listed in there). I will certainly use it to dip-in-and-out-of in my own GI work. So-called Application Boxes and Technical Boxes are sprinkled at pertinent points within the book's sections. For example, a box on Gerard Mercator rests in the sub-section on Projections & Coordinates. The text can also be worked through completely, or in sections. Each section includes additional study questions to ponder at the close, as well as further reading sources. The book is also complimented and supported with

online supplementary learning, presentation and instruction materials stored on the Wiley website.

There is additionally a biographical context throughout where notable figures from diverse backgrounds in the world of GI are profiled. I also think it is a thoughtful and fitting touch that the 4th Edition is dedicated to Roger Tomlinson, the "Father of GIS" who passed away in 2014. I'd had the pleasure of both meeting him and reviewing two of his books.

The authors, the 'gang of four', (who look very well in the 'band photo' on the back cover), can be thanked for bringing their classic work forward, were it will remain, I'm sure, the essential GI science and systems text for years to come.

For those already in possession of an earlier copy, it is likely you will need to think about doing an upgrade. For new students and entrants into the world of GI, this is a superb reference and learning tool.

One area of concern I have relates to the purchasing options. If the information given by Wiley, the publisher, is correct then the E-text is by far the most cost effective route and, it seems, the option it is pushing hard. The paper-back is attractively laid out, colourful and appealing, but the £160 price tag is an enormous difference from £33.33 for the electronic copy. Hard-copy printing, distribution and so on, increases production costs, but to this magnitude? Perhaps I'm reflecting my well-entered middle-age and drawing a conclusion not shared in the market place? But I do know I'd prefer the paperback option, but not for an almost five-fold mark-up.

Finally, I do hope Wiley don't want my review copy back, because I found that after a paper absorption test with red wine, the copy is now diminished to 'used, one careful owner' status.

Review by Chris Holcroft

# INSPIRE phase 2



**Benjamin Allan (left) explains that INSPIRE Phase 2 is the next logical step.**

TO UNDERSTAND WHAT INSPIRE is all about, you need first to understand the needs of the typical user that INSPIRE was designed for. Do this and all the strange technologies and requirements will suddenly make sense.

INSPIRE wasn't designed as a transparency tool but as a way of improving and enabling cross-boundary projects. Think of a new train link from Budapest to Barcelona. To plan this route the engineers will need to

which is now live and creating this type of value and impact. As the UK's largest publisher of Annex III data, we are able to see what data is being requested and published and it is obvious that INSPIRE is now starting to have the effect that it was designed for.

**What is Phase 2?** So if there is a Phase 1, there must be a Phase 2? Correct. Phase 2, which is now due, is the next logical step. If we consider our engineers, they have this great catalogue but all the schemas of all the different datasets are different. This means a huge amount of translation work and potentially the risk of errors as the data is interpreted differently. What would help is for all the data to be translated, just once, into a standard format by the data owner. This would mean that the translation was accurate, not translated multiple times downstream, and the whole ecosystem would be saving time and effort. This is the thinking behind INSPIRE Phase 2.

## INSPIRE Phase 2 Understanding the complexities and benefits of INSPIRE at first sight is not easy. Benjamin Allan of miso unravels the tiers of datasets needed to fulfil this pan-European initiative, how it will help the lives of ordinary citizens and where we will go next with the second phase.

build a library of thousands of different datasets. They will need to know information such as where people live, what land is used for, where power comes from and what other resources are available. This is a mammoth task in itself but now imagine doing it across seven nations and ten different languages: almost impossible and hugely expensive.

Now imagine that same task but with a pan-European catalogue of all the appropriate datasets with one common form of index. This catalogue would describe what was available, who owned it and how to contact them in one consistent way. It might also give them a glimpse of what the data might look like and perhaps a chance to use some of it in a limited manner. Consider how much easier the engineers' task now is and how much more likely that project is to succeed.

What I have just described was Phase 1 of INSPIRE,

**Timetable** The INSPIRE Phase 2 deadlines require you to transform your data sets into an INSPIRE compliant GML format and then publish it. The Annex III deadline of October 2015 is for all new or heavily revised datasets and December 2020 covers all Annex III datasets.

**How can I do this?** There are two key ways to approach this: A long way that might be perfect and a short way that will get you over the line. The long way would be to:

- **Download all the annex schema specifications** – there are 27
- **Interpret them using the guides** – often over 500 pages long each
- **Match your data to the different schemas**
- **Build the schemas using an XML builder**

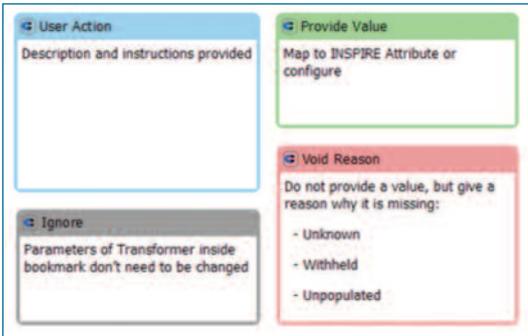
As ever at miso, we always like the simplest way to get over the line, which is why we suggest you take a shorter path:

- **Match your data to a schema using our matching matrix** – it is very likely that you may only need one schema
- **Use an options map to only complete the minimum information** – all schemas have data entry options that enable you to enter a lot or a little information. You need to identify these options.

Below is an example of how our workbenches split out these options. These options refer to one feature (left), and then you are presented with three choices;

```
<?xml version="1.0" encoding="UTF-8"?>
<gml:FeatureCollection xmlns:gml="http://www.opengis.net/gml/3.0" xmlns:slu="http://inspire.eu.ec.europa.eu/schemas/slu/3.0" xmlns:ogc="http://www.opengis.net/ogc">
  <gml:boundedBy>
    <gml:Envelope srsName="EPSG:4326" srsDimension="2">
      <gml:lowerCorner>50.7422584988143 -6.2496589328077</gml:lowerCorner>
      <gml:upperCorner>50.906521722834 -5.98711147752996</gml:upperCorner>
    </gml:Envelope>
  </gml:boundedBy>
  <gml:featureMember>
    <slu:ExistingLandUseObject gml:id="id75a641eb-6c43-44bd-9ab5-c8a3158ec52b">
      <gml:description>Burdies Chase</gml:description>
      <slu:inspireId>
        <base:Identifier>
          <base:localId></base:localId>
          <base:namespaceDotted:Base Allotments</base:namespaceDotted:Base:namespace>
        </base:Identifier>
      </slu:inspireId>
      <slu:beginLifeSpanVersion nilReason="unknown" xsi:nil="true"/>
      <slu:geometry>
        <gml:MultiSurface gml:id="id75a641eb-6c43-44bd-9ab5-c8a3158ec52b-0" srsName="EPSG:4326" srsDimension="2">
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            <gml:surface gml:id="id75a641eb-6c43-44bd-9ab5-c8a3158ec52b-1">
              <gml:patches>
                <gml:PolygonPatch>
                  <gml:exterior>
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                      <gml:posList>50.9057455166651 -6.1239746853573 50.9021578861084 -6.1236549686229 50.9019569997643 -6.12393
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                  </gml:exterior>
                  <gml:interior>
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  </gml:featureMember>
</gml:FeatureCollection>
```

not add anything but provide a reason, add additional information or simply pass (below).



- Use a transformation tool to automate the process – we use FME, but whatever you choose make sure it can save your schemas workflows for your data updates
- Re-use that transformation tool elsewhere in the organization – we love the poetry of DEFRA funding you to invest in a data management tool that makes your day job much better
- Do the whole process in a regional work group – it’s much easier to go through this as a work group so that any changes made later on will be much easier to face as an established team

**Publishing** Authorities are required, as part of Phase 1, to publish data using an OGC 2.0 WFS. It is not clear that the newly created GML should replace the original data as the source of this WFS. The OGC WFS is a standard that the majority of GIS software solutions can consume. Therefore converting your shiny new GML to this format will add little to its usability, though there will be some additional feature definitions.

Instead, if we think about our engineers, they are likely to want to download datasets so that they can work on them internally; in which case the GML makes sense as it overcomes the classic SHP/TAB interoperability issue. So perhaps it is better published as a download, assuming the user has software that can consume INSPIRE GML.

**Summary** INSPIRE Phase 2 is a very sensible requirement from a central European perspective. A UK view will inherently see less value but it can still help in large cross-boundary projects.

The schemas are complex and difficult to manage but a simplified, team-led approach can lever standard technologies to make it relatively painless and leave the authorities with technologies and capabilities that can create far greater value in the rest of the organisation.

**“ . . . a simplified, team-led approach can lever standard technologies to make it relatively painless. . . ”**

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Above: Under-Secretary-General Wu Hongbo presenting an Award of Certificate of Appreciation to Dr Vanessa Lawrence.

The meeting follows a set agenda, with formal papers published in advance. We consulted with a range of key stakeholders across not only Westminster but also the devolved administrations and UK industry. This included central government departments such as the Cabinet Office and Defra, the Scottish, Welsh and Northern Ireland Assemblies, and RICS and AGI. The Policy and Engagement Team at OS then drew all the responses together into briefing notes that were used during the session.

During the session, agenda topics are introduced, either by leaders of the Working Groups, or by Member States with a significant interest in the topic; the floor then is open for general debate and discussion. Formal interventions

## The importance of geospatial information at the United Nations

The Fifth Committee of Experts on Global Geospatial Information Management (UN-GGIM) meeting was held in New York during August 2015. **James Norris** reports.

FOR THOSE WHO ARE NOT AWARE UN-GGIM is a formal part of the United Nations system with a mandate from the Economic and Social Council (which alongside the General Assembly, Security Council and the International Court of Justice, make up the main bodies of the UN). This short report isn't about UN-GGIM as an organisation, if you'd like more information then drop us an email at [policy@agi.org.uk](mailto:policy@agi.org.uk) or look at these FAQs at <http://ggim.un.org/about.html>

Unlike many conferences and events UN-GGIM operates at a political level rather than organisational, and attendees are nominated by - and represent - their Member States. The UK delegation comprised **Peter ter Haar** (Ordnance Survey), **Ian Coady** (ONS) and myself. Other UK representatives included **Vanessa Lawrence** (co-chair of UN GGIM) and **Louise Brooke-Smith** (immediate past-president, RICS). UN GGIM provides a forum for discussions at a strategic level on topics relevant to the geospatial industry, such as legal and policy frameworks, international standards, the global geodetic reference frame, to name but a few. The full list of topics, and the papers discussed can be found on the UN-GGIM website - [http://ggim.un.org/ggim\\_committee.html](http://ggim.un.org/ggim_committee.html)

**So how did we represent the UK?** UN GGIM is now in its fifth year of existence. Over this time, we at OS have taken the lead in coordinating activities relating to UN-GGIM. This has included working very closely with colleagues across government, both in Whitehall and at the UK Mission to the UN in New York to ensure that UK is properly represented.

can be made by representatives of Member States – this is where the briefing notes come in. Some of the topics have a wide scope and potential impact, such as legal and policy frameworks, so a considered and balanced approach was taken reflecting the views of the wider UK.

**Okay, but what did we achieve?** The primary achievement for UN GGIM was the continued support and backing of Member States to advance and promote the importance of geospatial information to senior policy and decision makers. UN-GGIM has also made significant progress in a number of topics including the adoption of a UN General Assembly Resolution for a Global Geodetic Reference Frame. The resolution is the first of its kind to be agreed by the UN and recognises the global importance of location and positioning for many different areas of development. Also adopted were important guidelines for international geospatial standards, and examples of good practice. This is an area where the UK, through its work with Ordnance Survey International and the Kingdom of Bahrain, was cited as a global example of cooperation and partnership.

Other key achievements related to sustainable development and the post 2015-sustainable development agenda, as well as the application of geospatial information to land administration and management. Both of these provide opportunities for the UK to take an active lead as thought-leaders. The final outcomes document for the session has recently been published on UN-GGIM website and can be viewed here.

“

**... the first of its kind to be agreed by the UN and recognises the global importance of location and positioning. . .**

”

**Future Trends** Another key topic that was discussed was the adoption of the Second Edition of the report "Future Trends in geospatial information management: the five to ten year vision", the draft of which can be seen here.

OS authored the first version which was published in 2013 and has been translated into all six official UN languages plus Korean and Japanese. At its fourth session the Committee decided that an update of the Future Trends report should be completed in 2015. The second edition of the report has also been produced by OS. And as well as exploring new areas, highlights changes to the trends identified in the original report, showing how the role of governments is changing, and documenting the increasing role of data collection technologies and processes.

The 2015 version of the Future Trends report observes that in a world which is increasingly driven by the consumer, the most significant geospatial information changes will not come through singular technologies, rather the linking of multiple technologies and policies. The updated report explores these ideas through a series of themes, focusing on four emerging and developing trends: Artificial intelligence and Big Data; Internet of things and smart cities; Integration of statistics and

geospatial information; and, Indoor and outdoor mapping. The report has taken into account submissions from representatives from UN Member States as well as individuals and organisations from across the world. As lead author, I would like to thank those who provided submissions, participated in workshops and reviewed the final version of the report. Thank you.

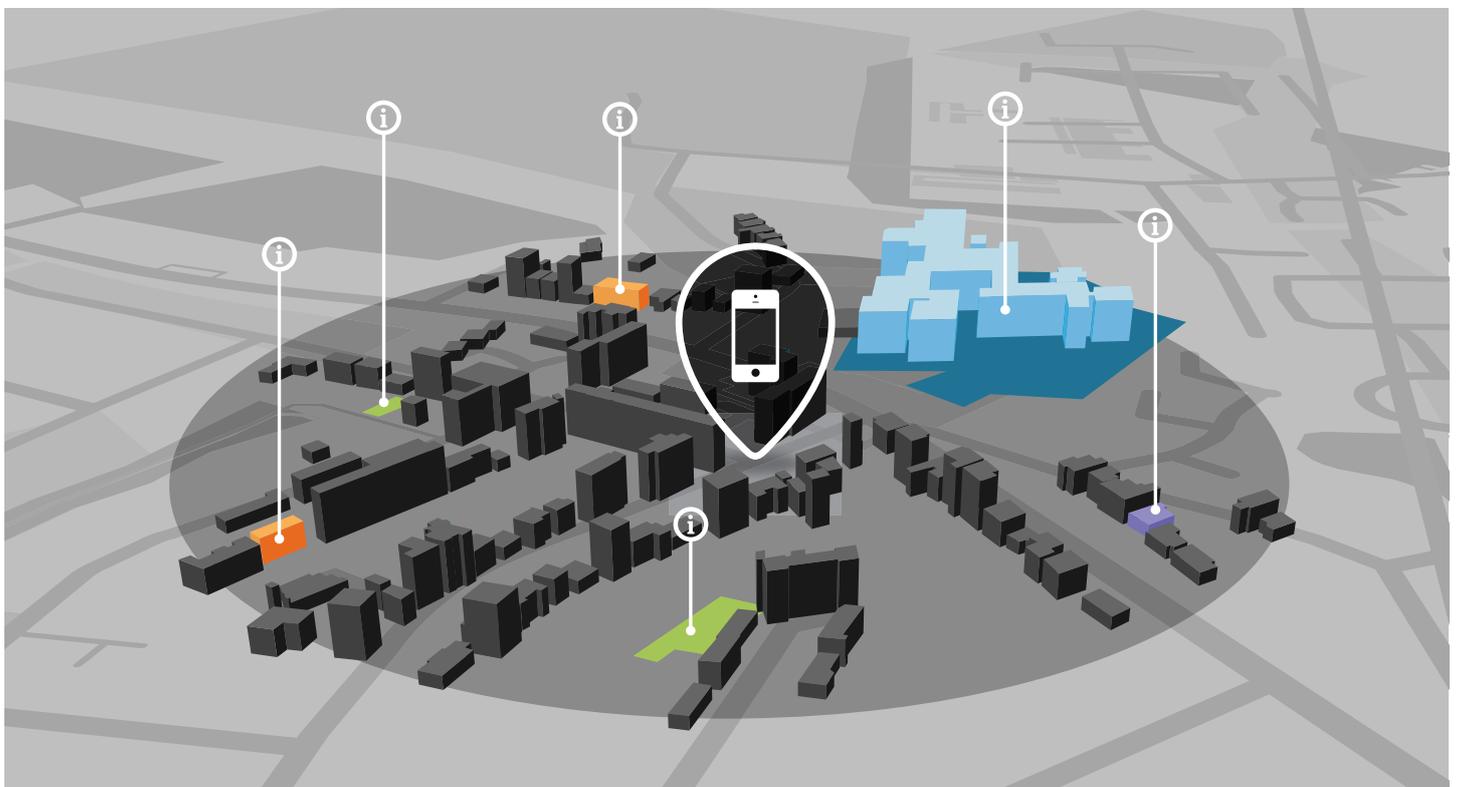
It would not be right to finish this report without mentioning the work over the last five years of Ordnance Survey's former director general and chief executive, Vanessa Lawrence, who stepped down from the role of co-chair at this meeting, a position she has held since 2011. In recognition of her work, a certificate of appreciation was presented to Vanessa by the under-secretary-general of the department of economic and social affairs, Mr **Wu Hongbo**. The write up of the presentation, and the text on the certificate, can be found here.

UN-GGIM continues to grow in both reach and influence across both the UN system, but also national organisations and governments. It was an honour to be part of the UK delegation to UN GGIM again this year, and I look forward to working with other government departments and organisation in the year to come as the UK continues its support for such an important topic going forward.



**About the author**

James Norris is OS Policy and Engagement Executive and Advisor to the UK Delegation to UN-GGIM.



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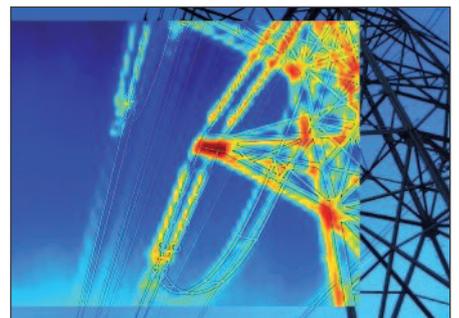
The TripleView head features a 180-degree vertical range of motion, 6x digital zoom, active gimbal stabilisation and, thanks to the eXom's shrouding frame design, an unobstructed field of view. The eXom is capable of achieving a 1mm still image resolution at a surface distance of 5m.



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• *Abigail Page is an elected member of AGI Council and AGI Honorary Secretary 2015. In her day job, Abigail is a Senior Business Consultant for global IT firm CGI.*

THE USE OF DRONES OFFERS a quick entry point for the remote capture of data. However, with a now bewildering range of solutions (hardware and software), combined with ethical and legal considerations, their use is not straightforward. AGI Scotland hosted an AGI Focus Event in July, supported by Edinburgh College of Art, to discuss and investigate the issues. With speakers including commercial operators and geospatial professionals, the event attracted a large and diverse audience.

**Equipment** The session, programmed by **James Reid** of EDINA, opened with a display of equipment from AGI members and speakers. This provided a great overview of current products. Evident in both the presentations and in the display, the rise of the micro-drone (sub 20 kg) has made a huge impact in the adoption of drones for low-cost data capture.

Almost all speakers debated the choice between

drone-specific insurance (ensuring the policy covers aviation incidents) was essential.

**Interpreting data** The flexibility of data collection over traditional remote sensing technologies (no waiting for breaks in the Scottish weather for your plane to take off!) is a huge benefit to researchers. **Alasdair MacArthur**, University of Edinburgh, described his particular interest in time-series data, which was now vastly more affordable. Alasdair provided an interesting overview on whether the data collected was suitable for Earth Observation research and the issues to be considered.

Both Alasdair and Pauline highlighted that many of the systems used to process data from drones is still relatively “black box”. For this reason, quantifying the sources of error and the accuracy of data collected can be challenging. In addition, distortion from many of the cameras used (designed mainly for quite a different

## Getting to grips with Drones

AGI members in Scotland recently had an opportunity to acquaint themselves with the geospatial opportunities offered by the growing availability of fixed wing and multi-rotor UAVs. **Abigail Page** reports.

fixed-wing and multi-rotor equipment. This was well summarised by **Pauline Miller** of the James Hutton Institute (JHI), which took into account a range of factors in identifying the benefits of each.

### Fixed Wing:

- Longer flight time and greater area coverage
- Advanced flight planning opportunities
- Will glide in case of failure

### Rotary:

- More flexibility on sensor mountings
- Vertical take-off and easier to fly
- Focused, low altitude acquisition (higher resolution)

Pauline covered the range of sensor options available, from multi-spectral (agricultural and land cover applications), thermal (building surveys and environmental) to Lidar (asset inventory, structural surveys).

Many at the event stated the low costs compared to other options, even with the costs of certified training or hire of a qualified pilot. However, it was observed that the skills required and maintenance costs were often underestimated when starting out.

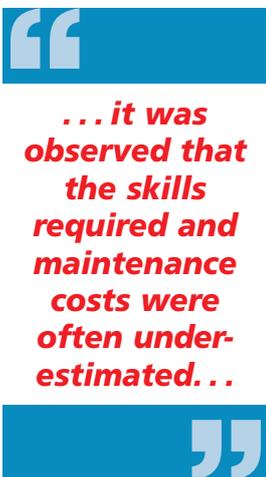
**Legislation** This was a common theme touched on by a number of speakers, in particular from the commercial operators (**Craig Jump**, Sky View Video and **Paddy Davies**, Horizon AP). While micro-drones which are flown below 400 feet for non-commercial purposes have only limited regulations to adhere to, going beyond this is a more serious undertaking as outlined by the speakers.

In addition to understanding and complying fully with the legislation set out by the Civil Aviation Authority (CAA), it was also recommended that

purposes) and the possibility of the point cloud being noisy and of low precision, are all potential issues. Using a high quality camera, a well-planned flight (ensuring overlaps and cross-strips) and the use of ground control points were all recommended. It's my view that this area will see the greatest impact from geospatial professionals' greater use of the technology – better understanding of the data becomes critical.

**Applications** Despite the issues cited on the interpretation of data, the range of applications demonstrated was limited only by imagination. JHI are predominantly using the technology for projects ranging from land cover and habitat classification, catchment morphology and flood-risk assessment to precision agriculture. Alasdair MacArthur described a research projects in Iceland and other environments which the University of Edinburgh are involved in. The commercial operators were involved in commissions for wildlife surveys (for example identifying and measuring individual seals in a population) to providing videos of the views from luxury Thames side apartments.

The most engaging applications though were outlined by **Paul Georgie** of GeoGeo, an advocate of lowering the barriers to the use of geospatial information. He demonstrated some incredible visualisations of urban Edinburgh and Glasgow but went on to describe his interest in humanitarian mapping and the use of drones in these more challenging environments. The ability to travel with a drone in hand luggage and deploy very quickly could provide a huge impact in a humanitarian disaster. Work is ongoing on how such applications (and resulting data) are co-ordinated, but the potential is truly inspiring.



*... it was observed that the skills required and maintenance costs were often underestimated...*

• *AGI Scotland are currently planning for their 2016 Annual Event, which will be held in March with a theme encompassing remote data capture and sensors. Details will be released shortly on the AGI website: [www.agi.org.uk](http://www.agi.org.uk)*

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## Smart search tool for LA's at GeoCom



November's GeoCom event will see several exhibitors launching new products and making presentations. One of the more significant debuts comes from Cadcorp, which has introduced Notice Board, a responsive smart searching product for local government websites enabling them to add a mobile-friendly spatial searching capability to their websites. The product has been developed on the premise that when people visit a council website, they are not browsing, but are looking for information about a particular locality – very often their home address or current location. For example, they want to know what day their green waste is being collected or they need the contact details of their councillor.

Notice Board addresses this need by displaying the information which is most commonly requested by visitors. It uses advanced spatial search techniques in order to generate personalised responses based on location; either an address entered by the user, or a geolocation captured by their mobile device. Search results are summarised as 'notices' pinned digitally on a single page of the website. Users can request more detailed information, including maps, by clicking on hotlinks within a notice. Notice Board detects when a website is being accessed from a mobile device, and adjusts the screen layout accordingly.

Cadcorp see Notice Board as a valuable extension to an existing council website by drawing dynamically from the spatial information the council already has in place to support local service delivery. Notice Board is a server based application and does not require any installation on PCs or mobile devices accessing the system.

In a sector which is having to do more for less, Martin McGarry, Cadcorp's MD, argues, "Notice Board provides an opportunity to improve a citizen's experience of accessing a local government website. In doing so it encourages online self-service as the channel of choice and offers the prospect of making a significant contribution towards reducing the cost of customer interaction."

- You can find more information about Notice Board, and an online demonstration on the Cadcorp website at <http://cdcp.io/nbd>

### UAV mounted LiDAR

Routescene has collaborated with Hanseatic Aviation Solutions to develop a LiDAR system mounted on a UAV. The maiden flight of the integrated Hanseatic S360 and Routescene LidarPod took place in July in Bremen, Germany to collect

3D point cloud data of the runway at Bremerhaven Airport. The lidar pod is mounted in the nose cone of the fixed-wing aircraft, which minimises the effects on the GNSS/INS caused by noise and vibration from the rear engine. The S360 has a wingspan of 3.6m and

can carry a payload of 6kg. It can operate in winds up to Force 7.

### Rotary-wing UAS for Europe

Topcon Positioning Group has announced the addition of a rotary-wing unmanned aerial system (UAS). The Falcon 8 - powered by Ascending Technologies - is designed for inspection and monitoring, as well as survey and mapping applications. The drone features an autopilot safety feature that provides three levels of redundancy for protection against performance drop or loss of control. Three IMUs synchronise all sensing data and identify, signal and compensate when needed.

### Disy's new mobile GIS

The recent Intergeo event in Stuttgart saw Disy Informations-systeme GmbH introduce a new version of its Cadenza Mobile GIS 2go, which allows GIS users to transfer their maps from Cadenza or ArcGIS for Desktop to their mobile devices and use them offline. They can also be made available to other users via the cloud. In addition to tablets, Cadenza Mobile GIS 2go also supports smartphones (iPhone or Android).

### Web map service for UKMap

The GeoInformation Group's UKMap Web Map Service (WMS) and Application Program Interface (API) is now enabling users to access highly-detailed, large-scale mapping of London. The service provides instant access to high-resolution aerial photography and base mapping of London that can be seamlessly integrated within existing applications.

### Access to over 200,000 Landsat Images

Data - Eternix Ltd has announced the availability of the Landsat database through Blaze Terra, allowing users to instantly review and analyze the data directly in a GIS environment. Blaze Terra gives

access to all of Landsat's 200,000 images with real-time updates ensuring the latest imagery is immediately at the user's disposal. Landsat images are represented on a global layer map, making it easy for users to work intuitively and spot areas of interest. Pinpointing a specific location, for example, returns all the Landsat imagery for that location. Search results are visualized as geospatial footprints within a split second, easing storage and facilitating effortless image management. A dynamic search toolbar enables users to query the set of images based on metadata information, cloud coverage, acquisition date, geographic area and more.

### Green GIS reduces data storage

Intergraph has announced a "Green GIS" initiative in Europe aimed at better energy-efficiency and climate-friendly IT processes by reducing data storage requirements. With the patented ECW (Enhanced Compressed Wavelet) data compression format that can reduce raster data by up to 95%, in combination with the new version of the ERDAS APOLLO application, Intergraph and its Hexagon Geospatial software offer a package that drastically reduces the volume of raster data and point clouds.

The move comes against an explosion in data volumes driven by the diversity of sensors which deliver an unprecedented flood of information. In addition, new geodata products with enormous demands on storage capacity and computing power are generated, such as 3D point clouds and pixel-clear digital surface models by means of the SGM (semi-global matching) algorithm. Modern satellites and drones produce data with great precision and in almost unimaginable volumes but this all needs to be processed, catalogued and delivered.

A recent project has shown that for 71 terabytes of image

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data at tile cache level 19 and 30 centimetres tile width, costs are reduced by 98 % through using ECW compression. Savings of up to 65,000 Euros per annum can be made for cloud server utilisation.

### Insurers gain 'detailed insight' from crime data

Insurers can gain ready online access to the risk of crime by postcode under a new "perils" model launched by emapsite. The service includes official police updates of property-related crime to the portfolio of risk data. The crime dataset incorporates a series of Home Office categories populated monthly by 43 police forces across England, Wales and Northern Ireland. They include burglary, arson, criminal damage, vandalism and theft.

### Keeping lone workers safe

Antris, one of the first Canadian companies to join the Esri Startup Program, has launched AntrisPRO, a cloud application that helps organizations increase the safety of travelling, work-alone and at-risk employees. The application uses ArcGIS to enable real-time mapping updates of employees' locations. Workers check in through their mobile devices and send automated notifications to supervisors when

they may be at risk.

"People are an organization's greatest asset. Whether they work around the community or out in remote areas, employers need to ensure that their employees are safe," said Kaila Beattie, president, Antris.

## BRIEFS

**Proteus, a provider of satellite derived mapping and geospatial services has launched a professional satellite image procurement service. Dedicated expert account managers provide customers with an end-to-end independent, fast and reliable sensor agnostic satellite image procurement service.**

Opti-cal Survey Equipment and GeoSLAM have formed a partnership to market the ZEB1 laser scanner, a handheld scanner which captures data in previously difficult surveying locations. Without the need of tripods or targets, the user can simply walk through the environment to be surveyed and rapidly capture scenes at more than 40,000 pts/sec. Raw scan data is then uploaded into the GeoSLAM Cloud where software converts it into a fully

## UAV flight restriction map



Aerial mapping company Bluesky has created a prototype map for the UK showing where it may be unsafe or even illegal to fly Unmanned Aerial Vehicles (UAVs). Bluesky has combined their expertise in flight planning and 3D aerial mapping with various geographic datasets to come up with the concept of a UAV Flight Restriction Map. Designed for commercial operators it includes 'No Fly Zones', areas where further advice should be sought as well as areas where no restrictions on flying are currently in place.

registered point cloud. More <http://surveyequipment.com>

**Swiss drone manufacturer senseFly has announced that its eBee fixed-wing UAV has become the first to be designated as a 'compliant small UAV' by Transport Canada, a distinction that moves organisations that use this drone a critical step closer to achieving compliant operator status.**

Arithmetica is making 3D model project collaboration easier by taking advantage of Sketchfab, the online platform for sharing 3D files. By automatically converting very large point clouds into manageable 3D models, at a fraction of the size, and uploading its Pointfuse Pro generated textured 3D models to Sketchfab, content can be shared and users can visualise their projects in true 3D.



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**OCTOBER 2015**

**Geo: Big 5 – Big Data & You**  
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**Esri European User Conference 2015**  
**14-16th October 2015, Salzburg, Austria**  
[www.esri.com/events/euc](http://www.esri.com/events/euc)

**Commercial UAV Show**  
**20-21st October 2015, ExCel, London, UK**  
[www.terrapinn.com](http://www.terrapinn.com)

**2015 Cyark Summit**  
**20-21st October 2015, Berlin, Germany**  
[www.cyark.org](http://www.cyark.org)

**Maximising Airborne ISR Strategy**  
**26-27th October 2015, Holiday Inn, London, UK**  
[www.smi-online.co.uk](http://www.smi-online.co.uk)

**NOVEMBER 2015**

**HxGN Live 2015**  
**18-20th November 2015, Hong Kong**  
<http://hxgnlive.com>

**The Capturing Reality Forum**  
**23-25th November 2015, The Salzburg Congress, Austria**  
[www.CapturingRealityForum.com](http://www.CapturingRealityForum.com)

**GeoCom: Resilient Futures**  
**23-25th November 2015, Warwick, UK**  
[www.agi.org.uk/events/calendar](http://www.agi.org.uk/events/calendar)

**AGI Awards for Geospatial Excellence**  
**25th November 2015, Warwick, UK**  
[www.agi.org.uk/events/calendar](http://www.agi.org.uk/events/calendar)

**DECEMBER 2015**

**GeoBIM Europe**  
**10-11th December 2015, Novotel, Amsterdam, Holland**  
[www.geo-bim.org/Europe/index.html](http://www.geo-bim.org/Europe/index.html)



## 2015 Geo: The Big 5 event programme

Following incredible success in 2014, the Geo: The Big 5 event programme is back, focussing on five developing sectors that will be central to the GI industry over the next few years.

### GeoCom: Resilient Futures - 23-25 November – Warwick

This annual flagship event will provide a climax for the 2015 event programme, bringing together the year's themes. Chesford Grange Hotel in Warwickshire will again be the residential format to maximise the opportunities for debate, engagement and collaboration.

The price of £660 including VAT for members until 30th September, includes entry to two full days of conference, the Welcome Dinner, the Gala Night, the AGI Awards evening and two nights accommodation.

### AGI Awards for Geospatial Excellence - 25 November – Warwick

The AGI Awards for Geospatial Excellence is your chance to step forward and be recognised for the great things you and your colleagues are doing in the geospatial industry.

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